



presentation

Minimal Viable Gaia-X

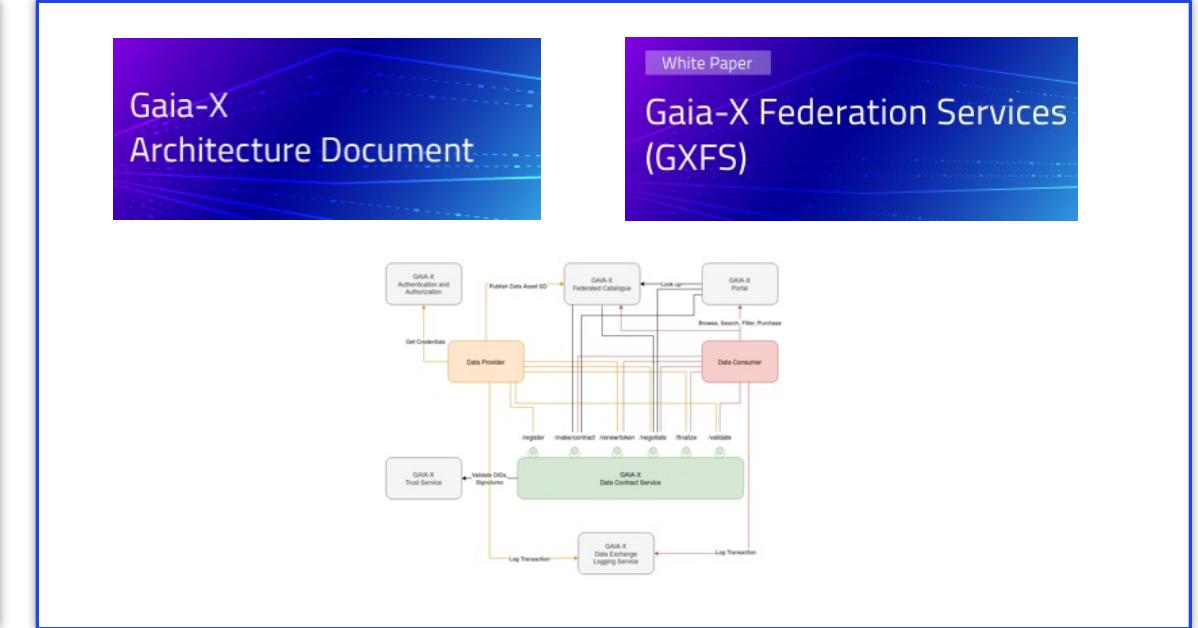


our starting point

expectation vs. reality



© Federal Ministry for Economic Affairs and Climate Action



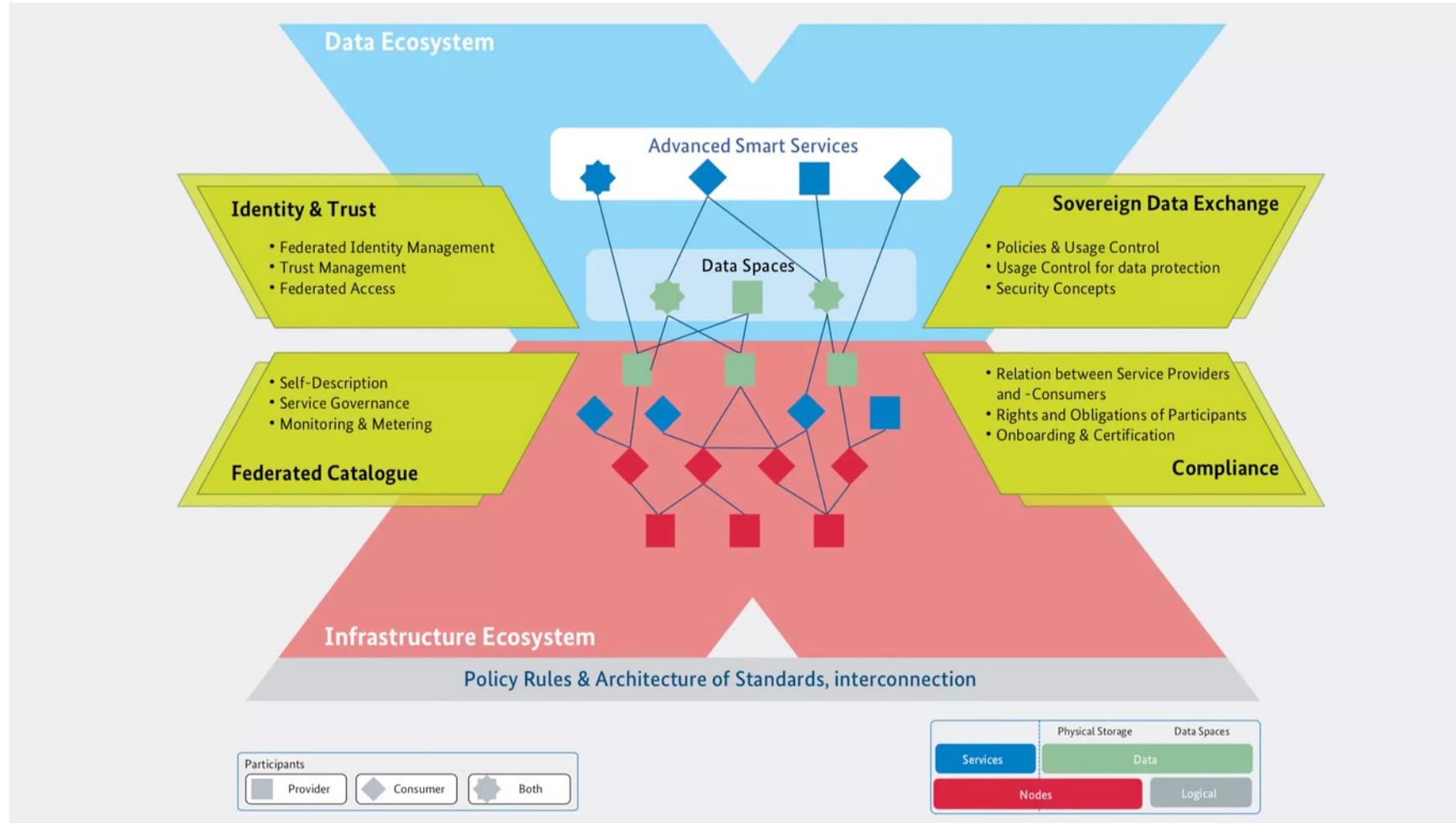
exceptional & necessary

why decentralized?

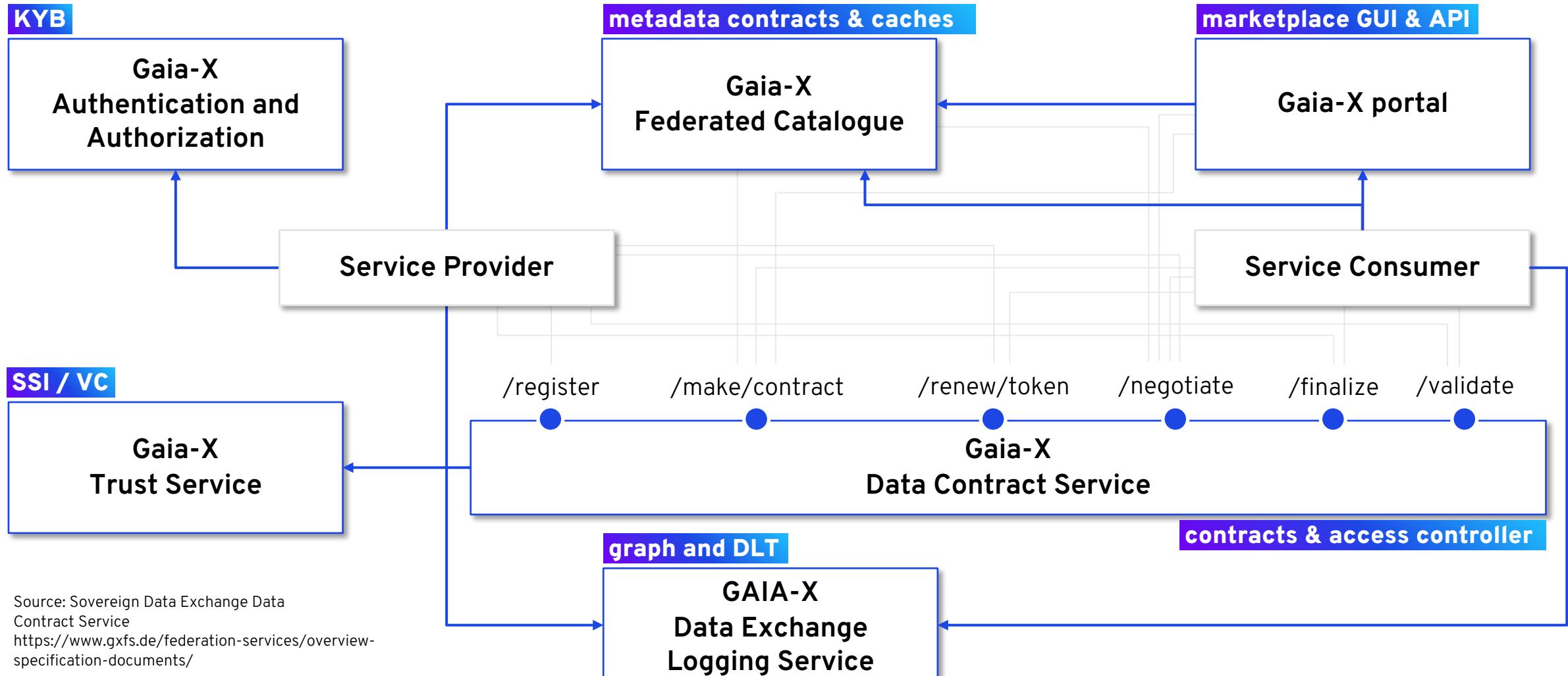


it is very hard to
decentralize later.

