KEY STATE CAPITAL

vLEI

The Dawn of Organizational Digital Identity

KEY STATE CAPITAL

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Glossary

ACDC	Authentic Chained Data Containers
BIS	Bank of International Settlements
C2B	Citizen/Customer to Business
C2G	Citizen to Government
CBP	(US) Customs and Border Protection
CCIP	Chainlink Cross-Chain Interoperability Protocol
DID	Decentralized Identifier
DUNS	Data Universal Numbering System
EBA	European Banking Authority
ECR	Engagement Context Role
EFPIA	European Federation of Pharmaceutical Industries and Association
eIDAS	Electronic Identification and Trust Services
EPoC	Evaluative Proof of Concept
ESMA	European Securities and Market Authority
FDTA	(US) Financial Data Transparency Act
FSB	Financial Stability Board
G20	Group of Twenty
GBI	Global Business Identifier
GDP	Gross Domestic Product
GLEIF	Global Legal Entity Identifier Foundation
GLN	Global Location Number
IDP	Identity Providers
IMI	Innovative Medicines Initiative
ISO	International Standards Association
KERI	Key Event Receipt Infrastructure
KYB	Know Your Business
LEI	Legal Entity Identifier
LOU	Local Operating Units
MID	Manufacturer Identification Code
MiFID II	(European) Markets in Financial Instruments Directive 2014
MiFIR	(European) Markets in Financial Instruments Regulation
OI	Organizational Identity
OOR	Official Organization Role
OTC	Over the Counter
P3DH	Pillar 3 Data Hub
QVI	Qualified vLEI Issuer
ROC	Regulatory Oversight Committee
SMS	Short Messaging Service
SOX	Sarbanes-Oxley Act
SSI	Self Sovereign Identifiers
SSN	Social Security Number
Smishing	Fishing through Short Messaging Service
UTI	Universal Transaction Identifier
VAT	Value Added Tax
VC	Verifiable Credential
vLEI	Verifiable Legal Entity Identifier
W3C	World Wide Web Consortia
XBRL	eXtensible Business Reporting Language

About this Report

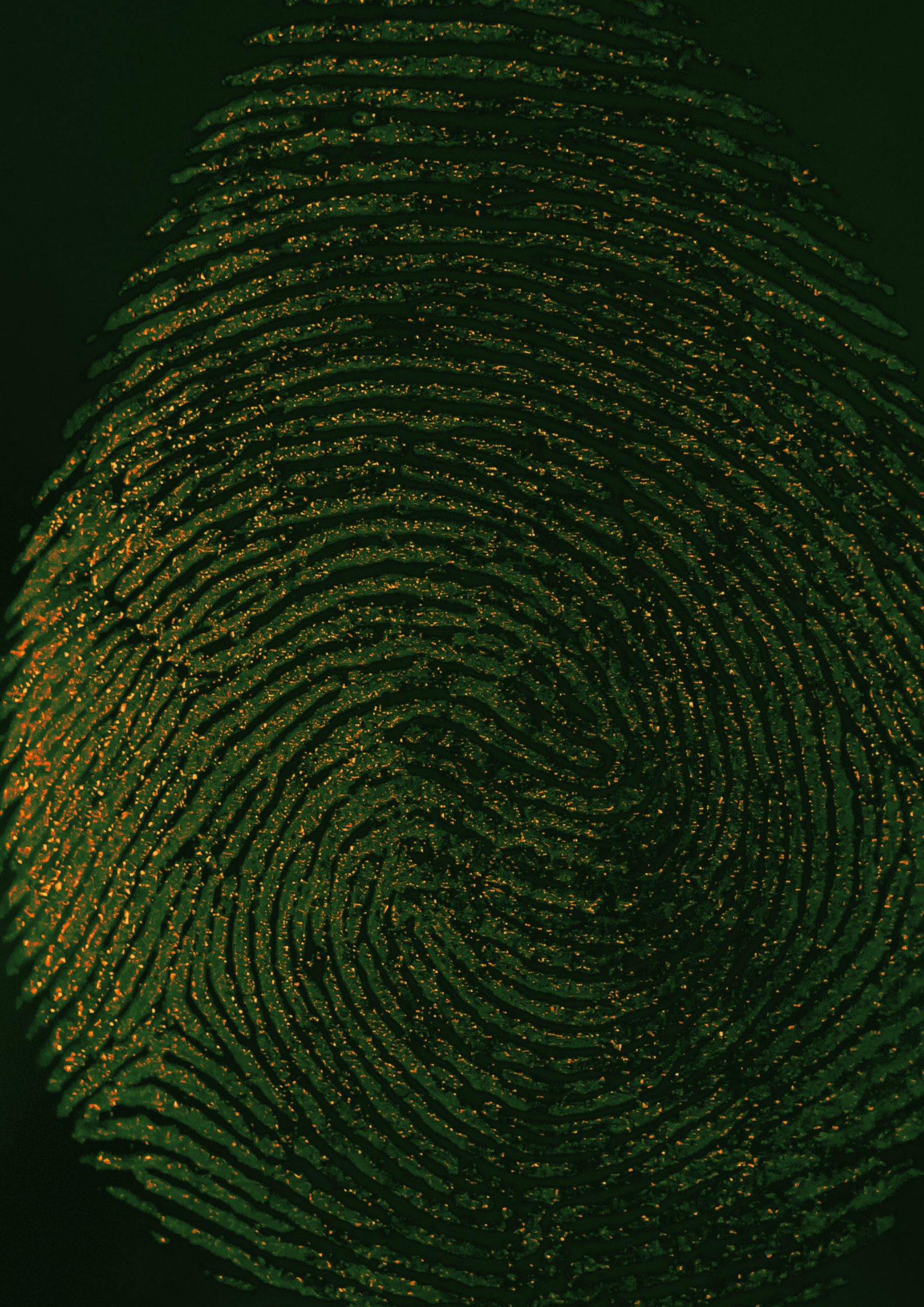
About Key State Capital

KEY STATE CAPITAL is a network of business angels conducting investment & advisory focused on empowering decentralized economies. We invest in early stage startups in the digital identity space and provide our portfolio companies with unparalleled reach, support and guidance enabling them to scale internationally.

Investment Thesis

We envision a future where authentic data streams and the widespread adoption of Self-Sovereign Identity (SSI) intersect, facilitated by a protocol-based approach that leverages the DID/VC standards and KERI protocol. The KERI protocol not only ensures interoperability but also exponentially enhances the utility of each respective ecosystem.

We invest in and support visionary founders of early-stage ventures which propel and embody the imminent trusted data economy.



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The Problem

The Problem

1. **Walled Gardens / Interoperability Issues**
   - Current Business Registries are fractured, not interoperable and not digitally verifiable

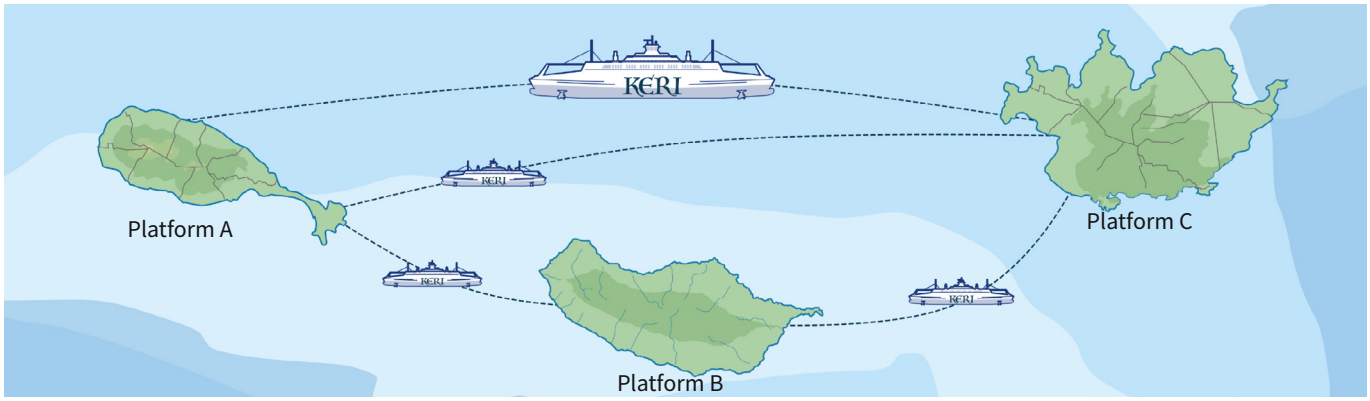
2. **Impersonation and Fraud**
   - There is no cryptographic way to prove an entities identity, much less the individual acting on behalf of an entity
   - Verifying businesses requires costly due diligence processes that are not reusable.

3. **Compliance**
   - Growing regulatory requirements that lead to a convoluted compliance process.

4. **Inefficiency in analogue Verification Processes**
   - High friction and wasteful process when integrating digital verification into analogue process

→ The **Association of Certified Fraud Examiners (ACFE)** estimated in their "2020 Report to the Nations" that typical organizations lose 5% of their annual revenues to fraud each year. Given the World Bank's estimate of global gross domestic product (GDP) being around $88 trillion in 2020, that 5% could imply global fraud losses of **approximately $4.4 trillion annually**.

