

Use Cases for Enabling the Future of Skills-Based Hiring, Advancement, and Lifelong Learning

Use Cases for Education and Training Providers to Implement Labor-Market-Informed Strategy, Career Pathways, Skills Alignment, Digital Credentials, and Continuous Improvement

From the U.S. Chamber of Commerce Foundation's T3 Innovation Network

An extension to the [Skills-Based Hiring and Advancement Project Report](#), use cases for employers and job candidates

July 2023



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Introduction

Education and training organizations face a pivotal opportunity to help overcome the worker skills shortage that stands between our economy and \$8.5 trillion in future revenue, much of which could be critical earnings for disadvantaged populations.¹ Demand for workers is high and growing while the supply, the total labor force, continues to shrink.² On top of that, employers report an increasing skills gap between their needs and the workforce, including new grads, working adults, and current workers. Contributing factors include inadequate worker training and engagement, low enrollment, graduation, and completion rates.³ Yet learners, education, and employers share two goals: program completion and job placement. A skills-based hiring model can improve both of these outcomes, starting with education providers, who can emphasize and communicate the in-demand skills produced by learning opportunities so that both learners and employers have a clear line of sight between learning and work.

Just in time, we're at a key moment in workforce history. According to LinkedIn, most companies already see the value of skills-based hiring and those who make the shift are 60% more likely to make a successful hire.⁴ The U.S. Chamber of Commerce Foundation, employers, and many other organizations are striving to enable a future where skills are the currency of the workforce and individuals are empowered with them to obtain rewarding opportunities. To this end, the originator of the academic credit hour, the Carnegie Foundation for the Advancement of Teaching, in partnership with GRE-creator ETS, just announced a plan to "radically transform" how we measure education; "the new currency of education should be based upon meaningful skills and accomplishments demonstrated through assessment."⁵ Since soft skills, termed *durable skills*, greatly improve jobseeker employability, America Succeeds and IT certification provider CompTIA have partnered with employers on a new assessment to recognize these skills no matter how they were learned.⁶ Competency-based education is growing, a movement to build education around what learners can do. The state of Alabama just passed legislation to maintain lists of credentials of value based on quality criteria including their competencies and

¹ Franzino, M., Guarino, A., Binvel, Y. (2018). *Future of Work: The Global Talent Crunch*.

<https://www.kornferry.com/insights/this-week-in-leadership/talent-crunch-future-of-work>

² Ferguson, S. (2023). *Understanding America's Labor Shortage*.

<https://www.uschamber.com/workforce/understanding-americas-labor-shortage>

³ Populace. (2022). *Populace Insights: Purpose of Education Index*.

<https://static1.squarespace.com/static/59153bc0e6f2e109b2a85cbc/t/63e96b44a0e46d79a10ecf26/1676241761790/Purpose+of+Education+Index.pdf>

⁴ Dewar, J. (2023). *How to Get Started with Skills-Based Hiring*.

<https://www.linkedin.com/business/talent/blog/talent-acquisition/how-to-get-started-with-skills-based-hiring>

⁵ ETS. (2023). *Carnegie Foundation, ETS Partner to Transform the Educational Pillars They Built: The Carnegie Unit and Standardized Tests*.

<https://www.prnewswire.com/news-releases/carnegie-foundation-ets-partner-to-transform-the-educational-pillars-they-built-the-carnegie-unit-and-standardized-tests-301799118.html>

⁶ Short, S. (2022). *America Succeeds and CompTIA Team Up to Take on the Durable Skills Challenge*.

<https://americasucceeds.org/america-succeeds-and-comptia-team-up-to-take-on-the-durable-skills-challenge>

alignment to in-demand occupations.⁷ Many states are uniting employers, workforce development, education and training providers, technology vendors, and others to reduce disconnects between worker supply and demand through education-to-career pathways and new kinds of skills-based records of education and work.

Most urgently, this would help many marginalized workers who are qualified or could easily become qualified but don't get hired. For example, half the workforce is estimated to be eligible for higher-paying work, but face barriers to employment from lack of a college degree.⁸ Internships, apprenticeships, and other work-based learning opportunities are powerful contributors to career success, but they are too rare and their learnings may go unrecorded. Further, over 40% of workers change jobs annually, between industries and occupations, bringing transferable but often unrecognized skills.⁹ For example, a job posting that requires experience as an office assistant may miss out on cashiers and customer service agents who have over two thirds of the relevant skills for the position.¹⁰ The loss of productivity from the difficulty of communicating skills-related information is vast and falls on historically marginalized groups who are less likely to have a degree and more likely to be excluded from high-earning industries. Since most good jobs require some form of education after high school, be it degrees, training, or the equivalent, workforce preparation is distributed inequitably, causing an economic fragility that leaves many businesses and populations vulnerable to economic shock.¹¹

This report sets a vision for the role of education and training providers through aspirational use cases, building on the [prior skills-based hiring report](#) which described the role of employers and job candidates. It lays out these use cases to examine potential points of failure and priorities to mitigate them. Education and training providers, including employers who provide these services (we'll refer to them as **providers**) can consider what use cases to pursue. Tech vendors can inform their roadmaps, policymakers can identify ways to incentivize participation, employers can inform their partnerships with talent suppliers, researchers can connect and expand their work, quality assurance providers can consider outcomes-based accountability, and workforce intermediaries can facilitate change and collaboration. Education and training providers serve a group we'll call **learners**, which includes students, workers, job candidates, and anyone else who is learning from providers, keeping in mind that many learners are working, caregiving, and looking for work all at the same time.

It will take well-designed collaborations across the public and private sectors to seize the best opportunities for innovation while avoiding the pitfalls. A systematic exploration of the

⁷ McCartney, T., Morton, J., and Parnell, J. (2023). *Quality and Transparency are Key When it Comes to Workforce Development*.

<https://aldailynews.com/quality-and-transparency-are-key-when-it-comes-to-workforce-development/>

⁸ Opportunity@Work. (n.d.) <https://opportunityatwork.org/stars/>

⁹ Bersin, J. (2019). *HR Technology Market 2019: Disruption Ahead*. https://oliver-dev.s3.amazonaws.com/2019/01/27/12/54/25/916/Tech_Disruptions.pdf.

¹⁰ Dewar, J. (2023). *How to Get Started with Skills-Based Hiring*.

<https://www.linkedin.com/business/talent/blog/talent-acquisition/how-to-get-started-with-skills-based-hiring>

¹¹ Excellent description of these trends can be found in America Succeeds. (2023). *No Worker Left Behind: How Empowering People With Skills Can Ignite the Economy and Create Economic Mobility*. <https://americasucceeds.org/wp-content/uploads/2023/04/No-Worker-Left-Behind-America-Succeeds.pdf>

complementary roles of education and work is needed to design accessible, affordable, and effective solutions to reverse a shrinking middle class. Education, training, and recognition for skills learned across all settings are now an imperative across the lifetime of learning that careers will demand.

On skills: Please note that for convenience this report uses the term *skills* to refer to a group of concepts including skills and competencies. Skills, competencies, knowledge, abilities, responsibilities, mindsets, learning objectives, and other terms represent important variations on explaining what a person can do, and all play nuanced roles in this vision. At the conceptual level of these use cases, *skills* suffices to indicate the group of concepts for which the specifics will be teased out in future work. We provide operational definitions of these and more terms in the [glossary](#).

Predictability of Candidate Performance Can Narrow Skills Gaps

Predicting the future job performance of individuals based on their skills-related information can play a significant role in narrowing both real and perceived skills gaps. Efforts to develop skill-based resumes and AI-based, bias-reducing matching processes can help employers evaluate a candidate's skills accurately, beyond the keywords on a traditional resume. With access to a more comprehensive set of data on a candidate's education, training, and work history, employers can make more informed hiring decisions that align with their business needs. This can help to mitigate skills translation issues, where a candidate's qualifications and experience are not perceived as relevant to the job but are transferable, as in the significant skills overlap between food servers and office assistants (see LinkedIn's Career Explorer for more).¹² Digital resumes and records will store and transport this information. Transformative culture change from employers and education providers is needed alongside technical implementations to enhance hiring effectiveness and equity. These records will also reduce real skills gaps by helping motivate their holders to obtain more education and persist in those programs by making gaps and progress more obvious through the use of software that analyzes them. Applications will be able to predict that an individual will not perform well and suggest upskilling opportunities.

Hiring people for what they can and could do based on skills requires a transformative culture change from employers and providers who wish to prepare learners and workers to thrive in the dynamic future labor market. To enhance hiring effectiveness and equity, some employers are shifting towards skills-based hiring and advancement, rather than relying on indirect indicators such as the length of time a candidate spends in a postsecondary program. However, this is just a first step. Hiring for competence is a cross-organization and cross-sector undertaking that requires a routine exchange of information between all major stakeholder groups in the workforce, iterative improvement, education to work pathways, career progressions, and empathetic redesign of hiring and credentialing.

¹² LinkedIn. (2020). *Find new jobs with the skills you already have*. <https://linkedin.github.io/career-explorer/>

This report's use cases aim to identify and address skills gaps and skills translation issues: misalignment between provider curricula and employer needs and the tension between the different "languages" of education providers and employers. For an individual to demonstrate their candidacy for a role through education or training, all of the following are helpful: the job seeker's educational curricula is aligned to employer requirements, the alignment is kept up to date, what learners should be learning is fully assessed and it is assessed at an appropriate level, evidence of learning is generated for future use, the learner can communicate the learning, the learning transfers to the work setting, and the employer can process the kinds of evidence that the learner has. It is essential to note that even if a provider's curricula offers valuable skills, any weakness in the other factors that contribute to demonstrating competence to employers can create a real or perceived skills gap.

New kinds of resumes and related evidence like assessments could enable employers to better predict performance on the job. The use cases show how widespread use of digital resumes embedded with data-rich Learning and Employment Records (LERs) has the potential to be more predictive of the record holders' performance at a given opportunity, especially when the skills in the LERs are linked to definitions and assessment methods for coherence between education/training providers and employers. Today, candidates who know how to stuff the right keywords into a resume (game the system) get access to opportunities. Those who don't get filtered out even though they may be a better fit. LERs and LER-based resumes can make resumes more predictive of performance by using tools and processes that can represent and prove more of a candidate's real skills, and match them to jobs whether or not the right keywords are present.

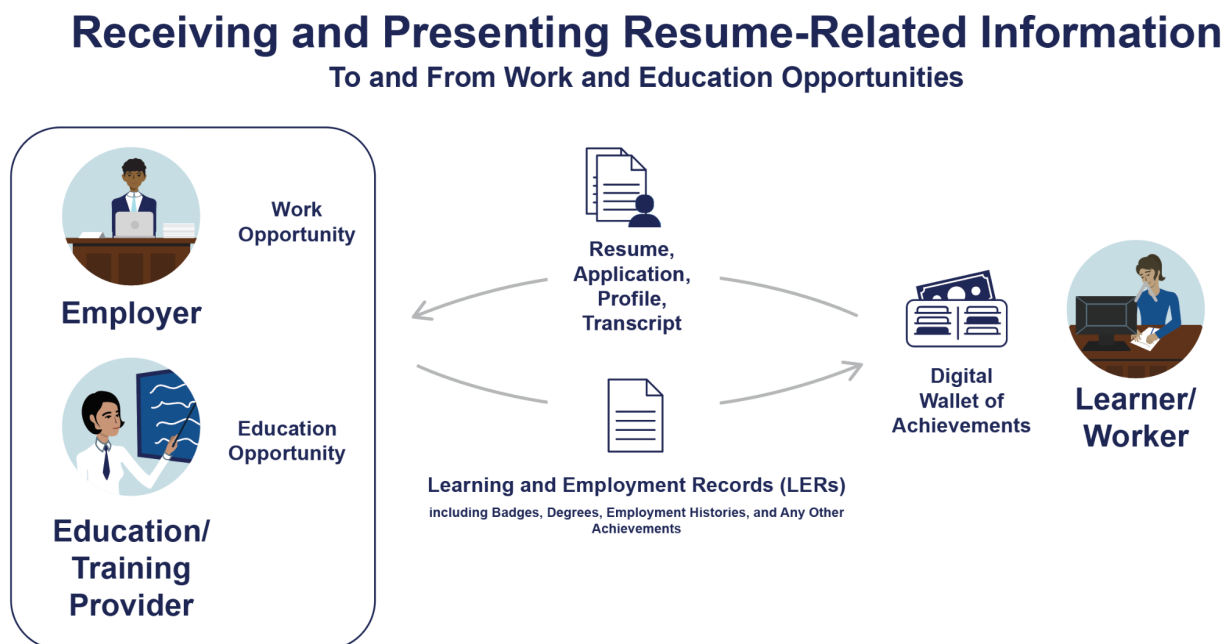


Figure 1. Receiving and presenting resume-related information

The potential for revolutionizing the job search process is vast. Currently, individuals search for jobs to find a good match, but in the future, jobs could actively seek out people whose preferences and achievements align with the requirements of the position.

This transformative vision can be realized through the development of sophisticated guidance services including career navigation apps. These services would allow individuals to share their records of learning and work, encompassing their educational background, skills, and accomplishments. Within these career navigation apps, marketplaces of education and job opportunities would exist, providing users with tailored recommendations on how to navigate their career paths and achieve their goals. By leveraging the power of AI with career coaches, these services could process hundreds of thousands of options to fit individuals' criteria. It will also be able to identify gaps in an individual's records as compared with their target occupation or job and suggest bridging education or training. Unlike the spammy and low-quality matches often produced today, thoughtfully-architected matching and guidance has the potential to change lives and economies.

Employers, Providers, and Learners Have Shared Goals and Needs

Employers, providers, and learners have overlapping goals and needs that can be addressed through a comprehensive approach to skills-based hiring and advancement. This approach can increase the pursuit of education and training beyond high school, potentially leading to increased enrollment, retention, completion, and employment. By working together, employers and providers can bridge the gap between education and work and prevent learners from falling through the cracks into poverty.

Education providers and employers have the shared goals of wanting to see learners complete programs obtain jobs.¹³ Employers are interested in completion because in today's job market, most good jobs require some form of education or training beyond high school, along with relevant work experience.¹⁴ This education or training may take various forms, including vocational programs, trade schools, apprenticeships, professional certifications, or traditional degrees from colleges and universities. When it comes to job placement, it's the biggest reason students enroll in education and training, yet low percentages of employers agree that graduating students have the skills they need.

To address this challenge, education providers can implement the use cases in this report, including creating career-aligned pathways and curricula and enabling learners to credibly showcase their skills. This way, employers can more easily identify and recognize the value of

¹³ Leigh, E., Jankowski, N., Leavitt, M. (n.d.). *Trends in Employer Partnerships With Community Colleges*. <https://stradaeducation.org/report/trends-in-employer-partnerships-with-community-colleges/>

¹⁴ Carnevale, A. et al. (2022). *The Uncertain Pathway from Youth to a Good Job. How Limits to Educational Affordability, Work-Based Learning, and Career Counseling Impede Progress toward Good Jobs*. Georgetown University McCourt School of Public Policy, Center on Education and the Workforce. <https://cew.georgetown.edu/cew-reports/pathway/>

these candidates. This is likely to have the effect of helping employers better ascertain programs of value that they may want to target for recruiting, provide work-based learning to, advise on the curriculum, or provide mentorship to learners, the three most common employer-education partnership activities.¹⁵ According to Strada's alumni survey, alumni from all fields of study who experienced quality connections to career preparation as students and/or developed in-demand skills were more likely to believe their education helped them achieve their goals.¹⁶ Connecting to career preparation was also associated with higher earnings, but colleges offered it infrequently and with inconsistent quality.¹⁷

Additionally, by tracking employment rates, wage growth, and other key outcomes of graduates, disaggregating by demographic, providers will be able to make data-driven improvements. Ultimately, education providers can better communicate the value of their programs to potential students and build a more marketable appeal for their offerings. Both potential learners and potential employer partners are likely to take note, kicking off a positive loop of interest and improvement.

