

GaiaX Technical workshop

Tecnalia use cases

Gorka Zarate - DATAC

- GaiaX Spain: Technical workshop
- 2/17/2025

A little bit of Tecnalia

TECNALIA is the largest center of applied research and technological development in Spain, a benchmark in Europe and a member of the Basque Research and Technology Alliance. We collaborate with companies and institutions to improve their competitiveness, people's quality of life and achieve sustainable growth. We do it thanks to people who are passionate about technology and committed to building a better society.



COMPETENCE CENTER SPAIN

As **IDSA Competence Center and Implementation Partner (business & technology)**, TECNALIA became the Spanish national benchmark center to promote IDS, develop new business models based on this technology, and guide companies when integrating their own data control processes. 3

IDSA Member, IDSA Competence Center Spain:

European and national R&D projects, (pre-production) pilots, consultancy and dissemination support. Alberto Berreteaga as IDSA Ambassador and IDSA Competence Centre Coordinator. Different working groups collaboration (rulebook, architecture, certification, training, dataspace protocol...) - <https://internationaldataspaces.org>

Gaia-X EU, Gaia-X Hub España (Gaia-x Spain Hub) member. Jesus Maria Santamaria as Gaia-X Hub Spain CTO. Different working groups collaboration (Trust framework, architecture, Clearing Houses, Identity...) - <https://www.gaiax.es>

DATA SPACES BUSINESS ALLIANCE (DSBA)

participant. As member of IDSA and Gaia-X.

ECLIPSE Foundation partner and **ECLIPSE Dataspace Working Group** member, <https://dataspace.eclipse.org>.

BAIDATA Partner - <https://www.baidata.eu/en>

Data Spaces Support Centre (DSSC): not partner but supporting initiatives / working groups: Governance, Technology and Business.

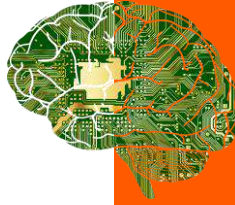
SIMPL: not partner but following the initiative and Community collaboration. - <https://simpl-programme.ec.europa.eu>

Sovity (Commercial provider) Connector as a service (CaaS) user and client (used for demos, internal testing and project support)

Huawei Boot-X (Commercial provider) alliance. Partners with Huawei EDS (Exchange Data Space), solution used to provide Data Spaces Technologies.

dataspaces@tecnalia.com
<https://www.tecnalia.com/en/>

DataSpaces in European projects



OASEES

Open Autonomous programmable cloud appS & Smart Edge
Sensors

The OASEES project aims to create a new programmability framework that will allow edge devices to work together in a decentralized and secure way, using advanced technologies such as AI/ML accelerators (FPGAs, SNNs, Quantum) and a privacy-preserving Object ID federation process. This framework will be fully open-source and developed specifically for Europe.



USE CASES



E-Health: Smart Nodes for Analysis of Voice, Articulation and Fluency Disorders in Parkinson Disease



Energy: EVs fleet coordinated recharging to support optimal operation of electricity grid.



Drone Swarm for area and infrastructure inspection: Drone Swarm over 5G for High Mast Inspection.



Structural Safety for Building and Critical Infrastructure: Swarm powered intelligent Structural safety assessment for Buildings

