

Verifiable Credentials, Decentralized Identifiers, And Governance Frameworks: The Building Blocks of SSI

Brent Zundel, Senior Crypto Engineer

23 April 2020



Who Am I?

Hats



- Senior Crypto Engineer
- Co-Chair W3C DID WG
- Hyperledger Ursa Maintainer
- Hyperledger Aries and Indy Contributor



Commercial vendor of SSI
software & solutions

International non-profit global
public utility for self-sovereign
identity



HYPERLEDGER

Open source code for SSI
contributed by Sovrin to
Linux Foundation

The Hyperledger Greenhouse



HYPERLEDGER

Community Stewardship and Technical, Legal, Marketing, Organizational Infrastructure

Frameworks



Permissionable
smart contract
machine (EVM)



Permissioned
with channel support



WebAssembly-based
project for building
supply chain solutions



Decentralized
identity



Mobile application
focus



Permissioned &
permissionless support;
EVM transaction family

Tools



Infrastructure for
peer-to-peer
interactions



Blockchain
framework benchmark
platform



As-a-service
deployment



Model and
build blockchain
networks



View and
explore data on
the blockchain



Ledger
interoperability

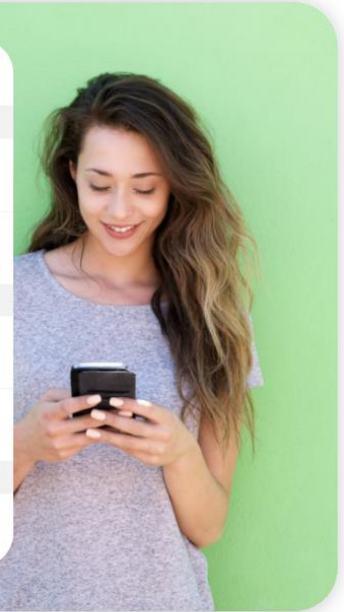
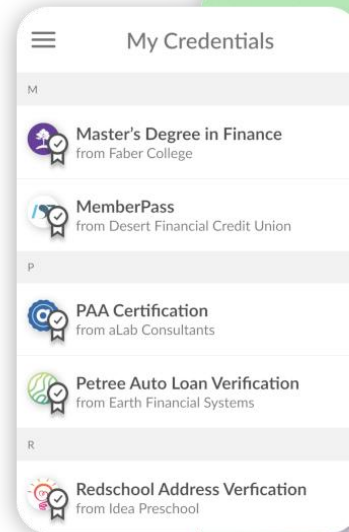


Shared
Cryptographic
Library



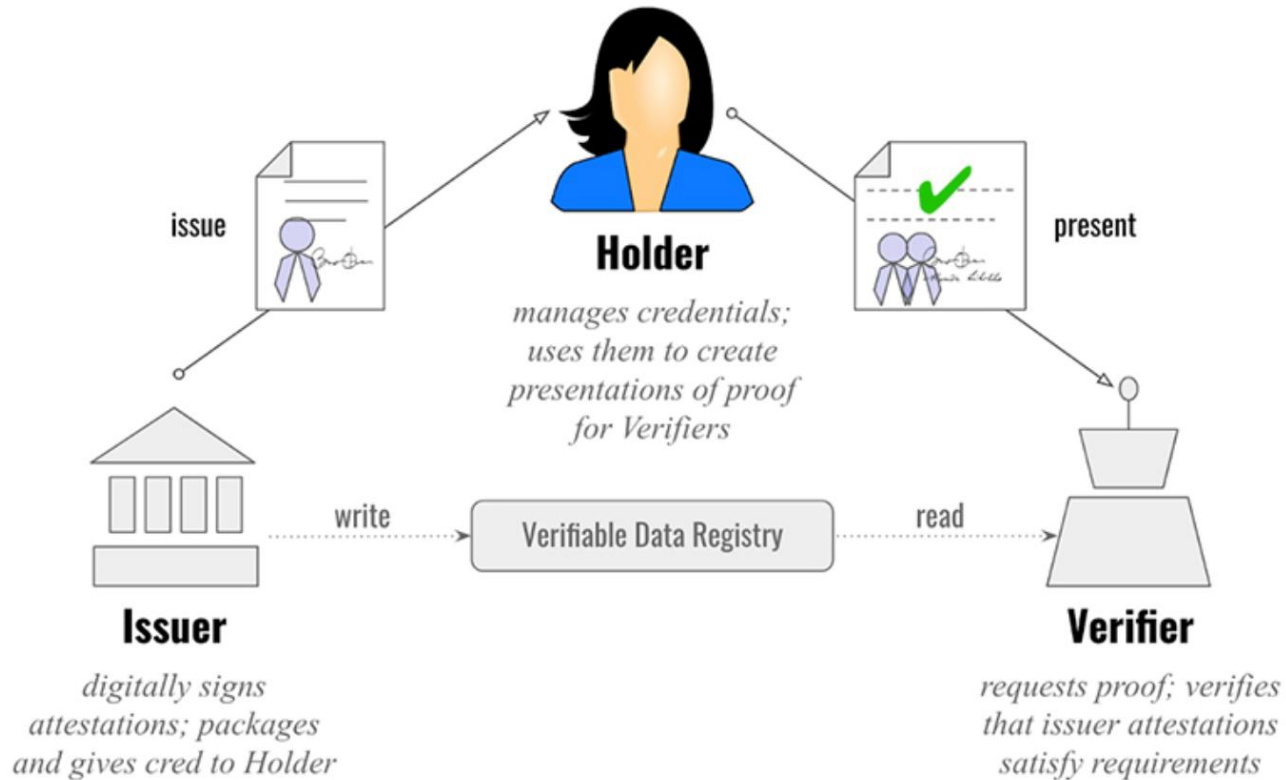
What's all the excitement about **SSI**?
How does this new **identity model**
fundamentally work?

SSI and verifiable credentials in a nutshell



For more details, see the Evernym webinar:
"An Introduction to Verifiable Credentials"
www.evernym.com/webinars.

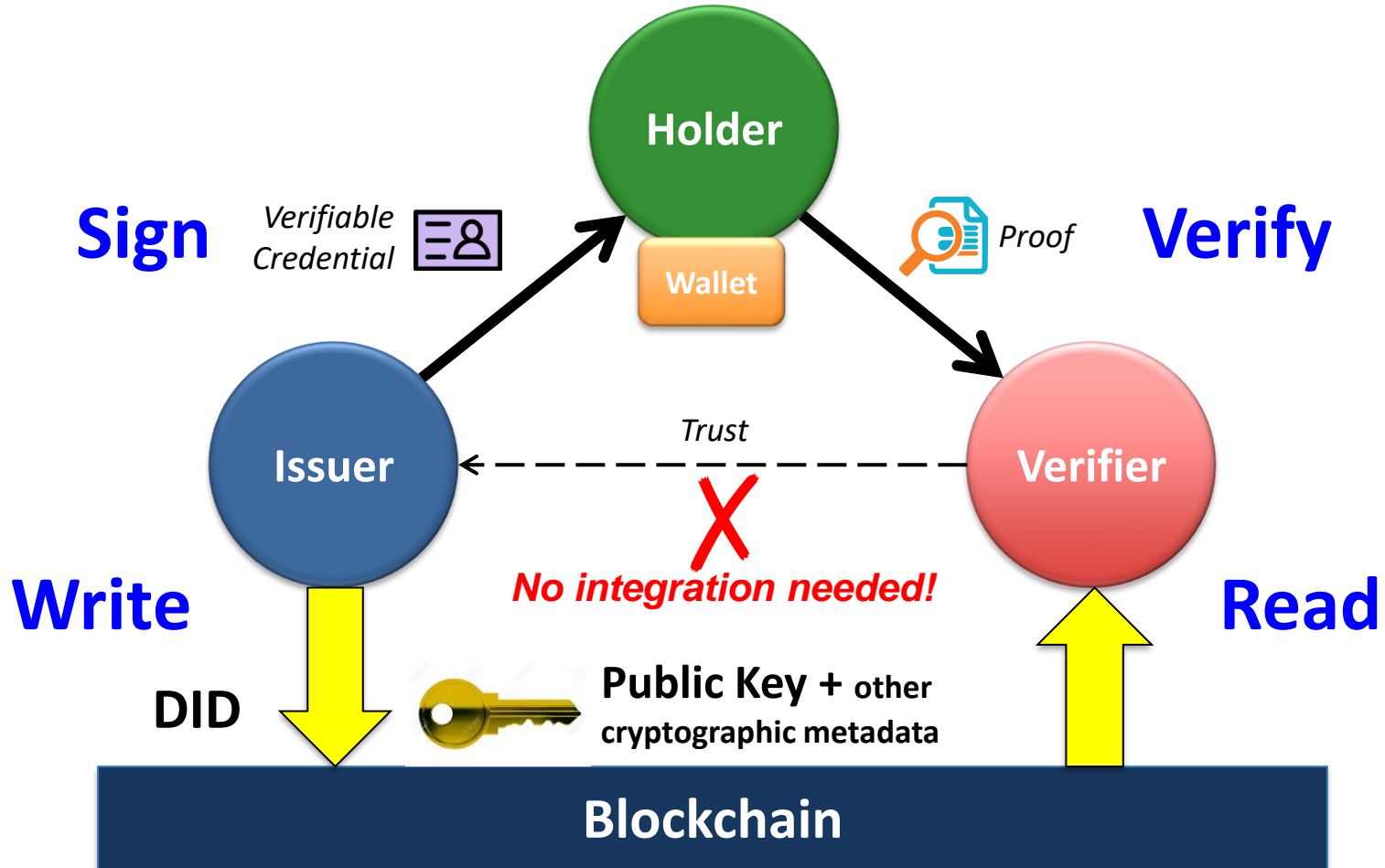
The verifiable credential trust triangle



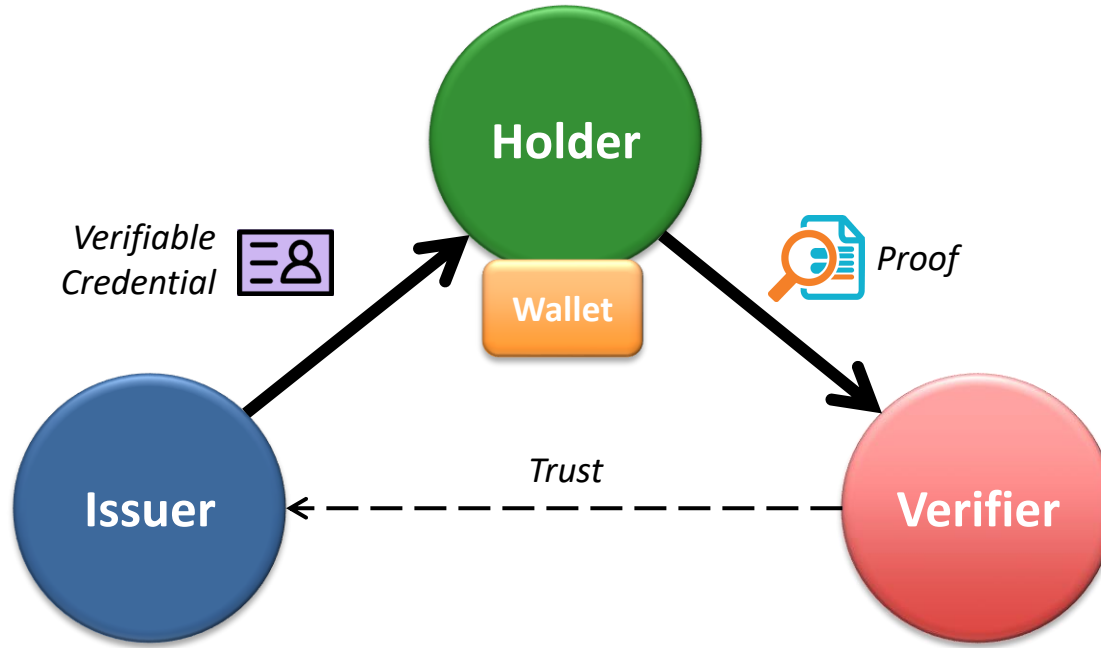


How do **verifiable** credentials work?

