Development of Blockchain Infrastructure in Cyprus (EBSI)

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Building a trustworthy digital society

The Digital Trust Challenge

- To create a unified and seamless **digital society** away from paperwork and time-consuming processes

- However, processing sensitive digital data (e.g., id docs) could lead to vulnerabilities and fraudulent activities
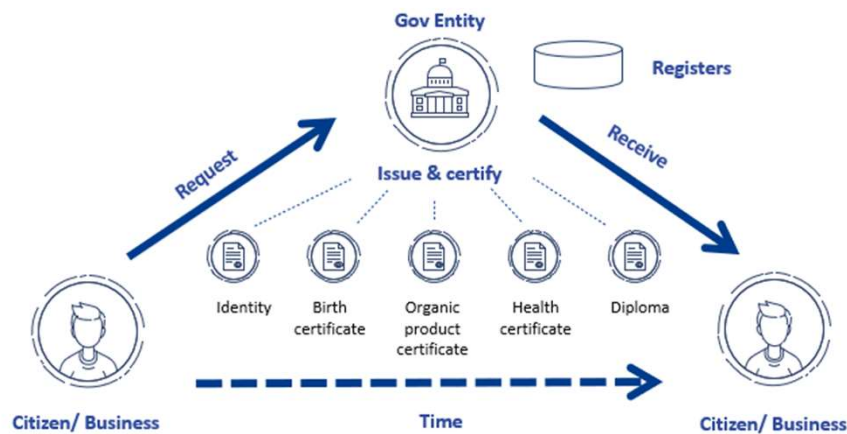
" *figuring out a way to make everyday online interactions safe and trustworthy for all parties involved is challenging* "

The triangle of trust for Gov entities?
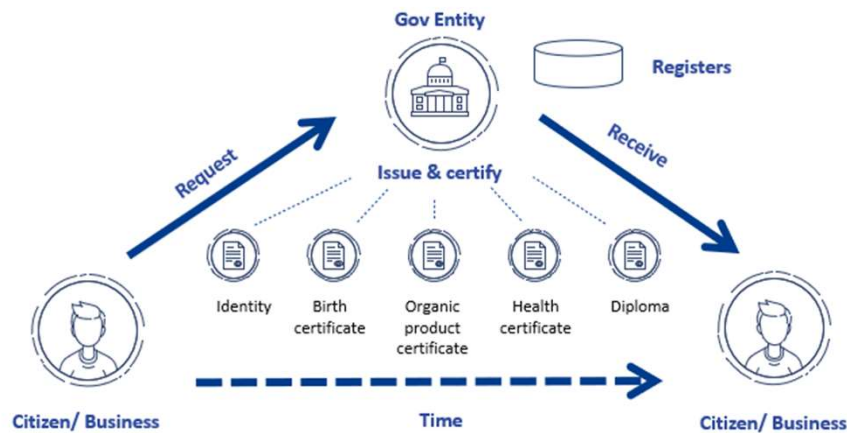
- How can governments trust digital data?
- How to share official docs, called 'evidences' or 'credentials' in a way that can be trusted?
- How to prevent digital fraud?
- How to create safe processes when exchanging and processing docs and info over the internet?

The triangle of trust for Gov entities?

Gov Entity — Registers

Request → Issue & certify → Receive

Identity · Birth certificate · Organic product certificate · Health certificate · Diploma

Citizen/ Business — Time — Citizen/ Business

Paradigm Shift

Issuer — **IS** — Verifiable Claim — User — **UsR** — Verifiable Presentation — Verifier — **VF**
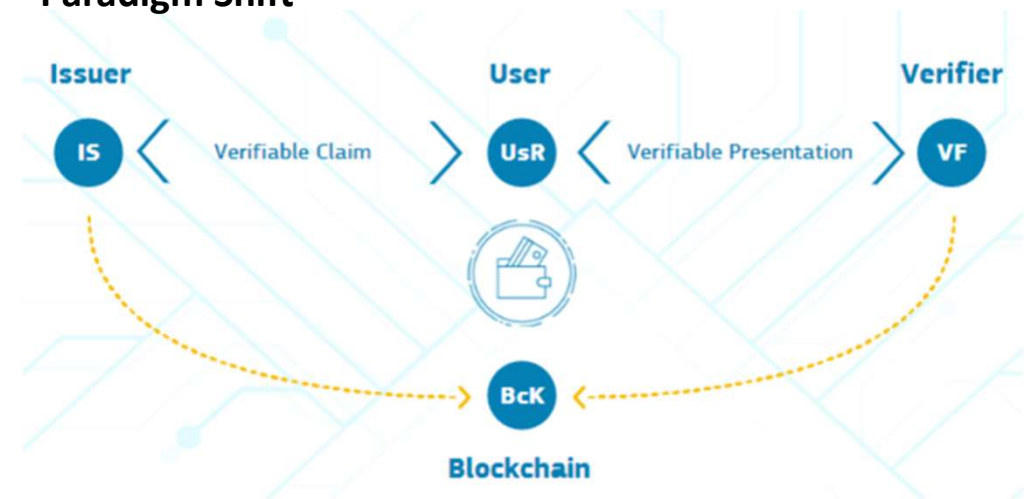
BcK