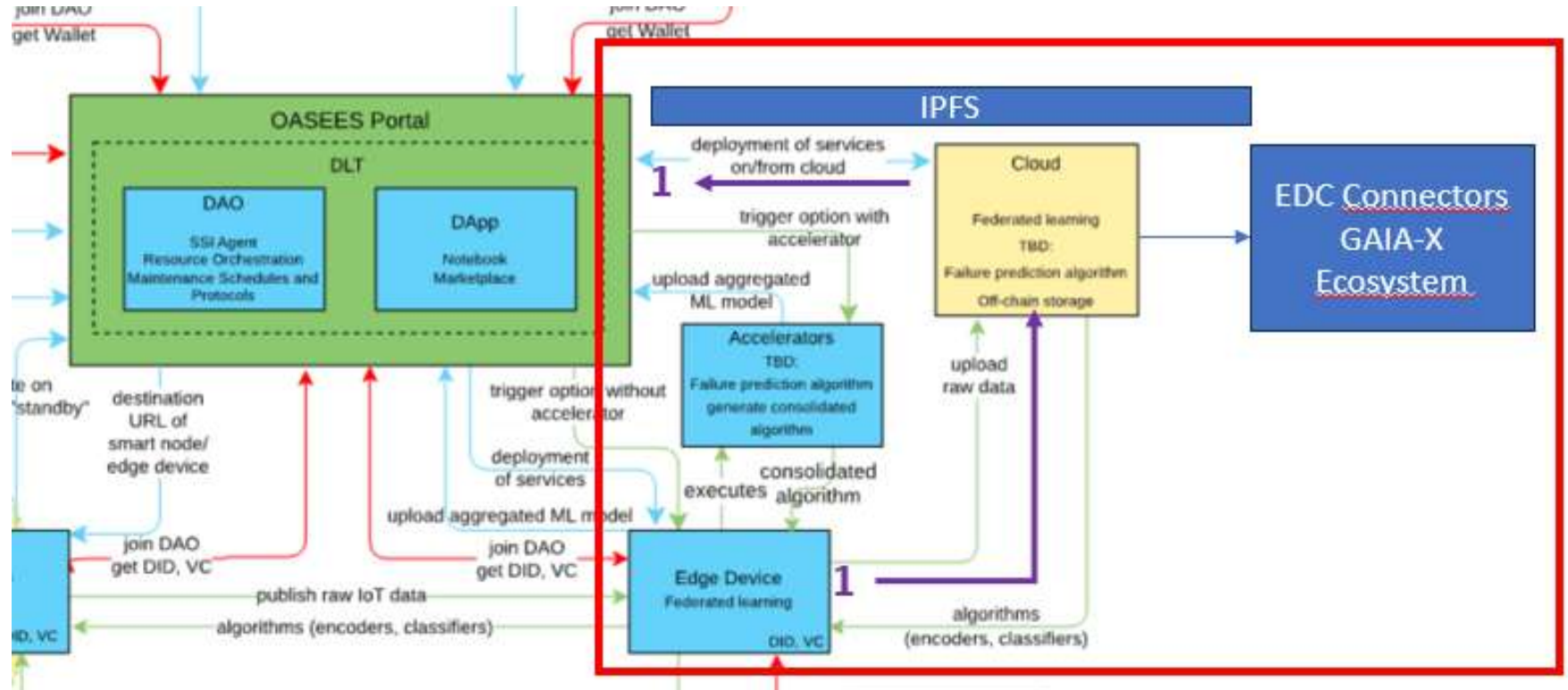


Collaborative robotic automation: : Robotic Swarm powered Smart Factory for I4.0



Wind Energy: Smart Swarm Energy harvesting and Predictive Maintenance Wind turbines

Close view on Use case data gathering



Wind energy Data Product definition






The Data Product Canvas

Name of Data Product: **Blade Acoustic Monitoring Swarm System**

We create the data analytics solution

Who is the customer? **Wind Farms owners – Wind turbine Maintenance companies**

... for the following customers and users

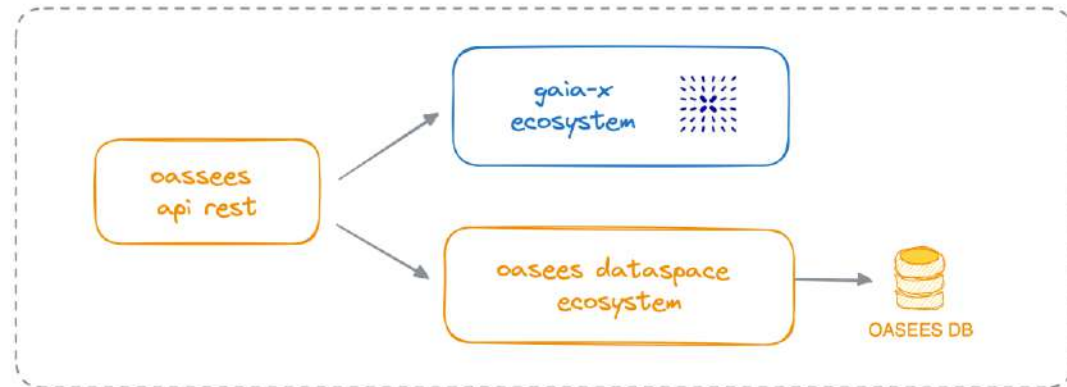
Data Sources	Analytics	Data Product	Customer benefits	Pains and Gains
 <p>What data sources do we need to create customer value?</p> <p>Wind turbines (WT) acoustics monitoring systems: This refers to systems that monitor the acoustic characteristics of wind turbine blades. These systems collect raw acoustic data, providing insights into the sound produced by the blades during their operation.</p> <p>WT blade failure and stop historic. This involves gathering information about the historical occurrences of blade failures and instances where the wind turbine had to be stopped.</p> <p>WT blade maintenance plan. It outlines the schedule and procedures for maintaining and servicing the blades, ensuring optimal functionality and preventing potential failures.</p>	 <p>With which data analytics methods do we generate insights from the data?</p> <p>Signal Processing Methods: identifying relevant features in the sound patterns failures associated with turbine performance and potential.</p> <p>Neural Networks Trained by Distributed Learning Algorithms: Neural networks, a type of artificial intelligence, will be employed to recognize complex patterns in the acoustic data.</p>	 <p>In which form do we provide the data service to our users and customers?</p> <p>Technical Reports Based on Processed Acoustic Dataset: information included in the reports consists of datetime, wind turbine id, wind turbine height and diameter, and labelled anomalies.</p> <p>Wind Turbine Blades anomaly detection: Unusual patterns or anomalies in the acoustic data that can indicate issues with the blades.</p> <p>Maintenance Prediction and Impact on LCOE (Levelized Cost of Energy): potential impact of maintenance activities on the Levelized Cost of Energy</p> <p>Dynamic Maintenance Plan According to Blade Health Status: The data product includes a dynamic maintenance plan that adapts based on the real-time health status of the turbine blades.</p> <p>Anonymized Blade Acoustic Data: To address privacy concerns, the product includes anonymized versions of the raw acoustic data.</p>	 <p>What added value and what advantages does the data service generate to our users and services?</p> <p>This data service adds value by improving turbine performance, offering non-intrusive monitoring, enabling proactive analysis and detection, ensuring algorithm reliability, evaluating maintenance cost impact, and providing anonymized data for further analysis and development.</p> <p>These advantages collectively contribute to a more efficient and cost-effective management of wind turbine operations.</p>	 <p>What wishes, problems and challenges do our customers and users have?</p> <p>Wishes:</p> <ul style="list-style-type: none"> - Privacy and data protection between stakeholders (Wind Farms owners – Maintenance companies) <p>Problems:</p> <ul style="list-style-type: none"> - Lack of availability, quality and veracity of the raw acoustic blade data. - Expensive blade failure detection methods. - Wind turbine shutdown for blade inspection. <p>Challenges:</p> <ul style="list-style-type: none"> -Improve Operational and Maintenance Expenditure elaborating dynamic maintenance plans. -New and innovative alternatives to diagnose blade status.