Platforms vs Protocols



Trust protocol ocean

Blockchains only enable interoperability between the participants using them. There are hundreds of separate DID/VC projects being created right now to which this applies. KERI can bridge the gap between these trust domains.

For widespread acceptance, the technology must be open-source, free, and adhere to shared standards; proprietary systems and centralised platform approaches (whether they are blockchain based or not) are not suitable to bridge the gap between hundreds of separate trust domains.

Why platforms fail:

- Platforms use customer-lock-in and pursue monopolistic strategies
- Rivals replicate this approach, fragmenting the market
- Platforms resist change, hindering interoperability
- Absence or poor adoption of interoperability standards
- Subpar digital transformation strategies inhibit interoperability

Failed trade finance Blockchain projects:

We.trade

- Used Hyperledger Fabric
- Was backed by IBM and 12 of the biggest names in finance

Marco Polo

- Used R3 Corda
- Was backed by 30 bank members such as Commerzbank, BNY Mellon and SMBC[16]

Tradelens

- Used Hyperledger
- Was backed by Maersk, IBM

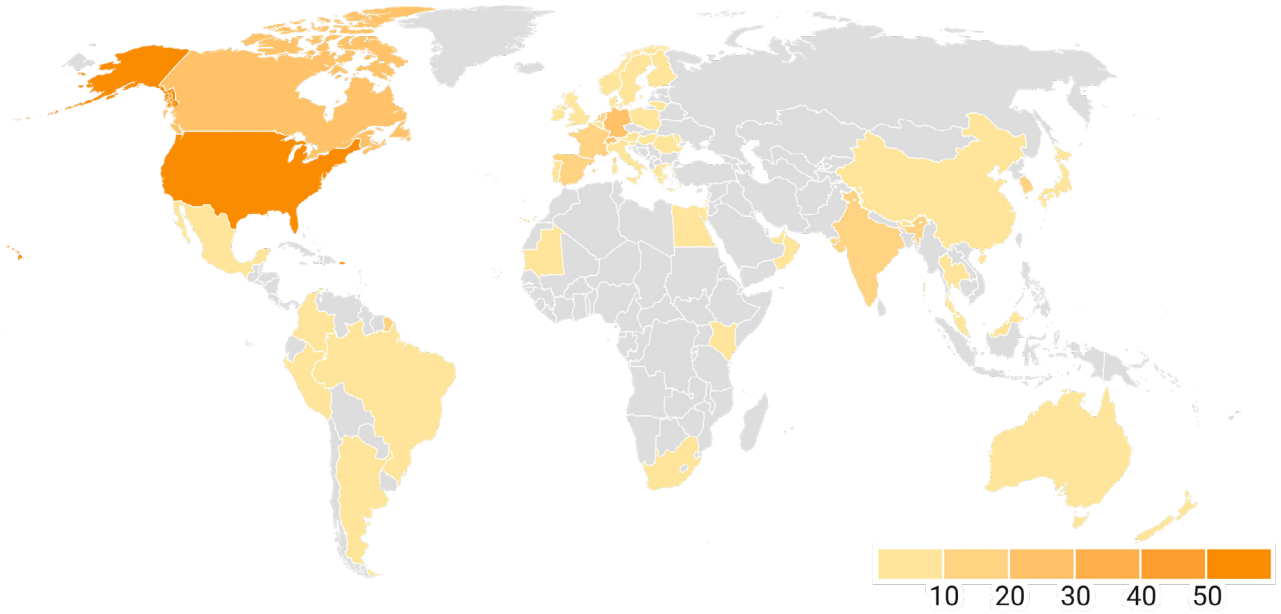
→ Blockchains are platforms

→ The technology must be open-source, free, and adhere to shared standards.

Our Research

Digital Identity Acceleration

Number of decentralized identity projects per country



Source: Web of Trust Map (weboftrust.org)

Country	Number of Projects
United States of America	58
Canada	23
Switzerland	20
Germany	20
Singapore	16
South Korea	15
Spain	14
Netherlands	14
France	11
India	10

Country	Number of Projects
Italy	9
United Kingdom	8
Australia	6
Austria	5
Belgium	5
New Zealand	4
Slovenia	3
Ireland	3
Argentina	3
Portugal	3

Click on each country to explore their full profile on weboftrust.org

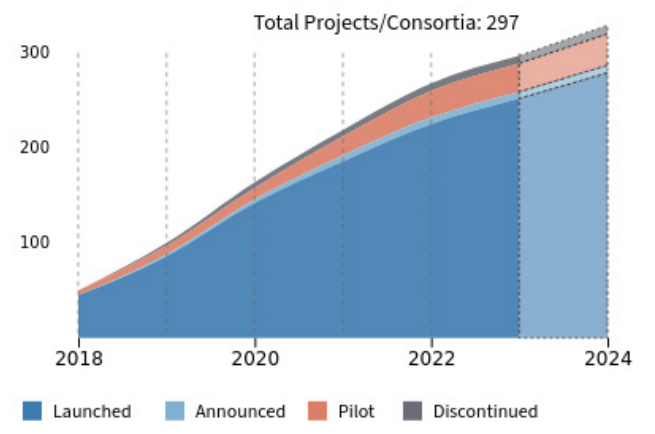
Digital Identity Adoption

The Web of Trust Map

As an early participant in the decentralized identity space we have witnessed a breathtaking acceleration in the digital identity space first hand.

In an attempt to quantify this, Key State Capital conducted an extensive research project in partnership with the Adrianople Group, dubbed the Web of Trust Map. This unique effort visualize the projects, consortia, individuals and standards shaping the decentralized identity space.

Decentralized Identity has grown rapidly since its inception. Our data shows a steady yearly increase of government affiliated projects, consortia and initiatives driving adoption.



Source: Web of Trust Map (weboftrust.org)

To keep a narrow but detail-oriented scope, the following inclusion criteria was necessary for a project to be included in the research:

Tech Stack (resolves to true if A1 or A2 are true)

- A1 - Uses World Wide Web (W3C) DID or Verifiable Credential (VC), Key Event Receipt Infrastructure (KERI) or Authentication Chained Data Containers (ACDC) standards
- A2 - Claims to be Self-Sovereign Identity or Decentralized Identity

State Affiliation

- B1 - Received funding or endorsement from government-actors or closely state-affiliated institutions.

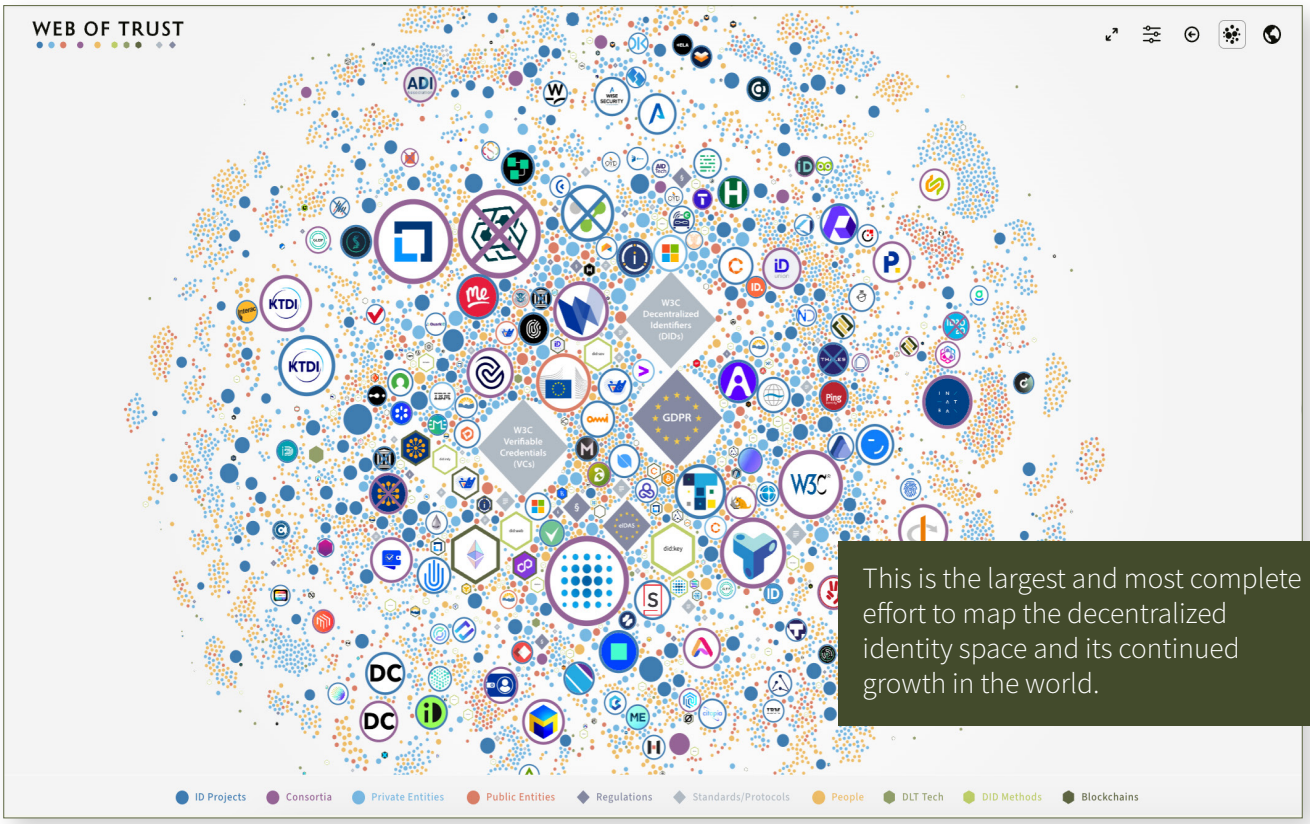
Partners/Users

- C1 - Have at least 1 well-known partner or user

Timeframe

- D1 - Project announcement date is from January 1, 2018, until July 1, 2023

→ "We identified over 3600 private entities, 1000 public entities, 3500 people, 260 projects, and 140 blockchains."



