

Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages



# GXFS Tech Workshop #3

**5-6 September 2023, Villa Elisabeth, Berlin**

**Welcome!**

# Welcome & Kick-Off

**Lauresha Memeti**

Gaia-X Federation Services-DE / XFSC



# Our Programme

## Day 1

### 11:00-12:00 Basics session for components (voluntary) 🧑🏫

- Basics Identity & Trust components (OCM, PCM, TSA)
- Basics Self-Descriptions and Federated Catalogue
- Basics GXFS Workflow Engine

### 12:00-14:00 Exercise: using NOT API and OCM and exchanging credentials 🧑🏫

### 14:00-14:45 – Deep Dive Session 🍷

- Authentication and Authorisation Service – questions, challenges etc.

### 14:45-15:15 Networking coffee break ☕

### 15:15-17:45 – Deep Dive Session continued 🍷

- OAW – presentation, questions, challenges etc.
- AAS continued if needed
- NOT API – setup, questions, challenges etc

### 17:45-18:00 Summary of the day & prep for next day 📋

Voting on hacking tasks:

- Complete the Drinks Inc. Federation
- Enhance GXFS components
- Other ideas are welcome!

### 18:00-22:00 GXFS Connect 2023 Networking Event 🍷

## Day 2

### 9:15-9:45 Registration & Networking (voluntary basis, main conference room)

### 9:45-9:50 Short welcome & outlook for the day 🧑🏫

### 9:50-11:00 Hackathon launch 🧑🏫

### 11:00-11:30 Networking coffee break ☕

### 11:30-12:30 Hackathon continued 🧑🏫

### 12:30-13:45 Lunch break 🍽️

### 13:45-15:45 Hackathon continued 🧑🏫

### 15:45-16:00 Hackathon end / Concluding session 💡

- Summary and learnings
- Q&A and discussion
- Feedback
- Next workshop announcement

### 16:15-16:45 Meet the GXFS-DE OSS Community

→ Recap from GXFS Tech Workshop #3 (main conference stage)

### 16:45 End 🚩

## Recap and impression of the Tech Workshop . 6.9 , 16:15

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- Recap from GXFS Tech Workshop #3 (main conference stage)
- We kindly request volunteers to offer insights from their experiences during the tech workshop.
- **Please inform us by the conclusion of day one if you are interested in sharing your experiences.**

\* Otherwise, it will be my pleasure to personally select some of you myself

16:15 Meet the GXFS-DE OSS Community – Recap from GXFS Tech Workshop #3

What are incentives to join an FOSS project?

Speaker



**Lauresha Memeti**  
Technical Project Manager GXFS-DE, eco – Association  
of the Internet Industry

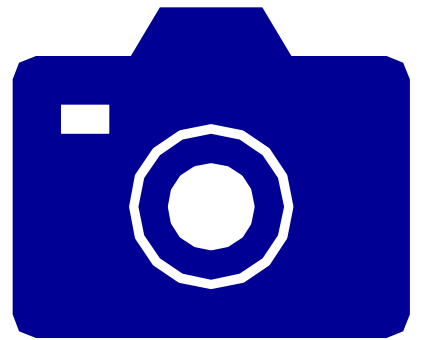


**XFSC Community Leads and Members**



## GXFS Tech Community Photo

- We would like to take a photo of you and the GXFS Team together at GXFS Connect
- Please ensure your availability **by 18:00** on the first day of the workshop (05.09.2023). We will arrange to pick you up and proceed to the press wall for a group photo together.





# 11:00-12:00 Basics session

## GXFS components (voluntary)

—  
Bobby, Konstantin, Christoph, Steffen



# Identity & Trust

—

# GXFS IDM & Trust Components



## Authentication & Authorization Service



- ✓ Requesting verifiable, decentralized and cryptographic credentials and identity attributes from other participants in a federation

## Personal Credential Manager



- ✓ Self-sovereign management of your own certifications, e.g. ID documents, certificates or authorizations
- ✓ Authenticate using a mobile app or browser application

## Registry

- ✓ The concept of decentralized identity (DID) allows Gaia-X to leverage various decentralized registries - even standard web domains - as another layer of trust between actors

## Organisational Credential Manager



- ✓ Configuring a self-determined and easy entry into a federation for companies, e.g. by independently issuing and managing digital participation cards to employees

## Trusted Services API



- ✓ Enforce usage policies & establish rule-based trust
- ✓ Ensuring chains of trust between multiple participants, organizations and authorities

## Notarization Service

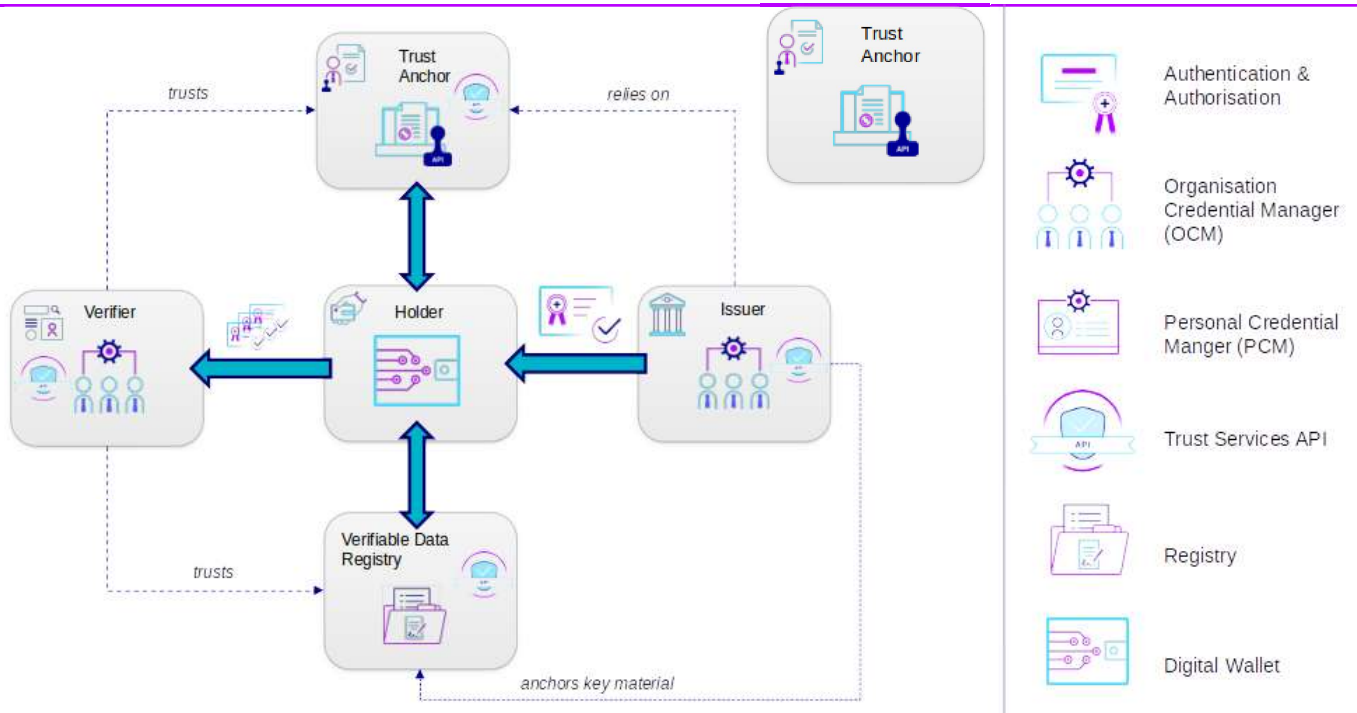


- ✓ Issuing a verifiable attestation upon successful validation of a participant to confirm the status as a registered participant in a federation
- ✓ Processing notarial requests and issuing digital, legally binding and trustworthy certifications

