



gaia-x

Gaia-X Lab – Onboarding Presentation

–

Kai Meinke – Gaia-X Lab Development Team

Pierre Gronlier – Gaia-X CTO

Friday, 25 March 2022



gaia-x

01

Mission of the Gaia-X Lab

What is the Gaia-X Lab?



- The Gaia-X Lab is a **development team** under the Gaia-X CTO office.
- The Gaia-X Lab team writes prototypes to **technically validate functional and technical hypothesis** made by the Gaia-X Working Groups, when working on the Gaia-X specifications.
- The team **demonstrates working prototypes**.
- The Lab **accelerates the development** of external **open-source software (OSS)** project.
- The Lab **identifies missing functional components** in the Gaia-X Specifications

Deliverables of the Gaia-X Lab?



- All results of the prototyping activities are shared with the Gaia-X Working Groups and the Gaia-X Lighthouses projects for their own considerations.
- The Gaia-X Lab doesn't contribute to the Gaia-X specs.
- The Gaia-X Lab doesn't release any official Gaia-X deliverables.
- All working activities are publicly done in the current repository.

Public Repository: <https://gitlab.com/gaia-x/lab>

Public Backlog: <https://gaia-x.atlassian.net/browse/LAB>

What happens with the Code?



Type	Use Case	Action
Accelerator	The prototype is a feature of an existing OSS project.	It's contributed back to the OSS project.
Filler	The prototype identified a missing Gaia-X Component.	It's released as a new OSS project under the Eclipse Foundation.
Demonstrator	The prototype showcases a workflow for educational purpose	It's released as a new OSS project under the Gaia-X OSS rules.

All Gaia-X Lab projects follow the **Gaia-X OSS rules**.

The license is either **Apache License Version 2.0** or **Eclipse Public License - v 2.0**.

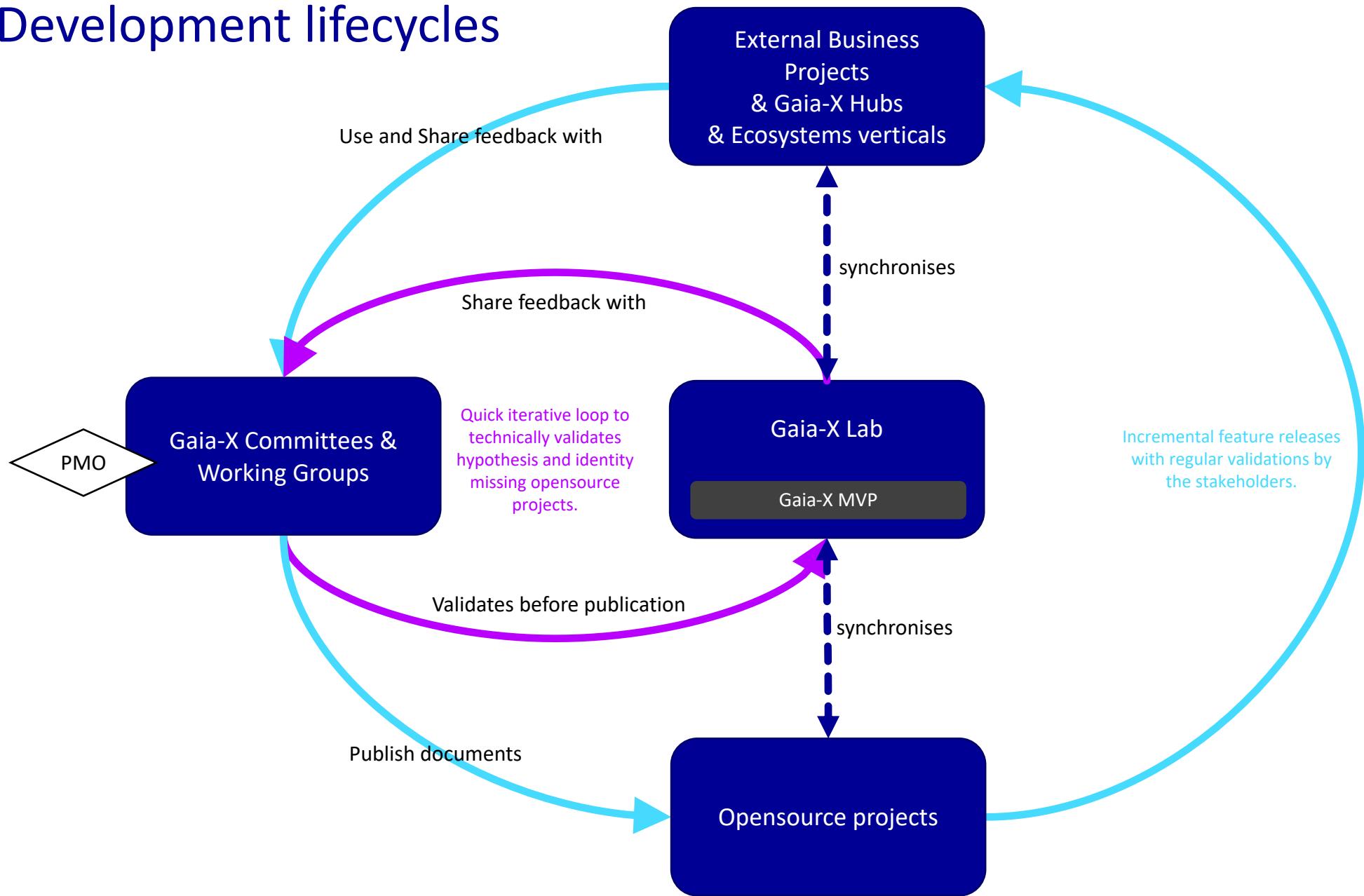


gaia-x

02

Context of the Gaia-X Lab

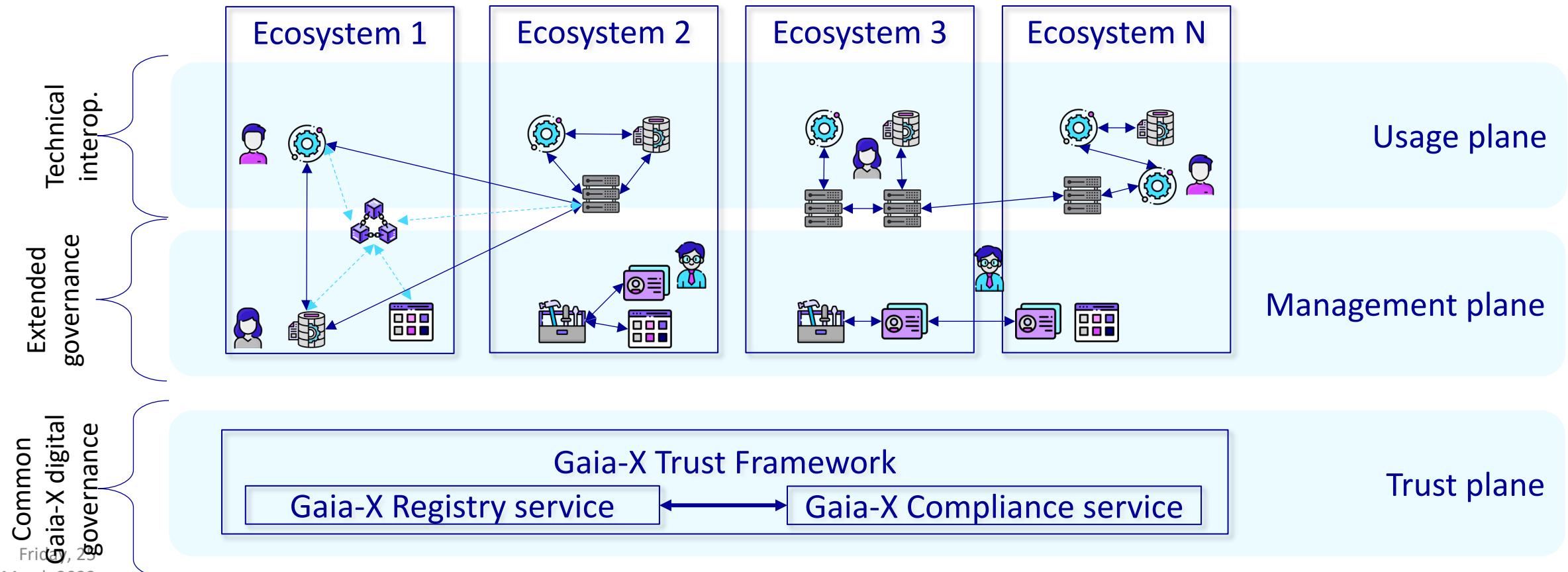
Development lifecycles



One Gaia-X Ecosystem, federating interoperable autonomous ecosystems.



- Gaia-X Ecosystem: the virtual set of Participants, Service Offerings, Resources fulfilling the requirements of the Gaia-X Trust Framework.



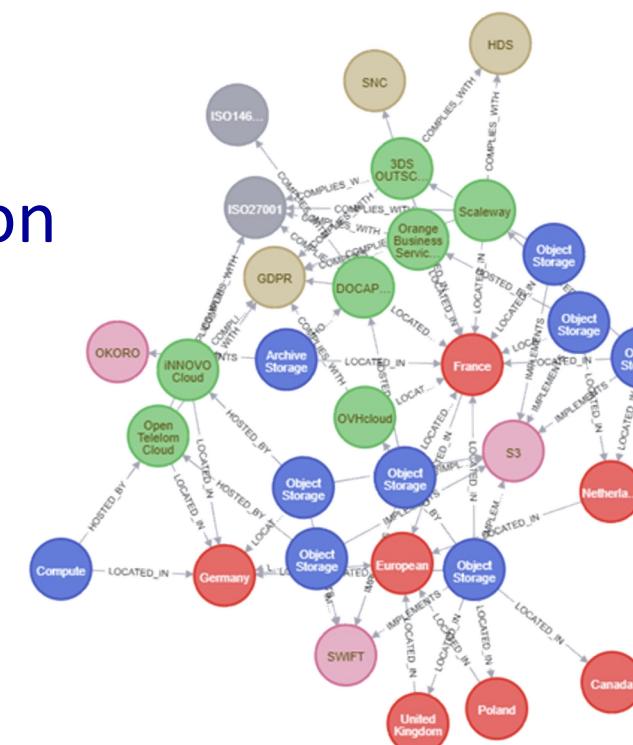
NIST 500-332: Cloud Federation Reference Architecture (§2)

Friday, 29
March 2022

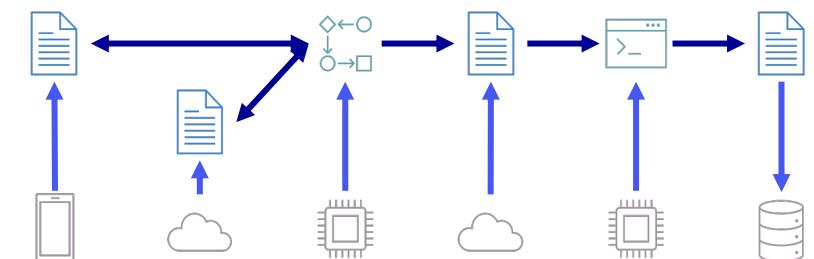
Gaia-X Trust Framework 1/2 from fragmented market to service composition



