



Building a Skills-Based Talent Marketplace

Verifiable Credentials Wallets for Learning and Employment

AT A GLANCE

Skills-based practices make pathways to good careers more accessible to a wider segment of the workforce by focusing on what workers can do, not on the degrees or certifications they've earned. The verifiable credentials wallets highlighted in this market scan give learners and workers the tools they need to communicate the totality of their skills and abilities and translate their achievements into future opportunities.

Developed by



APRIL 2022

Contents

03 _____

Introduction

06 _____

Understanding the
Landscape

14 _____

Opportunities
for Impact

22 _____

Innovators to Watch

33 _____

Trends to Watch

38 _____

Conclusion

Introduction



Sharon Leu

Executive in Residence,
Jobs for the Future

As the U.S. economy recovers from the COVID-19 pandemic, the number of job openings is at a **20-year high**. But employers are **having trouble filling jobs** and the labor force participation rate has **stagnated**, with participation dropping especially fast among women, workers without a college degree, and those in low-paying service industry jobs—the same groups that were hit disproportionately hard by **job cuts** during the first year of the pandemic. This labor shortage is having a widespread impact on individuals and the country itself, contributing to record high inflation and costing the U.S. economy roughly **\$184 billion per quarter** in sales.

The labor shortage is also compounding the effects of existing barriers to social and economic advancement. Many workers who are unemployed or underemployed want full-time jobs that pay family-sustaining wages but are overlooked by hiring processes that rely on automated recruiting systems that aren't able to recognize or reward learning or experience that isn't formally credentialed. This excludes applicants who have some college but no degree and leaves an estimated 27 million capable workers “**hidden**” from employers and excluded from opportunities for advancement. This pool of hidden talent includes caregivers, veterans, immigrants, refugees, and others who aren't visible to the **75 percent of U.S. employers**—a figure that includes 99 percent of Fortune 500 companies—who rely on these automated systems.

The verifiable credentials wallets highlighted in this market scan are a critical nexus between employers, jobseekers, and learning providers.

They offer learners and workers the tools they need to capture and communicate the totality

of their skills and abilities. With verifiable credentials wallets, users can seamlessly blend learning from many sources and providers, across different experiences and spanning extended periods of time, strengthening their connections to institutions and opening up markets for innovation in high-quality, modular content. They can integrate these with digital assets that attest to skills they've earned over varied workforce experiences—through assessments or in military or community service, for example. Because these wallets are built on a foundation of open standards of interoperability, learners and workers can have confidence that the records they contain are transparent, secure, and can accurately express their skills as they pursue future opportunities.

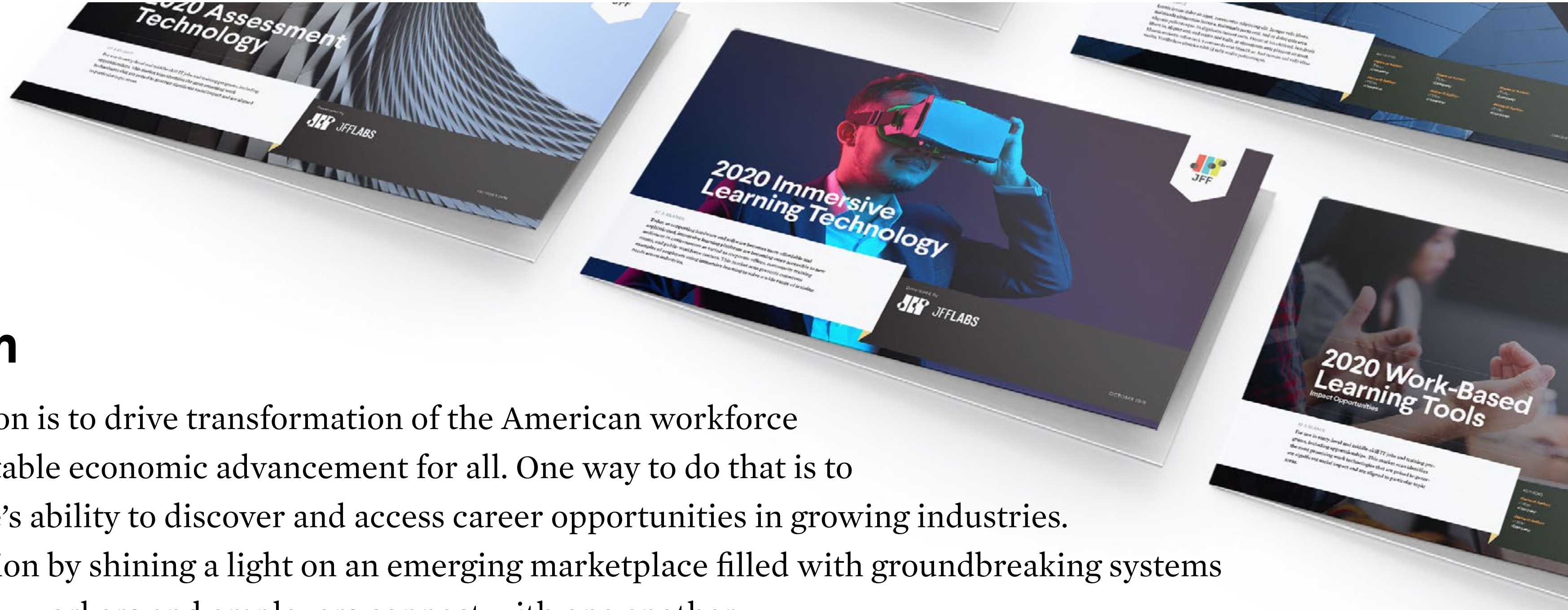
Companies also can benefit from the verifiable credentials stored in digital wallets. When jobseekers agree to share the skills data from their wallets to talent engagement platforms, companies can use this data to identify candidates from a more diverse talent pool. They can more efficiently place candidates, including those they have traditionally overlooked, in the right positions to fulfill their hiring needs.

This market scan describes critical functionality of verifiable credentials wallets and highlights the nascent marketplace of innovators who have adopted the open standards and design practices that allow learners and workers to maintain control over their data, giving them the flexibility to pursue any opportunity. As new innovators enter this sector, they will expand this shared vision of a new talent marketplace, to the benefit of employers, workers, and learners, and begin to close longstanding inequities in our economy. ●

“Every day, capable and passionate people are excluded from opportunities regardless of whether they can actually do the job, often because they don’t have a traditional degree or the right network. Whether their skills are developed through short-term courses, on-the-job-training, military service or community service, workers with the right skills should have access to opportunities. Digital credential wallets give people a way to manage and showcase skills in ways that tell the complete story of their abilities, which is key to advancing equity and opportunity for all.”

— Sean Murphy, Director, Opportunity at Walmart





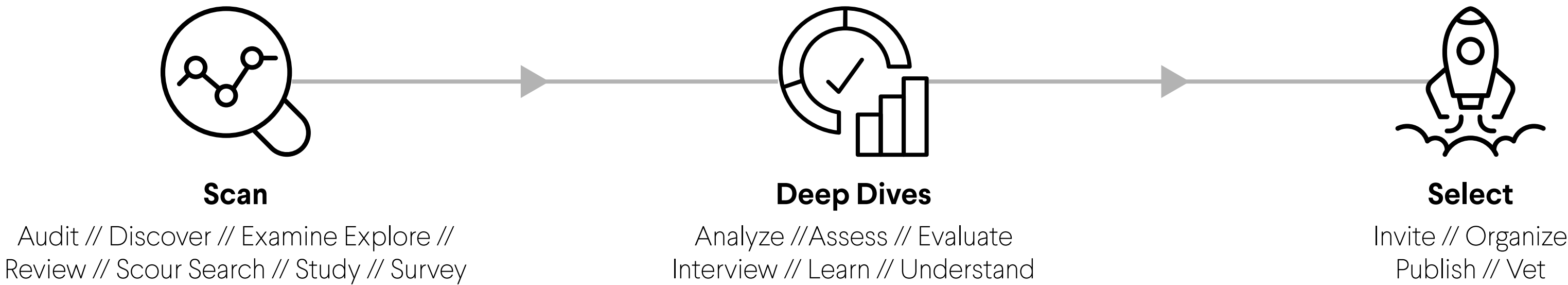
About This Market Scan

At Jobs for the Future (JFF), our mission is to drive transformation of the American workforce and education systems to achieve equitable economic advancement for all. One way to do that is to support initiatives that improve people’s ability to discover and access career opportunities in growing industries. This market scan aligns with that mission by shining a light on an emerging marketplace filled with groundbreaking systems and tools that can revolutionize the way workers and employers connect with one another.

We believe technology can revolutionize the way we live and work. It can help people be more efficient and productive, open access to new information, opportunities, and human connections, and allow us to solve bigger problems than we ever dreamed possible.

JFF Labs market scans dive deeply into technology landscapes offering solutions that are transforming work and learning in America today, uncovering impact opportunities, technology trends, market dynamics, and impact investment insights. Our market scans feature mission-aligned companies and nonprofit organizations of all sizes, from seed-stage startups founded by inspiring innovators and entrepreneurs to growth-stage organizations that are already creating significant social impact and business value.

Through our proprietary evaluation process, we review companies to assess their approach to and concern for social impact, and the traction their efforts have gained. We identify the most innovative and advanced technologies connecting people to rewarding jobs and careers, valuable education and training opportunities, effective workforce and education systems, and equitable, resilient opportunities for economic security and mobility—at scale.





Understanding the Landscape

The Transformed Talent Marketplace

Imagine if, instead of just getting a diploma recognizing their academic achievements, high school graduates could also receive credentials acknowledging the skills they gained through extracurricular activities, part-time jobs, and volunteer work. And then think of the advantages they'd have if they could continually add to their collections of achievements whenever they acquired new skills or experiences as they advanced along their education and employment pathways.

Digital wallets make that possible. People using wallets will be able to be recognized not just for the formal degrees they receive, but for all of their skills, whether they acquire them through formal or informal learning experiences, online or self-taught training, or workplace experiences. When people share the skills stored in their wallets with talent platforms and applicant systems, employers can search for workers with specific skills profiles that match their needs with full confidence in the reliability of these credentials. This will allow employers to engage with a broader and more diverse pool of talent than they might reach if they were looking for formal degrees alone. Employers will seek talent based on the skills they need in the workplace, thus inverting the traditional talent marketplace by recruiting learners and workers to apply for positions they might not have considered.