This is the largest and most complete effort to map the decentralized identity space and its continued growth in the world.

Source: Web of Trust Map (weboftrust.org)

The Web of Trust Map is a unique effort to map out the projects, consortia, and individuals shaping the decentralized digital identity space. It highlights their connections, technology stacks, and protocols, offering a clear view of the ecosystem's exponential growth. This open-source dataset will be publicly accessible to researchers, journalists, regulators, academics, investors, and others seeking an in-depth overview of the decentralized identity ecosystem.

→ **The Dataset assembled will be released under CC BY 4.0 at weboftrust.org in Q2 2025.**

This open dataset includes:

- 3,600+ private entities
- a network of 3500+ individuals
- 1,100+ public entities are involved
- 260+ decentralized identity projects
- 140 blockchains
- 40+ consortia

Co-Contributors

The map partnered with leading industry experts who helped with defining features and working on data quality.

Currently Targeted Use Cases

Our research has revealed that the majority of these projects in the decentralized identity space do not address organizational identity. Their focus primarily lies in C2B & C2G interactions.

A non-exhaustive list of use-cases being addressed by the majority of current digital identity projects:

Citizen-to-Government (C2G)

- **Electronic Voting:** verifiable auditing privacy preserving voting
- **Digital Passports:** seamless cross-border travel
- **Tax Reporting:** automated filing and compliance
- **Social Services:** simplify access to and management of social welfare services
- **Digital driver's licenses:** digitally native mDL

Citizen-to-Business (C2B)

- **Digital Banking KYC:** re-usable verifiable credentials for customer on-boarding
- **Electronic Health Records:** secure patient-data exchange
- **E-commerce Verification:** verifying customer age, location, or other attributes
- **Telecommunications**: verifying customer identity for mobile operators or internet service providers
- **Insurance:** manage and share their personal and policy data with insurance companies

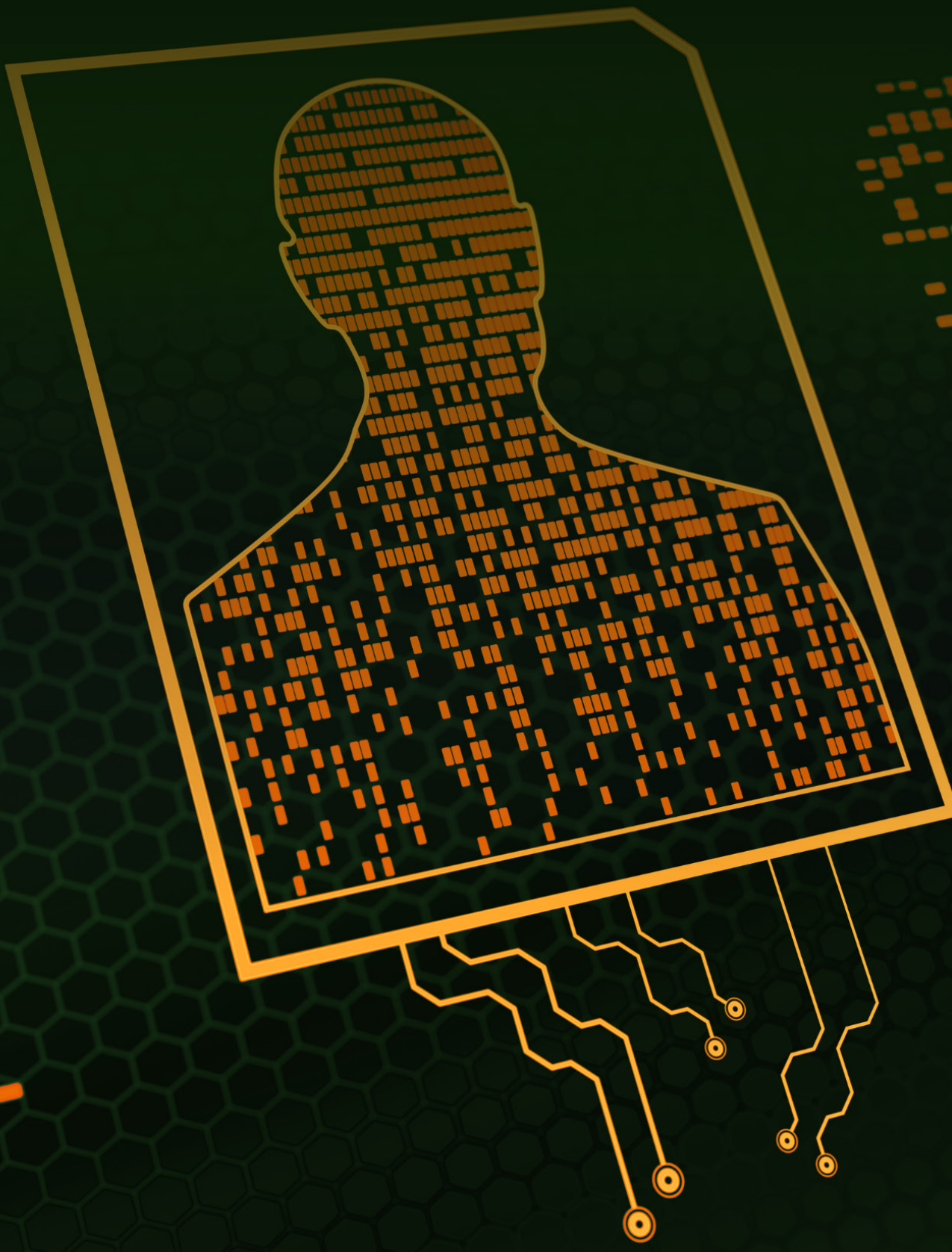
eIDAS2.0 is the updated EU regulation for electronic identification and trust services, expanding on digital identity standards, and facilitating secure cross-border electronic transactions for businesses, citizens, and public authorities inside the EU.

The proposal sets a target for at least 80% of citizens to have a digital Identity by 2030.

All member states are forced to offer a digital ID wallet to their citizens within 2 years of **eIDAS2.0** being enacted.

→ They are missing a solution for a globally interoperable Organizational Identity based on a global root of trust.

The vLEI



The LEI

The LEI (Legal Entity Identifier) is a cross-border unique ID issued by the **GLEIF** (Global legal Entity Identifier Foundation) and was introduced by the G-20 in 2011 in response to the 2008 crisis.

The G-20 leaders supported „the creation of a global legal entity identifier (LEI) which uniquely identifies parties to the financial transactions."

LEI issuers include:

- Beijing National Institute of Financial Standardization
- Bloomberg Finance
- GS1
- InfoCert
- Irish Stock Exchange (Euronext Dublin)
- London Stock Exchange
- Nasdaq
- The Federal Statistical Office of Switzerland
- Qatar Central Bank
- Saudi Credit Bureau
- Tokyo Stock Exchange

LEI's Reach

The LEI is mandatory for various cross-border transactions and in the EU, for example, **mandatory for all publicly traded companies** and is used for various purposes by the European Banking Authority (EBA).[3] It is part of the Universal Transaction identifier (UTI) in the banking sector.

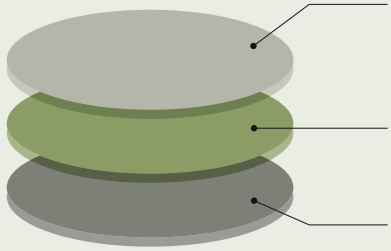
Every OTC executed in private banking transaction gets assigned a UTI. Since 2018, the ESMA (European Securities and Market Authority) demands the inclusion of LEIs in regulatory reporting for MiFID II and MiFIR.[4]

The US Financial Data Transparency Act (FDTA) requires seven of the financial regulatory member agencies of the US Financial Stability Oversight Council to adopt and apply uniform data standards for information collected from regulated entities.[4] Bank of International Settlements (BIS) Paper No. 126 lists the LEI and vLEI as one of the most mature cross border organizational identity solutions.[5]

- **The LEI is a life-long identifier owned by the respective legal entity.**
- **It is globally unique.**
- **It points to the associated reference data.**
- **The LEI is an ISO standard ISO 17442.**

→ The LEI is the only identifier of its kind in the world.

LEI Governance



1 **Regulatory Oversight Committee (ROC)**
Represents public financial market authorities from around the world
→ 71 regulators and 19 observers from 50 countries

2 **Global Legal Entity Identifier Foundation (GLEIF)**
Ensures the operational integrity of Global LEI system

3 **Local Operating Units (LOUs)**
Issue LEI to legal entities

GLEIF is a not-for-profit Swiss foundation founded by the Financial Stability Board (FSB) and overseen by the Regulatory Oversight Committee (ROC).