Several recent reports highlight the difficulty and necessity of coordinating between employers, providers, intermediaries, and other groups to achieve impact at scale, including Harvard Business School's *The Partnership Imperative* which describes education and employers systematically underinvesting in their collaborations.¹⁸ Employers need to take the initiative to come to the table, invest in sustainable talent sources as a buffer against the increasing skills gap, and engage with education providers that have the commitment and capacity to make substantial progress.¹⁹ Creating shared roadmaps is essential to bridge between each party's field of vision. These use cases intend to lay groundwork for expanding and enhancing collaboration.

Aspirational Use Cases Build on Collaborative Labor Market Information

To kick off the process, providers need a reliable and actionable signal of labor market demand and trends. To achieve this, service providers can help customize and interpret this information for education providers. For example, the initial employer use case from the [previous report](#) (*Use Case 1.1 Employer Determines Critical Skill Requirements*) is where employers conduct job analyses to review and validate their hiring requirements and work tasks to determine what skills can be trained on the job, removing barriers to qualified candidates. These validated requirements can be combined with other sources into a new source of national labor market information produced collaboratively for local needs, which we will refer to as **collaborative**

¹⁵ Leigh, *Trends in Employer Partnerships With Community Colleges*.

¹⁶ Clayton, D. and Torpey-Saboe, N. (2021). *Student Outcomes Beyond Completion: National Findings From the 2021 Strada Alumni Survey*. <https://cci.stradaeducation.org/pv-release-oct-27-2021/>

¹⁷ Ibid.

¹⁸ Fuller, J. and Raman, M. (2022). *The Partnership Imperative: Community Colleges, Employers, & America's Chronic Skills Gap*. <https://www.hbs.edu/managing-the-future-of-work/research/Pages/community-college-report.aspx>

¹⁹ Ibid.

labor market information. This is inspired by the American Enterprise Institute's vision in *A National Collaborative for Local Workforce Information*.²⁰

The Chamber of Commerce Foundation's T3 Innovation Network Jobs and Workforce Data Network (which published this report), and the Chamber's Talent Pipeline Management initiative and forthcoming JobSIDE software plan to help facilitate this data source. These efforts have the potential to provide more comprehensive and validated data on employer skill requirements including more detailed rubrics and frameworks that describe levels of competency, means of assessment, and work context. Under the JEDx Initiative, Learning and Employment Records (LERs) along with improved government data collection (i.e. unemployment insurance records) can bolster analyses of earnings and education attainment, evaluate impact of education and workforce development programs on economic outcomes, supply and demand, and regional or industry-based strategies.²¹

Improving access to employer-validated data is a prerequisite for this report's use cases for education and training providers.

1. In the first use case, education and training providers receive and synthesize labor market demand data along with other information to develop strategies. This source data is essential for all education provider use cases.
2. The second use case aims to create education to work pathways within and between educational programs to provide flexibility to learners, connect programs to careers, and remove barriers to attainment.
3. The third use case comprises two parts which can be pursued simultaneously: aligning and communicating skills with employer's needs through the use of skills frameworks, logically-related sets of skills from professional organizations, providers, governments, etc., and digital credentials, i.e. claims made by a provider about a learner.
4. The last use case, consistent with the prior report's recommendations for employers and candidates, centers on continuous improvement.

Providers and Employers Can Act Now to Increase Economic Mobility

To support providers who are ready to implement these use cases, there are certain strategies that require less investment and have shown early evidence of economic mobility gains for learners. These strategies can be implemented successfully with less reliance on technology and can then be scaled up with the help of technology. This allows for early wins while the modernized infrastructure is being developed. While determining the ROI of the use cases remains a priority, these strategies below are all already being implemented and showing

²⁰ Lane, J. (2023). *Reimagining Labor Market Information: A National Collaborative for Local Workforce Information*. American Enterprise Institute.
<https://www.aei.org/research-products/report/reimagining-labor-market-information-a-national-collaborative-for-local-workforce-information/>

²¹ U.S. Chamber of Commerce Foundation. (n.d.). *Jobs and Employment Data Exchange (JEDx)*.
<https://www.uschamberfoundation.org/JEDx>

positive results. Employers can also invest in these strategies by supporting providers, L&D, and changes to their hiring processes.

- **Soft skills.** Soft skills such as communication, critical thinking, and problem-solving are in high demand across all industries. Employers were asking for these ten years ago, and they still are today.²² Help learners practice these in work-based settings or scenarios, create evidence of their skills, and articulate it to employers.
- **Career pathways.** Creating and marketing clear pathways to careers can address learners' priorities and help rebuild trust in the value of education.²³ Within an organization's Learning and Development department, creating career pathways within the organization is a powerful strategy to increase employee retention and potentially diversity.²⁴
- **Short-term credentials.** Skills-aligned short-term credentials can provide learners with employable skills in a shorter time frame, and are most credible when partnered with industry standards and frameworks.
- **Learner career fluency.** Providers can empower learners to represent their achievements to employers through building their agency, career literacy, and professional networks. Third-party platforms that facilitate mentoring, coaching, networking, and career navigation are a growing space and can be integrated with existing programs and career services. Importantly, this increases learners' abilities to represent their skills to employers regardless of technical improvements to data flows.
- **Change management.** Along with agile design thinking, continuous improvement approaches can support both employers, workforce intermediaries, and education and training providers in this work.

A Future Vision Through Use Cases

These use cases outline a future state of interactions between providers, employers, learners, and their systems. They are based on research and best practices cited throughout, input from the T3 Network members, and our conversations and collaborations with leading thinkers in the space. While many providers have made progress on one or more use cases, the set of steps outlined here taken together are largely aspirational. For more detail on each step of the use cases, see Appendix A.

²² Hart Research Associates. (2013). *It Takes More Than a Major: Employer Priorities for College Learning and Student Success*.
https://dgm81phvh63.cloudfront.net/content/user-photos/Research/PDFs/2013_EmployerSurvey.pdf
and The Chronicle of Higher Education. (n.d.). *What Hiring Managers Want From Higher Ed*.
<https://connect.chronicle.com/rs/931-EKA-218/images/WhatEmployersWantpdf.pdf>

²³ Populace, *Populace Insights: American Priorities For Higher Education*.

²⁴ Coffman, J., Rosenblum, E., D'Arcy, A., and Thompson Love, L. (2021). *How Clear Career Paths Strengthen Retention—and Diversity*.
<https://www.bain.com/insights/how-clear-career-paths-strengthen-retention-and-diversity/>

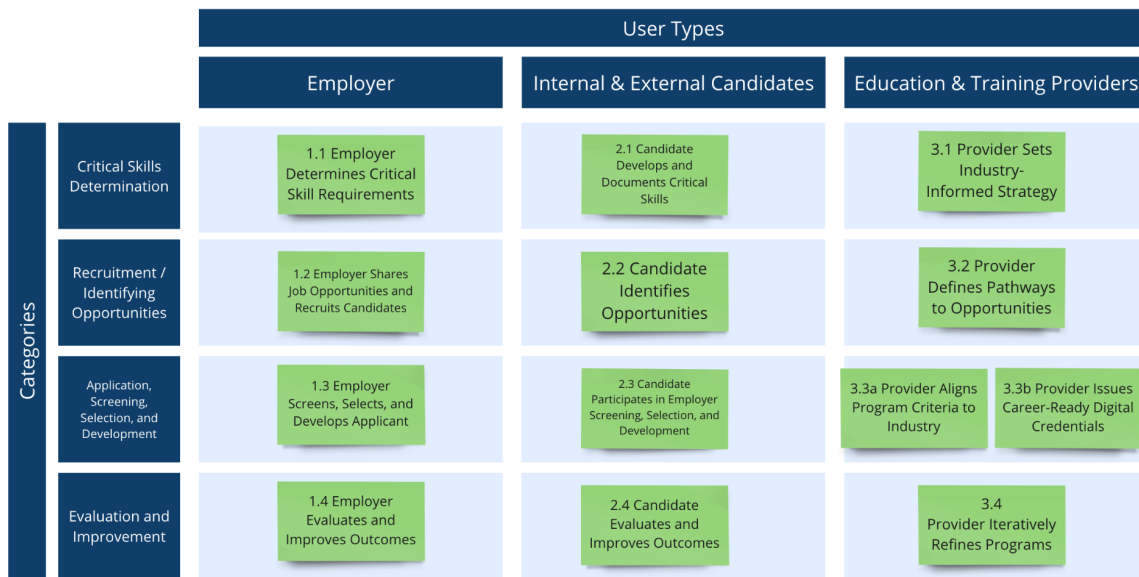


Figure 2. Use cases across three stakeholder groups

This diagram builds on the use cases from the previous report by adding the third column for education and training providers to the first two columns for employers and candidates. The rows represent the four categories of use case, critical skills determination, recruitment/identifying opportunities, application/screening/selection/development, and evaluation and improvement. The use cases are numbered with the first number representing the stakeholder group (1 for employer, 2 for candidate, 3 for education and training) and the number after the decimal representing the use case for that group. Summaries of the new use cases, 3.1 through 3.4, are below.

Use Case Summaries

Use Case 3.1: Education/Training Provider Sets Strategy Informed by Labor Market Information

- Education & training providers can use collaborative labor market information with validated skills frameworks and employer partnerships to set sustainable strategies that prepare learners with the skills they need for work.

Use Case 3.2: Education/Training Provider Defines Pathways to Opportunities Informed by Talent Marketplace Demand

- Education & training providers can increase access & enrollment through flexible, stackable, career-connected journeys.

Use Case 3.3a: Education/Training Provider Aligns Program Criteria to Industry Performance Models

- Provider seeks to align the skills taught in their curricula to the sets of validated skills

frameworks from the labor market info obtained in use case 3.1.

Use Case 3.3b: Education/Training Provider Confers Skills-Based Digital Credentials

- Provider confers skills-based digital credentials.

Use Case 3.4: Education/Training Provider Iteratively Refines Programs

- Provider actively monitors, collects, shares out select outcomes from, and acts on program effectiveness data to iteratively improve strategies.

The U.S. Chamber of Commerce Foundation hosts several initiatives which improve data flow between employers, learner/workers, and education/training providers. As shown in the Future Ecosystem Figure, these initiatives and similar initiatives by T3 Innovation Network partners can help address the SBHA use cases. This ecosystem map can be used by the T3 Network in the future to display other initiatives that address the SBHA use cases. The initiatives are shown in light blue where they provide functionality in the triangle between the three parties. The use cases in green describe the activities that occur between the parties and how the initiatives support these activities.

Olivia Gains a Lifelong Asset for Her Nursing Career

For example, Olivia wants to become a nurse. She uses intermediaries to determine what education is right for her (2.1), looks for work (2.2), and applies using a new type of resume of trustworthy and detailed records (Learning and Employment Records, LERs) issued to her digital wallet by the provider, by past employers, and ones she has created herself, potentially via AI assistance (2.3). To hire Olivia, the hospital had to determine the skills they needed (1.1), create a job posting that accurately reflects their needs (1.2), and conduct a hiring process that accurately screens for those needs using her digital records (1.3). The education provider had sought the input of employers and industry organizations to inform their curriculum (3.1), created pathways that communicated to Olivia that she would become a strong candidate for a nursing position (3.2), created links from the the curriculum to the labor market and helped Olivia provide evidence of her skills (3.3a), and issued this information to Olivia as LERs so she could share it with future advancement opportunities (3.3b).

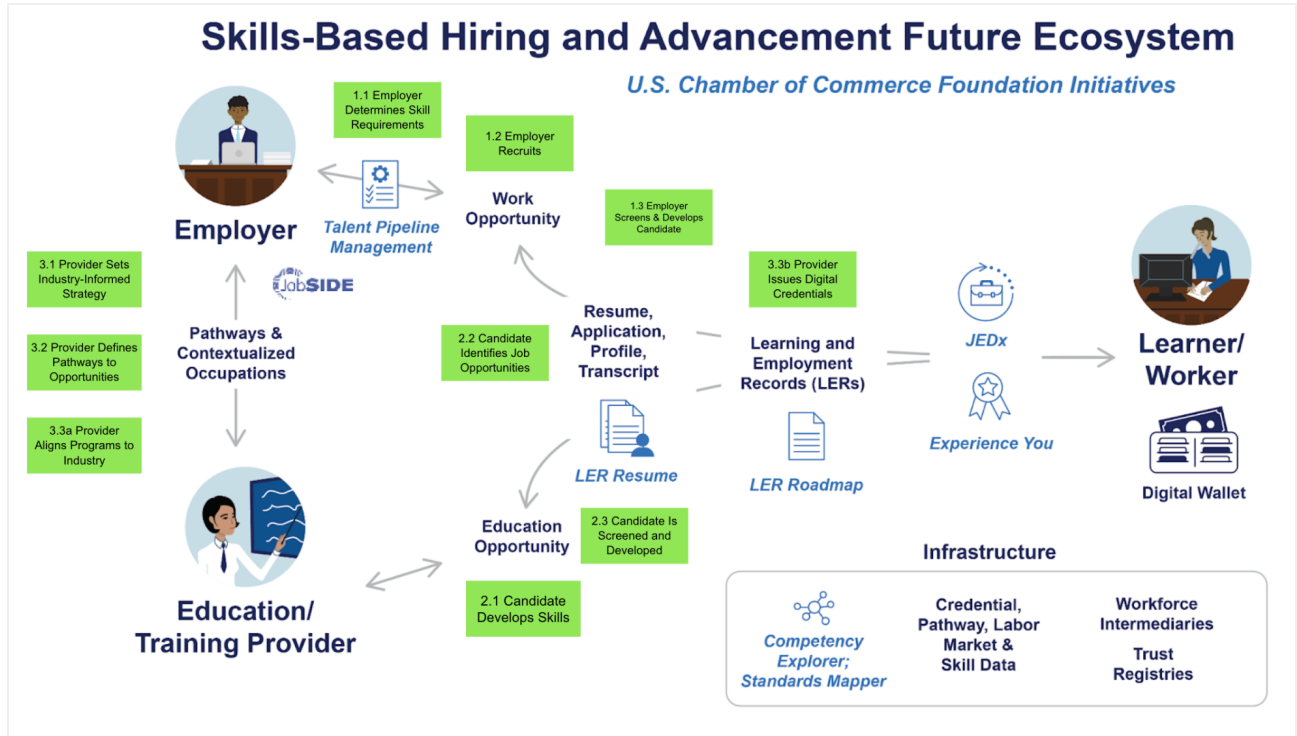


Figure 3. Skills-based hiring future ecosystem with Chamber Foundation initiatives

Increasing Trust Between Parties Through Quality Assurance

Trust is the foundation of meaningful connections, and it's important to establish trust between education providers, learners, and employers. Each party must be confident that the information they receive and send is accurate and reliable. The following instances of trust are particularly important:

- Providers must trust the labor market information they receive to develop relevant and high-quality programs.
- Learners must have trust in the education opportunities they explore to make informed decisions about their future.
- Employers must trust the information they receive from candidates including information contained in records issued by providers to identify and hire qualified talent.