In the transformed talent marketplace, the **33 million adults** who attended college but did not graduate could curate their own education and employment pathways to adapt to their changing circumstances and priorities and pursue opportunities based on demonstrated skills and verified credentials, rather than relying on connections in their personal networks or going back to school to earn college degrees. Learners and workers could search for openings while giving employers the opportunity to find them based on their skills. Digital wallets would put learners and workers at the center of the talent marketplace by enabling them to own and control the evidence of their academic and professional achievements.

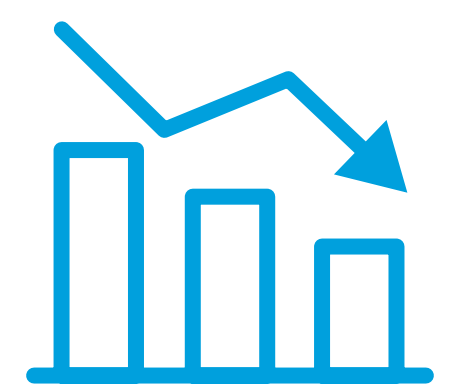
Gaining Traction

Employers are showing increased interest in skills-based hiring and digital credentials.

In 2019, global spending on postsecondary education and workforce training hit **\$2.6 trillion.**



In a 2021 survey, **34% of HR leaders** indicated that their organizations have adopted skills-based hiring strategies.



Companies that prioritize hiring hidden workers are **36% less likely to face talent and skills shortages** than organizations that don't hire hidden workers.

MORE RIGOROUS AND BETTER HIRING OUTCOMES

DIVERSITY, EQUITY, AND INCLUSION

According to a **2021 survey of HR leaders**, the top motivations for skills-based hiring include more rigorous and better hiring outcomes (cited by 66% of respondents) and diversity, equity, and inclusion (62%).

Understanding the Technology

Recording Lifelong Learning

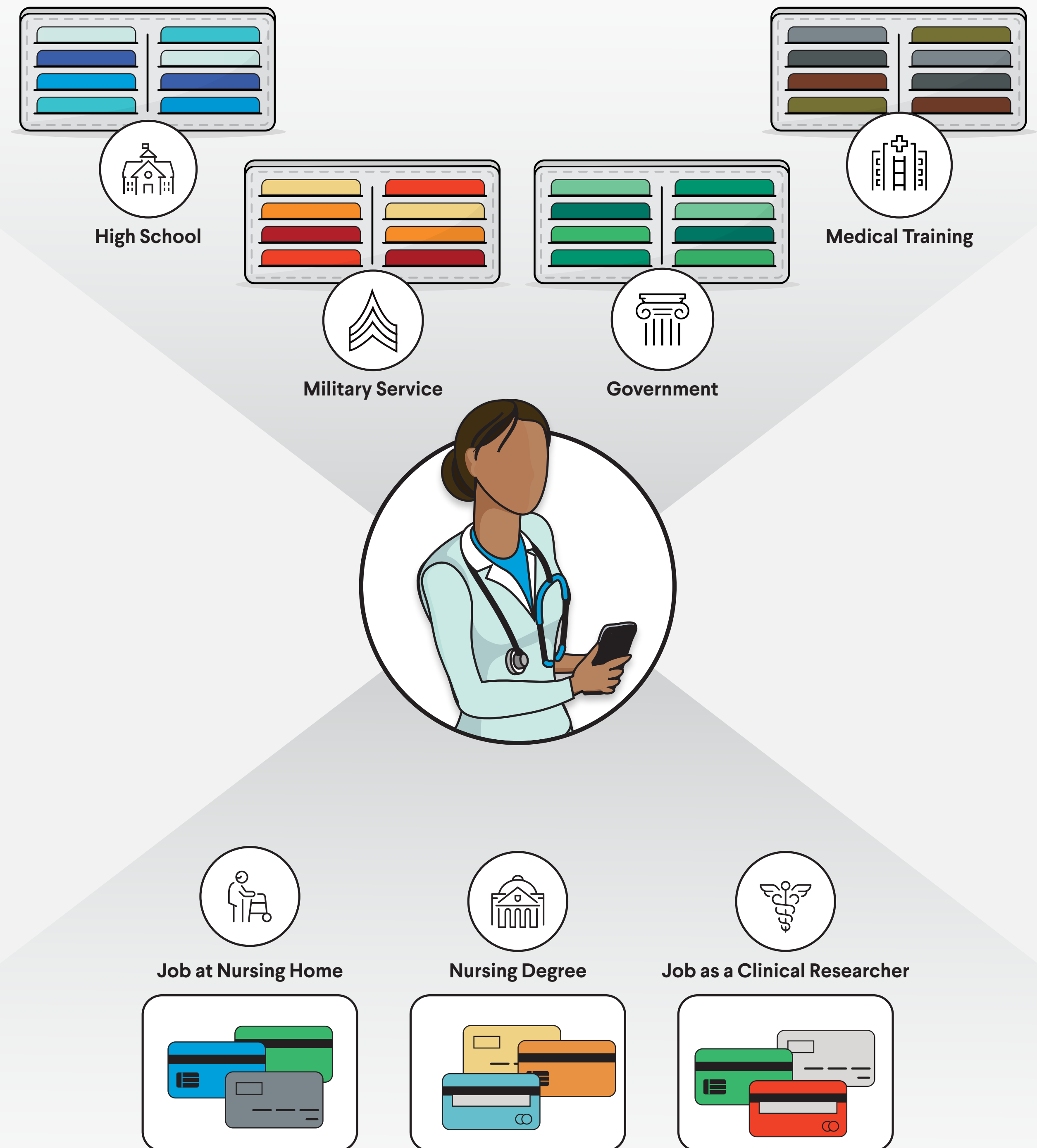
The digital wallets we discuss in this market scan are specifically designed to hold learning and employment records (LER), which are digital records of learning and work that can be linked to an individual and combined with other digital records for use in pursuing educational and employment opportunities. LERs can include information about a range of things, including employment history and past earnings.

A 2021 Credential Engine report identified [nearly 1 million unique credentials](#) that workers and learners in the United States could pursue. More than half of those were available through apprenticeships and other non-academic programs from providers offering badges, certificates, licenses, and the like. And nearly 10 thousand could be earned online. An LER documents learning wherever it occurs, including self-paced credential programs, informal learning experiences, on-the-job activities, or military service. For adults without formal degrees but whose work experience can qualify them for certain positions, the ability to easily share information in a digital wallet can open up new opportunities.

While there are various applications or tools that people can use to do some of these things, the digital wallets in the emerging market we explore in this scan are designed specifically to hold LERs and to give everyone the opportunity to issue, share, store, and verify their credentials—and thus translate their past accomplishments into future opportunities.

Curating Experiences

Like physical wallets, users can hold many types of credentials in different digital wallets.



With verifiable credentials, users will be able to choose which of these achievements to share as they pursue future opportunities.

Interoperability

Because there are so many types of credentials, and so many organizations and individuals issuing, receiving, and sharing credentials, interoperability is essential for wallets to become ubiquitous. To understand interoperability, think about the ways people access the internet. Despite differences in software and hardware, a variety of device types manufactured by countless companies are capable of accessing the internet because they all conform with certain technical standards. These standards define URLs—the locations of websites, HTTP—the protocol that makes it possible to view websites, and HTML and CSS—which provide instructions to web browsers so that they will display content and images as intended.

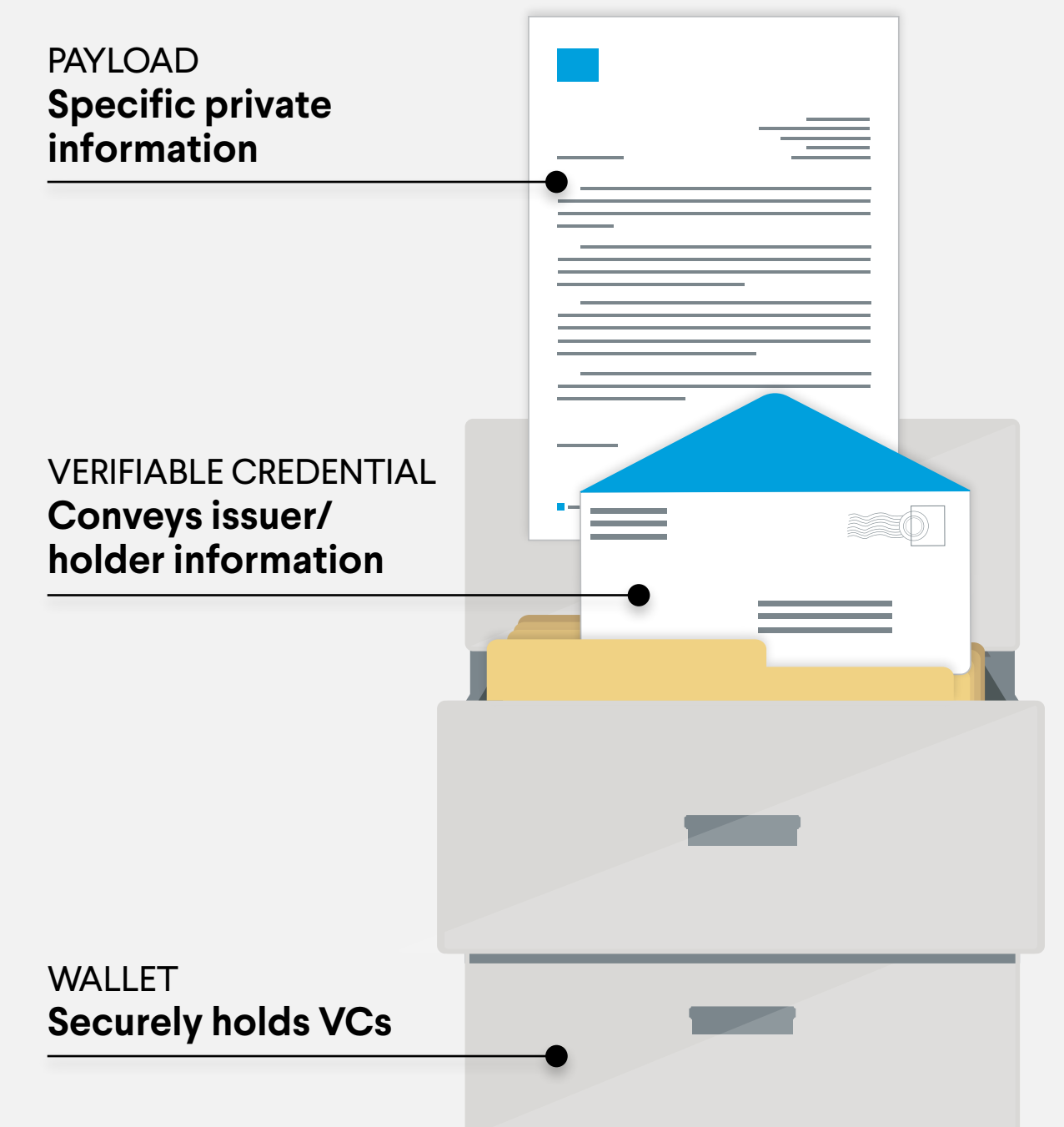
To ensure similar interoperability throughout the LER ecosystem, the community of wallet developers, credential issuers, providers of data integration services, and developers of any ancillary tools and systems need to agree on a common set of technical protocols and standards. Individual learners and workers are likely to own and use multiple devices, especially over the course of a lifelong journey of work and learning, and they will likely be issued credentials for different types of digital wallet applications from different schools, employers, and government agencies, with each wallet containing multiple types of credentials. An interoperable ecosystem will give individuals the flexibility to move their credentials between different wallets and share understandable and verifiable information with an array of employers, educational institutions, training providers, and others.

