



The next evolution of digital identity:

Scalable, secure, and trusted digital credentials

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Executive Summary

The pandemic accelerated the transformation of digital credentials, creating an urgent need for organizations to issue, manage, and verify digital identities at any time.

A global digital credential infrastructure could streamline this process while improving user experience—from enabling people to pass quickly through airport security, to proving that a welder has the required certifications to be on a job site, to verifying the age of a customer purchasing a bottle of wine.

However, industry knowledge, interoperability, and open standards are key to the successful scaling of digital credentials. Distributed ledger technology or other highly secure and available technologies can help make this process secure and seamless, while also putting individuals in control of their digital identities. To get started, organizations need to invest in platforms that enable new ways of working.

With a secure infrastructure providing the trust anchor for using and exchanging any kind of credential data, such as private, company, and product data, entities can engage in new types of trusted, transparent transactions and services—and revolutionize traditional business models.



A new way to manage digital identity

What defines a person's identity?

Where they were born. What they've studied. Who they work for. What they own. Where they live. How much they earn.

People need to verify these basic facts about themselves as a regular part of their daily lives. Whether they want to enter a new country, get a new job, or take out a loan, people must prove that they have the right credentials—and that they're who they say they are.

ID cards, key fobs, employee badges, secure logins, and personal identification numbers are all credentials that confirm a person's identity. Today, most credentials live in a physical wallet, purse, backpack—or in someone's head. But a better way to manage personal identity is emerging.

Digital credentials, which can be securely stored and shared on a mobile device, offer a more efficient, fraud-resistant, and reliable alternative to traditional systems. Digital credentials are generated using secure technologies, such as distributed ledger technology, and protected by cryptographic key pairs—which facilitates data privacy while also enabling virtually instant verification.

Many educational institutions already offer digital credentials, and some forward-looking governments, such as Estonia, have issued digital identity cards for years.¹ However, the pandemic accelerated efforts to apply this technology more broadly.

As countries required proof of vaccination or negative COVID-19 tests for people to cross borders or visit public venues, government agencies and businesses needed a secure way to quickly view and verify specific private health data. Many organizations required a similar solution for employees returning to work.

However, there was robust debate on what type of digital documentation could be trusted. As governments raced to roll out their own digital vaccine passports, they also had to assess which external credentials they could trust, demonstrating a strong need for shared standards, governance frameworks, and interoperability.² In response, many governments have developed digital vaccine passports, as well as digital identity cards, as the first step toward creating broader digital trust ecosystems.

For example, the European Commission is working to establish a European Digital Identity Framework that will let Europeans confirm their right to live, work, and study across EU member states, while protecting their personally identifiable information. The Commission is starting with the deployment of European Digital Identity Wallets, where citizens can store their credentials securely.³

“Every time a website asks us to create a digital identity or to log-in with a convenient tech platform single-sign-on service, we actually have no clue what happens to our data, and this has to stop,” said Ursula von der Leyen, president of the European Commission, in her 2020 State of the Union Address. “It is for this reason that the Commission will soon be proposing a secure European digital identity. We need to be able to trust it and citizens all over Europe need to be able to use it to do everything from paying their taxes to renting a bike.”⁴

In the US, more than 20 states have either considered, tested, or launched a digital driver’s license. The federal government is considering its options for creating a digital identity framework, and the Transportation Security Agency (TSA) has launched a pilot program at an airport in Phoenix, Arizona, to test the viability of accepting digital IDs that passengers have uploaded to their Apple Wallets.”⁵

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Ursula von der Leyen

President of the European Commission

The pandemic also increased consumer demand for these types of digital interactions. People quickly adjusted to using digital credentials for payments, travel, and work—and they’re not interested in going back to the way things were. In late 2021, IBM Institute for Business Value (IBV) research revealed that 58% of global consumers felt more comfortable visiting stores that had contactless shopping options available. Similarly, one in three consumers said touchless travel solutions, including digital boarding passes, would increase their desire to travel.⁶

But the existing applications of digital credentials only scratch the surface of what’s possible. From birth certificates and personal health history to proof of employment, professional licenses, and banking logins, soon, verifiable credentials of many types will be available digitally.

By storing credentials in digital wallets that are trusted, fraud-resistant, portable, interoperable, and privacy-preserving, individuals will be able to prove who they are, what access they’re entitled to—and who gets to see their credentials—in real time.