Gaia-X infrastructure and ecosystem

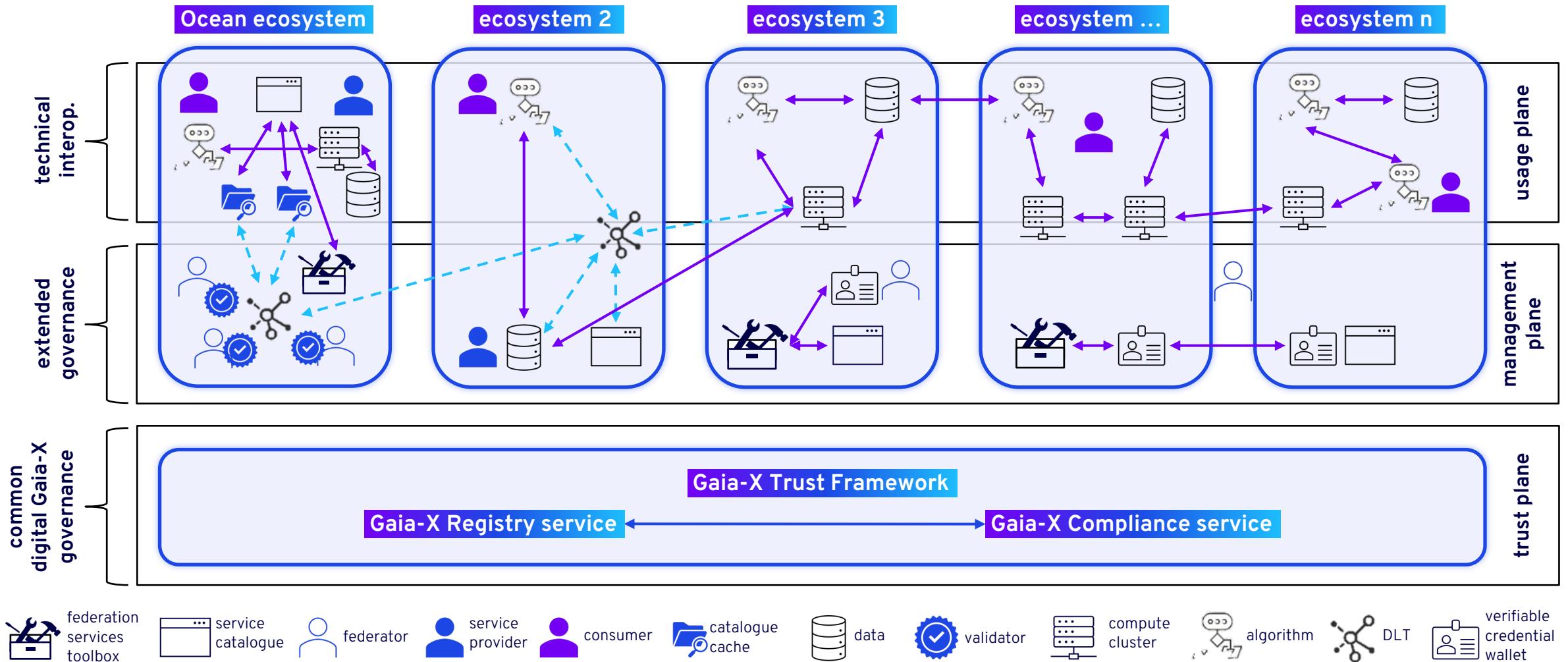


Gaia-X federation services & the Minimal Viable Gaia-X

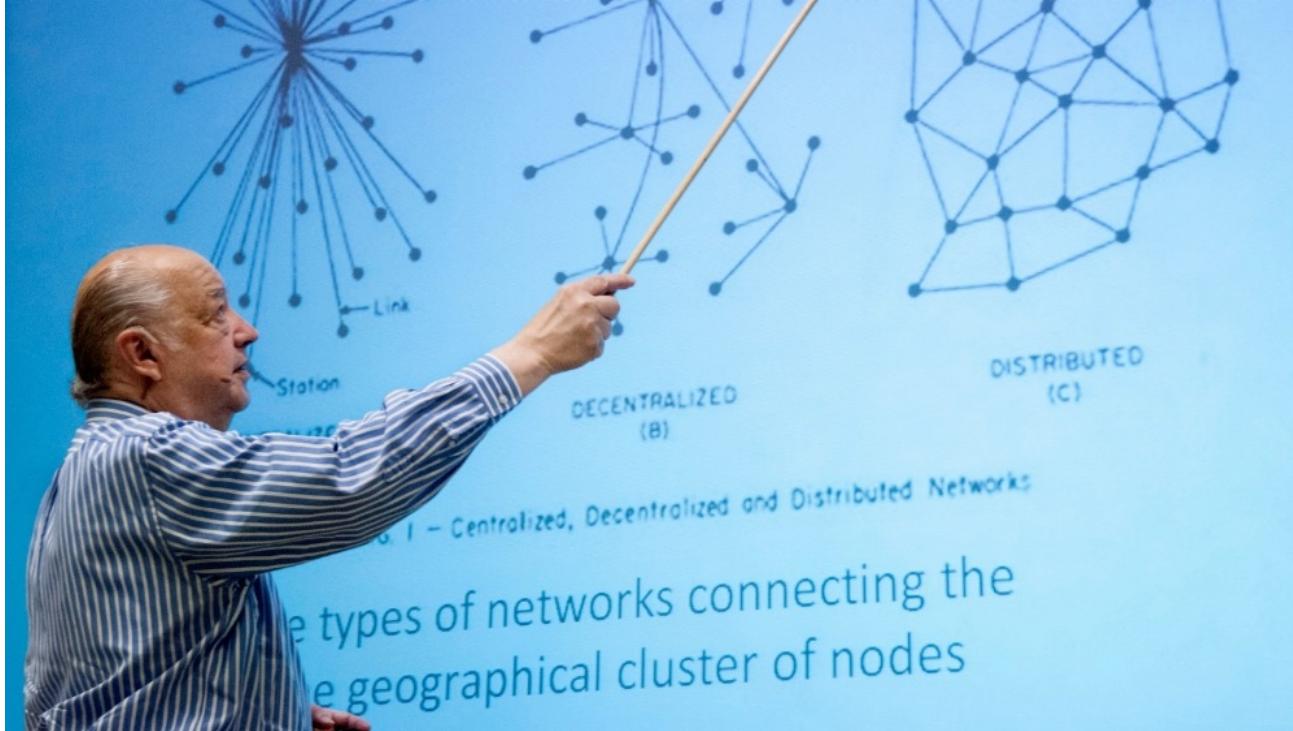


introduction of a Minimal Viable Gaia-X

there will be many ecosystems. how to start a decentralized one?



distribution leads to resilience and reduces dependencies



Paul Baran presents his work at a RAND Alumni Association event on July 25, 2009
Photo by Diane Baldwin/RAND Corporation

Paul Baran's seminal 1964 article "On Distributed Communications Networks"

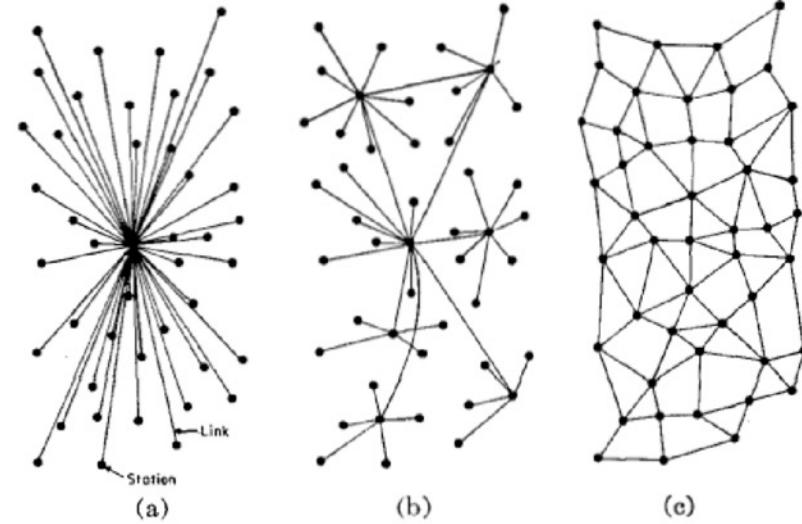


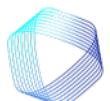
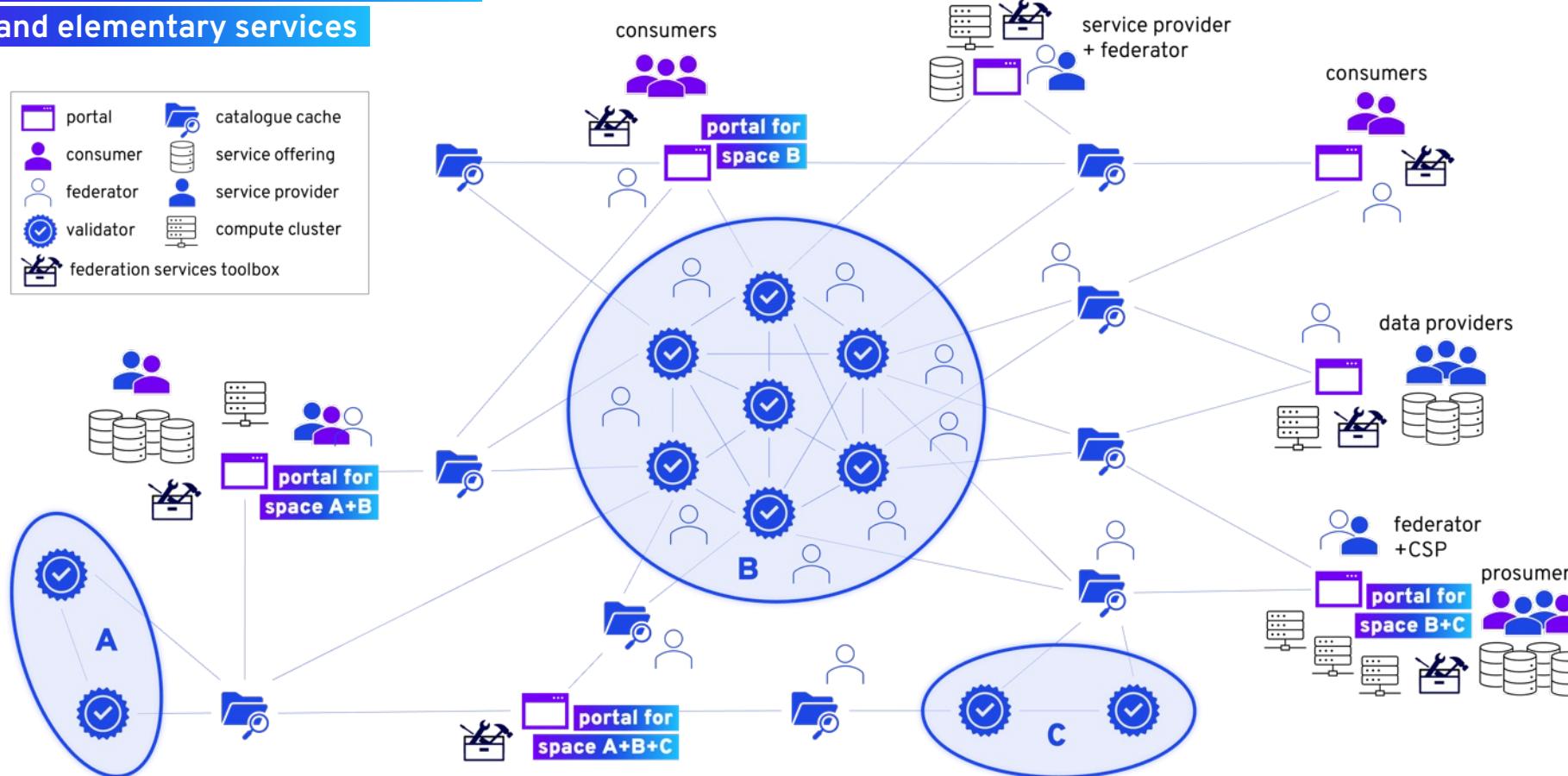
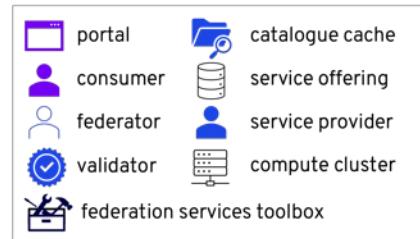
Fig. 1—(a) Centralized. (b) Decentralized. (c) Distributed networks.