The [World Wide Web Consortium](#) (W3C)—the international standards body that develops protocols and guidelines to ensure interoperability on the Web—is playing a leading role in promoting interoperability for the LER ecosystem. The organization’s [Verifiable Credentials Community Group](#) is overseeing the development of the W3C [Verifiable Credentials \(VC\) Data Model](#), the emerging global standard for expressing credentials on the Web in a cryptographically secure and machine-verifiable way that preserves users’ privacy. The standard describes a secure, cryptographic relationship between the holders of credentials, the organizations that issue credentials, and the individuals and organizations that must verify credentials.

The digital wallets we highlight in this market scan all use the W3C VC specification. This means that they’re designed to accept, store, display and exchange verifiable credentials, creating a truly interoperable ecosystem that should give individuals the flexibility to use multiple systems without concerns that their credentials will be siloed into one vendor’s platform.

Inside a Digital Wallet

Digital wallets hold credentials. In the illustration below, the digital wallet is the file cabinet that can hold many credentials. The credential is the envelope and has information like who the information is about, who issued it, and the type of credential. More specific information about the credential can be found in the payload (depicted by the letter) such as level of mastery, assessment results or credit hours.



Verifiable Credentials

Credentials that conform with the VC standard are tamper-evident files whose authorship can be cryptographically verified. This differentiates them from other digital documents that might be used as credentials (such as PDFs of diplomas) because they allow verifiers (prospective employers, for example) to see information about the organizations that issued the credentials and the people who received their credentials. They also enable verifiers to ensure that the credentials haven't been altered and check the status of the credential to see if they have expired or been revoked. The VC standard provides structured terms to describe learning- and work-related records about who issued the records, who earned them, and how the records can be verified. All of this information is digitally encrypted within the VC and can be verified nearly instantaneously, with no need to engage with the issuer of the credential or any other entity. This digital foundation of trust allows prospective employers, institutions, and other entities to efficiently verify claims made by applications about their qualifications.

Verification, Validation, and Relevance

Though digital wallet technologies make it possible for individuals to send information to prospective employers or educational institutions instantaneously, staff at the organizations receiving them often still have to validate the accuracy and relevance of the information that credentials contain. This step is called validation, and the open standards used in VC-compliant credentials facilitate this process, making it easier for human resources specialists or admissions officers to carry out—as long as they, too, use VC-compatible systems.

Blockchain and Verifiable Credentials

Digital credential platforms that support the VC standard may be built on blockchains. Best known as the technology underpinning of the Bitcoin, blockchain is a type of shared, distributed ledger technology (DLT) that uses an agreed-upon and encrypted process to create a secure and decentralized record of transactions. DLTs store and manage information in blocks that are cryptographically linked and immutable. This ensures that the data on the blockchain is tamper-proof and can be trusted even without centralized, third-party validation.

“Verifiable credentials are the most ideally suited standard for educational credentials. They extend digital trust to individuals, allowing them to hold their records and exchange them in secure, reliable, privacy-preserving ways. Together with decentralized identity, individuals can be in control of digital assets, online identity, and reputation.”

— Kim Hamilton Duffy, Director of Identity and Standards, Centre Consortium



Supports for Self-Sovereign Identity

Currently, most people's identities are verified through third parties, including the government (via driver's licenses, for example), educational institutions (student IDs), or companies (like when you use a username and password for Facebook or Google to log in to multiple websites). VC credentials shift control of identity and personal data back to the individual through the principles of [self-sovereign identity](#) (SSI). With VC-compliant credential systems, individuals can create [Decentralized Identifiers](#) (DID), which are unique identifiers that they control and manage. Based on open standards, DIDs can be used as the identities associated with VC-based credentials. Individuals create DIDs using public key cryptography, which means they control the identity because they control the keys. Unlike identities provided by third parties, DIDs can't be taken away from the individuals.

When VCs are supported with SSI-compatible technologies, people can directly access and control their identity information as well as their learning and employment records, and they can also maintain the verifiability of the data. Systems built with [SSI principles](#) in mind may also support the following privacy practices:

- **Data minimization:** Limiting data collection to only what is required for a specific purpose
- **Progressive disclosure:** Initially sharing a small amount of information and gradually sharing more over time
- **Selective disclosure:** Allowing the holder to decide which pieces of information to share
- **Elective computation:** Ensuring that an individual's information is not used in any data analysis without their permission
- **Personal data stores:** Allowing individuals to control where their data is stored

DIDs offer immense benefits: They allow the user to control who gets access to which pieces of information, they are less prone to identity theft than other identifiers, they limit the ability of third parties to sell data about individuals, and individuals can access them even if an issuing institution closes. Given the vast number of individuals, industries, institutions and employers that can issue and receive credentials, having a decentralized identity verification system creates the strongest possible foundation for skills-based hiring, and it's a key benefit of using VCs with DIDs in digital wallets.



Opportunities for Impact

Opportunities for Impact

Workers miss out on opportunities if they aren't able to share the full breadth of their skills and experiences when they apply for jobs. When wallets are built on the VC standard, people can collect learning and employment records that represent everything they've achieved in all of their education and work experiences, whether formal or informal. They can store and share multiple credentials in multiple wallets and know that their data is secure because the VC standard ensures that they alone have access to and control of who can see their information in the wallet. Digital wallets also allow users to compile and collate different VCs into verifiable presentations that they can share with people who request certain types of information. For example, VC users who apply for jobs that have specific requirements, such as language proficiency or proof of citizenship, can pull all of the relevant information from any of their wallets and share it with the parties that need it.

Learners and workers have many options for how to manage their credentials today. For example, for official academic transcripts that are owned and controlled by institutions, learners may request an official copy as they need it. Upon completion of online courses, learners may choose to upload a link of their achievement to LinkedIn or other professional or social networking sites. None of these solutions allows learners to have perpetual access to their credentials or ensure the veracity of their data. Because of this, Jobs for the Future is focusing solely on digital wallets that are capable of accepting, storing, displaying, and exchanging VCs. Tools and applications with these capabilities enable users to receive and share information securely in a trusted manner.

As we evaluated the digital wallets, we analyzed technology trends and interviewed experts. That research revealed that VC-based digital wallet solutions could have a significant impact on efforts to enhance equity in the work and learning ecosystem if innovators take advantage of opportunities to develop systems that support and advance the following four priorities: lifelong learning, individual agency and control, privacy, and universal accessibility.

We examine each of those opportunities for impact in more depth here, focusing on the ways in which VC wallets can make a difference in the life of a learner. We also offer questions for employers, education and training providers, and workforce development professionals to consider as they evaluate wallet solutions.