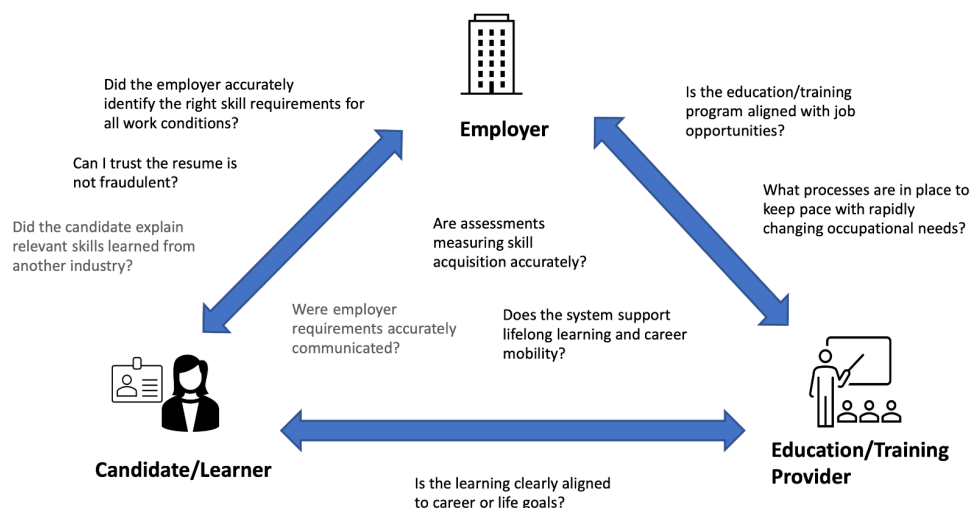


Figure 4. Issues of trust between the three stakeholder groups

Trust can be built through:

- Transparency between employer needs and education/training provider approaches
- Consistent behaviors by suppliers and consumers in the talent ecosystem
- Transparent evidence of achievements controlled by individuals
- Measurable predictors of performance that will be useful across opportunities
- Comparability of learner records with work opportunities through the use of machine-readable Learning and Employment Records (LERs) and new kinds of job postings
- Verifiability of records, accomplished through data standards and protocols that LERs should follow

Quality assurance organizations can play a larger role in helping providers build this level of trust. For example, see the Workforce Talent Educators Association,²⁵ Education Quality Outcomes Standards (EQOS),²⁶ and the Postsecondary Value Commission,²⁷ for efforts that help providers determine their program outcomes according to standardized metrics which they can then use for evaluation and continuous improvement. For example, according to the Postsecondary Value Commission, "To make the promise of college completion real for Black, Latinx, Indigenous, and underrepresented AAPI students, students from low-income backgrounds, and women, program instruction must be high-quality, rigorous, and lead to strong employment, earnings, and post-college outcomes. For students to reap value from their postsecondary education, they must at least earn enough to recoup their financial investment on top of what they would have earned without pursuing education after high school."²⁸ See recent

²⁵ Workforce Talent Educators Association. <https://www.workforcetalent.org/>

²⁶ Education Quality Outcomes Standards Board (EQOS). <https://eqos.org/>

²⁷ Postsecondary Value Commission. <https://postsecondaryvalue.org/>

²⁸ Postsecondary Value Commission. (2021). *Ensuring equitable postsecondary value: An action agenda*.

<https://postsecondaryvalue.org/wp-content/uploads/2021/07/PVC-Action-Agenda-Final-7.2.pdf>

proposals for alternative approaches to accreditation that emphasize program outcomes as well as processes that focus on determining employer requirements and assuring programs meet these requirements.²⁹ Quality assurance bodies for all types of credentialing entities, including licensing, certifications, traditional accreditation bodies, and organizations that accredit these bodies (e.g., Council for Higher Education Accreditation), should be included in conversations to move towards outcomes-based and process accountability across the implementation of the use cases. These frameworks and standards can reduce variation in implementation of best practices, increase intended outputs, and increase trust in the ecosystem.

Cross-Use Case Preconditions

Preconditions outline the necessary state of a system before a use case can begin. There are two preconditions for these use cases, a spark and fuel. The spark is a catalyst to begin transformation, through the recognition of a need for change. The fuel is the reliable labor market information that the change should be based upon.

- **Identify gaps.** Provider leadership recognizes a critical gap between workforce demands and current organizational capabilities and outcomes.
- **Collaborative labor market information exists and providers have access.** While traditional Labor Market Information (LMI) is good general guidance, it often lacks necessary context like geography, granularity, and up-to-date information. Job posting aggregation is also known to suffer from the systematic inaccuracies in job postings. To address these challenges, a new form of LMI can provide highly-detailed lists and rubrics of what skills are needed for jobs, at what level, in what geography and context, how they tend to be assessed, and what qualifications are necessary vs trainable on the job. To create this new LMI, employers will have gone through skills-based hiring processes to provide higher-quality information using expert-generated skills frameworks. This will result in occupational skills profiles that reflect the input and curation of many employers weighting skills by importance in the job market. In many countries, national skills or qualifications frameworks perform the role of aligning education, training, and work, which facilitates transfers and comparisons. In the United States, which is operating on a decentralized model of many frameworks and little coordination between them, this new collaborative labor market information and related infrastructure can help translate between employer, academic, and industry frameworks to produce a powerful plurality of frameworks whose items can be interrelated with the help of analytics software.

²⁹ U.S. Chamber of Commerce Foundation Center for Education and Workforce. (2023). *Talent Finance Quality Assurance Workgroup Report*. Talent Finance Quality Assurance Workgroup Report | U.S. Chamber of Commerce Foundation ([uschamberfoundation.org](https://www.uschamberfoundation.org)); U.S. Chamber of Commerce Foundation Center for Education and Workforce. (2016). *Changing the Debate on Quality Assurance in Higher Education*. <https://www.uschamberfoundation.org/sites/default/files/ChangingtheDebateonQualityAssurance.pdf>

Use Case Points of Failure Summary

The use cases help reveal potential points of failure that have major impacts on success metrics. Listed first here are the most important points of failure from across the use cases or particular use cases (detailed in Appendix A). When referenced in the priorities section, stars have been added as a reminder of their importance. Failure points are enumerated as F1, F2). for convenience; the numbering does not denote level of importance.

Cross-Use Case Points of Failure

- **Major**
 - ☆ **F1. The digital divide widens.** Implementing more digital tools can inadvertently introduce more barriers. Globally, women have lower access and digital literacy. Target populations should be continuous design partners. Systems must provide alternative means for individuals to succeed with multiple barriers, including along axes of access, accessibility, digital literacy, and trust.
 - ☆ **F2. Unclear value proposition and ROI of use cases.** Payoffs in retention, engagement, equity, satisfaction, completion, enrollment, advancement and other results are promising and show early support, but the efficiency of the below use cases and other strategies needs proving out. Strategies vary in their resource intensity and helping providers weigh risk and return will allow more strategic decisions. *Closed* systems which collect data on learner/worker mobility, like the military, wraparound support programs, or professional member organizations can help study the outcomes of interventions with fewer barriers to acquiring the data.
 - ☆ **F3. Learner agency for economic mobility remains low.** Providers who do not leverage and expand their learners' ability to improve their social and economic mobility may see limited movement on impact metrics.
 - ☆ **F4. Solutions use proprietary data formats, definitions, and technologies.** Just as the internet is built on universal standards so everyone can contribute and join, so should digital credentialing, labor market data, pathways systems, and other solutions use open data standards. Open standards are public descriptions of the terms and vocabularies for encoding data and metadata that facilitates interoperability between systems. Solutions that use proprietary data formats, definitions, and technologies can limit interoperability, search, and discovery.
 - ☆ **F5. Lack of aligned policy.** Some of the most comprehensive and well-resourced pilots have access to the state authority and data sources needed to connect and motivate stakeholder groups. Policy should be aligned with workforce readiness, informing consumer choice of education and training value, and developing the infrastructure to measure outcomes, in addition to shaping economic incentives.³⁰

³⁰ America Succeeds, *No Worker Left Behind*.

- ☆ **F6. Lack of collaboration and priority.** Funding, established processes, and current regulations may be impediments to progress. Leadership must facilitate the priority of use case implementations. Personnel may feel threatened by how reforms will affect their work if it appears to detract from existing duties. Faculty or staff buy in may benefit from incentivization. Providers who implement any of these use cases are encouraged to create social, cross-department, employer, learner, and community partnerships to break down silos.
- ☆ **F7. Misaligned economic and accountability incentives.** Providers who are held accountable to input-based and not output-based quality measures, or whose economic interests are otherwise potentially misaligned with student economic outcomes (i.e. seat time vs competency-based) may lack the right economic structure to motivate improvements. Pell Grants and other HEA Title IV financial aid require credit hours, which can inhibit growth into other learning models. According to the Chronicle, the majority of college officials believe accreditors do not foster innovation in competency-based learning.³¹ However, accreditors vary in their innovativeness and the inertia of organizations operating on input-based models will not easily alter.
- **Additional**
 - **F8. Adoption barriers.** There are significant barriers to adoption for both learners and providers, particularly for digital credentials, resumes, wallets, and guidance apps. Significant user and usability research is needed to ensure these solutions are effectively designed and implemented to solve real user problems. Products and services that skip this step may create additional adoption barriers instead of reducing them and risk chilling future demand for these solutions. User experiences for the applications and systems in these use cases ideally should be usable without training and with minimal time investment to learn how to use them. Universal design is recommended to enable access and effectiveness across all usability barriers.
 - **F9. Lack of quality oversight.** Quality assurance bodies and their frameworks exist to provide third-party accountability and stamps of approval that can be extremely helpful to consumers and partners. These frameworks should be adopted for the use of data and the operation of processes across all use cases. Particularly, AI auditing, quality control, and regulatory frameworks are needed to monitor AI decisions, source data, and implications.
 - **F10. Technologies look like a silver bullet solution.** The primary actions to increase economic mobility are culture change efforts catalyzed or incentivized by technology improvements. Technology's role is an accelerator that reduces friction in supporting these processes, and should not be the solution itself.

³¹ The Chronicle of Higher Education. (2023). *The Road Ahead for Accreditation*. pg 12.
https://connect.chronicle.com/rs/931-EKA-218/images/Research%20Brief%20-%20The%20Road%20Ahead%20for%20Accreditation_Watermark.pdf

Major Points of Failure from Each Use Case

Use Case 3.1: Education/Training Provider Sets Strategy Informed by Labor Market Information

- ☆ F11. Employers not prioritizing talent pipeline development
- F12. Disjointed intra-employer participation
- ☆ F13. Collaborative labor market information is not available

Use Case 3.2: Education/Training Provider Defines Pathways to Opportunities Informed by Talent Marketplace Demand

- F14. Pathway design relegated to non-credit education (for degree providers)
- F15. Providers miss the opportunity to eliminate barriers
- F16. Learners are not provided alternative entry and exit points
- F17. Financial aid unavailable for short-term programs

Use Case 3.3a: Education/Training Provider Aligns Program Criteria to Industry Performance Models

- F18. Prohibitive amount of complexity and change required
- F19. Learners cannot articulate their skills to employers

Use Case 3.3b: Education/Training Provider Confers Skills-Based Digital Credentials

- F20. Authoritative credential quality frameworks are needed
- F21. Credentials issued without skills data and evidence
- F22. HR vendors hold off on digital credential ingestion
- ☆ F23. No LER validation tools

Use Case 3.4: Education/Training Provider Iteratively Refines Programs

- F24. Learner data sharing aversion
- ☆ F25. No early wins from leading metrics
- ☆ F26. Difficult to ascertain the impact of interventions

Priorities for the T3 Innovation Network

Among the many solutions needed to better prepare learners and workers for the future, the following are well aligned with the goals of the T3 Innovation Network. It's important to note that other solutions not included in this list are also important, and we encourage our community to develop roadmaps and ecosystem priorities to address the use cases' points of failure. Priorities are grouped by T3 Innovation Networks and their projects.

An Interconnected Web of Solutions with Partners

Overall, the priorities touch on most of the failure points. However, many of them will be best targeted by partner organizations in the T3 network and beyond, particularly around learner agency, digital divide and equity, economic incentives, quality oversight, and pathways. Recognizing and leveraging these partnerships in complete solution suites will be a service to those who want to get started in skills-based hiring. For example, there are ongoing and beginning pilots in Learning and Employment Records (NGA Skills-Driven State Community Of Practice³²), outcomes measurement (statewide longitudinal data systems), competency-based learning and assessment (Carnegie Foundation, ETS, and ACE pilot), and pathways (RIPL Data for Opportunity in Occupational Reskilling Solution,³³ Launch Equitable and Accelerated Pathways for All³⁴) which could become part of a more interconnected web of solutions. The areas T3 is best positioned to target first have to do with the generation of higher quality labor market information, infrastructure for generating data sources for outcomes evaluation, best practices around technology creation, and communication to employers and other groups the value and technical logistics of skills-based hiring and advancement. This communication to employers should be a catalyst to spark media attention, funding, demand, and energy into the area.

Category	Priority	Points of Failure Addressed
General <i>These priorities pertain across U.S. Chamber initiatives.</i>	Employer engagement. Engage employers across employer sizes and industries in this work, as well as chambers of commerce, including small employers and their representatives. Consider establishing a working group of employers who can provide feedback across initiatives.	☆ F22. HR vendors hold off on digital credential ingestion. ☆ F11. Employers not prioritizing talent pipeline development ☆ F13. Collaborative labor market information is not available F12. Disjointed intra-employer participation ☆ F6. Lack of collaboration/priority. ☆ F5. Lack of aligned policy.
	LER & SBHA Toolkit. This toolkit aims to provide guidance to all key stakeholder groups to implement use cases related to learner and worker mobility. It can leverage	☆ F25. No early wins from leading metrics. F21. Credentials issued without skills data and evidence.

³² National Governors Association. (2022). *Skills-Driven State Community Of Practice*. <https://www.nga.org/projects/skills-driven-state-community-of-practice/>

³³ Research Improving People's Lives (RIPL). (2022). *DOORS / Data for Opportunity in Occupational Reskilling Solution*. <https://www.ripl.org/ripl-doors/>

³⁴ LAUNCH, Equitable and Accelerated Pathways for All. <https://launchpathways.org/>

	standards, tools, and expertise already available. It could include a north star vision and strategies to implement use cases. Journey Maps: Creating journey maps can help better understand the hiring and education/training experiences of learner/workers and further the design of SBHA-related use cases. The project proposal "Hiring Workflows: Small Business Project Plan" already covers some of this scope.	F18. Prohibitive amount of complexity and change required. F10. Technologies look like a silver bullet solution. ★ F11. Employers not prioritizing talent pipeline development
	Quality assurance frameworks. In partnership with organizations already leading change in this area, help coordinate and promote the use of quality assurance frameworks for credential quality, outcomes data, AI auditing, data security and privacy, and processes like LER issuance. A quality assurance body which could help identify vendor compliance (frequently updated) would catalyze adoption. It could also accelerate new vendor growth by helping match early-stage vendors with projects or funding that can help support their up-front development costs.	★ F1. The digital divide widens F9. Lack of quality oversight ★ F2. Unclear value proposition and ROI of use cases ★ F3. Learner agency for economic mobility remains low ★ F13. Collaborative labor market information is not available F20. Authoritative credential quality frameworks are needed ★ F23. No LER validation tools ★ F26. Difficult to ascertain the impact of interventions ★ F7. Misaligned economic and accountability incentives.
	Communicate to Policymakers. Policymakers need to see concrete evidence of the impact of these use cases to support their implementation. To this end, it would be valuable to curate a list of successful examples and their impact on relevant categories. Additionally, policy measures that mandate product interoperability and open data sharing (such as credential data) should be encouraged. Policy support should also foster synergy among K-12 education, post-secondary education, workforce	★ F5. Lack of aligned policy ★ F6. Lack of collaboration and priority ★ F1. The digital divide widens F4. Solutions use proprietary data formats, definitions, and technologies ★ F11. Employers not prioritizing talent pipeline development ★ F13. Collaborative labor market information is not available F17. Financial aid unavailable for short-term programs

	development, and employers, promoting a seamless transition between these domains.	☆ F19. Funding sources and business models do not support competency-based learning ☆ F7. Misaligned economic and accountability incentives.
	Create the LER-Resume. Publishing and piloting a resume standard built to hold LERs will pave the way for products to help users create these resumes, encourage HR software to accept them, and help other applications use resume data by making resumes machine readable. These resumes will create a useful source of outcomes data about individuals' stated career progressions.	F22. HR vendors hold off on digital credential ingestion F4. Solutions use proprietary data formats, definitions, and technologies.
	Communicate a vision of SBHA. Messaging for each major stakeholder group in targeted language can spotlight the potential benefits of SBHA while providing guidance on the transformative work needed to remove barriers for the workforce. It is essential to communicate the value of increasing predictability to improve trust and outcomes.	☆ F2. Unclear value proposition and ROI of use cases ☆ F11. Employers not prioritizing talent pipeline development ☆ F6. Lack of collaboration and priority. F22. HR vendors hold off on digital credential ingestion
Open Competencies Network (OCN) <i>The OC Network is focused on solving three overarching challenges in the competencies ecosystem: (1) existing competencies are held captive in legacy encoding schemes (e.g., PDF, Microsoft Word, CSV (spreadsheets), etc.); (2) competencies are neither accessible to people nor machine actionable; and (3) competencies are not shared via open licenses.</i>	Relationships between frameworks. Leverage existing open data standards and technologies that support competency alignments between learning and working, tools and resources developed by OCN. This includes leveraging the Data Ecosystem Schema Mapper Tool and Open Competencies Network technologies developed by OCN as well as open source technologies already fully supported for competency data management and publishing. Explore options for scaling creating relationships between skills/competencies among skill/competency frameworks.	F4. Solutions use proprietary data formats, definitions, and technologies. F18. Prohibitive amount of complexity and change required F19. Learners cannot articulate their skills to employers F21. Credentials issued without skills data and evidence ☆ F23. No LER validation tools