Today, most people use government-issued IDs to verify their identity, which means cashiers who need to verify customers’ birth dates to sell them age-restricted items get to see their home addresses, as well. Digital credentials could allow people to prove their age without sharing other private information.

This creates opportunities for organizations across sectors to boost efficiency, strengthen security, reimagine their operations, and create new ways for people to work, shop, and travel. But first they need to understand where traditional credentials may be holding them back.



Digital credentials enable future connected ecosystems

In the traditional model, organizations such as government agencies, licensing boards, or educational institutions issue physical credentials that individuals can use to prove their identity, achievements, professional licensure, or experience to a third party, such as a bank or an employer. That institution then manually verifies the credential by contacting the original issuer, which can take hours, days, or even weeks.

In this scenario, individuals have little to no control over what pieces of their data are accessed, how quickly the data is accessed, or how much of this data is retained by the verifying entities even after the need is over.

Today's more robust digital credential platforms, on the other hand, allow organizations to verify information almost instantly by referring to a common trust registry, such as a distributed ledger, using the associated cryptographic keys. When an individual presents a digital credential they've received, they "sign" it with their private key to unlock the specific data they want to share. Verifiers then use a public key to view only the information the holder has authorized them to see (see Figure 1).

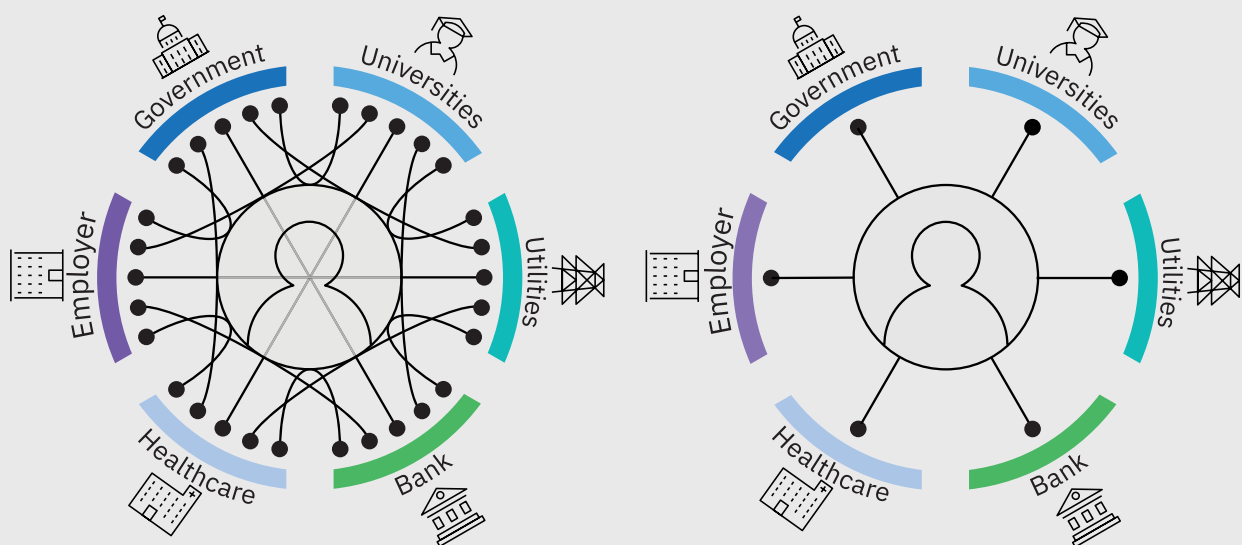
Being able to transfer digital assets, or even just transact digitally, requires all parties involved to be able to uniquely identify themselves in a verifiable and trusted manner. By helping ensure that the data only resides with the individual, modern digital credential platforms can provide that security while also putting individuals in control. And this shift has the potential to revolutionize the business landscape by accelerating digitally unified worlds.

Digital identities alone are projected to create economic value that is equivalent to 3% to 4% of GDP in 2030—an amount that is just under \$1 billion in the US.⁷ This economic boost across the ecosystem will come, in part, from efficiency gains, a reduction in fraud, transformative business offerings, and the ability to provide trusted and higher quality information about the credentials being presented.

FIGURE 1

Putting people in control of their data

Digital credentials reduce credential holders' dependency on issuing institutions.



Digital credentials can help organizations make better matched, higher quality hires.