1

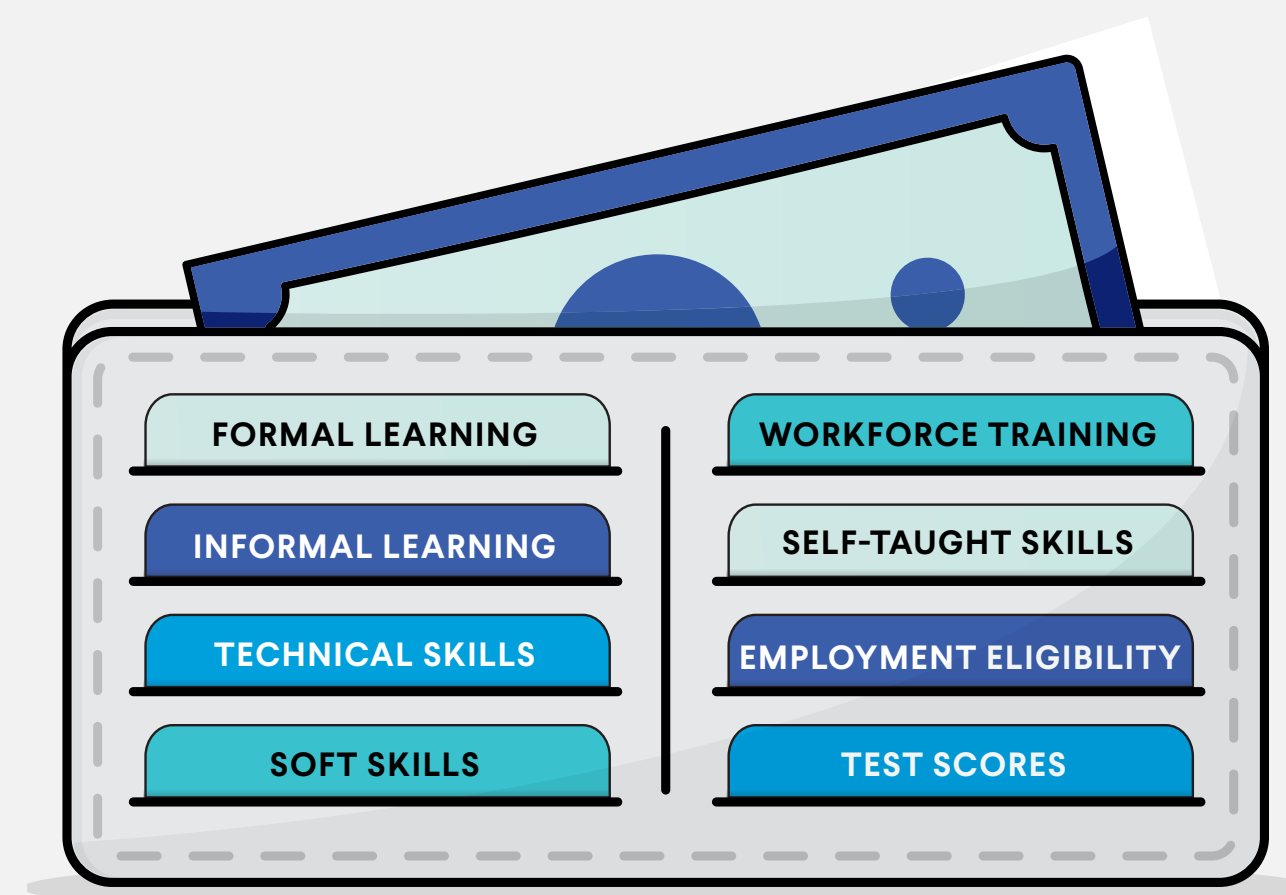
Lifelong Learning

Digital wallets need to hold a wide variety of verifiable learning and employment records that reflect people's achievements over lifetimes of learning and work. This will enable individuals to keep track of the skills and work experiences they have accumulated as they advance from job to job, pursue new learning opportunities, and consider new options throughout their careers.

Open Standards for Interoperability

Just as the ways people can learn have proliferated, ways of describing learning have also increased. In order for learners and workers to maintain unified records of their lifetime academic and work experiences, and for those records to become the foundation of a skills-based education and employment marketplace, the data in digital wallets must adhere to open standards for interoperability. Standards include [Open Badges](#), a digital, online representation of a skill, interest, or achievement that can be verified through credible organizations, and [Credential Transparency Description Language \(CTDL\)](#), which provides a linked open data structure for descriptions of credentials and related information, including degrees, diplomas, licenses, certificates, badges, professional and industry certifications, skills, and occupations.

Collect Various Types of VCs Throughout Your Life



Questions to Consider

Here are three questions that can help you determine whether a digital LER wallet supports lifelong learning:

1. Is the wallet built based on open standards that enable interoperability so that workers and learners can store a wide variety of verifiable credentials from various sources without loss of meaning using decentralized identities that they control?
2. Will the wallet allow workers and learners to receive and share those verifiable credentials with applications and platforms used by institutions and employers?
3. Will users be able to continue to access their credentials even if the organizations that issued them go out of business or otherwise cease operations?

2

Individual Agency and Control

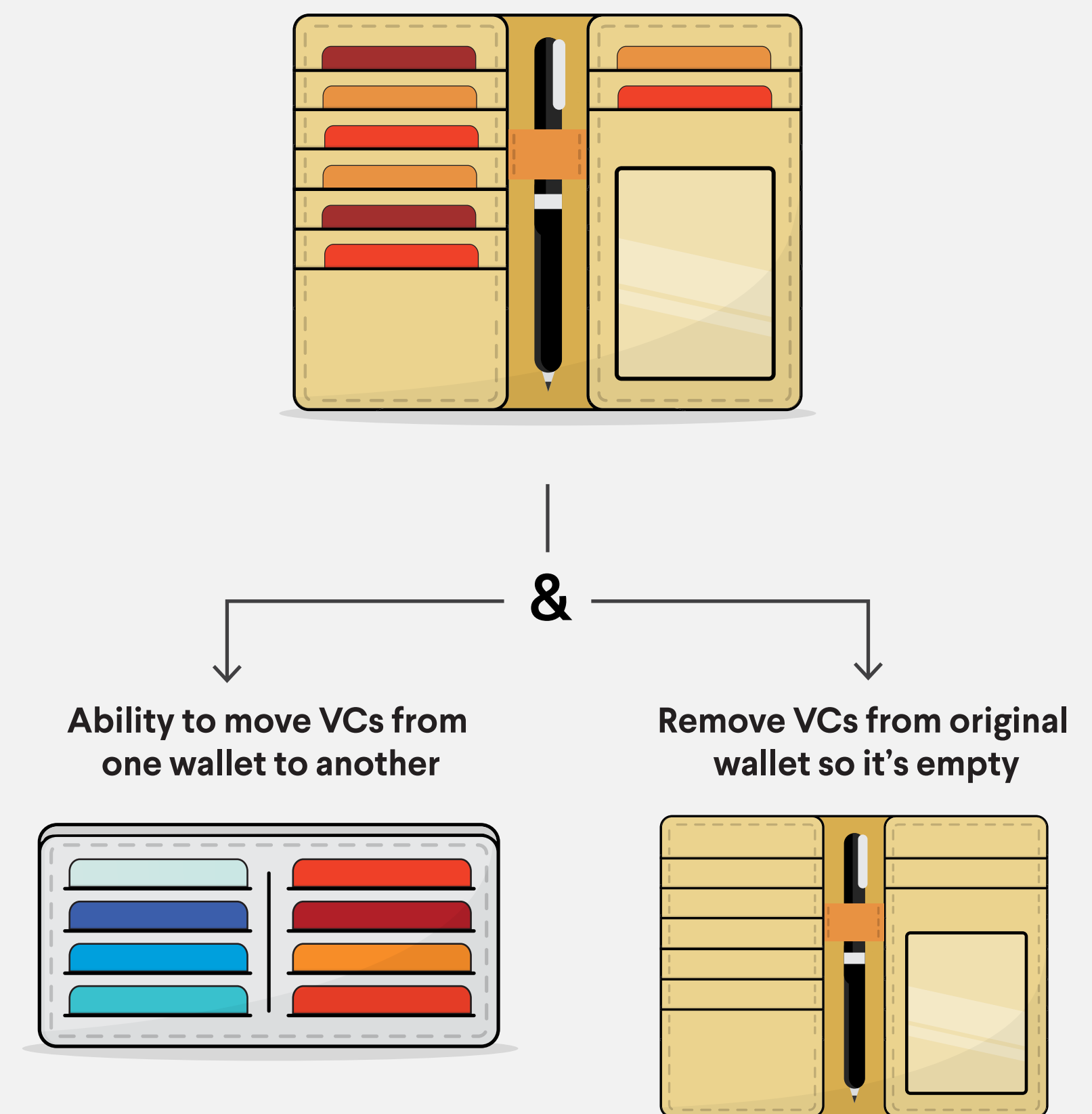
Digital wallets that support SSI principles allow users to have agency and control over their credentials. This means that organizations must request permission from users before issuing credentials to their wallets. It also means that, once users have received credentials, they will be able to access them at any time, control who can see them, and combine credentials to generate profiles.

Guardianship

In some instances, there may be legal reasons or technical factors that prevent individuals from controlling their digital identities. That could be the case, for example, with workers and learners who are minors, people experiencing homelessness, refugees, asylum-seekers, incarcerated individuals, and anyone else who doesn't have access to tech devices or internet service or can't be self-sovereign for some reason.

In these cases, digital identity credentials stored in wallets require a mechanism of guardianship that ensures that the technology works alongside existing identity frameworks and supports the legal, social, and organizational processes that individuals cannot digitally transact themselves. Most important, within this framework, fiduciary, automated, and/or custodial wallets implementing guardianship mechanisms must ensure that while individuals can temporarily assign maintenance of credentials to another entity, they can reclaim their self sovereign identity at the appropriate time.

Individual Agency & Control



Questions to Consider

Here are three questions that can help you determine whether a digital LER wallet supports individual agency and control:

1. If users decide to use different wallets, will they be able to take their credentials to those wallets or request deletion of their credentials?
2. Is the wallet based on open standards that enable users to create custom profiles of their credentials, including those stored in other wallets, to share with applications, platforms, or people?
3. Does the wallet allow users to choose where they store their data?