The GLEIF Board has:

- 18 independent directors
- 39 Partners for LEI issuing (LOUs) and growing
- 2,200,000 issued LEIs to date[3]

Local operating Units (LOUs) onboard and execute KYB on new businesses applying for LEI issuance.

When presenting an LEI, it is not clear if:

- the LEI is valid
- the presenter is the LEI owner or an affiliate
- the presenter has the right to use it

As a result:

- The recipient of the LEI must still check and verify
- Background checks are often done manually at a high cost

→ However, the LEI is not able to create cryptographic signatures. It is a simple unique string, similar to a VAT number or SSN in the US. It is a mere identifier, not a digital identity.

The verifiable LEI (vLEI)

In late 2022, GLEIF introduced the vLEI (verifiable LEI), based on the **KERI** (Key Event Receipt Infrastructure) protocol. The vLEI has since been standardized under ISO 17442-3:2024.[22]

It allows holders of LEIs to bind a private/public key pair to their LEI and thus create unforgeable digital signatures that can be verified outside the organization.

Root of Trust

vLEI holders can issue an unlimited number of sub-credentials for any role in their organization, which can then cryptographically prove their role/ authority outside the organization across borders.

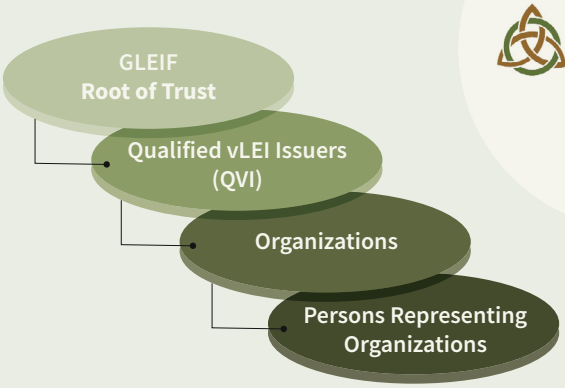
All organizations which have an LEI can create a qualified digital identity and create digital identities for all their employees & roles in their organization or even devices, with GLEIF as "root of trust".

The vLEI is not a Platform

As the vLEI uses KERI, which **operates without a blockchain,** it does not require participants to onboard to a proprietary platform and allows participants to use their own infrastructure.

This is extremely important to GLEIFs mission-statement; in order to bridge the gap between all global business registries, it can't require users to onboard into new "walled gardens", which is the case with blockchains.

> "The International Chamber of Commerce Digital Trust in Trade initiative noted that the vLEI provides a cryptographically secure chain of trust that can replace manual processes needed to access and confirm an entity's identity across industries."
> – Financial Stability Board[26]



KERI

https://keri.one

GLEIF becomes:
- The global root of trust

The vLEI becomes:
- The global digital identity
  - for organizations
  - and their representatives

vLEI Credential Types

In the vLEI trust framework there are **3 types** of credentials:

1. **QVI vLEI credential:**
   a. Allows Qualified vLEI organizations authorized by GLEIF via the GLEIF QVI qualification process to issue OOR and ECR credentials to Organizations which have an analogue LEI.
   b. Contains the QVIs LEI

2. **OOR (Official Organizational Role) vLEI credential:**
   a. vLEI Role Credentials issued by Legal Entities to Persons whose Official Organizational Roles (ISO 5009 standard) can be verified both by the Legal Entity as well as against one or more public sources by the QVI.
      i. Example: vLEI Role Credential for a CEO
         a. Can be used to:
            i. carry out official duties and powers conferred legally or required by regulation, e.g., annual reports, SOX reports
            ii. carry out internal policies, duties or tasks, e.g., approve strategic plans, sign employee service awards

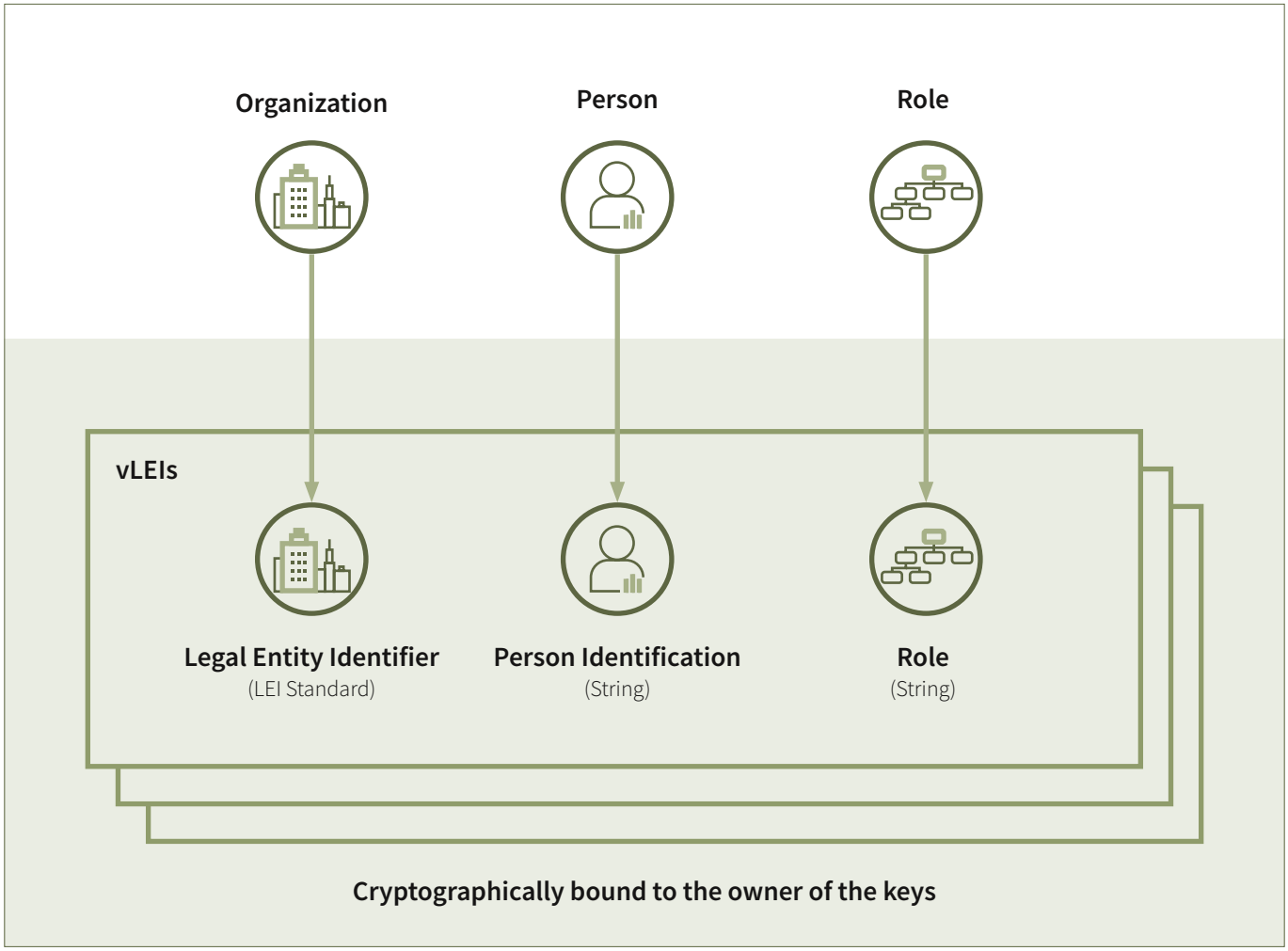
3. **ECR (Engagement Context Role) vLEI credential:**
   a. vLEI Role Credential issued by Legal Entities to Persons in the context of the engagement of those Persons with the Legal Entities which can be verified by the Legal Entities and their respective counterparties.
      1. vLEI Role Credentials issued by a Legal Entity to its authorized suppliers. The Legal Entity then requires authorized suppliers to submit invoices signed with their Credentials (eliminate presentation of fraudulent invoices).

