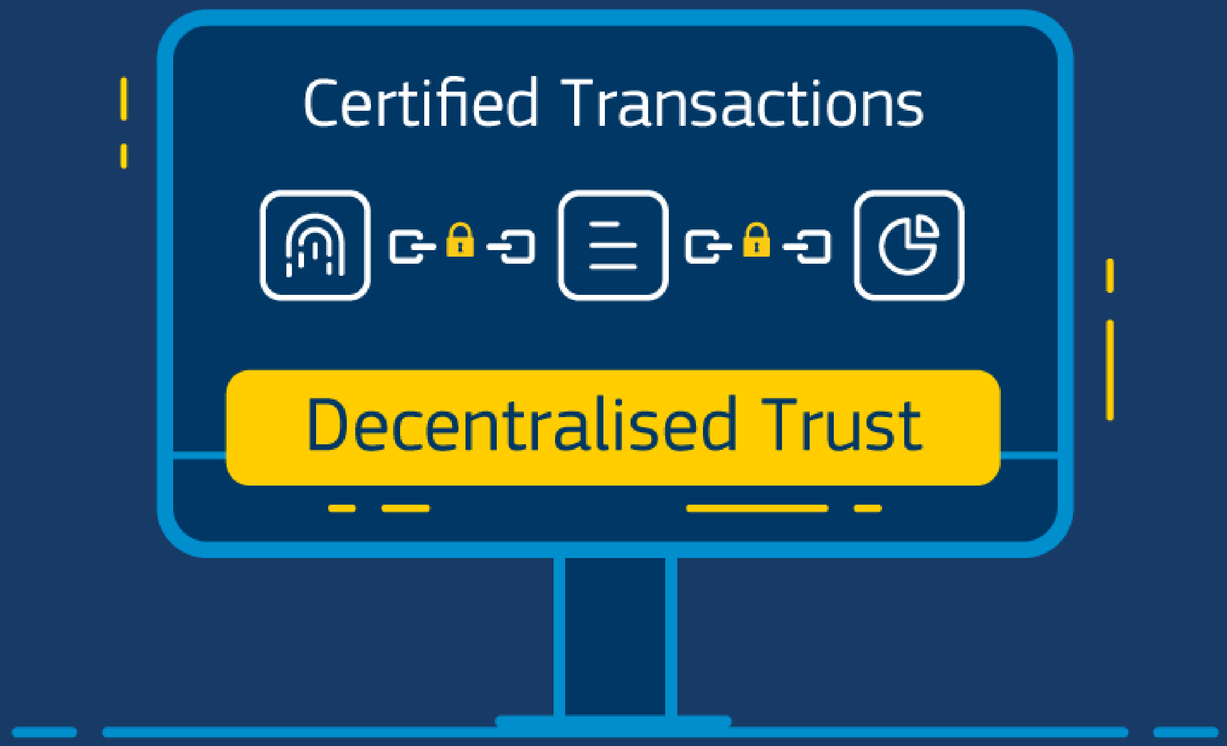
Meet

European Blockchain Services Infrastructure

HARNESS THE POWER OF BLOCKCHAIN SERVICES, INCREASING TRUST THROUGH DATA SECURITY, PRIVACY AND TRANSPARENCY

#Blockchain4Europe



How to use this presentation

This presentation is meant for the EBP members, their representatives and other relevant stakeholders to provide information about EBSI to interested parties.

The deck has been divided into different sections to cover interest of different audiences.

Executive Summary

The **European Blockchain Services Infrastructure (EBSI)** provides **digital public services** leveraged by **blockchain** technology.

This infrastructure is supported by the European Commission and 29 participating countries forming the **European Blockchain Partnership (EBP)**.

- **Explore** the 4 use cases:

Notarisation of documents

European Self-Sovereign Identity

Diplomas management

Trusted data sharing

Explore the use cases

- **Leverage** the EBSI network:

Integrate your applications with EBSI

Deploy & connect a node to the network

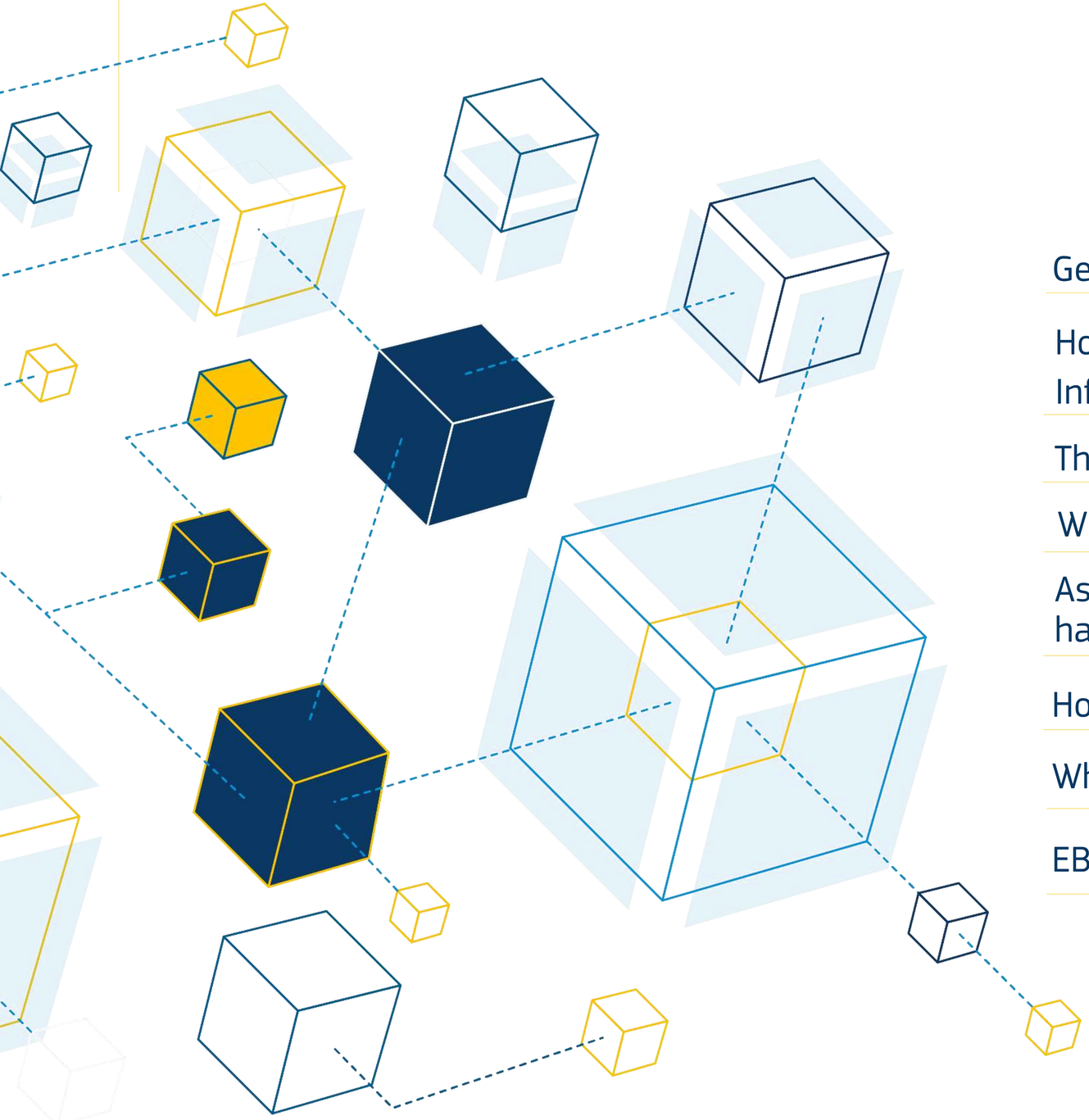
Get started

- **Join** the EBSI Community

Join the community

- **Contact** the Support Team

EBSI Service Desk



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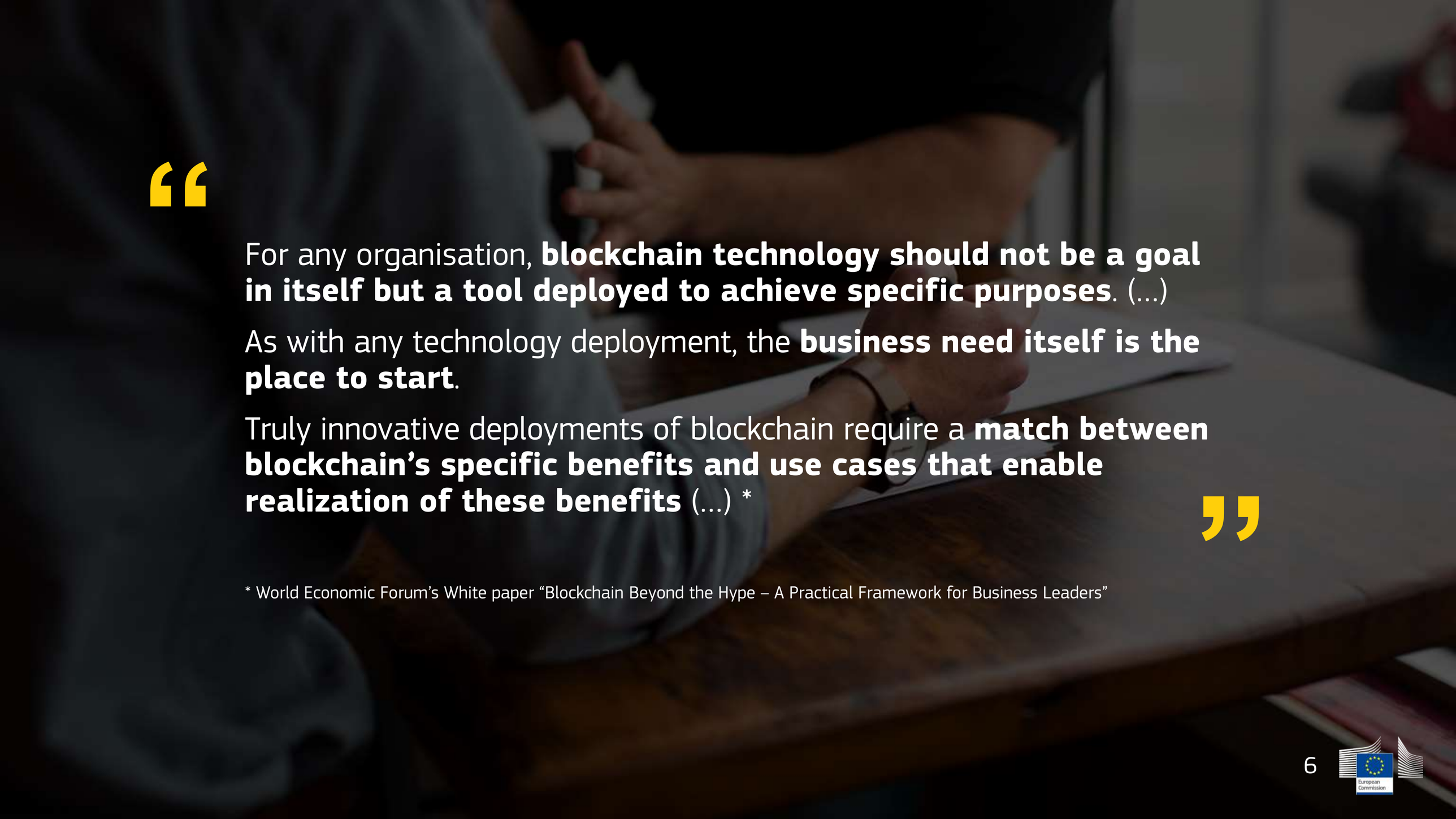
Get inspired by blockchain technology



For any organisation, **blockchain technology should not be a goal in itself but a tool deployed to achieve specific purposes**. (...)

As with any technology deployment, the **business need itself is the place to start**.

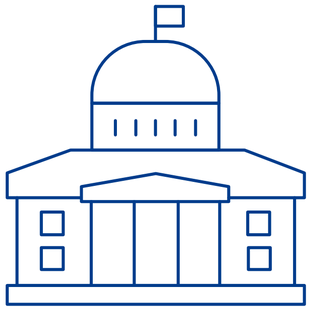
Truly innovative deployments of blockchain require a **match between blockchain's specific benefits and use cases that enable realization of these benefits** (...) *

* World Economic Forum's White paper "Blockchain Beyond the Hype – A Practical Framework for Business Leaders"

Discover the types of blockchains

	Type 1	Type 2	Type 3
	Allow anyone to join the network, to write to the network and to read the transactions from those networks	**Whitelisted access is required, all transactions are publicly viewable**	**Only people with permission can read or write to such systems**
Write access	Permissionless	Permissioned	Permissioned
Read access	Public	Public	Private
Topology	Distributed nodes	Distributed nodes	Distributed nodes
Typical consensus model	Proof of Work / Proof of Stake	Proof of Authority	Practical Byzantine Fault Tolerance, Raft
Example	Bitcoin / Ethereum / EOS / Tezos	European Blockchain Services Infrastructure (EBSI)	Hyperledger Fabric / Corda

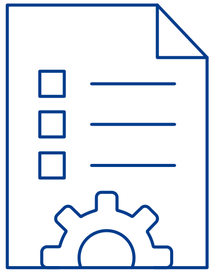
Blockchain is merely a technology



1

PROBLEM

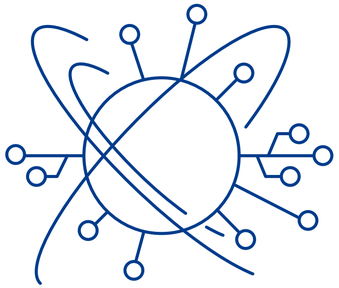
Understand your organisation's specific **business needs** and **challenges**



2

SOLUTION

Assessing possible **solutions** available to address your needs and challenges



3

TECHNOLOGY

Deploying the **technology** that will enable addressing your business needs

Blockchain – a new paradigm

From improving businesses processes

- ✓ Faster processes
- ✓ Increased security
- ✓ Digitalising processes

To redefining business processes with blockchain

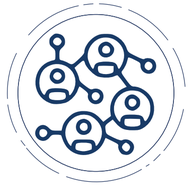
- ✓ Removing intermediaries
- ✓ Supporting auditability
- ✓ Redefining trust models
- ✓ Increasing decentralisation
- ✓ Enabling traceability

European Commission

Benefits from the adoption of blockchain (with EBSI)

Simplifying Administrative Processes

- **Reduce significant effort** in any kind of information **checks and audits** with other entities
- **Reduce the burden for cross-border information sharing** and synchronization with with other EU organisations / agencies / citizens
- **Deployment of decentralised trust** services that eliminate the need for manual checks or data processing pipelines



Enhancing Trust with external stakeholders

- **Enhance trust in members and external stakeholders of DGs** through the use of the EBSI Wallet with Self Sovereign Identity (EBSI SSIF) and Verifiable Credentials and EBSI
- blockchain distributed ledger technology and Smart Contracts' Transparency **increases trust** of the users towards the **procedures and data handling of EC DGs**

Increasing Efficiency

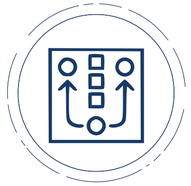
- **Enhanced performance** through the use of local copies of apps and data and **interoperability** with existing systems
- **Enhanced security** and **resilience**

Increasing Transparency

- Increase **transparency** and **traceability of transactions and data** managed by the EC DGs and in cross-border services