centralization can be an expensive liability.

Composability of federated dataspaces (and ecosystems)

creation and connection of complex services

from atomic and elementary services

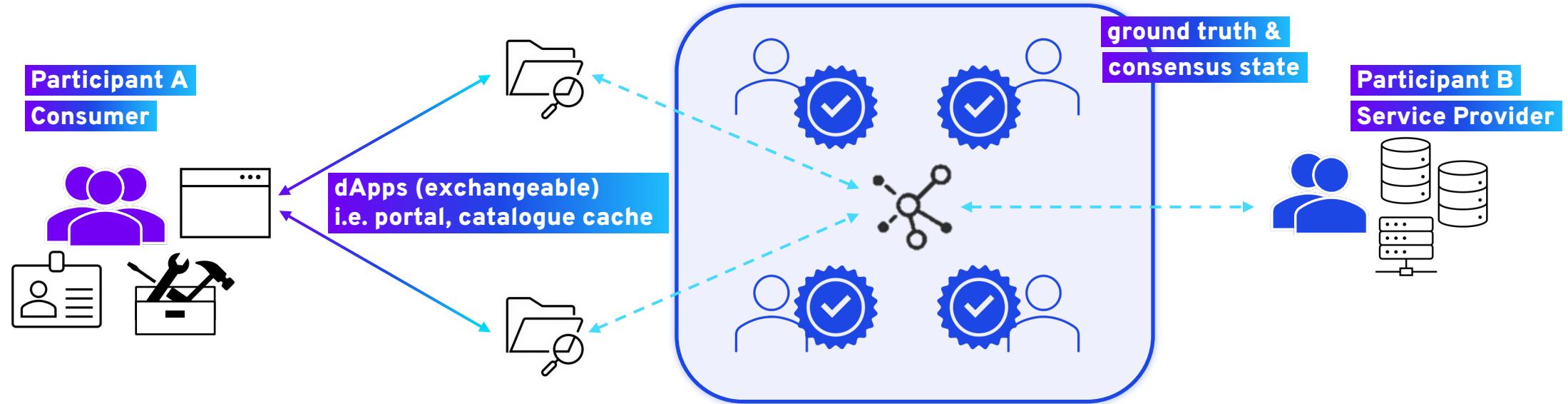


deltaDAO

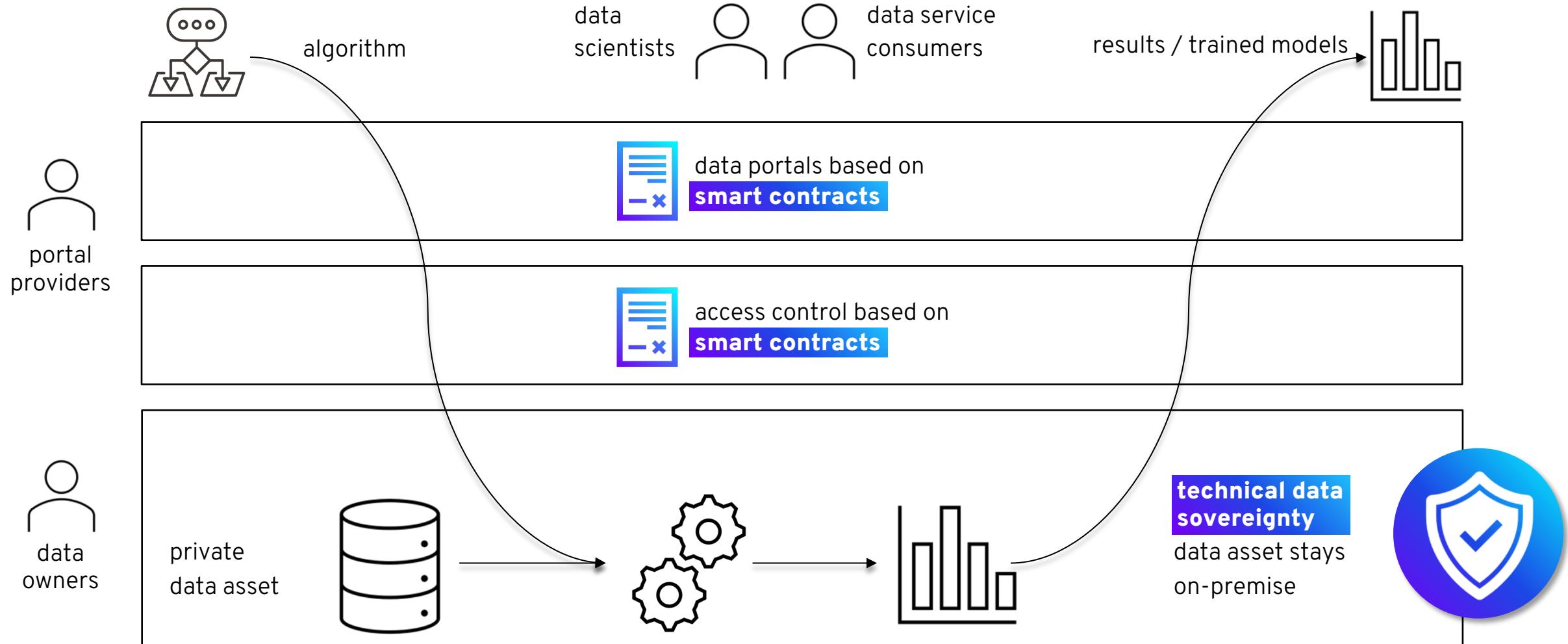
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removing single points of failure