Standardisation

In addition to vLEI itself being standardized under ISO 17442-3:2024, its underlying tech stack, KERI is being standardised by the Trust over IP foundation (ToIP) as part of the ToIP trust spanning protocol. The ToIP is part of the Linux Foundation and enjoys support from many high profile ToIP member-organizations:

Binding Organization, Person and Role

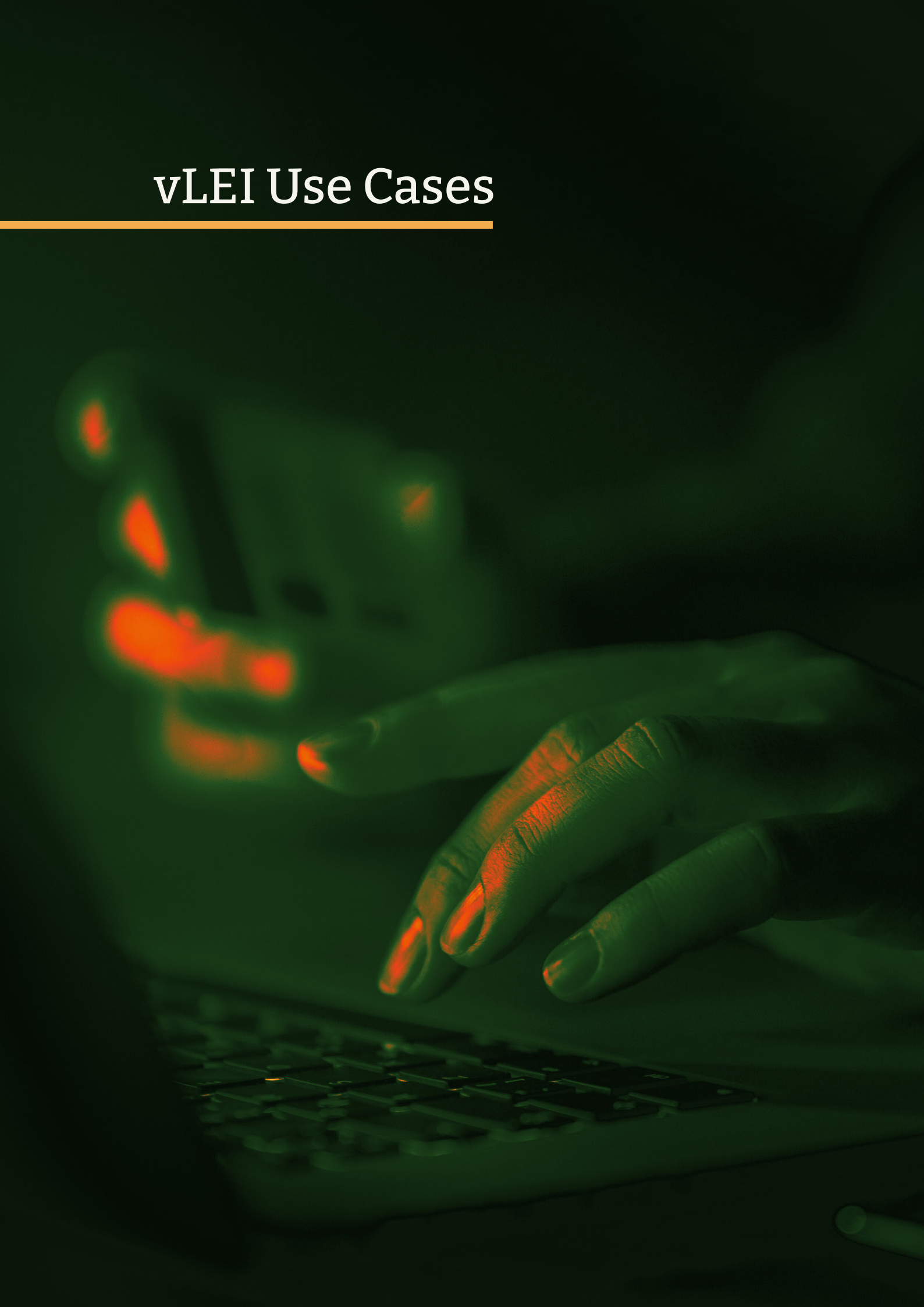
“By combining three concepts – the organization’s identity, represented by the LEI, a person’s identity and the role that the person plays for the organization, vLEI credentials can be issued.” [6]



vLEI trust Framework: www.gleif.org/en/vlei/introducing-the-vlei-ecosystem-governance-framework

→ Due to vLEI credentials being **infinitely delegatable**, every role in an organization can be represented.

vLEI Use Cases



vLEI use-cases (existing or being built)

European Banking Authority: vLEI for Pillar 3 reporting requirements

The Pillar 3 Data Hub (P3DH) will require banks to submit prudential disclosure data directly to the EBA, rather than via national regulators.

This requires **secure identification and authentication** of bank representatives submitting the data. EBA investigated using verifiable LEI (vLEI) in a PoC as well as in an ongoing Pilot for this purpose.

"The EBA has initially engaged Gartner Consulting to conduct a detailed technical risk assessment of GLEIF and vLEI. The key points from Gartner's assessment, after scanning the market, have been that there are no comparably efficient alternative solutions globally." – EBA/DP/2023/01

EBA plans to potentially use vLEI for bank user identification when submitting Pillar 3 data directly to the EBA as well as signing of individual XBRL documents, as showcased on page 18. This will leverage vLEI's automated identity verification capabilities.

vLEI being used in P3DH reporting requirements would have 2 main applications:

1. **Authentication of the bank representative uploading the regulatory reports to the EBA.**
2. **Secure, bespoke signing of data in XBRL reports submitted to the EBA**

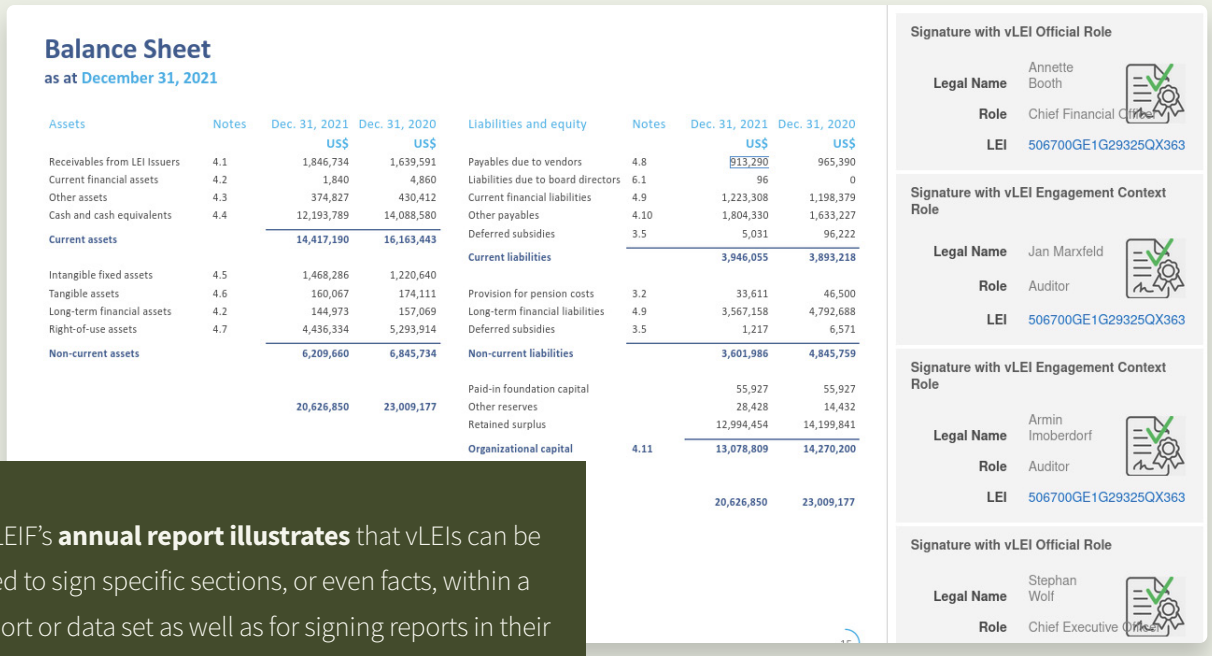
The Pillar 3 Data Hub will impact thousands of financial institutions across the EU who need to make prudential disclosures:

- Large institutions like global systemically important banks
- Investment firms subject to the CRR prudential requirements. As of December 2021, there were around 6,000 investment firms operating in the EU
- Financial holding companies and mixed financial holding companies that are subject to prudential requirements on a consolidated basis under the CRR.
- All credit institutions established in the EU. As of September 2022, there were 2516 credit institutions in the EU.[25]

This is a key and strategic project to the EBA that will put in place new tools to allow, for the first time, the access by all stakeholders to centralised prudential disclosures data from all the EEA institutions. Such an initiative will facilitate access, usability and comparability of prudential information by all interested users, strengthening the transparency of the EU banking sector and further contributing to market discipline and soundness of the European financial system. – EBA/CP/2024/20[18]

"It's incredibly rewarding to see the enthusiasm around the potential of verifiable legal entity identifiers to streamline processes, reduce costs, and, most importantly, enable trusted digital identities. We're excited to keep pushing this innovation forward and are fully committed to making supervisory reporting in the #EU more efficient and secure. Looking forward to continuing this journey."
– Gaetano Chionsini, Head of Statistics, EBA[19]

Bespoke verifiable XBRL filings



Balance Sheet
as at December 31, 2021

Assets	Notes	Dec. 31, 2021 US$	Dec. 31, 2020 US$
Receivables from LEI Issuers	4.1	1,846,734	1,639,591
Current financial assets	4.2	1,840	4,860
Other assets	4.3	374,827	430,412
Cash and cash equivalents	4.4	12,193,789	14,088,580
Current assets		**14,417,190**	**16,163,443**
Intangible fixed assets	4.5	1,468,286	1,220,640
Tangible assets	4.6	160,067	174,111
Long-term financial assets	4.2	144,973	157,069
Right-of-use assets	4.7	4,436,334	5,293,914
Non-current assets		**6,209,660**	**6,845,734**
		20,626,850	**23,009,177**

Liabilities and equity	Notes	Dec. 31, 2021 US$	Dec. 31, 2020 US$
Payables due to vendors	4.8	913,290	965,390
Liabilities due to board directors	6.1	96	0
Current financial liabilities	4.9	1,223,308	1,198,379
Other payables	4.10	1,804,330	1,633,227
Deferred subsidies	3.5	5,031	96,222
Current liabilities		**3,946,055**	**3,893,218**
Provision for pension costs	3.2	33,611	46,500
Long-term financial liabilities	4.9	3,567,158	4,792,688
Deferred subsidies	3.5	1,217	6,571
Non-current liabilities		**3,601,986**	**4,845,759**
Paid-in foundation capital		55,927	55,927
Other reserves		28,428	14,432
Retained surplus		12,994,454	14,199,841
Organizational capital	4.11	**13,078,809**	**14,270,200**
		20,626,850	**23,009,177**

"GLEIF's **annual report illustrates** that vLEIs can be used to sign specific sections, or even facts, within a report or data set as well as for signing reports in their entirety." [7]

XBRL (eXtensible Business Reporting Language) is the business reporting standard required by the SEC for operating company financial statement information and fund risk/return summary information.