Enabling Regulatory Compliance

- **Compliance with General Data Protection Regulation** (GDPR)
- EBSI Core Services enable **compliance with eIDAS**



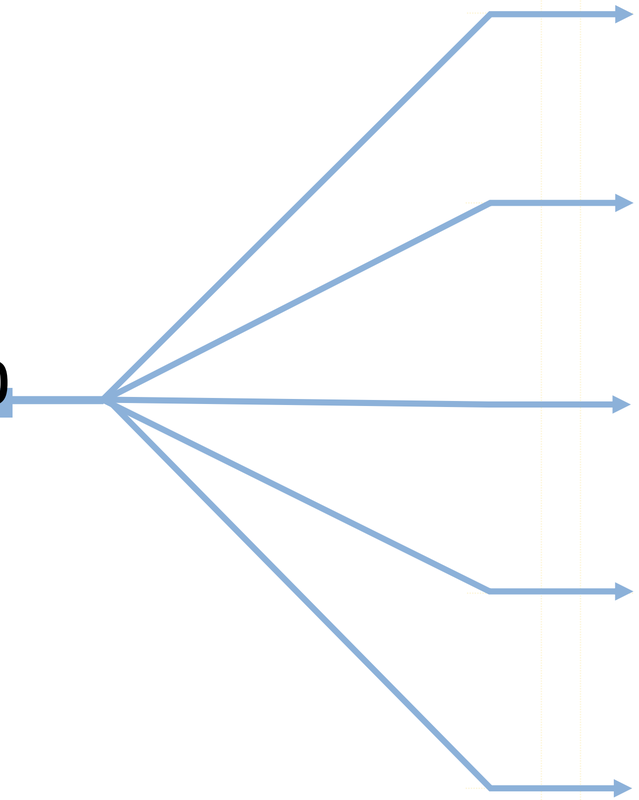
Data harmonisation

- Ensures data harmonisation due to **distributed ledger** technologies, **increased reliability** of records and **easy detection of anomalies**

How the European Blockchain Services Infrastructure (EBSI) started

An ambitious strategy through EU blockchain initiatives

Establishing global leadership on blockchain and distributed ledger technologies



- Joined-up political vision and cooperation (the EU together with the Member States)
- Public-private partnership
- Connecting Global Expertise
- Investing in EU Innovation and start-ups
- Promoting an enabling legal framework, skills development, standards and interoperability

How did it all start?

The European Blockchain Services Infrastructure (EBSI) was born from the joint-vision for Europe to seize the opportunities offered by blockchain technologies and in particular to exploit them for enhancing cross border services. EBSI is supported by 29 participating countries* and the European Commission forming the European Blockchain Partnership (EBP) - (*in 2020)

2019

-

European Blockchain Services Infrastructure

In early 2019, the European Commission published the 2019 Telecommunications Work Programme of the Connecting Europe Facility (CEF) creating initial funding conditions for EBSI.

2020

-

European Blockchain Services Infrastructure

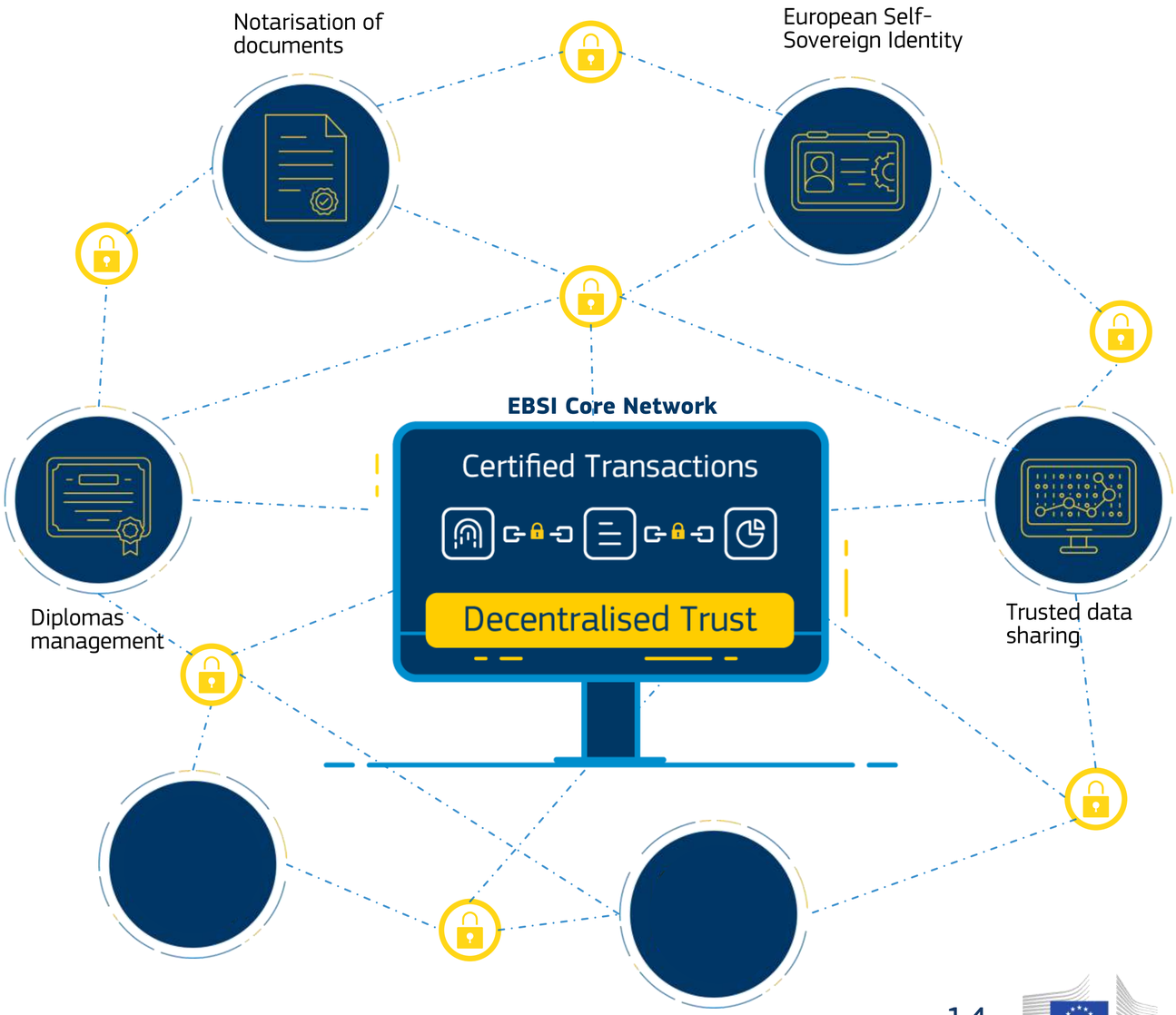
In early 2020, release of the first version of EBSI. Start of EBSI testing by EBP members, national administrations and interested public authorities parties.

What is EBSI?

The European Blockchain Services Infrastructure (EBSI) is a **blockchain infrastructure** that offers **cross-border public services.**

The vision is for EBSI to become a **network** where EBP Members can flexibly use the infrastructure to **cooperate** via cross-border public services, **connect** existing solutions or **integrate** specific services.

These services include use cases that are identified and selected each year by the Member States (EBP) and the European Commission.



Additionally to the generic infrastructure, EBSI includes 4 initial use cases

These 4 use cases enable you to simplify administrative processes, increase efficiency and instill trust in citizens. These can be used to start piloting EBSI applications as they come with sample code.

Notarisation of documents

Leverage the power of blockchain to create trusted digital audit trails, automate compliance checks in time-sensitive processes and prove data integrity.

European Self-Sovereign Identity

Implement a generic Self-Sovereign Identity capability, allowing users to create and control their own identity without relying on centralized authorities.