- Enable the **creation of more complex composite services from atomic or elementary services** as well as complex services.
- Ensuring **composability** and hence **substitution**
- Creates **Transparency** with **portability** across **providers** and hosting platforms



Knowledge graph of verifiable and composable signed claims
(Catalogue demonstrator - March 2020)



Data pipeline example, from edge (mobile) to cloud

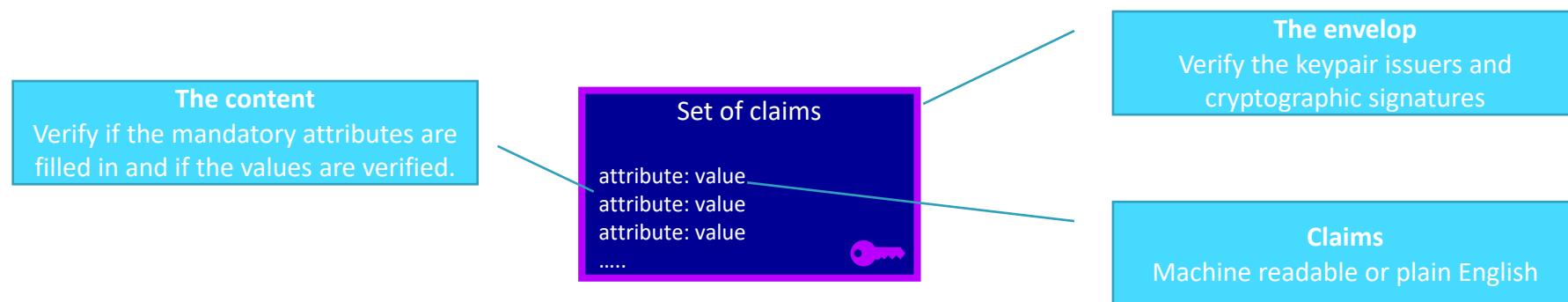
Gaia-X Trust Framework 2/2



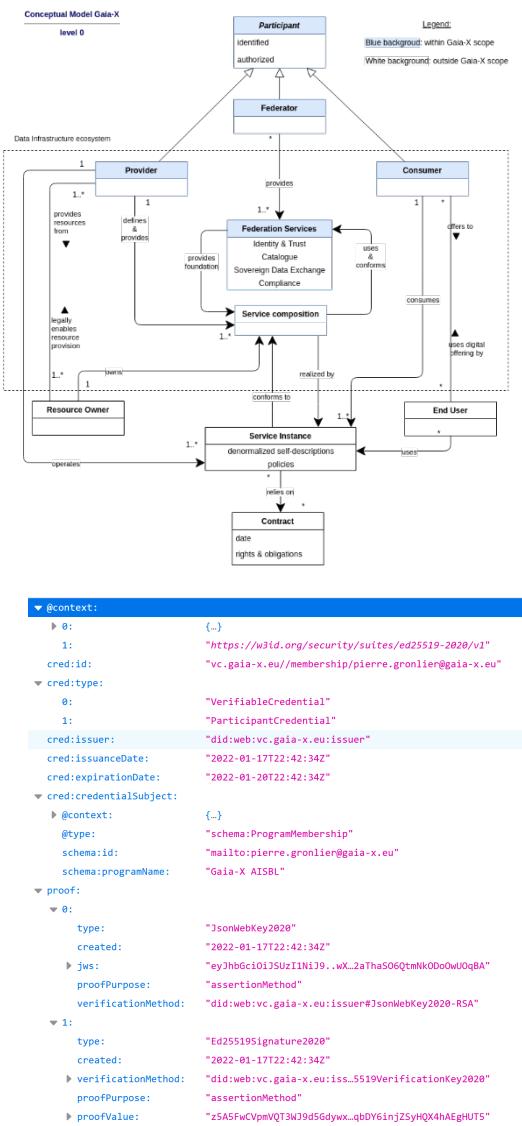
To ensure **Trust** the Gaia-X Trust Framework is:

- **Automated by Gaia-X specific components** part of decentralized technology framework
- Versioned, i.e. **bound to** a specific version in time of the **Compliance rules set**
- **Applied to the self-description** file of all entities implied in the Gaia-X conceptual model (*)
- Aimed to **verify the existence and veracity of the attributes** and not judging their value

(*) as defined as part of the Gaia-X Conceptual model described in the Gaia-X Architecture document



- Trust Framework example:
 - All cars must have a color
 - All Datasets must have a location
 - All Services must identify their provider with its legal country of jurisdiction.
- Label examples:
 - cars level 1 are red, cars level 2 are blue, ...
 - My dataset must be located in EU
 - My services must be non-subject/immune to non-EU laws



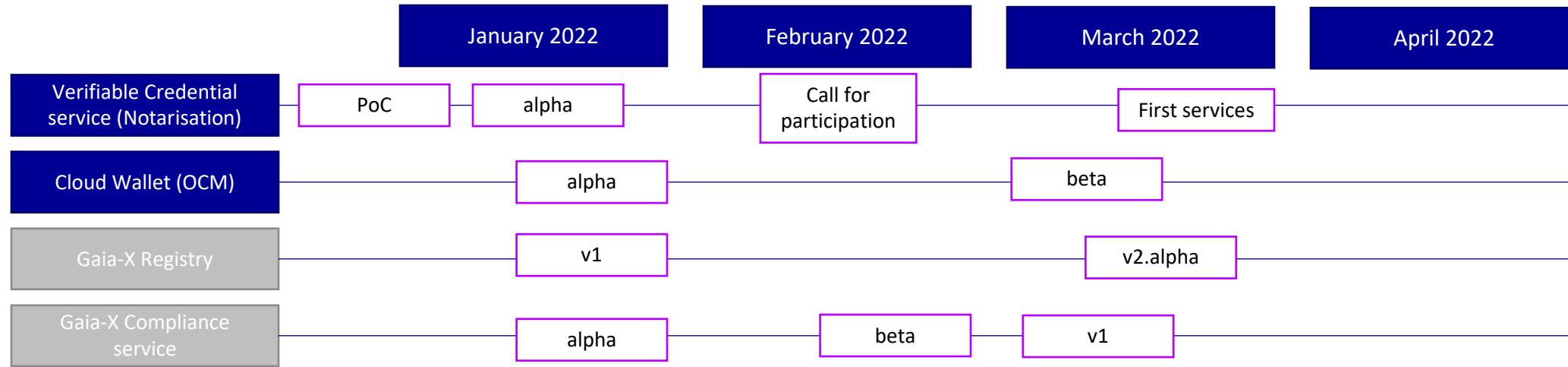


gaia-x

03

Roadmap

Roadmap and Focus



- Demonstration of the **Trust Framework**, Self-Sovereign Identity (SSI) & Verifiable Credentials
- Alpha Version of **Gaia-X Registry**
- Verification of **Gaia-X Compliance**
- **Trust Framework:** <https://gaia-x.gitlab.io/policy-rules-committee/trust-framework/>





04

Gaia-X Lab Onboarding
Demonstrator

Gaia-X Lab Onboarding Demonstrator



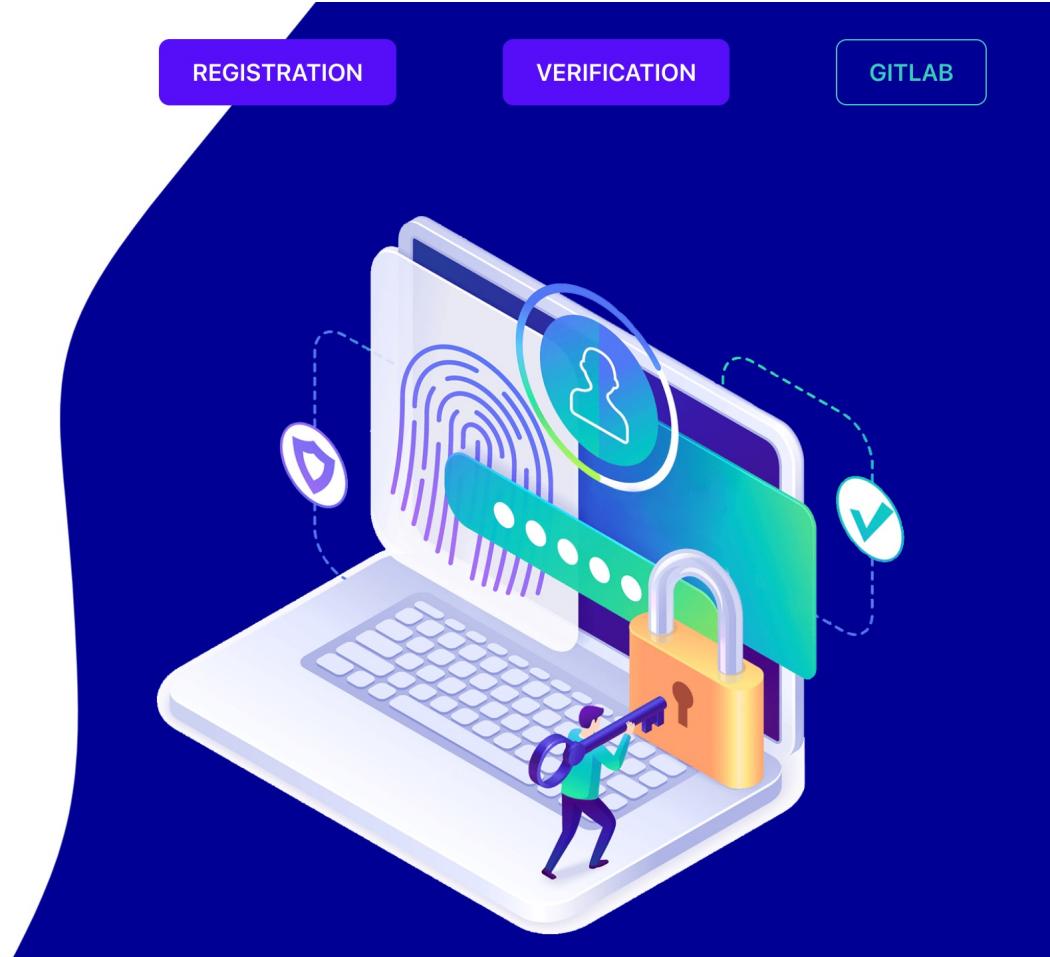
Gaia-X Lab

Onboarding Portal

This web app demonstrates how SSI could be used to issue Gaia-X participation credentials in a way that is cryptographically secure, privacy-respecting, and machine-verifiable.