The process to make a Data Product for Gaia-X

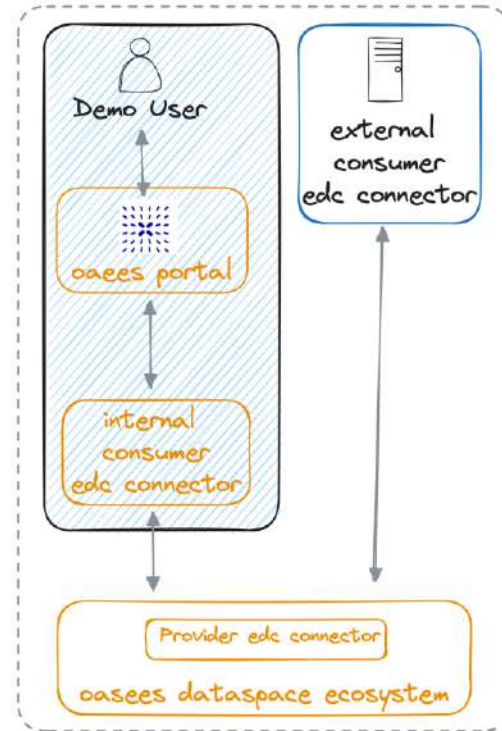
1 Store the data



2 Register the data-products



3 Consume the data



DATA PRODUCT generation (Technical Report)

BAMS Laboratorio Madrid

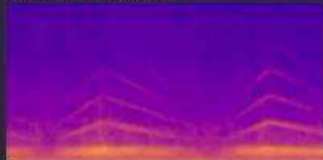


BAMS Laboratorio Madrid

[15:27:34] - ▲ Anomalia 1

Channels: 2, SampleRate: 48000, BitRate: 384000

Spectrogram Original WAV



Spectrogram Filtered WAV



Alert History



TEMPERATURE



HUMIDITY



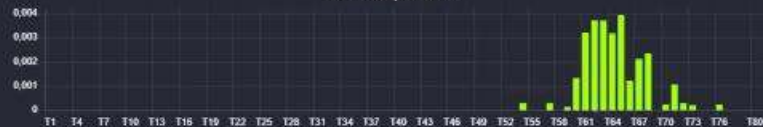
PRESSURE



WIND_SPEED



Audio Freq Filtered



Audio Freq Filtered AVG



WIND_DIRECTION



Checking that the DATA PRODUCT is stored in IPFS

The screenshot displays the Swagger UI for the IPFS API for Data Products - OASEES 0.1.0 OAS 3.1. The browser address bar shows the URL `172.26.41.12:8088/docs`. The page title is "IPFS API for Data Products - OASEES 0.1.0 OAS 3.1".

Under the "Servers" section, the "default" server is selected, with the base URL `/dataproducs`.

The "default" section lists the following API endpoints:

- POST** `/{dataproducs_id}/path/` Create Folder Structure In Ipfs
- POST** `/{dataproducs_id}/files/add` Upload Files To Ipfs
- GET** `/{dataproducs_id}/files` Get Files In Zip
- GET** `/{dataproducs_id}/file` Get File
- GET** `/{dataproducs_id}/items` Get Item List By Path
- DELETE** `/{dataproducs_id}/items` Delete Item

The "Schemas" section is expanded, showing the following schemas:

- `Body_upload_files_to_ipfs__dataproducs_id__files_add_post` Exposed as `object`
- `HTTPValidationError` Exposed as `object`
- `ValidationError` Exposed as `object`

Generating the Verified Credentials for the Data Product offer

The screenshot displays the Swagger UI for the Oasees API. The browser address bar shows the URL `oasees9102/docs/#/`. The page title is "Oasees 0.1.0 (GA 3.1)". Below the title, there is a section for "Oasees API" and another for "Oasees testing API".