Diplomas management

Give access to education credentials, with control by citizens, significantly reducing verification costs and improving authenticity trust.

Trusted data sharing

Securely share data (e.g. IOSS VAT identification numbers and import one-stop-shop) amongst customs and tax authorities in the EU.

European Commission

What is EBSI trying to achieve?

Leveraging blockchain to offer services across the EU

EBSI's aim is to enhance **cross border** public services provided to the citizen and businesses, to enhance government or public authorities collaboration, in support of **EU policies** and in full **compliance** with EU regulation, meeting the highest standards in terms of sustainability, privacy and security.

Cross border

enhance cross border services provided by government to the citizen

Mobility

enhance cross border citizen and enterprise mobility

Sustainable

support use cases that enhance environmental and green deal policies

Compliance

compliance with GDPR, eIDAS, SDGR...

Enabler

reinforce blockchain capacities in Europe

How are decisions taken in EBSI?

EBSI – Governance

Governance Bodies	Objective	Frequency	DECISION	ESCALATED DECISION	CONSULTATIONS and INFORMATION
European Commission (EC) blockchain coordination group	Day-to day decisions	2x week	X		
European Blockchain Partnership (EBP) - Policy group	• Key decisions on priorities for EBSI (eg: selection of new use cases) • Decision on major changes or changes to the baseline of the roadmap • Decision on legal, financial and policy matters • Validation of relevant technical decisions	4x year	X	X	X
EBSI Operational Management Board (OMB)	• Decisions on defining the EBSI roadmap • Report to EBP policy group on major changes to the roadmap • Decisions on the scope of sprints for the technical team	2x month	X		X
European Blockchain Partnership (EBP) - Technical group	• Urgent technical decisions (e.g.: security, etc.) • Provision of technical requirements to the business analysts concerning the infrastructure and the use cases • Validation of the convenors' input to DIGIT technical team • Defines the EBSI technical governance	4x year + Working Groups	X		X
Use cases stakeholders group	• Consulted and informed on the EBSI progress • Provision of technical input in relation to the use cases	TBC + Working Groups			X

EBSI – Composition of governance bodies

EC European Commission
EBP European Blockchain Partnership

Governance Bodies	EC CNECT F3	EC CNECT H4	EC DIGIT D3	EC Other DGs	EBP Convenors	EBP Policy members	EBP Technical members	EBP EBSI use case groups members
Blockchain coordination group	X		X					
European Blockchain Partnership - Policy group	X		X		X	X		
EBSI Operational Management Board (OMB)	X	X	X		X			
European Blockchain Partnership Technical group	X		X		X		X	
Use cases stakeholders group								X
Blockchain Competence Network group (European Commission's Inter-Services group)	X	X	X	X				

What can EBSI do for you?

What can EBSI do for you?

By participating in the EBSI network, your National Administration can use the infrastructure and the available solutions to:

- Offer enhanced seamless services to citizens and companies in your own country and across the EU
- Enhance transparency and trust in public services
- Simplify administrative processes and increase efficiency
- Increase data security and privacy
- Ensure sustainability

EBSI infrastructure guiding principles

The EBSI infrastructure is built around strong guiding principles (in full respect of EU regulations) to ensure enough flexibility for future use cases' implementations.

1. **Security**
2. **Interoperability**
3. **Scalability**
4. **Performance**
5. **Auditability**
6. **Privacy**
7. **Open approach**

EBSI at a glance

The EBP members will operate EBSI nodes at national level. These nodes will be able to create and broadcast transactions that will update the ledger. The architecture will be composed of three main layers.

1 **BUSINESS APPLICATIONS**

2 **USE CASES**

3 **MAIN SERVICES**

BUSINESS APPLICATIONS	Enables private or public organisations to develop applications that connect to EBSI nodes and consume exposed core services, having the option to reuse the code from sample use cases layer.
USE CASES	Sample applications for each selected use cases to showcase functionalities, technical implementation and use of exposed services
CORE SERVICES	Enablers for all applications, that provide interfaces for on-chain and off-chain services
CHAIN AND STORAGE	This layer encompasses the blockchain protocols and off-chain storage protocols, currently supported by EBSI
INFRASTRUCTURE	This layer enables the deployment and connectivity of the EBSI nodes (at the blockchain and off-chain storage level) and includes network, compute, security and operation capabilities.

GOVERNANCE

What are the benefits of the EU-wide EBSI network?

EBSI Stack Nodes will exist in Member States and in trading partners outside the EEA. The EBSI Stack provides:

- **Increased resilience** from a network of systems and data that can take over from failed nodes and distributes proofs of actions geographically
- **Enhanced trust** with the use of blockchain smart contracts and ledgers
- **Enhanced cyber security** from the enforcement of encryption practices
- **Enhanced performance** for cross border systems through the use of distributed data and code execution
- **Granular** capabilities that can suit small and large Member States as well as cross border or local applications

This is the status of the EBSI network

Updated on 14 May 2020 – Latest information available here

24 Member State Nodes

24 nodes have been requested by Member State institutions from **14 Member States**, of which:

- **16 nodes** have been connected with all available services
- **3 nodes** are currently in the process of connection
- **5 nodes** are in the preparatory stages to connect **during Q2/Q3 2020**
- **8 nodes** are in the process of being on-boarded

+

6 Commission Nodes

=

At least 30 Node TestNet Planned for 2020

What’s in it for you?

Participate easily to the EBSI network and get all the support you need!

Functional evaluation	Resource evaluation	Cost-free software	Blockchain services testing	Governance & regulatory support	Early access to EBSI	Community access
Ability to evaluate the core functionality and use case features delivered with EBSI 1, including how blockchain is leveraged and how cross border services may benefit, including simulating EBP Members impact.	Detailed assessment of the costs and resources needed to implement EBSI1 and have a basis for evaluating the costs of a production node in EBSI 2.	No software license costs, nor usage fees or service fees to the Commission or any third party. Hosting, resource and computing costs are EBP Members’ responsibility, however every effort has been made to ensure that costs are reasonable.	Request the testing of cross border use cases against the core capabilities such as the ledgers, smart contracts, SSI, notarisation and also in combination with off-chain storage.	Support EBP to establish governance of decentralised cross border digital services for your country’s or Institution’s services.	Get ready early in the preparation of use cases against core capabilities of EBSI, thereby accelerating your country’s adoption of cross border services.	The EBSI community will be actively discussing practical implementation topics and sharing experiences and solutions.

Leverage a government hosted blockchain network

Assess the strategic and business relevance it has for you

Would EBSI be useful for my National Administration and its current or future business processes?

Would EBSI be useful for my National Administration (NA) and its current or future business processes?

Validation

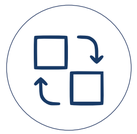
Is your NA dealing with **validation of documents**?

Blockchain enables easy and automated validation of documents (e.g. in my business process I need to make validated documents available to others)

Cross border

Does your NA need to **interact with services/entities in Europe**?

Blockchain supports trust establishment to allow interactions with external parties (e.g. in my business process I have to communicate with authorities in other European Countries that follow an accreditation process to be part of my network)



Processing

Would your NA benefit from having **less overhead to process validation checks**?

Blockchain supports automated validation checks (e.g. in my business process I need to perform several lengthy steps to validate the issuance of official documents)

Trust

Would you benefit from having a more **trust in services**?

Blockchain supports the establishment of a decentralised trust model where only validated parties are able to participate in the transactions (e.g. in my business process only accredited parties are able to send documents).

Transparency

Would you benefit from providing **transparent processes**?

Blockchain supports the establishment of transparent processes while proving authenticity/traceability of information to other entities (e.g. in my business process I want to be able to proof the authenticity and origin of documents).

Would EBSI be useful for my National Administration (NA) and its current or future business processes?

Auditability

Do I need to easily **enable auditability of transactions**?