The Verifiable Credential Trust Triangle

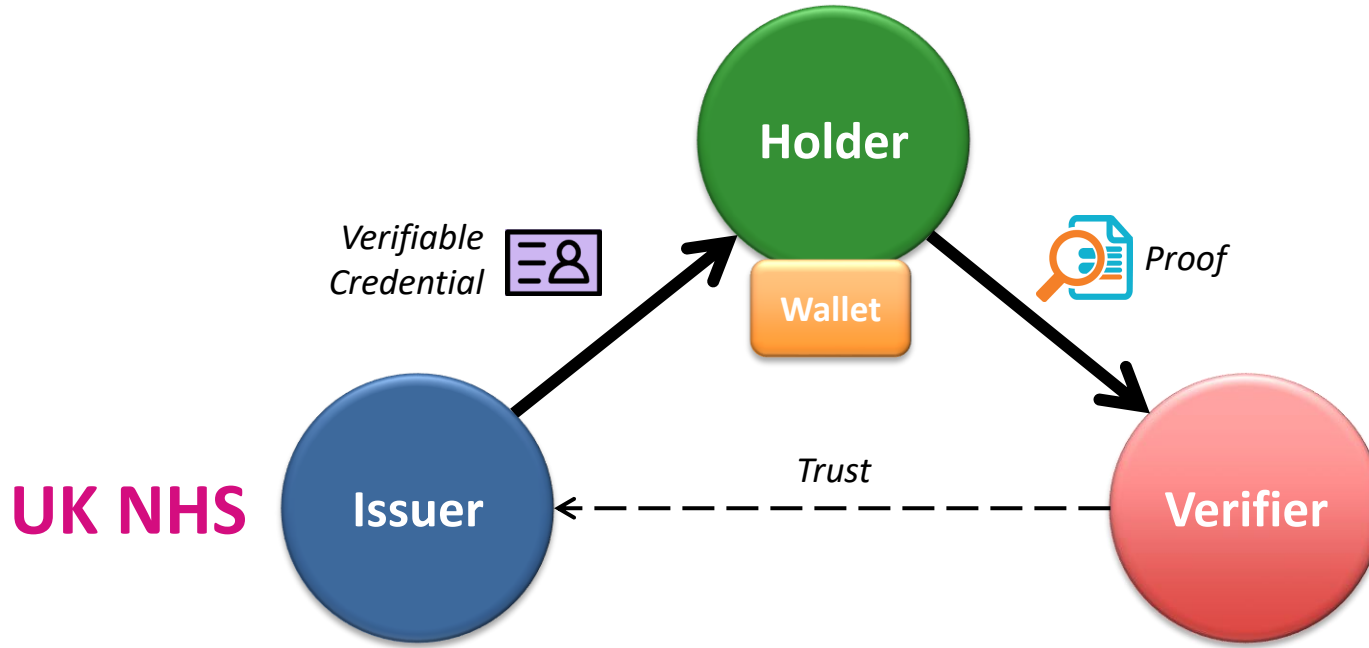


Doctor's Passport Example



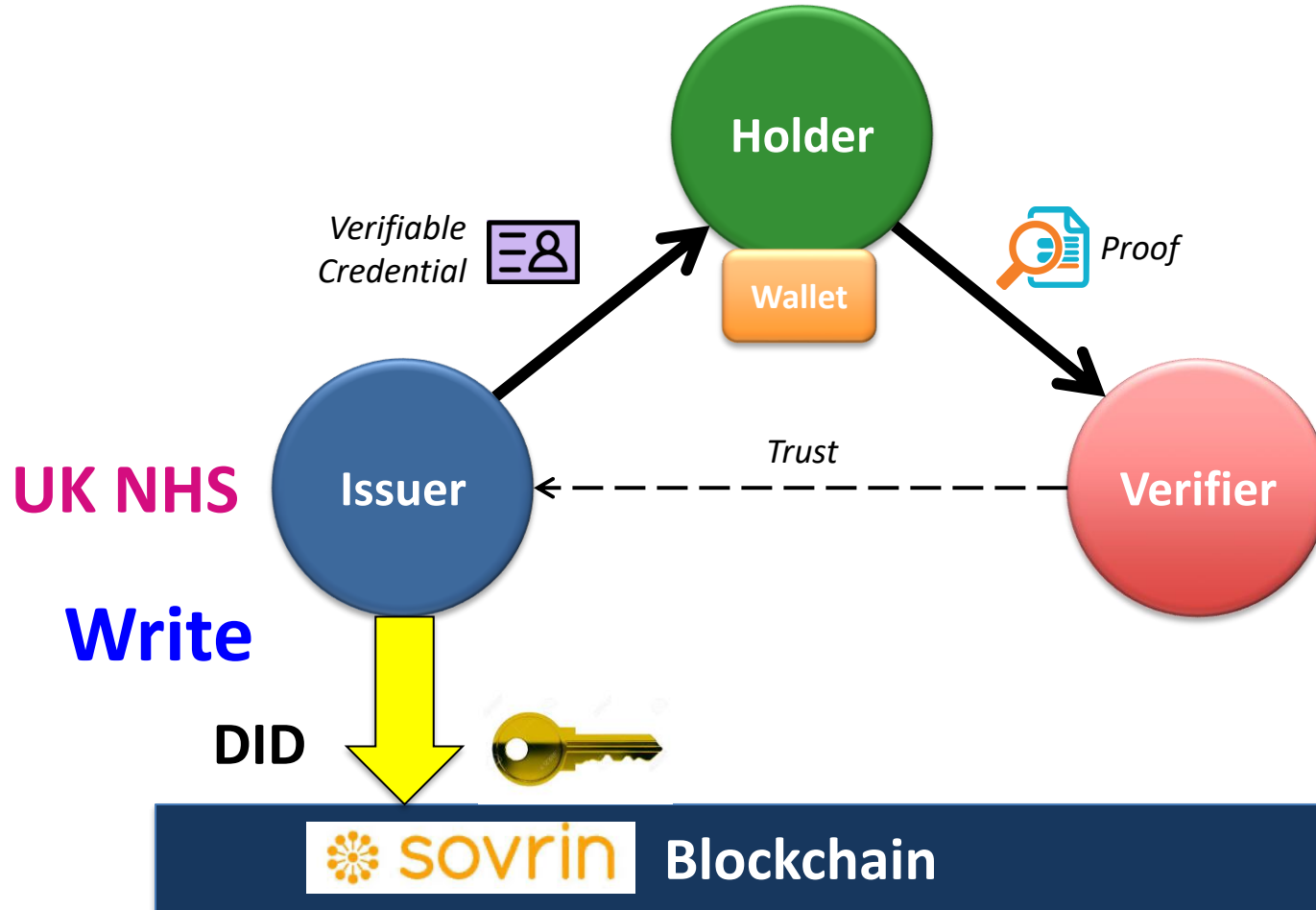
Blockchain

Doctor's Passport Example

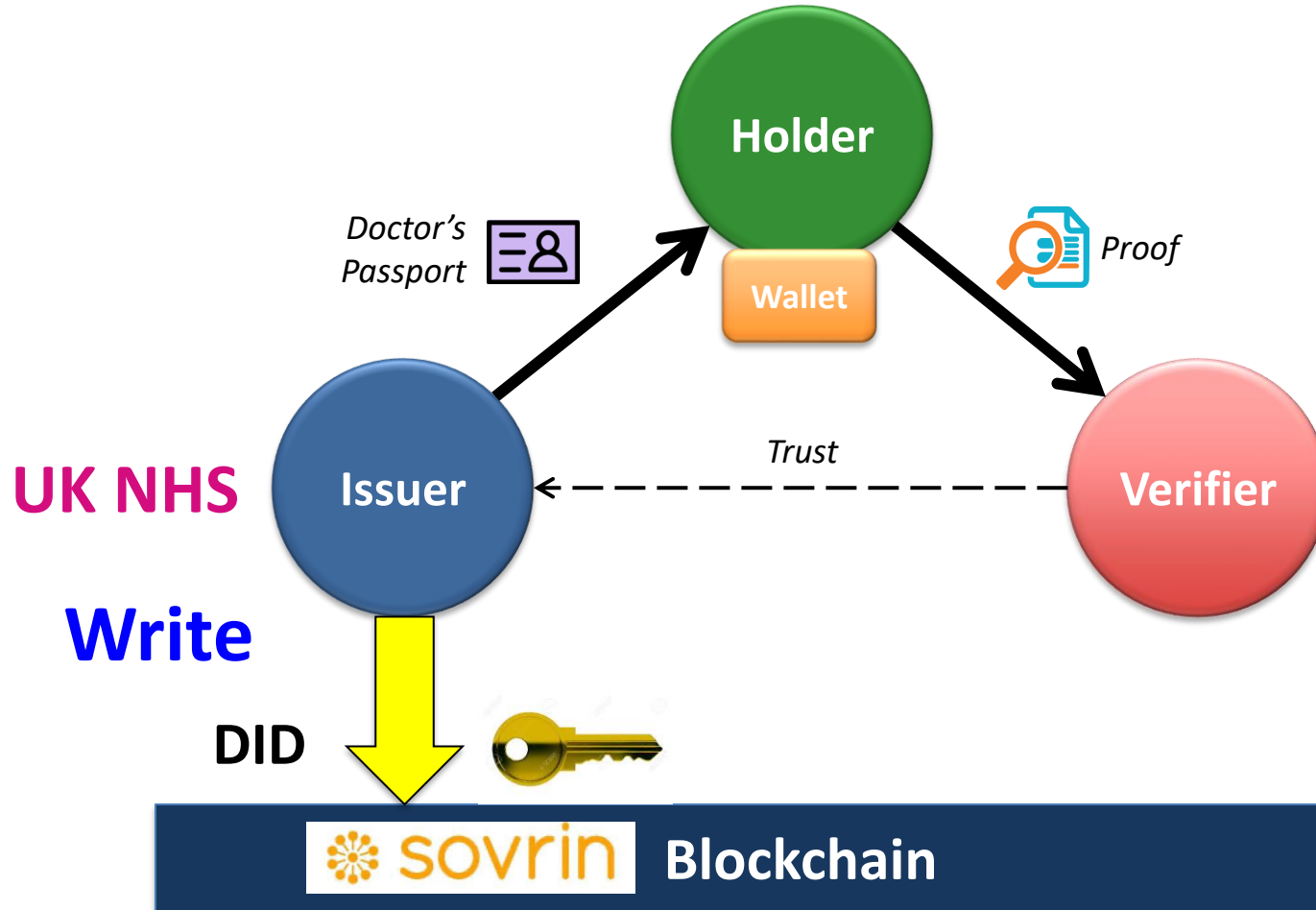


Blockchain

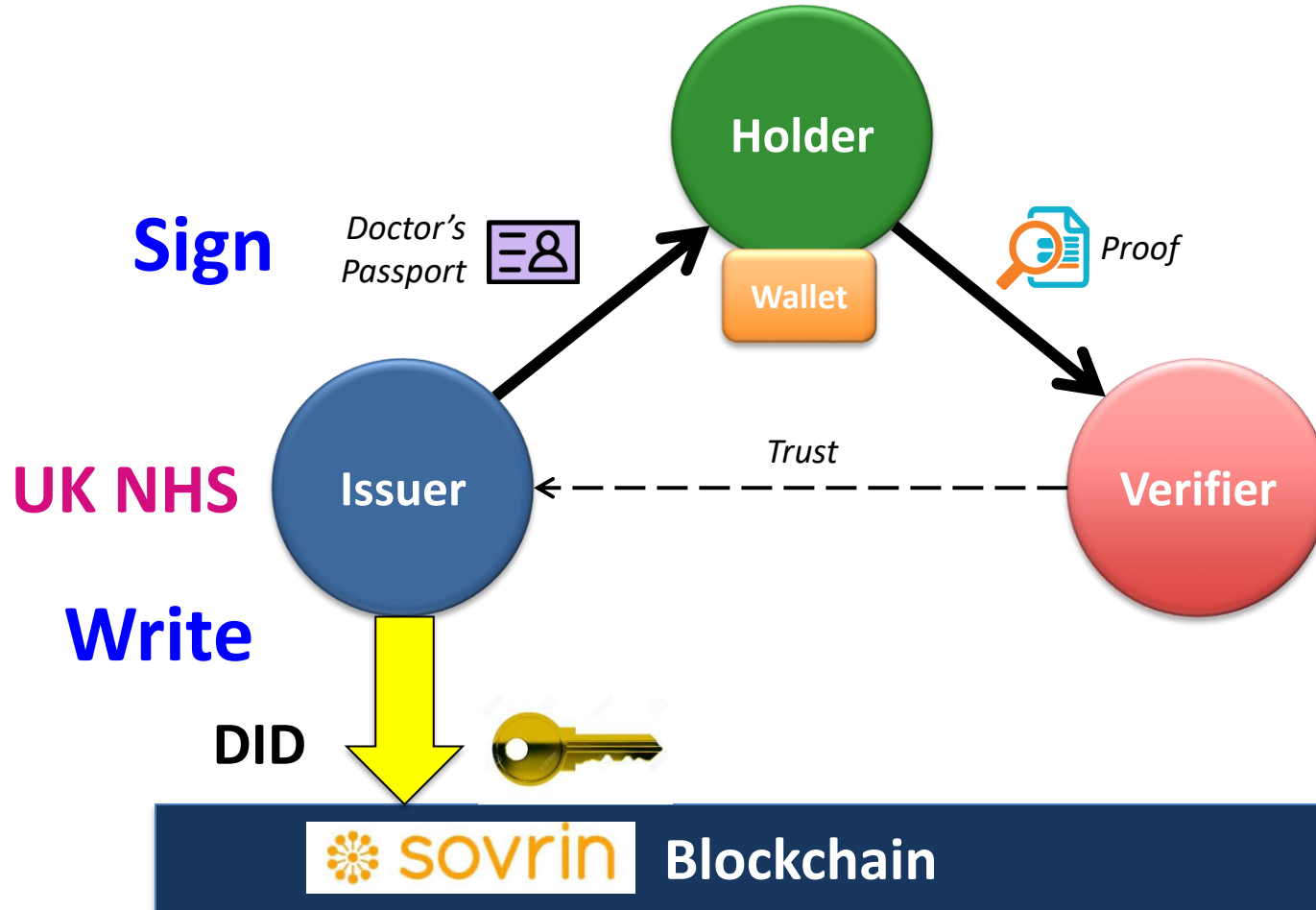
Doctor's Passport Example