Oasees API

- POST** `/dsddocument` Create Dd
- POST** `/legalparticipant` Create legal participant
- POST** `/dataproducer` Create dataproducer with resources
- GET** `/dataproducer/{id}` Get dataproducer by name
- POST** `/publish-dataproduct` Create and publish dataproducer
- GET** `/dataproducers` Get dataproducers list
- GET** `/cesrecords` Get ces records

Oasees testing API

- POST** `/signVC` Sign VC
- POST** `/sign-vp` Sign VP
- POST** `/compliance` Call compliance
- POST** `/credential-verify-credential` Call verify credential

Data Product consumption

The screenshot shows a web browser at localhost:3000/catalogue. The navigation bar includes a menu icon, the GASEES logo, and links for PRODUCTS, PRICING, and BLOG. A '+ DATA PRODUCT' button and a user profile icon are also present. The main content area is titled 'Catalogue' and features three product cards:

- Blade acoustic monitoring swarm system technical Report**
Technical Reports Based on Processed Acoustic Dataset. Information included in the reports consists of datetime, wind turbine id, wind turbine height and diameter, and labelled anomalies.
[SEE MORE](#)
- Parkinson disease diagnostic and rehabilitation**
A data product that not only detects the presence of Parkinson's disease but also assesses its severity. The deep learning model will provide a quantitative measure of disease severity based on specific voice features. This information can assist...
[SEE MORE](#)
- Charging Points info for Electric Vehicles Fleet managers**
The data product is the result of advanced analytics methods applied to diverse data sources, providing a detailed overview of the electricity landscape for charging stations.
[SEE MORE](#)

DataSpaces in real projects (Inkolan)



INKOLAN



Problem: Gas leak due to outdated data used for civil works

«Gas leak at the works to extend the car park at the Santiago Bernabéu stadium. According to initial reports, the leak occurred at around 8.40 am, when workers on the renovation, which is being carried out by Acciona, accidentally punctured a 20-inch diameter steel gas pipe.»

Madrid 05/22/2024.

The use of obsolete information or information not provided through INKOLAN may cause security incidents on the network, with risk to the population.



INKOLAN Starting Business Model - Data Consumption - Madrid City Council

The screenshot displays the INKOLAN web portal interface. At the top left is the 'inkolan' logo with the tagline 'NETS FOR SMART TERRITORIES'. To the right is the Madrid City Council logo. The main interface includes a search bar for 'BARRIO', a 'Abrir' button, and a summary of '54.719 Descargas asociadas'. Below this are two maps: a larger one on the left showing a highlighted area in yellow, and a smaller one on the right titled 'Obras asociadas' showing a dense cluster of colored markers. To the right of the maps are two sliders for filtering: 'Distancia suidiles' (set to 0,13 and 75,00) and 'Dif días descarga - fin de obra' (set to 0 and 1500). At the bottom, there is a timeline navigation bar with months from febrero to julio, and a table with columns 'ID_OBRA', 'Distancia suidiles (m)', and 'Dif días descarga y fin de obra'.

ID_OBRA	Distancia suidiles (m)	Dif días descarga y fin de obra
5f8a385f340f478b90cc3a95cc8a3a88	0,13	119
4c931d4d82cb4363495151c890e7d959a6	0,13	180
c076e78-9400-451d-b920-9de8bb3e3a8f6	0,13	533

Once consumers select data on the INKOLAN portal, they receive a URL to download a ZIP file containing the CAD (DWG) files they have ordered.

These CAD files can then be uploaded to their GIS tools to incorporate into their maps. Once the consumer receives the URL, they can download the ZIP files as many times as they wish.

02

Adapting business to data space

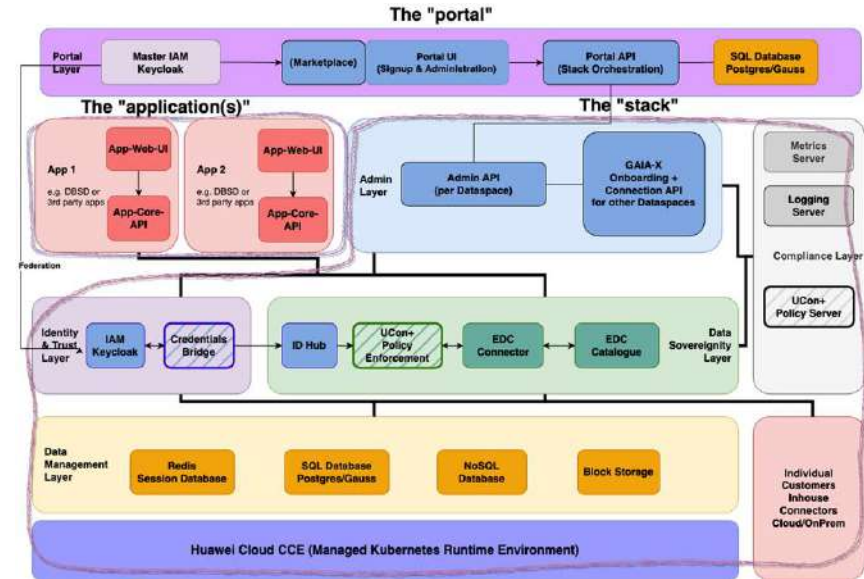
Using the BOOT-X Lighthouse

Why BOOT-X?