3

Privacy

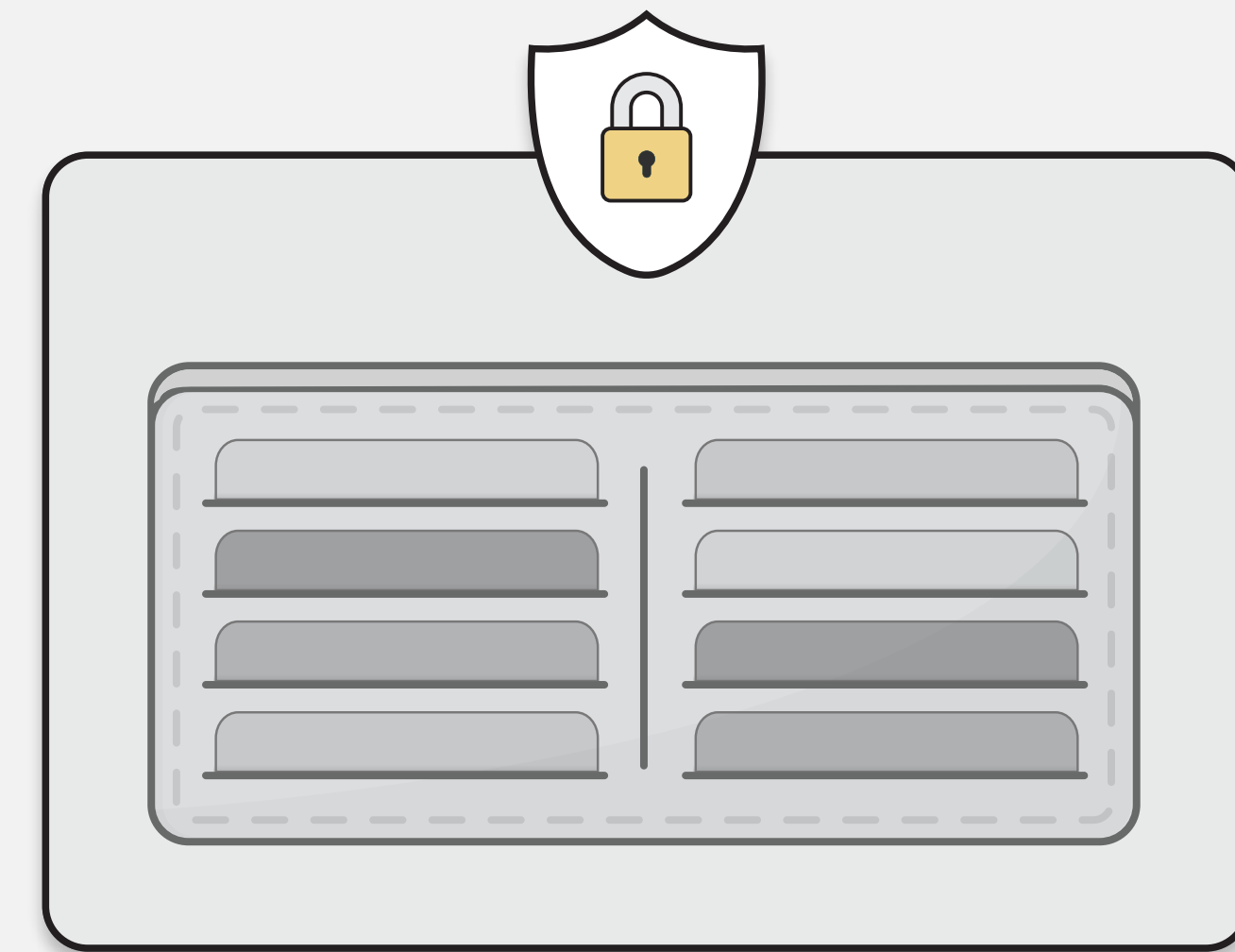
Digital wallets store personal information, and they should be capable of protecting that information. They should be designed to ensure that the credentials they contain are not visible to anyone—including the wallet developers—without the rightful user’s consent.

Personally Identifiable Information

Developers of digital LER wallets must understand the laws and regulations governing the use of personally identifiable information (PII) in general and educational credentials in particular. In the United States, federal laws that wallet developers should comply with include the [Family Education Rights Privacy Act](#) (FERPA) and the [Children’s Online Privacy Protection Act](#) (COPPA). In addition, many states have their own privacy laws, and the European Union’s [General Data Protection Regulation](#) (GDPR) may be applicable in certain instances.

Wallets should be developed in accordance with the principles of the [Privacy by Design](#) framework, which calls for developers to prioritize consumer privacy throughout the design and engineering process.

Privacy



Questions to Consider

Here are two questions that can help you determine whether a digital LER wallet supports privacy:

1. Will users be able to select the amount and type of information they would share with others?
2. Can users easily change tracking preferences and privacy settings and find out whether—and if so, how—wallet developers are sharing their data?

4

Universal Accessibility

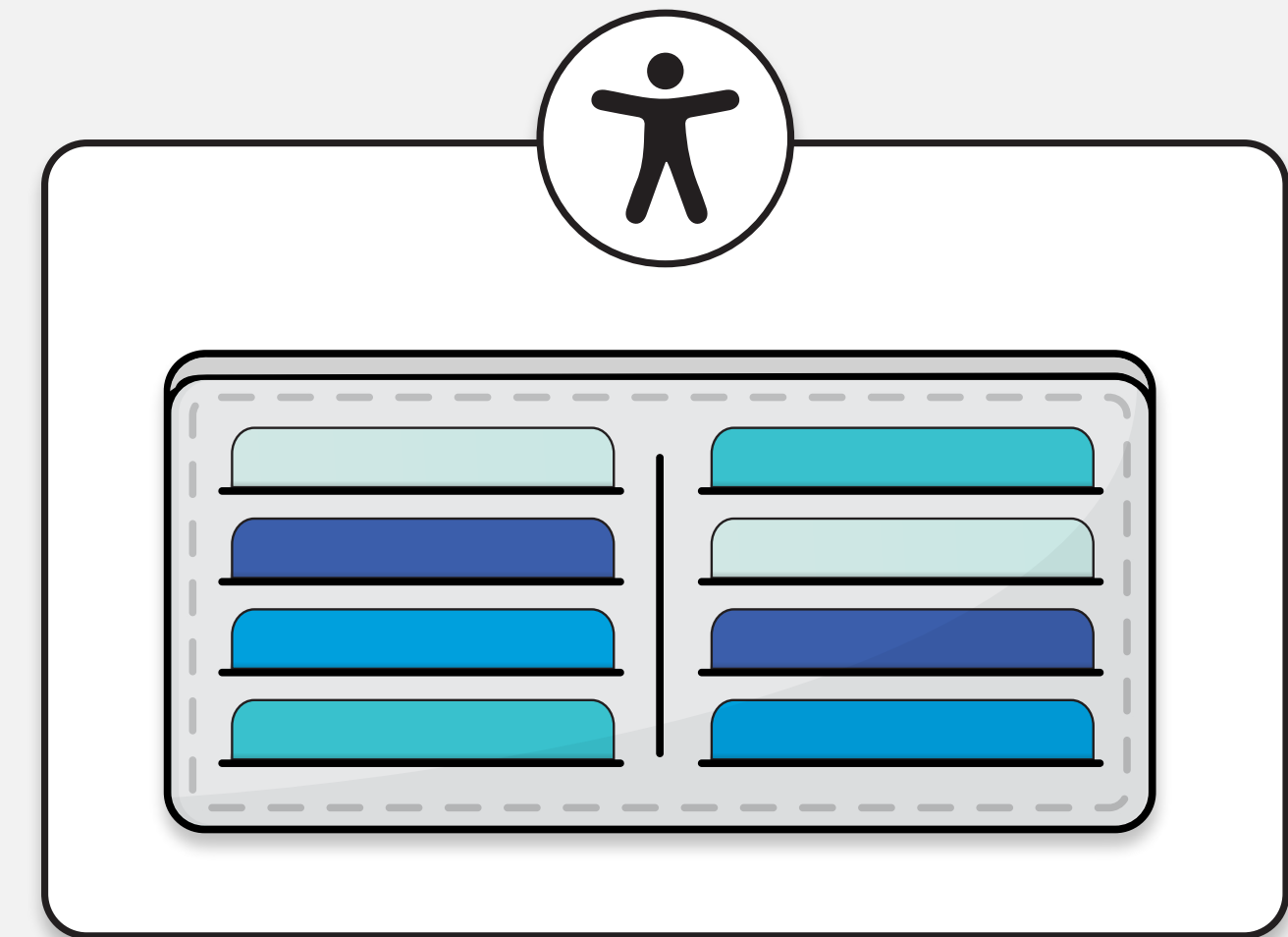
We envision wallets as tools that can make the labor market more equitable and help give everyone opportunities to achieve economic advancement. That means they need to be accessible to a wide variety of users, including individuals with varying physical and learning abilities, people who lack access to tech devices and broadband service, and those who have limited experience using digital tools.

A best practice for ensuring inclusive, learner-centered design is for wallet developers to employ [Universal Design for Learning \(UDL\)](#) principles in the design process. This proactive design approach can reduce the need to make costly individual accommodations to technologies that are inaccessible to certain users or implement remedial measures in order to conform with applicable legal requirements.

Civil Rights and Accessibility

Colleges and universities have a legal obligation under federal civil rights law, including Section 504 of the Rehabilitation Act of 1973 and the Americans With Disabilities Act of 1990, to ensure that educational technology is accessible to students with disabilities in a way that permits those students to receive all the benefits of the technology in an equally effective and equally integrated manner. For their part, public agencies can drive improvements in accessibility through the terms they require vendors to meet in their procurement agreements.

Universal Accessibility



Questions to Consider

Here are three questions that can help you determine whether a digital LER wallet supports universal accessibility:

1. Did the wallet's developers employ a Universal Design for Learning (UDL) approach when designing the architecture?
2. How can users with limited access to tech devices or broadband internet gain access to their credentials?
3. What is the onboarding process for users who have limited experience using digital tools?

A Note on What Is Not Included

The ecosystem of organizations that offer products and services capable of managing and tracking certifications and other learning and employment records extends well beyond our five innovators to watch. Because we chose to focus only on publicly available solutions that adhere to the W3C VC standard and are designed to give individuals control of their records, we omitted the following:

- Tools and applications that only issue or verify credentials (such as Accredible, Credly, or Badgr) or facilitate services such as [career navigation](#) or [online learning](#). These are part of the ecosystem, but they aren't digital wallets. We focused on wallets because they are the only products on the market that individual learners and workers can use directly.
- Wallets that are VC-compliant but aren't equipped to hold learning and employment records. Technically, VC-based LERs can be added to any wallet that conforms with the VC standard, but users would only be able to display their education and employment credentials in wallets that aren't specifically designed for LERs—they wouldn't be able to create curated presentations of specific records or otherwise manage their information. Solutions that fall into this category include EarthStream from Mesur.io, Metal Trail from Mavennet Systems, and Veres Wallet by Digital Bazaar.
- Wallets that hold learning and employment records but are not yet fully aligned with the W3C Verifiable Credentials Data Model. These wallets don't support interoperability, and the credential data they contain can generally be used only in closed ecosystems. In order to achieve their full potential, LER wallets must be able to work with data from multiple sources, including systems in other sectors such health care, to ensure that they can accommodate all of the information people need to pursue additional education or employment opportunities. This interoperability is only possible through VC compatibility. While we did include established companies whose products predate the VC standard and have VC compliance on their product road maps, we omitted non-VC products that are in earlier stages of development.
- Digital wallets that hold educational and employment records but keep the data in central repositories and don't allow users to control their own records. For learners to be empowered in the education and employment marketplace, they need to be able to manage personal records, and we omitted wallets that don't allow them to do that. Offerings in this category include the National Student Clearinghouse (NSC) MyHub wallet, which is currently being piloted as the Indiana Achievement Wallet.
- Systems that currently aren't available for people to download and use. We understand that this is an emerging marketplace with rapidly developing technologies, and we cover products that are currently in pilot trials or closed beta tests in our list of early implementations below. But for the purposes of this scan, we focused primarily on products that are ready for workers and learners to begin using today.