Compliance checks

Do I need to perform **automated compliance checks**?

Proof of data integrity

Do I need a **proof of data integrity**?

Timestamping

Do I need to **timestamp documents in the context of auditing**?

Enable trust

Do I need to **enable trust between different actors in the EU**?

Authenticity of documents

Do I need to **authenticate documents**?

User identity & access control management

Do I need to enable **users to control their identity data and manage access to data**?

If **yes**, EBSI could support your National Administration.

EBSI use cases

Overview of functionalities

Notarisation of documents

Leverage the power of blockchain to create trusted digital audit trails, automate compliance checks in time-sensitive processes and prove data integrity.

Use case: Notarisation of documents

Overview of core functionalities

Notarisation of a document

Allows notarisation of files submitted by the user together with the related metadata while building a trusted audit trail.

Verification of authenticity/ integrity of files

Allows users to generate an imprint of a file and retrieve any existing registration related to the imprint, and the associated metadata.

Use case: Notarisation of documents

Overview of supporting functionalities due in **next versions**

Request for registration

Enables new users to submit a request to access and use the registry

Registration of an identity

Enables new users to establish their identity

Entrusting a registrar

Allows an auditee to entrust an auditor.

The auditor (a) gains access to the previous registrations made by the auditee and (b) can also register new artefacts on his/her behalf.

Searching for a registration

Allows users to filter/retrieve relevant registrations in a user-friendly way.

Visualising registrations

Allows users to view in a user-friendly way the relevant information related to a given registration

EBSI use cases

Overview of functionalities

European Self-Sovereign Identity

Implement a generic Self-Sovereign Identity capability, allowing users to create and control their own identity without relying on centralized authorities.

Use case: European Self-Sovereign Identity

Overview of core functionalities

Registration

Users can request their own self-sovereign identity (i.e. users control what is shared with whom)

Issuers can request their registration

Authentication

Users can authenticate using a strong authentication online (i.e. national eID)

Verification

Users can:

- Request / obtain / present verifiable claims and credentials
- Request verifiable consent / mandate

Issuers can:

- Verify identifications
- Suspend / revoke credentials

EBSI use cases

Overview of functionalities

Diplomas management

Give access to education credentials, with control by citizens, significantly reducing verification costs and improving authenticity trust.

Use case: Diplomas management

Overview of core functionalities

Credential request

The student can request the issuance of a credential of his/her final qualifications in an education institution and gets it stored in his e-wallet

Credential Presentation: Application to an Higher Education Institution (HEI)

The student wants to enroll at an university of another state and can use his EBSI compliant e-wallet to request the enrollment

Credential Verification: Acceptance of the student at the HEI

The HEI verifies the documentation received by the student and enrolls him/her in the institution

Third party credential presentation: Application for an apprenticeship

Once the student graduates, he/she applies for an apprenticeship. The company is able to verify the students' graduation and accepts his request

Credential Audit: Setting up a new business / Apply to EU funding

The trainee graduates wants to set up his/her business in his/her home country or apply for EU funding and uses his digital credentials stored in his/her e-wallet

EBSI use cases

Overview of functionalities

Trusted data sharing

Securely share data (e.g. IOSS VAT identification numbers and import one-stop-shop) amongst customs and tax authorities in the EU.

Use case: Trusted data sharing

Overview of **existing** and **future** core functionalities

Registration/identification of a new user (due in future versions)

A user interacting with the Trust Data Sharing Service must be first identified and authenticated before being able to publish or consult content on it.

Publication of content

An identified entity can publish, update and delete content on the Trust Data Sharing Service for a specific group.

Consultation of content

An identified entity can consult shared content on the Trusted Data Sharing Service, in compliance with data confidentiality and data protection requirements

Change/Update the data model (due in future versions)

The Group Admin can update/change the existing data model related to a specific workflow, supporting simultaneously multiple versions if needed

Change/Update the business rules (due in future versions)

The Group Admin can update/change the existing business rules related to a specific workflow, by supporting simultaneously multiple versions if needed.

Discover the EBSI version 1 use cases

Walk through a citizen’s experience. Imagine what blockchain could bring to your citizens. Shape your Business Scenarios by using user-centric and collaborative tools, methods and techniques.

Experience a citizen’s journey and test the use case

Open your EBSI wallet account

- Create an EU login account (citizen)
- Access your EBSI wallet (citizen)
- Create a decentralized identifier (DID) address (citizen)

Get your eID verifiable credential

- Request a verifiable eID (citizen)
- Issue the eID verifiable credential (government)
- Store the verifiable credentials (citizen)
- Access your verifiable credential (citizen)

Get your Bachelor Diploma

- Request your bachelor diploma verifiable attestation (citizen)
- Issue bachelor diploma verifiable attestation (government)
- Store your bachelor diploma verifiable attestation (citizen)
- Access your bachelor diploma verifiable attestation (citizen)

Get your Master Diploma

- Request your master diploma verifiable attestation (citizen)
- Issue master diploma verifiable attestation (university)
- Store your master diploma verifiable attestation (citizen)
- Access your master diploma verifiable attestation (citizen)

Notarize your documents

- Participate in a call for proposals to get EU funding for your start-up (citizen’s company)
- Notarise documents justifying the spending of the grant received (citizen’s company)
- Verify your notarized documents (EU auditors)

Embark on the journey!

How to leverage EBSI?

How to leverage EBSI?

For EBP Members

Integrate your applications with EBSI

Make sure your applications and systems integrate with EBSI APIs and services as expected. Confirm your expectations of functionality, reliability, performance and security.

Budget estimator – See pages 53 & 54

Deploy & connect a node to the network

Deploy the node on your infrastructure. Connect to the network. Shape your PoC by using user-centric and collaborative tools, methods and techniques.

Budget estimator – See pages 58 - 62

Disclaimer: Please NOTE that hosting a node is NOT a requirement for integrating an application to EBSI

The EBSI code has an open source license and is published under EUPL 1.2.

Integrate your applications with EBSI

Make sure your applications and systems integrate with EBSI APIs and services as expected. Confirm your expectations of functionality, reliability, performance and security.

Audience

BUSINESS OWNERS & TECHNICAL TEAM

Budget Estimator

SEE PAGE 50 & 51

Ways to integrate your applications to EBSI

1 Core Services

Self standing applications leveraging EBSI added value core service tools & APIs.

A v2 feature due in 2021

AUTOMATED INTEGRATION TOOLS

CORE SERVICES (APIs)

Lower effort, faster re-use of common functionality

2 Infrastructure Services

Self standing applications requiring native blockchain and storage APIs.

INFRASTRUCTURE INTERFACES

PARTICIPATION IN THE NETWORK

More flexible, direct blockchain usage within EBSI governance

EBSI Core Services available for application development

Self standing applications leveraging EBSI added value core service tools & APIs

1

One way for self standing applications to connect to the EBSI network is by leveraging the EBSI added value core service tools & APIs.

A v2 feature due in 2021

AUTOMATED INTEGRATION TOOLS

CORE SERVICES (APIs)

Users can choose to directly deploy their applications using the provided APIs of the Core Services.
In 2021, an Automated Integration Tools will be available to reduce integration efforts even further.

Lower effort, faster re-use of common functionality

EBSI native blockchain and storage APIs available for integration

Self standing applications requiring native blockchain and storage APIs

2

Another way for self standing applications to connect to the EBSI network is by using the native blockchain and storage APIs and participate in the governance of the network by deploying a node.