Blockchain

- How can governments trust digital data?
- How to share official documents, called 'evidences' or 'credentials' in a way that can be trusted?
- How to prevent digital fraud?
- How to create safe processes when exchanging and processing docs and info over the internet?

EU Building Blocks for Trust

- EU launched several EU-wide initiatives to support the development of digital solutions that can enable public administrations, businesses and citizens in Europe to benefit form **cross-border** and **cross-sector** services.

European Blockchain Service Infrastructure (EBSI)	*Accelerate the creation of cross-border services and put **blockchain/DLTs** at the service of public administrations*
eDelivery	*Exchange electronic data and documents in an interoperable and secure way*
eID	*Offer services capable of electronically identifying users across Europe*
eSignature	*Create and verify electronic, paperless signatures*
eInvoicing	*Send and receive electronic invoices with automated processing, in line with the European standard*

What is EBSI?

EBSI

- EBSI provides a common, shared blockchain infrastructure and service layer

- The infrastructure delivers a secure and interoperable ecosystem that enables the development, launch and operation of EU-wide cross-border digital services in the public sector

Mission

- To build the first EU-wide blockchain infrastructure
- To make public services more trustworthy and accessible by European citizens

Design Principles

- Working towards the public good
- Transparent governance
- Data compatibility
- Open-source software
- Compliance with EU regulations e.g., GDPR

EBSI Use cases

Self-Sovereign Identity → Cross-border verification of identity credentials allowing users to create and control their own identity across borders.

Diplomas → Cross-border verification of educational credentials. This means that a diploma issued by Member State A can be verified by a university or third party, e.g. "employer" from Member State B.

Document Traceability → Build a trusted, time stamped audit trail of digital artefacts that are linked together

Data Sharing – Social Security Use case → Cross-border verification of social security coverage of posted workers.

Other use-cases being explored:
- *Tax Audit, Customs*
- *SME Financing, Public Administration*
- *Asylum Process Management*

EBSI Nodes

EBSI Nodes Eligibility

- EBSI enables a "public permissioned" blockchain
- Network nodes (EU members) managed by the European Commission
- Additional members of the European Blockchain Partnership within individual regions
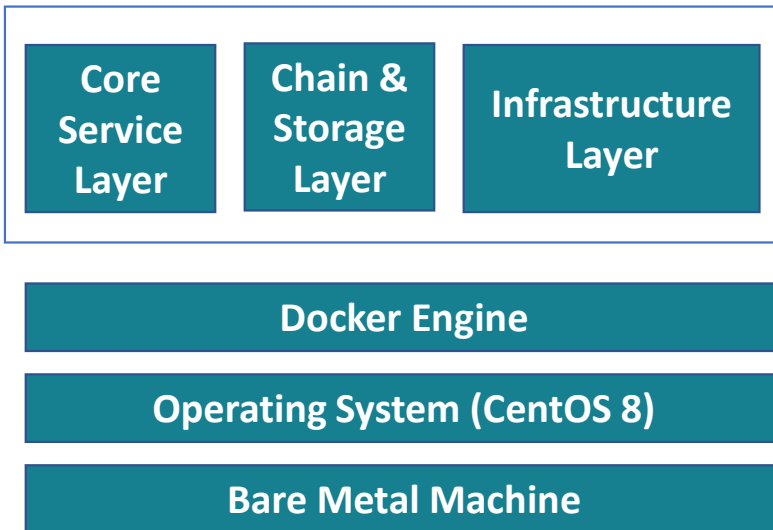
Cyprus EBSI Node

- EBSI node for Cyprus implements the infrastructure elements required to setup an EBSI node

- Supports EBSI's layered architecture which is used to aggregate tools and services needed to develop, build, test and deploy an EBSI use-case