[REGISTER CREDENTIAL](#)

[VERIFY CREDENTIAL](#)



Demonstrator: <https://onboarding-portal.lab.gaia-x.eu/>
Repositories: <https://gaia-x.atlassian.net/browse/LAB>

Gaia-X Lab Registry



gaia-x

3. List of defined trust anchors

Name	Defined as
State	<p>The Trust Service Providers (TSP) must be a state validated identity issuer.</p> <ul style="list-style-type: none"> - For <code>participant</code>, if the <code>legalAddress.country</code> is in EEA, the TSP must be eIDAS compliant. - Until end of 2022 Q1, to ease the onboarding and adoption this framework DV SSL can also be used. - Gaia-X association is also a valid TSP for Gaia-X association members.
eIDAS	<p>Issuers of Qualified Certificate for Electronic Signature as defined in eIDAS Regulation (EU) No 910/2014 (homepage: https://esignature.ec.europa.eu/efda/tl-browser/#/screen/home) (machine: https://ec.europa.eu/tools/lotl/eu-lotl.xml)</p>
DV SSL	<p>Domain Validated (DV) Secure Sockets Layer (SSL) certificate issuers are considered to be temporarily valid Trust Service Providers. (homepage: https://wiki.mozilla.org/CA/Included_Certificates) (machine: https://ccadb-public.secure.force.com/mozilla/IncludedCACertificateReportPEMCSV)</p>
Gaia-X	<i>To be defined after 2022Q1.</i>
EDPB CoC	<p>List of Code of Conduct approved by the EDPB (homepage: https://edpb.europa.eu/our-work-tools/documents/our-documents_fr?f%5B0%5D=all_publication_type%3A61&f%5B1%5D=all_topics%3A125)</p>
gleif	<p>List of registered LEI issuers. (homepage: https://www.gleif.org/en/about-lei/get-an-lei/find-lei-issuing-organizations) (machine: https://api.gleif.org/api/v1/registrationAuthorities)</p>

Features of the Gaia-X Onboarding Demonstrator



- **Demonstrates working prototype** of the Trust Framework
- **Validates functional and technical hypothesis** made by the Gaia-X Working Groups
- **Accelerates the development** of free open-source software (FOSS)
- **Issues and verifies** Gaia-X Participant Credentials, based on Self-Descriptions
- Leverages Gaia-X Participants Credentials for Access Control
- Provides a **first Version of the Gaia-X Registry**

Technology

- SSI Kit provided by walt.id under Apache 2.0 License, extended for Gaia-X
- Communication via HTTPS
- Using Decentralized IDentifiers (DIDs), JSON LD-based Credentials
- Using Open ID Connect for SSI
- Using Open ID Connect for Verifiable Presentations (OIDC4VP)
- Using Self-Issued Open Identity Provider v2 (SIOPV2)
- Cryptosuite (RSA and ED25519, SECP256K1 and others also possible)
- Registry can be used to find and verify the key of Trust Anchors

Gaia-X Lab Registry



gaia-x

3. List of defined trust anchors

Name	Defined as
State	<p>The Trust Service Providers (TSP) must be a state validated identity issuer.</p> <ul style="list-style-type: none"> - For <code>participant</code>, if the <code>legalAddress.country</code> is in EEA, the TSP must be eIDAS compliant. - Until end of 2022 Q1, to ease the onboarding and adoption this framework DV SSL can also be used. - Gaia-X association is also a valid TSP for Gaia-X association members.
eiDAS	<p>Issuers of Qualified Certificate for Electronic Signature as defined in eIDAS Regulation (EU) No 910/2014</p> <p>(homepage: https://esignature.ec.europa.eu/efda/tl-browser/#/screen/home)</p> <p>(machine: https://ec.europa.eu/tools/lotl/eu-lotl.xml)</p>
DV SSL	<p>Domain Validated (DV) Secure Sockets Layer (SSL) certificate issuers are considered to be temporarily valid Trust Service Providers.</p> <p>(homepage: https://wiki.mozilla.org/CA/Included_Certificates)</p> <p>(machine: https://ccadb-public.secure.force.com/mozilla/IncludedCACertificateReportPEMCSV)</p>
Gaia-X	<i>To be defined after 2022Q1.</i>
EDPB CoC	<p>List of Code of Conduct approved by the EDPB</p> <p>(homepage: https://edpb.europa.eu/our-work-tools/documents/our-documents_fr?f%5B0%5D=all_publication_type%3A61&f%5B1%5D=all_topics%3A125)</p>
gleif	<p>List of registered LEI issuers.</p> <p>(homepage: https://www.gleif.org/en/about-lei/get-an-lei/find-lei-issuing-organizations)</p> <p>(machine: https://api.gleif.org/api/v1/registrationAuthorities)</p>

Gaia-X Lab Registry



- Use the eIDAS Trusted Service Provider List and TSP Services Public Keys provided

MIIE0TCCA7mgAwIBAgIBADANBgkqhkiG9w0BAQUFADBbMQswCQYDVQQGDAJBVDEjMCEGA1UECgwaVGVsZWtvbS1Db250cm9sLUtvbW1pc3Npb24xJzAlBgNVBAMM
HINtY3VyZSBuAw1lc3RhbXBpbmcgU2VydmljZXMGMTAeFw0wNjEyMTUxNTA0MDBaFw0xMTEyMTUxNTA0MDBaMGkxCzAJBgNVBAYMAkFUMTIwMAYDVQQKDCICdW
5kZXNhXQgZsO8ciBFaWNoLSB1bmQgVmVybWVzc3VuZ3N3ZXNlbjEmMCQGA1UEAwduU2ljaGVyZXlgWmVpdHN0ZW1wZWxkaWVuc3QtMDEwggEiMA0GCSqGSIb3D
QEBAQUAA4IBDwAwggEKAoIBAQDIIUc4wAWOlwXBMsYC/y7ok3cLQffAxHKk1PVmfCuO7IVZ1FGBLA2N4vQfSmJ3Qi2z9abVYABaQm1nrl2rbDQ76BtJzRqLQofw9QOxsB
pROYzjLrpJ2I09E2MwETIL+IqyW2WQ32ARFzyWJlVxOolkSn5At7tQ4GmA+/e6Q2SGxVqt7Y8kecvxHLjkUbnpq41RhFjWxZbl/cvNN2hu3lfzfVuBiY7QtzxkS7+XHkgKbJGoAL
WgXNIEA62I89kjq4OBExecQOPBug/u1De48SIHmg+ZrhUdAqaE1Nj7JYAFse7OOBxjUITkO3ihPZEEnRN57aNRI8iRhauVffkcwyeZAgMA7IOjggGQMIIBjDAfBgNVHSMEGD
gBS9r9+uTM+eljNmNtsJ7RcCA+Fe2TAdBgNVHQ4EFgQUShCrcsQbbvXyFGRVdKwVB6YBQwNwYDVR0fBDAwLjAsoCqgKIYmaHR0cDovL3d3dy5zaWduYXR1ci5ydHluYX
QvY3VycmVudC5jcmwwVgYDVR0gBE8wTTBLBqkqKAAVAEEAQAwPjA8BggrBgEFBQcCARYwaHR0cDovL3d3dy5zaWduYXR1ci5ydHluYXQvZGUvZGlyZWN0b3J5L2Nwcy
5odG1sMHMGA1UdEQRsMGqkaDBmMSMwIQYDVQQDBpTaWNoZXJlciBaZWI0c3RlbXBlbGRpZW5zdDEyMDAGA1UECgwpQnVuZGVzYW10IGZ1ZXlgRWIjaC0gdW5kIF
Zlcm1lc3N1bmdzd2VzZW4xCzAJBgNVBAYMAkFUMAwGA1UdEwQFMAMBAQAwDgYDVR0PAQH/BAQDAgeAMBYGA1UdJQEB/wQMMAoGCCsGAQUFBwMIMA4GByoo
AAoBAQEEAwEB/zANBgkqhkiG9w0BAQUFAAOCAQEAX3z9+khVFJx8w2PYuqCyoPnQSosZZd3k6igkYxAk8TMop55gpzg+BdegbnX2F4xgLauOQHwuAiTOQw9GnEQPKLV
xIN2LsTcu/9mZclkJksiHt8sjBn9vEBD5Oi8FBWNwlymTVupadHrXG95L+byTSY8DvZDVP/vVAPGoucAu+6wxZEEXfEVPT4HU2NLtt1pcmbHGWQKvWARnzFN+Ayeeuhz+hq
vbsKhSwQqkJs47cbj7atgCOb7zgavI79StPQE1dc7R6EkOF+mqAX26cOVJMMIX/t01w2EmQeTV6BzwWSMww3YjwwVy2BrdJ2IHxY4xua8+cqp1WI0bbaVB1HIQ==

Demonstrator: https://registry.gaia-x.eu/api-docs/#/Trust%20Anchor/post_api_trustAnchor
Example: <https://www.signatur.rtr.at/currenttl.xml>



gaia-x

05

Demonstration and Flows

Actors



Participant

- Gaia-X Participant undergoing a KYB process to **receive a Gaia-X Credential**



Federator /
AISBL

- Gaia-X Federator / Gaia-X AISBL **providing Identity Services and Credentials**



Service Provider

- Gaia-X Service Provider **offering a service** to accredited Gaia-X Participants