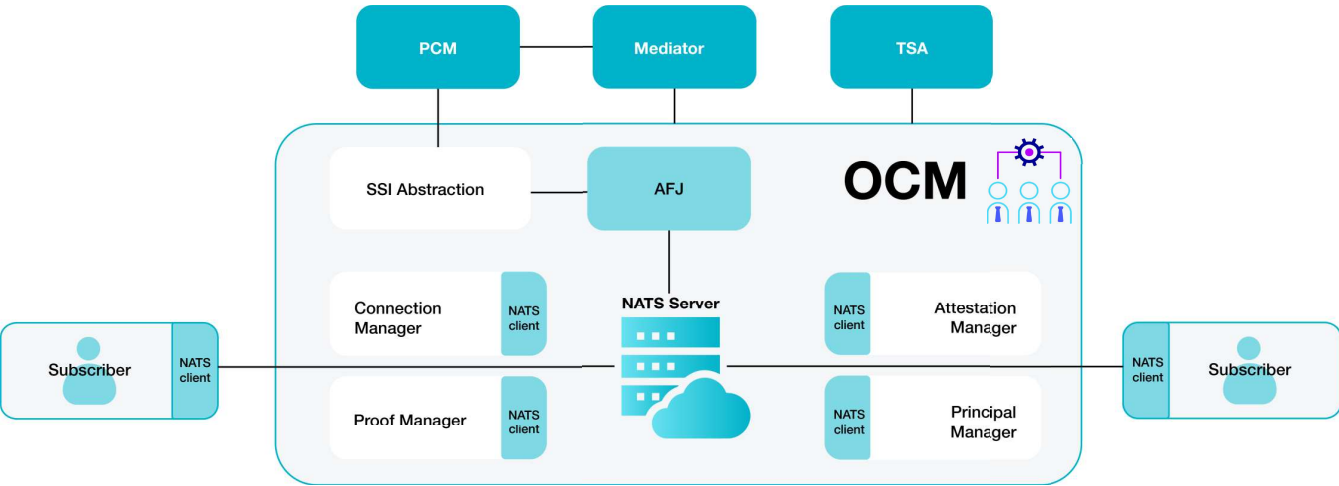




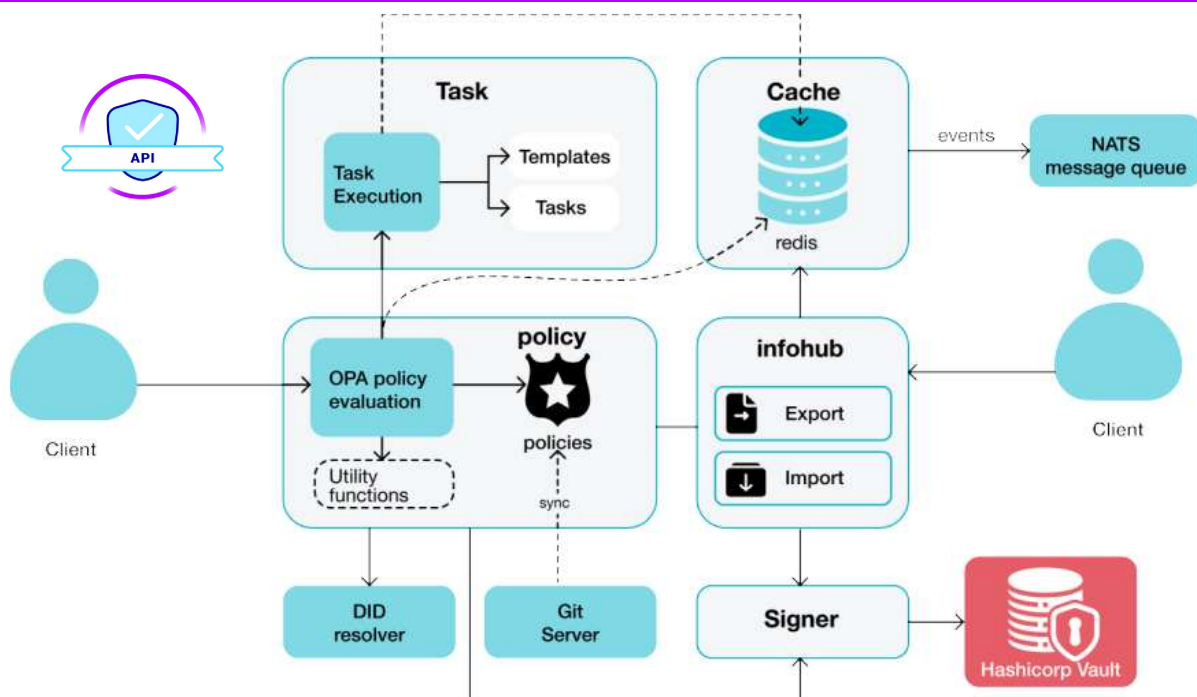
# Trust Landscape



# Organization Credential Manager



## Trust Services API



## TSA Components



### Policy

- ✓ policy evaluation
- ✓ policy lock & unlock
- ✓ policy extension functions  
(didResolve, createTask, cacheSet, cacheGet, createTaskList )



### Signer

- ✓ get keys
- ✓ get issuer DID
- ✓ generate VC proof
- ✓ generate VP proof



### Infohub

- ✓ export
- ✓ import



### Task

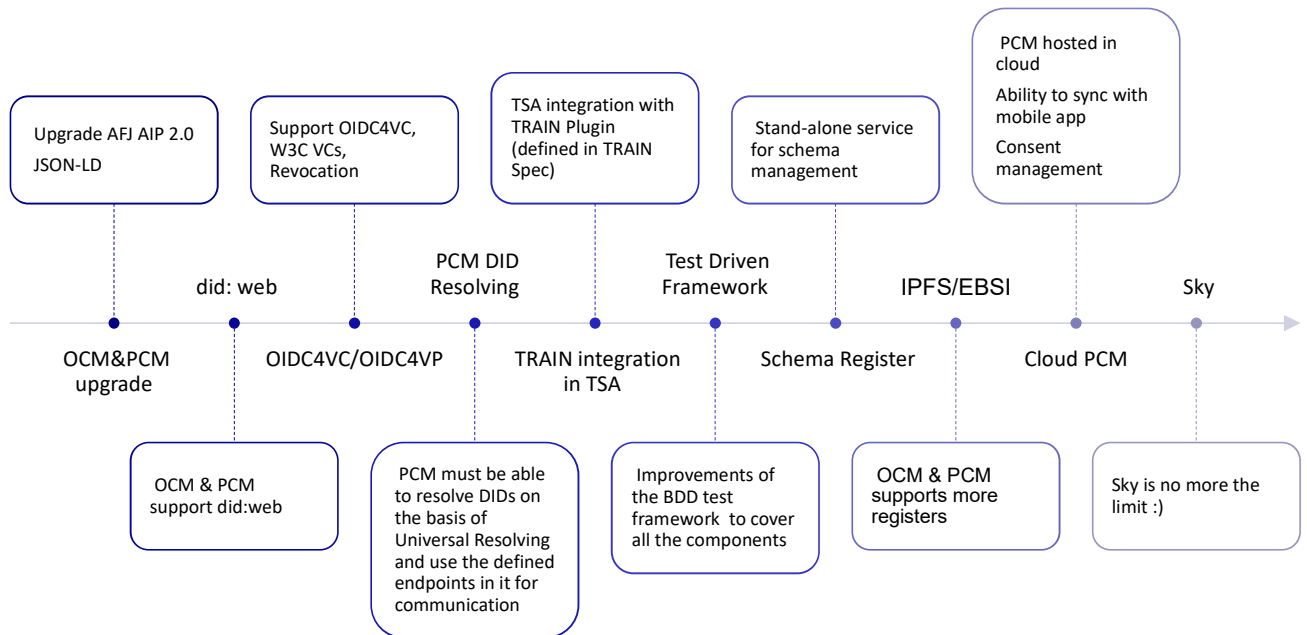
- ✓ create task
- ✓ get task result
- ✓ create task list
- ✓ check task list



### Data Grid

- ✓ set data
- ✓ get data
- ✓ set external data

## Course of action





# Self-Descriptions and Federated Catalogue



## Current state of Toolbox



### Self-Descriptions

- Gaia-X Working Groups superseding term “Self-Description” by simply “Gaia-X Credential”, defined as “W3C Verifiable Credential”, for release 2023-11 (cf. [latest Architecture Document WG draft](#))
- Necessity to *present* a *number* of credentials *on demand* remains, i.e., Verifiable Presentation
- GXFS Portal Spec v2 addresses this point, introducing Self-Declaration → next slide
- Toolbox unchanged for now: SD Creation Wizard for producing schema-valid, untrusted *claims*.
  - Repository: <https://gitlab.eclipse.org/eclipse/xfsc/self-description-tooling>
  - Demo: <https://sd-creation-wizard.gxfs.dev/>

### Catalogue

- XFSC Catalogue implementing Spec v1, new home:
  - Repository: <https://gitlab.eclipse.org/eclipse/xfsc/cat/fc-service>
  - <https://fc-server.gxfs.dev/verification> / [query](https://fc-server.gxfs.dev/query)
  - Examples / Tutorial: [xfsc.cat/fc-service/...examples/TechWorkshop](https://xfsc.cat/fc-service/...examples/TechWorkshop)
- Active contribution from community:
  - ~5 merge requests from ~5 projects so far
  - further work by former implementation team
- No integration with other services yet, except AAS. GXFS Portal Spec v2 covers publication of Self-Declaration to Catalogue.

## GXFS Portal Spec v2 Scenarios and Today's Actions



GXFS Portal Spec v2 draft in its entirety is an internal draft – but working on resulting action items:

**Quick wins:**  
scenarios connecting existing services, try in hackathon using WFE without UI

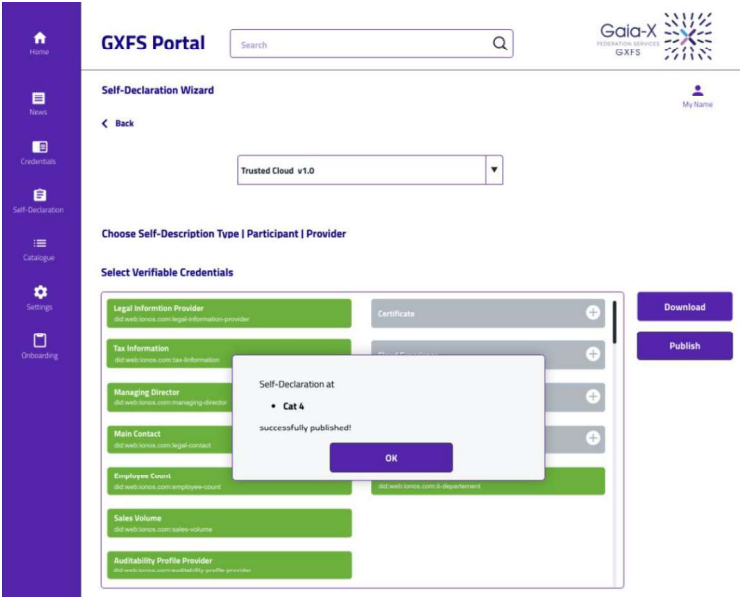
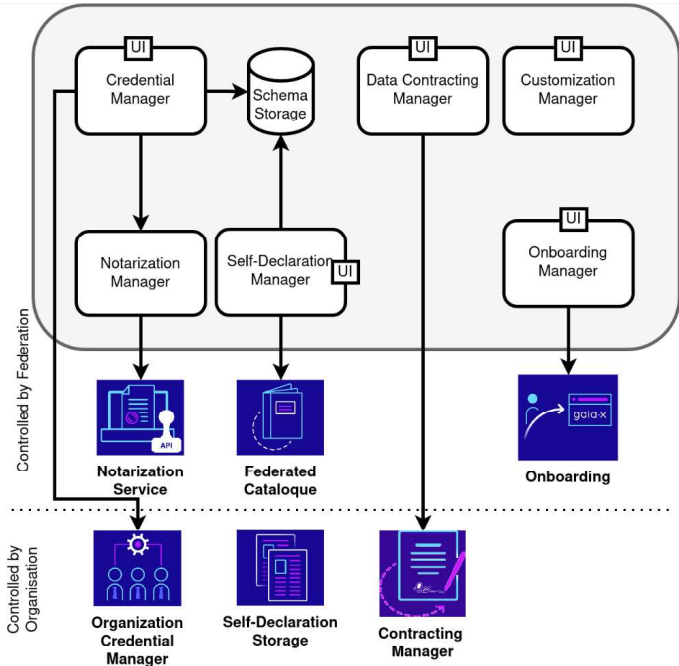
**Medium:** requires new services on top of current XFSC, but no rocket science to prototype these reusing off-the-shelf stuff