Innovators to Watch

Innovators to Watch

We narrowed the field from hundreds of digital wallets to those that workers and learners could use to both store and share their learning and employment records. Of the options that met those criteria, we only profiled the ones that use the W3C Verifiable Credentials (VC) standard and are currently in use and available to the public. That group is made up of the following companies: Diwala, Gataca, iDatafy, MATTR, and Tykn.

We also include snapshot profiles of two other offerings, Blockcerts and GreenLight Credentials, that were introduced before the VC standards were developed but whose developers plan to make them compatible to the VC standards. Since these are established companies with a product that is open to the public, we've chosen to mention them with the understanding that they will soon transition to using VCs.

Wallets created by all of our innovators to watch provide solutions that illustrate at least one of the four areas where we see opportunities for impact, and we highlighted what most impressed us in their profiles. Because these products are all engineered to conform with the VC standard, they currently offer—or will soon offer—the following (some companies plan to add these features to upcoming versions of their wallets):

- The ability to hold both formal and informal learning credentials, including self-attested credentials.
- The capacity to be prepopulated with credentials the a user has already earned, usually through partnerships with institutions that issue credentials.
- Functionality that enables users to revoke access to their records. This capability is available to both entities that issue credentials and individual workers and learners.
- Support for selective disclosure of information in the wallet. This means that users can choose to share only some pieces of information, but not every detail.

Some companies allow users to download credentials as PDFs or enable users to make credentials accessible both via mobile devices and on the web. They made their choices about which options to offer based on the needs of their intended user base and community.





DIWALA AT A GLANCE

diwala.io

Product Launched: 2018

Used in: Botswana, Ghana, Kenya,
South Africa, Uganda, and Zimbabwe

What does Diwala do and who are its products designed for?

With a target market of young people in developing countries and members of displaced communities, Diwala offers a blockchain-based platform and mobile application that enable educational institutions and other organizations to safely issue secure credentials that people can use to verify their identities and offer proof of their education and employment histories. The company piloted its wallet in six countries in Africa, where issuing an official academic certificate can cost \$5 to \$15 and take three to six months. Its system uses VCs that are delivered via secure multi-messaging notification platforms.

Diwala was founded in July 2017 at the Katapult Future Festival in Oslo, where its founders were members of a team that was one of three winners of a blockchain hackathon organized by UN Women and Innovation Norway. Competing with technology innovators from around the world to create blockchain-based digital identity platforms and other tools for refugees, the Diwala team designed an app that assigns “Diwala tokens” that women could use to verify their skills or buy and sell services.

How does using Diwala give individual learners and workers opportunities for mobility?

When they created the Diwala wallet, the company’s developers truly thought about the needs of all of their end users, including the employers and other organizations that accept the certificate—not just the individual learners and workers who

use the credentials and the organizations that issue them. User research indicated that employers were more likely to accept certificates that resembled paper credentials, so Diwala designed its certificate to look like an official paper document. Other research showed that many people in their target markets either don’t have phones with adequate storage or don’t have access to smartphones at all. To address that problem, the Diwala platform was designed to hold any credentials that are issued on a user’s behalf and the company makes its certificates web-accessible. Diwala’s product road map includes a plan to develop a credential transfer system that enables users with access to more advanced technologies to hold and manage their own credentials.

Why did JFF select Diwala?

Diwala keeps the needs of all users in mind and thinks deeply about the accessibility of its solutions. The company also makes an effort to mirror the diversity of its users by intentionally recruiting and hiring people whose backgrounds are similar to those of its customers—not only from a cultural perspective, but also on the basis of lived experiences: Diwala employees have had direct experience overcoming the challenges of obtaining their own credentials. The company’s current workforce includes people from Uganda, Kenya, Nigeria, Norway, Trinidad, Sri Lanka, and India.



GATACA AT A GLANCE

gataca.io

Product Launched: 2019

Used in: European Union

What does Gataca do and who are its products designed for?

Gataca is a cybersecurity company that provides decentralized identity management technology to users of its wallet, with an emphasis on functionality that supports information authentication to prevent identity fraud. Founded at MIT in 2017, Gataca has developed a blockchain-based SSI solution. The company aims to drive multi-regional adoption of credential wallets by developing an agnostic technology standard that enables interoperability of vendor certificates and wallet platforms.

The European Commission selected Gataca to be an early adopter of the European Blockchain Services Infrastructure (EBSI), which is designed to support cross-border delivery of services for the public good. The company is currently working with higher education institutions throughout Europe to scale a system to authenticate student IDs, academic diplomas, and transcripts.

How does using Gataca give individual learners and workers opportunities for mobility?

Europe has a high degree of student mobility. Many postsecondary institutions have exchange programs, and many students start a degree in one country and finish in another. Once

verified, the student ID in Gataca's wallet allows students to use all of a university's systems, from those that control building access to those that safeguard digital academic resources. Gataca's technology also authenticates student records and transcripts from universities across Europe.

Why did JFF select Gataca?

The verified decentralized identity in Gataca's wallet can be used not only for the transfer of academic records, but also for many aspects of student life, allowing users to access all of a university's facilities and academic resources. Using principles of self-sovereign identity, Gataca has created technologies that allow student IDs to become a starting point for facilitating mobility within and outside of the higher education ecosystem. Among other things, Gataca's wallet platform makes it possible for students to download records automatically, self-authenticate their own skills, choose which pieces of personal information they want to reveal using selective disclosure functionality, and revoke access to records they had previously agreed to share.



IDATAFY | SMARTRESUME AT A GLANCE

smartresume.com

Product Launched in: 2018

Used in: Arkansas

What does iDatafy's SmartResume do and who is it designed for?

SmartResume is a blockchain-based platform developed by iDatafy that trusted iDatafy partners, including educational institutions and workforce skill certifiers, can use to record the academic achievements, leadership experiences, and job skills of their current and past students. Individuals who have SmartResumes own the data stored in these digital portfolios, and they are free to share it with third parties. And because all of these learners and workers have at least one certified skill or achievement in their SmartResume files, they make up a trusted talent marketplace where employers can confidently search for job candidates who have proven skills.

SmartResumes come preloaded with credentials users have already earned from one of iDatafy's trusted partners. Learners and workers can update their SmartResumes with credentials from organizations that aren't iDatafy partners, but these experiences are marked as unverified.

How does using iDatafy's SmartResume give individual learners and workers opportunities for mobility?

SmartResume has an open ecosystem that allows users to add both traditional and nontraditional learning and employment records to a single digital file and share the information with current and potential employers. Employers can search the

SmartResume talent marketplace for people who have the skills, experience, and educational background they need to fill openings for both blue- and white-collar jobs. SmartResume holders can opt in if they're interested in being contacted about positions they might not have considered.

Why did JFF select iDatafy's SmartResume?

SmartResume takes a familiar hiring tool—the resume—and enhances it with new layers of convenience and trust. The SmartResume platform gives jobseekers an easy way to share their learning and employment records with organizations inside and outside the SmartResume ecosystem; it also provides them with a readily accessible means of maintaining consolidated records of their skills, experiences, and educational accomplishments. And because many of the credentials on SmartResumes are certified, employers can have confidence that the people they find in the SmartResume marketplace have the qualifications they say they have. Moreover, thanks to iDatafy's partnerships with educational institutions and workforce skill certifiers, SmartResumes come preloaded with credentials learners and workers have already earned from those partners, which lowers the barriers to entry for people who might be unfamiliar with digital resumes or those who have limited experience with digital tools in general.

MATTR

MATTR AT A GLANCE

mattr.global

Product Launched: 2020

Used in: Canada, New Zealand

What does MATTR do and who is it designed for?

MATTR is a New Zealand company whose stated goal is to find ways to make decentralized identity and verifiable credentials “easy and intuitive to use for as many people as possible.”

First released in June 2020, the company’s mobile wallet for smartphones features a simple user interface to allow people to interact with and receive credentials from issuers and present credentials to third parties.

The company is developing a number of credential systems for the health sector, including a COVID vaccine pass app for New Zealand residents. MATTR also offers a solution in Canada that provides learners, educational institutions, government agencies, employers, and other organizations with a fast and easy way to issue and share transcripts, diplomas, credentials, badges, and other academic documents.

MATTR believes that adoption of wallet platforms and applications will gain traction as users become accustomed to using the technology for documents and credentials they need on a daily basis, such as vaccine records and driver’s licenses. The MATTR team has done extensive usability research on the factors impacting broad adoption of wallets, and the company says the results indicate that crossing the threshold of seven wallet-based credentials that people are likely to use every day greatly increases the likelihood that people will accept wallets and grow comfortable using them. This holistic approach to scaling user

adoption will benefit all organizations that develop wallets and issue and share credentials.

How does using MATTR give individual learners and workers opportunities for mobility?

Learners and workers can also use MATTR’s wallets to access social services. For instance, users could share their verified credentials to prove that they are eligible to participate in food assistance programs. Benefits like those can improve educational outcomes—and, in turn, increase opportunities for economic advancement—by increasing the likelihood that students experiencing food insecurity or other financial barriers will persist and graduate.

Why did JFF select MATTR?

Of all the companies we reviewed, MATTR’s focus on privacy and its ability to support selective disclosure was the most mature, allowing users to choose what pieces of information they want to share from the various credentials they hold in their wallets while preserving cryptographic integrity. MATTR is committed to interoperability, and its use of decentralized identifiers allows learners and workers to easily move credentials between sources.



TYKN AT A GLANCE

tykn.tech

Product Launched: 2017

Used in: Ethiopia, Kenya, Malawi, Thailand, The Netherlands, USA, Turkey, South Africa

What does Tykn do and who is it designed for?

Tykn is a Netherlands-based startup that develops blockchain-based self-sovereign decentralized identity solutions. The company works with other startups, governments, and international nongovernmental organizations. The Turkish ministry of foreign affairs is piloting Tykn's digital identity platform to accelerate the distribution of work permits to the 3 million refugees in the country, many of whom have lost access to the official IDs they had been issued in their home countries.