Documents & Tools



Ecosystem
self-description
wizard tool

- Self-Description Generator



- Self-Description of a Participant



Verifiable Credential

- Verifiable Credentials signed by the Participant and the Federator / AISBL



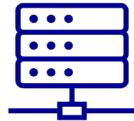
Verifiable Credentials Wallet

- Set of Credentials held by the Participant in a Credential Manager / Wallet

Infrastructure



- Private Database containing identities



- Public Webserver



- Issuer / Signatory

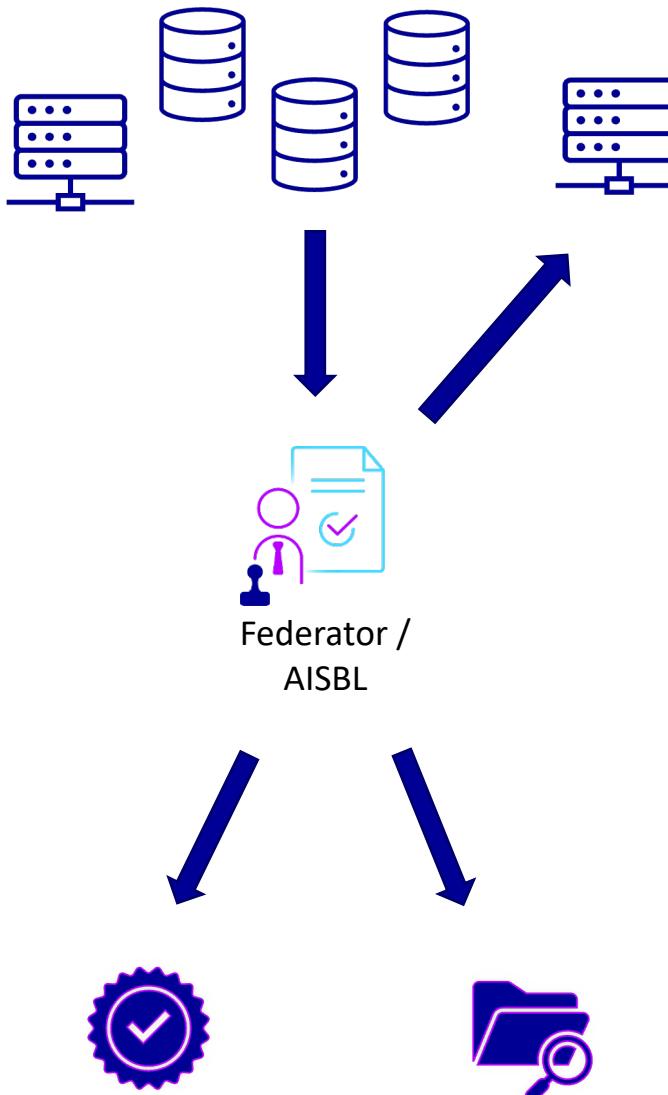


- Verifier



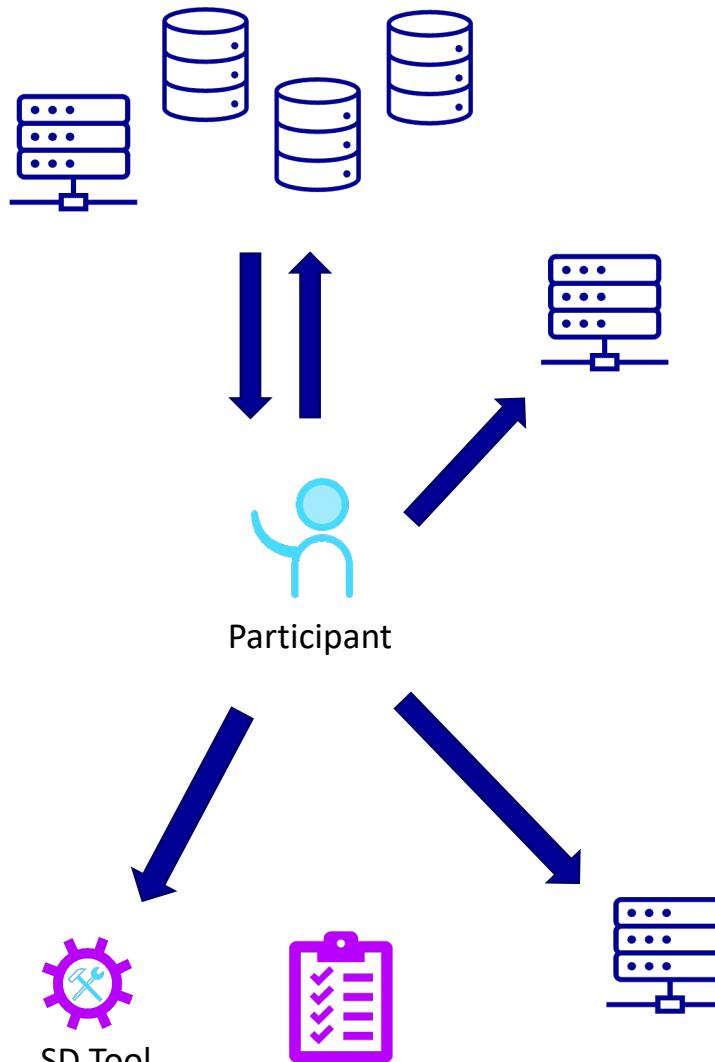
- Credential Manager / Wallet

Gaia-X AISBL / Federator



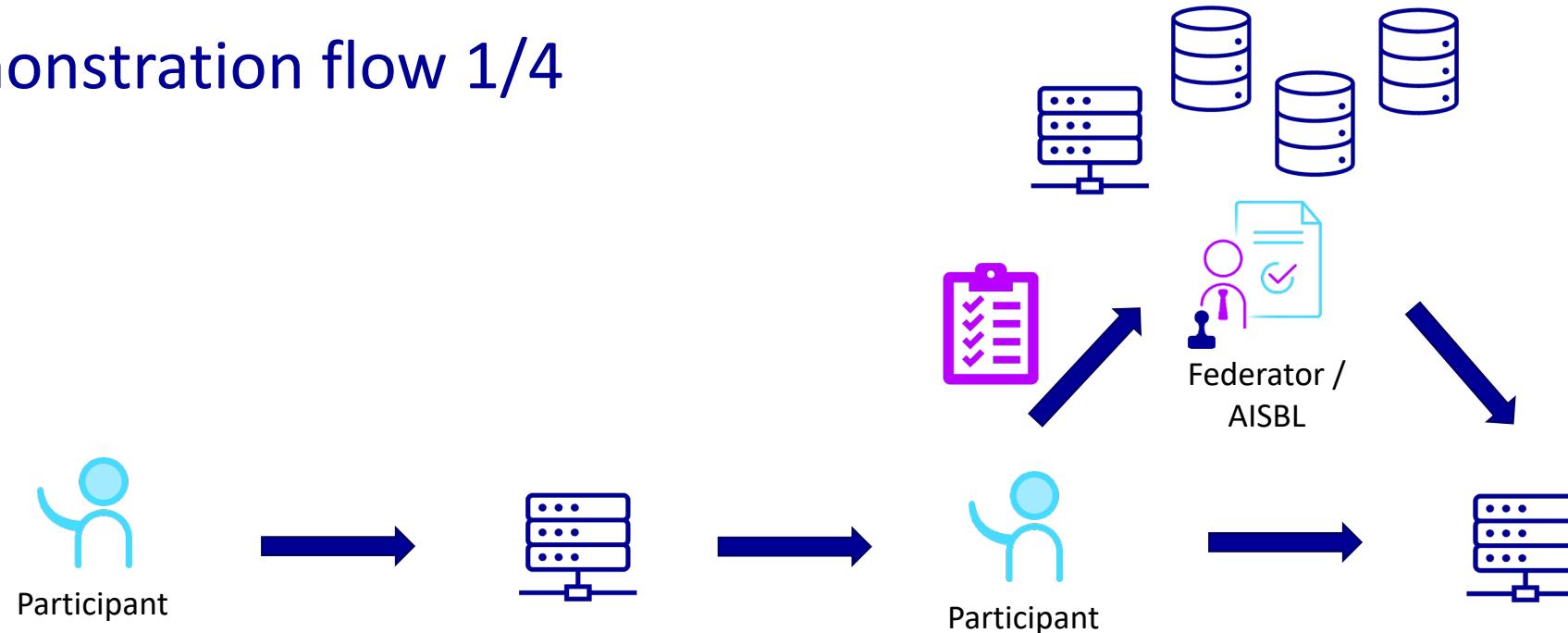
- Federator / AISBL checks **information from Trusted Data Sources**
- AISBL **provides Trust Framework**, Federator **follows Trust Framework**
- Federator / AISBL public key is listed in the **Gaia-X Registry** as Issuer
- Federator provides **Onboarding Portal** for Accreditation
- Identification via public key in **DID:WEB via public Webservice**
- Federators provide **Credential Issuer / Signatory**
- Federators provide **Credential Validator Service / Verifier**

Participant / Service Provider



- Participant is registered with **Trusted Data Sources**
- Participant public key is NOT listed in the **Gaia-X Registry**
- Participant creates **Self-Description** using SD Toolkit
- Participant uses **Onboarding Portal** for Accreditation
- Participant operates a **public Webservice** (optional)
- Participant has **access to a Credential Manager**

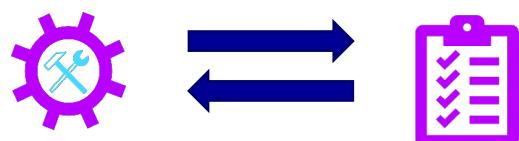
Demonstration flow 1/4



Participant (OpenID Provider) visits the Onboarding Portal to receive a Credential

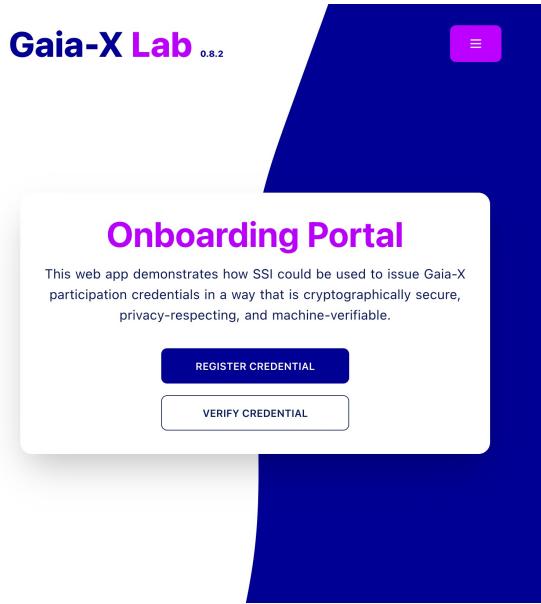
Onboarding Portal requests e-mail address to verify the Participant

The participants receives access to the Onboarding Service

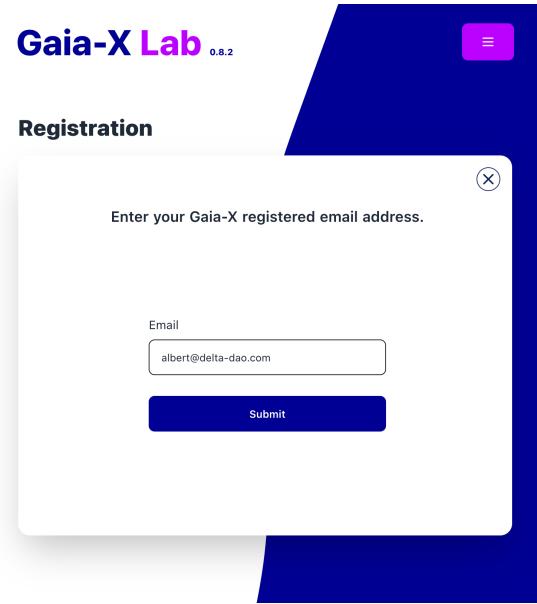


This represents a full KYB process in which the AISBL / Federator checks the provided information (SD) with Trusted Data Sources and verifies the integrity of the SD & identity.