For example, when organizations hire new employees, they must often wait weeks for paperwork that validates a candidate's credentials and professional licenses to be requested and delivered. And many self-asserted achievements go unverified until discovered later on-the-job, which leads to inefficiencies and lost opportunities. Digital credentials also reduce the risk of job seekers providing false or exaggerated information on their applications, making it less likely that a company will hire someone unable to do the work required. In the healthcare sector, one study projects that hospitals could save \$74,000 per physician hired by using real-time digital credentials.⁸

In addition to filling open roles faster, digital credentials can help organizations make better matched, higher quality hires. If job candidates can prove their skill sets, work experience, and certifications using digital credentials, companies searching for talent can tap into a more diverse population without relying on traditional college degrees—and potentially find people who would be a better fit for a given role.⁹

This is critical, as many jobs of the future will require different skill sets than the jobs that are in demand today—and may not require four-year degrees.¹⁰ In fact, research from LinkedIn found that, on average, 25% of the skills required for a specific job changed between 2015 and 2021. If change continues at this pace, between 39% to 44% of skills could change by 2025.¹¹

In response, forward-thinking organizations are shifting to skills-based hiring. LinkedIn reports that 40% of employers now use skills data to fill open roles—and organizations that use skills data are 60% more likely to find a successful hire.¹² To support this emerging skills-based labor market, LinkedIn is investing more in its skill-building platform and making it easier for organizations to assess job candidates' skills.¹³

As part of its Learning Hub, LinkedIn has rolled out a comprehensive skills taxonomy that can help organizations define the skills they need on their teams, as well as those they already have.¹⁴ Once they identify who has which skills, organizations can issue digital credentials that make it easier to match individuals to new job roles in the future.

Trusted and verifiable skills credentials can also provide individuals with a highly tailored roadmap for their desired career journey. They can help people understand how their skills align to the career they want, point them to education opportunities that build the skills they need, and then match them to open jobs in their local area.

But Human Resources is just one area where digital credentials can transform an organization. They can also spur innovative offerings—a new generation of products, services, and business models built on a bedrock of personal data.



The case for decentralization

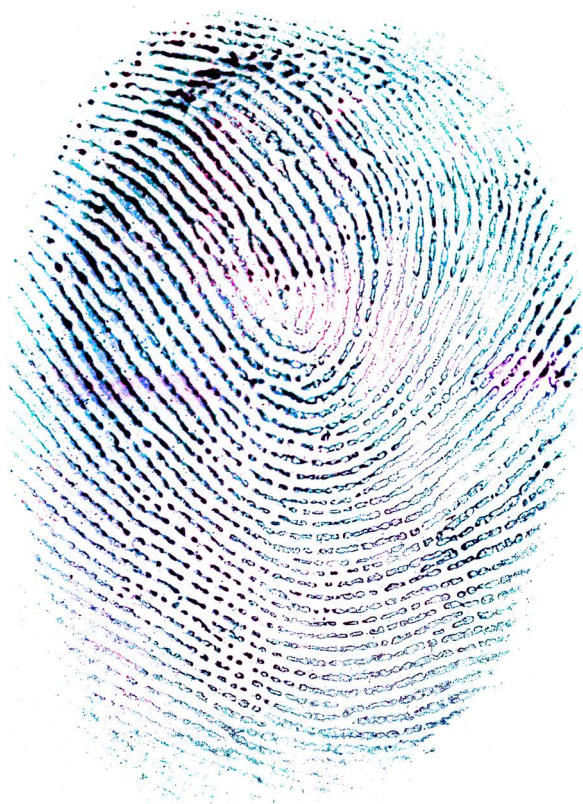
When individuals carry their personal information with them, they have the power to share their private data as they see fit. That means many types of organizations could deliver products, services, and experiences that are tailored based on personal data.

And with the mobility that digital credentials provide, consumers could enjoy the freedom of choice in many new areas. In healthcare, for instance, digital credentials allow patients to quickly share their private health data with new providers, making it faster and easier to get multiple opinions before moving forward with a medical treatment plan. This promises to produce better patient outcomes—while also reducing the administrative burden on the healthcare organizations that are currently required to send printed medical records.