compute-to-data enables true technical data sovereignty



vision Gaia-X & European data economy / data act

fairness
&
competitiveness

GDPR-compliance
&
data security

increase access,
lower barriers
& transaction costs

minimize lock-in
&
open-source software

incentives to share
&
incentives to collaborate

enable investments,
foster innovation,
& fair returns

auditability,
provenance &
transparency

open private data
&
increase B2B use

reduce fragmentation
& EU-wide regulatory
framework

guiding principles

reuse existing software as much as possible

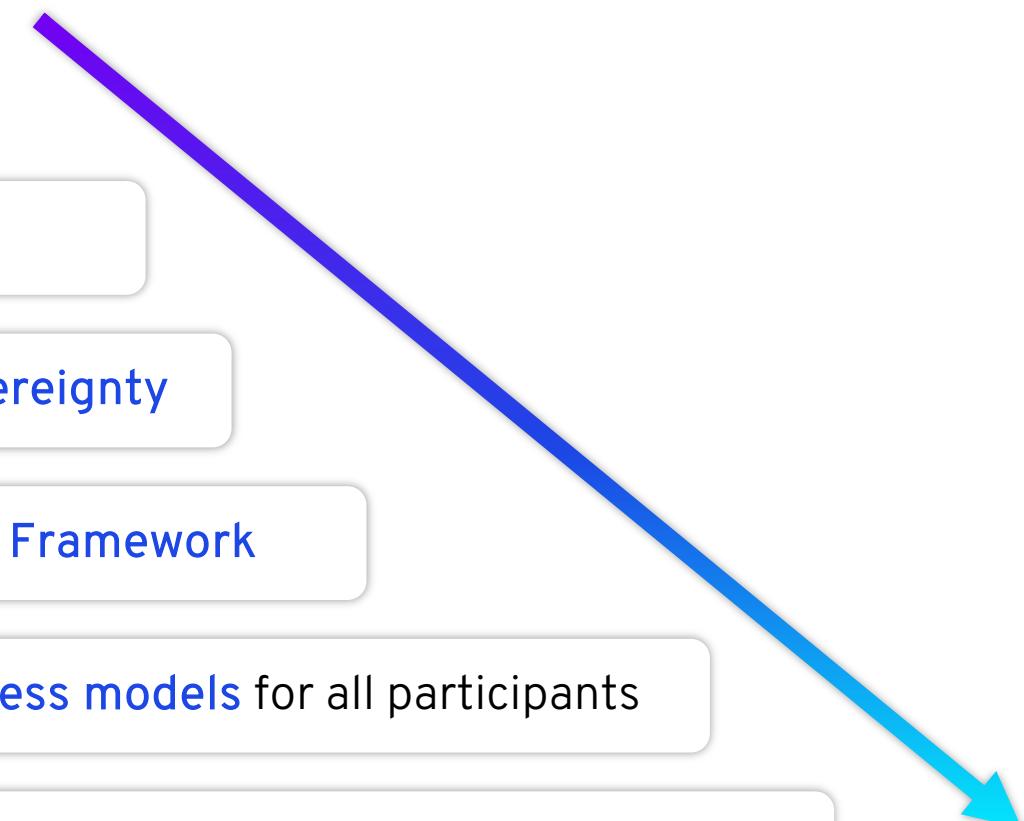
be transparent, use free open-source

enable technical data sovereignty

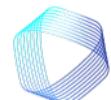
enable Gaia-X Trust Framework

sustainable business models for all participants

no lock-in, no central point of failure or control



made with love and 100% free open-source technology



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VMware Tanzu™



ocean



solidity



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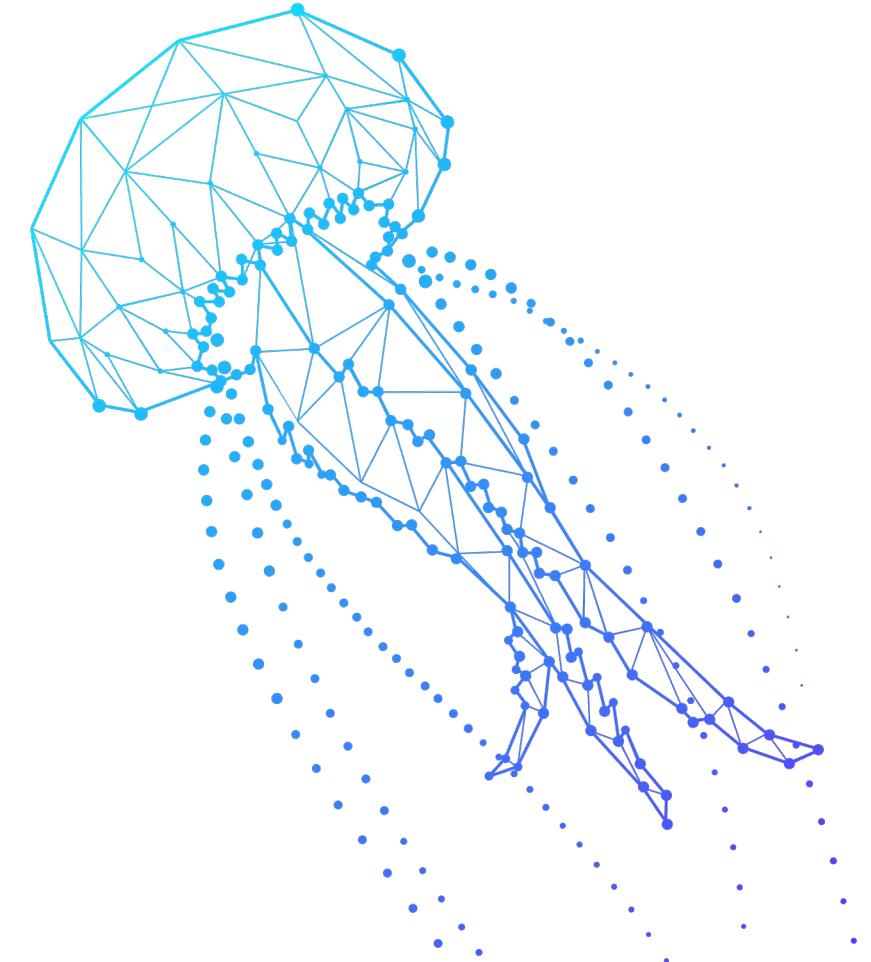
Minimal Viable Gaia-X portal



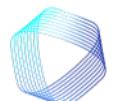
powered by
Ocean Protocol



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portal.minimal-gaia-x.eu



Hackathon #1 - First Minimal Viable Gaia-X Demonstrator

A screenshot of the MVG Portal Demonstrator website. The top navigation bar includes "Publish", "Profile", a search icon, "Connect Wallet", and a settings icon. The main title is "MVG Portal Demonstrator" with a subtitle "A platform to find, publish and consume Data Services in the Gaia-X Test Network." Below this, it says "powered by ocean". On the left, there's a large blue button with a play icon and the text "START NOW". On the right, there's a section titled "Gaia-X on Ocean Protocol Academy" with a description of the platform's aims. The background features abstract blue wavy lines.

<https://portal.minimal-gaia-x.eu>

Video: <https://youtu.be/R49CXPTRamg>

Medium [Minimal Viable Gaia-X blogpost](#)

for F.A.I.R. science and to connect researchers & businesses



Development build of the Universitat de Lleida portal for the Gaia-X hackathon #2.

Universitat de Lleida

publish account browse

<https://udl.portal.minimal-gaia-x.eu>

UDL Science and Research Portal

An open research and science platform following the FAIR guiding principles of findability, accessibility, interoperability and reusability.

powered by Ocean Protocol

ocean

Goal

The Universitat de Lleida MVG Portal aims to accelerate the progress of research and science, increase the quality of data, and foster collaboration between research and educational institutions. On the research portal, data scientists and researchers can find, consume and share research data sets and algorithms. Depending on the publisher's decision, the data assets can be consumed either by granting compute or download access to the data assets.

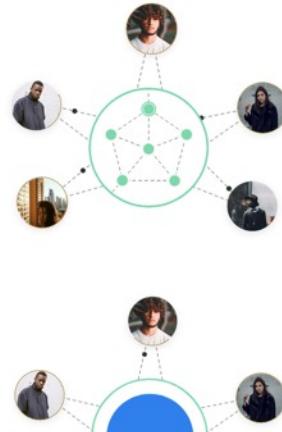
for SMEs and GDPR-compliant data usage

Development build of the foreverontheblockchain portal for the Gaia-X hackathon #2.

foreverontheblockchain account browse Search... <https://forever.portal.minimal-gaia-x.eu>

GDPR compliant data monetization with Compute-to-Data

powered by Ocean Protocol



01 compute-to-data

Compute-to-Data, powered by Ocean Protocol, enables privacy-preserving data monetization for anyone. A trusted algorithm is brought to the data and is executed on-premise while the data always stays with us. We keep full ownership and control while you are invited to obtain valuable insights from our customer base. Ocean Protocol solves the trade-off between monetizing private data and the risk of exposing it while being fully

Medium [foreverontheblockchain Blogpost](#)

for regulators and the finance industry



Development build of the safeFBDC portal for the Gaia-X hackathon #2.

safeFBDC Portal account browse Search... Connect Wallet ⚙️

powered by Ocean Protocol

ocean

20
21

safe FBDC

Our vision Our vision of FBDC is a federated ecosystem that provides business, academic, and regulatory stakeholders with a secure, data sovereignty-preserving infrastructure for the exchange and AI-powered mobilization of financial data.

- We develop, prototype, and validate infrastructures for the processing and secure exchange of financial data.
- We ensure that data owners retain sovereignty over their data.
- We develop AI-powered applications to process, exploit, and monetize distributed datasets based on various use cases.
- We ensure the compatibility of our structures and developments with the requirements of the markets and with important data structures under development, such as Gaia-X or International Data Spaces.

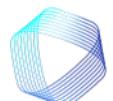
20
21

Background

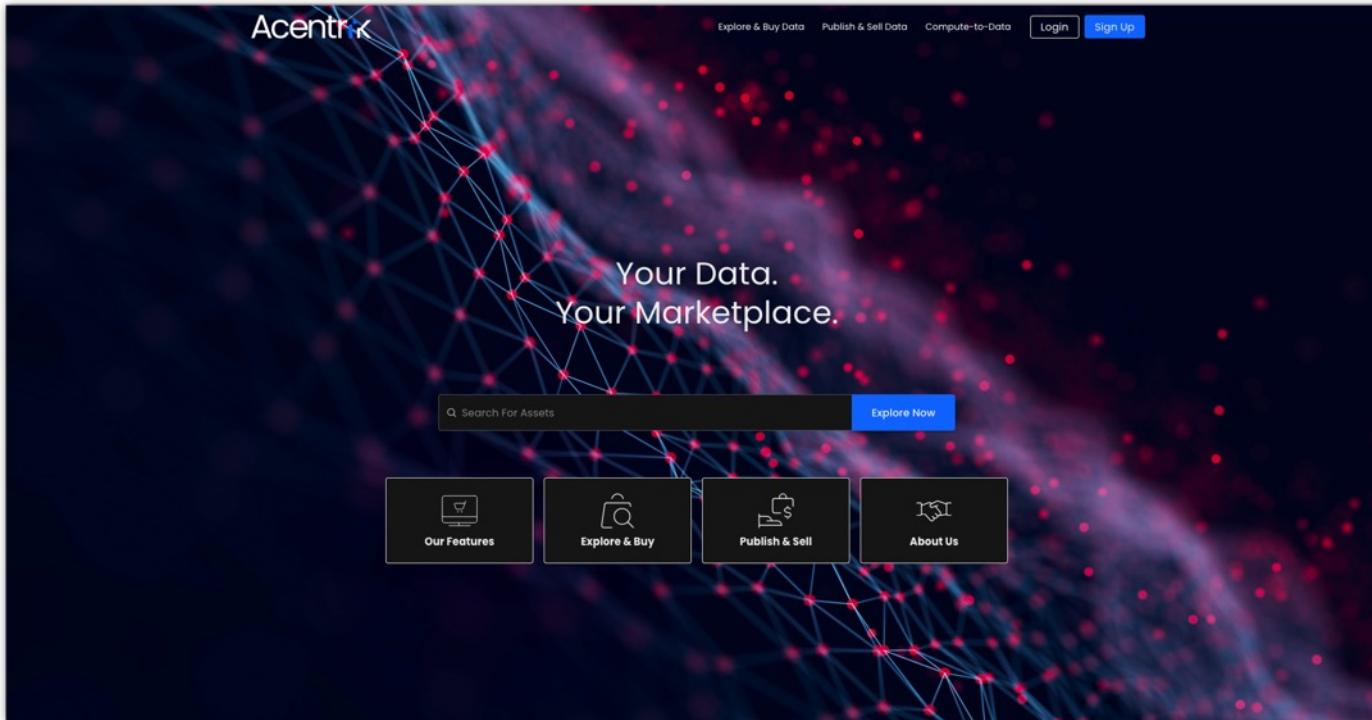
safeFBDC is a research project funded by the Federal Ministry for Economic Affairs and Energy (BMWi) with a three-year project duration (2021-2023). The consortium under the leadership of TechQuarter consists of eleven founding and 30+ associated partners covering a large part of the German financial industry and beyond.

20

<https://safefbdc.portal.minimal-gaia-x.eu>



for enterprise marketplaces and cloud service providers

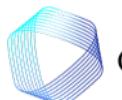


<https://sandbox.acentrik.io/>

Medium [Acentrik blogpost](#)

The Acentrik marketplace page shows a grid of asset cards. Each card includes a thumbnail, title, publisher, description, and purchase/download options. The cards are categorized by type (e.g., Algorithm, Dataset, Compute) and industry (e.g., Healthcare, Manufacturing).