Data and Technology Standards Network <i>The mission of the DTS Network is to be a catalyst for global collaborative incubation and implementation of standards-based specifications and services that enable the learning and employment ecosystem envisioned by the T3 Network. The mission is not to maintain standards, but to work with existing standards organizations.</i>	Assessment standards. Identify existing standards for skills assessment data and rubrics agnostic to industry, domains, or soft skills and job-specific skills. Use the DESM tool to map relevant schemas and identify any gaps in supporting use cases. An ecosystem map can be created to show how the standards work together to enable predictability in SBHA. Standards for career navigation. Identify the existing open standards that support career pathways and other guidance tools and engage with the organizations that manage those specifications to do mapping to support use cases. Encourage the development of new standards where gaps exist.	F4. Solutions use proprietary data formats, definitions, and technologies. ☆ F25. No early wins from leading metrics. ☆ F26. Difficult to ascertain the impact of interventions ☆ F23. No LER validation tools F21. Credentials issued without skills data and evidence (these failure points apply to both Assessment standards and Standards for career navigation)
Learning and Employment Records Network <i>Piloting and establishing equitable and inclusive best practices for the creation and sharing of secure and standards-based records containing education, training, work, and individually acquired skills and knowledge.</i>	LERs focused on skills-based hiring. Employers are more interested in skills-based hiring than verification (determining the authenticity of the credential).³⁵ Emphasize in end-to-end LER pilots the necessity of skills and assessment alignment. The growing demand for skills-based hiring appears to be a significant factor in how talent acquisition technologies treat and interface with digital credentials. LER value beyond ingestion. Imagine two concurrent information flows from learners to employers: one where an individual sends LERs to an employer who sees and uses them (and ideally ingests and uses them for many purposes), and another for all other modes of	F10. Technologies look like a silver bullet solution. F8. Adoption barriers. F4. Solutions use proprietary data formats, definitions, and technologies. F19. Learners cannot articulate their skills to employers F24. Learner data sharing aversion ☆ F25. No early wins from leading metrics ☆ F26. Difficult to ascertain the impact of interventions

³⁵ Gallagher, S. Leuba, M. Houston, C., and Trieckel, E. (2023). *Digital Credentials and Talent Acquisition Tech*. Northeastern University Center for the Future of Higher Education and Talent Strategy and 1EdTech.
https://cps.northeastern.edu/wp-content/uploads/2023/03/Digital_Credentials_Talent_Acquisition_Tech.pdf

	communication. For example, learners who receive LERs with detailed descriptions of their credentials, skills, and experiences may be better equipped to communicate their value to employers even if the employer never sees the LER. This is particularly important for the high volume of small employers who will not be ingesting LERs in the near or mid-term future and for the significant amount of jobs obtained through networking for which a job app may be a formality or non-existent.	F22. HR vendors hold off on digital credential ingestion F21. Credentials issued without skills data and evidence F18. Prohibitive amount of complexity and change required F16. Learners are not provided alternative entry and exit points
Jobs and Workforce Data Network <i>Improving how employers and their HR technology service providers develop, organize, and share standards-based jobs and workforce (workers in jobs) data to create value for public and private stakeholders.</i>	Collaborative labor market information. Facilitate the creation of collaborative labor market information through the U.S. Chamber's Talent Pipeline Management and JobSIDE which can help generate employer-weighted job requirements. The Chamber's Jobs Data Exchange standard (JDX) can make job postings far more filterable and useful in recommendation engines and talent marketplaces. Update the JDX schema to a linked, open data format, in collaboration with NASWA, Credential Engine, and others.	★ F11. Employers not prioritizing talent pipeline development F12. Disjointed intra-employer participation ★ F13. Collaborative labor market information is not available
	Create the employment record standard as an LER. This is the publishing and piloting of a standard for the records employers can give to their workers to document their work experience in a record the worker can take with them. It represents the "E" (Employment) in Learning and Employment Record. It will create a useful data source on employment history from people who consent to share their records for research purposes. This can augment government employment data sources.	F4. Solutions use proprietary data formats, definitions, and technologies. ★ F13. Collaborative labor market information is not available ★ F26. Difficult to ascertain the impact of interventions

	LERs as outcomes data sources. Explore outcomes data collection possibilities via LERs, LER resumes, and wallets. Consider the consent flow processes for using this data (i.e. opt-in to share data to researchers, one-time sharing vs continuous), and implications for the data standards. Coordinate with other initiatives looking at profile and resume data to generate outcomes. This data source could complement existing state administrative data sources and collaborative labor market information, but relies on making progress on F24, Learner data sharing aversion.	★ F2. Unclear value proposition and ROI of use cases ★ F26. Difficult to ascertain the impact of interventions
	Expand the SBHA use cases into Career Services. Career Development Service Providers, including online and in-person services. Bringing traditional career services providers into the conversation will allow us to bring their expertise into some of the most exciting and comprehensive aspects of the use cases.	★ F3. Learner agency for economic mobility remains low. F14. Pathway design relegated to non-credit education (for degree providers) F15. Providers miss the opportunity to eliminate barriers F16. Learners are not provided alternative entry and exit points
Talent Pipeline Management (TPM) & Jobside <i>The TPM approach builds external pipelines for employers—adequately preparing talent that has yet to walk through the door—as well as long-term strategies for backfilling, upskilling, career pathway development, and succession planning.</i>	TPM's model for applying supply chain management strategies to talent pipelines and its upcoming platform JobSIDE will help create the collaborative labor market information data through employer generation of validated and weighted data.	★ F11. Employers not prioritizing talent pipeline development F12. Disjointed intra-employer participation ★ F13. Collaborative labor market information is not available

Appendix A: Use Case Detail

This appendix expands each use case into its full set of components: goals, actors, preconditions, flow of events, postconditions/success criteria, and points of failure. Each flow of events diagram represents the main actors of the use case in rows, with education and training providers always as the primary actor in the first row. The events from the flow are shown as boxes in the diagram, with boxes in green for events that are significantly updated by skills-based hiring processes, and boxes in blue that may more resemble typical processes, though all events are likely to see some transformation from the strategies in this report. Events that span multiple rows are collaborations between the stakeholders in those rows.

Use Case 3.1: Education/Training Provider Sets Strategy Informed by Labor Market Information

- **Goal of the Primary Actor:** Education & training providers can use collaborative labor market information and employer partnership to set sustainable strategies that prepare learners for the skills they need for work.
- **Actors:**
 - Humans: Education and Training Providers, referred to as *Providers*. Employers, HR professionals, HR service providers, industry associations, and employer collaboratives, referred to as *Employers*. Workforce agencies, state agencies, community-based organizations, technology vendors who help create labor market information. Service providers of labor market information to providers. Quality assurance organizations. Service providers to interpret labor market information for education/training providers. Analytics vendors.
 - Systems: Labor-market-information-generating software. Employers' hiring and performance human capital management software. Talent marketplace, networking, mentoring platforms, LMS. Analytics platforms.
- **Preconditions:** see cross-use case preconditions.
- **Flow of Events:** Step 1 contains several substeps for which the order of occurrence may vary and cycle.

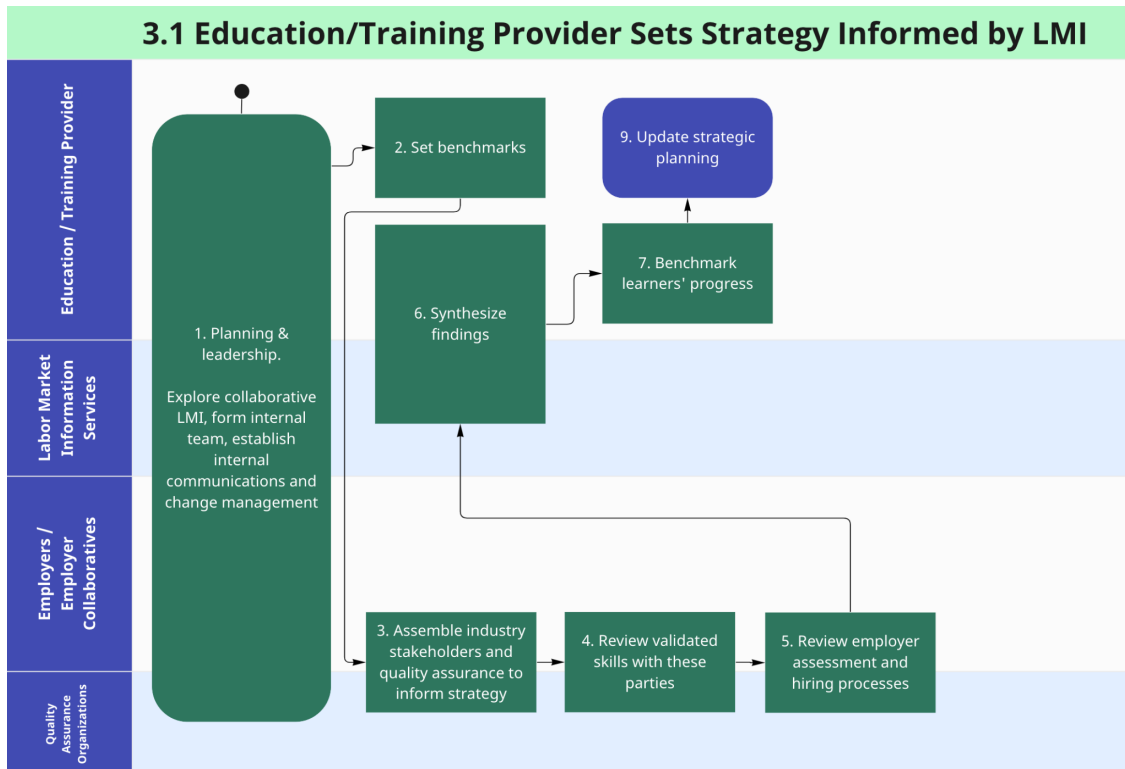


Figure 5. Education/Training Provider Sets Strategy Informed by LMI

- **1. Planning and Leadership.**

- **1a. Leadership.** A champion from provider leadership who advocates for learner outcomes should lead the work. This champion should have executive-level authority and support to manage the complex change management required for implementing skills-based hiring. The leadership of educational/training organizations must understand the value of skills-based hiring and commit to implementing it. This commitment should be reflected in strategic plans, policies, and budgets to ensure the necessary resources and support are in place.
- **1b. Explore collaborative labor market information through services.** Ideally, service providers could supply labor market information while synthesizing labor market demand and context for providers. The information gathering should include federal, state, and regional workforce and education information pertinent to workforce readiness, including state longitudinal data systems, grant opportunities, upcoming legislation, workforce centers/intermediary initiatives, and other possible sources of support and consideration. Provider explores the employer and professional association landscape affecting their regions, areas of focus, etc. with an eye to possible resources and partnerships. Explores demographic and situational trends for learners. Provider uses new sources of refined LMI to identify significant and reliable demand projections appropriate to the education or training. Long-form training like 4-year degrees

will benefit from longer-term projections and emphasis on durable, long-lasting skills like soft skills. Frameworks may be most useful when sector/industry specific.

- **1c. Planning process.** Provider may undertake a comprehensive approach that includes framing the alignment with strategic goals, determining desired outcomes, resourcing, communication plans, and leadership. The process should also involve outcomes and impact setting for each stakeholder group, current and future state analysis, best practices research, resource gap analysis, and recommendations for next steps. It's essential to organize the work around a planning question that focuses on the learners and their needs, such as "How can our learners obtain the training/education and evidence of it they need for economic security/mobility and personal fulfillment?" While built for a competency-based education transformation project (a subset of our use cases), the C-BEN Fieldguide provides an applicable and robust system-wide change framework. Using a theory of change with impact and outcome statements may be useful (see IDEO Designkit).
- **1d. Internal team.** Provider forms a facilitation team that includes representatives from key stakeholder groups, such as learners, faculty, administrators, and employers. Working groups may be established to address specific areas of the project, and a detailed timeline and plan should be developed, including a clear vision statement. The provider should allow ample time for communication and collaboration across all stakeholder groups involved in the transformation process. This includes regular check-ins with stakeholders and a mechanism for soliciting feedback and addressing concerns in a timely manner.
- **1e. Internal communications.** Throughout the work, the provider communicates the urgency of the effort by highlighting the gap between the current state and the intended future state, emphasizing the critical role of career connectedness in bridging the gaps. This message should be consistently reinforced to stakeholders throughout the project, highlighting the benefits of the initiative to learners, employers, and the broader community. By clearly articulating the need for this transformation, provider can build support and momentum for the initiative, driving successful implementation and outcomes.
- **1f. Open-source change management.** Provider may use an open-source change management process in which employees co-create decisions, implementation, and communications. This approach, recommended by Gartner for people-focused and high strategic importance changes, can help increase worker retention by 14 times, reduce risk of change fatigue, and make employees happier about the process. To prevent decision making from defaulting to consensus or safe choices that reduce decision makers' liability, the use of trial decisions and pilots that are held to shorter-term outcomes can help progress. Additionally, the provider will prioritize addressing existing and emerging work frictions that may arise during the change process to prevent bad processes from hindering change. Employees, learners, and other stakeholders will be

valuable sources of insights for process improvement.³⁶

- **2. Set benchmarks.** With the above teams and project management in place, provider establishes a baseline by evaluating the current state in their organization. This includes identifying benchmarks across key metrics, e.g. enrollment funnels, use of workforce information, retention, completion, student outcomes, offerings, skills. These metrics serve as benchmarks to measure progress towards the intended future state and inform decision-making throughout the transformation process.
- **3. Consult employer stakeholders and quality assurance bodies to inform strategy.**
 - For education & training providers: an employer advisory group, for example. Providers create an advisory group from organizations outside the organization, including their accreditation bodies, employers, workforce boards, chambers of commerce, industry associations. Sets goals for this advisory group.
 - For in-house training / L&D: leadership, management, and HR. Provider has all the necessary departments to understand the full hiring and advancement process and key decisionmakers are present.
 - Provider communicates willingness to collaborate to increase economic impacts and explain their impact goals and how they are resourced and authorized to effectuate them. Provider should be willing to follow through on implementing changes or employer partners may be discouraged.³⁷
 - If early partnership attempts are not successful, provider proceeds with the collaborative labor market information and can return to attempt partnership again farther along in the process.
- **4. Review the validated skills with these parties.** With the employer representatives, reviews the validated employer skills requirements against their needs for comparison and localization, if helpful. Explores means of attaining these skills, through degrees, licenses, microcredentials, industry certifications, experiences like work-based learning, etc. Obtains role hiring projections and wage information.
- **5. Review employer assessment, hiring processes, and advancement processes.** Employer representatives explain how information moves through the application process including what formats and pieces of info are selected for or screened out. Notes all the documentation requirements and steps for candidates. Employer(s) describe how performance is assessed and criteria for advancement, including sharing career ladders/progressions.
- **6. Synthesize findings.** Provider makes strategic decisions about how to act on the high-quality LMI coupled with the advice and details from the employer(s). Consultation with workforce and partners and quality assurance bodies may be useful.
- **7. Benchmark learners' preparation in the in-demand skills.** It may be useful to select a third party to conduct an accurate benchmark which can inform how well these skills are being taught currently, if applicable.
- **8. Update strategic planning.** Provider formalizes conclusions into goals and shares.