Boot-X is part of EDS (Exchange Data Space) and provides the infrastructure and technology needed to create a **complete data space environment** or join an existing one.

Boot-X **supports the Gaia-X Trust Framework** and provides interfaces to the GXDCH, making it easy to onboard new participants or services. It follows the EDC framework, implementing data transfer, cataloging, and identity management features. It further enhances these features with advanced identity management, policy management, and monitoring in a production-ready environment.

Boot-X is the technical enabler for **real-world use cases** and applications using data space technologies. Tecnalia and Inkolan are an example of a fully operational use case.

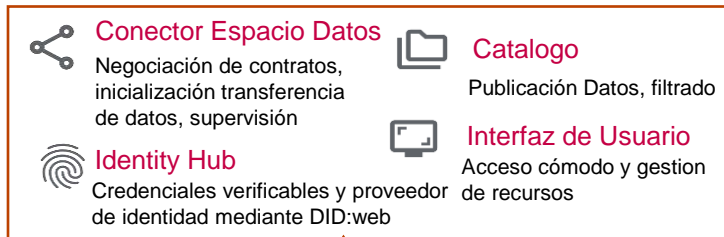


CASO DE NEGOCIO DE INKOLAN CON BOOT-X

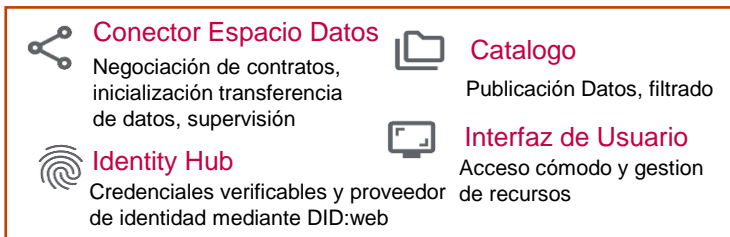
Participantes Espacio de Datos



INKOLAN (Data Broker)

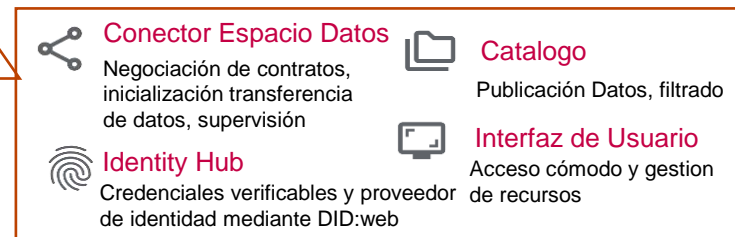


Operador de red (Data Provider)



Comunicación a través de DSP y su especificación para peticiones al **catalogo**, **negociación de contrato**, y **gestion de las transferencias** (inspección)

Ayuntamiento (Data consumer)



CASO DE NEGOCIO DE INKOLAN CON BOOT-X

Espacio de Datos- Proceso

INKOLAN



Servicio de Registro

Autoridad central del espacio de datos



Centro de Identidad

Credenciales verificables y proveedor de identidad mediante DID:web

- Proporciona el formulario de aplicación web
- Procesos de aplicación actualizados para activar el backend del espacio de datos
- Define las políticas para el conjunto de datos (bundles)
- Persiste los acuerdos contractuales
- Registro y supervisión
- Procesa los datos obtenidos de las utilidades y genera archivos KML
- **Mejor control del uso de los datos salientes**
- **Infraestructura reutilizable para futuros casos o actualizaciones en las políticas**

- Inicia la aplicación como siempre
- Se autentica con la identidad del espacio de datos (CV diferente de Utilidad)
- Solicitud de datos (por ejemplo, seleccionar rango, añadir capa) mediante el formulario de la aplicación Web.
- Desde el visor SIG, cuando se solicita KML se da la uri del conector
- **Si se concede el acceso y se acuerdan las políticas, los datos se transfieren al visor del GIS y se muestran en el mapa.**

Operador de red

- Carga el archivo en OBS (en el futuro será a través de FTP/otro)
- Se autentica con la identidad del espacio de datos (VC)
- La petición de los datos acciona la petición vía conector del dataspace
- Contratos persistentes como prueba
- Seguimiento de los intercambios de datos con fines de auditoría. Información proporcionada a través de un panel de control

Ficheros (KML)
Keyhold Markup Language



Ayuntamiento

La UX se proporciona en la misma plataforma GIS en la que se gestionan otros datos espaciales (por ejemplo, abiertos (Datos gubernamentales: [qué son los datos abiertos | data.europa.eu](https://data.europa.eu)) para proporcionar contexto a la información ofrecida por INKOLAN (privada y segura, relacionada con infraestructuras críticas...) y se tratan conjuntamente como [Espacios Comunes de Datos Europeos | Shaping Europe's digital future \(europa.eu\)](https://www.europa.europa.eu/press-communication/infographic/2022/04/02/espacios-comunes-de-datos-europeos)



INKOLAN Data Space - Demo

From Data Providers (Network Operator) to Data Consumers (Municipalities)

Atención telefónica 944 702 008

inkolan AREA DE SERVICIO AL CLIENTE [Servicio Inkolan](#) [Nuestro servicio](#) [Tarifas](#) [Información Técnica](#) [Proyectos](#) [Área de clientes](#)

Área de clientes
Todos en Área de clientes

Descargas
[Resultados descargas](#)
[Consulta de descargas](#)

Apoyos
[Localización apoyo](#)
[Consultas de apoyo](#)

Bienvenido al Área de Clientes.