**Hard:** to be aligned with the community / projects, possibly dedicated tender / implementation contract

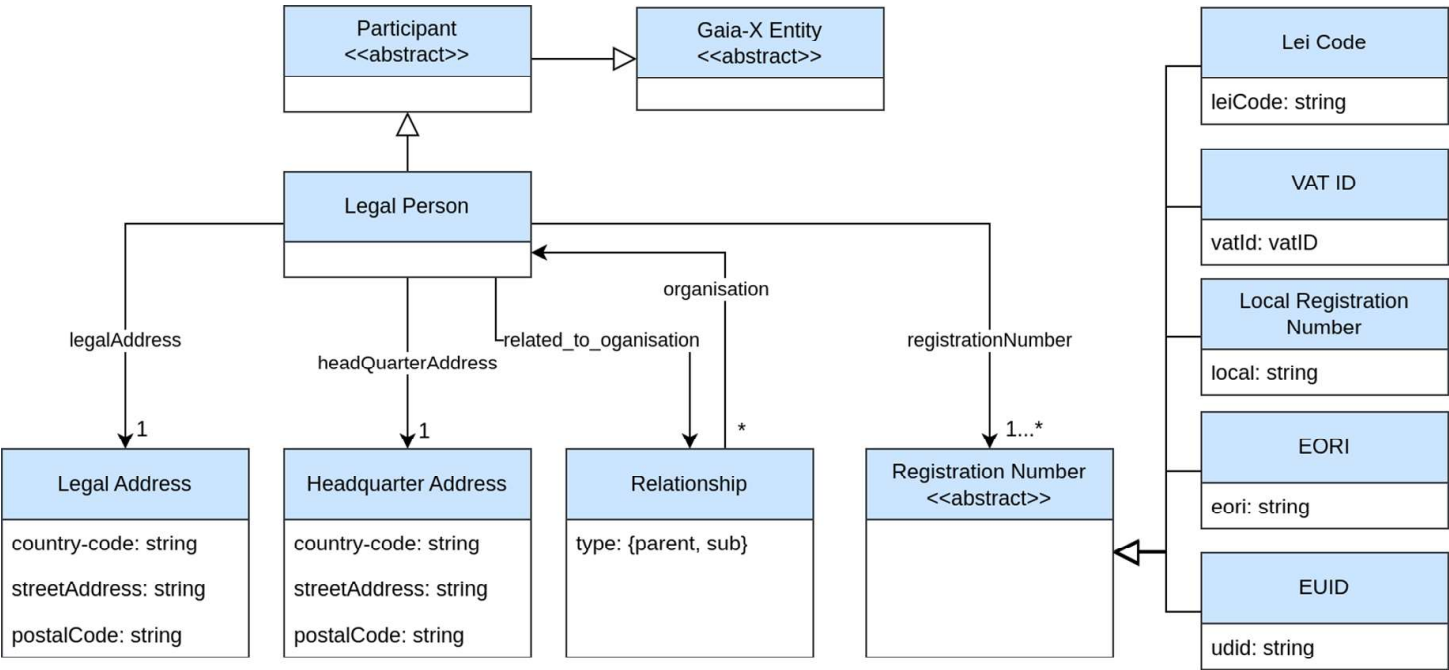
- Onboarding of Organization as Participant ●
  1. Create DID and DID Document for Organization ●
  2. Create DID and DID Document for Onboarding Office ●
  3. Onboarding Officer receives Onboarding Credentials
  4. Create [Self-]Attested Verifiable Credentials ●
  5. Create Self-Declaration ●
  6. Onboard Organization ●
- Onboard Principal for Organization ●
  - Retrieve a Self-Description ●
  - Make Available Self-Declaration for Service Offering in CAT ●
  - Contracting: Asset Creation → Usage Policy Creation → Contract Creation → Asset and Policy Management → Contract and Lifecycle Management → Asset Acquisition ●



# GXFS Portal Spec v2: Architecture and UI Teaser

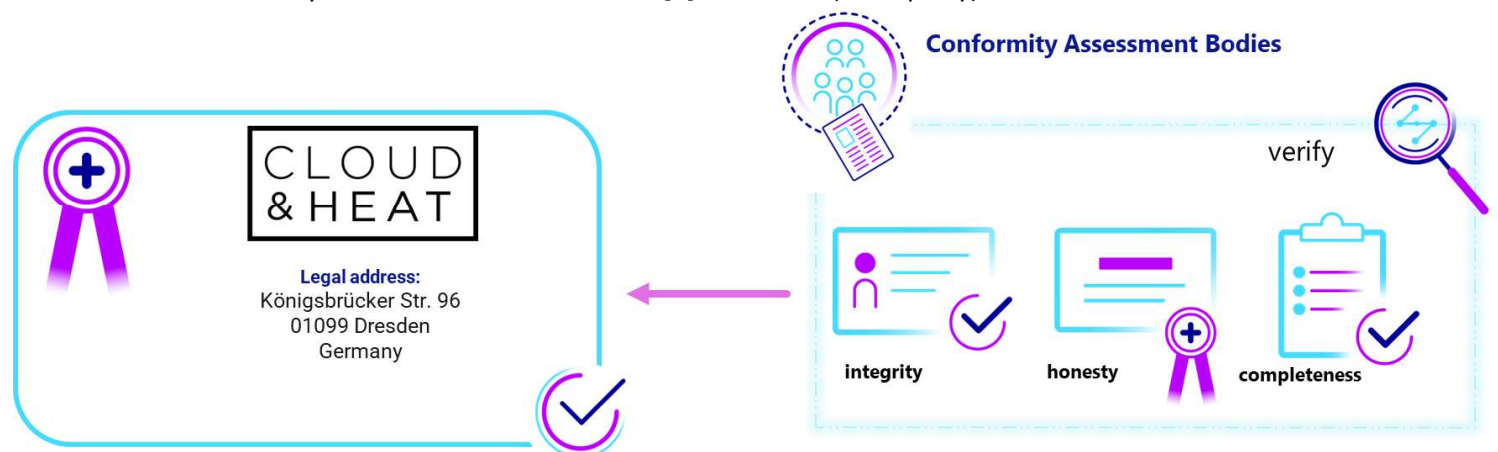


# Gaia-X Credential Basics: Schema (here: Participant)



## Trust in Claims from Consumer's Perspective

Achieve trust in claims by **W3C Verifiable Credentials** [1] as a set of (third-party) attested attributes.



Set of **W3C Verifiable Credentials** = **W3C Verifiable Presentation**

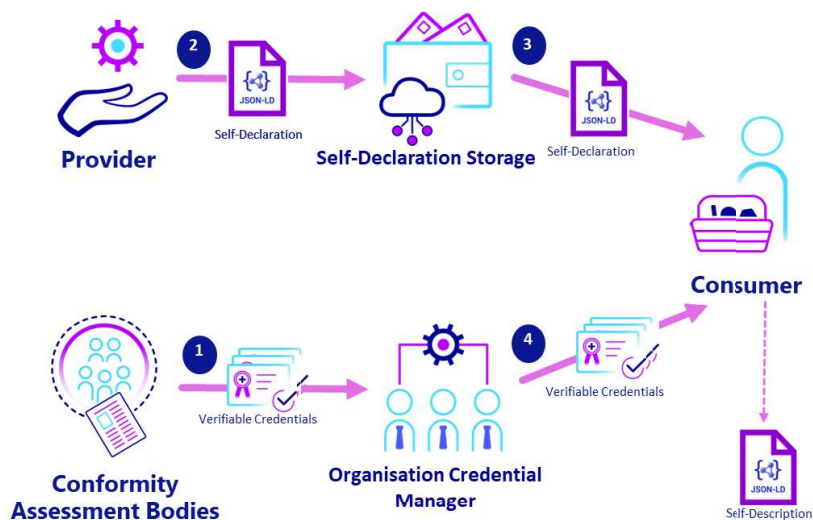
Provider's perspective: Self-Declaration "I hold the following credentials" assembled to Verifiable Presentation on demand

[1] <https://www.w3.org/TR/vc-data-model/>

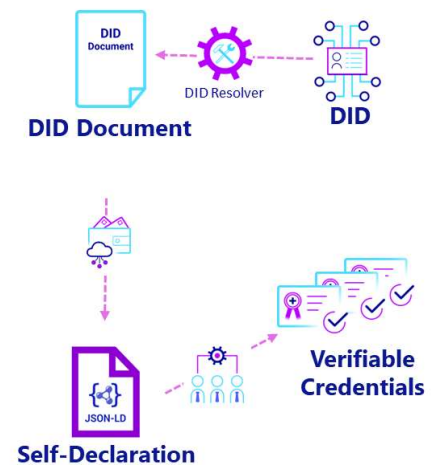
## Provider's Perspective: Self-Declaration