³⁶ Gartner. (2023). The Top 5 Priorities for HR Leaders in 2023.
<https://webinar.gartner.com/423847/agenda/session/989926?login=ML>

³⁷ King, J. (2021). *Understanding Credential Employment Pathways*.
https://evollution.com/revenue-streams/workforce_development/understanding-credential-employment-pathways/?affiliate=ache

- **Postconditions/Success Criteria:** In keeping with the last report on employer and candidate use cases, success criteria are grouped into three categories: time/cost savings, quality improvement, and equity.
 - Quality
 - Strategic alignment and impact
 - Provider leadership has reviewed the collaborative labor market information data
 - Provider has clarity on the projected longevity of skills demand to determine which skills make sense for the curricula
 - Provider has selected from the following use cases to facilitate skills-based hiring
 - Sustainable alignment updated on an ongoing basis
 - Increased student career readiness contributes positively to near and long-term organizational goals
 - Providers understand their grads' career-readiness
 - Provider staff see career prep efforts as a good use of time
 - Providers see the demand for lifelong and nontraditional learning
 - Provider is able to proceed with the new, validated LMI even if the employer partnerships are not immediately successful
 - Updated strategies reflect employment outcomes priorities
 - Partnership
 - Strategy is created with key partners' input
 - Key employer partners communicate validated, skills-based hiring requirements
 - Provider establishes or strengthens partnerships with key labor market information sources including employers
 - Employer partners feel providers have the ability and willingness to collaborate
 - Equity
 - Learners are continuous design partners, even at this level
 - Provider has demonstrated connection between organizational equity goals and workforce readiness goals, particularly regarding skills-based hiring
- **Points of Failure:**
 - Major
 - **Employers not prioritizing talent pipeline development.** Employers often expect providers to initiate the partnership and tend to under-invest in them because cultivating talent pipelines may not yet be considered a valuable enough strategy compared with just-in-time hiring and many employers believe providers do not have the culture needed to keep up with changing employer demands.³⁸ Employers must be willing to build rather than buy talent.³⁹

³⁸ Fuller, *The Partnership Imperative*.

³⁹ Ammerman, C., Groysberg, B., and Rometti, G. (2023). *The New-Collar Workforce*. Harvard Business Review. <https://hbr.org/2023/03/the-new-collar-workforce>

- **Disjointed intra-employer participation:** Employer representatives must be able to engage their organizations at multiple levels. Leadership is generally more open to skills based hiring than HR teams and hiring managers, but hiring managers make the decisions. The partnership breaks down if the requirements shared with talent suppliers do not match the process applicants experience in the hiring process.
- **Additional**
 - **Partnership is not enacted at high enough seniority levels at either partner.** Lower levels of personnel do not have the strategic perspective to coordinate skills needs nor the decision making capacity for the degree of change needed.
 - **Confusion from discrepancy between LMI and local/key partners' needs.** Employers may be hyper-focused on their own specific needs which may differ from the regional LMI. Providers will need to manage expectations that they are aligning with the labor market and not typically a single employer. Employers who are unwilling to compromise may not be a fit for partnership. Employers who have not gone through skills-based hiring processes may be working off of hiring requirements that are not validated and don't represent good qualifications for the role. Providers may need to compromise between the LMI and important employers' needs or play a role of encouraging flexibility and exposing employers to skills-based hiring processes.

Use Case 3.2: Education/Training Provider Defines Pathways to Opportunities Informed by Talent Marketplace Demand

- **Goal of the Primary Actor: Provider:** Education & training providers can create flexible, stackable, career-connected journeys.
- **Actors:**
 - Humans: Education and Training Providers, referred to as *Providers*, with focus on leadership, workforce development departments, teams of instructional designers and support services. Employers, HR professionals, and HR service providers, referred to as *Employers*. Workforce intermediaries, agencies, state agencies, community-based organizations, technology vendors who facilitate pathways, credential and skills publishing. Students, workers, job candidates, and others served by providers, referred to as *Learners*. Analytics vendors.
 - Systems: Credential and skills publishing. Pathways creation and hosting. LMS, SIS, ERP. Provider websites. Training software. Marketing systems. Registries of credential metadata, skills, industry and qualifications frameworks registries. Analytics platforms.
- **Preconditions:** see cross-use case preconditions. Completion of use case 3.1.
- **Flow of Events:**

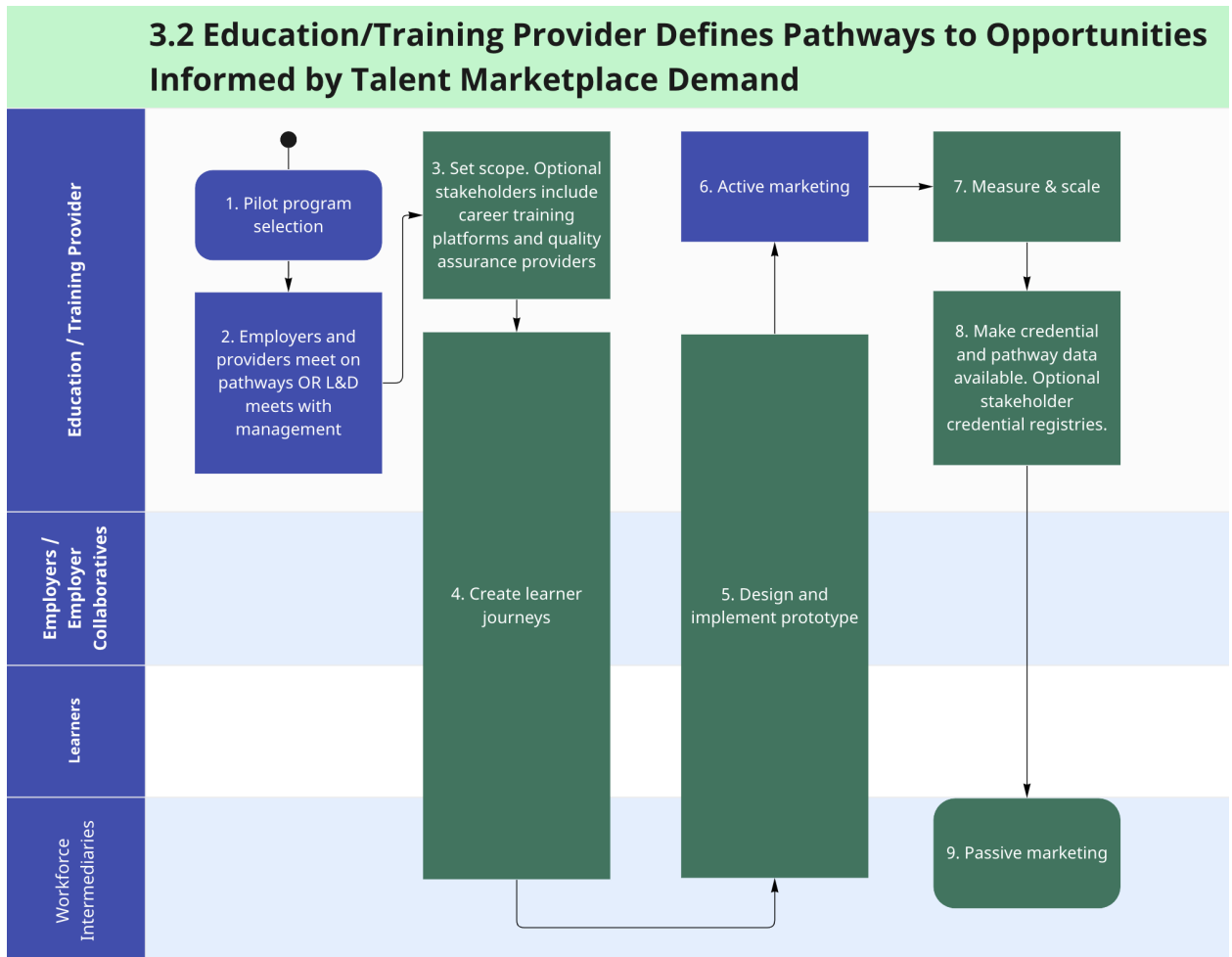


Figure 6. Education/Training Provider Defines Pathways to Opportunities Informed by Talent Marketplace Demand

- **1. Pilot programs selection.** Provider creates a set of initial pilots that are broad enough to indicate momentum but few enough to be manageable, such as a set of career pathways from one or more programs and one or more of the below scopes. Criteria for pilots can be existing progress, existing employer partnerships, or critical demand, for example.
- **2. Employers and providers meet on pathways.** Provider selects key partners to work with directly and form formal or informal partnerships for the purpose of end-to-end education to career pathways. Provider and employer partners meet to clarify employer needs. For in-house L&D, meets with management, HR, and leadership. Discussion includes skills, qualifications, application and hiring process, assessments, and all documentation needed.
- **3. Set scope.**
 - **Education-to-Career Pathways & Micropathways.** This can be the process of organizing existing offerings into pathways, creating new programs, or reviewing credential offerings to see where existing non-credit options could supplement and scaffold into for-credit options, for example. Determines where learning can

be stacked instead of lost. Takes the perspective of students who have attended multiple organizations, have credits across programs, frequently stop attending and restart attending, would like dual credit, or other messy-but-common examples to design for real use. Considers the Credential As You Go model for providing smaller increments of value more frequently.

- **Create new programs, like microcredentials and apprenticeships.** Considers increasing the amount of onramps and offramps (completion points) to programs. Considers what changes could help learners finish with more of the pieces needed in their job search, including work experience.
 - **Incorporate third-party credentials.** Sees if critical soft and technical/perishable skills needs could be represented via already-employer-credible third-party providers like industry certifications or badges. Many employers find industry certifications valuable.⁴⁰
 - **Engage with networking / training / coaching platform(s).** These types of platforms are useful for practicing and building the communications skills needed to present one's candidacy to an employer and advocate for one's own and others' advancement. Helping learners capitalize on social networks is essential for a sense of belonging and impacts retention. Learners' existing and peer networks are valuable assets as well as the new connections they build.⁴¹
 - **Career center integration.** Pertains to education providers. Few students or potential students visit the career center or understand the resources. Working with the career center and career development services, organizations can create career action plan programming and other initiatives to better engage learners with career services and integrate it into the learning experience.
- **4. Current & future state learner journeys.** Provider sets personas representative of learners to build learner journeys for the use cases. Maps the steps those learners could take to achieve not just completion of programs but also career success. It is imperative to review these learner journeys with all stakeholder groups that interact with them to incorporate their perspectives, with emphasis on the students themselves and not forgetting employers and career development professionals. Updates them to add in common barriers and disconnects. Marks which systems or platforms / touchpoints each part of the journey occurs on. The result should be very information rich. Provider then makes a redesign of the learner journey as a future state with all the same representatives.
 - **5. Design & implement a prototype.** Provider implements revisions to the use case programs, with an eye to student wraparound supports, work-based learning, case management, the enrollment funnel, advising, financial aid, marketing, outcomes measurement. Implements with measurement in mind to decide what to expand to new use cases and scale across the organization. All affected stakeholder groups should be

⁴⁰ SHRM & SHRM Foundation. (2022). *Making Alternative Credentials Work: A New Strategy for HR Professionals*.

<https://www.shrm.org/foundation/about/Documents/Making%20Alternative%20Credentials%20Work%20A%20New%20Strategy%20for%20HR%20Professionals.pdf>

⁴¹ Freeland Fisher, J. (2021). *How an asset-based approach to building students' networks can expand their opportunities*.

<https://www.christenseninstitute.org/blog/how-an-asset-based-approach-to-building-students-networks-can-expand-their-opportunities/>

consulted in the design and receive training on implemented solutions.

- **6. Active marketing.** Provider markets the journeys or pathways to students emphasizing clear career trajectories and employer, industry credential, or state license buy-in and partnership.
- **7. Measure and scale.** Successful prototypes and pilots are scaled up.
- **8. Make credential and pathway data available.** Provider makes their credential and pathway information available to employer partners, career centers, career navigation / pathways applications, and other workforce intermediaries in a structured, machine-readable format that can be ingested or downloaded easily. This can be hosted by the provider or by an external registry like the Credential Registry. The beauty is that the data is shared once, updated periodically, and can generate returns continuously.
- **9. Passive marketing.** Workforce intermediaries ingest this information into databases, clean the data, and present it through their own systems to provide awareness of available education/training offerings and education pathways, creating new communications channels to potential students. In these apps, users often receive personalized occupation, education, and/or training recommendations for their goals and constraints. Often these platforms also connect to job boards.

- **Post-Conditions/Success Criteria:**

- Quality
 - Engagement, retention
 - Providers create flexible, stackable, career-connected journeys
 - Providers proactively reduce barriers in the learner journey to career or advancement
 - Degree providers add short-form credentials to their offerings
 - Providers add work-based and project-based learning experiences
 - Providers design around concurrent work and learning
 - Learners perceive an increase in value, engagement increases
 - Learner retention increases
 - Offerings are stackable: Providers create bridges between credit and noncredit, continuing education, professional development units, and credentials
 - Enrollment
 - Providers understand the value of career connection for enrollment
 - Providers market implemented career-connected journeys, career outcomes, pathways, and possibly employer partnerships
 - Student perceptions of the value of the program increase
 - Providers add on-ramps to their offerings
 - Interest and enrollment increase
- Time/cost
 - Learners experience less credit loss
 - Completion increases, improving the value to cost for learners

- Faster completion due to less barriers, dead ends
 - Equity
 - Interest, enrollment, engagement, retention, value perception, increase for target populations, credit loss decreases.
- Points of Failure
 - Major
 - **Pathway design relegated to non-credit education (for degree providers).** While beginning with non-credit pathways can be much nimbler than for-credit work, pathways should be created in for-credit programs to occupations.
 - **Providers miss the opportunity to eliminate barriers.** The opportunity to create pathways encourages a review of the steps a learner can take to complete the education/training and obtain work in the field. Pathway creation should help reduce barriers to employment.
 - **Learners are not provided alternative entry and exit points.** Disadvantaged learners may particularly benefit from using prior learning assessment to shorten a program length and be able to start and stop programs more frequently while still obtaining value.
 - Additional
 - **Pathways created without alignment to industry skills frameworks may create more noise.** As the number of unique credentials in the U.S. soars, employers struggle to interpret their value, which stunts the utility of all credentials. Ties to industry frameworks trusted by employers can create a means of measuring a credential relative to its adherence to or preparation for a respected set of professional competencies.
 - **Providers do not attract new learners with their programming.** This outcome is difficult to interpret but could indicate that a program's value is not being communicated to potential learners, learner's don't recognize the market demand, or problems less relevant to labor market alignment.
 - **Siloed effort from career services.** Career services should be involved in the design processes to help represent barriers to employment that the pathway may be able to mitigate.
 - **Financial aid unavailable for short-term programs.**⁴² Fortunately there appears to be progress on expanding Pell grants and other financial aid to these programs. If this falls through, progress could be stymied. On the other hand, apprenticeship programs allow learners to earn money while learning and sometimes help cover instructional costs, reducing the need for financial aid.