- Handwriting Recognition** (Algorithm, Healthcare)
Published by Daimler South East Asia
Description: This dataset consists of more than four hundred thousand handwritten names collected through...
- Micha's Test** (Algorithm, Healthcare)
Published by Energy Web Foundation
Description: Id rather not describe id rather not describe id rather not describe id rather not...
- Heart Attack Prediction Algorithm** (Algorithm, Healthcare)
Published by Daimler South East Asia
Description: Use this algorithm to gain insights on the heart attack dataset. This is for testing purposes only.
- Customer Preference for Mercedes Vehicles** (Dataset, Manufacturing)
Published by Daimler South East Asia
Description: This dataset sheet is a record of Mercedes vehicle types, categories, subcategories, their release year and counts of...
- Vehicle Crash Reporting Data** (Dataset, Manufacturing)
Published by Ocean Protocol
Description: This data sheet is a record of vehicle crash reports detailing all important crash information, including crash...
- Vehicle Break Failure** (Algorithm, Manufacturing)
Published by Ocean Protocol
Description: This algorithm calculates the Top 5 vehicle models with break failures against the vehicle crash records of...
- Key Supplier Market Share** (Dataset, Manufacturing)
Published by Ocean Protocol
Description: The statistic Mercedes suppliers worldwide and the parts they supply from 2010 to 2015, based on worldwide...
- Measuring Innovation using...** (Dataset, Manufacturing)
Published by Qaudiv
Description: This dataset is designed to show a proxy of innovation measurement from changes in sales (which Fortune 500...

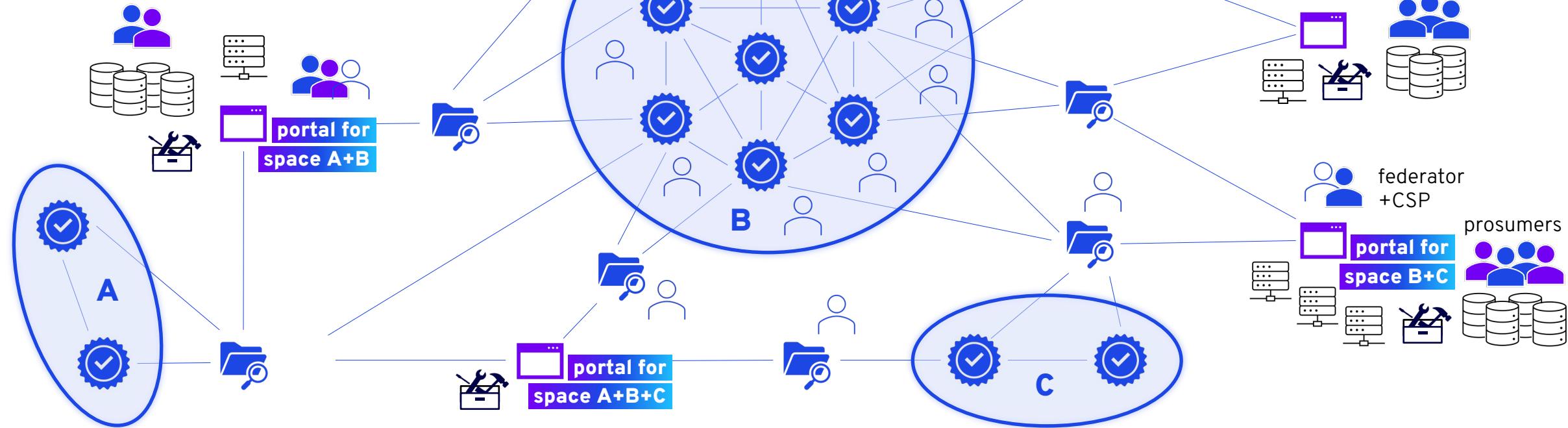
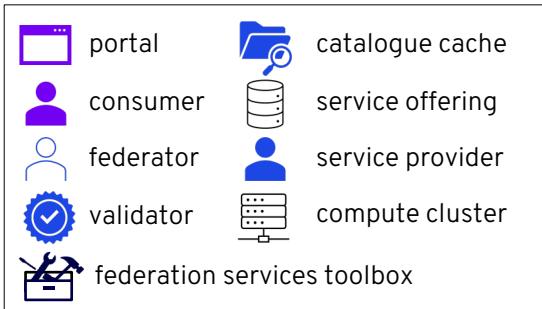


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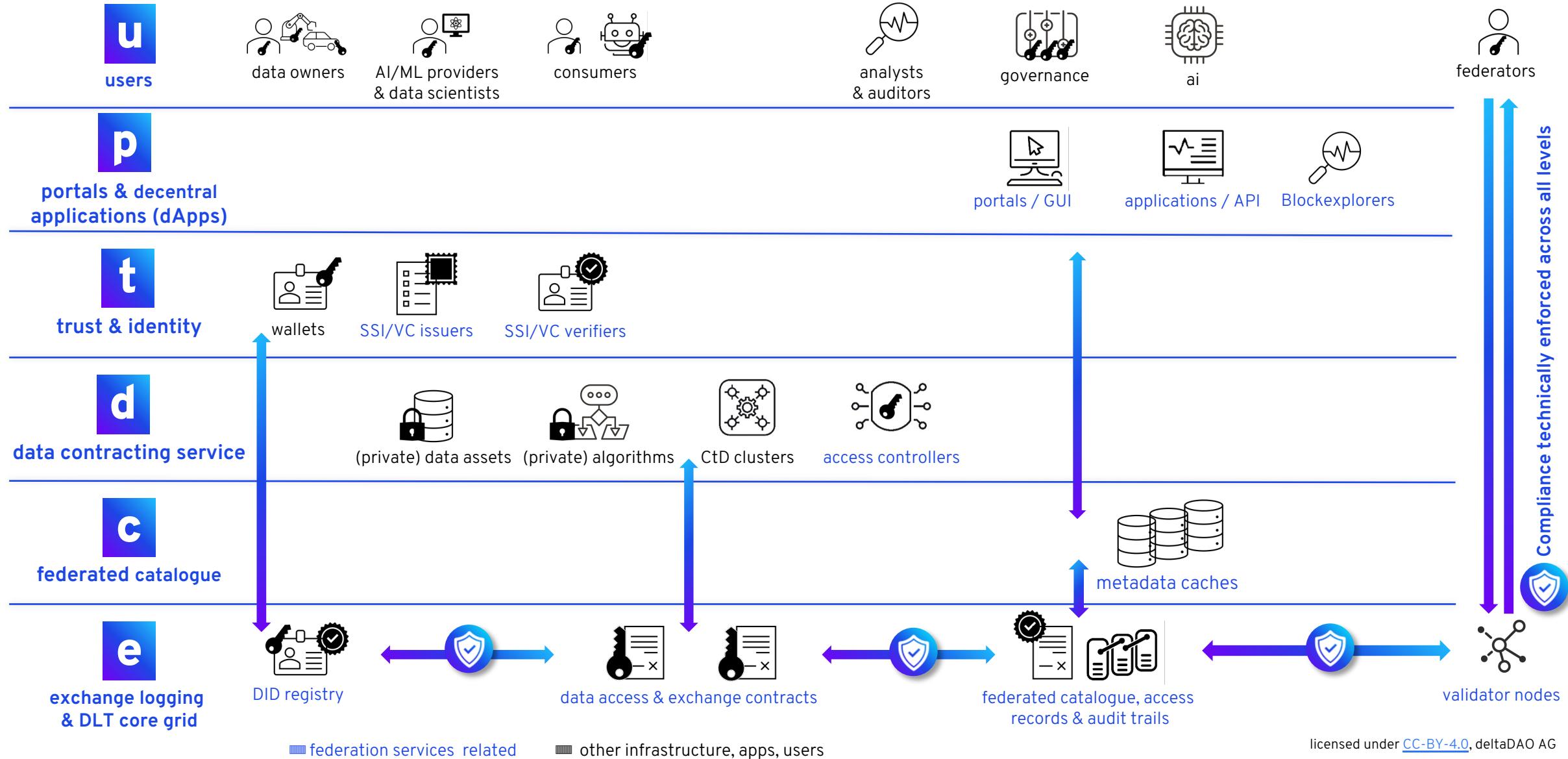
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introduction of a Minimal Viable Gaia-X