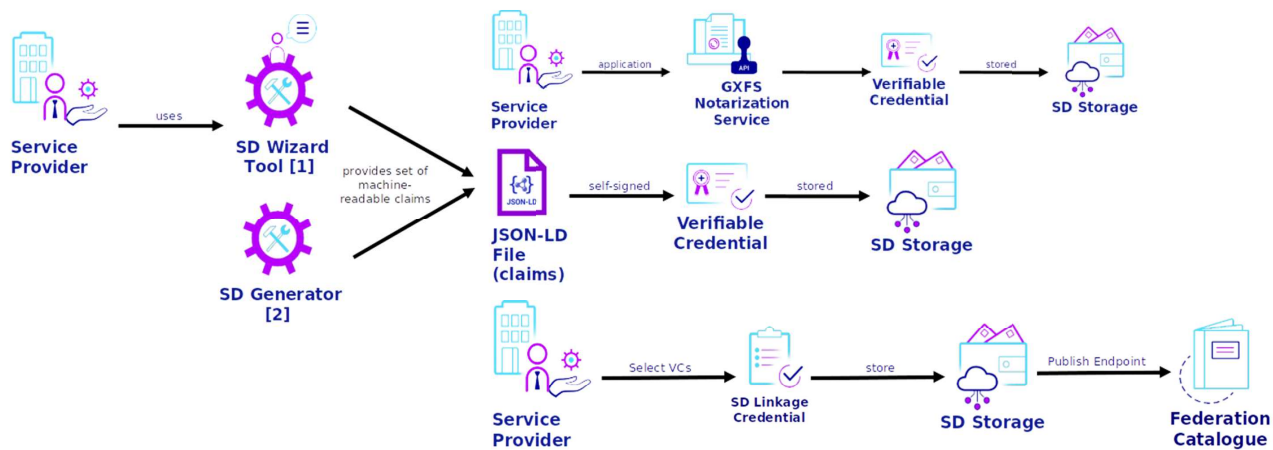
### Workflow



### Reference Model



## Provider's Perspective: creating a Self-Declaration



[1] <https://sd-creation-wizard.gxfs.dev>

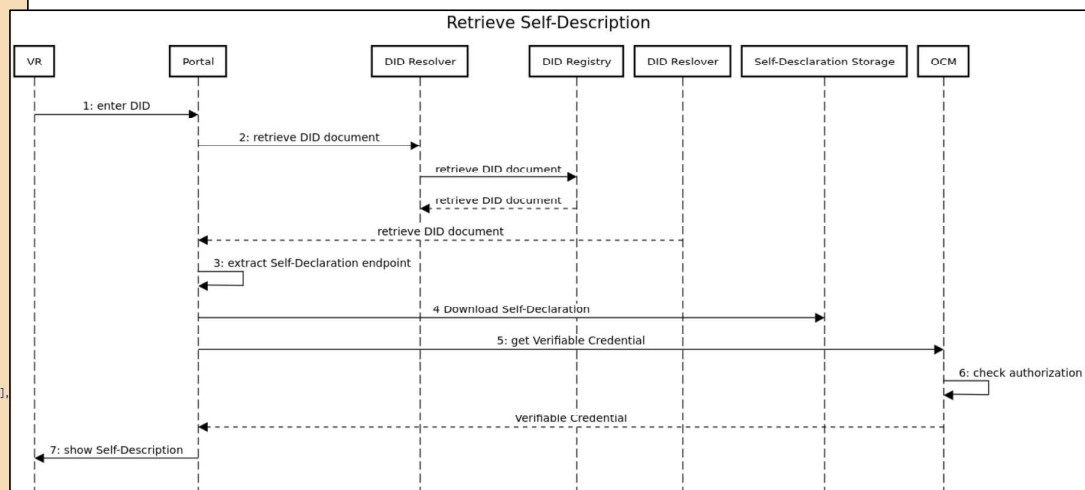
[2] e.g., <https://github.com/SovereignCloudStack/gx-self-description-generator>

## Portal v2: Self-Declaration → Verifiable Presentation



```

{
  "@context": {
    "cred": "https://www.w3.org/2018/credentials",
    "gxfs": "https://gxfs.eu/vocab#\"
  },
  "@id": \"did:method:ABC_Company_Self_Declaration\",
  \"@type\": [ \"cred:VerifiableCredential\", \"gxfs:SelfDeclaration\" ],
  \"cred:issuer\": \"did:method:ABC_Company\",
  \"cred:issuanceDate\": \"...\",
  \"cred:credentialSubject\": {
    \"@context\": {
      \"gx\": \"Gaia-X schema URI as specified by the Gaia-X Registry\"
    },
    \"id\": \"did:method:ABC_Company\",
    \"@type\": \"gx:LegalPerson\",
    \"gxfs:attestationReference\": [
      {
        \"@id\": \"did:method:ABC_Company_Registration_Number_Credential\",
        \"presentation_definition\": {
          \"id\": \"<a unique ID for this presentation definition>\",
          \"input_descriptors\": {
            \"id\": \"<a unique ID for this input descriptor>\",
            \"constraints\": {
              \"fields\": [
                {
                  // We expect the credential subject to be a legal person.
                  \"path\": [ \"${'cred:credentialSubject'}['@type']\" ],
                  \"filter\": {
                    \"type\": \"array\",
                    \"contains\": {
                      \"type\": \"string\",
                      \"const\": \"gx:LegalPerson\"
                    }
                  }
                }
              ]
            },
            // The legal person must have a registration number.
            \"path\": [ \"${'cred:credentialSubject'}['gx:registrationNumber']\" ],
            \"optional\": false
          },
          // We expect the credential subject to have a local registration number.
          \"path\": [ \"${'cred:credentialSubject'}['gx:registrationNumber']['@type']\" ],
          \"filter\": {
            \"type\": \"array\",
            \"contains\": {
              \"type\": \"string\",
              \"const\": \"gx:LocalRegistrationNumber\"
            }
          },
          // The registration number must have a value.
          \"path\": [ \"${'cred:credentialSubject'}['gx:registrationNumber']['gx:value']\" ],
          \"optional\": false
        }
      }
    ]
  },
  \"protocol\": \"AIP\",
  \"version\": \"1.0\"
}
  /* optionally, further credentials
  (note that, in addition to a registration number,
  a valid LegalPerson must also have a legal address and a headquarter address,
  which SHOULD be provided in separate credentials) */
}
  
```



- Self-Declaration is interpreted as *instruction for building Verifiable Presentation*.
- Shown for a Visitor here. Catalogue is like Visitor, plus extra validation steps.

# Catalogue Overview



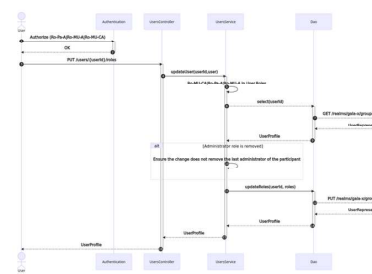
## Table of Contents

1. Introduction and Goals
  - 1.1. Requirements Overview
  - 1.2. Quality Goals
  - 1.3. Stakeholders
  - 1.4. Assumptions
2. Architecture Constraints
  - 2.1. Business Context
3. Solution Strategy
  - 3.1. Self-Descriptions
    - 3.1.1. Granularity of Self-Descriptions
    - 3.1.2. Identification of Self-Descriptions
  - 3.2. Schema
    - 3.2.1. Schema Types
    - 3.2.2. Schema Validation Checks
4. Overall System overview
  - 4.1. Level 1: Components of the Federated Catalogue
    - 4.1.1. Catalogue
    - 4.1.2. Authentication
    - 4.1.3. Graph database
    - 4.1.4. File Store
    - 4.1.5. Metadata Store
  - 4.2. Level 2: Description of the Submodules
    - 4.2.1. Controller
    - 4.2.2. Service
    - 4.2.3. Authorization

## 5.2.11. Changing the Roles of a User

This may change depending on SSO Implementation.

Role ID	Can be given by
Ro-MU-CA	Ro-MU-CA
Ro-MU-A	Ro-MU-CA, Ro-MU-A
Ro-SD-A	Ro-MU-CA, Ro-MU-A, Ro-Pa-A (if not self)
Ro-Pa-A	Ro-MU-CA, Ro-MU-A, Ro-Pa-A



- ✓ SD Management
- ✓ Schema Management
- ✓ SD Verification
- ✓ Query
- ✓ Participant, User, Role, Session Management
- ✓ REST API for each block

Component of the Catalog  
Interfaces exposed by the catalog  
Potential users of exposed interface

<https://gitlab.eclipse.org/eclipse/xfsc/cat/fc-service/-/wikis/home>

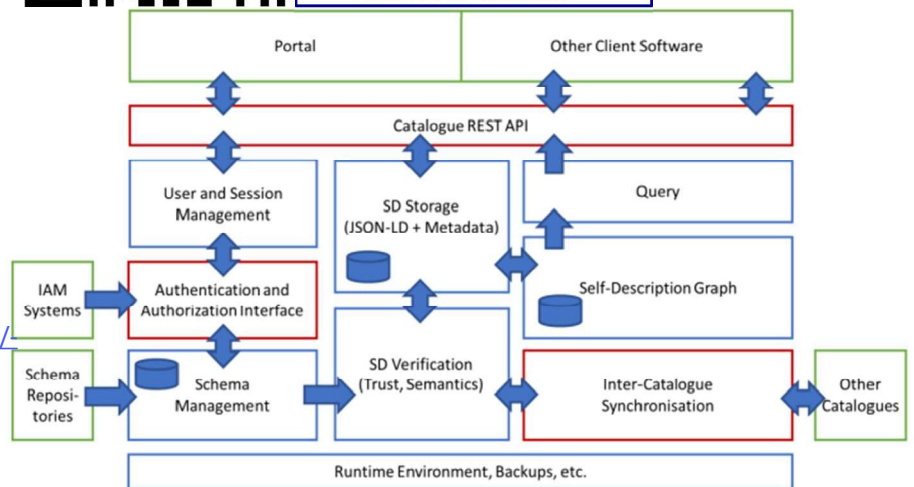


Figure 1: High-Level Architecture of the Gaia-X Catalogue.