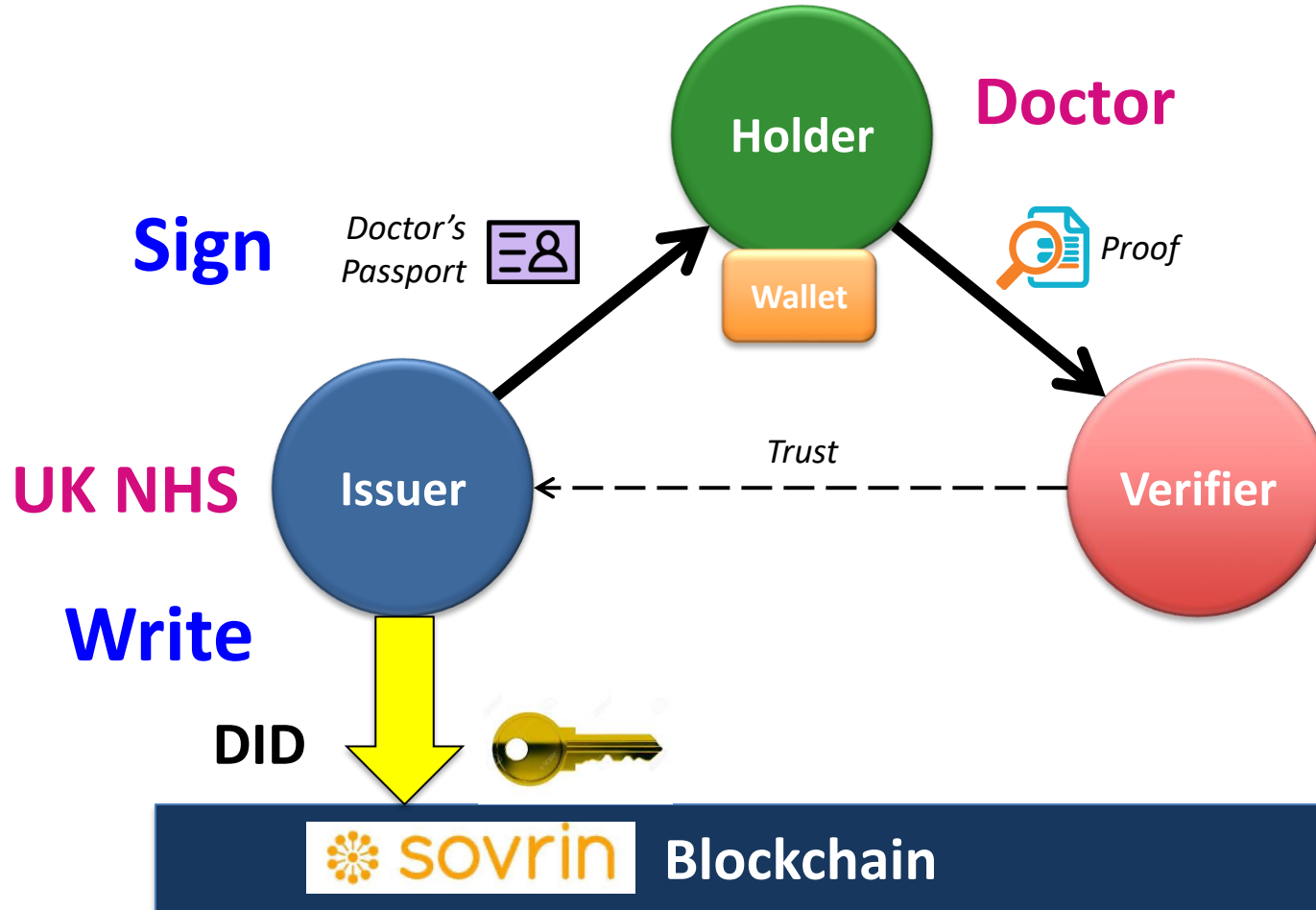
Doctor's Passport Example



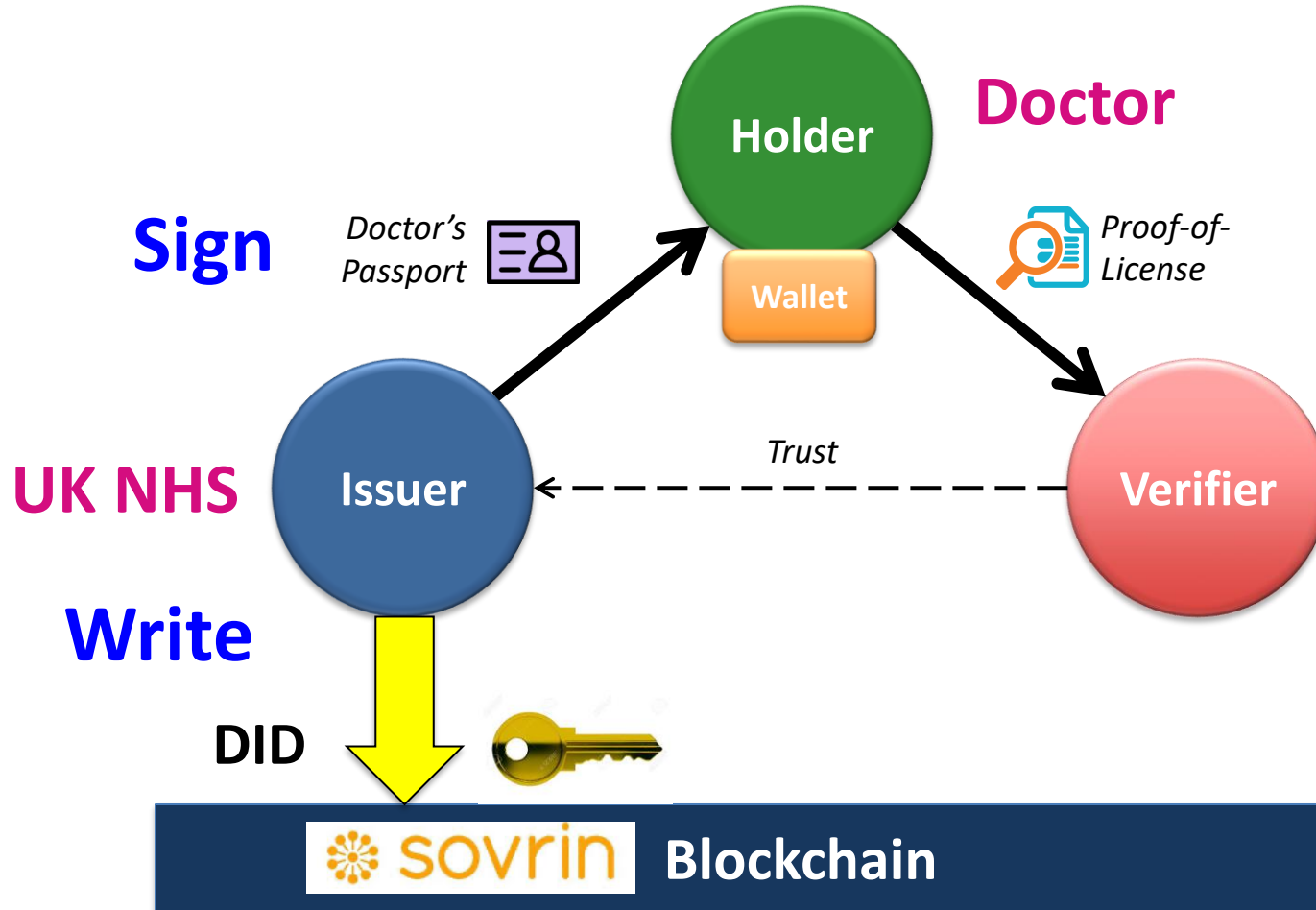
Doctor's Passport Example



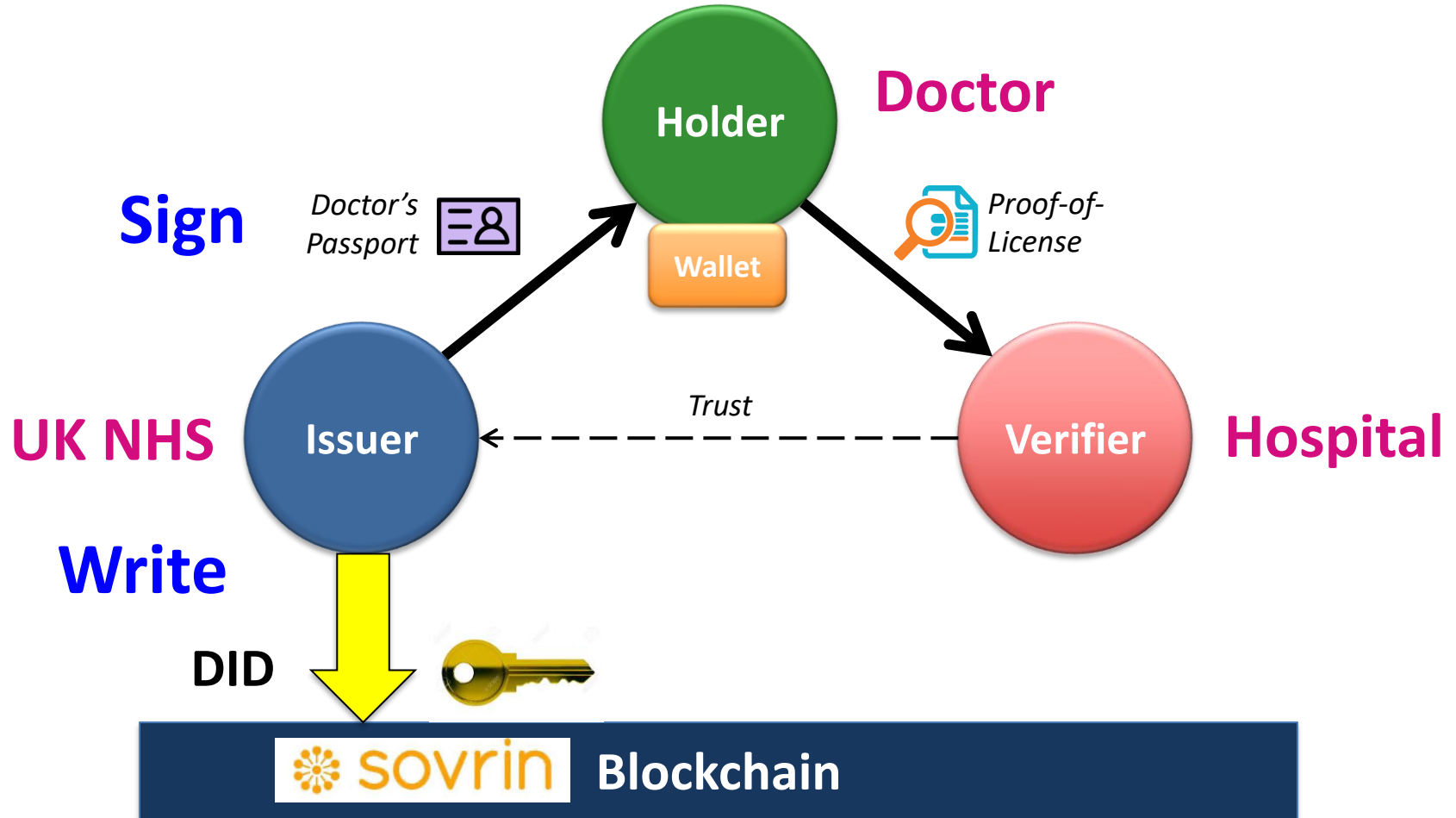
Doctor's Passport Example



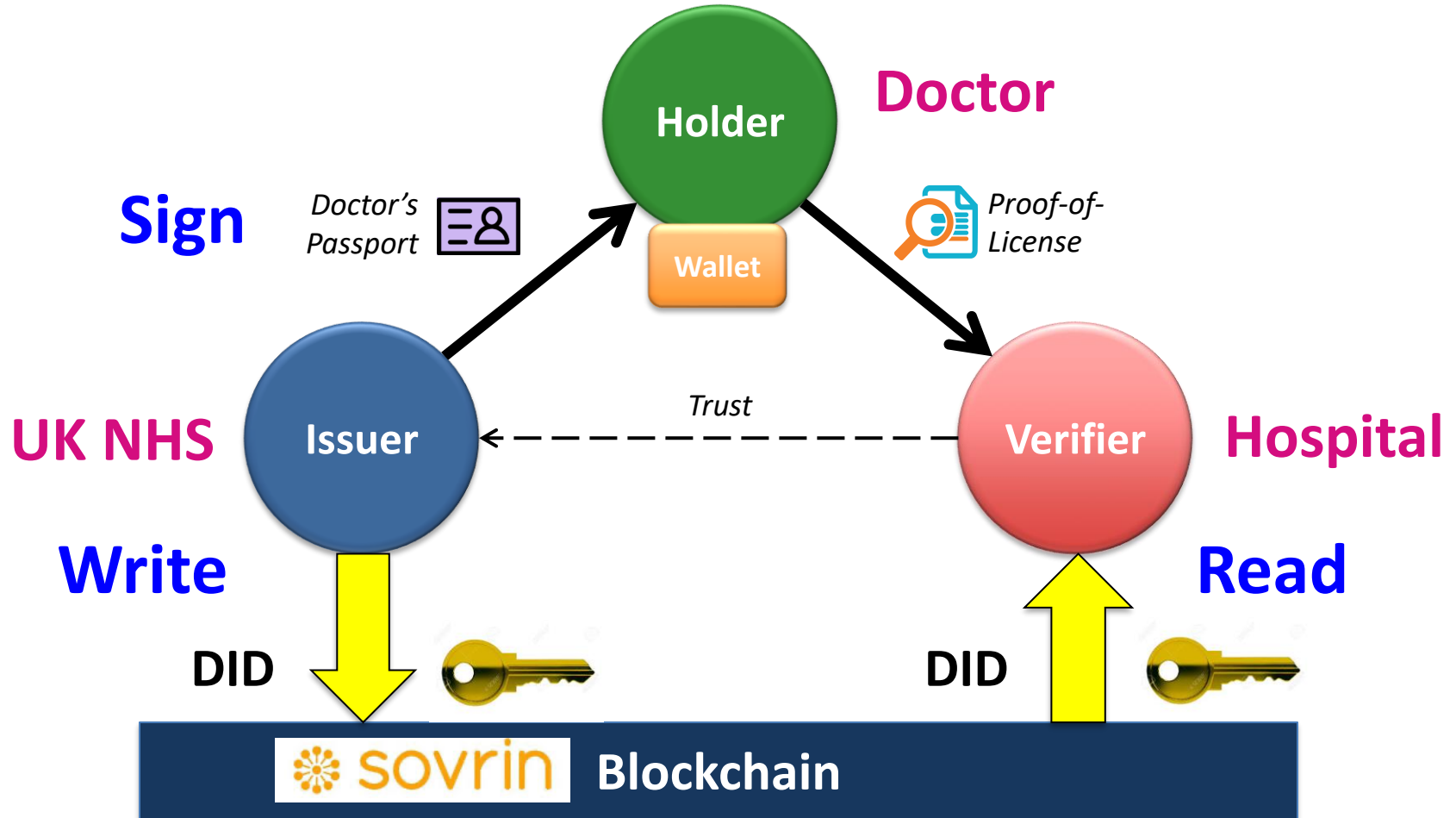
Doctor's Passport Example



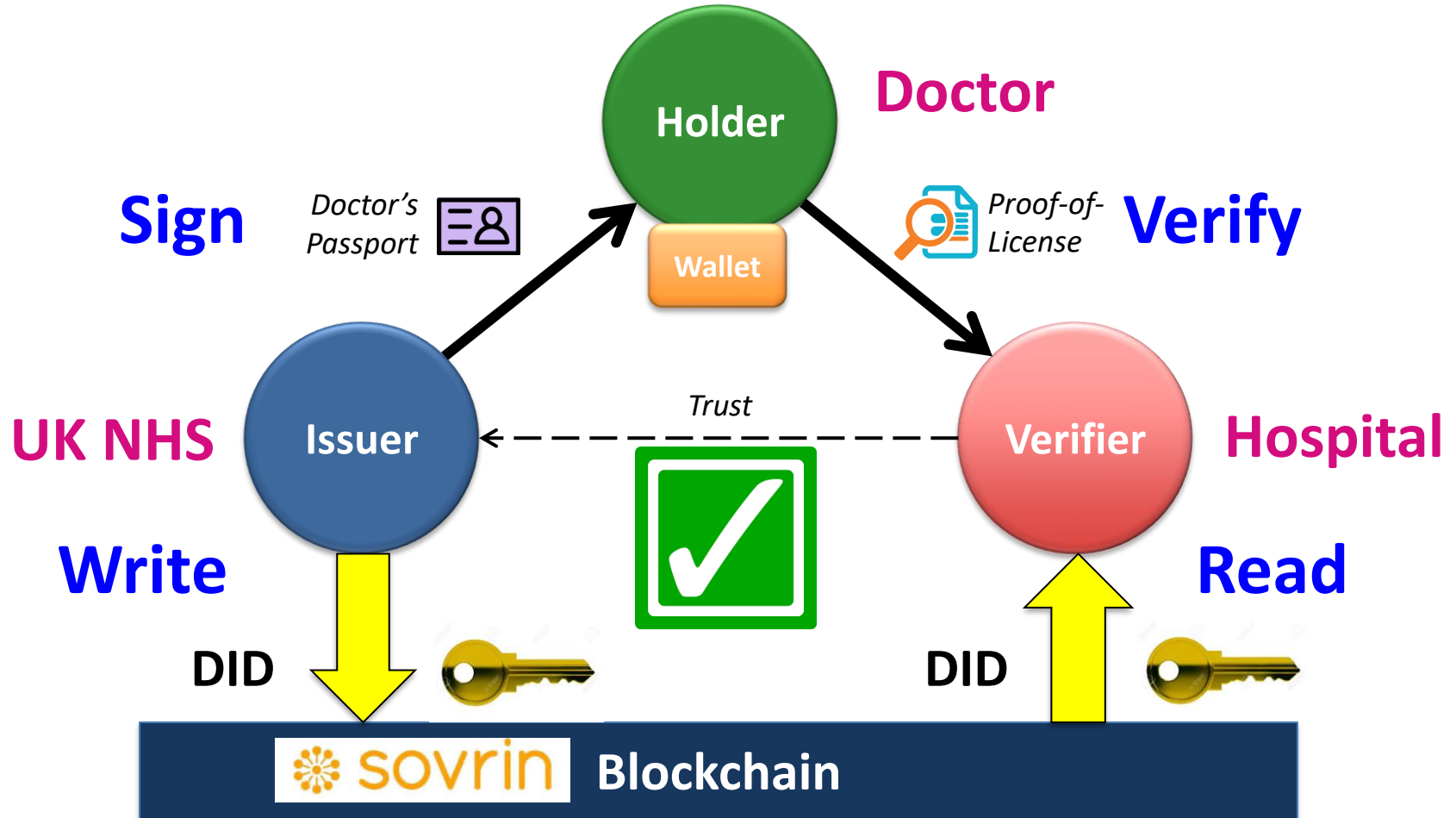