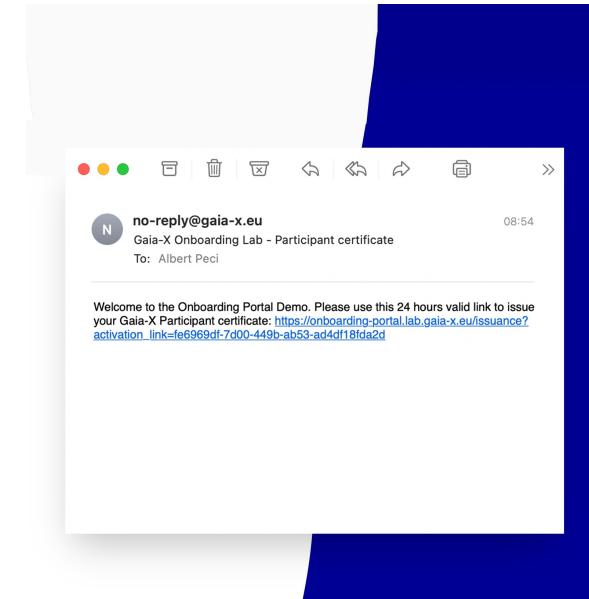
Demonstration flow 2/4



1. Visit the [Gaia-X Lab](#) Onboarding Portal and select *Register Credential*. This will start the onboarding flow.

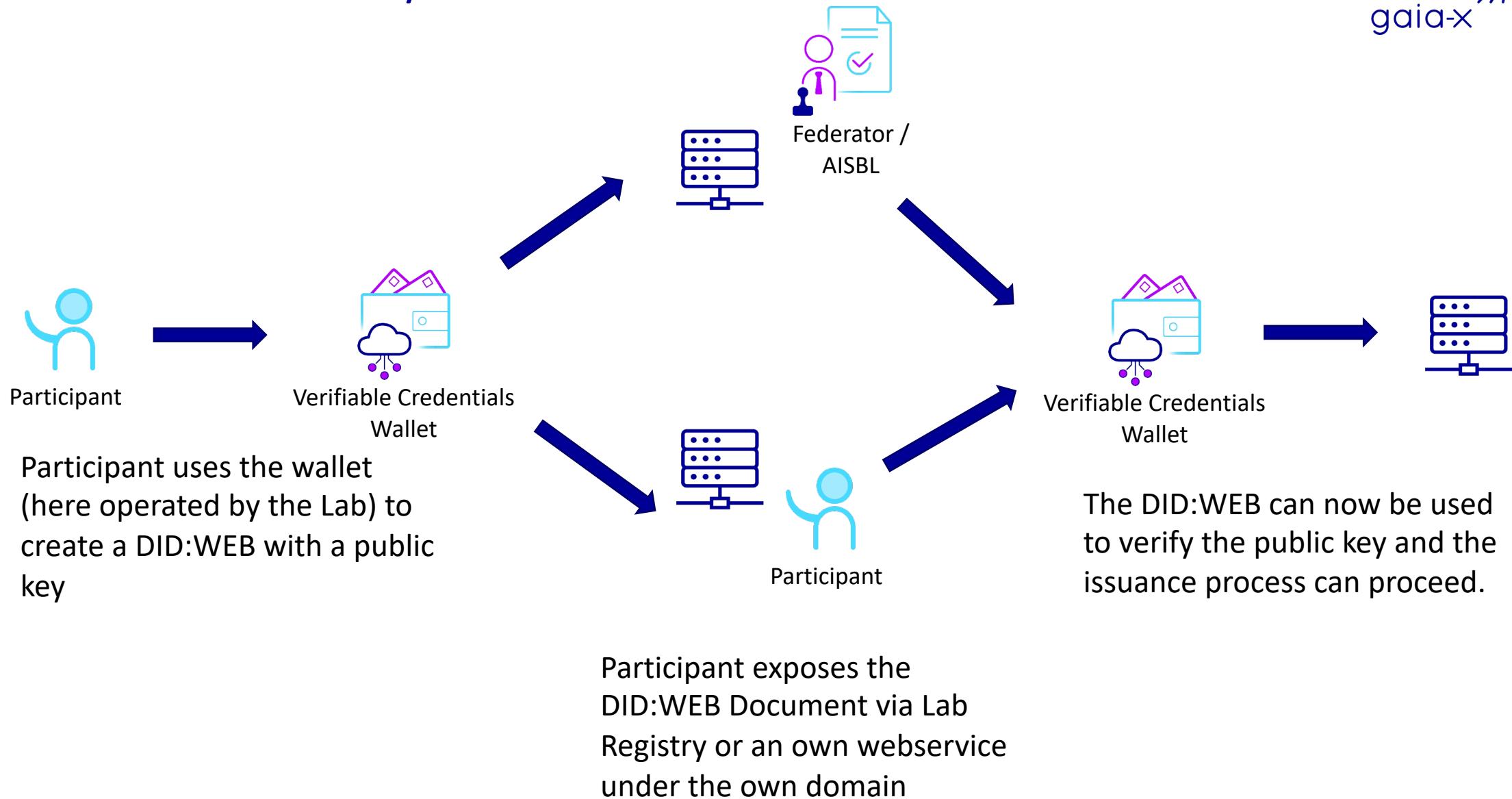


2. Type your email that you also used to register on GitLab. If your email is not registered, you will not get an email and cannot issue a Participant Credential. Click on *Submit*.



3. Check your emails. You will receive a registration link that is valid for 24 hours. Click on the link to initiate the issuance of your credential.

Demonstration flow 2/4



Demonstration flow 2/4



The image consists of five mobile device screenshots arranged horizontally. 1. The first screenshot shows a login interface with fields for 'Email' and 'Password', a 'Login' button, and an orange 'MetaMask' button. It also includes links for 'Sign up' and 'Forgot password?' with small flags below them. 2. The second screenshot shows a 'My credentials' page with a search bar and a blue '+ Request Credential' button at the bottom. 3. The third screenshot is a modal menu with four items: 'Credentials', 'Connections', 'Settings' (which is underlined and highlighted in white), and 'Logout'. 4. The fourth screenshot shows the 'Settings' screen with three main sections: 'Account' (Manage your account), 'Data' (Manage your data), and 'Ecosystems' (Join and manage your identity ecosystems). Each section has a 'View' button. The 'Ecosystems' section has an 'Add' button and a status message 'Selected' below it. 5. The fifth screenshot shows the 'Ecosystems' screen with three listed options: 'EBSI/ESSIF' (Based on the EU blockchain (EBSI)), 'DNS' (Based on the domain name service (DNS)), and 'Key' (Peer-to-peer based key distribution). Each has an 'Add' button; the 'DNS' button is highlighted in blue. A 'Select Ecosystem' button is at the bottom.

1. Visit the [Gaia-X Lab Wallet](#) and type a new email and password combination that you can remember.

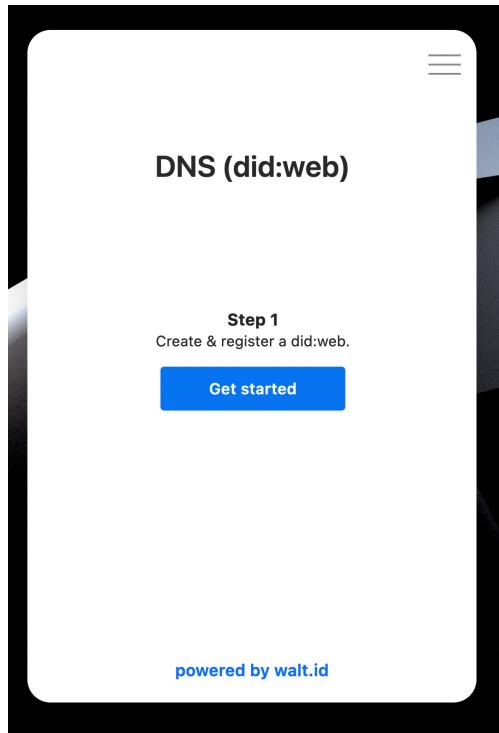
2. If you used a new account, an empty credential page will be shown. Click on the hamburger menu in the top right corner.

3. The menu opens. Select *Settings* to setup your account.

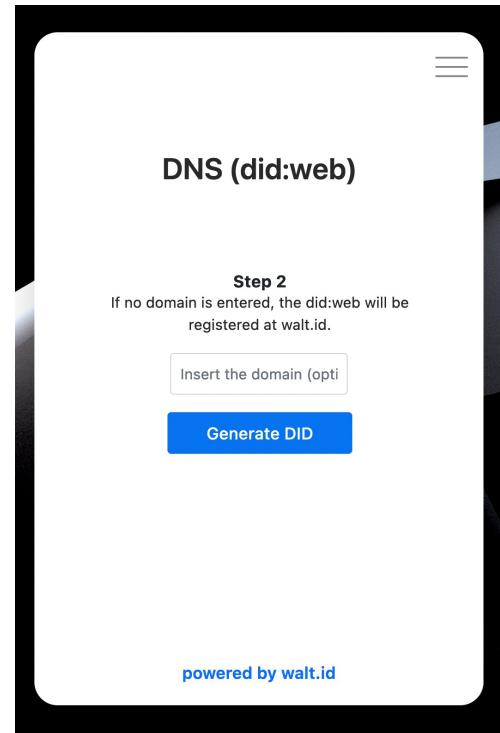
4. There are different aspects that you can manage in your wallet. We are interested in the Ecosystem setting for now.