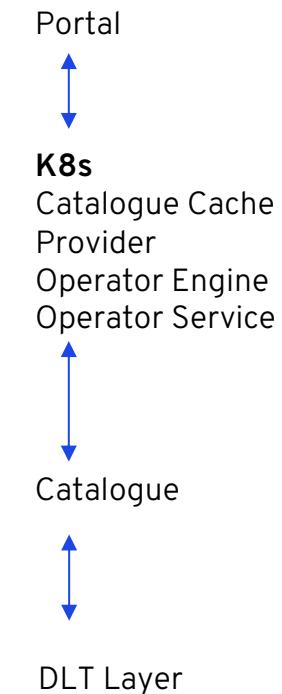
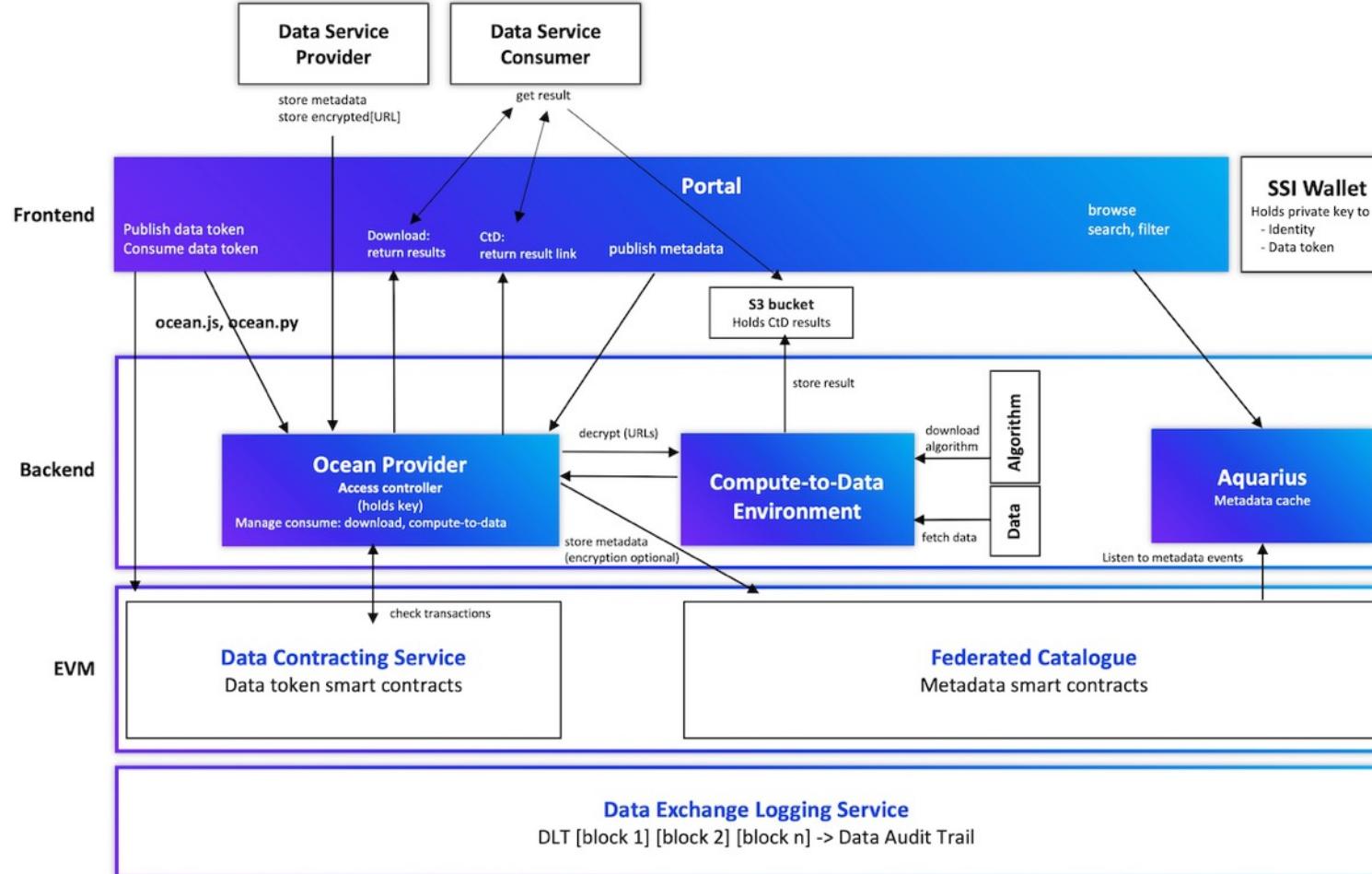
creation and connection of complex services from atomic and elementary services



MVP Gaia-X federation services & decentralized core grid



deep dive #1



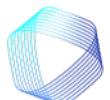
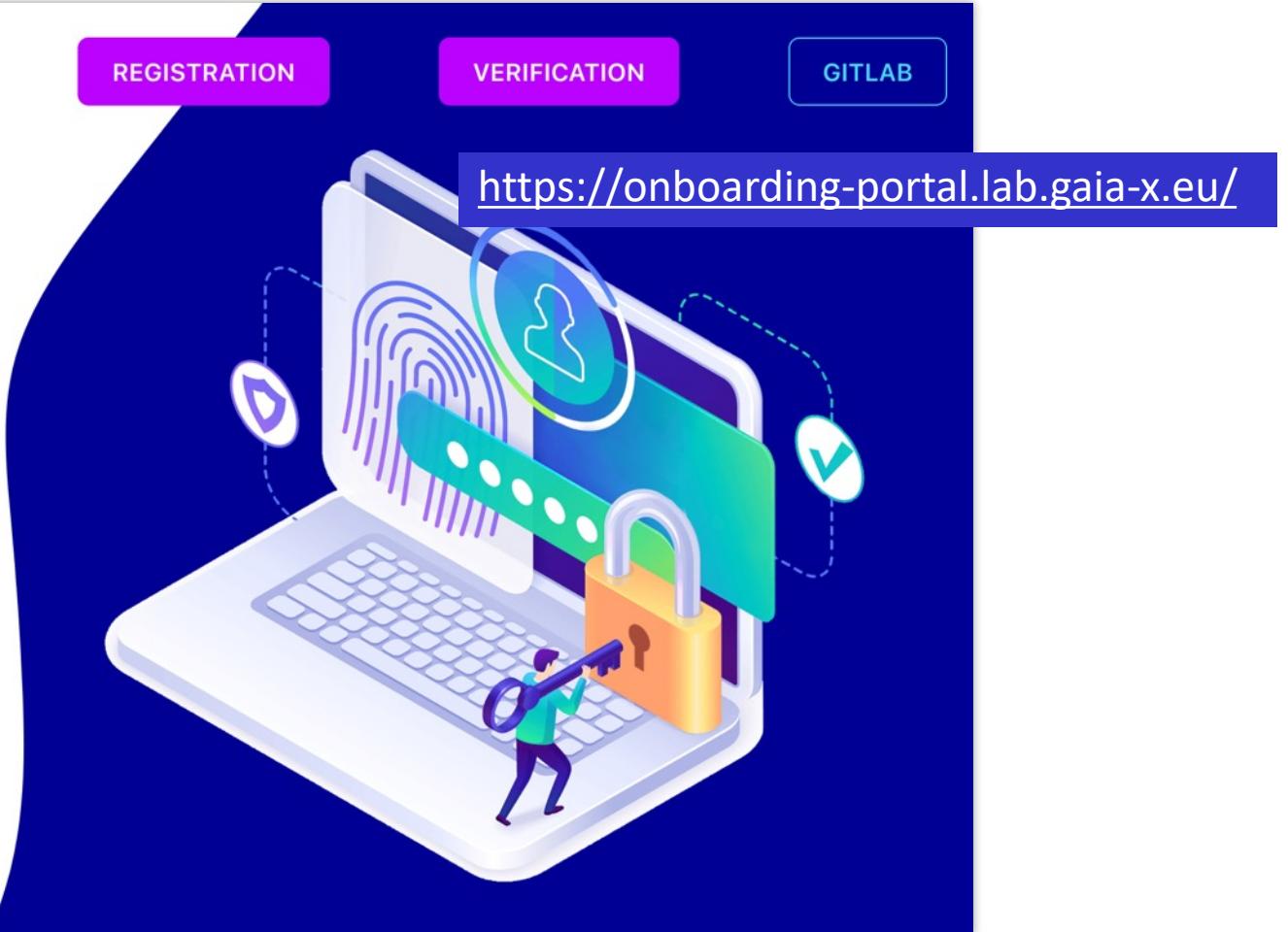
Gaia-X Lab 0.8.3

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](#)

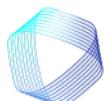


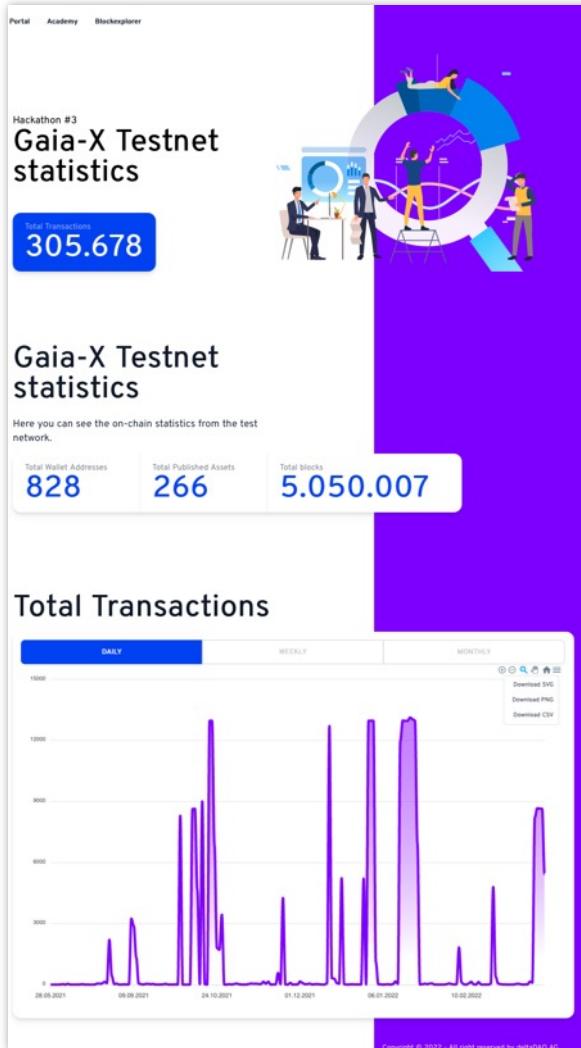


3. List of defined trust anchors

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>

https://registry.gaia-x.eu/api-docs/#/Trust%20Anchor/post_api_trustAnchor





May 2021 – March 2022

Total Transactions

314.087

Total Wallet Addresses

828

Total Published Assets

266

Total blocks

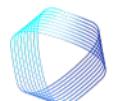
5.050.007

Hackathon 3
> 4600 Transactions
> 100 Gaia-X Participant Credentials

<https://stats.minimal-gaia-x.eu/>

Repositories

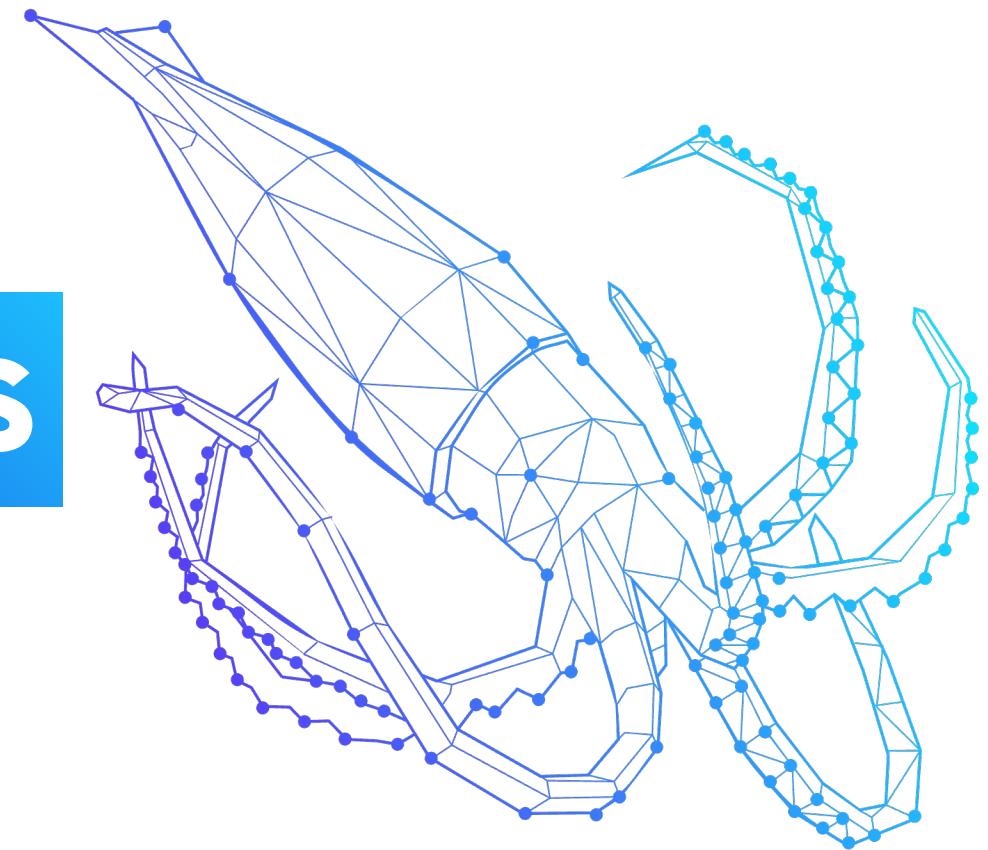
- <https://github.com/deltaDAO/gaia-x-testnet-statistics-api>
- <https://github.com/deltaDAO/gaia-x-testnet-statistics>
- <https://github.com/deltaDAO/gaia-x-snapshot>