⁴² Hermes, J. (2023). *Washington Watch: Different paths to same goal*. American Association of Community Colleges. <https://www.ccdaily.com/2023/03/washington-watch-different-paths-to-same-goal/>

Use Case 3.3a: Education/Training Provider Aligns Program Criteria to Industry Performance Models

- **Goal of the Primary Actor:** Provider seeks to align the skills taught in their curriculum to to the sets of validated skills and/or skills frameworks from use case 3.1.
- **Actors:**
 - Humans: Education and Training Providers, referred to as *Providers*. Employers, HR professionals, and HR service providers, referred to as *Employers*. Curriculum and assessment committees, instructional designers, academic administrators, quality assurance organizations. Analytics vendors.
 - Systems: LMS, SIS, ERP. Registries of credential metadata, skills, industry and qualifications frameworks registries. Data standards and frameworks mapping systems. Analytics platforms.
- **Preconditions:** see cross-use case preconditions. Completion of use case 3.1. Recommended to undertake with use case 3.2, and enhanced by 3.3b and 3.4.
- **Flow of Events:**

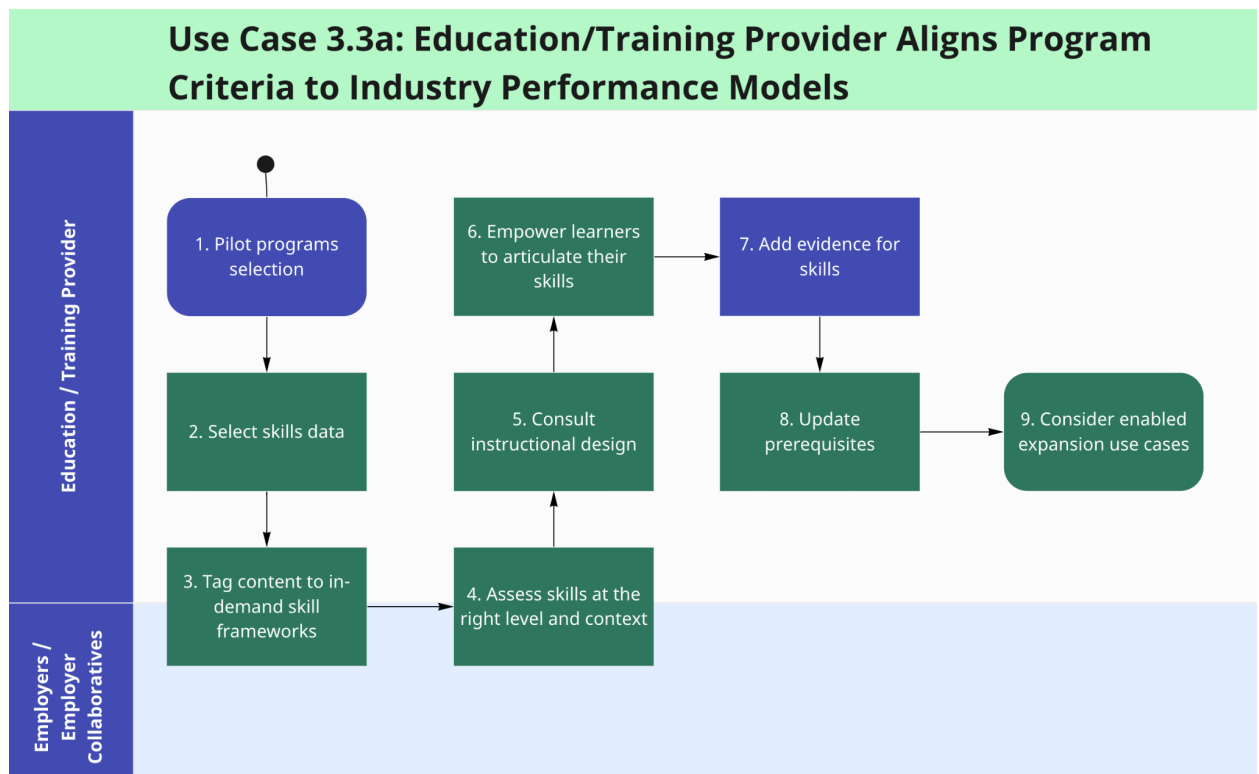


Figure 7. Education/Training Provider Aligns Program Criteria to Industry Performance Models

- **1. Pilot programs selection.** (same as use case 3.2) Provider creates a set of initial pilots that are broad enough to indicate momentum but few enough to be manageable, such

as a set of career pathways from one or more programs and one or more of the below projects. Criteria for pilots can be existing progress, existing employer partnerships, or critical demand, for example.

- **2. Select transparent skills data.** Provider considers options for using existing external skills frameworks and/or creating internal skills frameworks. This data store must meet the metadata requirements for the use cases it will be employed for. Particularly, it should be designed for transparency such that credentials can be issued with their associated skills and the definitions for those skills. Skills issued in digital credentials should be publicly explorable, with their connections to industry frameworks apparent. Linked open data formats are ideal, like JSON-LD.⁴³
- **3. Tag content to in-demand skill frameworks.** Sometimes called *skillifying*, this process compares what the provider teaches to in-demand skills needs. This step must use **Collaborative labor market information: Validated labor market skills by occupations and roles** from the first use case to receive a reliable signal. Typically, it is important to include both soft and hard skills in a given program. Grads who are well equipped in one but not the other will be at a disadvantage. Software can help automate this process, using skills generated from job postings, i.e. SkillsEngine or Lightcast skills, skills generated in a software-guided jobs analysis across employers, i.e. the upcoming JobSIDE,⁴⁴ skills from industry frameworks i.e. NIST NICE,⁴⁵ academic frameworks like C21 skills taxonomy,⁴⁶ or combinations thereof. Future infrastructure can help translate between sets of skills so that a single one is not needed nationally in order to *speak the same language*. Employers want a way to see at the level of the credential source that candidates have genuinely acquired these skills without the employer needing to do time-consuming research or look at the transcript. Providers who master this will be providing a ground-breaking service to jobseekers.
 - **Durable skills.** In-demand skills today and into the future are, by definition, *durable skills*, another word for soft skills. The hardest to measure, but the most adaptable over time, these skills are extremely unlikely to depreciate. They also tend to be valuable across occupations and trades and are important to enumerate and include across most any program. Critical thinking, communication, and leadership typically top the list, but domain-based knowledge can also serve over a lifetime.
 - **Perishable skills:** In contrast, these skills have shorter shelf lives. These are often technical, *hard skills* which can decrease in relevance as technology changes.
- **4. Assess skills at the right level and context.** Skills should have levels that are ideally meaningful to employers, like level of responsibility the skill can be performed at or levels in alignment with an industry standard. Education which is aligned to the right skills but assesses them at a level which does not serve the learner after their education

⁴³ Camilleri, A., Muramatsu, B., and Schmidt, P. (2022). *Credentials to Employment: The Last Mile*. Digital Credentials Consortium.

<https://digitalcredentials.mit.edu/docs/Credentials-to-Employment-The-Last-Mile.pdf>

⁴⁴ U.S. Chamber of Commerce Foundation. (n.d.) *JobSIDE*.

<https://www.uschamberfoundation.org/JobSIDE>

⁴⁵ NIST. (n.d.) *NICE Framework Resource Center*.

<https://www.nist.gov/itl/applied-cybersecurity/nice/nice-framework-resource-center>

⁴⁶ Ward, R. et al. (2021). *Towards a 21st Century Personalised Learning Skills Taxonomy*.

<https://ieeexplore.ieee.org/document/9453883>

will not further student outcomes. Determines how skills will be assessed. Applies learning engineering principles to course design and assessment to ensure that course effectiveness/learner outcomes are measured in the right way. Multi-measure assessments can achieve higher confidence levels around performance by including different kinds of inputs like assessments, evidence, interviews, ratings, etc. Assessing a skill in a similar performance environment to an occupation may also be a factor that can help increase predictability, for example an assessment where distractions are present if that mimics a typical work environment.

- **5. Consult instructional design.** To improve the predictability of on-the-job performance based on skills, provider may benefit from consulting experts in instructional design, the learning sciences, learning analytics, psychometricians, and/or career development professionals.
- **6. Empower learners to articulate skills.** Learners who cannot articulate and demonstrate skills to employers may not be rewarded for them. Learners should be prompted to reflect on them, apply them outside the organization setting, and receive feedback on their ability to do so. Provider determines the supplemental instruction needed.
- **7. Add evidence for skills.** Provider helps learners document employer-worthy evidence that substantiates the skills in addition to or in supplement to assessments. ePortfolios are typically equipped to hold media-rich evidence like images, video, documents, links, and assessment scores with rubrics. Learning and Employment Records will also be able to hold this evidence and/or link to it. Employers have evidence that substantiates the claims of the achievements may increase an employer
- **8. Update prerequisites.** Provider reviews program prerequisites for compatibility with any changes to the program skills.
- **9. Consider enabled expansion use cases:**
 - **Prior learning assessment (PLA).** "Evaluates and formally recognizes learning that has occurred outside of the traditional academic environment. It is used to grant college credit, certification, or advanced standing toward further education or training."⁴⁷ Also known as credit for prior learning (CPL) and recognition of learning.
 - **Competency-based learning.** Inclusive of competency-based education (CBE), this is the process of curricular design in which the time it takes to demonstrate competencies varies while clearly-defined learning objectives and expectations are held constant. Learning is often self-paced and credentials are earned upon mastery. This is a fundamental alternative to credit-hour-based learning. It is a significant undertaking for an organization but it supports career readiness by organizing learning around the key outputs desired by employers - attained competencies and evidence of their attainment - and reduces barriers to achievement.
 - **Credit articulation between organizations.** In the same vein, the less credit loss and starting over that learners will be obligated by, the more they can progress.
 - **Work-based experiences.** There are endless options for work alignment that can build in-demand skills: real-world projects, credit and noncredit experiential

⁴⁷ CAEL. (2023). *A Brighter Future Through Credit for Prior Learning*. <https://www.cael.org/lp/pla>

learning, train the trainer models, industry practitioner visits and instruction, use of equipment, learn-and-earn opportunities.

- **Post-Conditions/Success Criteria:**

- **Quality**
 - List of skills from skills frameworks have been tagged to each course or other unit of learning
 - Skills extraction unlocks one or more of the expansion use cases listed above
 - Instructors see a good deal of overlap between skills extracted from material they already teach and in-demand skills
 - Instructors update their materials to improve the alignment
 - The top in-demand skills for occupations relevant to the programs align better with the skills taught in those programs
 - Process is repeated at least annually
- **Time/cost**
 - Use of skills analytics tools saves time from manual skills alignment
 - Learners have reduced need for additional training between program completion and workforce readiness

- **Points of Failure**

- **Major**
 - **Prohibitive amount of complexity and change required.** In addition to funding models, changes spread to the academic calendar, faculty performance, assessment standardization and grading models, registrar changes to transcripts, and typically the digital credentialing effort (use case 3.4) that is enabled by this use case.
 - **Learners cannot articulate their skills to employers.** Learners who can't explain how what they learned makes them valuable to a potential employer will be at a disadvantage.
- **Additional**
 - **More Competency-Based Education services needed.** Vendors who could offer technical, administrative, and change management services could efficiently create competency infrastructures. These vendors will rely on funding models supporting CBE and the ability to tie changes to improved outcomes.
 - **Limited access to and use of high-quality and dynamic open competency frameworks.** Skills frameworks from industry associations, employers, education providers, and other expert sources provide curated lists, taxonomies, and ontologies of skills with metadata for each item. Many of these are not yet open, machine-readable, or searchable for comparison so that more than one framework can be easily used at the same time.
 - **Relationships between skills across skills frameworks are almost nonexistent.** Experts and AI could both play a role in semantic mapping between skills from

different frameworks using predicates i.e. identical, reworded, narrower, precedes.

- **Manual tagging.** Competency and skill frameworks can be used by providers to tag their profiles with skills but this will require online hosted skills and software that helps suggest them to users to optimize fit with the content.
- **Choice of source material for skills extraction.** It may be better to use larger amounts of data, like Common Cartridge files and other sources from the LMS to generate skills data, as opposed to a syllabus alone.
- **Lack of machine-readable structured data to extract skills from.** Providers often store documentation which contains skills information as unstructured data like PDFs that cannot be easily transferred and analyzed across internal systems.
- **Lack of openly available and clearly defined and granular learning outcomes.** Data sources may include the course syllabus (may be intellectual property of the instructor and could change every time taught) or considered proprietary by a vendor and not defined clearly enough to determine level of performance
- **Curriculum development process does not update.** Process must update learning outcomes and assessments through continuous improvement based on the evaluation of successful work performance from data provided by employers and workers.
- **One-word skills.** Use of skills which are not written using a standardized description format or which lack metadata. One-word skills are not useful enough to tag with because they lack any specificity about the level of the skill's performance, context, and any indication of assessment methods typical of it.
- **Lack of reliable, valid, and aligned assessments for evaluation and feedback.** Including lack of predictive assessments and misalignment of pre-hire screening and training assessments.

Use Case 3.3b: Education/Training Provider Confers Skills-Based Digital Credentials

- **Goal of the Primary Actor:** Confer digital credentials valuable to learners, employers, and other stakeholders. For more technical use cases related to digital credentials in the education space, see the W3C Verifiable Credentials for Education, Employment, and Achievement Use Cases.⁴⁸
- **Actors:**
 - Humans: Education and Training Providers, referred to as *Providers*. Employers, HR professionals, and HR service providers, hereafter referred to as *Employers*. Students, workers, job candidates, and others served by providers, referred to as *Learners*. Tech

⁴⁸ Lemoie, K., Hamilton Duffy, K., Camilleri, A., and Zagidulin, D. (2022). *Verifiable Credentials for Education, Employment, and Achievement Use Cases*. W3C Community Group. <https://w3c-ccg.github.io/vc-ed-use-cases/>

vendors.

- Systems: LMS, SIS, ERP. Registrar systems: credential issuing, publishing, management. Credential issuing fulfillment i.e. badge platforms. Digital wallets. Identity registries. Credential, pathway, and skills data registries. Talent marketplaces and job boards.
- **Preconditions:** see cross-use case preconditions. Completion of use case 3.1 and 3.3a, ideally 3.2, and enhanced by 3.4.
- **Flow of Events:**

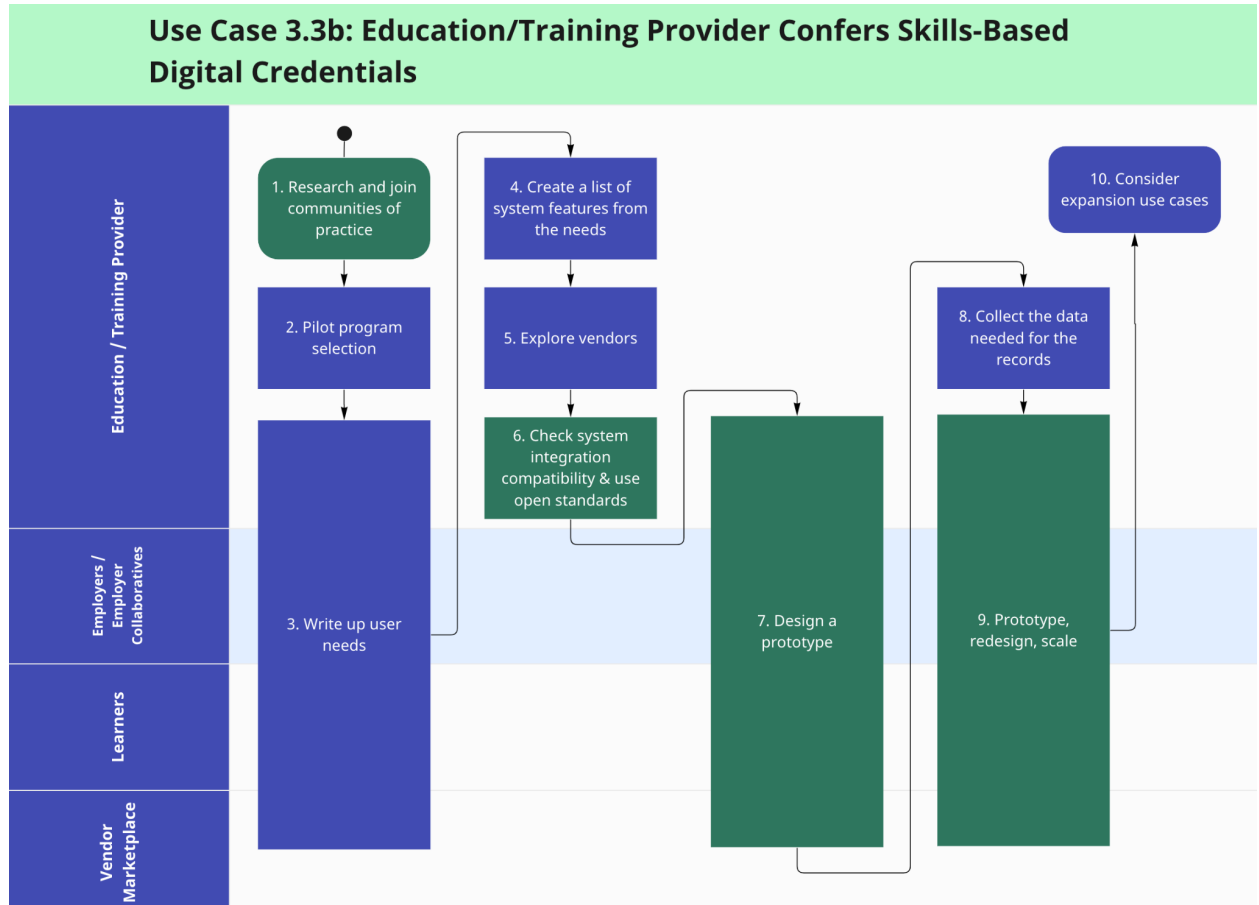


Figure 8. Education/Training Provider Confers Skills-Based Digital Credentials

- **1. Research and join communities of practice.** LER best practices are still being developed. Taking part in a community of practice, sponsored pilot or research project can provide access to dynamic technical and implementation updates. For example see the state-level *Skills-Driven State Community Of Practice*⁴⁹ from the National Governors Association.
- **2. Pilot programs selection.** (same as use case 3.2 and 3.3a) Provider creates a set of initial pilots that are broad enough to indicate momentum but few enough to be manageable, such as a set of career pathways from one or more programs. Criteria for

⁴⁹ National Governors Association, *Skills-Driven State Community Of Practice*.

pilots can be existing progress, existing employer partnerships, or critical demand, for example.