Desde esta página tienes acceso a los principales servicios que te ofrece Inkolan, de acuerdo al momento, y con esta finalidad (plano digital de redes de agua, gas, electricidad, telecomunicaciones municipales).

Inkolan te permite consultar el estado de las facturas y actualizar los datos cuando lo necesites.

Mantén el mejor perfil de tu cliente de la empresa todo en función de su historial de información digital cartográfica de redes de servicios.

Para saber más sobre la actualidad de Inkolan [Síguenos en LinkedIn](#)

[Aviso legal](#) [Política de Privacidad](#) [Condiciones Generales de Contratación](#) [Inicio © 2022](#)

DASHBOARD for metrics



A dashboard has been developed to obtain real-time metrics of all transactions carried out within the data space so that this information can be used for **AUDITS**.

03

KATEA DATA SPACE (TECNALIA)

KATEA Research Cloud (KRC)

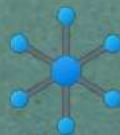
Where digital projects are built



Máquinas
Virtuales



Contenedores



SDN



Almacenamiento



Seguridad



API



KATEA Compute Platform (KCP)

When processing power is required

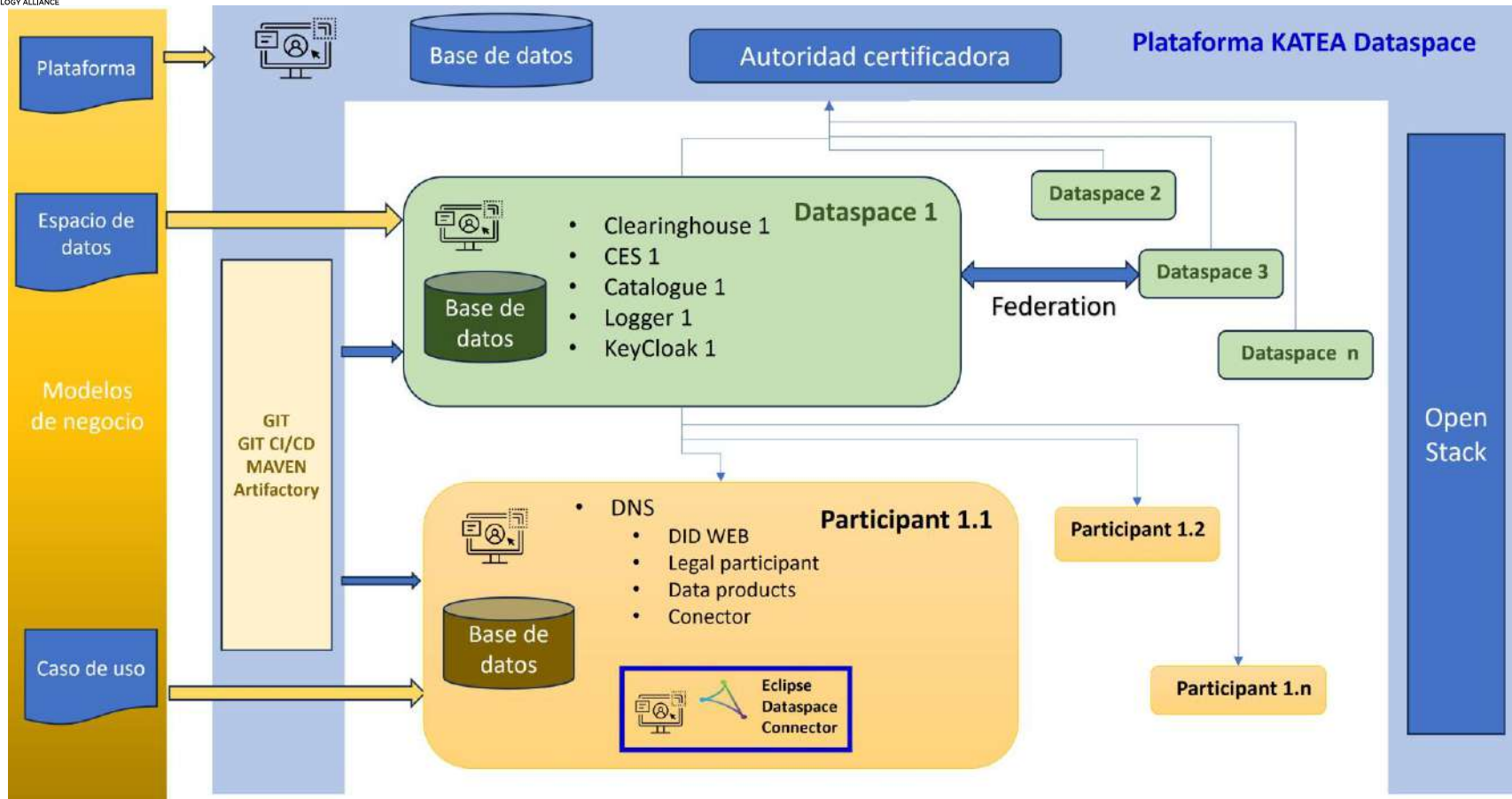
KCP, primer centro de super computación de KATEA ubicado en Mikeletegi 2 (Donostia)