Organizations that integrate their systems with Tykn's platform will be able to convert any user credentials—from a simple email address to an entire passport—into tamper-proof credentials that comply with the W3C VC standard. Individual users are provided with web-based digital ID wallets that hold their credentials. Users can be verified and authenticated via the blockchain.

How does using Tykn give individual learners and workers opportunities for mobility?

Tykn developed its blockchain-based digital identity management platform for the “invisible people” worldwide who either never had an ID or have lost their official documentation. Without the proper paperwork, these individuals are unable to access health care services, enroll in education and training programs, access financial services, or apply for jobs. The founders of Tykn strive to create more opportunity for these people by providing them with secure access to their digital identities.

Why did JFF select Tykn?

Tykn takes into account the needs of users in different countries and of varying socioeconomic backgrounds who may not have access to the type of technology needed to use a wallet. The Tykn wallet is available on both smart mobile devices and feature phones. Credentials for feature phones are issued in simple SMS text format through an API. Of the systems we reviewed, Tykn's solution comes the closest to providing a truly decentralized identity platform based on the SSI principles, and at the same time, the company recognizes that, given the limitations of public telecommunications infrastructures in many parts of the world, it may not be possible to deploy a fully integrated DID systems in certain countries.

These two companies have established digital credential products that will soon conform with the W3C Verifiable Credentials data standard.

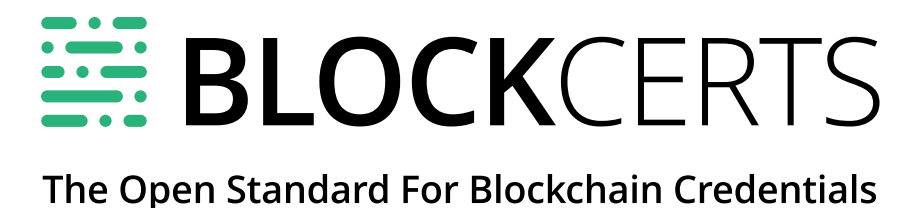


GreenLight Credentials

glcredentials.com

GreenLight Credentials offers a blockchain-based product that learners can use to store and share education credentials from elementary school through college. GreenLight's pilot demonstrated that it could format and exchange records according to institutional specifications for three types of institutions: community colleges, K-12 schools, and four-year universities in the Dallas, Texas, area. GreenLight's platform also enables reverse transfer information to be built into records, providing students and institutions with transparency into credits earned and the credits still needed to earn a degree.

Founded in 2017, GreenLight predates the development of the W3C Verifiable Credentials standard, but it has emphasized alignment with the VC standard on its product road map.



Blockcerts

blockcerts.org

Launched in 2015 as part of an MIT Media Lab project, Blockcerts provided one of the first standards for creating, issuing, viewing, and verifying credentials on the blockchain. Many educational institutions and training providers in the United States and around the world use Blockcerts to issue digital certificates and diplomas to students. Students who have received Blockcerts credentials can access them through the Blockcerts wallet.

At this time, the Blockcerts wallet cannot store other forms of credentials. In December 2021, Blockcerts released [Blockcerts v3](#), an updated standard that aligns the Blockcerts data model with the W3C Verifiable Credentials standard and proposes a method for providing support for Decentralized Identifiers.

Early Implementations of VC wallets

Here's a rundown of digital wallet products that are currently in the early implementation or pilot phase. These wallets all support the VC standard, but were not available for public use or were still in development at the time of publication. We are looking forward to watching them develop.

Arizona State University Pocket

pocket.asu.edu

Arizona State University is developing Pocket, a digital wallet and portfolio, that allows ASU students to manage their digital student credentials and records. The wallet is due to be deployed in the fall of 2022, and one of ASU's goals is to create a network of U.S. institutions that use it. Pocket will allow students to store their grades and other records to present a holistic picture of their academic achievements. Students will also be able to store portfolios that feature work submitted for courses, skills endorsements, and internships. Pocket will also support the exchange of reverse transfer student data, allowing students to earn associate degrees from their bachelor's degree coursework. This model of data exchange offers a secure solution that eases administrative burdens and enables more efficient student transfers.

Learner Credential Wallet by DCC

lcw.app

Founded in 2018, the Digital Credentials Consortium's goal is to create a "trusted, distributed, and shared infrastructure that will become the standard for issuing, storing, displaying, and verifying academic credentials digitally." The organization's [Learner Credential Wallet](#), an open-source wallet for verifiable credentials, is a reference implementation of the W3C [Verifiable Credentials data model](#) and the draft W3C [Universal Wallet](#) interoperability specification. (A reference implementation of a technical standard is a prototype software application that's designed to demonstrate how other systems based on the standard should work.) The Digital Credentials Consortium is piloting the wallet with MIT, the Georgia Institute of Technology, College Unbound, and San Jose City College.

C.TI Wallet by Convergence.Tech

convergence.tech

Convergence.Tech delivers next-generation digital badges in partnership with 30 institutions in 10 countries. These badges document student competencies and outcomes in skills-based learning programs using open and interoperable standards that allow students to easily present data and share credentials to allow anyone to validate their authenticity. The C.TI Wallet also allows students to stack credentials that can demonstrate mastery and create flexible learning pathways that help them visualize their routes to greater achievements.

Super Skills

learningeconomy.io/post/superskillstech

Created by the Learning Economy Foundation in partnership with the Lego Foundation, Super Skills is a learning game ecosystem for kids ages 5 to 12 that includes a wallet that players use to store credentials they acquire as they achieve milestones while gaming. Players can exchange their credentials for prizes, like a Lego set. Super Skills is designed to showcase the W3C Universal Wallet, a package of standards that includes DIDs and VCs, and open-source frameworks from MIT, Transmute, and the Learning Economy Foundation. It also introduces children to the basics of digital identity systems, perhaps laying the foundation for continued use of digital wallets and related technologies throughout their lifetimes.

Talao

talao.io

The Talao professional credential wallet is a user-centric SSI solution for the HR industry. The wallet allows freelancers to prove their identity, skills, and credentials when joining gig platforms, enabling frictionless onboarding. With the Taleo wallet, Jobseekers can share their career records without multiple background checks and verification, and they can present their work experiences as certified credentials. Talao's offering benefits employers by reducing resume fraud and accelerating the recruiting process. Talao follows European Self-Sovereign Identity Framework (ESSIF) recommendations to enable compliance with the upcoming EU Digital Identity toolbox, and it has been chosen by the Ministry of Luxembourg as the technology solution for the prototype Lux Resident Card.

The Open Credential Publisher Wallet by Randa Solutions

opensource.ieee.org/ilr/ocp

North Dakota officials use the Open Credential Publisher to publish formal educational records, including comprehensive learner records, badges, and collections of other credentials as verifiable credentials on the [North Dakota State eTranscript](#) platform. The system supports multiple methods of sharing and verifying credentials. The web wallet will allow students and their guardians to access all of their credentials stored in the North Dakota State Longitudinal Data System.

The Teacher Wallet by Randa Solutions

lifelonglearnerproject.org

As part of the Lifelong Learner Project, Randa has introduced a blockchain-based solution called the Teacher Wallet, which is designed to give teachers control over their licensure and credential data and serve as a secure repository for their intellectual property, such as lesson plans and curriculum designs. The wallet can help teachers navigate the complex process of accessing and applying for teaching opportunities. It can also benefit school districts by streamlining the process of identifying, recruiting, vetting, and hiring qualified teachers—especially teachers of color. The Utah State Board of Education, ETS, and Digital Promise are founding members of the Lifelong Learner Project.

The Velocity Career Wallet

velocitycareerlabs.com

The Velocity Network is a blockchain-based open-source verifiable credential exchange utility layer that provides standardized communication protocols, governance, compliance, and payment rails, enabling trusted, private and secure exchange of career and education credentials between individuals and organizations. The Career Wallet was launched in 2022 as a free app that gives individuals a way to claim, store, manage, and share their career credentials through the Velocity Network.

Walt.id

walt.id

Walt.id offers an easy and fast way for developers and organizations to use SSI functionality. The company's products—SSI Kit and Wallet—are fully open source (Apache 2) and are already used by various governments, public authorities, and businesses across a variety of industries (including education, human resources, and banking). Moreover, all Walt.id solutions are built on open standards (W3C, DIF, OIDF, EBSI) and support a growing number of identity ecosystems across the globe.

WayTo by Workday

credentials.workday.com/docs/overview/

WayTo by Workday allows workers to personally manage their own profiles of verified credentials and to easily prove their qualifications. This mobile app complements the enterprise WorkDay Credentialing ecosystem by allowing users to accept issued credentials and share them both internally with their employers and externally with other employers. With WayTo, workers can build career capital as they acquire new skills, making it easier to access new employment opportunities. For employers, Workday Credentials provides system tools that enable them to issue verifiable credentials to employees.

Yoma by Trinsic

yoma.world

Yoma is a platform that uses verifiable credentials to help young people in Africa build digital CVs and find employment opportunities that match their skills. The platform uses artificial intelligence to prepare individualized learning pathways for young people based on their aspirations and psychometric profiles and connect them with suitable job openings and opportunities to complete “impact tasks” that benefit their communities. As users complete their impact tasks, acquire new skills, or finish training programs or classes, Yoma rewards them with certificates of their accomplishments, formal endorsements of their skills, and digital tokens that they can store in digital credential wallets. The credentials can be verified using blockchain technology, and young people can redeem the tokens for goods and services such as data, air time, and more in the Yoma marketplace. Yoma is based on SSI technology developed by Trinsic Technologies. It was the winner of the UNICEF COVID-19 innovation challenge.

A man with short dark hair, a beard, and glasses is shown from the chest up. He is holding a gold-colored smartphone in his right hand, looking at it with a thoughtful expression. He is wearing a dark red sweater over a patterned shirt. The background is a clear blue sky.

Trends to Watch

This market scan reveals a rapidly developing ecosystem where individuals will be able to use wallets and wallet applications to manage their learning and employment records in pursuit of economic advancement. We believe the products we feature are beginning to show the potential to benefit employers and the regional economies where they are being used. In addition to the opportunities for impact we identified earlier, which focus on areas where advances in features and functionality can make wallets more user-friendly and technically sound, we are excited about some broader trends that will result in the emergence of a vibrant ecosystem of wallets and wallet applications that learners and workers will be able to use to further their opportunities for advancement. Here's a look at some of the positive developments we've observed.