Legal entities do not act. The people inside them do. The vLEI makes who the actors are:

- Verifiable
- Traceable

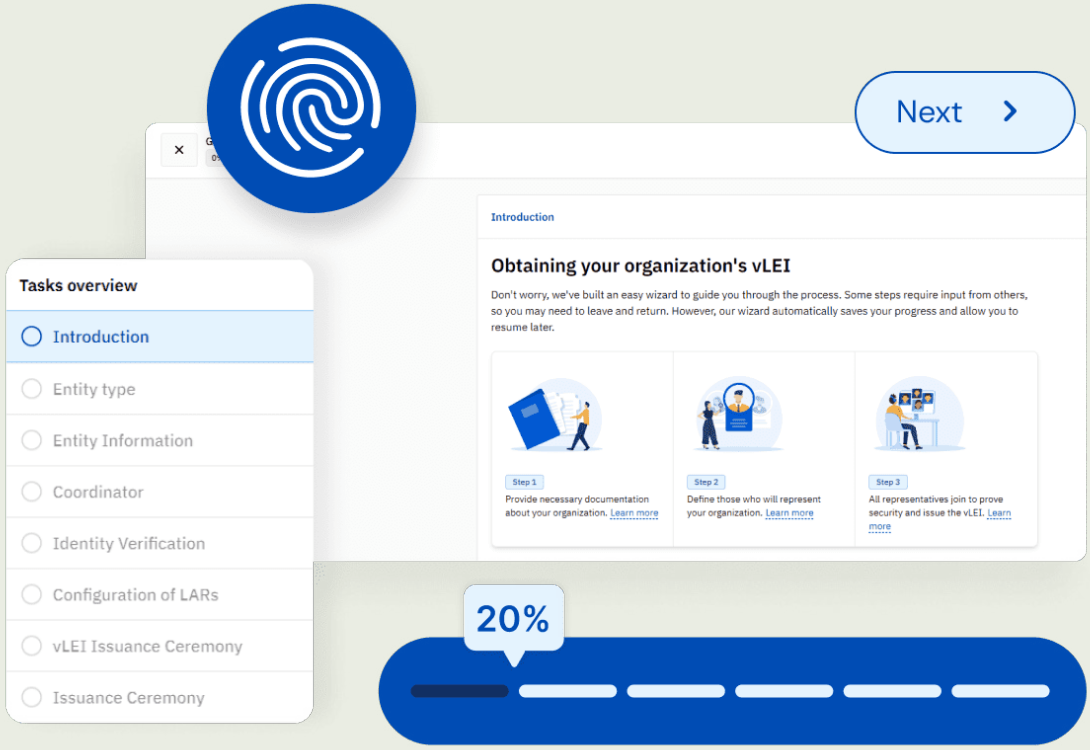
In the above screenshot from **GLEIFs 2021 annual report,** the user clicked on "Payables due to vendors" and was immediately able to verify that the listed figure of $913.290 was **personally co-signed and verified** by the CEO, the CTO, 2 auditors, the Board Chair and General Counsel.

Each of these co-signers did so using their **OOR credentials** which are tied to them and their role in the organization personally.

The use of **KERI** allows for these signatures to be verifiable without the use of a centralised Identity provider. If the XBRL report were to be downloaded and saved locally, the signatures remain unforgeable and are always cryptographically verifiable.

→ By **utilising the vLEI in XBRL formatted filings** and reports, each individual data point can be signed by the people inside an organization which are **personally responsible for that specific data**.

End to End verifiable SMS messages



One of the exciting use cases for vLEI is being implemented by the startup **Provenant.**

Provenant was co-founded by KERI inventor Dr. Samuel Smith, is the first QVI, and issued the very first vLEI to GLEIF itself.

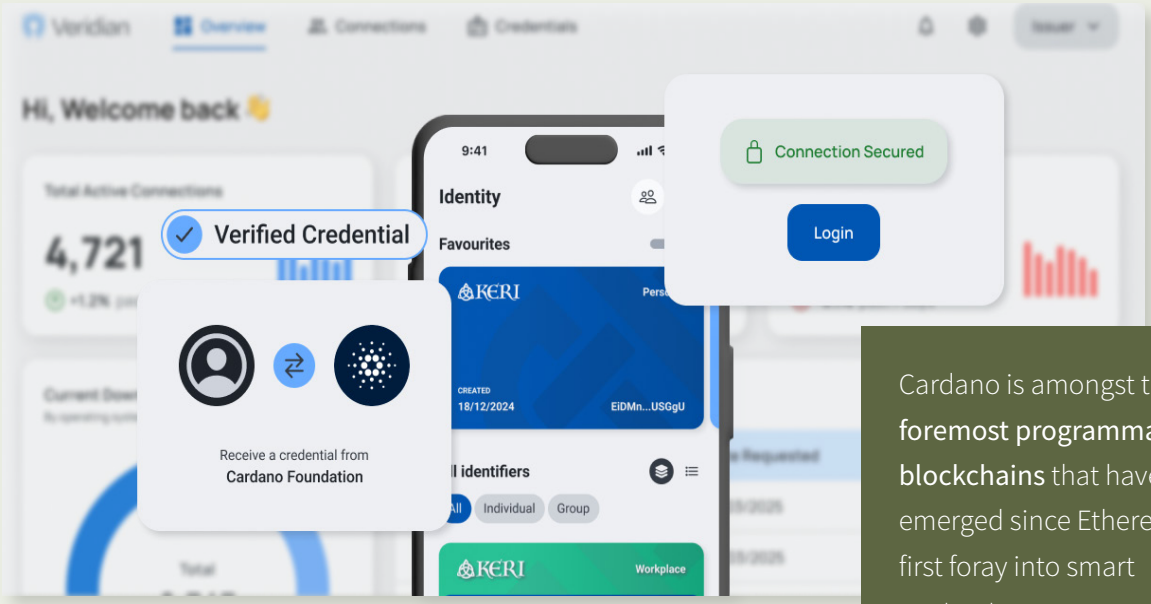
Provenant is implementing End to end verifiability for SMS in the US SMS network by using the vLEI and is currently running pilots with the involved ecosystem participants.

Problem: The outdated SMS protocols contain no way of verifying whether a sender actually has the right to send messages from the number he is claiming to to send from and there is no way to trace which path the SMS took through the network. This allows fraudsters to impersonate organizations such as Banks on a massive scale.

Solution: By signing SMS messages with the Carriers vLEI or an ECR vLEI credential assigned to each of the carriers Servers (hops), the origin of SMS becomes traceable and blocking spam & persecuting Scammers becomes trivial.[12]

Smishing (phishing attacks conducted through SMS messages) is one of the fastest-growing cyber threats, with as many as 84% of organizations encountering an attack in 2020.[9]

Cardano, the DLT leading the way for vLEI on chain.



Cardano is amongst the **foremost programmable blockchains** that have emerged since Ethereum's first foray into smart contracts.

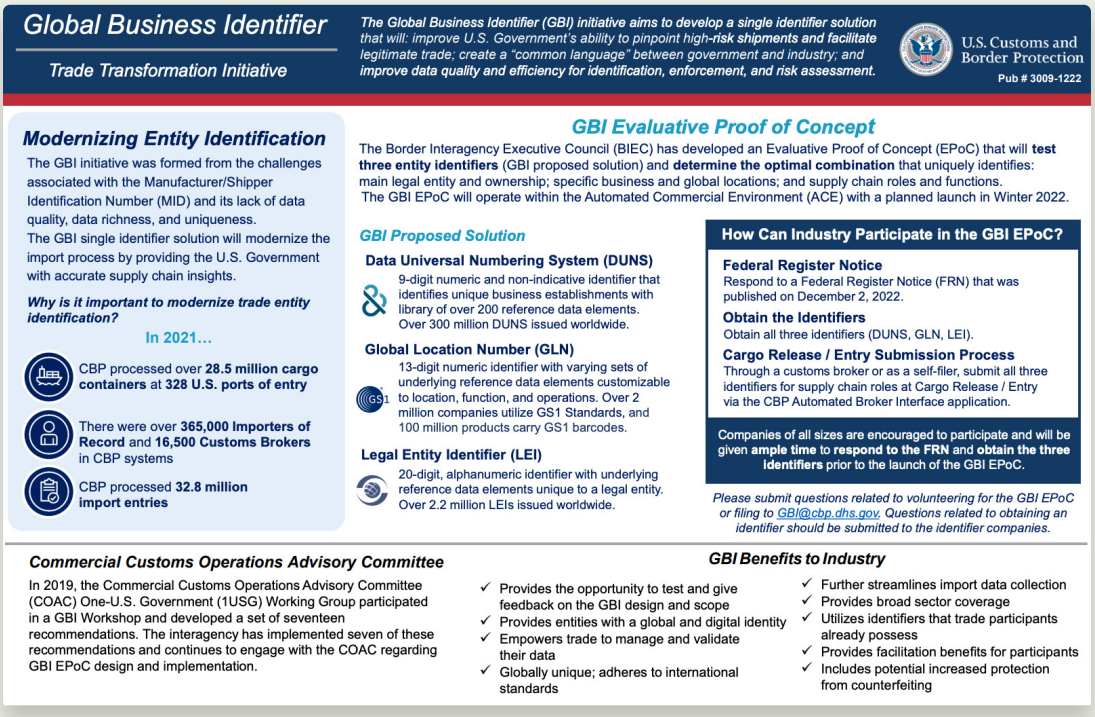
Cardano has been a hub for many cutting-edge research projects pushing the boundaries of what is possible on DLT. Decentralized identity has not been overlooked in this effort. Since 2021, Atala PRISM, now enshrined in Hyperledger Aventus, has been a notable development.