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Minimal Viable Gaia-X Features



decentralized catalogue, minutes to publish and consume



gaia-x

104 results

DATASETS **ALGORITHMS** **CATEGORIES**

		SORT	Published
FULL - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Algorithm)	TENANE-58	ALGORITHM	1 OCEAN
QUICK - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Algorithm)	STUJEL-8	ALGORITHM	1 OCEAN
Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Dataset)	INVDOL-81	DATA SET	1 OCEAN
Provider tests	PERWHA-66	ALGORITHM	1 OCEAN
Provider test	BILCOD-50	DATA SET	1 OCEAN
Bids test	VIBSEA-6	ALGORITHM	1 OCEAN
Test Dataset	GENSHA-68	DATA SET	1 OCEAN
Foreverontheblockchain Algorithm	JUDSTA-51	ALGORITHM	1 OCEAN
Foreverontheblockchain Dataset	QUICLA-8	DATA SET	1 OCEAN
Yolov5 Algorithm	CONWHA-61	ALGORITHM	1 OCEAN
Yolov5 Dataset examples	DOWLIN-26	DATA SET	1 OCEAN
QUICK - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox	ADACUT-79	ALGORITHM	1 OCEAN
FULL - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox	ADACUT-79	ALGORITHM	1 OCEAN
Data Fusion Dataset - Copernicus Sentinel-1 SLC IW and Sentinel 2 L2A	HUBHER-51	DATA SET	1 OCEAN

gaia-x

Publish

Highlight the important features of your data set or algorithm to make it more discoverable and catch the interest of data consumers.

Publishing Data Set

Successfully published. [How create a price on your data set.](#)

GO TO DATA SET →

Collected Form Values

```
{
  "name": "",
  "author": "",
  "dataSetConditions": {
    "name": "",
    "symbol": ""
  }
}
```

YOLOv5 Image Classification Sample Data (POC)

GAIA-X Testnet

DATA SET Inspired Lobster Token — INSLOB-11

Published By **0x68C2...246B**
5 days ago — updated 5 days ago

Service Online / Available
Type Machine Learning
Domain Mobility

About this Data Service Offering

This data service offering consists of data for a real-time object detection algorithm, which identifies specific objects in a sample set of videos and images. The algorithm uses features learned by a deep convolutional neural network to detect an object.

The YOLOv5 algorithm is listed in the [Minimal Viable Gaia-X Portal](#) here.

This data service can be translated to many other use cases, i.e. traffic detection, smart cities, agricultural use cases etc.

About the Use Case

This use case demonstrates how algorithm and data providers can train and monetize their machine learning scripts by making them available in Gaia-X. At the same time consumers in Gaia-X can use existing and well-trained models for classification, analysis and forecasting without the need to share their data and/or acquire personnel or

USE

zp
73.25 MB ≈ €2.51

Select an algorithm to start a compute job

Search by title, datatoken, or DID...

YOLOv5 Object Classification Algorithm (POC) ↗
LoopFor-49 | 0x68C2...46B1A6C67E52895394144724BcC5159018E446B

You will pay **5 OCEAN** ⓘ

BUY COMPUTE JOB

You do not have enough OCEAN in your wallet to purchase this asset.

<https://catalogue.minimal-gaia-x.eu>

Tutorial: <https://youtu.be/eAbnM5bfEMc>



SSI integration & access control for technical sovereignty

Set allowed algorithms

Selected Algorithms

Search by title, datasetoken, or DID...

<input checked="" type="checkbox"/> Demonstrator Algorithm A European Data Economy in 2021 ↗ CERFIS-7	1
<input type="checkbox"/> QUICK - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Algorithm) ↗ REDMHA-3	1
<input type="checkbox"/> FULL - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Algorithm) ↗ TENNAE-58	1
<input type="checkbox"/> QUICK - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox (Algorithm) ↗ STUUEL-8	1
<input type="checkbox"/> Provider tests ↗ PERIMA-66	1
<input type="checkbox"/> Bids test ↗ VIBSEA-6	1
<input type="checkbox"/> Foreverontheblockchain Algorithm ↗ J00STA-51	1
<input type="checkbox"/> YoloV5 Algorithm ↗ COMMA-61	1
<input type="checkbox"/> QUICK - Copernicus Sentinel Data Fusion with CNES Orfeo toolbox ↗ ADACUT-79	1

Choose one or multiple algorithms you trust to allow them to run on this data set.

All Algorithms

Allow any published algorithm

Allow any published algorithm to run on this data set.

SUBMIT **CANCEL**

Allow ETH Address

e.g. 0x12345678901234567890abcd

ADD

Enter ETH address and click ADD button to append the list. Only ETH address in allow list can consume this asset. If the list is empty means anyone can download or compute this asset

Deny ETH Address

e.g. 0x12345678901234567890abcd

ADD

Enter ETH address and click ADD button to append the list. If ETH address is fall under deny list, download or compute of this asset is denied

Disable Consumption

Disable

Disable dataset being download or compute when dataset undergoing maintenance.