Doctor's Passport Example



Doctor's Passport Example



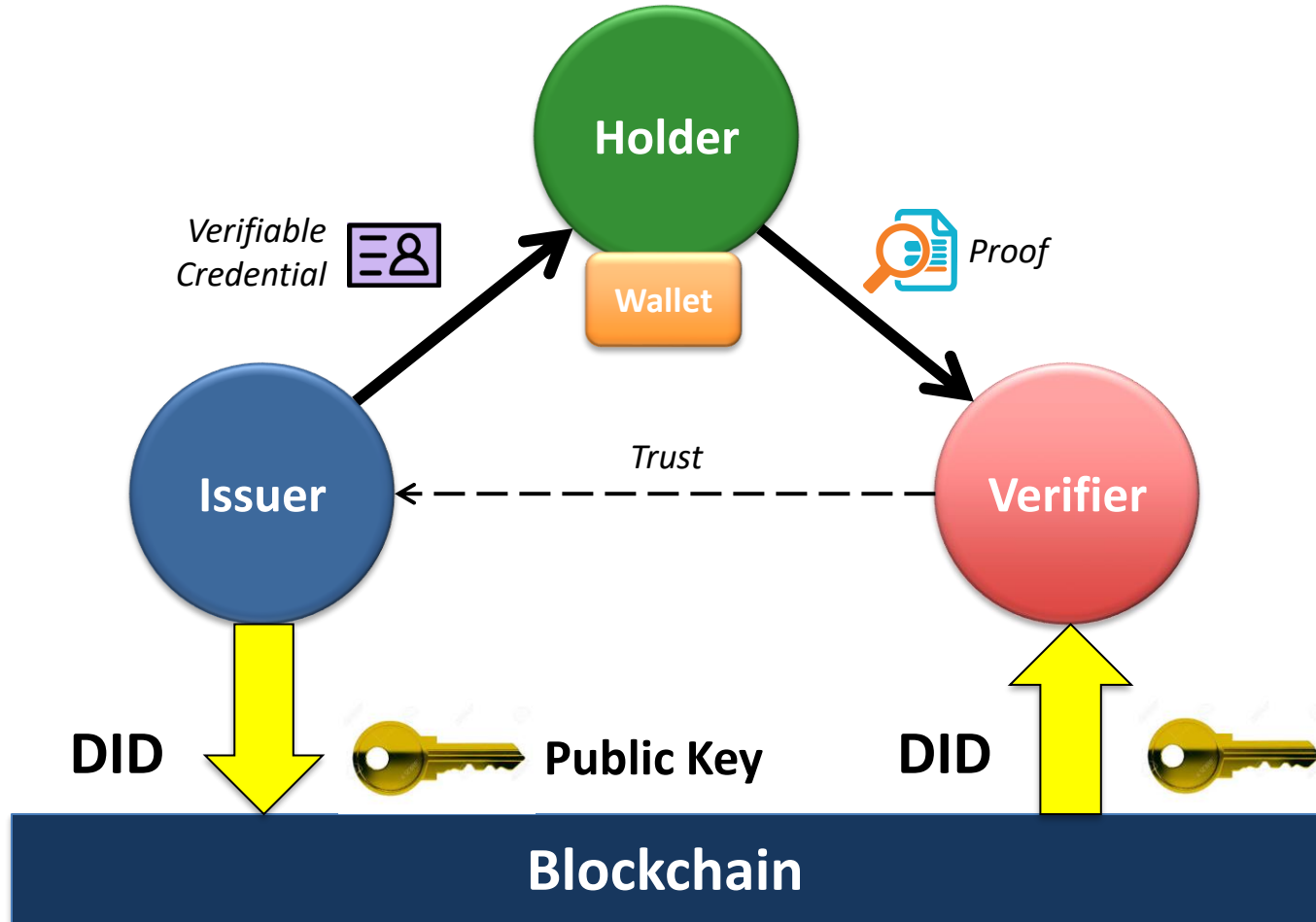
Doctor's Passport Example



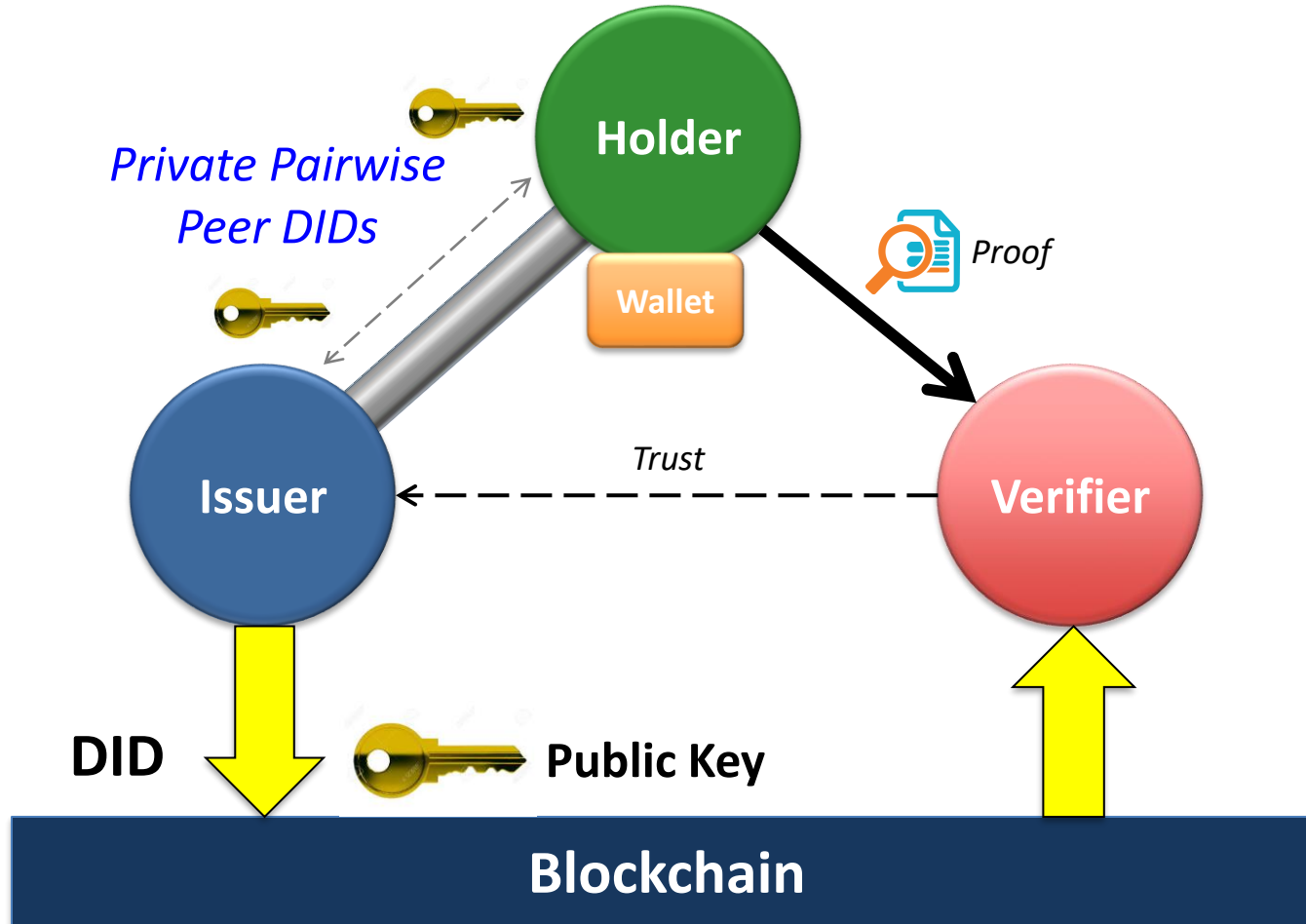


The special role of **peer-to-peer connections**

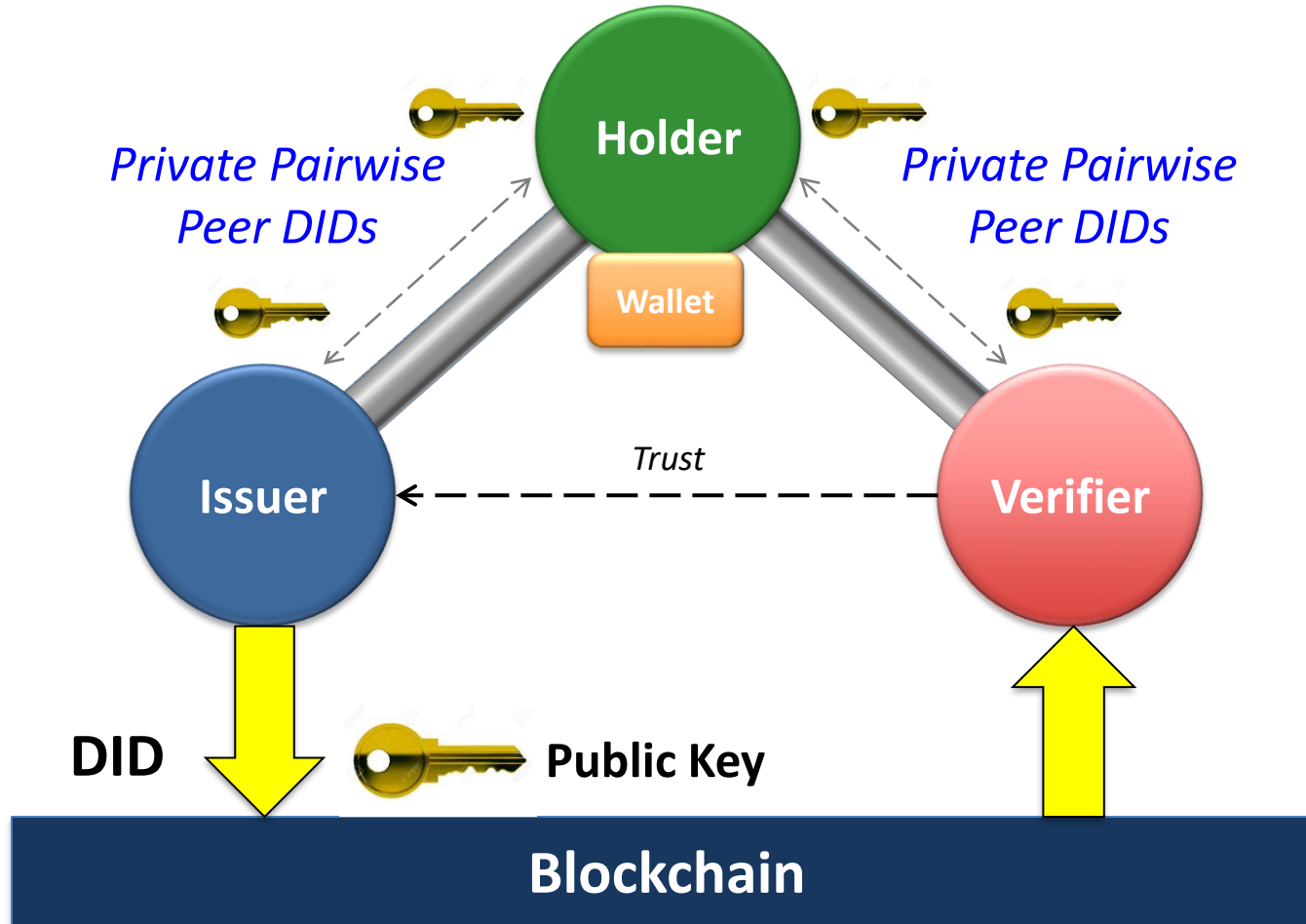
Every connection is secure and private