INFRASTRUCTURE INTERFACES (APIs)

PARTICIPATION IN TECHNICAL GOVERNANCE

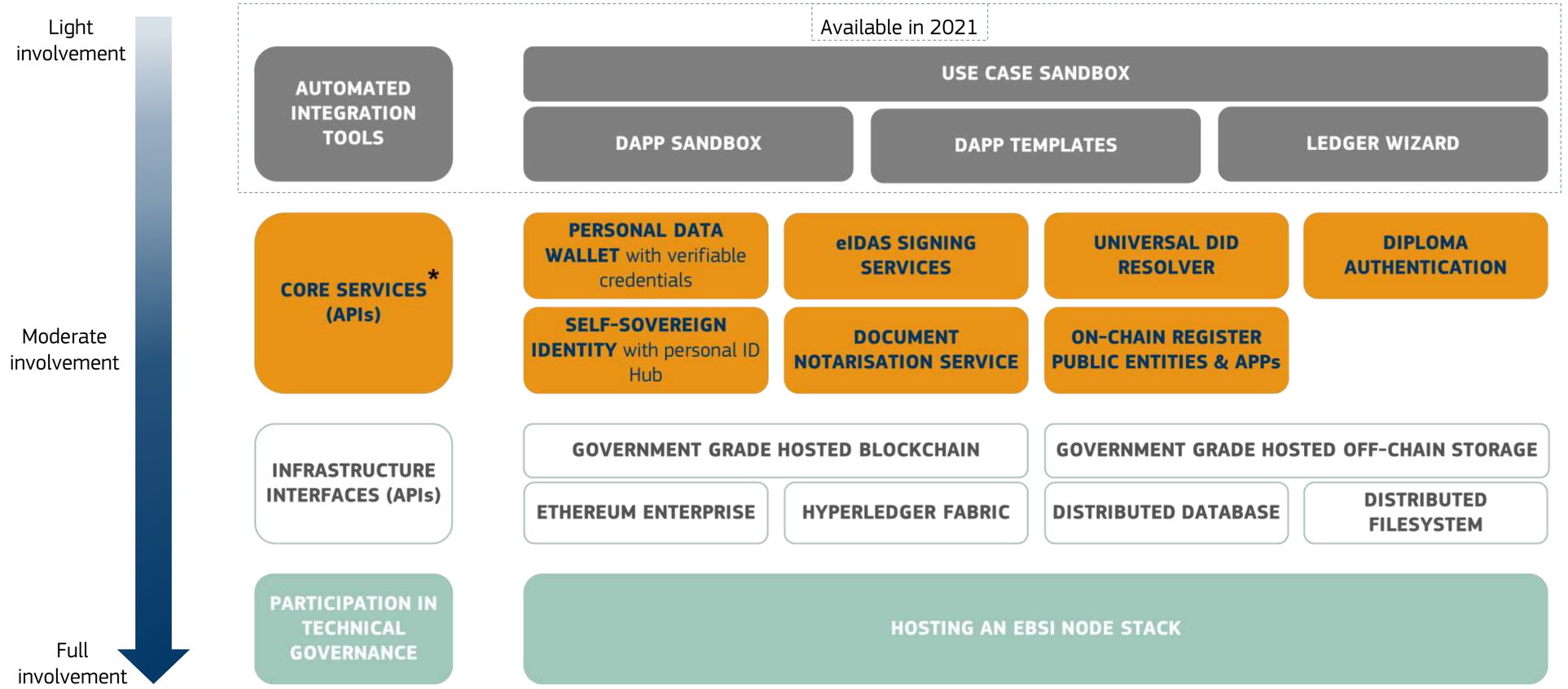
Users can choose to integrate directly to the native APIs provided by EBSI.

More flexible, direct blockchain usage within EBSI governance

EBSI Core Services available for application development

This is an overview of the **interface stack** and **integration points** available to integrate your application to EBSI. The full documentation is available **here**.

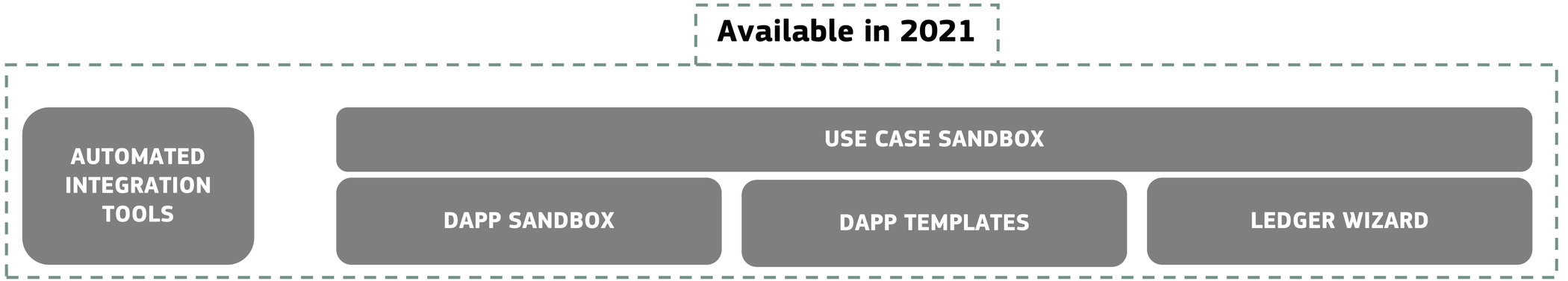
Levels of involvement depending on **resources requirements** and application **complexity**.



*NOTE: Some EBSI v1 Core Services have partial functionality. Please refer to relevant documentation for more information

EBSI Core Services available for application development

Integrate effortlessly any application to the EBSI infrastructure using the Use Case Sandbox



In v1, the use case sandbox is delivered through controlled access to the TESTNET via the governance of the EBP and operated by the EBSI support team

In v1, authorised participating application developers will have access to:

- Specific terms of use for EBSI v1
- Documentation for the features required
- API connectivity to the TESTNET
- Manual request to support team for smart contract submission
- Manual request to support team for request of promotion to production

The use case sandbox, as an automated, self-service tool, is to be delivered in the v2 of EBSI based on existing underlying capabilities, which will enable automation of the integration and approval processes.

EBSI Core Services available for application development

Integrate any application to the EBSI infrastructure using the Core Services APIs

*** CORE SERVICES (APIs)**

PERSONAL DATA WALLET with verifiable credentials	A **set of API capabilities** for Personal Wallets to use for personal data. Wallet API: including Authentication Manager, Secure Enclave, DID Document Resolver, Notification, Wallet requests Storage & Historical API (function of a wallet in order to store the queue of messages coming from the relying parties to be processed by the wallet. This information is stored in off-chain storage).
SELF-SOVEREIGN IDENTITY with personal ID Hub	**Wallet functionality** that includes Verifiable Identity creation and validation, Credential validation, including Attestation, Presentation of Credentials, Credential Registry and presentation registry, **an ID hub with off-chain storage and on-chain anchoring**.
eIDAS SIGNING SERVICES	**eIDAS signing services** are provided through an eIDAS bridge and **ensure sealing of Verifiable Credentials** such as verifiable identity issued by a Member State. This capacity is simulated based on current standards in V1 and will be activated in V2.
DOCUMENT NOTARISATION SERVICE	Notary service allows the **anchoring of a hash of a document in the blockchain** by uploading it to an off-chain storage and for the transaction to be signed by a wallet, subsequently the API allows validation of the self-notarization by checking either the hash or the document.
UNIVERSAL DID RESOLVER	This capability allows the **resolution of public addresses** from Distributed Identity JSON structures.
ON-CHAIN REGISTER OF PUBLIC ENTITIES & APPs	A series **of smart contract based registries** that allow the authentication of government bodies (such as universities), certified document formats and permitted EBSI applications.
DIPLOMA AUTHENTICATION	A service that allows **the issuance and authentication of educational accreditations** against universities registered on-chain and offering a basic API for universities to integrate.

*** NOTE: Some EBSI v1 Core Services have partial functionality. Please refer to relevant documentation for more information**

EBSI native blockchain and storage APIs available for integration

Integrate any application to the EBSI infrastructure using the Infrastructure APIs

As an alternative to using the Core Services APIs, applications may be integrated to native APIs where developers choose to create additional functionality to the ones available.