# Catalogue: Interactive Frontends



fc-server.gxfs.dev/verification

## Verify Self-Description

Please upload a file OR copy / paste in textarea:

Choose file legalPerson\_two\_VC.jsonld

```
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1"
  ],
  "@id": "http://example.edu/verifiablePresentation/self-description",
  "type": [
    "VerifiablePresentation"
  ],
  "verifiableCredential": [
    {
      "@context": [
        "https://www.w3.org/2018/credentials/v1"
      ],
      "@id": "https://www.example.org/legalPerson1.json",
      "@type": [
        "VerifiableCredential"
      ],
      "issuer": "http://gaiax.de",
      "issuanceDate": "2022-10-19T18:48:09Z",
      "credentialSubject": {
        "@id": "https://w3id.org/gaia-x/naax-trust-framework#Provider1"
      }
    }
  ]
}
```

☒ Verify Semantics ☒ Verify Schema ☒ Verify Signature

Verify

Verification result :

Status : success, Result: {"verificationTimestamp": "2023-01-24T14:17:28.198215Z", "lifecycleStatus": "active", "issuer": "http://gaiax.de", "issuedDateTime": "2022-10-19T18:48:09Z", "validatorDids": [{"did": "web:compliance.lab.gaia-x.eu"}]}

<https://fc-server.gxfs.dev/verification>

fc-server.gxfs.dev/query

## Discover Self-Descriptions

Parameters:

loc String Hamburg

Parameter initialization

Please write your query statement in textarea:

MATCH (p:LegalPerson)-[:legalAddress]->(a: Address {locality: \$loc}) RETURN p, a

openCypher

Submit

Status: success

```
{
  "totalCount": 1,
  "items": [
    {
      "p": {
        "legalName": "Hotel Elbe",
        "claimsGraphUri": [
          "https://www.example.org/mySoftwareOffering",
          "http://gaiax.de/some_unique_id"
        ],
        "registrationNumber": "R22525"
      },
      "a": {
        "postal-code": "22525",
        "claimsGraphUri": [
          "http://gaiax.de/some_unique_id"
        ],
        "street-address": "Keller Str. 392",
        "locality": "Hamburg",
        "country-name": "Germany"
      }
    }
  ]
}
```

JSON: list of maps

<https://fc-server.gxfs.dev/query>



## Setup for the Workshop



- **Please look into the repository**

- <https://gitlab.eclipse.org/eclipse/xfsc/cat/fc-service/-/tree/main/examples/TechWorkshop>

- **Required**

- Git
- Postman (we have a collection, but it's recommended to deploy your own catalogue)



This time, we would like to focus on some of the portal scenarios (no running Catalogue required), ...

... but discuss with us your priorities for continuing the Catalogue ("spec v1.1") – current plans, issues, merge requests:

- Support for Self-Declarations; interaction with OCM → prototype *everything except Catalogue* with us, using WFE
- Easy to use "frontend API", e.g., using WFE [#172](#)
- Credential support has always been hard to use ([#181](#)). Can be disabled, but also needs update. [#178](#)
- Support Self Descriptions of (Data Resources) or even of generic assets (e.g., digital product pass) [!291](#)



# OAW and WFE

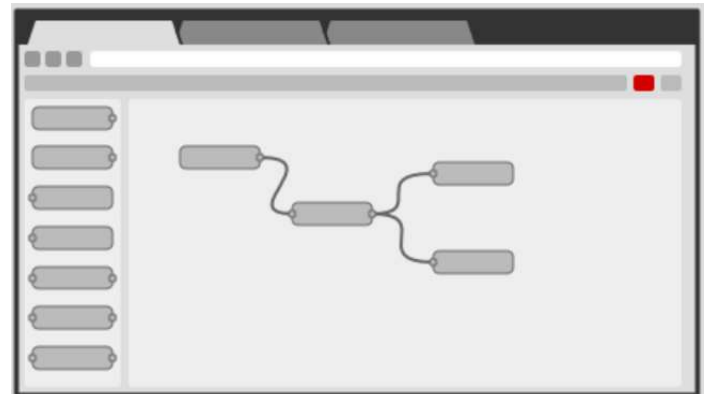
—

## GXFS Workflow Engine (WFE)

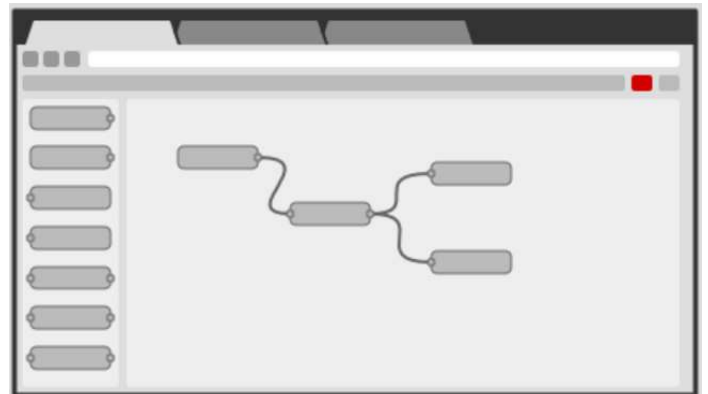


Gaia-X WFE is a fork of the Node-RED project, tailored for the Gaia-X ecosystem. It builds upon Node-RED's foundation while offering enhanced features for data sovereignty and federated infrastructure, aligning with the goals of the Gaia-X project.

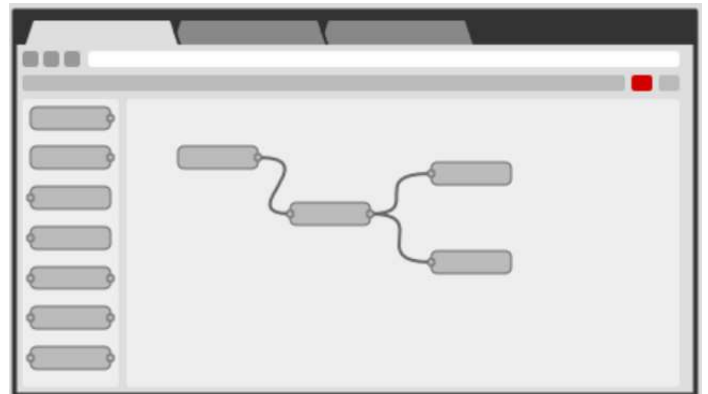
## Introduction to ***The Hackathon Topics***



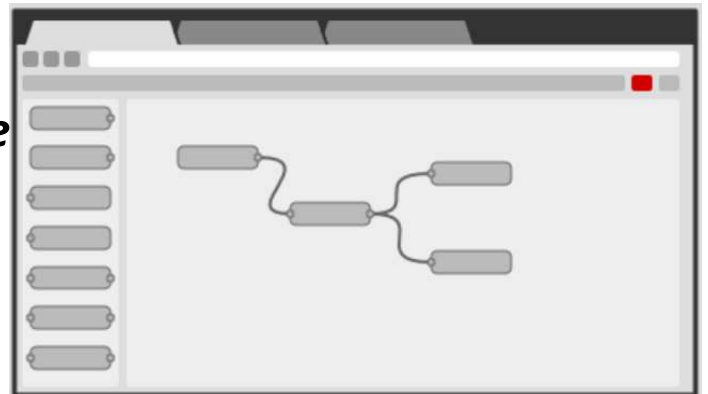
1. What does "***event-driven application development***" mean, and how do ***Node-RED*** and the ***Gaia-X Workflow Engine (WFE)*** play a role in it?



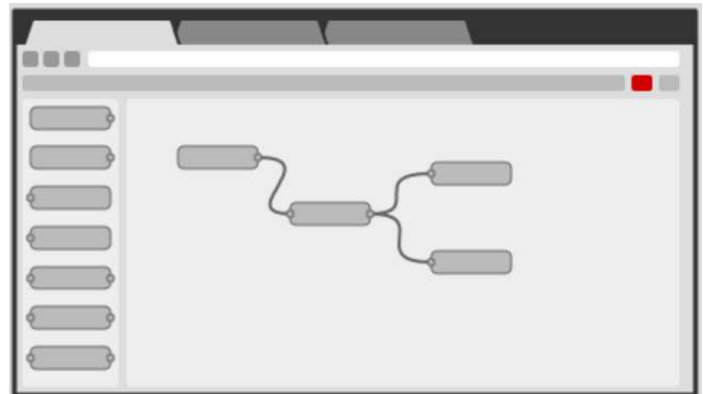
2. How can we use the **WFE** to **integrate** services within the **GXFS** ecosystems?



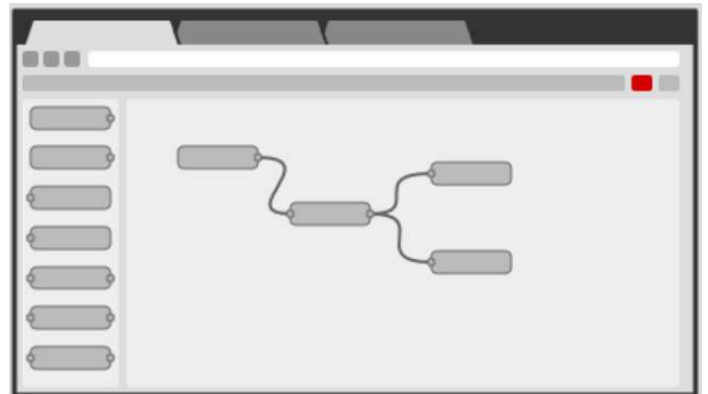
3. How can we use the ***GXUI framework*** to design ***interactive user interfaces***?



4. How do we establish ***API endpoints*** and manage ***API requests*** using WFE?



5. How can we orchestrate a ***complete workflow*** in WFE that includes ***authentication, dynamic UI generation, and data persistence***?