Specs:

- **CPU:** 1120 cores a 3,8GHz
- **RAM:** 11 TB
- **Storage:** ~ 1 Petabyte
- **GPU:**
 - 5 x Nvidia A100 80GB
 - 6 x Nvidia H100 80GB
 - 8 x Nvidia H100 SXM 80GB

Potencia bruta:

- **CPU** – 85.555,2 Gflops
- **GPU** – 977,5 Teraflops





Espacio de Datos: “Urban Data Sharing”

Ecosistema para la compartición de datos de infraestructuras

Descripción del modelo de negocio

Enfoque actual del intercambio de datos urbanos

Datos para la ciudad del mañana según el World Economic Forum

In collaboration with Connected Places Catapult and The Business of Cities



Global Future Council on Cities of Tomorrow

Data for the City of Tomorrow: Developing the Capabilities and Capacity to Guide Better Urban Futures

INSIGHT REPORT
JUNE 2023

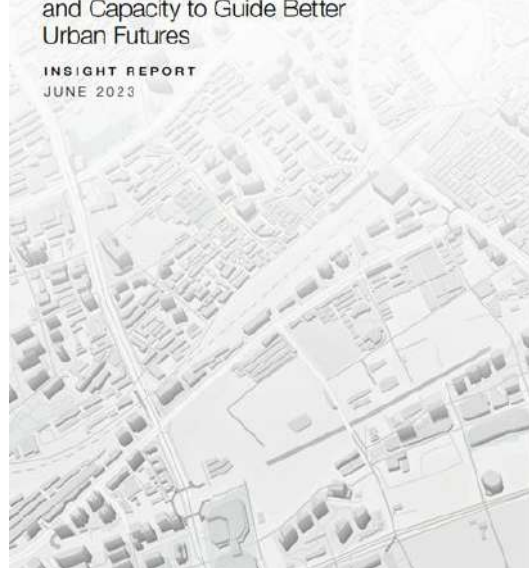


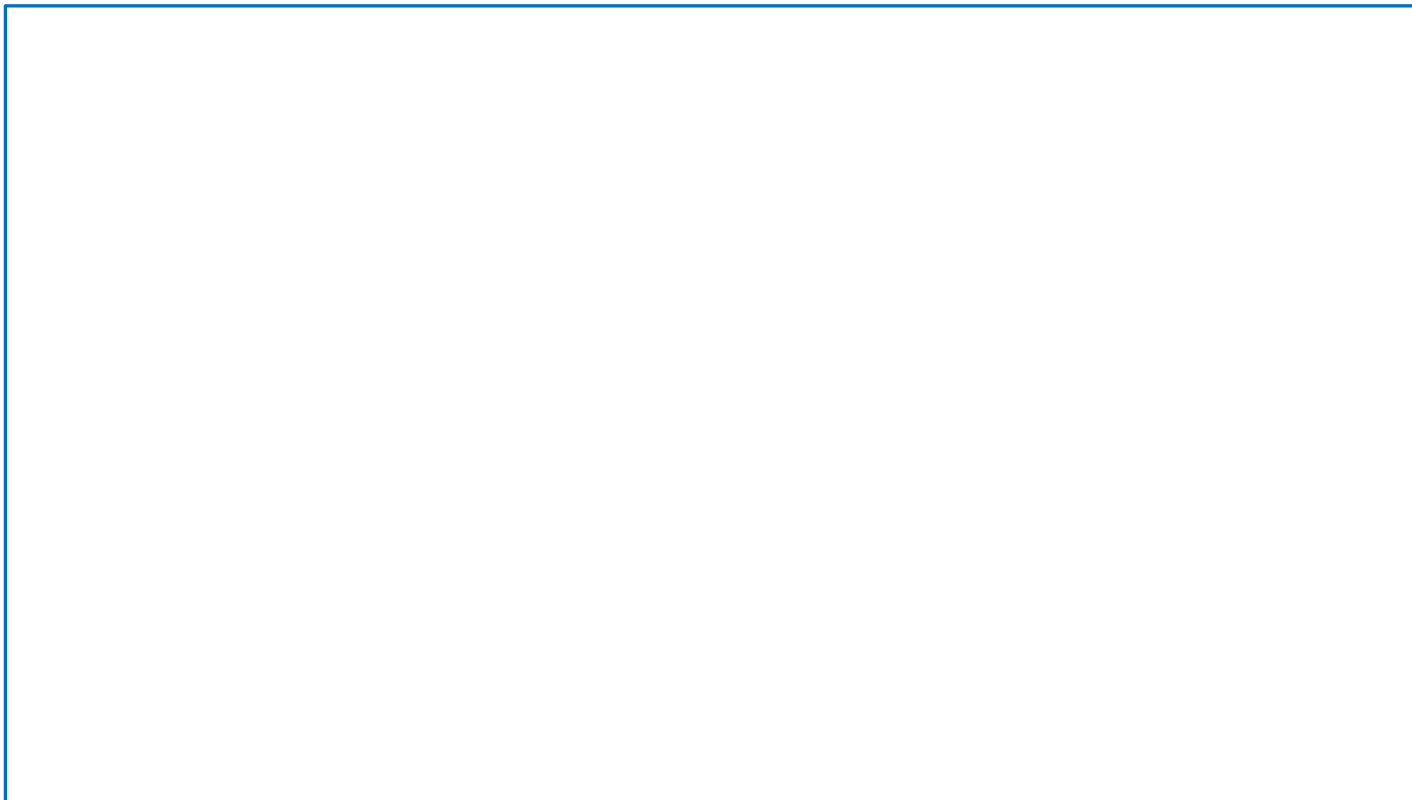
TABLE 1 The challenges holding back the application of data to city-making and management¹⁰