INFRASTRUCTURE INTERFACES (APIs)

GOVERNMENT GRADE HOSTED BLOCKCHAIN	EBSI is a private consensus network with public data ledgers.
ETHEREUM ENTERPRISE	The Ethereum Enterprise network is accessed through the Besu client and runs on a Proof of Authority consensus algorithm based on IBFT 2.0 where all the EBSI v1 network Member State and Commission nodes have validators.
HYPERLEDGER FABRIC	The Hyperledger Fabric runs on a Proof of Authority consensus algorithm based on RAFT where all the EBSI v1 network Commission nodes have validators. Member States may optionally apply for a validator.
GOVERNMENT GRADE HOSTED OFF-CHAIN STORAGE	EBSI provides off-chain distributed or local storage for applications. All of-chain storage is available through a unified API.
DISTRIBUTED DATABASE	In EBSI v1, the platform offers relational or key / value storage. The initial implementation has a Cassandra distributed database that synchronizes to all nodes. A MongoDB database will also be available for local state storage.
DISTRIBUTED FILESYSTEM	A distributed file system will be available based on GlusterFS.

EBSI native blockchain and storage APIs available for integration

Get fully involved in EBSI and participate in the technical governance by hosting a node

PARTICIPATION IN TECHNICAL GOVERNANCE

HOSTING AN EBSI NODE STACK

Member State and approved parties may host an EBSI node, having the appropriate referral from the EBP member state policy representative and having adhered to the appropriate agreements.

Hosting a node implies that the party will be involved in the technical governance, security and maintenance of the network, the full extent of involvement will be clarified through the V2 Governance work.

Once fully authorised, node set up is highly automated and available for cloud and local virtual machine environments.

Please NOTE that hosting a node is NOT a requirement for integrating an application to EBSI!

What are the typical costs items involved?

Methodology

The costs are calculated based on the IT Total Cost of Ownership (TCO) method, a best practice widely used to have an overview on all the costs linked to IT systems.

The **three key elements** and **cost categories** associated with the IT TCO method are:

- Acquisition costs
- Operating costs
- Resources costs

	Cost Categories		
	Acquisition costs	**Operating costs**	**Resources costs**
Cost Items	Software Hardware / cloud infrastructure Implementation Licenses Training	Security Software maintenance Ongoing training & support	Support staff DevOps / developer

Disclaimer: Please note that this is an estimation done by Experts of the EC with the intention to help EBP members estimate their costs based on extrapolation of observed efforts. The final resource efforts and cost may vary depending on every country.

What are the typical costs items involved?

There are no **license, usage or service fees** for the Commission or any third party. Integrating your application(s) to EBSI has no other costs other than your own development, application hosting, resource and computing costs.

Find an estimation of the Resources Costs in terms of Man Days (MD) required to connect to EBSI using the different methods below:

Resources Costs				
Cost Item	**Component**	**Description**	**Parameters**	***Man Days (MD)** (1 MD = 8 working hours)*
DevOps / Developer	*DevOps / Developer*	The operational people to connect to the different layers of EBSI	INTEGRATION TOOLS	3
			CORE SERVICES (APIs)	5
			INFRASTRUCTURE INTERFACES (APIs)	8
			PARTICIPATE IN TECHNICAL GOVERNANCE	15

*** Please note that the development time of custom functionality of the application is not included in our estimations.**

Disclaimer: Please note that this is an estimation done by Experts of the EC with the intention to help EBP members estimate their costs based on extrapolation of observed efforts. The final resource efforts and cost may vary depending on every country.

Links and documentation

- API catalog
- Get Started with EBSI
- Documentation
- Services
- Support and Community

Deploy & connect to the network.

Set-up blockchain infrastructure. Deploy the node on your infrastructure. Connect to the network. Shape your PoC by using user-centric and collaborative tools, methods and techniques.

Audience

BUSINESS OWNERS & TECHNICAL TEAM

Budget Estimator

SEE PAGES 54 - 58

How can you host a node?

Follow the steps and start deploying an EBSI node on your infrastructure

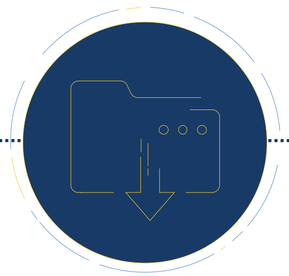
Get started!

Visit CEF Digital

All information regarding the EBSI's testing is available here.

Register to the test

Register to the test through our Service Desk and our support team will contact you with all relevant information asap.

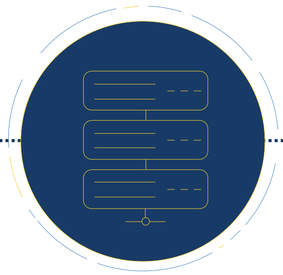


Prepare for the test

Verify whether your infrastructure meets the EBSI minimum technical requirements before starting to deploy the node.

Deploy an EBSI node

Leverage the deployment kit to deploy the node, install and configure all related components on your environment.



Connect to the network

Access the connectivity testing and verify if your node communicates correctly with other nodes of the EBSI network.

What are the typical costs items involved?

Methodology

The costs are calculated based on the IT Total Cost of Ownership (TCO) method, a best practice widely used to have a overview on all the costs linked to IT systems.

The **three key elements** and **cost categories** associated with the IT TCO method are:

- Acquisition costs
- Operating costs
- Resources costs

	Cost Categories		
	Acquisition Costs	**Operating Costs**	**Resources Costs**
Cost Items	Software	Security	Support staff
	Hardware / cloud infrastructure	Software maintenance	DevOps
	Implementation	Ongoing training & support	
	Licenses		
	Training		

Disclaimer: Please note that this is an estimation done by Experts of the EC with the intention to help EBP members estimate their costs based on extrapolation of observed efforts. The final resource efforts and cost may vary depending on every country.

What are the typical costs items involved?

Acquisition costs			
Cost Item	**Component**	**Description**	**Parameters**
Software	*Firewall*	Individual or organization firewall to protect the hardware / cloud with appropriate redundancy	1 firewall or organizational hosting site firewall service
	VPN (OPTIONAL)	This VPN is OPTIONAL and ONLY REQUIRED IF THE MEMBER STATES WISHES TO PARTICIPATE IN FABRIC ORDERING (This is also a temporary requirement until Fabric releases a VPN free stack)	Not required to run apps, core services, Ethereum node or fabric node as EC will guarantee Fabric ordering as a minimum. Only required if member state elects to participate in Fabric consensus. VPN to connect only member state node Fabric ordering service to EC Fabric ordering service
Hardware/ cloud infrastructure	*Servers*	The servers required to host a node. The 3 VMs roles: - Applications and Core Services - Ethereum node - Fabric node	3 Virtual Machines: - 4 Core CPU, 4 vCPU or equivalent, - 16 GB of RAM for the Besu and Fabric hosts, - 32 GB of RAM for Master/Applications host, - 80 GB SSD, - 256 GB SSD
	Internet Bandwidth	Required bandwidth for connectivity with the blockchain network	Outbound data transfer for all node machines of 100 Mbits/second for bandwidth (internet)
	Local Network	Internet network required between EBSI components	1 GB Ethernet (local network), latency 50ms (internet)
	Fixed IPs	The EBSI network requires three fixed IPs for each node	3x fixed IPs
Implementation	*Installation, configuration & test*	Costs related to installation, configuration, testing, etc. of infrastructure	According to MS requirements
Licenses	*License*	The EBSI platform is distributed with open source licenses	Open source licenses come with no cost
Training	*Support & training*	Costs related to support and training for stakeholders in implementing, connecting to the solution, etc.	According to MS requirements

What are the typical costs items involved?