5. We want to use did:web, so we click on *Add* for the *DNS* option.

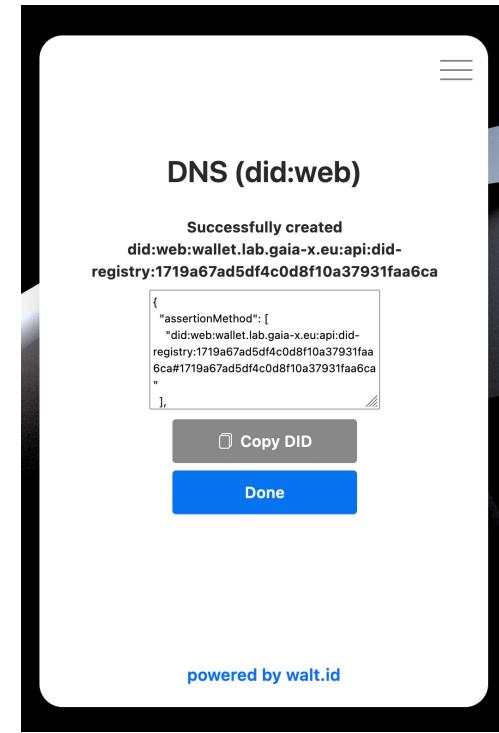
Demonstration flow 2/4



1. The Setup Wizard begins. Click on *Get Started* and follow the steps.

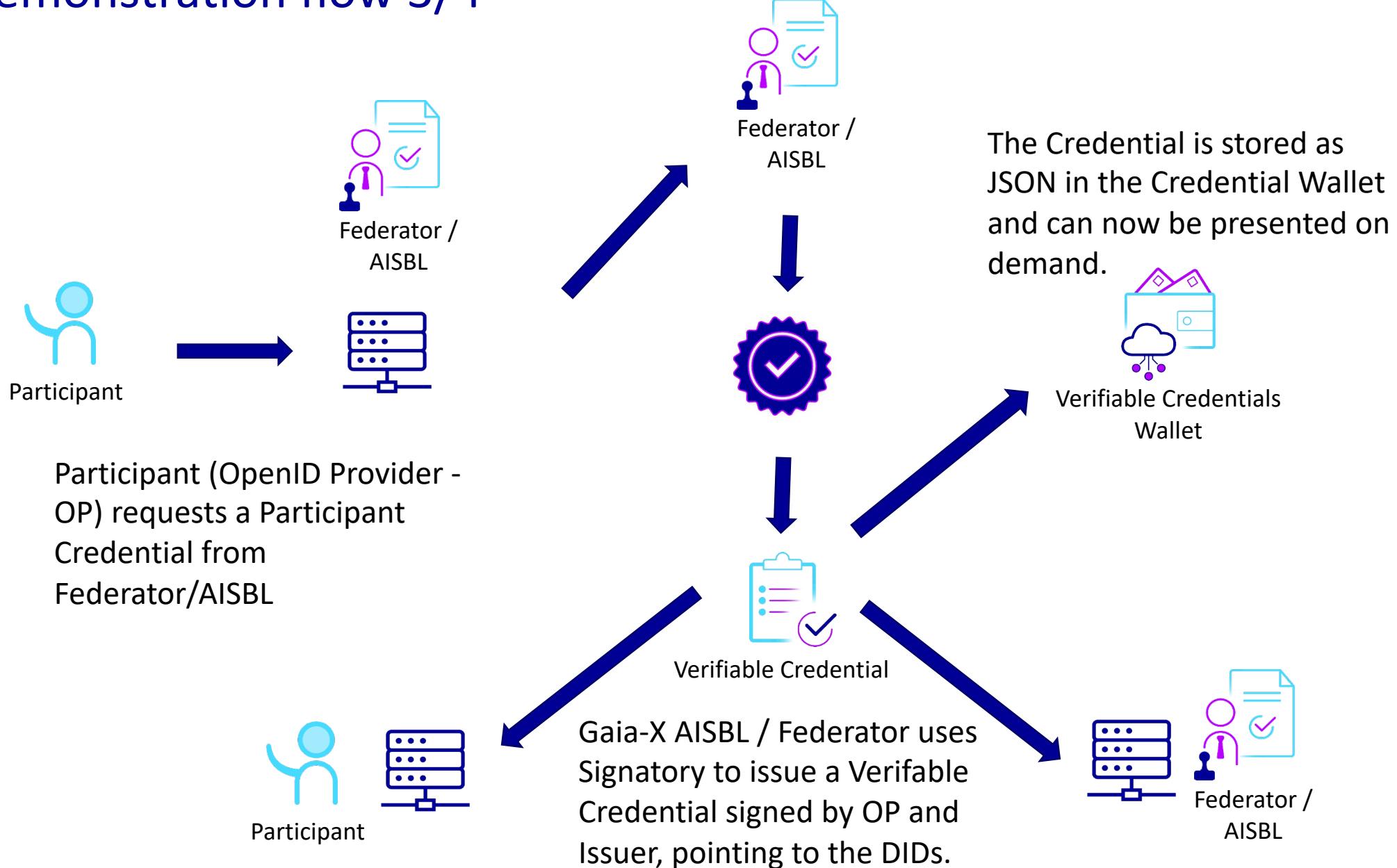


2. You can now enter a domain that you control. If you do not enter a domain a default domain of the demonstrator will be used. Click on *Generated DID*.

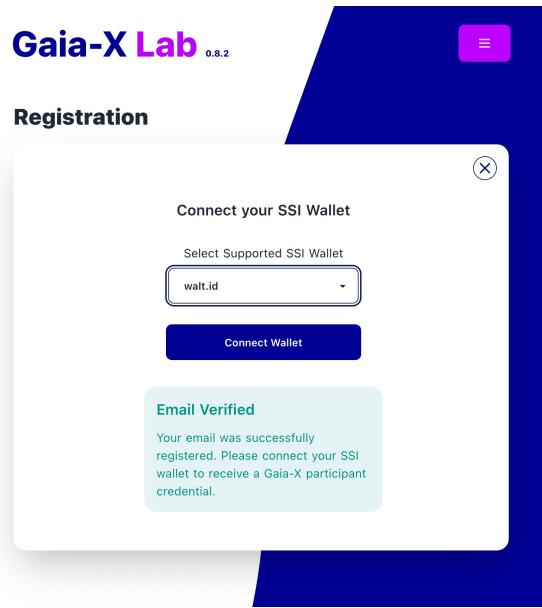


3. Your did:web was successfully created. You can now copy the DID to inspect it in detail, use it somewhere else or just close the window.

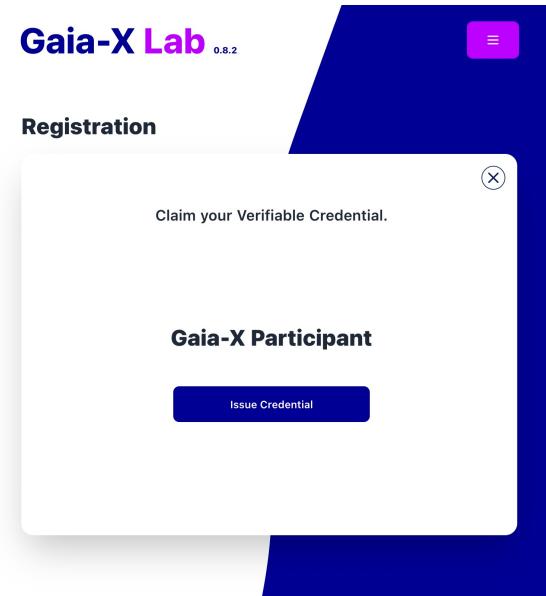
Demonstration flow 3/4



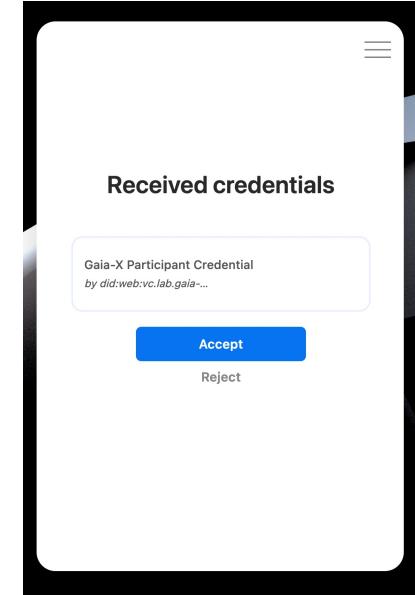
Demonstration flow 3/4



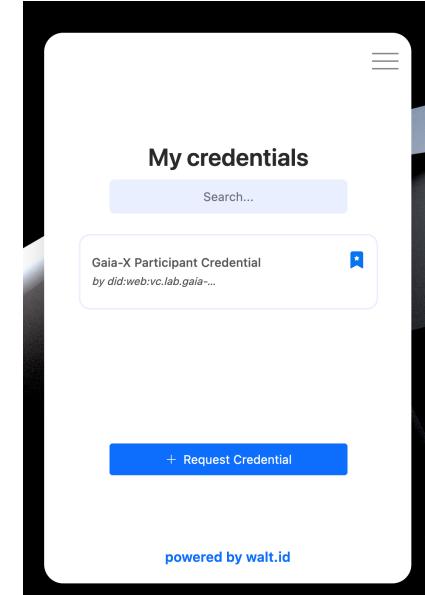
1. Click on the link from the email that you received. If your token is considered valid you can choose your wallet and click on *Connect Wallet*.



2. You can now issue your credential. Click on Issue Credential and the onboarding API will prepare a new credential for you. You will be redirected to your wallet to accept the credential.



3. You received a credential. Click on the credential to view its content first. Click on *Accept* next if you want the credential in your wallet.

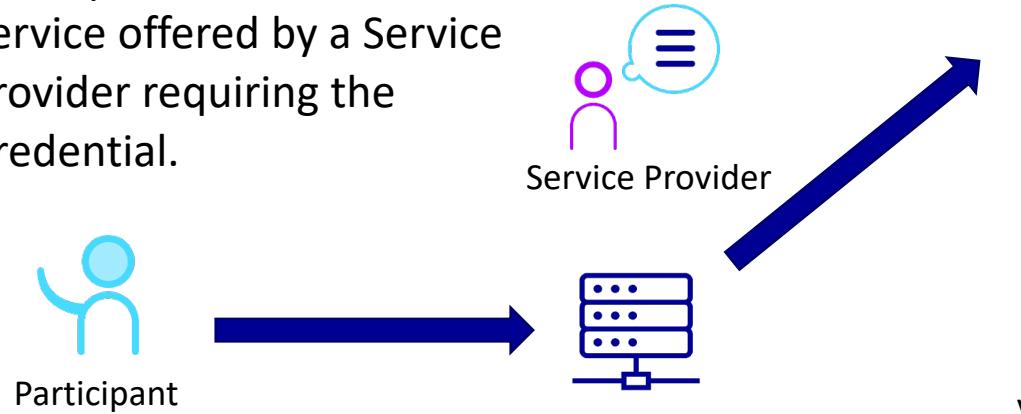


4. Your credential was successfully added to your wallet. You can use it now to create verifiable presentations.

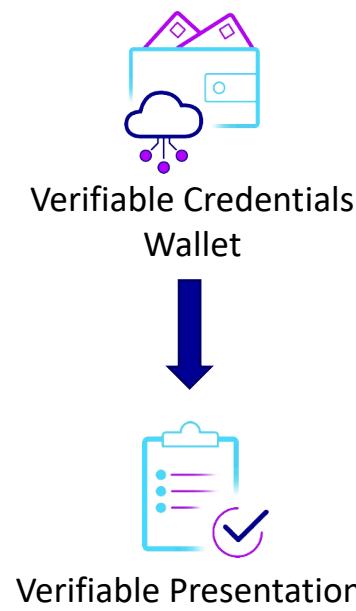
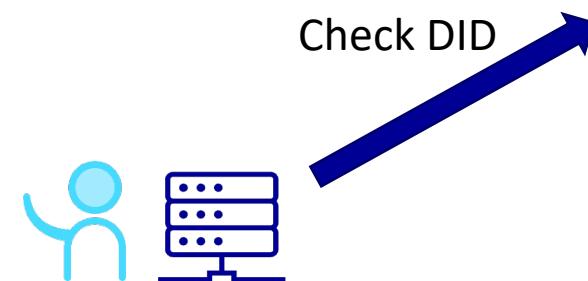
Demonstration flow 4/4



Participant wants to access a Service offered by a Service Provider requiring the Credential.



Participant is the OpenID Provider (OP), the Service is the Requesting Party (RP).