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# ***A Journey of Learning and Collaboration***



# 12:00-14:00 Exercise: using NOT API and OCM and exchanging credentials

 Bobby, Konstantin

## Where SSI starts



### Trusted Connection

Initiate secure communication channel with User (Holder)

1

### Anchor scheme

Initiate secure communication channel with User (Holder)

2

### VC Issuance

Issuing Verifiable Credential to User (Holder)

3

### Proof Presentation

Requesting from User(Holder) to present Claims from Verifiable Credential

4

## Create Schema & CredDef

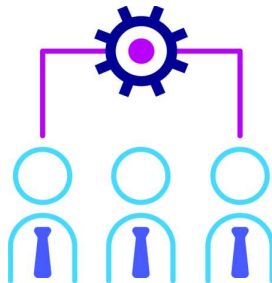


```
POST /attestation/v1/schemas
{
  "name": "nostrud",
  "createdBy": "ipsum consectetur",
  "version": "1.0",
  "attributes": [
    "irure nostrud",
    "Ut ut nostrud"
  ]
}
```



```
POST /attestation/v1/credentialDef
{
  "schemaID": "cupidatat exercitation ex do",
  "name": "ad mollit pariatur anim",
  "isRevokable": false,
  "isAutoIssue": true,
  "expiryHours": "23",
  "createdBy": "anim laboris nostrud ullamco in"
}
```

Organization Credential Manager

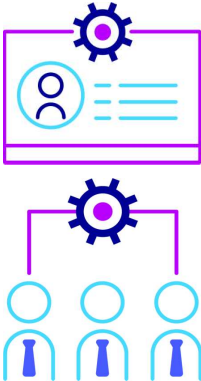


# Connection

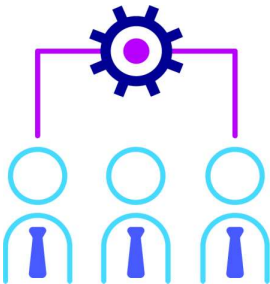


## Personal Credential Manager

Scan QR – Accept / Decline



## Organization Credential Manager



Send connection invitation QR code/URL

Accept connection invitation QR code/URL

`POST(empty body) /connection/v1/invitation-url?alias=trust`

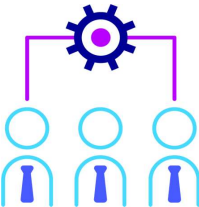
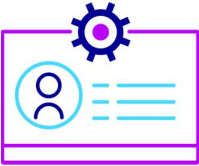
## Organization Credential Manager

`POST /connection/v1/accept-connection-invitation`  
`Body {"invitationUrl": "lorem ipsum",`  
`"autoAcceptConnection": true`  
`}`

# Credential Issuing



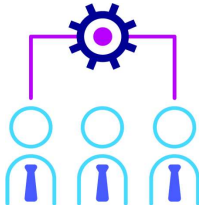
Personal Credential Manager  
*Accept / Decline*



Offer Verifiable Credential

Accept

Organization Credential Manager



POST /attestation/v1/create-offer-credential

```
{
  "connectionId": "58bd3b62-ea1f-49e3-8a30-1f57eed8fc56",
  "credentialDefinitionId":
    "BsFuFTECZPVRnoCgHUfB3p:3:CL:48687:creddefest-20-06-2023",
  "comment": "conseq",
  "attributes": [
    {
      "name": "fName",
      "value": "asd"
    },
    {
      "name": "lName",
      "value": "ads21"
    }
  ],
  "autoAcceptCredential": "contentApproved"
}
```

Organization Credential Manager

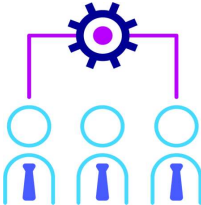
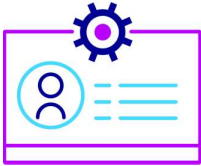
```
POST
attestation/v1/accept-offer?credentialID={{lorenIpsum}}
```

# Credential Presentation



Personal Credential Manager

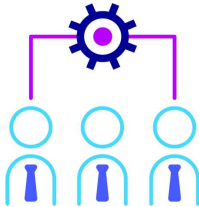
Accept / Decline



Send presentation request

Present

Organization Credential Manager



POST proof/v1/send-presentation-request

```
{
  "comment": "Loren Ipsum",
  "attributes": [
    {
      "schemaId": "",
      "credentialDefId":
        "7KuDTpQh3GJ7Gp6kErpWvM:3:CL:520446:BasicCredential-
        oct-3-2022-credDef.1.0.2",
      "attributeName": "lastName",
      "value": "",
      "condition": ""
    }
  ],
  "connectionId": "a4c01f34-c292-4e8a-b59a-2036d31e4988"
}
```

Organization Credential Manager

```
POST
proof/v1/accept-proof-request?proofRecordId={{Loren Ipsum}}
```

Want to explore more ?



---

## Power of Trust Service API

- TSA Policy Execution
- Signing
- Verification
- DID Resolution
- DataGrid usage



## Notarization Service



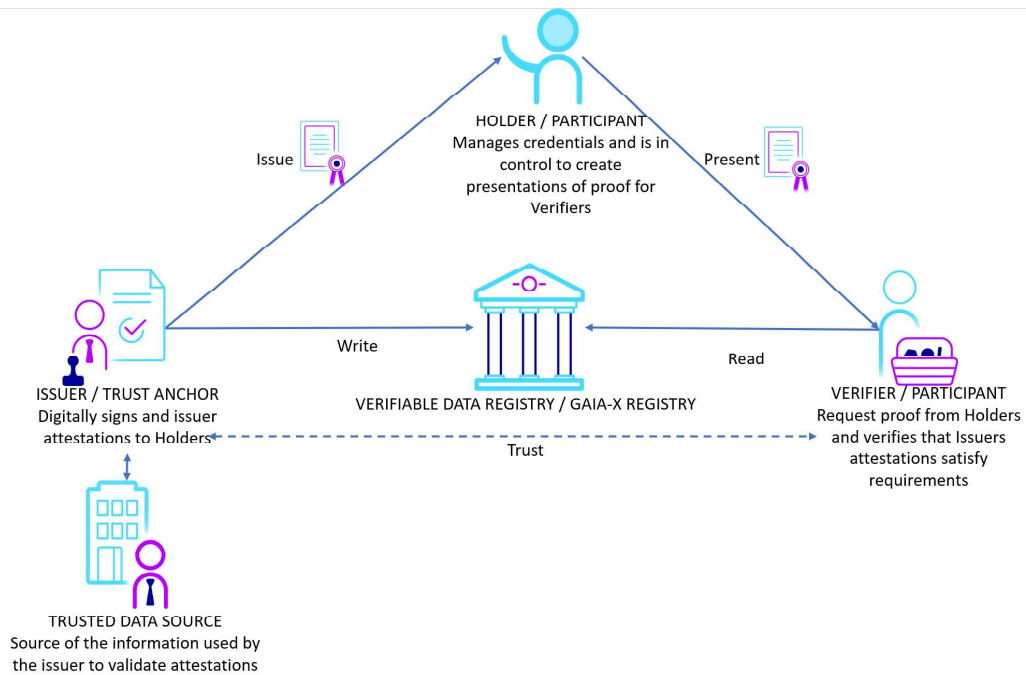
---

What is Notarization Service

Profiles

Request Life Cycle

## What is Notarization Service



## Profiles



- AIP (Aries Interop Profile)
- Notary keys to encrypt Business Owner data
- Tasks which should be done before a request can be submitted
- Resulting credential template
- Resulting credential metadata: revocability, validity etc.

## Notarization Request Life Cycle



- Business Owner starts a session (creates a request)
- Business Owner fulfills the required tasks (e.g uploads scans of documents)
- Business Owner submits the request
- Notary claims the request from the list of pending requests
- Notary does automated and/or manual checks
- Either
  - Notary accepts the request, and Notarization Service issues a credential
  - OR
  - Notary rejects the request, and a credential is not issued

Learn more



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— Source Code

- <https://gitlab.eclipse.org/eclipse/xfsc/not>



— Trust Anchors

- [https://gaia-x.gitlab.io/policy-rules-committee/trust-framework/trust\\_anchors/](https://gaia-x.gitlab.io/policy-rules-committee/trust-framework/trust_anchors/)





# 14:00-14:45 – Deep Dive Session

## Authentication and Authorisation Service □

—  
Steffen

# Agenda

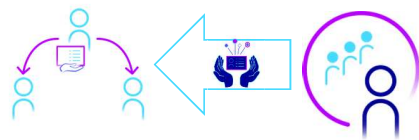


1. Purpose of AAS
2. AAS Working Principle
3. Service Architecture
4. Open Points
5. Q&A

Note: Repository was moved to

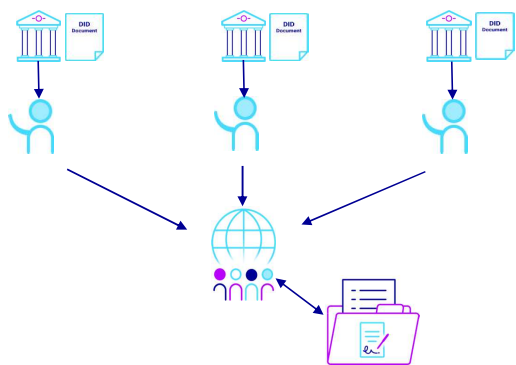
<https://gitlab.eclipse.org/eclipse/xfsc/authenticationauthorization>

## Purpose of AAS



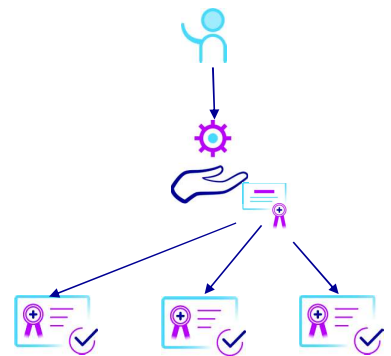
*Federators can provide an SSI based AAS to an OIDC Provider. The provider can use this AAS as IDP broker to allow access on his services.*