Every connection is secure and private



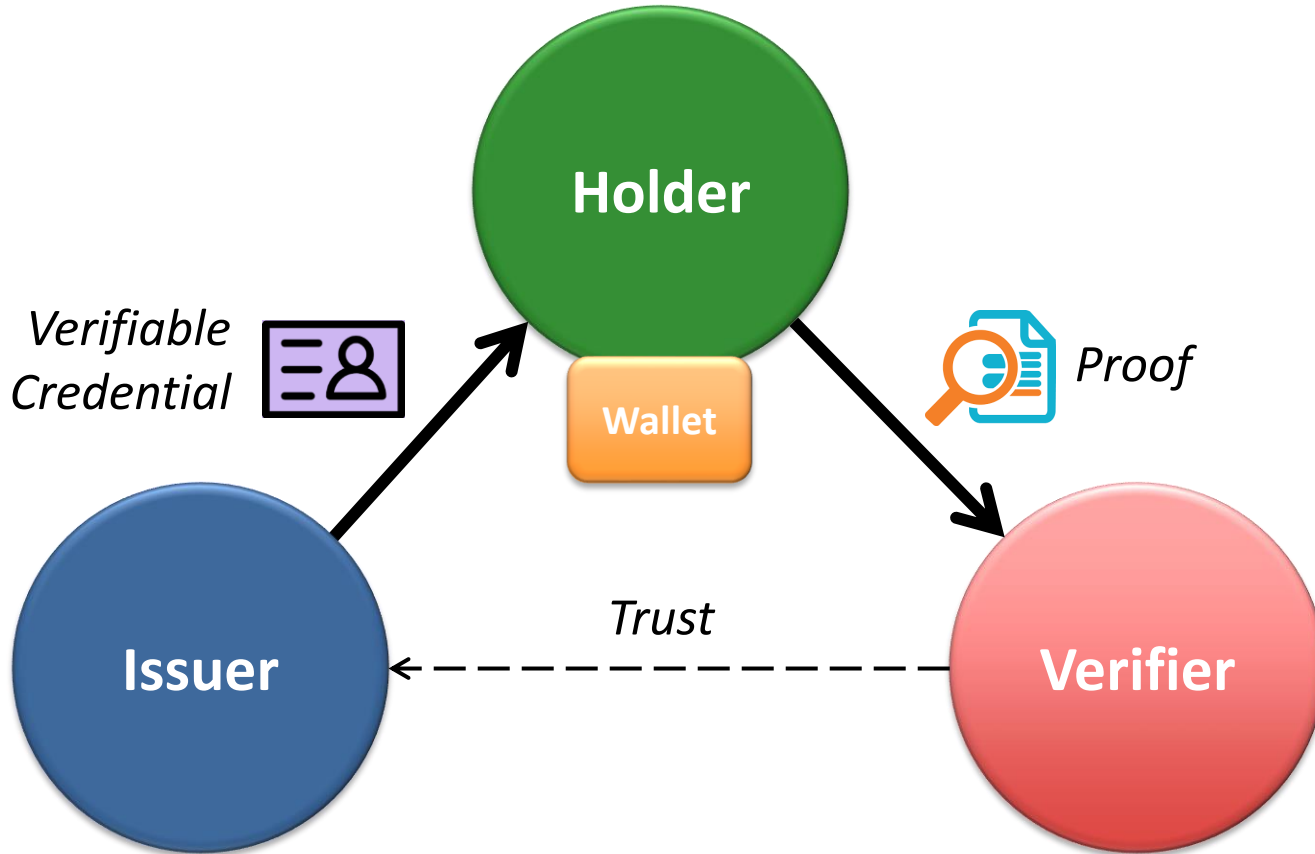
Every connection is secure and private



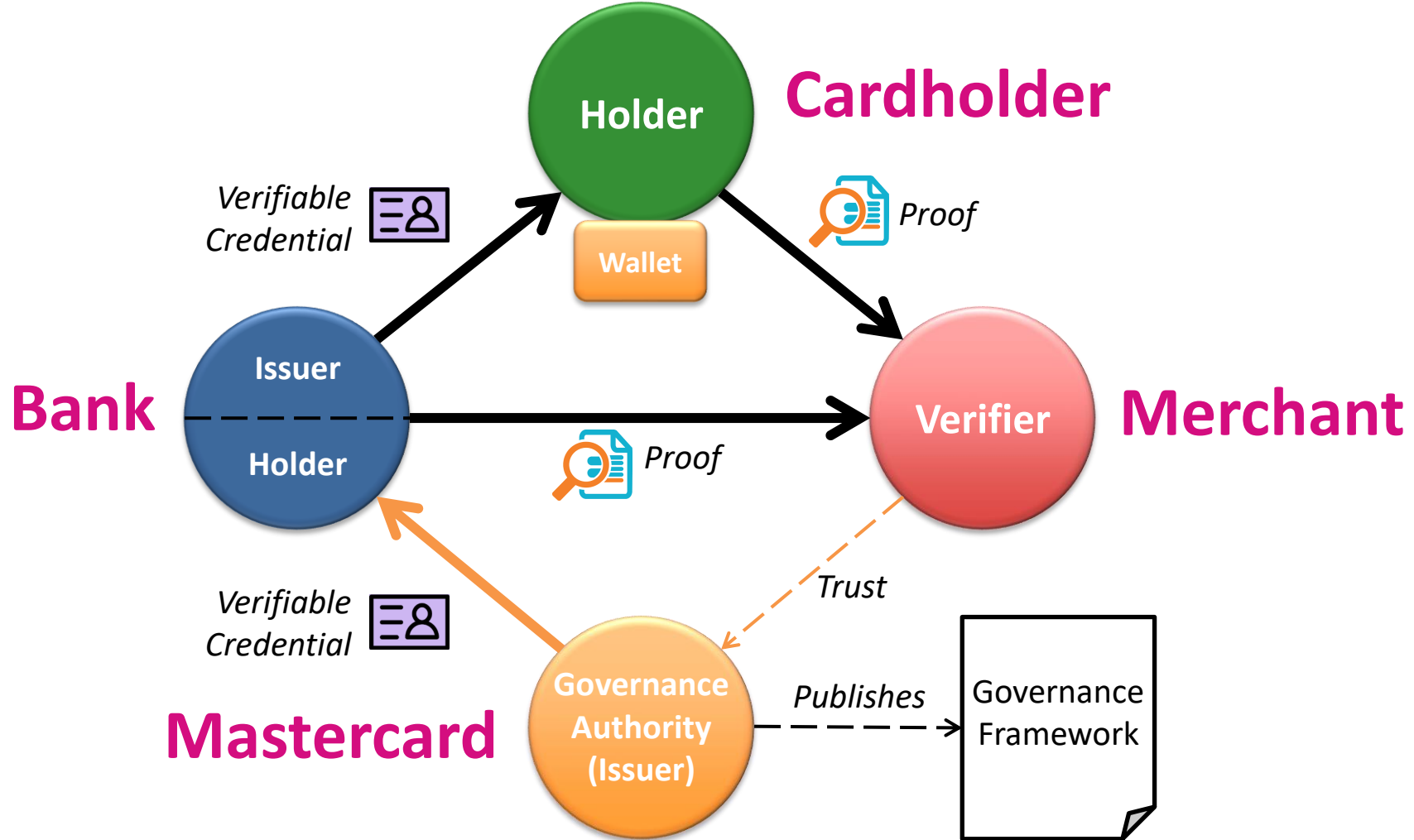


The special role of governance frameworks

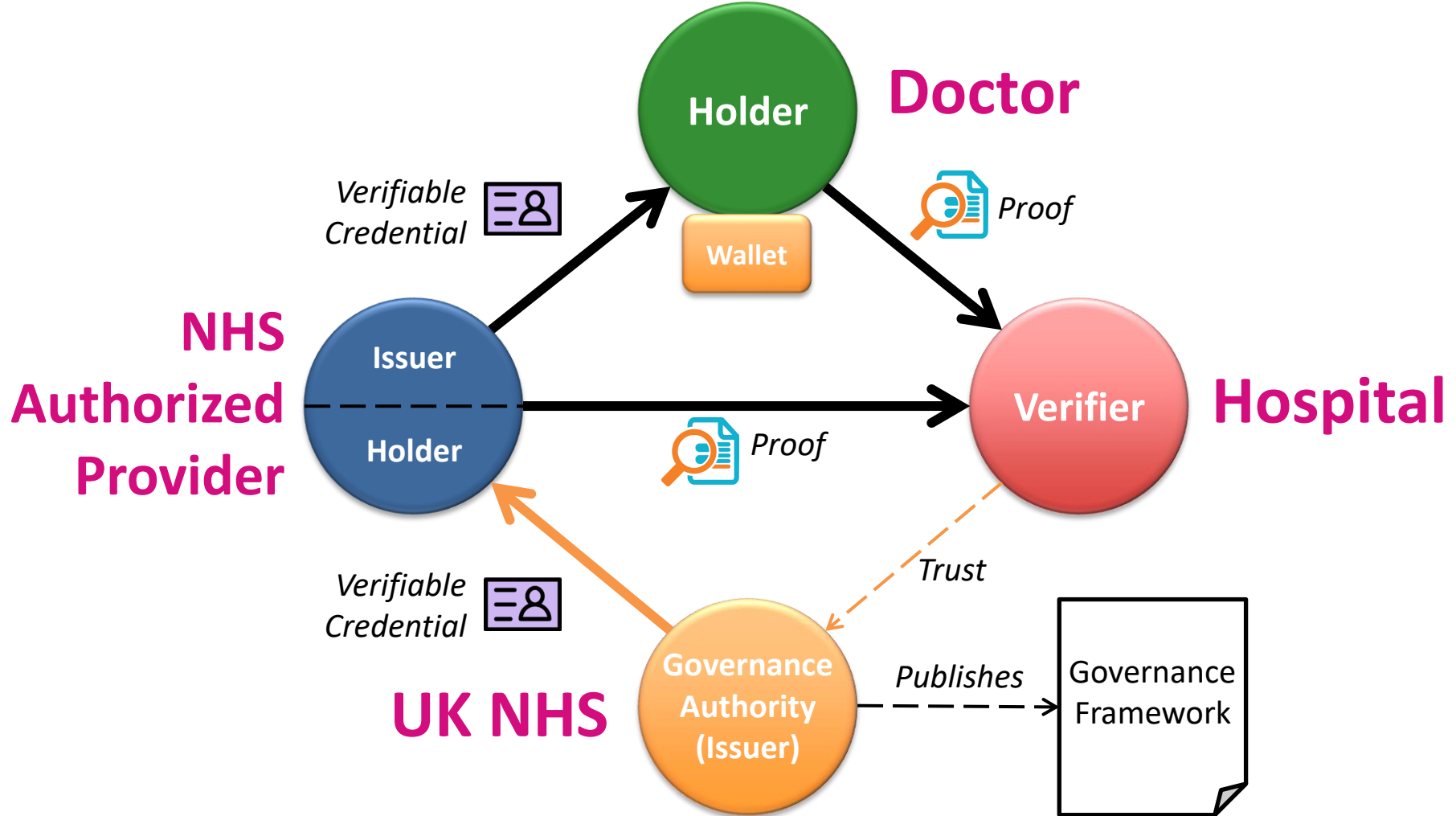
How can verifiers know all the issuers?