However, Aventus, which is a more traditional DID-based identity method, seems to have been surpassed by an exploration into a **KERI-based identity wallet developed by the Cardano Foundation:** veridian.id**.** Looking to be the first mobile-native wallet implementation of KERI in all appstores, due to release within Q2 2025, this represents a major step towards the maturation of the vLEI and KERI ecosystems.

The Veridian Wallet features:[32]

- HSM and Secure Enclave based private key security
- **Non-repudiable digital signatures** to ensure Authentic Communication
- **Native interoperability** through KERI witnesses and watchers
- vLEI support, allowing for **Organizational Identity integrations**
- KERI tunnel: connecting the **wallet to a browser** for in-browser signing
- Chat: KERI **encrypted chat between wallet users**
- **Crypto Wallet Integration**
- **Verifiable Credential Issuance**

Global Business Identifier Evaluative Proof of Concept (GBI EPoC)



In December 2022 U.S. Customs and Border Protection (CBP) launched a **Global Business Identifier** (GBI) Evaluative Proof of Concept (EPoC), which determines **a single identifier solution that will uniquely discern main legal entity and ownership**, specific business and global locations; and supply chain roles and functions. [10]

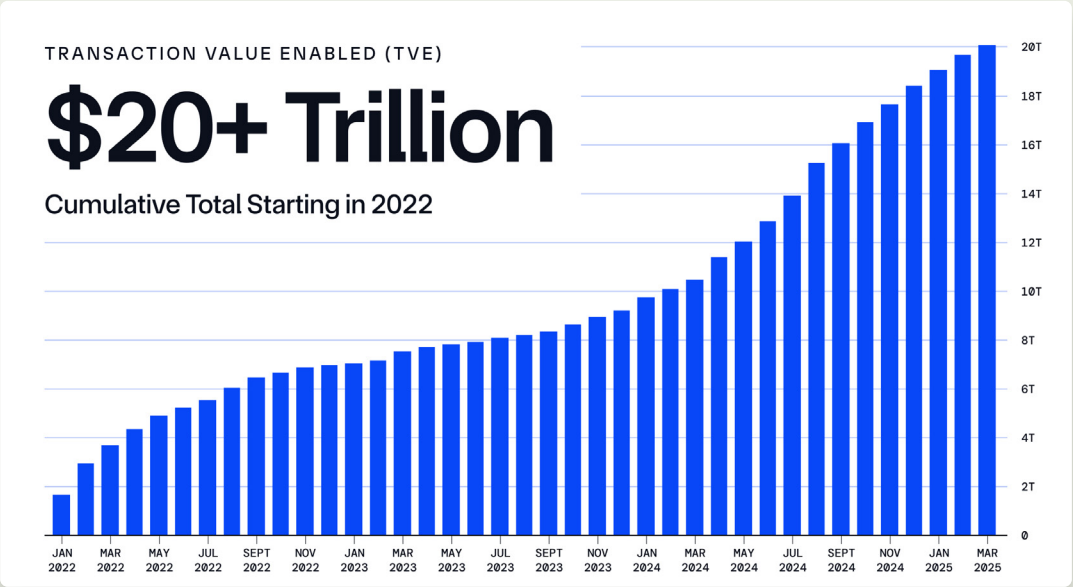
The three identifiers under evaluation:

1. Legal Entity Identifier (LEI)
2. Data Universal Numbering System (D-U-N-S)
3. Global Location Number (GLN)[11]

The **GBI EPoC** data collection ends on February 23, 2027. Neither the DUNS number nor the GLN possess the advanced cryptographic capabilities the vLEI possesses, we therefore believe it is **highly likely for the LEI to be chosen by the CBP to replace the MID**, which is currently used in the processing of **28.5 million cargo containers in 328 U.S. ports of entry.**

This would add yet another regulatory adoption driver for the LEI, in addition to the EBA (European Banking Authority), the ESMA (European Securities and Market Authority) as well as the FDTA (US Financial Data Transparency Act)

Cross-Chain interoperable digital identity for legal entities in the Blockchain space



Chainlink in numbers [21]

Chainlink

In November 2024, the blockchain-oracle network Chainlink announced their intention [20] of making vLEI signatures available on multiple blockchains using CCIP (Chainlink Cross-Chain Interoperability Protocol).

In their announcement, Chainlink postulates:

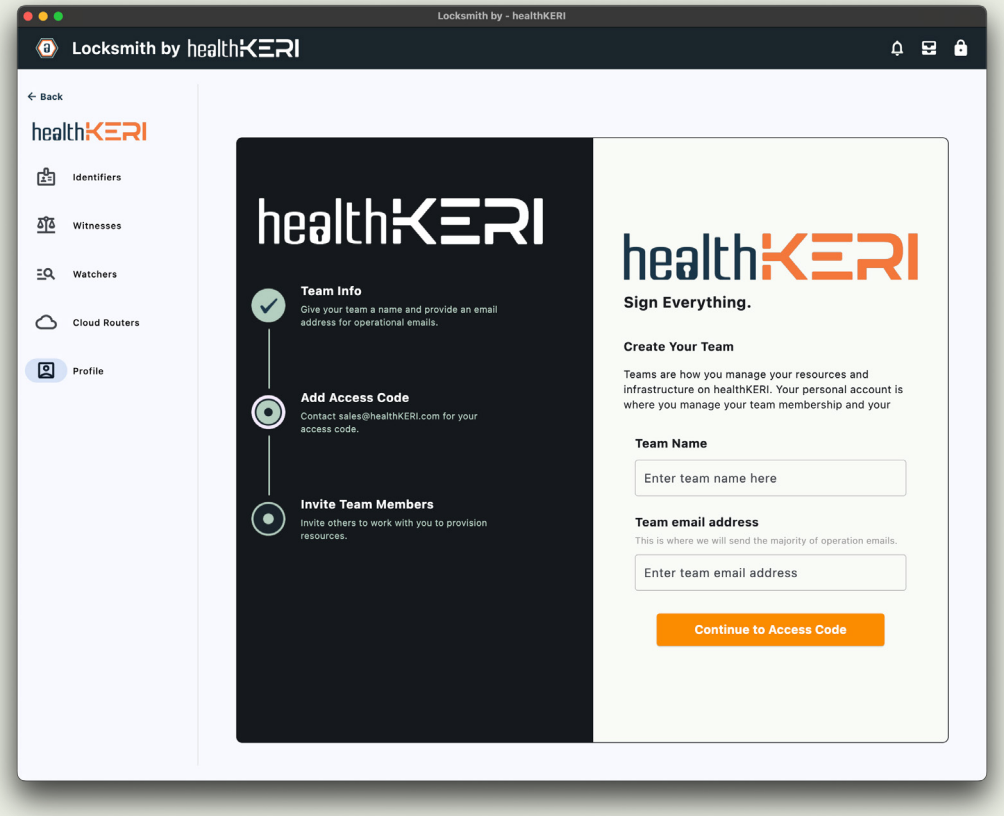
- Chainlink could distribute vLEI data across thousands of blockchain networks
- Smart contracts would be able to query vLEI information directly
- This could create a unified identity layer across otherwise fragmented blockchain networks
- vLEI integration into the Chainlink oracle network could then enable:
  - High-quality securities use cases
  - Payment solutions
  - Trade applications
  - Trustless Credit Appraisability

Chainlink

The most widely used Oracle network for powering hybrid smart contracts, enabling smart contracts on any blockchain to access off-chain data & computations securely.
Chainlink connects real-world data to blockchain networks.

→ "With this, Chainlinks ultimate goal is increasing transaction volume in blockchain environments by solving the identity verification challenge, which it sees as critical building block to enable high quality securities, payments and trade use-cases"

True Zero Trust Clinical Data Exchange



Started by healthcare veteran Jared Jeffery, KERI core developer Philip Feairheller, KERI originator Dr. Sam Smith — **healthKERI**'s mission is to secure healthcare's data by digitally signing & verifying every transaction.