SUBMIT **CANCEL**

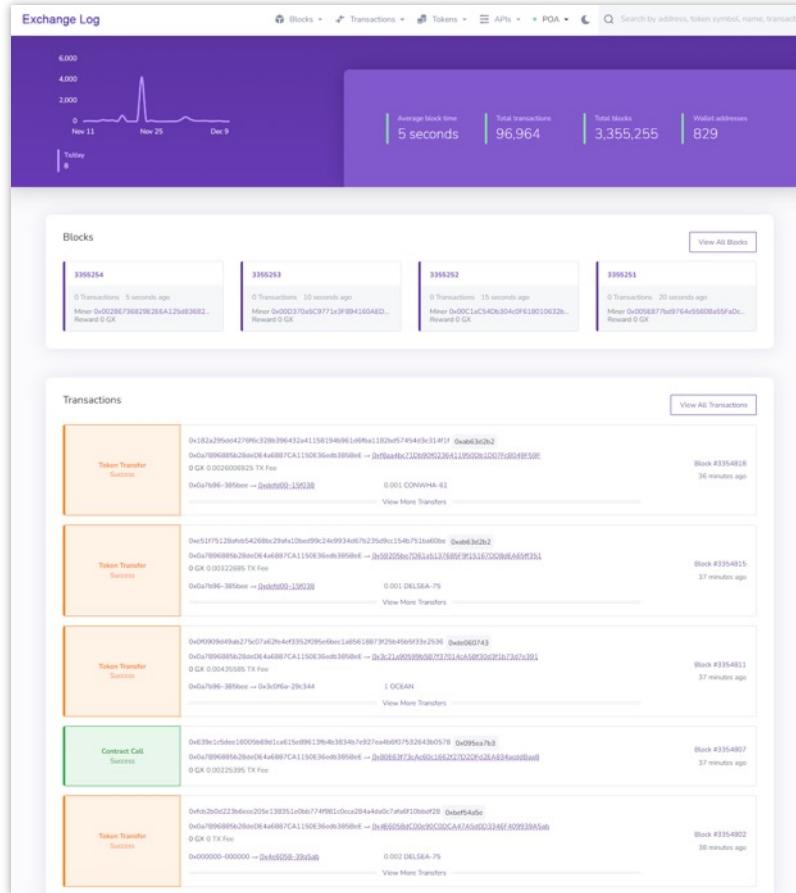
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74 },
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79 "type": [ "VerifiableCredential", "GaiaxCredential" ],
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83 }
```

Tutorial: https://youtu.be/vFfYo8LxbzM?list=PLIQB1A_2lytB5Cf6P0uTTN4hRGbAxw7E

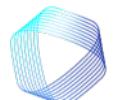


automatic audit trails & security & privacy by design

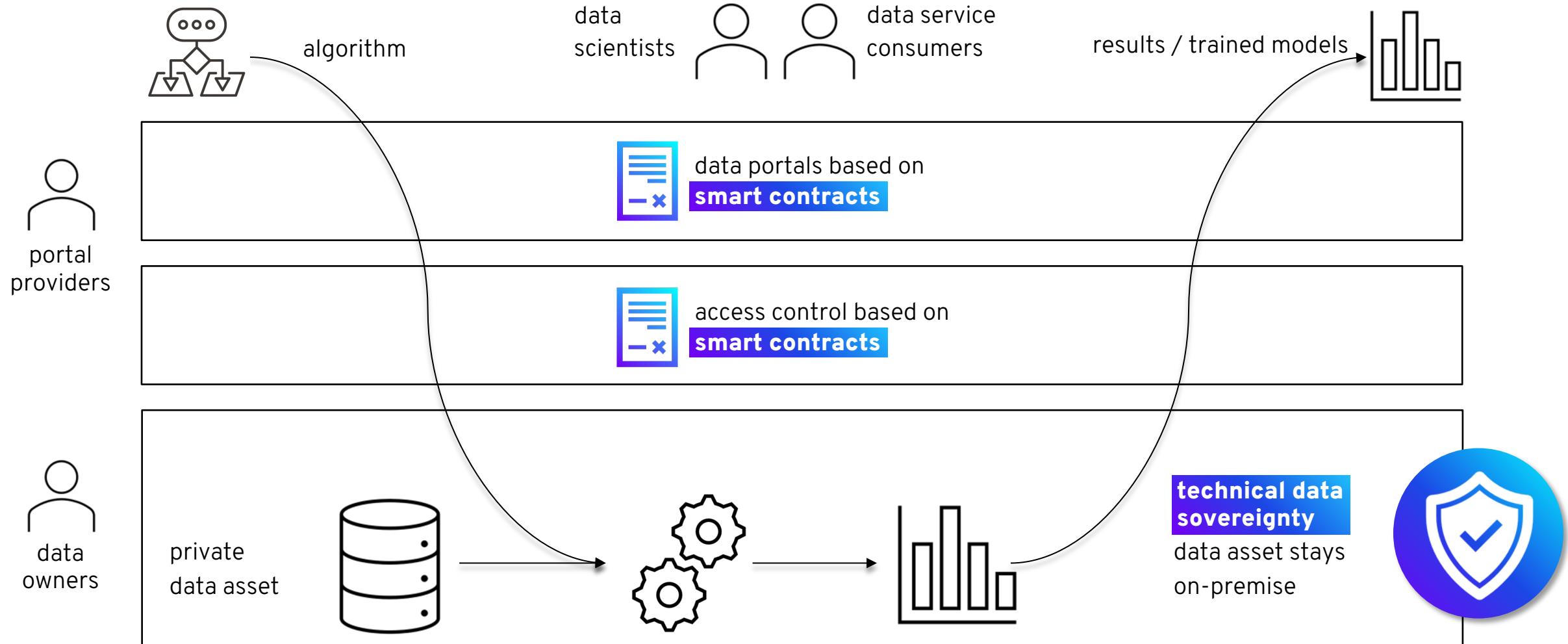


Transaction Details	
Transaction Hash	0x182a295dd4276f6c328b396432a41158194b961d6fb1182bd57454d3e314f1f
Result	Success
Status	Confirmed
Block	3354818
Timestamp	3 hours ago December-12-2021 06:25:50 PM +1 UTC Confirmed within <= 5.0 seconds
From	0xa07b96885b28dede4a6887ca1150e36edb385bee
Interacted With (To)	0xf8aa4bc71db90f0236411950db1d07fc049f59f
Tokens Transferred	<p>From: 0xa07b96885b28de4a6887ca1150e36edb385BeE To: 0x3c0f6a52c84a79eBC52C56Ff8C029a30F929C344 For: 0.998 CONWHA-61</p> <p>From: 0xa07b96885b28de4a6887ca1150e36edb385BeE To: 0x9984b2453eC7D99a73A5B3a46Da81f197B753C8d For: 0.001 CONWHA-61</p> <p>From: 0xa07b96885b28de4a6887ca1150e36edb385BeE To: 0xDefD0018969cd2d4E648209F876ADe184815f038 For: 0.001 CONWHA-61</p>
Value	0 GX
Transaction Fee	0.0022258425 GX
Gas Price	52.5 Gwei

<https://exchangelog.minimal-gaia-x.eu/>



compute-to-data enables true technical data sovereignty



access control

tokenized data access control on DLT

access to data services managed by smart contracts

if a consumer spends a **datatoken**, access is granted
more **conditions** in the SC are possible

**data access rights in the form of datatokens can be transferred on-chain
smart contracts become a tool to pool data and conditionalize data sharing**



access control
token-based data access control on DLT

data portals

buy & sell data services on data portals, enabled by smart contracts

download, stream, or access data via **compute-to-data** enabled by smart contracts

smart contracts enable on-chain datamarkets with integrated price discovery



simplify data exchange and monetization

easy to share, consume, sell and buy

data traceability and integrity

each access to data services is recorded on-chain

results of computations can be registered on-chain
as well

subsequent data uses can be tracked and traced

smart contracts enable trustless traceability and auditability of data services, also for subsequent data use



ensure data traceability and integrity
AI model and Data Lineage Tracking
traceability by design
enabled by smart contracts

price discovery

assets can be **dynamically priced** by the market

price discovery through Smart Contracts

if data is sold the price moves accordingly

community supports data service & price adapts

**smart contracts are the missing piece in a decentralized data economy
they enable the automatic and dynamic pricing of data services**



enable automatic price discovery
by smart contracts

data exchange, monetization & incentives

smart contracts enable **sustainable business models**

incentives of all actors are aligned

data owners, publishers, shareholders, market providers and developers earn fees, managed by Smart Contracts

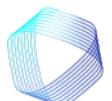
smart contracts enable trustless data exchange and monetization with incentives to cooperate on a platform level and to compete on a product level



**sustainable business models
and incentives**

all participants can rely on a sustainable business model. Incentives of all actors are aligned

portal.minimal-gaia-x.eu



Useful resources after demonstration

Minimal Viable Gaia-X

Portal: <https://portal.minimal-gaia-x.eu/>
safeFBDC: <https://safefbdc.portal.minimal-gaia-x.eu/>
Forever Portal: <https://forever.portal.minimal-gaia-x.eu/>
UDL: <https://udl.portal.minimal-gaia-x.eu/>
Acentrik: <https://acentrik.io/>
Catalogue: <https://catalogue.minimal-gaia-x.eu/>
Exchange Logging: <https://exchangelog.minimal-gaia-x.eu/>
Stats Page: <https://stats.minimal-gaia-x.eu/>
Repositories: <https://github.com/deltaDAO>

Gaia-X Trust Framework

Onboarding Portal: <https://onboarding-portal.lab.gaia-x.eu/>
Verifier API: <https://auditor.gaiax.delta-dao.com/v1/swagger#/Verification%20Policies/verifyVP>
Repositories: <https://gitlab.com/gaia-x/lab/compliance>

Gaia-X Architecture Document

<https://gaia-x.gitlab.io/technical-committee/architecture-document//>

Gaia-X Trust Framework

<https://gaia-x.gitlab.io/policy-rules-committee/trust-framework/>

deltaDAO Minimal Viable Gaia-X Video: <https://youtu.be/R49CXPTRamg>

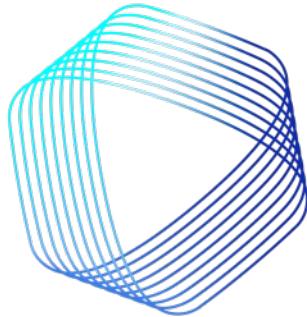
deltaDAO Medium: <https://deltadao.medium.com/>

Knowledge Base: <https://github.com/deltaDAO/Ocean-Protocol-Use-Cases>

Hackathon #3 Presentations:

Overview: <https://gitlab.com/gaia-x/gaia-x-community/gx-hackathon/gx-hackathon-3/-/wikis/GX-Hackathon-3>

SSI Onboarding Tutorial: https://gitlab.com/gaia-x/gaia-x-community/gx-hackathon/gx-hackathon-3/-/wikis/uploads/3d5f6539e21a7c7e476f27a64bfbaa66/20220328_Gaia-X_Lab_Onboarding_Portal_and_Registry.pdf



deltaDAO

data economy solutions – GDPR compliant

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Presented by

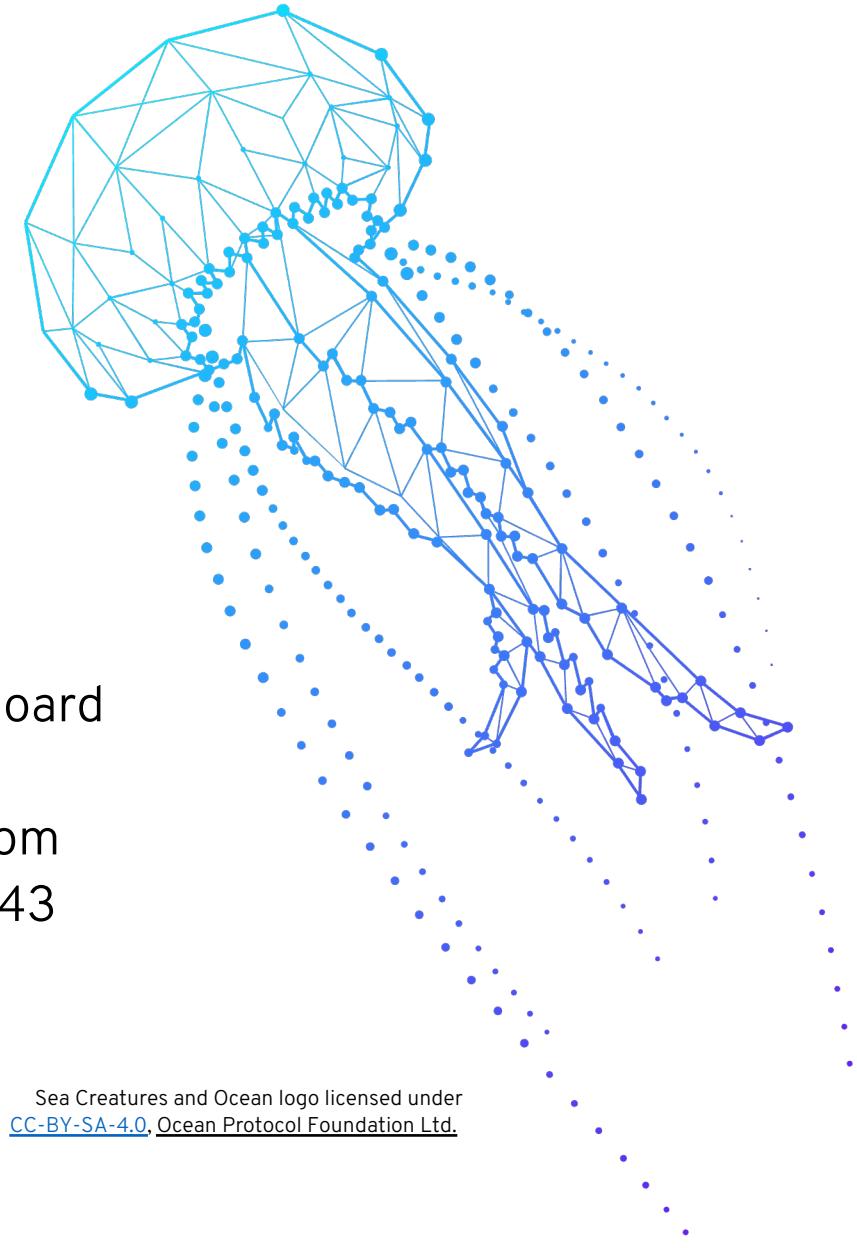
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