Verifiable Credentials Wallet

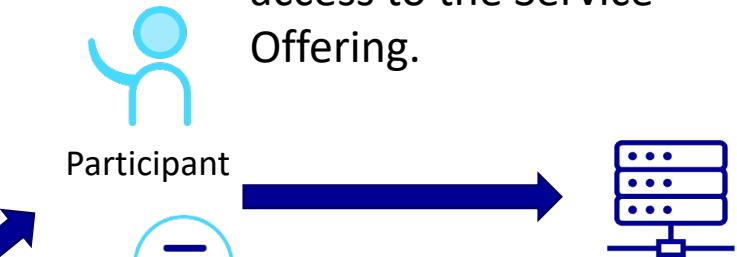


Verifiable Presentation

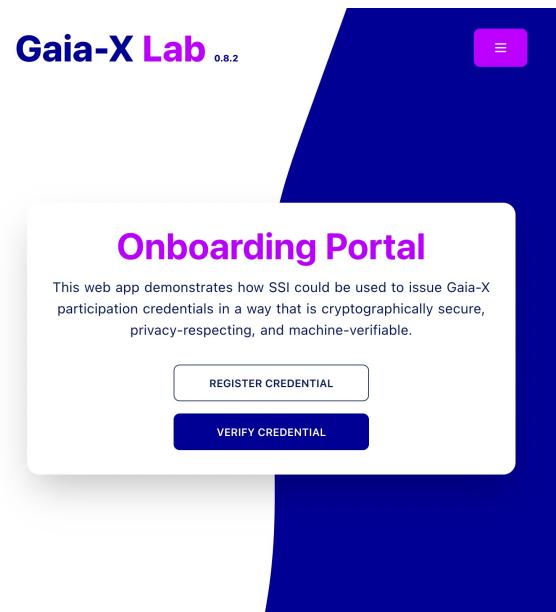


Check DID,
Shape and
Registry

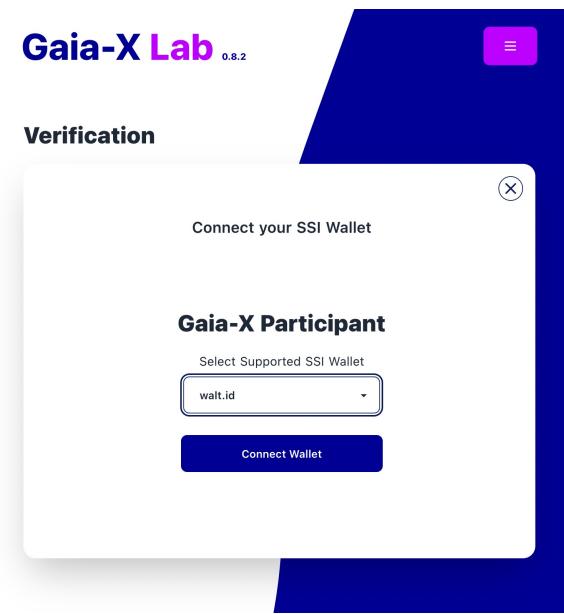
If the Credential has been successfully verified the Service Provider grants access to the Service Offering.



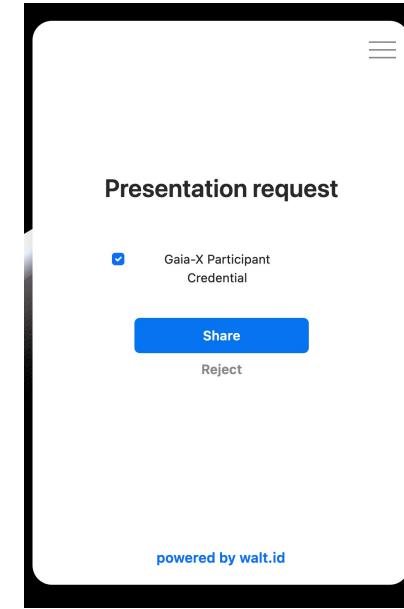
Demonstration flow 2/4



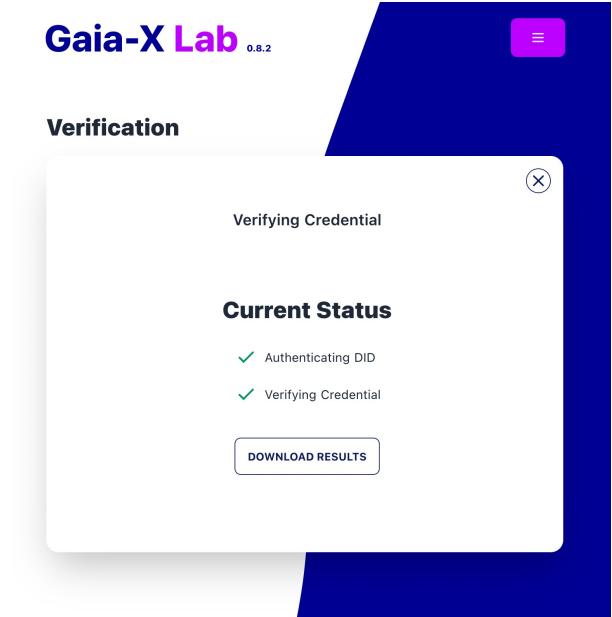
1. Visit the [Gaia-X Lab](#) Onboarding Portal and select *Verify Credential*. This will start the verification process.



2. Select your wallet and click *Connect Wallet*. This will open a new tab with your wallet.



3. Your wallet allows you to select which credential you want to present to the requester. Select your credential and click on *Share*.

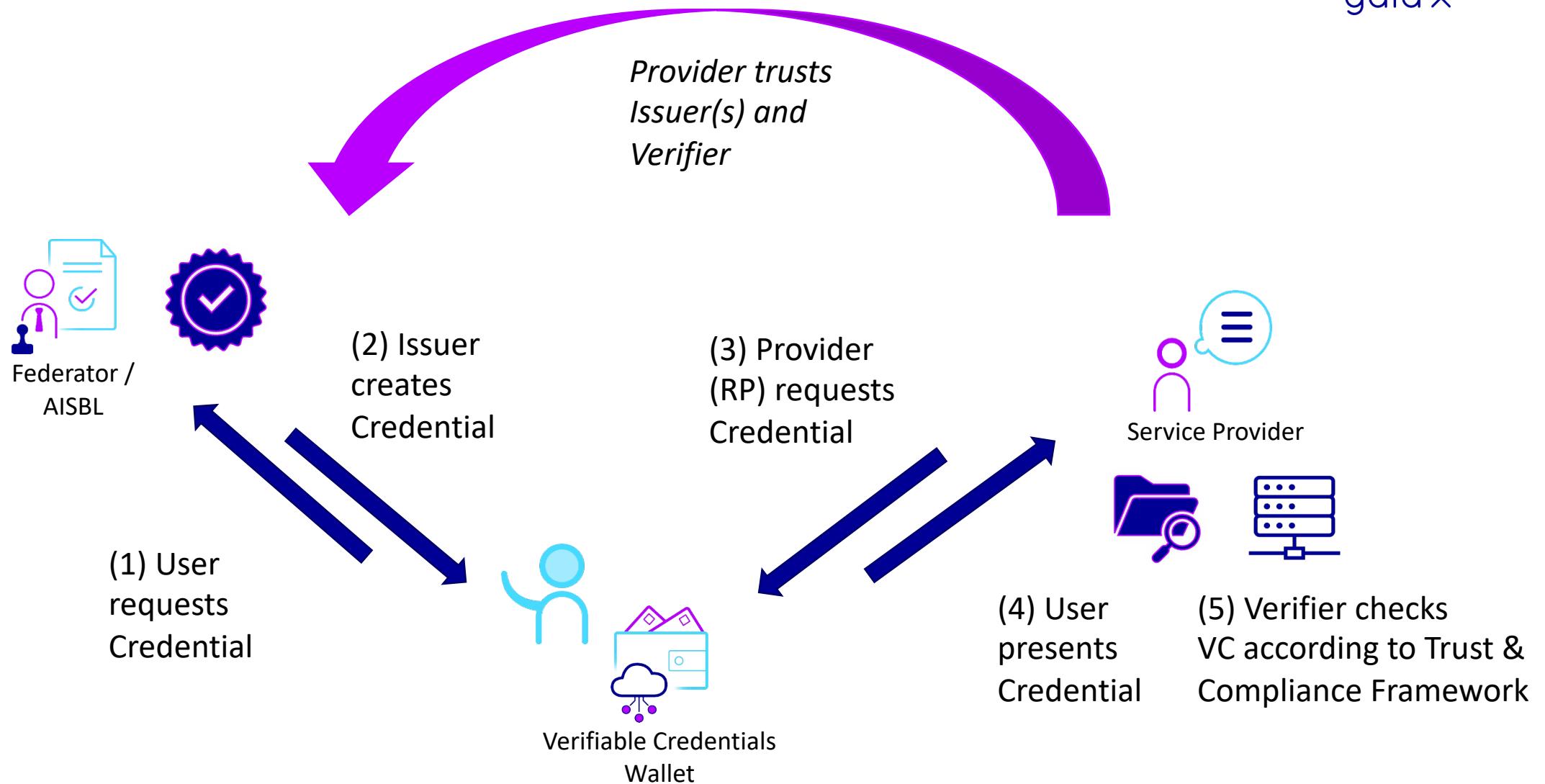


4. The Onboarding Portal will verify your credential if your credential is valid, you can download the results to share it with others.

What has not been shown?

- The Participant would have checked the Credentials of the Service Provider
- The Credentials will be used to increase trust in Service Providers and Service Offerings
- Many Verifiable Credentials can be combined to Verifiable Presentations
- The Verifiable Presentations will be part of the Service Offerings in the Catalogue
- The Registry can be used to revoke, i.e. the rights of an issuer, and this would lead to invalid Credentials
- The Issuer and the Verifier are the parties the Trust has been delegated to.

Summary – Triangle of Trust



Gaia-X Lab Onboarding Demonstrator



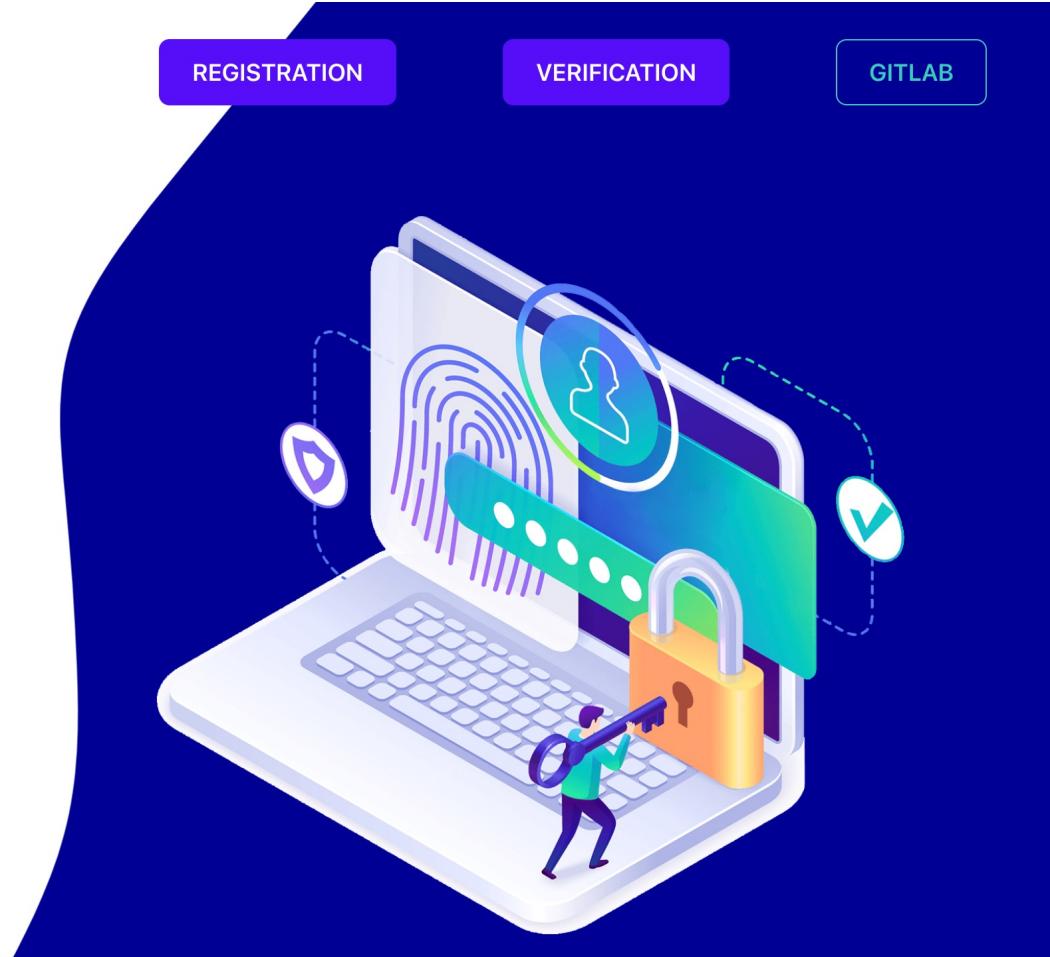
Gaia-X Lab

Onboarding Portal

This web app demonstrates how SSI could be used to issue Gaia-X participation credentials in a way that is cryptographically secure, privacy-respecting, and machine-verifiable.