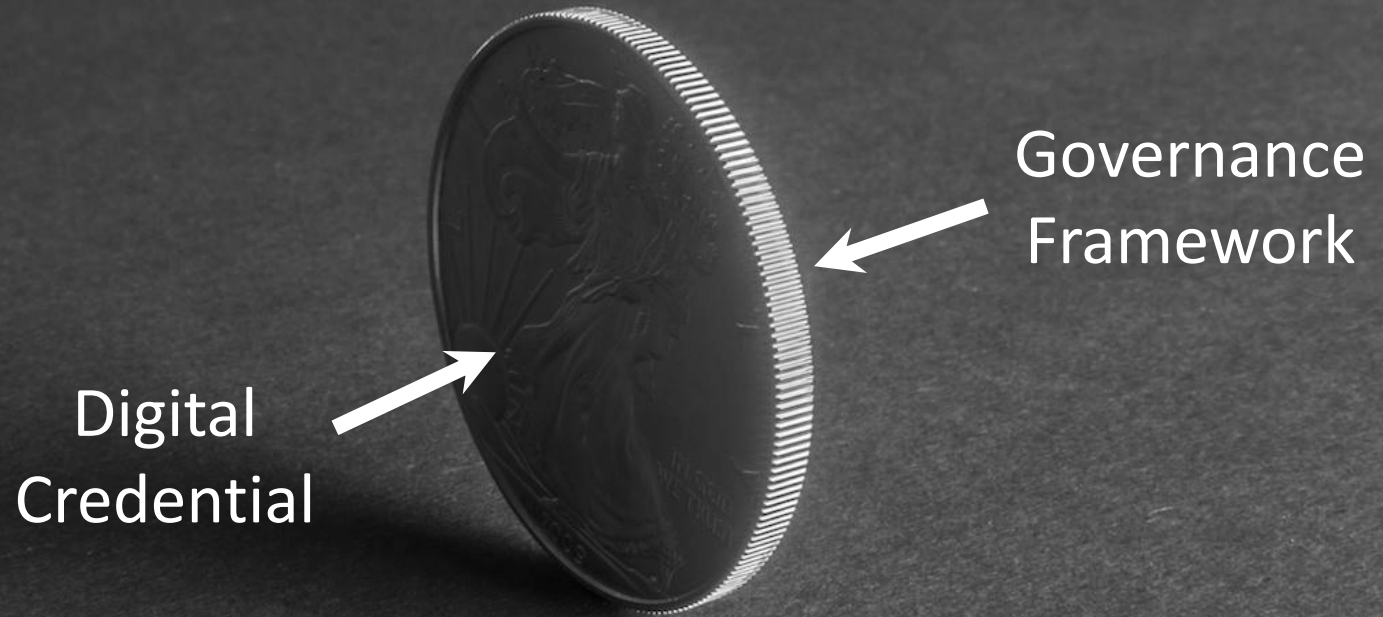
The governance framework trust triangle



Example: the doctor's passport



Two sides of the same coin





Questions?

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@brent_zundel



Appendix

Trust Over IP



So then...

How can we standardize SSI for
universal interoperability?