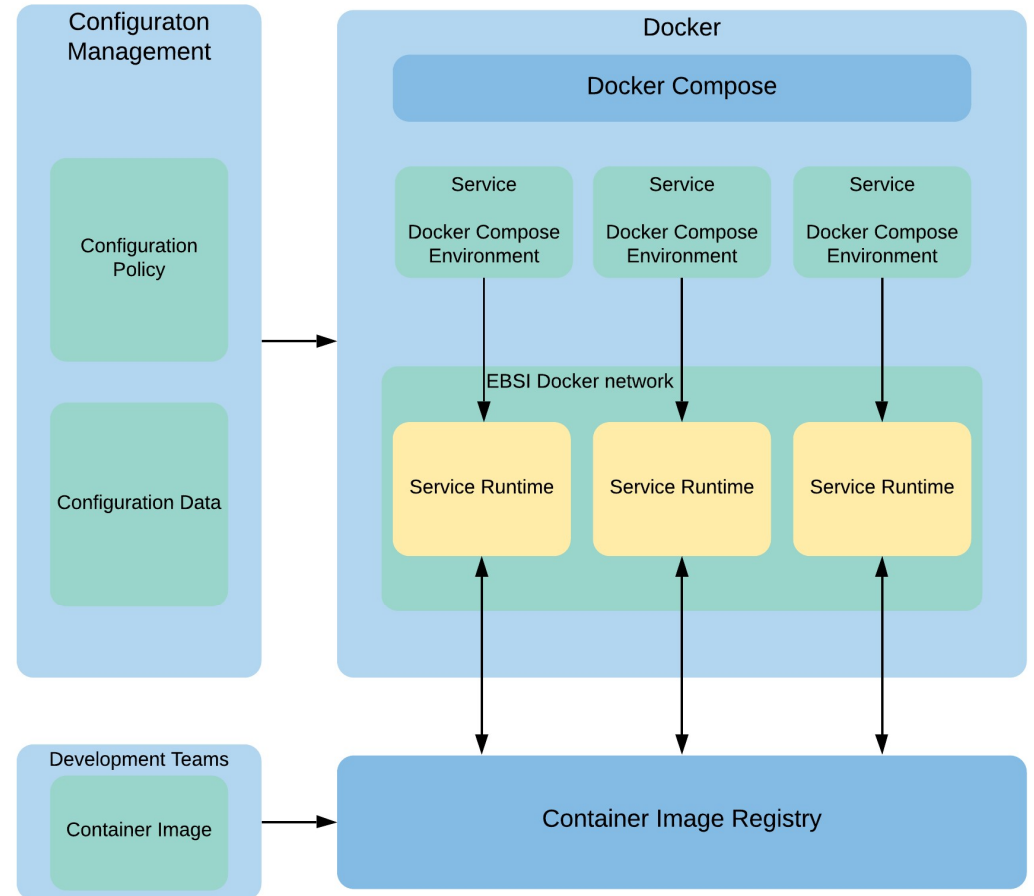- Supports EBSI by providing resources and increase its decentralization degree

Cyprus EBSI Node

EBSI's Infrastructure Layers
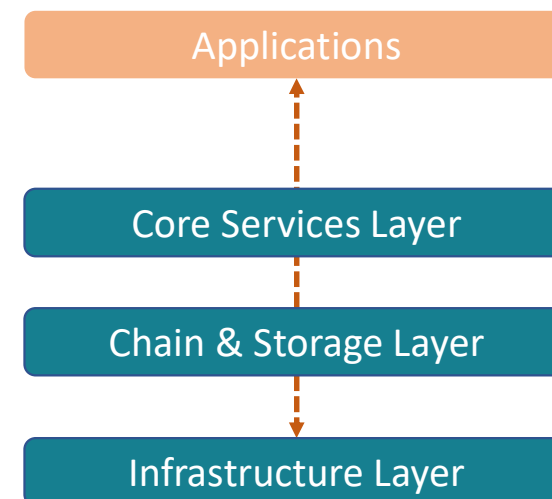
Core Services

- A set of standardised interfaces (APIs), which enable third-parties to develop different applications while ensuring compliance with the five guiding principles defined by the EBP

Chain & Storage Layer

- The chain and storage layer encompasses both the blockchain and the off-chain storage protocols currently supported by EBSI

Infrastructure

- Host images, and tools for connecting and monitoring the blockchain networks and other EBSI services