Governments can also use digital credentials to streamline the delivery of public services. According to Gartner, at least 80% of government services that require citizen authentication will support access through multiple digital identity providers by 2023.¹⁵

With the right infrastructure in place, digital credentials can help ensure that people receive the benefits they're entitled to, from healthcare to nutrition assistance to housing. Digital credentials could allow government agencies to identify eligible applicants, even those who aren't aware that they're eligible; approve their benefits virtually; and provide resources almost instantly—replacing slow and cumbersome manual processes and reducing fraud risk.

e-Estonia offers a case in point. As a leader in electronic governance, Estonia delivers 99% of its public services online—and 99% of citizens have a digital ID that they can use to vote, submit tax claims, fill e-prescriptions, and more. By using digital signatures, the government saves 2% of GDP per year, and 82% of Estonians are satisfied with public e-services.¹⁶



Digital credentials also helped government agencies and businesses manage the vaccine verification process throughout the pandemic. With the IBM-developed Excelsior Pass Plus wallets, residents of New York State were able to use their mobile phone to prove they were either vaccinated or COVID-19-free. With the successful adoption and collaborative use of the Excelsior Pass solution, the state is working on extending the platform to offer more digital services to its residents.

“The New York State Wallet app and Excelsior Pass solution architecture have and continue to lay the foundation for a stronger, more resilient digital state. Every day, those solutions deliver for people without fail. As we consider New York’s post-pandemic recovery, we must continue to push the boundaries of how clinical information and government services are delivered. The future of New York State must have not just infrastructure, but digital infrastructure, built to support current and emerging resident needs,” said Rajiv Rao, New York State Chief Technology Officer and Deputy Chief Information Officer, in June 2022.¹⁷

Digital credentials can fuel successful public-private partnerships, as well. For instance, the first application for Germany’s ID Wallet offers business travelers a fully digitized hotel check-in. The use case, implemented with crucial partners from the travel and transportation industry, lets guests scan a QR code at participating hotels for a contactless customer experience.

This technology, developed by IBM, gives the hotel the information it needs to invoice a guest for their stay while still complying with the federal registration act. The ID wallet helps hotels speed up the check-in process and get paid faster, and it reduces the amount of time it takes for travelers to validate, approve, and pay invoices.¹⁸

Non-governmental organizations can also advance their missions with digital credentials. OneTen, for instance, is a coalition of corporate leaders who are working to close the opportunity gap for Black talent in America. Taking a skills-first approach, OneTen aims to help one million Black individuals who do not have a four-year degree enter family sustaining-careers over the next ten years.¹⁹

By helping talent acquire verifiable digital credentials that accurately depict their capabilities and share that information with employers, organizations such as OneTen are advancing the skills-based labor market, which could help level the playing field for diverse talent who have the right skills but may lack the proper degree.

Overall, portable personal data empowers individuals by giving them unfettered access to their own identities and credentials. No matter what happens in the rest of the world, they'll be able to carry the data they've created over a lifetime with them wherever they go. People can avoid loss of data due to destruction caused by war or natural disasters, or the dissolution of institutions. It also allows people who are displaced to maintain access to the information they need to get a fresh start.

But transparency and integrity are needed to build a foundation of trust for digital credentials to be accepted universally—which is why distributed ledger and similar technologies are at the core of the digital credential platforms of the future.

“The future of New York State must have not just infrastructure, but digital infrastructure, built to support current and emerging resident needs.”

Rajiv Rao

New York State CTO and Deputy CIO

Building a trusted digital credential platform

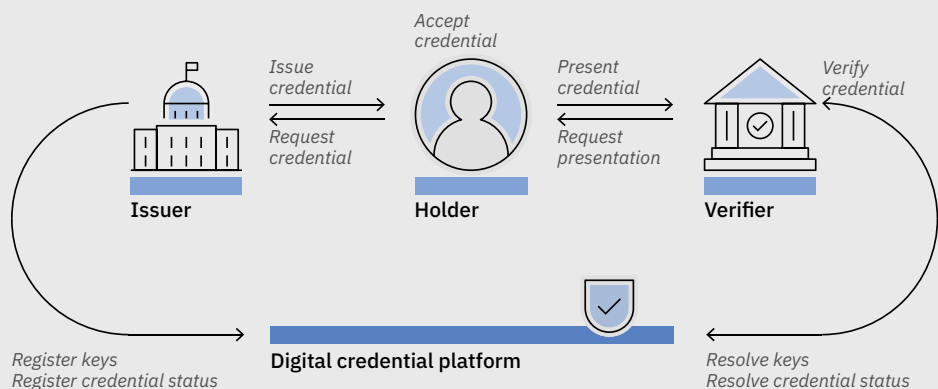
By decentralizing an individual’s data—for example, storing it in a digital wallet they carry with them—digital credential ecosystems take the onus of proof off the issuer. Rather than contacting a specific institution to verify an individual’s identity, an organization can check a digital credential against the common trust registry as soon as it is shared.