OIDC-SSI Bridge



*Participants decide over their issuing policy who has which role in their business. Other participants can accept/deny this by validating the decentralized identities over the registries during the authentication/authorization process.*

Decentralized Authentication/Authorization

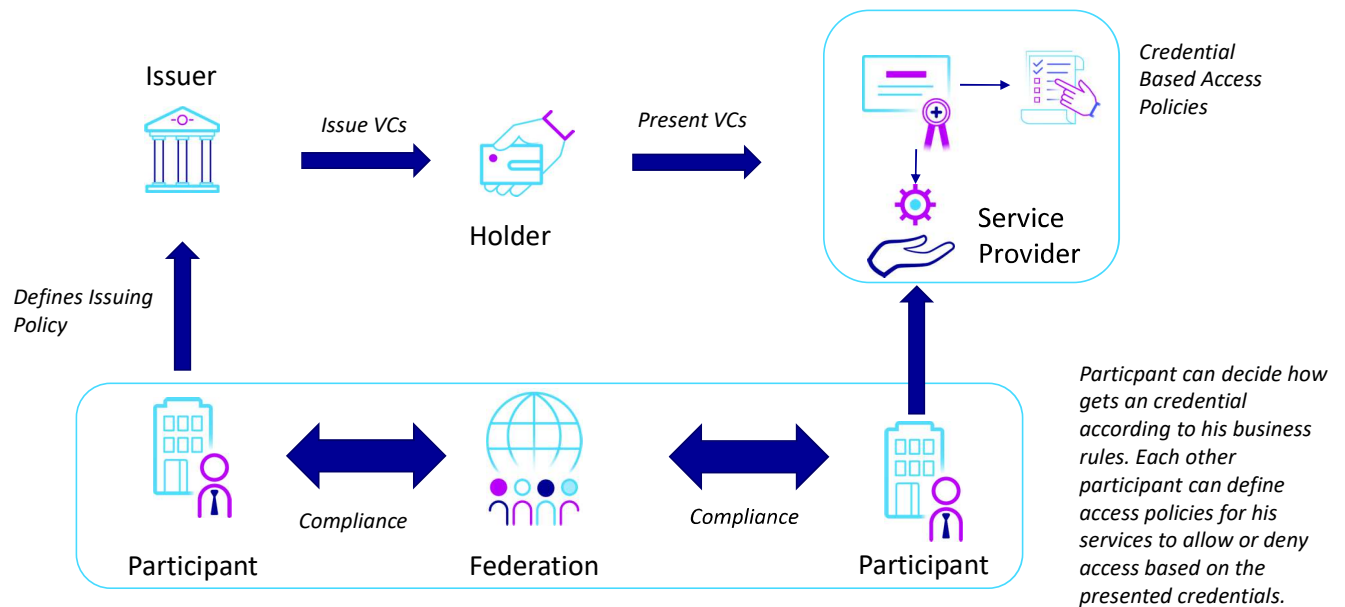


*When any special scope is requested, the SSI based mechanism requests in the background the right credentials for the scope.*

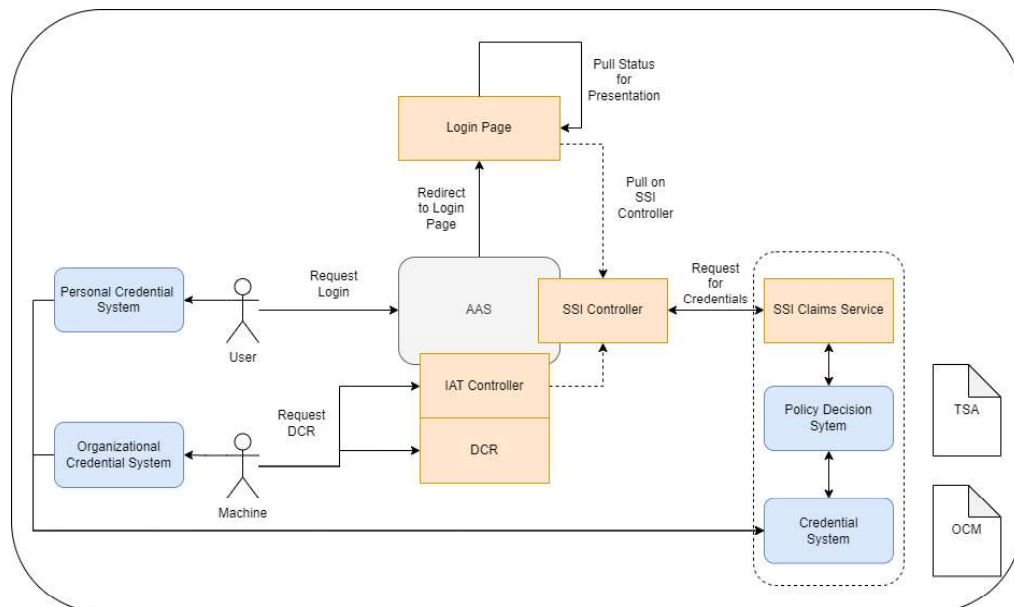
Credential Based Authorization



# Authentication/Authorization Service Working Principle



# Architecture



## Open Points



- An entire specification is still open (was not tendered)
- Potential new features in this spec:
  - Support of more oidc flows
  - New crypto support
  - Enhanced Scope support
  - Simplification of access policies and credential handling
  - ...
- Who wants to join the development?
  - A lot of work to do within Eclipse gitlab ;) → Be part of it / participate and contribute your insights to shape the future.
- Someone from the audience interested to do some hacking tasks tomorrow?

Q&A



Questions?

14:45-15:15 Networking coffee break ☕

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Gaia-X  
FEDERATION SERVICES  
GXFS





# 15:15-17:45 – Deep Dive Session continued Notarisation API & GXFS Workflow Engine □

—  
Konstantin, Hossein

## GXFS Workflow Engine Agenda



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<b>01</b>	Introduction	<b>08</b>	Integration with Gaia-X Ecosystem
<b>02</b>	Flow-Based Programming (FBP)	<b>09</b>	Prerequisites and System Requirements
<b>03</b>	What is Node-RED?	<b>10</b>	Step-by-Step Installation Guide
<b>04</b>	Key Features and Benefits of Node-RED	<b>11</b>	Basic Configuration and Setup
<b>05</b>	Advantages of FBP	<b>12</b>	Introduction to GXUI
<b>06</b>	Node-RED in Practice	<b>13</b>	Building a Simple Workflow
<b>07</b>	Overview of Gaia-X WFE	<b>14</b>	<i>Building GXFS Labeling workflow</i>

# Introduction

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In this workshop, we will explore the fundamentals of Node-RED, flow-based programming, and the Gaia-X WFE implementation. We aim to provide you with a solid understanding of these concepts and guide you through the process of installing WFE and creating workflows.

Brief overview of Node-RED, flow-based programming, and Gaia-X WFE

Provide context and introduce main topics



## GXFS Workflow Engine (WFE)



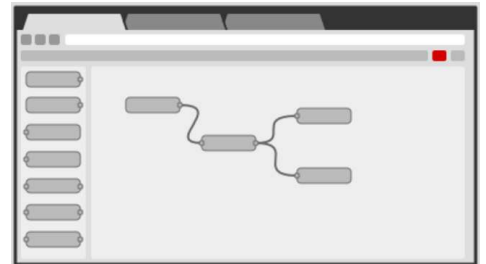
Gaia-X WFE is a fork of the Node-RED project, tailored for the Gaia-X ecosystem. It builds upon Node-RED's foundation while offering enhanced features for data sovereignty and federated infrastructure, aligning with the goals of the Gaia-X project.

### ***Local Deployment***

`docker run -p 1880:1880 -it leanea/hackathon:1.0.0`

### ***Cloud Deployment***

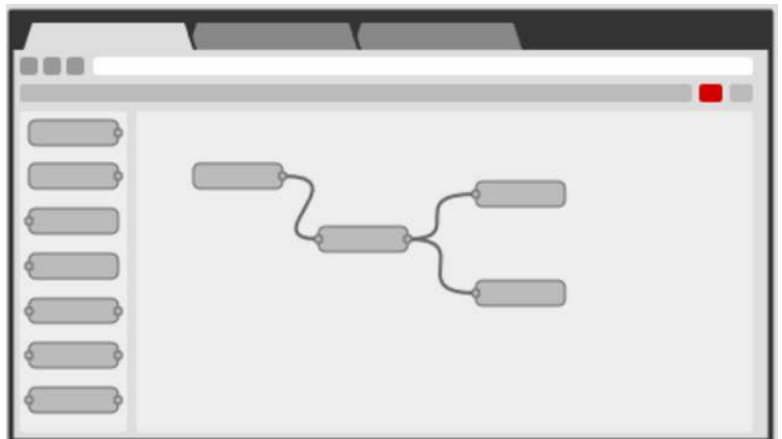
- **URL:** [HackathonX.leanea.com](https://HackathonX.leanea.com)
- **Username:** admin
- **Password:** hackathon



## Flow-Based Programming (FBP)

Flow-Based Programming is a paradigm that defines applications as networks of processes exchanging data. Each process is represented as a node, and data flows between nodes through connections, offering modularity, reusability, and parallelism.

- Programming paradigm
  - Applications as networks of processes
- Processes represented as nodes
  - Encapsulate specific functionality
- Data flows via connections (edges)
  - Visual representation of data movement

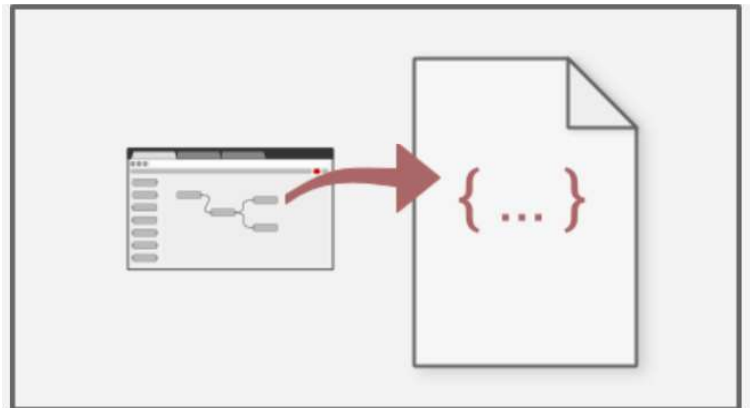


## What is Node-RED?



Node-RED is an open-source, visual programming tool developed by IBM that allows users to wire together hardware devices, APIs, and online services with ease. Built on Node.js, it simplifies connecting various components through an intuitive interface.