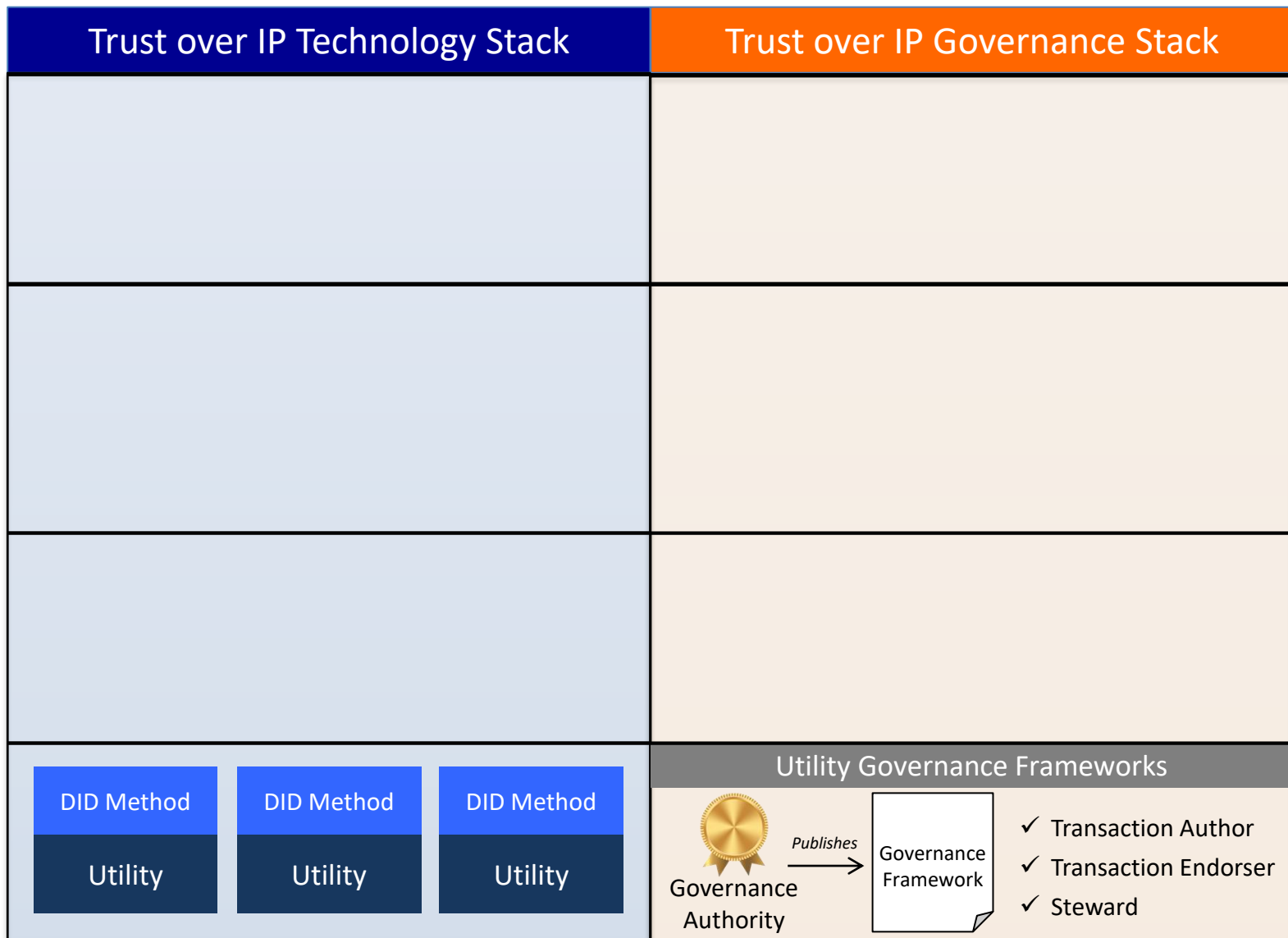
Introducing the **Trust over IP** Stack

Trust over IP Technology Stack	Trust over IP Governance Stack

**Technical Trust
Layer One**
Public Utilities

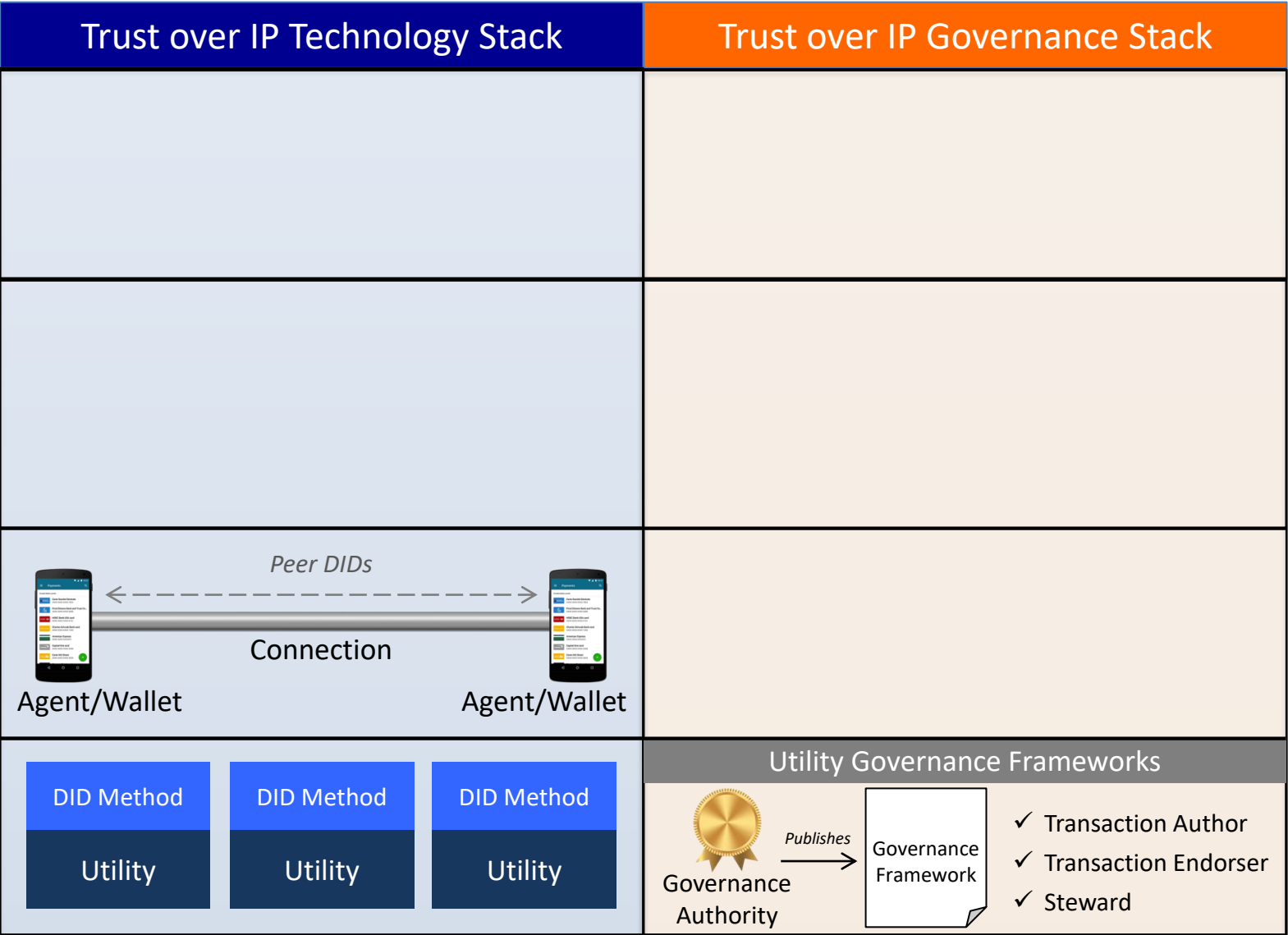
Trust over IP Technology Stack			Trust over IP Governance Stack
<div><div>DID Method</div><div>Utility</div></div> <div><div>DID Method</div><div>Utility</div></div> <div><div>DID Method</div><div>Utility</div></div>			

**Technical Trust
Layer One**
Public Utilities



Technical Trust
Layer Two
DIDComm
Protocol

Technical Trust
Layer One
Public Utilities





Governance Authority

Publishes



Governance Framework

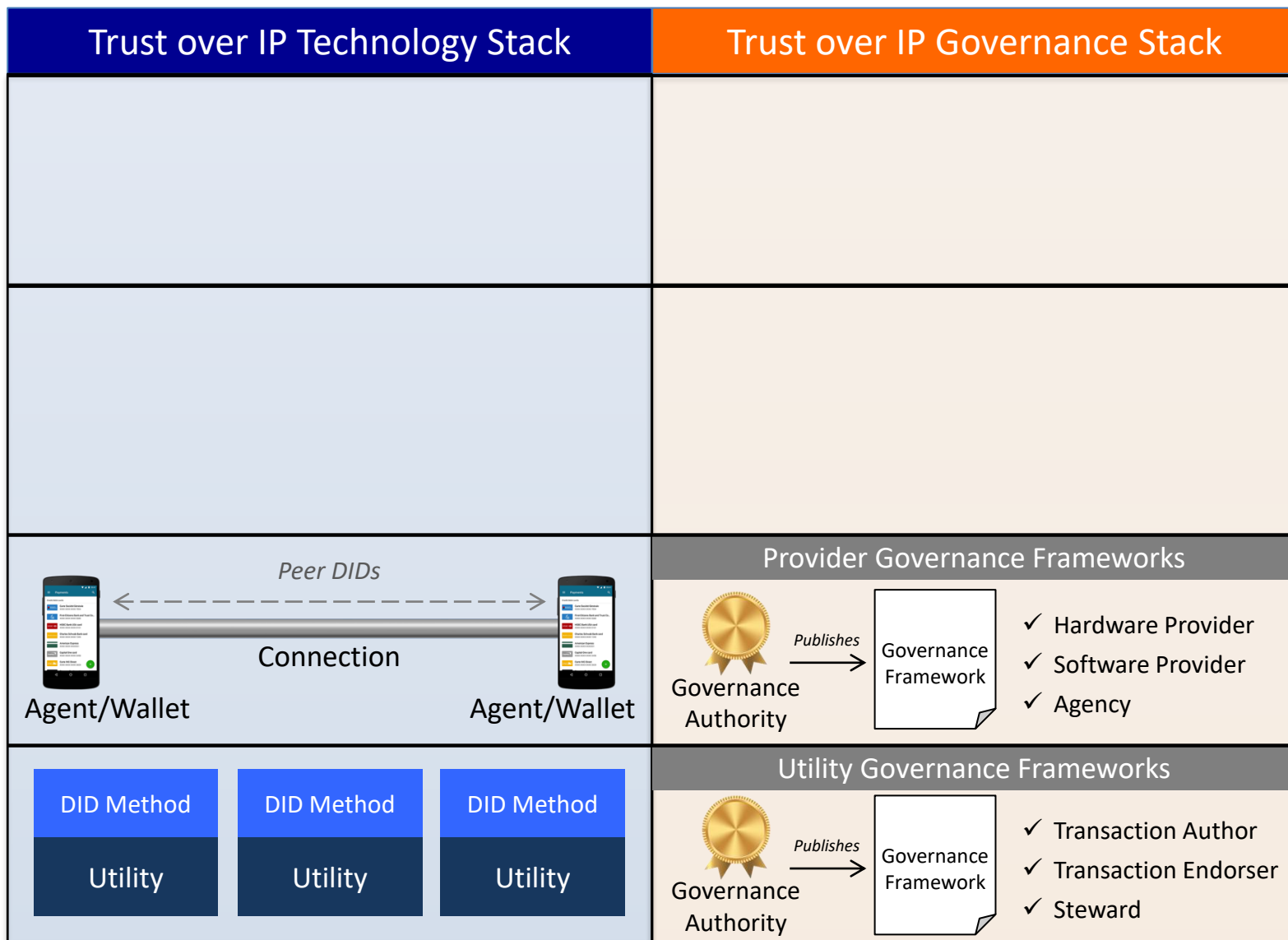
✓ Transaction Author

✓ Transaction Endorser

✓ Steward

**Technical Trust
Layer Two**
DIDComm
Protocol

**Technical Trust
Layer One**
Public Utilities

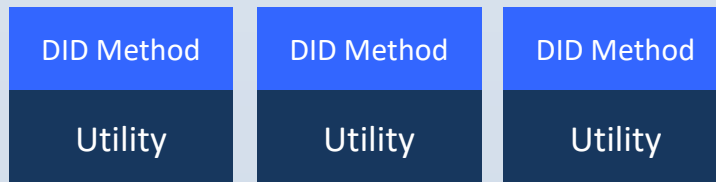
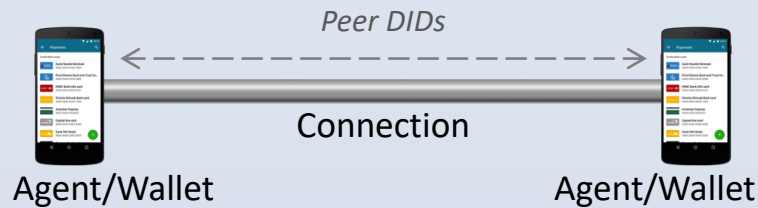
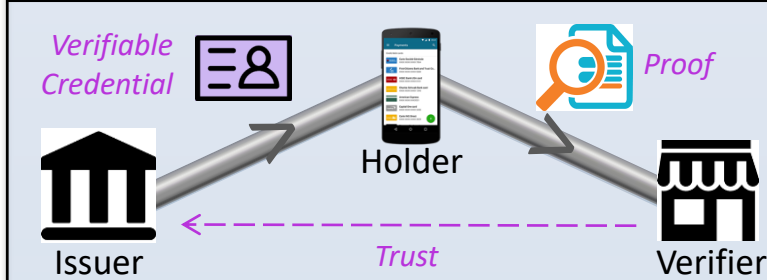


**Human Trust
Layer Three**
Data Exchange
Protocols

**Technical Trust
Layer Two**
DIDComm
Protocol

**Technical Trust
Layer One**
Public Utilities

Trust over IP Technology Stack



Trust over IP Governance Stack

Provider Governance Frameworks



Utility Governance Frameworks

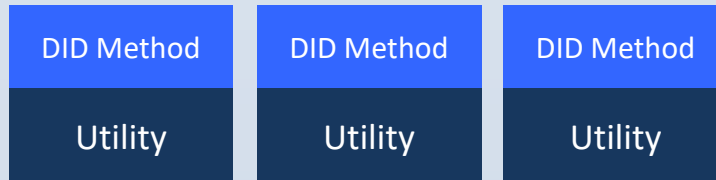
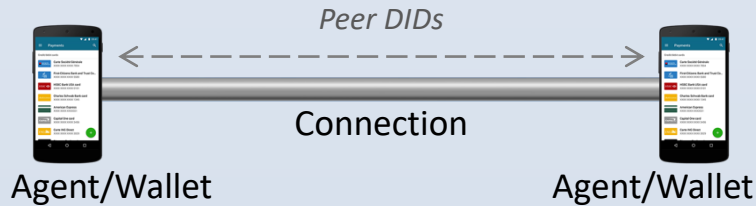
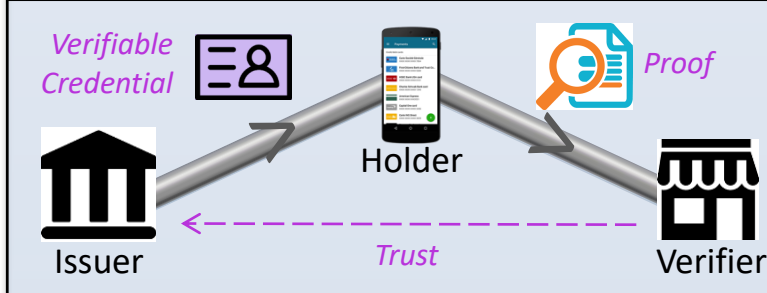


Human Trust
Layer Three
Data Exchange
Protocols

Technical Trust
Layer Two
DIDComm
Protocol

Technical Trust
Layer One
Public Utilities

Trust over IP Technology Stack



Trust over IP Governance Stack

Credential Governance Frameworks



Provider Governance Frameworks



Utility Governance Frameworks



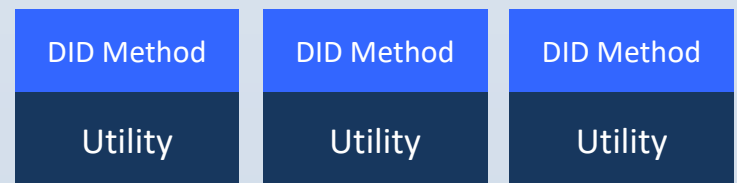
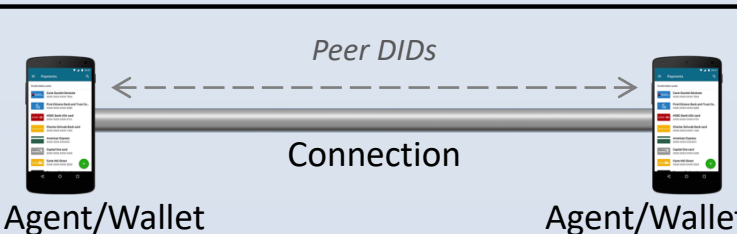
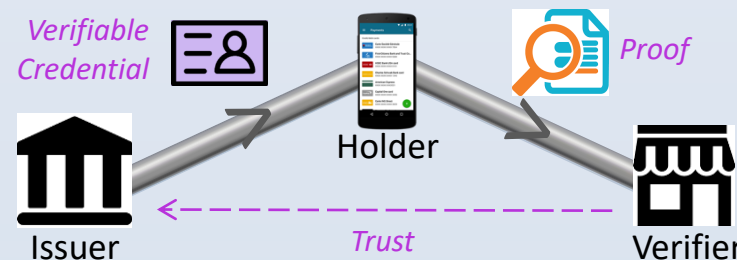
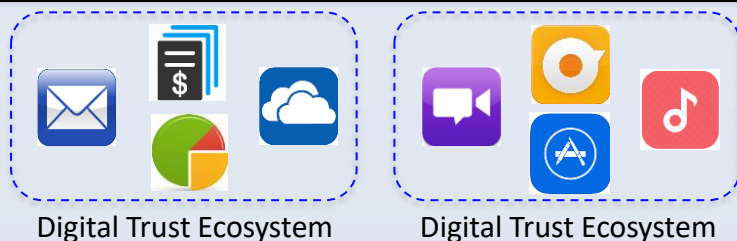
**Human Trust
Layer Four**
Application
Ecosystems