Verifiers can trust this authentication process because it is protected with cryptography. When issuers generate credentials, they’re associated with an individual’s unique decentralized identity (DID), cryptographically signed and accessible only with a public/private key pair. The holder keeps the private key and uses it to share credentials as needed. Verifiers use the public key, which is stored on a distributed ledger, for example, to authenticate the credentials they receive (see Figure 2).

FIGURE 2

The digital credential ecosystem:

Digital credential platforms use distributed ledger technology to build a foundation of trust.



Modern digital credentials also protect private data by allowing individuals to share all or only part of the information contained in the credential. This reduces unnecessary data exposure and removes opportunities for sensitive information to be lost or stolen.²⁰ Some digital credentials can also be issued with expiration dates or be revoked as needed, reducing the risk of fraud.

But for a digital credential ecosystem to function, wallets and applications must be able to connect and securely exchange DIDs and verifiable credentials. Yet, while at least a third of national governments and half of US states are expected to offer citizens mobile-based identity wallets in 2022, only a minority will be interoperable across sectors and jurisdictions.²¹ That means organizations need to invest in digital credential platforms that offer the right guard rails for open standards and interoperability.

Digital Credentialing as a Service (DCaaS) platforms, for example, are interoperable, technology agnostic, and can be deployed quickly using cloud-based subscription models and open APIs—eliminating the need for large up-front tech investments.

What a digital credential platform can do—and how it can interact with other platforms—will be defined by what the organization needs. Stakeholders must come together at the outset to determine several key factors, such as which problems the platform should solve, how people will use it, and who needs access to what information.

Once these parameters are defined, organizations can begin to assess their options for building a digital credential ecosystem. Partners that offer modular solutions that can be customized to an organization’s individual needs can help make this process as fast, efficient, and affordable as possible.



Accelerating business transformation with digital credentials

The transition to digital identity is happening in waves, but a sea change is inevitable.

Financial services, one of the first sectors to broadly adopt digital credentials, has set a clear precedent. Today, using physical bank branches or ATMs is not only less convenient than sending money virtually—it's also more expensive, as banks charge ever-increasing fees to access cash from ATMs or tellers.

Digital credential technology is poised to drive similar transformations in other sectors—if organizations implement solutions that allow individuals to control their credentials, rather than the organization. The key is finding the willingness to empower people to manage and control their own data in a decentralized manner.

Of course, each business case is different, and different obstacles will appear on each path. To reach the desired destination, organizations need to understand the technical challenges, risks, and benefits; use open standards to create interoperability; and work with partners who can help them along the way.

Here are five steps an organization can take as they start to adopt the secure, scalable, and trusted digital credentials of the future.

01

Define who will benefit—and what benefits they will receive.

Identify use cases that will inspire broad adoption or target a large cross section of the population. Make sure they provide clear value to stakeholders, such as dramatically reducing the time it takes for a healthcare professional to onboard or update their professional license. Determine what results your organization wants to see, and what benefits it will provide to others.

02

Adhere to open standards.

In a distributed environment, interoperability is key to success. Stay on top of industry standards—for example, the World Wide Web Consortium (W3C)—that are currently being developed to help ensure that your solution will be interoperable for the long term.

03

Evaluate pre-configured platforms and existing ecosystems.

Discover what digital credential issuing and digital credential management platforms already exist in the marketplace. Tailoring a solution that's ready to on-ramp, aligned to your industry, and already has other participants could be a lot faster than building a new platform from scratch.

04

Implement principles that are as inclusive as possible.

Everyone benefits when digital credential platforms have more participants. Providing universal access to digital credential platforms can play a big role in reducing global inequality by making it easier for underserved communities to join.

05

Build a minimally viable ecosystem.

Partner with a few players who can implement a scalable solution with high user adoption. These partnerships will help demonstrate what can be done, how decisions can be governed, and how to bring new ideas to life. Having both supply and demand for digital credentials is critical to their success.

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