[REGISTER CREDENTIAL](#)

[VERIFY CREDENTIAL](#)



Demonstrator: <https://onboarding-portal.lab.gaia-x.eu/>
Repositories: <https://gaia-x.atlassian.net/browse/LAB>

Gaia-X Lab Registry



gaia-x

3. List of defined trust anchors

Name	Defined as
State	<p>The Trust Service Providers (TSP) must be a state validated identity issuer.</p> <ul style="list-style-type: none"> - For <code>participant</code>, if the <code>legalAddress.country</code> is in EEA, the TSP must be eIDAS compliant. - Until end of 2022 Q1, to ease the onboarding and adoption this framework DV SSL can also be used. - Gaia-X association is also a valid TSP for Gaia-X association members.
eIDAS	<p>Issuers of Qualified Certificate for Electronic Signature as defined in eIDAS Regulation (EU) No 910/2014</p> <p>(homepage: https://esignature.ec.europa.eu/efda/tl-browser/#/screen/home)</p> <p>(machine: https://ec.europa.eu/tools/lotl/eu-lotl.xml)</p>
DV SSL	<p>Domain Validated (DV) Secure Sockets Layer (SSL) certificate issuers are considered to be temporarily valid Trust Service Providers.</p> <p>(homepage: https://wiki.mozilla.org/CA/Included_Certificates)</p> <p>(machine: https://ccadb-public.secure.force.com/mozilla/IncludedCACertificateReportPEMCSV)</p>
Gaia-X	<i>To be defined after 2022Q1.</i>
EDPB CoC	<p>List of Code of Conduct approved by the EDPB</p> <p>(homepage: https://edpb.europa.eu/our-work-tools/documents/our-documents_fr?f%5B0%5D=all_publication_type%3A61&f%5B1%5D=all_topics%3A125)</p>
gleif	<p>List of registered LEI issuers.</p> <p>(homepage: https://www.gleif.org/en/about-lei/get-an-lei/find-lei-issuing-organizations)</p> <p>(machine: https://api.gleif.org/api/v1/registrationAuthorities)</p>



gaia-x

06

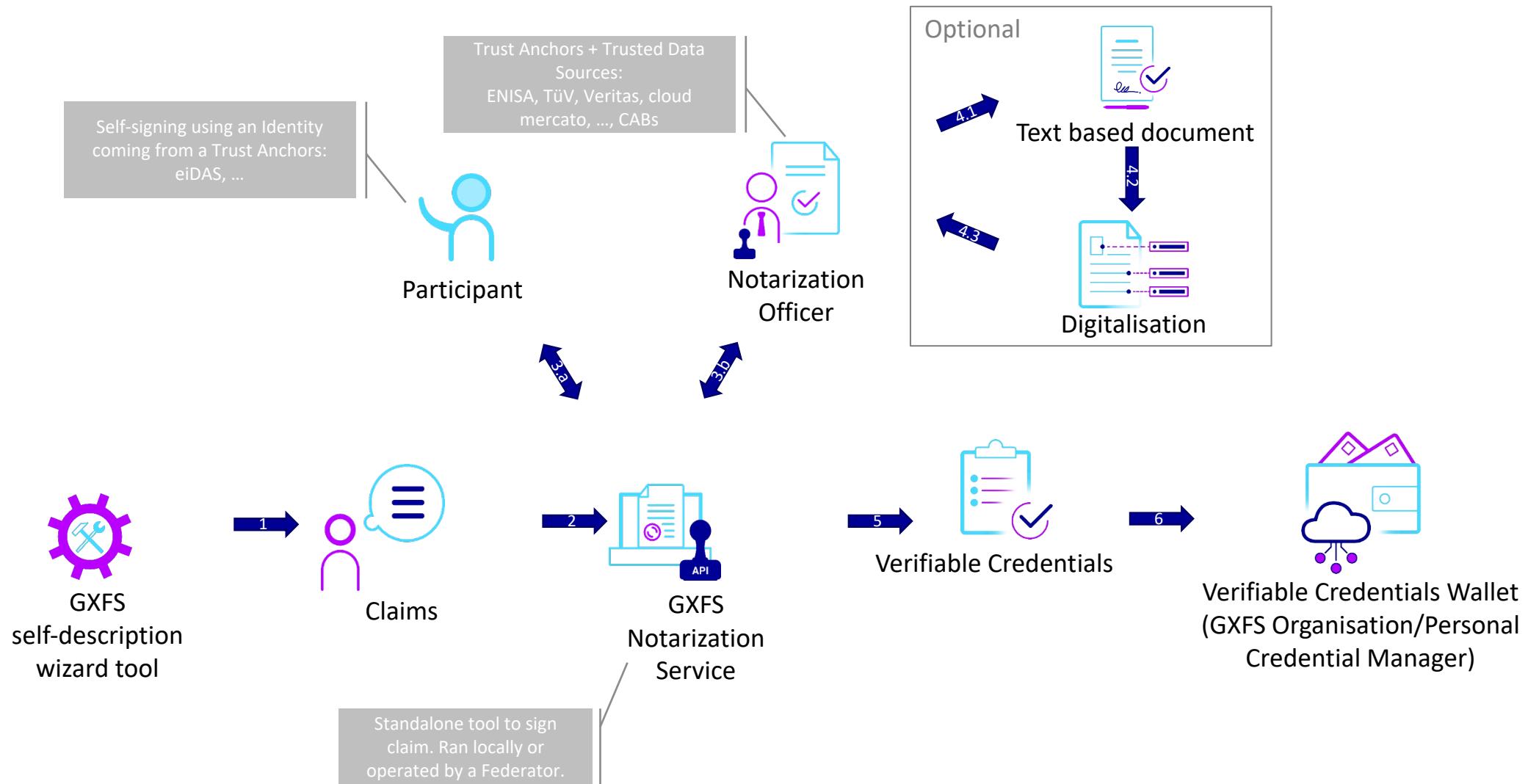
Appendix

Useful Resources

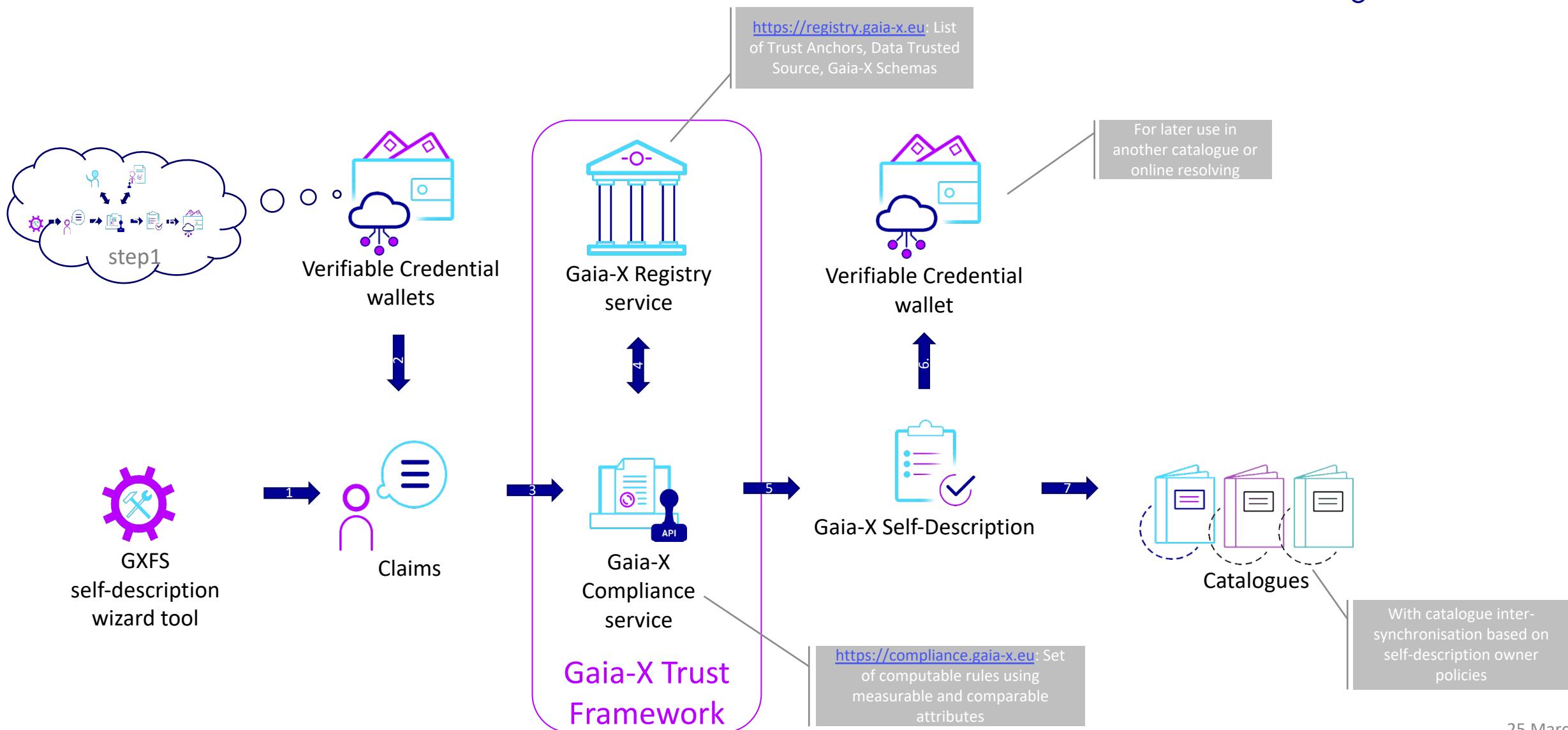


- Gaia-X [Architecture Document 21.12.](#)
- W3C OIDC Core [OpenID Connect Core 1.0](#)
- W3C IDC4VP [OpenID Connect for Verifiable Presentations](#)
- W3C OIDC Core [OpenID Connect Core 1.0](#)
- W3C DID Core [Decentralized Identifiers \(DIDs\) v1.0](#)
- Self-Issued [OpenID Provider v2 \(SIOPv2\)](#)
- walt.id SSI Kit [Website](#)

Step1/3: Collect signed claims



Step2/3: Create Gaia-X Self-Descriptions



Step3/3: Ecosystem governance extension