- **3. User needs.** Provider starts with the impact statements and primary outcomes for this work and refines them into user needs/user stories for technical requirements. Uses current and future state learner journeys to map how learners would be affected by and use digital credentials during and after their learning experiences. It is imperative to review these learner journeys with all stakeholder groups that interact with them to incorporate their perspectives, with emphasis on the students themselves and not forgetting employers and career development professionals. Updates them to add in common barriers and disconnects. Marks which systems or platforms / touchpoints each part of the journey occurs on. Take into account the different starting points of marginalized learners and beyond universal design make sure there are alternatives for learners across common barriers. Writes user needs that are learner-centric and follow universal design principles.
- **4. Create a list of system features from the needs.** Considers guidelines like the following:
 - IEEE P1484.2 *Recommended Practices for Learning and Employment Record (LER) Ecosystems*⁵⁰
 - MIT Digital Credentials Consortium *Building the digital credential infrastructure for the future*⁵¹
 - European Commission *Europass framework for digitally-signed credentials*⁵²
 - Jobs for the Future *Building a Skills-Based Talent Marketplace: Verifiable Credentials Wallets for Learning and Employment*⁵³
 - Canada's Digital Governance Council *Technical Specification for Digital Credentials and Digital Trust Services*⁵⁴
- **5. Explore vendors.** Browse filterable lists/marketplaces of vendors and their features to identify possible fits, put out RFP, connect with vendors.
- **6. Check system integration compatibility and use open standards wherever possible.** Open standards allow data to be dynamically exchanged across systems, enabling interoperability. They facilitate moving information between systems without expensive and lengthy custom integrations or dead ends for data that ends up stuck in an organization or a storage system. Start an integration pilot if one is needed from a willing vendor.
- **7. Design a prototype.** A paper prototype can help determine if the contents of the

⁵⁰ Coming later this year from the Learning Technology Standards Committee of the IEEE Standards Association.

⁵¹ Hamilton Duffy, K., Pongratz, H., Schmidt, P., eds. (2020). *Building the digital credential infrastructure for the future*. Digital Credentials Consortium.
<https://digitalcredentials.mit.edu/wp-content/uploads/2020/02/white-paper-building-digital-credential-infrastructure-future.pdf>

⁵² Everis. (2018). *Europass framework for digitally-signed credentials*. European Commission.
https://ec.europa.eu/futurium/en/system/files/ged/europass_background-info_framework-digitally-signed-credentials.pdf

⁵³ JFF Labs. (2022). *Building a Skills-Based Talent Marketplace*. <https://info.jff.org/digital-wallets>

⁵⁴ Digital Governance Council. (2023). *Technical Specification for Digital Credentials and Digital Trust Services*. Digital Governance Standards Institute.
https://dgc-cgn.org/standards/find-a-standard/standards-in-digital-credentials/digital-credentials/?#gf_69

digital credentials that would be issued and the process for doing so would work for key stakeholders before implementing solutions. A set of potential solutions and wireframes of their artifacts can be used for this purpose. Then, a prototype could be implemented.

- **8. Collect the data needed for the records.** This should include the skills from use case 3.3, information about the credential itself, include valid dates, description, relevant occupation and industry codes, and keywords.
- **9. Prototype, redesign, design organization-wide approach, and scale.** Test prototype, and gather feedback, and redesign. Armed with this experiential knowledge, consider an organization-wide digital credentialing plan that accounts for credit, noncredit, stackability, relationships between credentials, and so forth, looking at other organizations' example credentialing taxonomies. Implement & train users, develop a continuous improvement plan & scale.
- **10. Consider expansions:**
 - Retroactively issue credentials for past completers. The Chamber Foundation ExperienceYou and Education Design Lab XCredit projects are experimenting with this task.
 - If you want learners to be able to self-assert claims, consider piloting linked claims/endorsement for records in digital wallets
 - Enable wallet holders to opt-in to sharing their credentials with trusted issuers, research bodies, and other parties for outcomes generation
- **Post-Conditions/Success Criteria:**
 - Quality
 - Percent of credentials issued as LER-compliant digital credentials (see guidelines in step 4)
 - Training completed by education provider's own recruiters and hiring managers on verifying and reading digital credentials so that LERs issued by providers are used in their own hiring and advancement process
 - Wallets and LERs support features including self-assertions, endorsements, decentralized identity (DID), and progressive/selective disclosure
 - Collections of LERs contain records from diverse issuers, like community organizations, education institutions, employers, military, and other organizations
 - The top in-demand skills for occupations relevant to a program aligns better with the skills expressed in the digital credentials for that program
 - Worker records can be exported to worker-owned and controlled wallets
 - Leadership has used LERs firsthand for their own records to get a feel for using them
 - Equity
 - Learner usage rates of LERs by group
 - LERs and accompanying technology can be used by those with limited broadband or device access

- Time/cost
 - Time to employment (lagging metric)
- **Points of Failure**
 - **Major**
 - **Authoritative credential quality frameworks are needed.** Employers struggle to determine the quality and relative importance of digital credentials. The number of different credentials is skyrocketing. Employers lean on accreditation bodies, state-recommended credential lists, rankings, and other shortcuts to determine credential quality. Credential types like certification, certificate, and microcredential are not adequate to distinguish *high-stakes* from *low-stakes* credentials.
 - **Credentials issued without skills data and evidence.** Digital credentials of any type without skill/competency information do not address employers' need to evaluate whether the credential meets the role requirements.⁵⁵ Assessment data and criteria for obtaining the skills must also be present. Tying this information to credible industry/professional frameworks is even better.
 - **HR is waiting to invest in ingestion.** Employers need a strong business case to press their HR vendors to accelerate digital credentials ingestion. These credentials must contain enough data to be worth it, mainly skill data. Verification (checking the authenticity) alone is not compelling because employers are satisfied with background check providers covering this need.⁵⁶
 - **No credential validation tools.** While verification technology advances, it must be accompanied by validation technology which can parse the payloads (data inside digital credentials) against the employer's criteria for what it should contain. This task relies on comparison between skills, credentials, occupations, etc., a substantial infrastructure need.⁵⁷ While some international examples use nation- or region-wide frameworks to simplify this, a multi-framework model may be most realistic for the U.S. AI is likely to play a strong role in these tools.
 - **Additional**
 - **Credential issuer (provider) trust models are lacking.** Accreditation bodies have served the role of legitimizing providers, but have not been active in communicating that trustworthiness to employers through digital credentials. Issuer trust registries or closed record issuing systems both attempt to whitelist issuers who have met criteria in order to prevent a free-for-all of issuers of unknown quality. Making these trust lists openly usable will facilitate credential use. See the progress of the European Quality Assurance Agencies' Database of External Quality Assurance Results (DEQAR) for example.⁵⁸

⁵⁵ Camilleri, *Credentials to Employment*.

⁵⁶ Ibid.

⁵⁷ Ibid.

⁵⁸ EQAR. (n.d.) DEQAR. <https://www.eqar.eu/about/projects/deqar-project/about-deqar/>

- **Retroactive issuing is unsuccessful.** Those who received credentials in the past will now need digital credentials that they can use in LER-based resumes and applications, etc. Issuers can retroactively issue credentials that represent the material that was taught at the time of issuing (given that most programs change over time). Other approaches include issuers endorsing an individual's claim that they have obtained the credential, or 3rd parties issuing credentials that assess and sign off on the individual's skills. The credibility and feasibility of these approaches remains to be tested. For example, see two current projects experimenting in this area, Experience You and XCredit.
- **Unclear feasibility of a credentials-first approach.** HR operates on receiving resumes of applicant narratives which are sometimes backed up with documentation. Using verifiable (tamper-evident) credentials in resumes that support them switches to a format where most information is presented as credentials, including assertions (claims) jobseekers are making about themselves without supporting documentation). This requires behavior change in jobseekers and employers around a different communication model.
- **Legislative support lacking.** Accepting digitally-signed credentials as legally equivalent to official paper credentials would be significant. Government could tie funding to digital credential issuance. The U.S. government could also accept digital credentials as an employer.
- **Vendor selection.** Until features are better understood, providers may not have visibility to vendors who can fulfill their needs and best integrate with their existing tech stack.
- **Poor wallet usability.** Wallets need product and user experience design to overcome the challenges of the new concepts they introduce to users. Wallets coming from vendors with extensive experience in other consumer-facing software may have an advantage in this space, as well as those with large market share already.
- **Data privacy and security.** While the verifiable credential and wallet model follows state of the art practices for consent and user control over data, implementations should follow data privacy and security standards and rigorous review.
- **Inequitable learner adoption of digital record technology.** Many learners don't have adequate technology access in order to effectively use new tools and platforms.
- **Learners reject digital record technology over privacy or agency concerns.** Some early surveys found learners may not want the additional responsibilities of managing processes of which they were not previously liable for the risks.
- **Perpetuating existing or adding new unintended biases.** Much technology can amplify existing biases and research is needed to prevent this.

Use Case 3.4: Education/Training Provider Iteratively Refines Programs

- **Goal of the Primary Actor:** Provider actively monitors, collects, shares out, and acts on program effectiveness data to iteratively improve.
- **Actors:**
 - Humans: Education and Training Providers, referred to as *Providers*. Employers, HR professionals, and HR service providers, referred to as *Employers*. Quality assurance providers. Communities of practice. Industry/professional organizations. Workforce development intermediaries. Learners.
 - Systems: All systems identified across use cases.
- **Preconditions:** see cross-use case preconditions. Completion of use case 3.1 and any of the above use cases.
- **Flow of Events:**

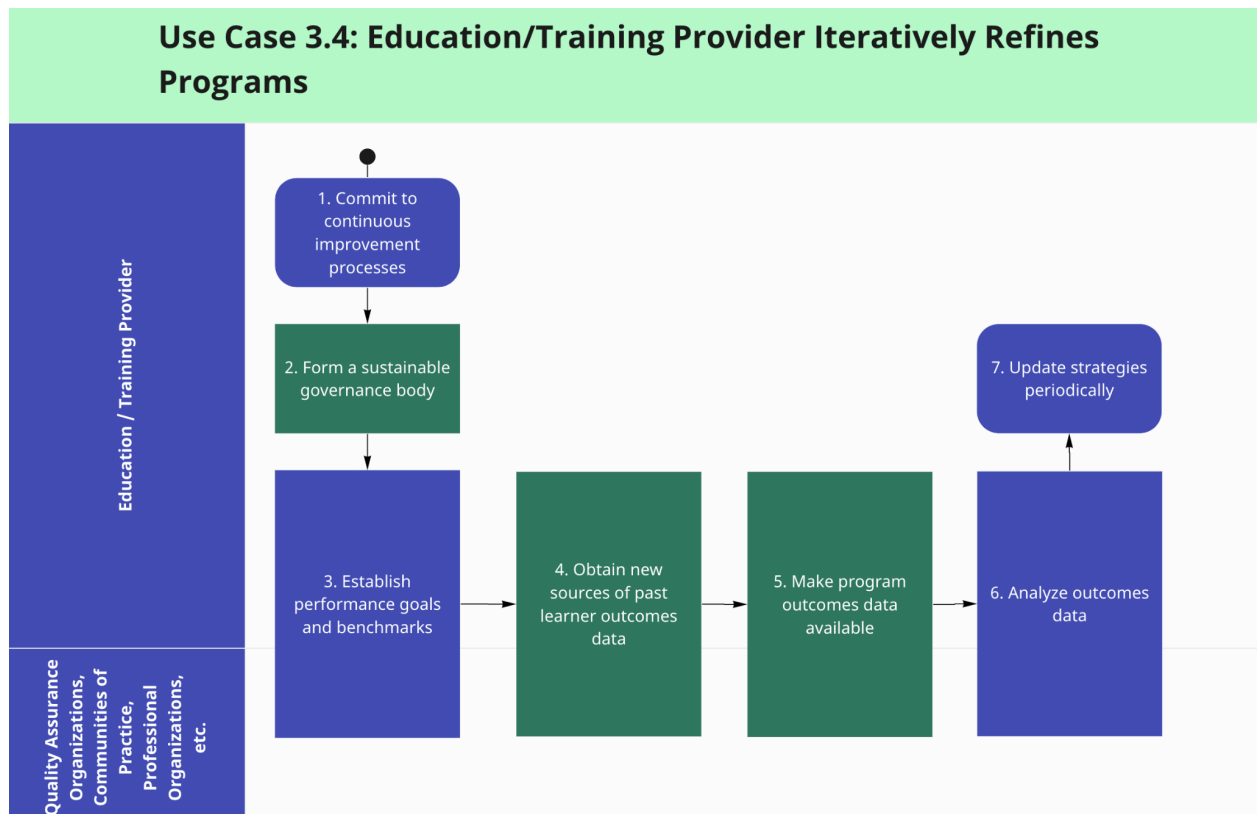


Figure 9. Education/Training Provider Iteratively Refines Programs

- **1. Commit to and adopt continuous improvement processes.** Regular data collection, data governance, analyses, and insight generation for performance gaps will contribute

to programs effective enough to predict job performance. Contracting with services for these analyses may be more feasible. Provider plans for long-term alignment by dedicating resources to ongoing monitoring of LMI and updates to strategy and projects.

- **2. Form a sustainable governance body.** This body should create policy and processes around new digital credential creation, communications and training, partnerships, data sources, competency databases, framework alignment, and outcomes measurement.
- **3. Establish program performance goals, metrics, and benchmarks.** Provider categorizes measures using leading and lagging metrics, for example. Employment outcomes are generally lagging metrics so monitoring learner progress, stakeholder satisfaction, system usability data, and other earlier wins are essential to getting frequent-enough results. Sets up processes for observing, measuring, analyzing, documenting and informing strategy from this information. Examples for corporate training include percent internal hires, onboarding time, proficiency, and turnover. To measure progress, provider draws on the benchmarks set up in use case 3.1 or sets them up now. Collect data and feedback from all affected parties including learners. Quantitative and qualitative methods should be used.
- **4. Obtain new sources of alumni/past learner outcomes data.** Ideally this ongoing process will be greatly simplified and not require alumni outreach. This could be through obtaining outcomes data from third parties including government agencies (IRS), data aggregators (National Student Clearinghouse), certification providers (NCCER), employer partners, community-based organizations or wraparound service providers, or an aggregation of these. An emergent option could be learner opt-in to sharing their wallet data with research organizations. Working with outcomes-based learner/worker-focused nonprofits can help capture more complete outcomes data. Quality assurance organizations can often help acquire these data sources.
- **5. Make program outcomes data available.** Active marketing through provider marketing materials may encourage enrollment. Potential learners are eager to know how well they will be prepared for work. Bootcamps have shown placement and employment rates, alumni salary averages, alumni satisfaction, and more outcomes data on their program landing pages. Passive marketing is enabled by making outcomes data available with credential and pathway data for aggregator applications to pick up and distribute to learners. Providers who disaggregate by target population group may be able to show progress towards equity that distinguishes them from other providers and shows leadership. Outcomes like cost, earnings, completion, financial assistance, and job placement are particularly important equity measures.⁵⁹
- **6. Analyze outcomes data.** Third party analysis services may be useful in looking for contributing factors to program success or failure using robust analysis methodologies.
- **7. Update strategies on a periodic basis.** Using the insights from the above steps, revise strategies, goals, and metrics, update data sources and processes, revisit partnerships, consider use cases, and so on. Provider benefits from the expertise of quality assurance organizations, communities of practice, professional and industry associations (and outside the U.S., qualifications framework bodies) to set and maintain high academic integrity and demonstrate adherence to trustworthy standards. Economic-mobility focused quality assurance entities are bringing innovation in this space.