- Visual programming tool
  - Simplifies connecting devices, APIs, and services
- Built on Node.js
  - Utilizes JavaScript for programming
- Open-source
  - Created by IBM and actively maintained



## Key Features and Benefits of Node-RED



Node-RED offers a browser-based flow editor, a wide range of pre-built nodes, and the ability to extend with custom nodes. Its lightweight, scalable design is supported by a strong community, making it an excellent choice for a variety of projects.

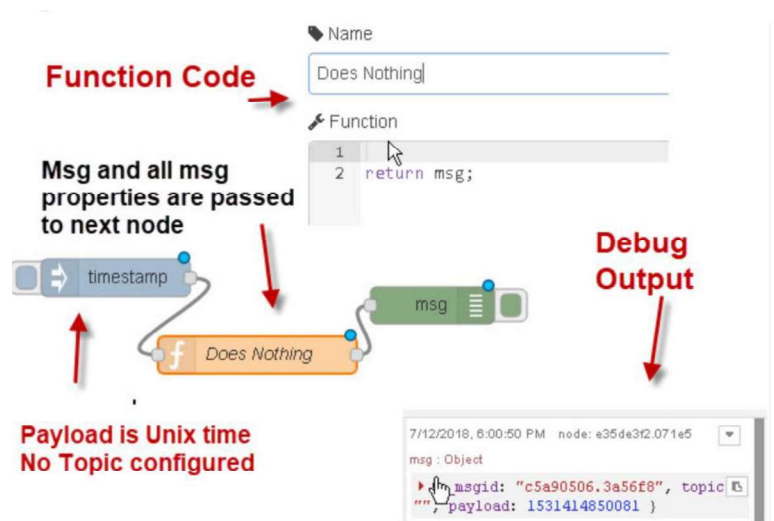
- Browser-based flow editor
  - Easily accessible and user-friendly
- Wide range of pre-built nodes
  - Supports various protocols and services
- Easy to extend
  - Create custom nodes and plugins
- Lightweight and scalable
  - Ideal for various project sizes
- Strong community support
  - Rich resources and active forums

## Advantages of FBP



FBP provides several benefits, including clear separation of concerns, easier parallelism, and enhanced maintainability and scalability. It also accelerates development and prototyping, making it an ideal choice for many application types.

- Modularity and reusability
  - Simplifies code organization
- Clear separation of concerns
  - Promotes maintainable code
- Easier parallelism
  - Natural fit for concurrent processing
- Enhanced maintainability and scalability
  - Adaptable to changing requirements
- Faster development and prototyping
  - Accelerates project completion



## Node-RED in Practice



In Node-RED, nodes, flows, and wiring serve as the building blocks for designing workflows. Users can create custom, interactive interfaces through the dashboard and user interface. Real-world examples include home automation, IoT projects, and API integrations.

- Nodes, flows, and wiring
  - Building blocks for designing workflows
- Dashboard and user interface
  - Create custom, interactive interfaces
- Real-world examples
  - Home automation, IoT, API integrations

## Overview of Gaia-X WFE



Gaia-X WFE is a fork of the Node-RED project, tailored for the Gaia-X ecosystem. It builds upon Node-RED's foundation while offering enhanced features for data sovereignty and federated infrastructure, aligning with the goals of the Gaia-X project.

- Fork of Node-RED project
  - Builds upon existing Node-RED foundation
- Tailored for Gaia-X ecosystem
  - Designed for specific requirements
- Enhanced features
  - Data sovereignty and federated infrastructure

## Integration with Gaia-X Ecosystem

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Gaia-X WFE ensures compliance with Gaia-X data and infrastructure standards, allowing seamless integration with Gaia-X services. Example use cases include data sharing between organizations, edge computing, and smart industry applications.

- Compliance with Gaia-X standards
  - Aligns with data and infrastructure policies
- Seamless integration
  - Works with Gaia-X services and platforms
- Example use cases
  - Data sharing, edge computing, smart industry



## Prerequisites and System Requirements

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Before installing Gaia-X WFE, ensure your system is compatible with the required operating systems (Windows, Linux, macOS) and Node.js version. Make sure your hardware meets the recommended specifications for optimal performance.

- Operating system compatibility
  - Windows, Linux, macOS
- Node.js version requirement
  - Specify minimum version needed
- Recommended hardware specifications
  - Suggested resources for smooth operation

## Step-by-Step Installation Guide

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Follow the detailed installation instructions provided in this workshop to set up Gaia-X WFE on your system. Refer to the included screenshots or code snippets for a visual aid, ensuring a smooth installation process.

- Detailed installation instructions
  - Guide the audience through the process
- Screenshots or code snippets
  - Visual aids for clarity

## Basic Configuration and Setup

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After installing Gaia-X WFE, configure the necessary settings and launch the flow editor. This will provide access to the main interface, where you can begin creating workflows and integrating various components.

- Configuring Gaia-X WFE settings
  - Customize settings as needed
- Launching the flow editor
  - Access the main interface

# Introduction to Gaia-X WFE Interface



Familiarize yourself with the Gaia-X WFE flow editor, exploring its key components and functionalities. This will help you understand the workflow creation process and provide a solid foundation for building your own projects.

- Familiarize with flow editor
  - Explore components and functionalities
- Key components and functionalities
  - Highlight important features

## Building a Simple Workflow



Follow the step-by-step guide provided in this workshop to create a simple workflow using Gaia-X WFE. Visual aids, such as diagrams or screenshots, will help illustrate each step and ensure a clear understanding of the process.

- Step-by-step guide
  - Walk the audience through workflow creation
- Visuals (diagrams or screenshots)
  - Illustrate each step clearly

## Tips and Best Practices for Workflow Design



To create efficient and maintainable workflows, focus on organization, modularity, error handling, and debugging. These practices will ensure your projects remain scalable, easy

- Organization and modularity
  - Keep workflows clean and understandable
- Error handling and debugging
- Scalability and maintainability

# GXFS Labeling Project Workflow



## Welcome to Gaia-X Labeling Portal-1

Create your account in a few steps and benefit of our secure and transparent Federated Catalogue.

1**Contactual Framework**  
This is First Group

1.1 Cotractual Governance

1.2 General Material

1.3 Technical Compliance

2**Data Protection**  
This is Second Group

3**Cybersecurity**  
This is Third Group

4**Portability**  
This is Forth Group

5**European Control**  
This is Fifth Group

Previous

Next

The Provider shall offer the ability to establish a contract under Union or EU/EEA/Member State law and specifically addressing GDPR requirements.

1.2.1 The Provider shall ensure there are specific provisions regarding service interruptions and business continuity (e.g., by means of a service level agreement), Provider's bankruptcy or any other reason by which the Provider may cease to exist in law.

☒ Confirm

☐ Deny

☐ Not applicable

Reasoning

Reasoning

Complete your evidence information



### First Step Tip

Create your account in a few steps and benefit of our secure and transparent Federated Catalogue.

Summary

## Q&A and Troubleshooting



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Addressing common issues and solutions

Encouraging attendees to ask questions





# 17:45-18:00 Summary of the day & prep for next day

—  
Lauresha



# Feierabend 😊

Enjoy the networking evening Gaia-X  
Roadshow powered by eco



Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages



# GXFS Tech Workshop #3

**5-6 September 2023, Villa Elisabeth, Berlin**

**Welcome!**



# 9:15-9:45 Registration & Networking

—  
Voluntary basis, main conference room



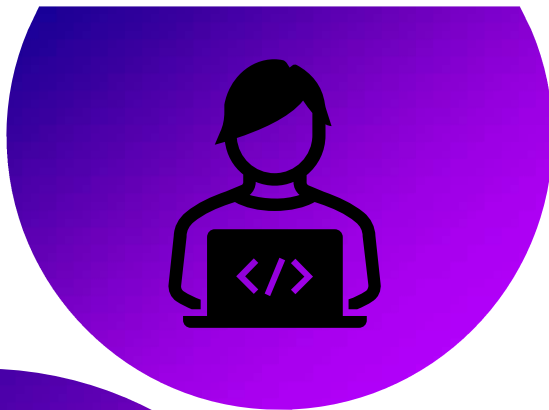
# 9:45-9:50 Short welcome & outlook for the day 🤝

—  
Workshop Room



**9:50-11:00 Hackathon launch** 

—



# Hacking in groups

- 2 Tables for Catalogue & Self-Description
- 1 Table for A&A
- 1 Table for TSA
- 1 Table for OCM & PCM
- 1 Table for the WFE & NOT



11:00-11:30 Networking coffee break ☕

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Gaia-X  
FEDERATION SERVICES  
GXFS







**11:30-12:30 Hackathon continued** 

—

12:30-13:45 Lunch break 🍽️

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**13:45-15:45 Hackathon continued** 

—



**15:45-16:00 Hackathon end /  
Concluding session** 💡

—

Feedback Time!

**[www.menti.com](https://www.menti.com)**

**Code 3948 7279**



# What's next?

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- Next GXFS Tech Workshops:
  - EclipseCon – Community day 16-19 October 2023, Ludwigsburg
  - 12.-13. Dezember, Cologne
  - More to come in 2024!



# 16:15-16:45 Meet the GXFS- DE OSS Community

—  
Recap from GXFS Tech Workshop #3 (main conference stage)



**16:45 End** 🚩

—  
Thank you for joining us & have a safe trip home!