Wallets as the Foundation of Services and Drivers of Opportunities

When a learner's credentials are issued in open, interoperable formats and include open data on skills, AI-enabled career navigation and pathway-finding applications can be layered onto the core wallet functionality.

That would make it possible for the applications to, for example, compare data in a wallet with open data on labor market trends, and then make personalized recommendations for additional skills a user might wish to acquire in order to qualify for

careers in growing industries that offer opportunities for economic advancement.

Wallet applications with that type of functionality could also alert users to new job opportunities (including opportunities with their current employers) that people with their skills could pursue. In addition, by analyzing data from other verifiable credentials shared to the wallet, applications could identify supports and services that the user may be eligible to receive or might find useful.

Formalization of Education Data Standards and Interoperability Through Policy

Just as there are a lot of ways in which learning can occur, there are many ways to assess and record learning. Therefore, U.S. and European policymakers are taking steps to make the heterogeneous learning credentials ecosystem more transparent. Across the United States, officials are enacting policies that require education and workforce training programs to use fully transparent and interoperable data formats for academic records and learning credentials in order to qualify for public funding. And in Europe, the European Commission is beginning to standardize the [Europass Digital Credentials Infrastructure](#) (EDCI) data model so that any school, college, university, or training provider in Europe can use Europass to issue credentials for free.

Global standardization efforts like those will make it easier for learners and workers to pursue international career opportunities. They also have implications for technology developers, who will run the risk of creating products that quickly become obsolete if they don't begin to adhere to standards.

Global Interoperability of Technology Through Open Standards

Technology developers in the VC ecosystem are engaged in ongoing efforts to refine and build upon the W3C Verifiable Credentials standard. Within the W3C, there are several notable projects that aim to extend the benefits of VCs for learners and workers. They include initiatives focused on Decentralized Identifiers, an editor's draft of the Universal Wallet 2020 specification, and efforts to harmonize various educational content payloads within the context of the VC data model.

Contributors to the VC standards ecosystem actively collaborate and regularly gather to test the technical feasibility and interoperability of VC-based platforms and applications at plugfests—events where designers of standards-based systems get together to demonstrate the interoperability of their products.

Important progress has also been made toward aligning policies and practices globally to enable learners and workers with VC wallets to have greater control over their digital identities and personal data within an SSI ecosystem. This will allow individuals to provide trusted verification of their identities in order to seamlessly access multiple services, all while protecting sensitive information and maintaining privacy. Notably, the European Union has adopted the [European Self-Sovereign Identity Framework](#) (ESSIF) as part of the [European Blockchain Service Infrastructure](#) (EBSI), an initiative whose goal is to make it possible to deliver EU-wide cross-border public services without centralized authorities.

Networks for Learning and Employment Mobility

Leaders from across the learn and work ecosystem are joining forces to push for the adoption of skills-based hiring practices in general and the use of digital LERs and credential wallets in particular. Many have come together to establish formal coalitions, including the [Velocity Network](#), Arizona State University's [Trusted Learner Network](#), and the [Learning Credential Network](#).

Together, they are shaping new standards and transforming practices.





Conclusion

Conclusion

Verifiable credentials wallets can help transform the talent marketplace in a way that creates equitable economic advancement for all.

Digital learning and employment records enable learners and workers to store and share artifacts of their learning, no matter where or how they were obtained. And expanded use of verifiable credentials wallets will make it easier for employers to adopt skills-based hiring and recruiting practices that make pathways to good careers more broadly accessible to a wider segment of the workforce because they focus on what workers can do, not on the degrees or formal certifications they've earned.

The digital credentials wallets highlighted in this market scan are a critical nexus between employers, jobseekers, and learning providers, giving learners and workers tools they can use to communicate the totality of their skills, experiences, and abilities, and translate their achievements into future opportunities.

In a skills-based talent marketplace, data voluntarily shared by wallet users can give employers the ability to find and recruit talent from a diverse pool of candidates, increasing efficiency and reducing workforce inequities.

The Work Ahead

Despite the tremendous potential that verifiable credentials, LERs, and skills-based practices bring, we face many challenges as we embrace the technologies that will make this transformation possible. With the rapid proliferation of applications, platforms, and digital tools that support the skills-based ecosystem, we should be mindful of the needs of all the users in the ecosystem—including HR specialists, workforce services providers, education and training professionals, and the learners and workers themselves.

We should implement bold solutions that do the following: address inequities in access to devices and high-speed internet service, support responsible stewardship of data to respect privacy and individual data choices, and embody equity-first principles of [inclusive innovation](#). And we should measure and assess the results these solutions deliver to ensure that they lead to equity-first outcomes.



Our Work Together

As we have illustrated in this market scan, the work of transforming the talent marketplace has already begun. With control over the verifiable credentials that attest to their abilities, learners and workers are empowered to get additional training and education they need to build in-demand skills, identify and pursue all of the career opportunities that reflect their interests and abilities, and seamlessly access services that support them in this pursuit. Learners and workers, education and training providers, employers, technology developers, policymakers, and workforce and community-based services providers can continue to work together across all sectors of the economy.



Recommendations

Educational institutions and training providers should develop credential programs, clarify competencies and skills requirements, issue digital credentials in VC-compatible formats, and reach out to learners, employers, and others to help them understand that digital credential systems are trustworthy, reliable, and easy to use. They should also work together to ensure that their data systems are interoperable and support the seamless transfer of digital academic records and other information between and among individuals and institutions.

Employers must be open to exploring new ways of reviewing and verifying candidates' skills and experiences. They will probably be happy to learn that the new digital systems not only are more efficient, but also help advance diversity, equity, and inclusion in hiring by enabling recruiters to reach a much wider pool of talent than they once did. But although many employers have expressed interest in using digital credential platforms,

technology alone won't increase employment opportunities for people who don't have traditional credentials like four-year degrees. Employers must commit to embracing skills-based hiring policies and adjust their HR practices and job descriptions accordingly. More specifically, they must ensure that their HR IT systems are capable of handling credentials data and allow applicants to mask information that algorithms might use in biased ways. Small and midsize businesses, especially those that currently don't use advanced tech-enabled systems for hiring and recruiting, should consider using third-party talent engagement platforms where jobseekers can share verifiable credentials and skills.

Developers of LER wallets should consider simplifying the user interfaces and functionality of their applications to attract people who need to be convinced that these products won't be too challenging to use and will actually benefit them. Developers can

ensure that their wallets offer users a good deal of flexibility and value if they focus on open standards that ensure interoperability of credentials and provide learners and workers with control over their data.

State and local policymakers should evaluate their existing economic and workforce development programs and postsecondary attainment initiatives and consider enacting policies that promote credential transparency and support skills-based hiring practices. Among other things, they should evaluate current and forthcoming workforce and education data systems that use open standards for interoperability and allow learners to control and own their own data. In addition, they should encourage state agencies and municipal offices to adopt skills-based hiring practices.

Workforce systems and community-based organizations should continue to use digital credentials and wallets to help jobseekers communicate their skills and abilities. They should also analyze the data stored in their wallets and use their findings as the basis of recommendations of training opportunities and job openings that individuals might want to pursue. In addition, they should continue to work together to offer digital literacy workshops.



About Jobs for the Future

Jobs for the Future (JFF) drives transformation of the American workforce and education systems to achieve equitable economic advancement for all. www.jff.org

About JFFLabs

JFFLabs bridges JFF's traditional field leadership with new relationships, practices, and business models. We partner with visionary entrepreneurs, Fortune 500 companies, and investors to foster innovative solutions that create positive change in education and workforce systems. We are proud to identify and scale the most innovative and advanced technologies with the potential to transform America's education and workforce systems.

About JFF's Language Choices

JFF is committed to using language that promotes equity and human dignity, rooted in the strengths of the people and communities we serve. We develop our content with the awareness that language can perpetuate privilege but also can educate, empower, and drive positive change to create a more equitable society. We will continually reevaluate our efforts as language usage continues to evolve.

Contributors and Authors



Maria Flynn
President & CEO

Kristina Francis
Executive Director, JFF Labs

Steve Yadzinski
Senior Innovation Officer

Joel Vargas
Vice President

Alex Swartzel
Deputy Director, Acceleration

Sharon Leu
Executive in Residence
Lead Author and Researcher

Joan Lee
Consultant
Lead Author and Researcher

Kristína Moss Gunnarsdóttir
Lead Researcher

Lauren Iannitto
Research Assistant

Tyler Nakatsu
Associate Director

Carlin Praytor
Digital Communications
Coordinator

Bob Rawson
Senior Editor

John Pastor
Senior Graphic Designer

Micayla Boari
Senior Graphic Designer

Special Thanks to

Deborah Everhart
Chief Strategy Officer, Credential
Engine

Kerri Lemoie
Director, Digital Credentials
Research & Innovation, Badgr;
co-chair W3C VC-EDU Task Force

With Funding from



This market scan is made possible through the generous support of Walmart.

About Philanthropy at Walmart

Walmart.org represents the philanthropic efforts of Walmart and the Walmart Foundation. By focusing where the business has unique strengths, Walmart.org works to tackle key social and environmental issues and collaborate with others to spark long-lasting systemic change. Walmart has stores in 24 countries, employs more than 2.2 million associates and does business with thousands of suppliers who, in turn, employ millions of people. Walmart.org is helping people live better by supporting programs to accelerate upward job mobility for frontline workers, advance equity, address hunger, build inclusive economic opportunity for people in supply chains, protect and restore nature, reduce waste and emissions, and build strong communities where Walmart operates.

To learn more, visit www.walmart.org or connect on Twitter @Walmartorg.

DISCLAIMER

The research included in this report was made possible through funding by the Walmart. The findings, conclusions and recommendations presented in this report are those of Jobs for the Future alone, and do not necessarily reflect the opinions of the Walmart.



50 Milk St., 17th Floor, Boston, MA 02109

122 C St., NW, Suite 280, Washington, DC 20001

505 14th St., Suite 340, Oakland, CA 94612

TEL 617.728.4446 **WEB** www.jff.org