Problem

30% of the world's data is health data[27]. This includes protected health information (PHI) which ostensibly receives protection under regulations such as HIPAA or GDPR. However, the US healthcare sector is facing an unprecedented rise in cyberattacks, with a **staggering 950% rise in stolen patient records over the past five years**[28]. The February 2024 ransomware attack on Change Healthcare compromised **100 million patient records**[29] alone. Health systems operate on outdated cyber technology, coupled with an expanding attack surface due to the use of hundreds of applications and thousands of connected devices.

Ascension –a major US health system—operates 136 hospitals in 18 states with over 131,000 employees and recently reported a $1.8bn loss[30] in 2024, citing a major cyberattack in May 2024 as a primary driver.

Solution

By using KERI and vLEI, healthcare organizations can create simplified internet-scale signing infrastructure, allowing all data to be cryptographically signed. The result is a true zero trust exchange architecture that leverages both the vLEI's technology and governance framework to create an efficient, secure system for use with all healthcare data standards. (HL7v2, FHIR, DICOM, etc.)

Bulletproofing Digital Trade With the vLEI

Through the vLEI, and the power of KERI, the oft-promoted electronic Bill of Lading (eBL/eBOL) can now become cryptographically verifiable.

Such benefits include features like:

- Reducing Fraud
- End-to-end product tracing
- Automatic Regulatory Compliance
- Payments upon proof of delivery
- Bulletproof Security
- Globally resolvable Roots of Trust

There are two major initiatives that are working to the realization of this new approach.

100+
Countries

630,077
eBL Issuances

eBL Market Share

Verifiable Trade

Verifiable.Trade is a Swiss non-profit working on producing open, ToIP-stack based standards and open source software for adding vLEI signatures to digital trade documents and thereby transforming electronic trade documents, such as electronic bills of lading, into verifiable cross-platform trade instruments.

Led by the former CEO of GLEIF, Stephan Wolf, Verifiable Trade is trailblazing a world class approach for vBL, leaping over traditional bottlenecks embodied by platform based approaches.

WaveBL

The WaveBL electronic shipping and digital trade solution enables the instant, encrypted, and authenticated transfer of electronic Bills of Lading and related trade documents. WaveBL has strong alliances with leading container lines, customers, and other beneficiaries in global trade to drive faster digitalization and adoption.

Through a recent announcement with GLEIF[31], the issuer of the vLEI. waveBL has committed toward the integration of the vLEI, with their ceo Noam Rosenfeld saying: "...the introduction of vLEIs could radically streamline this process by providing a trusted automated and universally accepted solution for verifying companies' digital identities worldwide."

Bhutan: Interoperability for national Organisational Identity

Bhutan‘s National Digital Identity (NDI), launched in 2023, is a pioneering initiative aimed at establishing a secure, blockchain-based national identity system for its citizens. This system is grounded in the principles of Self-Sovereign Identity (SSI), which empowers individuals with control over their personal data, enabling them to decide how, when, and with whom their information is shared.

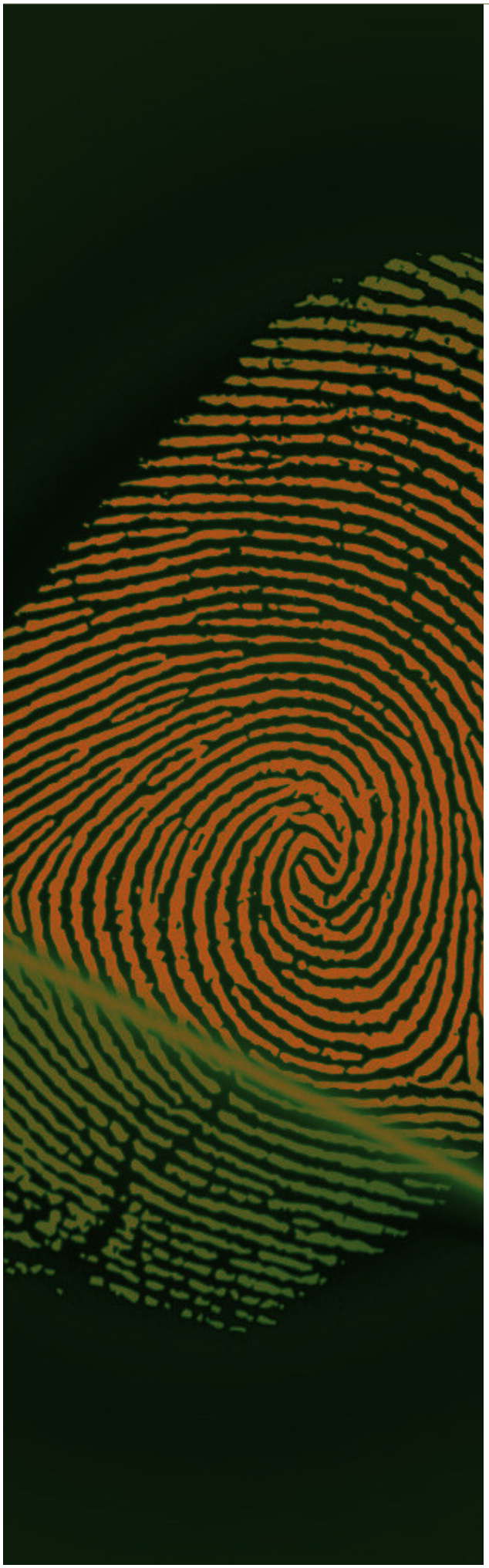
In a May 2024 case study[24], it was announced that in the future, any entity that obtains a vLEI will be considered a trusted party in Bhutan‘s NDI digital trust ecosystem.

Specifically, the case study states:

- The NDI trust ecosystem accounts for three categories of individuals: citizens, non-national residents, and tourists.
- For organisations participating in the ecosystem, trust is currently established via the Registrar of Companies or the Royal Monetary Authority.
- However, it notes that „eventually, any entity that has a vLEI (verifiable Legal Entity Identifier) will also be considered a trusted party.“[24]

The potential:

Integrating verifiable LEI (vLEI) into national digital identity systems and business registries worldwide could significantly enhance global interoperability. Enabled by its true zero-trust tech-stack and highest quality, globally recognized “root of trust” in GLEIF, vLEI would allow secure and private exchange of verifiable cryptographic signatures on behalf of companies across borders. Organisations could leverage vLEI for streamlined cross-border authentication, authorization, and transaction signing. This portability and interoperability unlocked by vLEI integration into nation level digital ID systems could increase efficiency in digital trade, reduce fraud and enhance cybersecurity. Overall, vLEI creates the potential for seamless global interoperability between national digital identity frameworks, business registries, and companies engaging in cross-border activities.



KERI and vLEI unlock unprecedented possibilities:

- Digitally signing regulatory filings and reports.
- Expediting supply chain due diligence processes.
- Verifying business payments.
- Expediting membership and registration to payment systems
- Accelerating business entity registration and license issuance.
- Streamlining and accelerating client onboarding/KYC Customer processes for financial and other providers of certain regulated services.
- Facilitating customs and border control checks.
- Confirming authenticity when applying for and vetting trusted network membership.
- Securing the remote execution of business contracts.
- To support data protection in all use-cases, including those mandated by regulation.

B2B Examples[8]

Authorized representatives will digitally sign documents, contracts, purchase orders, and attestations; recipients of those signatures will instantly verify signers' authority (and some digital documents will prevent signing without the expected authority);

The origin, chain of custody, and authority of a legitimate document, agreement, filing, or piece of data will be **instantly verifiable as authentic and un-tampered with;**

Phone calls, texts, email, and other digital communications originating from authorized representatives (or devices) of an organization—or any delegate of that organization—**will be instantly verifiable, as will the authority of the originating representative;**

The authority of every approval, signature, or other digital action in a supply chain will be instantly verifiable by downstream actors, and auditable in real-time;

Login by employees, contractors, customers and constituents will become passwordless and based on authority and entitlement, not passwords or devices;

Impersonation and ID theft of authorized representatives will become more difficult for fraudsters;

Security breaches will become shorter, less frequent and less impactful, as organizations adopt more robust OI and key management strategies;

Conclusion

→ vLEI is the only global root of trust for organizational digital identity

There is no alternative to vLEI

Both in terms of regulatory support as well as corporate support

→ vLEIs unique tech-stack avoids the pitfalls of past digitization efforts

(Which used platform strategies instead of a protocol approach)

Currently, the vLEI is little known.

This is primarily due to the fact that **there currently are only five QVI** (Provenant inc., Finema HQ, Certizen, CFCA and Nordic Legal Entity Identifier AB). However, there are currently more than 10 of the existing LOUs going through the qualification process in order to issue vLEIs to the existing LEI owners.

As soon as these LOU organizations, which have business relationships with the existing **2.4 million LEI owners,** acquire the capability of issuing vLEI, they will educate those 2.4 million entities about the new possibility and it will lead to exponential growth of vLEI usage.

The opportunity is **to be a trailblazer** and:

- **Get to market first**
- **Educate consulting-customers first**
- **Use the new possibilities first**
- **Position oneself as an authority in digitization**
- **Spearheading new ventures which utilize the vLEI by addressing one of the many use cases**

For the first time in history:

a person or thing can prove the scope of their authority to represent an organization,

outside the boundaries of that organization,

without the use of identity providers (IDPs), blockchains, or shared platforms.

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→ Join Key State Capital

We are looking for:

- **Business-cases** in the vLEI ecosystem
- **Founders** in the vLEI ecosystem

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