Applications

Core Services Layer

Chain & Storage Layer

Infrastructure Layer

EBSI's Core Technical Services
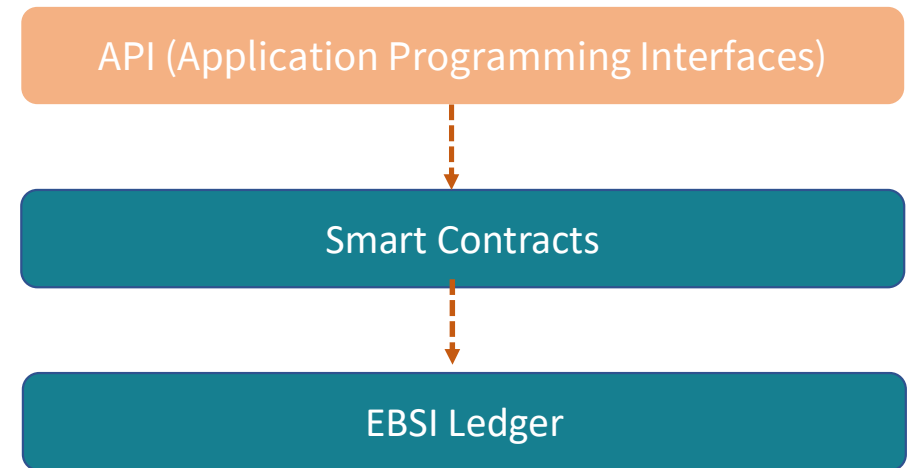
Application Programming Interfaces

- EBSI makes available a set of APIs, on the public internet. This is what allows users to interface with EBSI and, ultimately, retrieve needed information from the blockchain ledger. Each API fulfils a specific function, associated with one or several use cases.

Smart Contracts

- In EBSI, smart contracts are strictly controlled and cannot be deployed by anyone - they respond only to calls made to EBSI's APIs by conformant applications, and allow for transactions to be recorded on the ledger.

EBSI Ledger

- EBSI ledger is a decentralised database keeping a record of all transactions written on it.

API (Application Programming Interfaces)

Smart Contracts

EBSI Ledger

https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/What+is+ebsi#anchor-ebsi-use-cases

What is next for EBSI phase 2

Aim:

- to pilot innovations and to improve: scalability, energy efficiency, security, privacy, and interoperability of EBSI

Scalability → *For EBSI to be able to cater an increasing number of transactions from users in the long term*

Consensus → *Research on robust consensus algorithms for reaching decentralized agreements, authenticate and validate transactions. Consensus should be dynamic and configurable*

Governance → *EBSI structures to be used for both permissioned or permissionless settings and the same time adapting to different European Institutions and Regulators*

Identity → *Implement a GDPR-compliant Identity Solution with a new framework for EU digital identity proposed by the European Commission. This will allow businesses and citizens to have better control over their data.*

Interoperability → *Provide on-chain and off-chain bridges to other protocols outside EBSI. Also, support for Ethereum Virtual Machine (EVM) and other enterprise systems*

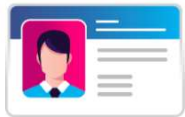# What is next for EBSI phase 2

Regulatory Sandbox

The regulatory sandbox will be instrumental to accompany the use cases on EBSI and beyond, enabling regulators and users as well as providers of DLT and blockchain technologies to interact in a trusted environment.

European blockchain regulatory sandbox for Distributed Ledger Technologies

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Sandbox+Project

What can you do with EBSI today?

cy·ebsi

Identity

Verifiable Credentials

Implementing a Self-Sovereign Identity model in Europe, allowing users to create and control their own identity across borders.

Diploma

Verifiable Credentials

With Diploma use case, citizens gain digital control of their educational credentials, significantly reducing verification costs and improving trust in document's authenticity.

Social Security

Verifiable Credentials

Social Security competent institutions in Member States can issue a PDA-1 document as a verifiable attestation, which can be verified by an inspector in another Member State.

Document traceability

Verifiable Credentials

Social Security competent institutions in Member States can issue a PDA-1 document as a verifiable attestation, which can be verified by an inspector in another Member State.

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/ebsi/

EBSI Future Opportunities

cy ebsi

Decentralized Governance using the Web3 Stack

— New EU-wide information systems for cross-border data and information exchange

- Replace the Web 2.0 motto *'trust the platform'* with Web3's motto '*don't trust, verify'*. How? By decentralising verification.