**Human Trust
Layer Three**
Data Exchange
Protocols

**Technical Trust
Layer Two**
DIDComm
Protocol

**Technical Trust
Layer One**
Public Utilities

Trust over IP Technology Stack



Trust over IP Governance Stack

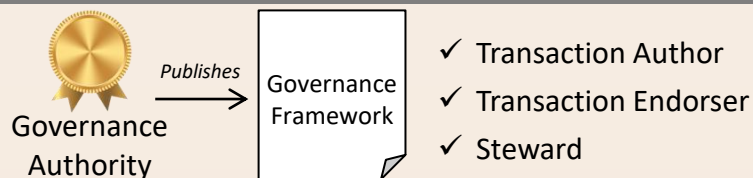
Credential Governance Frameworks



Provider Governance Frameworks



Utility Governance Frameworks



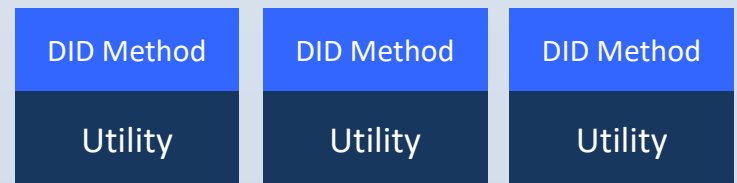
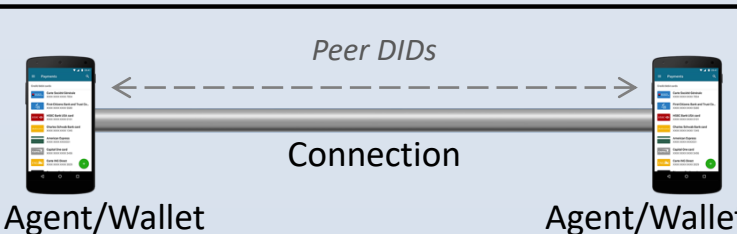
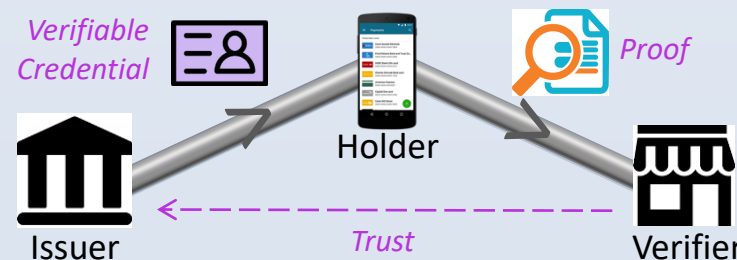
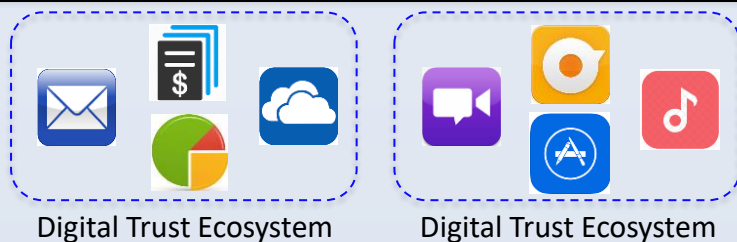
**Human Trust
Layer Four**
Application
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Layer Two**
DIDComm
Protocol

**Technical Trust
Layer One**
Public Utilities

Trust over IP Technology Stack



Trust over IP Governance Stack

Ecosystem Governance Frameworks



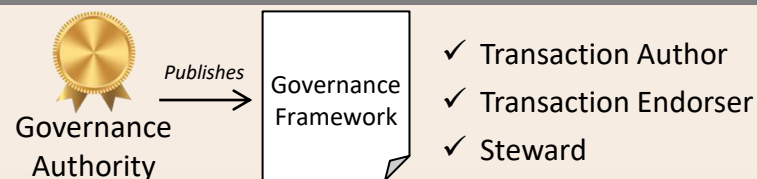
Credential Governance Frameworks



Provider Governance Frameworks



Utility Governance Frameworks





Launching
May 5

The purpose of the Trust over IP Foundation is to define a complete architecture for Internet-scale digital trust that combines both cryptographic trust at the machine layer and human trust at the business, legal, and social layers.

Trust over IP Foundation

Steering Committee

15 seats

Elected from Steering Members
(Max one seat per member)

Technical Stack Working Group

Members + Invited Experts

Utility Foundry Working Group

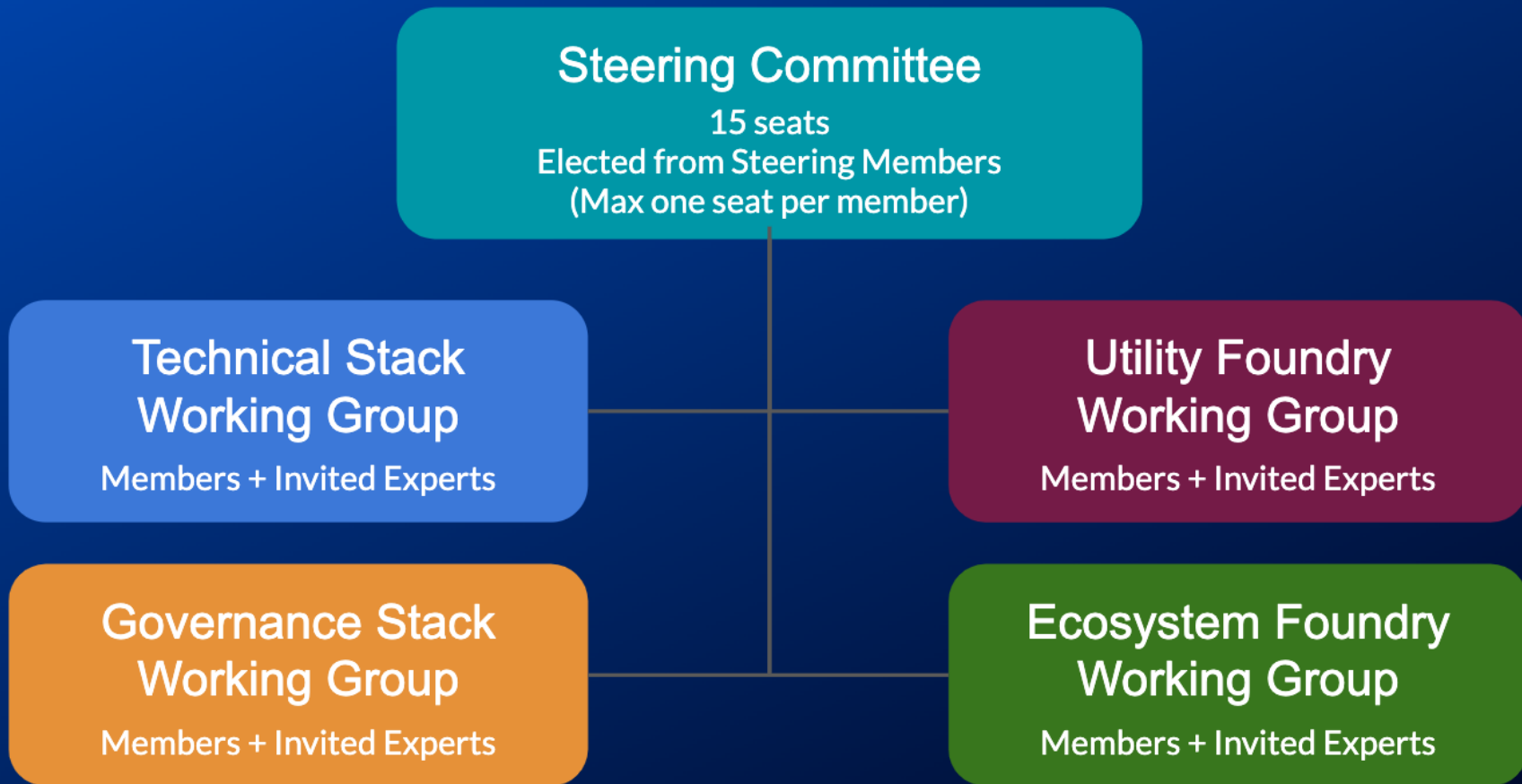
Members + Invited Experts

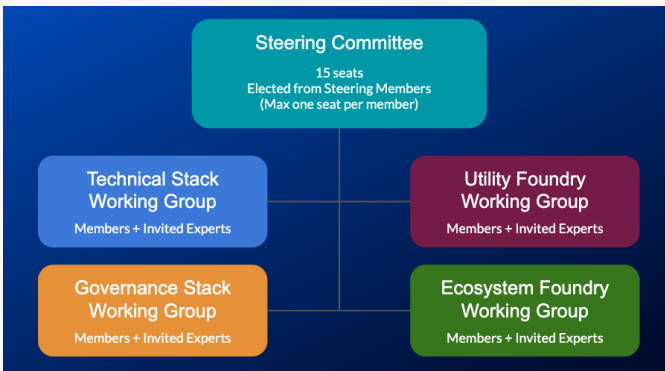
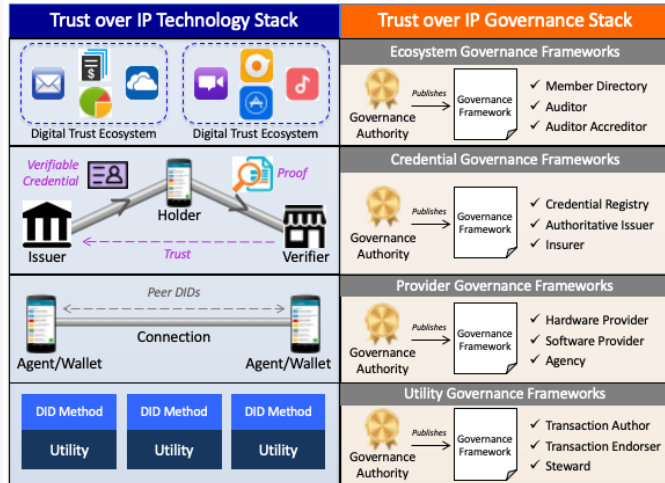
Governance Stack Working Group

Members + Invited Experts

Ecosystem Foundry Working Group

Members + Invited Experts





4

Ecosystem Projects

3

Credential Projects

2

Provider Projects

1

Utility Projects



Finally, we can have a trust layer
for the Internet—for **everyone**



Appendix

COVID Credentials Initiative

Bitcoin 24h **\$6,893.03** +2.81%

Ethereum 24h **\$158.46** +3.45%

XRP 24h **\$0.187803** +2.79%

Bitcoin Cash 24h **\$227.56** +0.83%



Story from **Business** →

COVID-19 'Immunity Passport' Unites 60 Firms on Self-Sovereign ID Project

Apr 13, 2020 at 14:05 UTC ▀ Updated Apr 13, 2020 at 16:08 UTC



A health worker conducts a COVID-19 test in Kuala Lumpur, April 12, 2020. (Credit: Shutterstock)

Technologists building blockchain-based self-sovereign identity (SSI) tools are collaborating on an “immunity passport” to help stop the spread of COVID-19 without compromising the privacy of users. Proving some level of immunity would help individuals return to everyday life.

The [COVID-19 Credentials Initiative \(CCI\)](#) is working on a digital certificate, using the recently approved World Wide Web Consortium (W3C) [Verifiable Credentials](#) standard. The certificate lets individuals prove (and request proof from others) they've recovered from the novel coronavirus, have tested positive for antibodies or have received a vaccination, once one is available.

Over 60 organizations in the SSI space are participating, such as Evernym, Streetcred, esatus, TNO, Georgetown University and others. The initiative also has a global spread including Consulcesi in Italy, DIDx in South Africa, TrustNet in Pakistan and Northern Block in Canada.

CCI Credentials Under Development

1. Healthcare Worker Mobility
2. Proof of PPE Entitlement
3. Proof of Need for Test
4. Proof of Immunity by Exposure
5. Proof of Immunity by Vaccine
6. Proof of Recent Health Record
7. Proof of Disease Prevention Training
8. Proof of Essential Worker Status
9. Proof of Deep Cleaning
10. Proof of Trusted Issuer



COVID-19 Credentials
Initiative (CCI)

<https://www.evernym.com/covid19/>



ROB FINDLAY

The state of elective waiting times before covid-19

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WORKFORCE

Digital ‘passport’ will let staff rapidly deploy to covid-stretched trusts

By [Nick Kituno](#) | 26 March 2020



3 Comments



> **NHSE/I and NHSX to launch temporary digital staff “passport” in coming weeks**

> **Would include minimum amount of credentials that can be stored on phones**

Most popular

Most commented



Updated: Hancock setting a bad example on social distancing, say NHS leaders

14