Operating Costs			
Cost Item	**Component**	**Description**	**Parameters**
Security	*Security specifications*	Implementation and monitoring od security specification to secure the node and network	- Set up and Management – weekdays - Operation -24/7/365 support (can be from existing shared security team)
	Insurance	Insurance for security issues created to the network by the MS	According to MS requirements
Software Maintenance	*Maintenance agreements*	Operational maintenance agreements may be desirable for certain elements of the platform once in production, dependent on Member State available DevOps skill sets not required	TBD by Member State based on hardware and software stack
	Contingency budget	Budget for contingency events such as extraordinary upgrades required on the network	According to MS requirements
Ongoing Training & Support	*Integration*	Management, product and technical people time for integration of National blockchain services requiring access to EBSI	According to MS requirements

What are the typical costs items involved?

Resources Costs			
Cost Item	**Component**	**Description**	**Parameters**
DevOps	*DevOps*	The operational people to set up and operate the node	- Set up and Management – weekdays - Operation -24/7/365 support (can be from existing shared security team)
Support Staff	*Support & training costs*	Costs related to support and training for stakeholders in implementing, connecting to the solution, using the solution, etc.	According to MS requirements
	Local Processes and regulation adherence	Management, product and technical people time for local processes and regulation adherence for EBSI connected services	According to MS requirements

What are the costs items involved?

Download

COST ESTIMATION TOOL			
Cost Categories			
	Acquisition costs	**Operating costs**	**Resources costs**
Cost items	Software	Security	Support staff
	Hardware / cloud infrastructure	Software maintenance	DevOps
	Implementation	Ongoing training & support	
	Licenses		
	Training		

What’s next?

Start piloting!

Get started!

Functional testing

Explore the demo and test the **use cases** offered by EBSI: manage diplomas leveraging the European Self Sovereign Identity as well as the notarisation of documents.

Available since February 2020

Deploy a node

Once you've **deployed** a node, you can test whether your infrastructure can **connect** to the EBSI network.

Available since February 2020

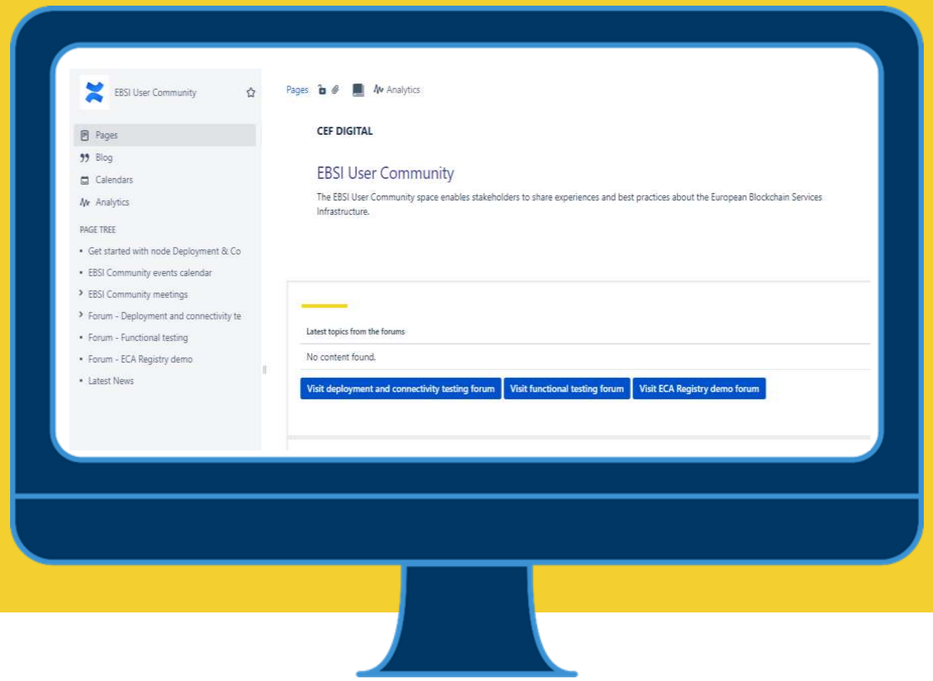
Integration pilot

Test whether your applications and systems **integrate** with EBSI APIs and services as expected.

Available since May 2020

EBSI Community and Support

Join the EBSI user community



Raise your questions and share insights

The European Commission set up a user community dedicated to the members of the EBSI network. After registering to the testing, you will be granted access to specific documentation, be able to ask questions and share your knowledge and experience.

Register

Join the community

At first, the community is restricted to the members of the EBP but the aim is to create a large blockchain community.

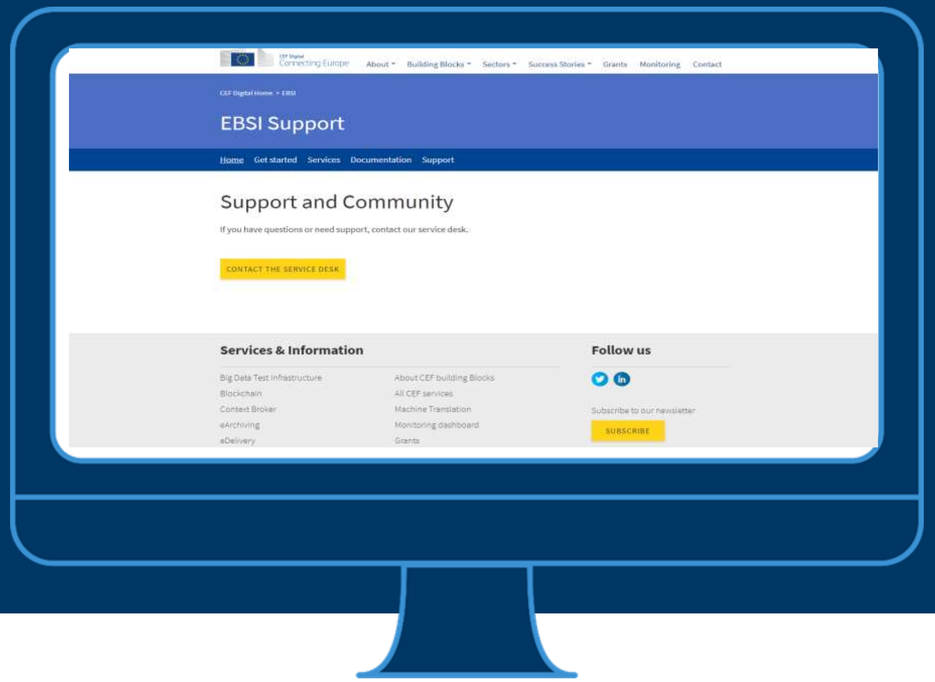
Ask & Share

Ask your questions to fellow members and share your feedback and experience.

Priority access

Have access to documentation created by the European Commission together with members of the EBP.

EBSI Support Offering



- ✓ **Raise and solve your issues**
- ✓ **Register for node deployment, integration and functional testing**

The EBSI support team is available 8:00 – 18:00 CET on normal Commission working days.

Contact us

EBSI Service Desk

- Issue Tickets: Service Desk
- For questions regarding EBSI in general

Standby Services

18:00-8:00 CET on normal Commission working days
Available 24 hours on weekends, Commission and public holidays.

Only by phone: +32 2 298 96 00

** Only for critical and urgent incidents and only by phone*

WANT TO KNOW MORE?

Discover more interesting content on our **landing page**
&
Subscribe to the **monthly newsflash**

https://ec.europa.eu/cefdigital/wiki/x/e4DEBg

Ready to get started?

Reach out to us to learn more!
Or visit our Connecting Europe Facility website www.ec.europa.eu/cefdigital

Contact your national representative in the European Blockchain Partnership:
CNECT-EUBLOCKCHAIN@ec.europa.eu

Learn more about the European Blockchain Partnership on:
https://ec.europa.eu/digital-single-market/en/news/european-countries-join-blockchain-partnership