— Web3 =>could lead to the provision of more *decentralised* government services

- Favourable for government, citizens and businesses, including Europe's GovTech ecosystem.
- Increase trust and transparency among participants (governments / agencies), participation and auditability by the citizens (hence trust). Increase effectiveness of policy instruments.

— Digital Twins

- Tracking and tracing of information, by combining *physical objects with their digital representation*.

Land registration

Healthcare

E-voting

E-identities

.. Notary services, verifiable credentials, etc.

https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Conformant+wallets

Thank you

EXTRA SLIDES

EBSI: Status

Digital Credentials for Europe (DC4EU)

- 82 organisations from 23 countries (21 EU MS + Norway and Ukraine)
- 4 use cases:
  - Educational Credentials
  - Professional Qualifications
  - Portable Document A1
  - European Health Insurance Card (EHIC)

Digital Credentials 4 Europe
DC4EU

https://dc4eu.eu/

EBSI: Status

EBSI Nodes Expansion (EBSI-NE)

EBSI- NE
Nodes Expansion

- 24 organisations from 15 countries (14 EU MS + Norway)
- Expansion of EBSI Nodes:
    - Pre-production environment
    - Production Environment
    - Reserved Production Environment
- ISO 27001 (Risk Management)
- Tools for node deployment and operation

EBSI: Status

EBSI-VECTOR
(enabled VErifiable Credentials and Trusted Organisations Registries)

- 52 organizations from 20 countries (19 EU MS + Norway)
- Self-Sovereign Identity Technologies in:
  - Education
  - Social Security
- It will involve:
  - Issuers
  - Verifiers
  - Trusted Organisations Registries

https://tcs.sunet.se/display/Projekt/VECTOR

EBSI: Status

EU Digital Identity Waller Consortium

EU Digital Identity Wallet Consortium.

- 52 organizations from 20 countries (19 EU MS + Norway)
- Self-Sovereign Identity Technologies used for:
  - Education
  - Social Security
- It will involve:
  - Issuers
  - Verifiers
  - Trusted Organisations Registries

https://eudiwalletconsortium.org/

EBSI: Status

POTENTIAL (PilOTs for EuropeaN digiTal Identity wALlet)

- 149 organizations from 20 countries (19 EU MS + Ukraine)
- Use Cases:
  - Electronic Government Services
  - Account Opening
  - SIM Registration
  - Mobile Driving License
  - Remote Qualified Electronic Signature
  - Electronic Prescription

https://www.digital-identity-wallet.eu/

EBSI: Status

TRACE4EU (Traceability Reference Architecture Conformant EBSI for European Union)

- 30 organizations from 14 EU MS
- Use Cases:
    - Traceability of Products and Materials
        - Food Production from Agricultural Products (led by Hungary)
        - Seafood Lifecycle (led by Norway)
        - Trademarked Sale of Haloumi (led by Cyprus)
        - Traceability of Metals for Battery Production (led by Germany)
    - Traceability of Data and Documents
        - Open Rights Management of Digital Assets (led by Finland and Estonia)
        - Resumé credentials for citizens (led by Germany)
        - Decentralized academic publishing, DAP (led by Croatia)
        - Electronic delivery of verified messages (led by Italy)
        - Customer data retrieval for identification, KYC (led by Cyprus)