⁵⁹ Credential Engine. (2023). *Equity Advisory Council Report and Recommendations*. Washington, DC: Credential Engine. <https://credentialengine.org/wp-content/uploads/2023/06/EAC-Final-Report.pdf>

- **Post-Conditions/Success Criteria:**

- Quality
 - Improved stakeholder satisfaction (including employers, learners and faculty)
 - Improved learning outcomes, informed by quality assurance frameworks i.e. EQOS
 - Design and implementation of data-driven improvements, and measurement of these improvements
 - Collaboration with expert organizations in curricula and program design and improvement
 - Implementation of best practices from relevant fields
- Equity
 - Outcomes data is disaggregated by group, and includes key economic metrics as well as leading metrics like tool adoption, satisfaction, learner skills awareness, perception of quality, etc.

- **Points of Failure**

- **Major**
 - **Learner data sharing aversion.** Some learners do not wish to share personal and outcomes data with organizations. Data privacy and security breaches, minimal transparency around data use, data misuse, personalized advertising, government agency or political administration mistrust, mistrust of the provider organization, vulnerable legal status, collection efforts perceived as invasive, and punitive data use contribute to an unwillingness by many learners to share more than the minimum. For example, some learners decline to enroll in programs that ask for social security numbers. This will impede benchmark, demographic, progress, and outcomes data collection.
 - **No early wins from leading metrics.** Efforts that do not prioritize leading indicator metrics and focus on long term impact may not be able to perform the informed iterations that would enable success. An agile mindset is crucial to build momentum, buy-in, and a data-driven approach. If early wins cannot be measured, or are not occurring, an implementation could be terminated.
 - **Difficult to ascertain the impact of technologies.** Since piloting new technologies and approaches often bundles many new things together, it may be difficult to discern the impact of one variable.
- **Additional**
 - **Factors contributing to outcomes are not investigated.** An analysis that drops the ball won't lead to improvement.
 - **Program outcomes data is not shared.** Beyond quality assurance efforts, sharing can increase trust with learners, employers, and the community.

- **Program leading metrics are not captured.** This will make it more challenging to iterate and pinpoint contributors to success (lagging metrics).

Appendix B: Digital Credentials

Digital Credential Contents Must Establish Predictability of Candidate Performance

Providers have been issuing digital credentials, including badges, Comprehensive Learner Records (CLRs), and other records for years. They appear on resumes, LinkedIn profiles, job applications and transcripts. But employer hiring systems are not built to receive them, so digital credentials may not be seen by employers and are almost never added to an employee's internal company profile. HR systems using, a.k.a. ingesting, digital credentials allows their data to be fully used, and it's a transition that's still at the beginning.

Skills-based hiring is the most compelling reason for employers and their HR vendors to invest in ingesting digital credentials.⁶⁰ This process will allow hiring managers to use detailed information about a candidate's accomplishments in their hiring decisions.⁶¹ Ingesting allows machine-readable information in the credentials to be understood by the HR software of the employer and acted upon efficiently, likely with the aid of AI. Since employers already have solutions for verifying authenticity like background check services, they need to see that there is an increasing volume of digital credentials in their talent pools which contain business-valuable information, and exist in relatively few standards so that integration is not prohibitively complex.⁶² Then once they have the technology to ingest these credentials, using the credentials' self-verifying functionality will add additional value to the hiring process (see below).

The business-valuable information should increase hiring managers' ability to use them to predict candidates' performance on the job. This should include:

- The skills represented by the credential
- The means by which they were assessed, including rubrics, passing criteria. Means which assure mastery are preferred. The more the assessment tasks resemble real-world scenarios and their contexts, like tools, environment, timing, and teamwork, the more authentic they are likely to be perceived.
- Explanation or proof of safeguards for academic honesty
- Evidence of learning such as an eportfolio, links to examples, assessment scores
- Explanation of alignment to industry/professional standards/frameworks and links to those frameworks

⁶⁰ Gallagher, *Digital Credentials and Talent Acquisition Tech*.

⁶¹ Ibid.

⁶² Ibid.

- Any awards, standards compliance, accreditation, or other quality assurance evidence of the program and/or provider
- If successful outcomes are available, any quality-assurance provider backed claims about the employment outcomes of program graduates

Education and training providers represent what an individual can do by means of learning objectives, skills, competencies, capabilities, etc. while employers represent it as work tasks, responsibilities, skills, and also competencies, though with varied similarity of definitions. The taxonomical chasm between these two approaches is bridged by skill and competency frameworks from both parties which can be used to translate between them.⁶³ Assessments and evidence are the means to prove that an individual has the skills from the frameworks.

Self-Verifying Digital Credentials Can Establish Authenticity

While the U.S. Chamber of Commerce Foundation is pushing forward on improving labor market and credential information, there has been a deep focus to empower learners with *verifiable* and *validatable* information they can share with employers. Employers can verify the authenticity of a record by consulting the issuing organization, using background check services, or by using a new technology called Verifiable Credentials, a standard from the World Wide Web Consortium (W3C) which maintains the standards that run the web.

The Trust Triangle diagram below explains how verifiable credentials work. It shows three parties, an issuer of a credential, a credential holder, and a credential verifier. This model is highly versatile and applies across financial, identity, and many other use cases. For skills-based hiring, the issuer is the education/training provider, the holder is the learner/worker, and the verifier is the party who receives credentials from the learner, like a hiring manager. The use of Verifiable Credentials enables the hiring manager to trust the authenticity of the credential issued from a learner (through their wallet for example) without any communication between the hiring manager and the education provider. This gives learners ultimate agency over the records they have earned. This is a vital protection for learners whose issuing organization is defunct or unstable. It has the power to turn a months-long verification process into seconds. It relies on technology like decentralized identity that frees learners to move easily between organizations. It also uses public utilities that contain information needed to run the triangle (including registries of credentials, trusted organizations, expired credentials, etc.). These can use distributed ledger technology like blockchain but it is not required. For more background on digital credentials, see MIT's *Building the digital credential infrastructure for the future*.⁶⁴

⁶³ Inspired by the Capability-Competency Chasm presented in Ward, R. (2021). *Towards a 21st Century Personalised Learning Skills Taxonomy*.

⁶⁴ Hamilton Duffy, *Building the digital credential infrastructure for the future*.

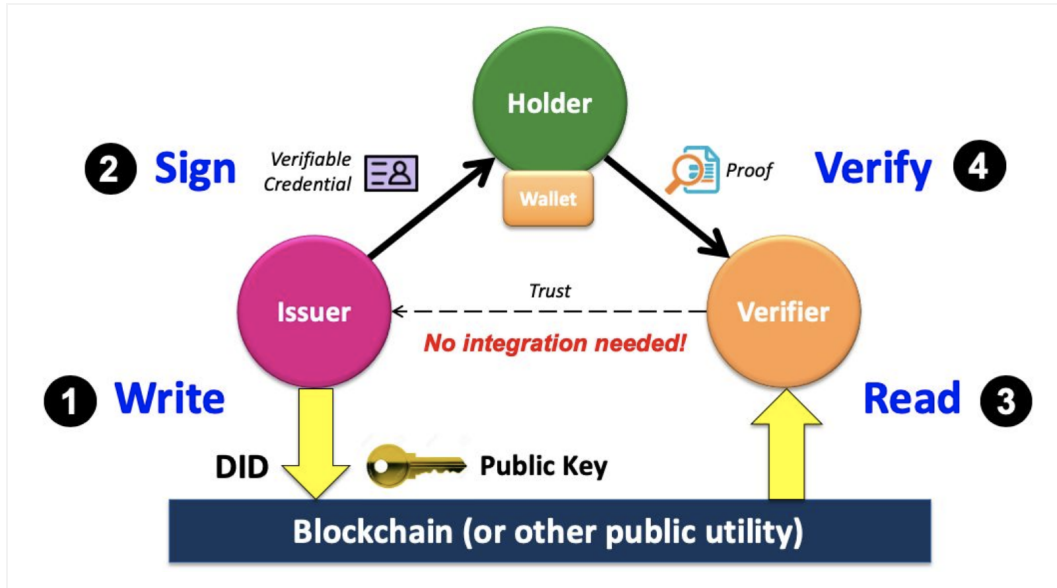


Figure 10. Verifiable Credential Trust Triangle.⁶⁵

It is just now possible for providers to issue digital badges, transcripts, and other records that leverage the power of this model. The U.S. Chamber calls trustworthy digital credentials, ideally compatible with the Verifiable Credentials standard, Learning and Employment Records (LERs). LERs which are verifiable and also validatable (contain rich detail on the skills, assessments, and evidence that back up their claims) can become trusted predictors of job performance and open doors of opportunity for their holders.

Glossary

[Digital] Credential

A credential is a set of one or more claims made by an issuer (such as an education provider) about one or more subjects.⁶⁶

Microcredential

There is little agreement on a shared definition of microcredentials. Generally though, they are short term, i.e. less than a year, and industry aligned.

Alternative Credential

Non-traditional (non-degree) credentials offered by institutions of higher education may include a myriad of credit alternatives including Massive Open Online Courses (MOOCs), micro-

⁶⁵ Trust Over IP Foundation. (2020). *Verifiable Credential Trust Triangle*.
https://trustoverip.github.io/WP0010-toip-foundation-whitepaper/trust/vcred_trust_triangle/

⁶⁶ Sporny, M. et al. (2022). *Verifiable Credentials Data Model v1.1*.
<https://www.w3.org/TR/vc-data-model/#dfn-credential>

credentials (badges), credit- or non-credit bearing certificate programs and various other opportunities. Typically issued in a digital format.⁶⁷

Digital Badges

Online representations that recognize skills, achievements, membership affiliation, and participation. An open badge is a type of digital badge⁶⁸

LER Digital Wallet

An app or other technology used by the holder of the LER to subscribe, curate, and control access to achievement assertions and other credentials by creating a presentation that is shared with verifying parties.⁶⁹

Learning and Employment Record (LER)

An open standards-based, machine-actionable, digital record of an individual's formal and informal learning and employment that is constructed as a W3C VC (or equivalent) that can be combined with other digital records useful in supporting an individual's education, employment, and supportive services.⁷⁰ LERs can document learning wherever it occurs, including at the workplace, through an education program/experience, or through military training.

Comprehensive Learner Record (CLR)

A CLR is an official document that seeks to capture, record, and communicate learning when and where it happens in a student's educational experience. This includes learning outcomes from courses, programs and degrees, as well as experience they have outside the classroom that help develop their career ready skills and abilities. A CLR may contain one or more other credentials (badges, degrees, certificates, courses, experiences, etc.) that have been validated and recorded on behalf of the student. CLRs are a type of Learning and Employment Record (LER).⁷¹

Skills

The ability to effectively use cognitive and physical abilities to perform a task or activity.⁷²

Competencies

The set of skills and behaviors required in the performance of a task or activity within a specific context.⁷³

⁶⁷ AACRAO. (2022). *Alternative Credentials: Considerations, Guidance, and Best Practices*.

⁶⁸ Ibid.

⁶⁹ Unpublished, Learning Technology Standards Committee of the IEEE Standards Association, *Recommended Practices for Learning and Employment Record (LER) Ecosystems*.

⁷⁰ Ibid.

⁷¹ AACRAO, *Alternative Credentials*.

⁷² IEEE Standards Association. (2022). *IEEE Approved Draft Standard Data Model for Sharable Competency Definitions*. <https://standards.ieee.org/ieee/1484.20.3/10749/>

⁷³ Ibid, based on existing competency data standards including the Credential Transparency Description Language (CTDL) standard for competency data managed by Credential Engine and the Competency and Standards Exchange managed by 1EdTech.

Skill & Competency Frameworks

Any list, ontology, or taxonomy of logically-related skills or competencies shared by an education provider, employer, industry consortia, government agency, workforce agency, etc. can be described as a competency framework. “Logically-related” encompasses a set of items brought together for some purpose, such as to describe a role, course, or occupation. When openly licensed and stored in an open data standard, these frameworks can be widely referenced and reused, creating more consistent understandings across organizations.

[Work] Context

Describes the performance setting that might include, but not be limited to the job, role, occupational category, physical and psychological environment, and required or expected tools, information, and incentives.⁷⁴

Competency-Based Education

As opposed to a focus on seat-time as a means of earning credit, CBE focuses on content mastery; this requires explicit and transparent skills tied to all aspects of the overarching learning program and process.

Upskilling & Reskilling

Employers upskill their employees by providing them opportunities to learn more skills. Reskilling is the process of learning new skills so you can do a different job, or training people to do a different job.

Verifiable Credential

“A tamper-evident credential that has authorship that can be cryptographically verified. Verifiable credentials can be used to build verifiable presentations, which can also be cryptographically verified. The claims in a credential can be about different subjects”.⁷⁵

Digital Credential Verification and Validation

Evaluation of whether a digital credential is an authentic and timely statement from the issuer or presenter. Compare with Validation which is making sure that the information in a digital credential is valid for the business case.⁷⁶

Job Analysis and Skills Validation (part of use case 1.1)

Effective skills-based hiring and advancement depends on rigorous job analysis methods (e.g., job task inventories/surveys, cognitive task analysis) that determine the most important work tasks and the most critical worker attributes or capabilities (e.g., knowledge, skills, abilities, and other characteristics) needed to successfully perform them within a given work context. Job analysis and skills validation are also important for determining which skills are required for screening and hiring (pre-hire skill requirements) and those skills that can be acquired through further training and development (post-hire skill requirements). Finally, skills validation

⁷⁴ Ibid.

⁷⁵ Sporny, *Verifiable Credentials*.

⁷⁶ Ibid.

encourages employers to include only critical skill requirements set at the necessary levels of proficiency and discourages employers from adding additional or higher skill requirements that will unnecessarily reduce the number of potentially qualified candidates and reduce opportunities for underserved populations similar to the effects of unnecessary college degree and work experience requirements.

Open Data Standards

Open data standards are agreements that establish a consistent way to create, use, and share data. They are useful across all industries and enable vast improvements in data quality and collaboration. Imagine if every building you walked into used a different kind of electrical outlet and you had to constantly struggle with adapters that never quite worked right. A world built using open data standards is one that communicates, collaborates, and operates more seamlessly behind the scenes. Ideally, open standards are free/low-cost, consistent, create portable data, are openly-governed, interoperable, useful, and structured.

Job Descriptions

Include a broad range of documents including formal job descriptions, job postings and skill profiles that describe job roles, responsibilities, requirements, and related job information.

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- Pima Community College
- Alamo Community College District
- University of Arizona
- Vametric
- Fit First Technologies
- Ain Shams University
- Dream2Career
- Placenets Consulting
- U.S. Department of Labor Workforce Information Advisory Council
- Arizona State University

- Western Governors University
- Southern New Hampshire University
- New Trust Lab
- ETS
- InnoEnergy Skills Institute
- IEEE Learning Technology Standards Committee (LTSC)
- Kerogen Ventures LLC
- Muzzy Lane
- Brookings Institute
- DePaul University
- University of Huddersfield
- National Governors Association
- Credential Engine
- University Professional and Continuing Education Association (UPCEA)

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