https://www.spherity.com/newsroom/spherity-trace4eu-ebsi-supply-chain

EBSI DTAP Standard

EBSI Environments and Networks
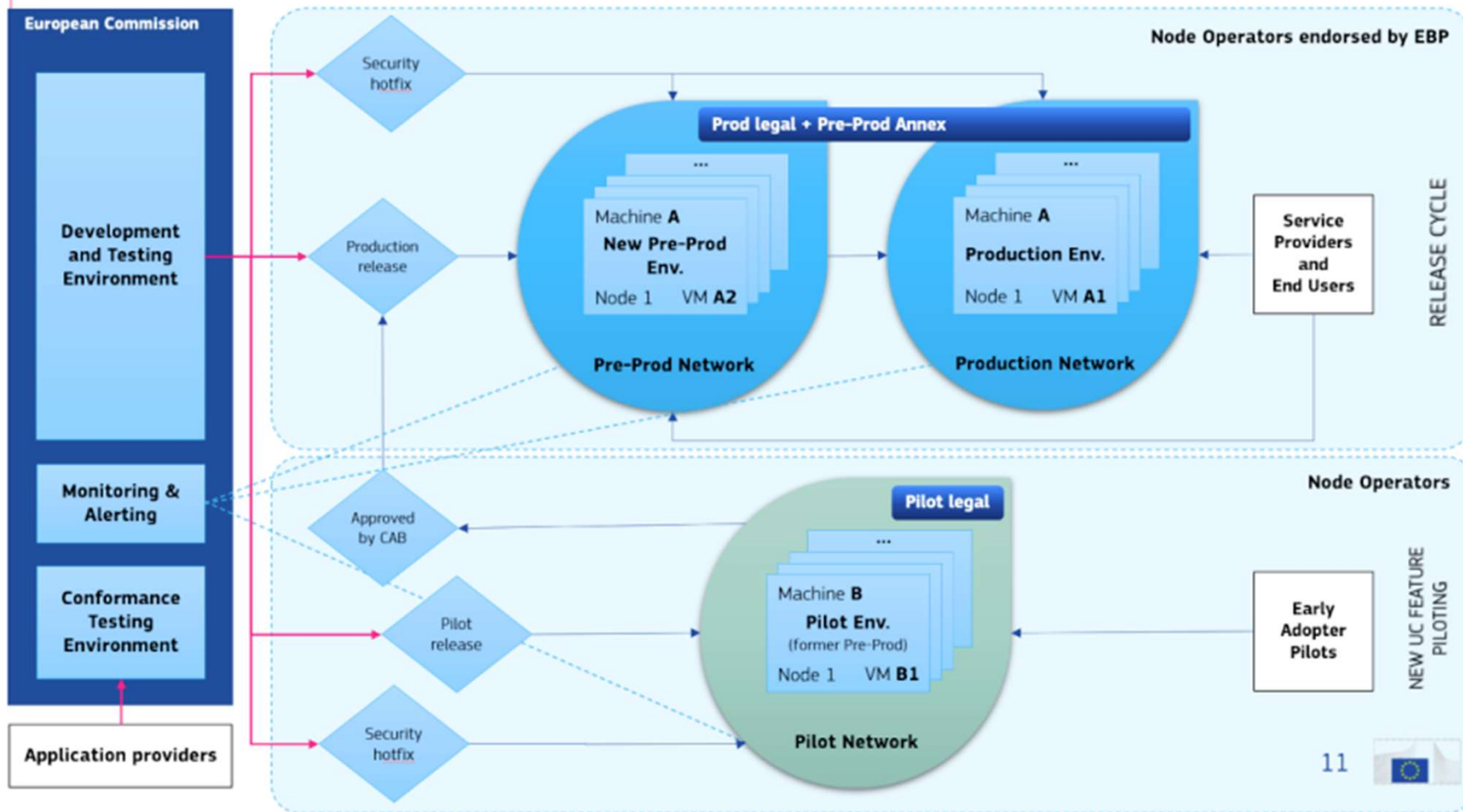
EBSI Available Nodes (1/2)

1	Only Pilot environment

Commitment to host one Virtual Machine with the following resource allocation and conform to applicable SLA & MTRs (Minimum Technical Requirements):

- 4 vCPU, 32 GB RAM, 80 GB Disk + 256 GB Disk - Pilot SLA

2	Only Pre-Production and Production environments

Commitment to host two Virtual Machines with the following resource allocation and conform to applicable SLAs & MTRs:

Pre-Production
 - 4 vCPU, 32 GB RAM, 80 GB Disk + 256 GB Disk - Pre-Production SLA

Production
 - 8 vCPU, 64 GB RAM, 80 GB Disk + 500 GB Disk - Production SLA

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Developers

3	Pre-Production, Production and Pilot environments providing with hardware separation of the Pilot environment.

Commitment to host 3 Virtual Machines provided with hardware separation of Pilot environment with the following resource allocation and conform to applicable SLAs & MTRs:

Pre-Production
 - 4 vCPU, 32 GB RAM, 80 GB Disk + 256 GB Disk - Pre-Production SLA

Production
 - 8 vCPU, 64 GB RAM, 80 GB Disk + 500 GB Disk - Production SLA

Pilot
 - 4 vCPU, 32 GB RAM, 80 GB Disk + 256 GB Disk - Pilot SLA

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Developers

Cyprus EBSI Node (1/2)

CPU

- 4-8 cores datacenter CPU or vCPU, newer than 2018 generation

RAM

- 32 GB Ram (minimum)

Storage

- 80 GB SSD – for OS
- 256 GB SSD – for Data Volume

Connection

- 100MBps – 1 fixed public IPv4
- 1GBps (LAN bandwidth)

No	3 VMs for EBSI
1	EBSI v2.0 All in one Full stack pilot network
2	EBSI v2.0 All in one Full stack production network
3	EBSI v1.0 All in one Full stack Node

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Developers

Abstract overview of EBSI's Layers
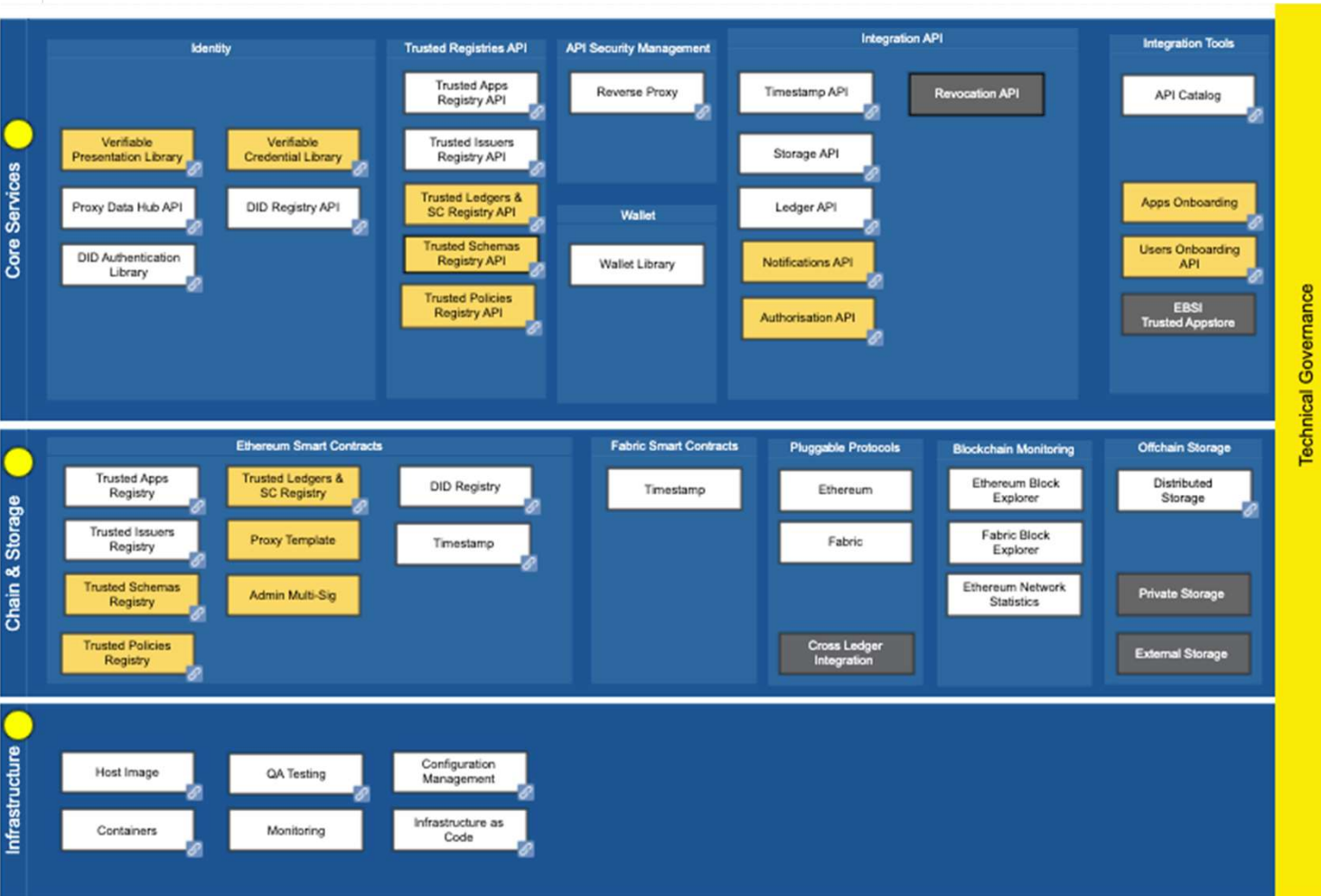
Figure shows the generic services provided by the underlying EBSI infrastructure to enable various use-cases.

[1] https://ec.europa.eu/digital-building-blocks/wikis/display/EBSIDOC/Build

EBSI Monitoring – Block Explorer

[1] https://app.preprod.ebsi.eu/besu-explorer/

EBSI Monitoring - Grafana
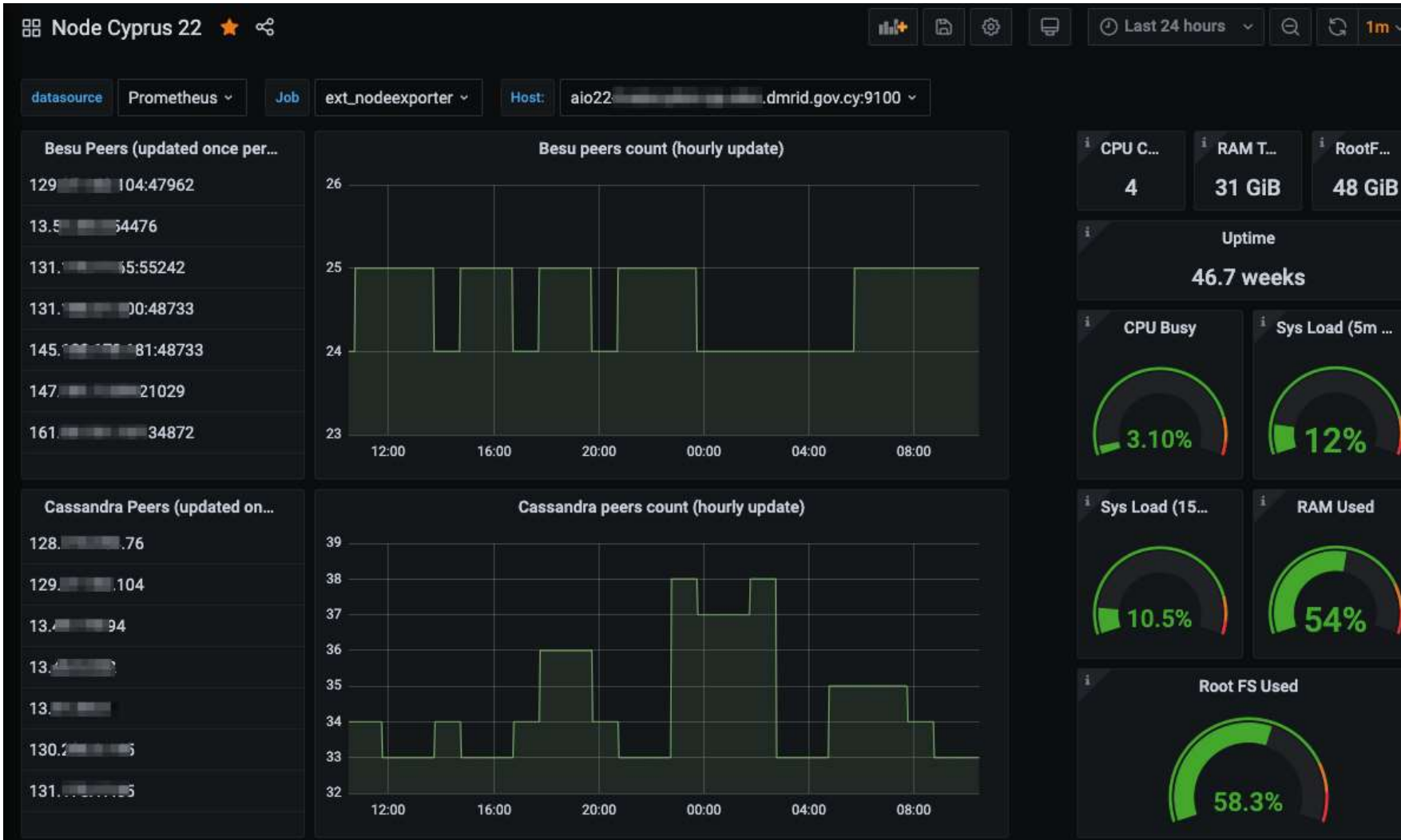
What can you do with EBSI today?

EBSI conformant wallets

Wallets are applications that let you interact with the EBSI ecosystem. It is a tool to let you manage your account and all your documents on the network. With your EBSI conformant wallet, you are able to store, verify and share information across Europe.

https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Conformant+wallets

How to get involved with EBSI

Use Cases

- Get involved in existing use cases
- Propose new use case (must be supported by several Member states)
- Participate to the Early Adopters calls

Large Scale Pilots / Future Projects

- Participate to the coordination of a LSP and future projects
- Participate to the European Digital Infrastructure Consortium - EDIC