Problem and need	Limited data availability	Definitions and coherence issues	Few agreed standards
The problem	In many parts of the world, especially in lower-income cities and regions, the reservoir of public, private and civic data from which to draw is still modest.	No accepted universal definition yet exists for what constitutes a city, where cities stop, or what defines liveability, smartness or prosperity.	Efforts to standardize city indicators and data-collection processes ¹¹ are still at an early stage and are not uncontested. Data is also hard to interpret in a vacuum and translate into policy decisions.
What cities need	<ul style="list-style-type: none"> - Better data planning - Stronger digital infrastructure - More reliable or pooled resources - Incentives for data to spread to new places 	<ul style="list-style-type: none"> - More clarity on "what success looks like" - More "like-for-like" data across diverse cities or contexts 	<ul style="list-style-type: none"> - An agreed consensus on what data matters, for what and for whom - Advice to navigate the many data choices available
Problem and need	Lack of skills and capacity	Governance and processes issues	Lack of trust
The problem	The collection of data, the development of accurate models and the preparation of information for decision-makers and residents rely on strong local capability and a culture of valuing this activity.	Only some cities have data strategies, chief data or technology officers, or enjoy strategic partnerships with data service providers.	Citizens do not always trust their local government or city with their data. They may also not fully understand how data is being used, especially with enhanced data sets (like digital twins).
What cities need	<ul style="list-style-type: none"> - Funds and structures to recruit the skills required - Strong technical and communication systems to maximize the value of data 	<ul style="list-style-type: none"> - Credible governance and systems to organize data around problems - Tools to combine public- and private-sector information - Tried-and-tested arrangements for durable partnerships and responsible co-ownership 	<ul style="list-style-type: none"> - Improved dialogue with citizens about the security and use of their data - Clear data policies and communication on the benefits data use will deliver to people and businesses and will contribute to sustainability - Local and international media to popularize good data for cities.



INKOLAN

Modelo de
Negocio



INKOLAN

Modelo de Negocio- Consumo de Datos- Ayuntamiento de Madrid

inkolan
NETS FOR SMART TERRITORIES

Search BARRIO

Albarros

54.719
Descargas asociadas

ID_DESCARGA

1000003
1000006
1000007

Distancia sucidés: 0,13 75,00

Dif días descarga - Fin de obra: 0 1500

Nº Obras asociadas

Obras asociadas

ID_OBRA	Distancia sucidés (m)	Dif días descarga y fin de obra
5f8a385f13a0f478160cc3a95ccab3a88	0,13	119
4c931d4d83cb436145511c839e07d59a6	0,13	180
c076e78-940-451d-b920-9deb0be3a8f6	0,13	533

Una vez que los consumidores seleccionan los datos en el portal INKOLAN, reciben una URL para descargar un archivo ZIP que contiene los archivos CAD (DWG) que han pedido.

Estos archivos CAD pueden cargarse en sus herramientas GIS para incorporarlos a sus mapas.

Una vez que el consumidor recibe la URL, puede descargar los archivos ZIP tantas veces como desee.

RIESGOS INHERENTES AL SUMINISTRO DE DATOS GIS

Fuga de gas debido a los datos no actualizados utilizados para obra civil

«Fuga de gas en las obras de ampliación del aparcamiento del estadio Santiago Bernabéu. Según las primeras informaciones, la fuga se produjo en torno a las 8.40 horas, cuando los trabajadores de la reforma, que está llevando a cabo Acciona, pincharon por error una tubería de gas de acero de 20 pulgadas de diámetro.»
Madrid 22/05/2024.

El uso de información obsoleta o no facilitada a través de INKOLAN, puede originar incidentes de seguridad en la red, con riesgo para la población.



02

Adaptación del negocio a Espacio de Datos

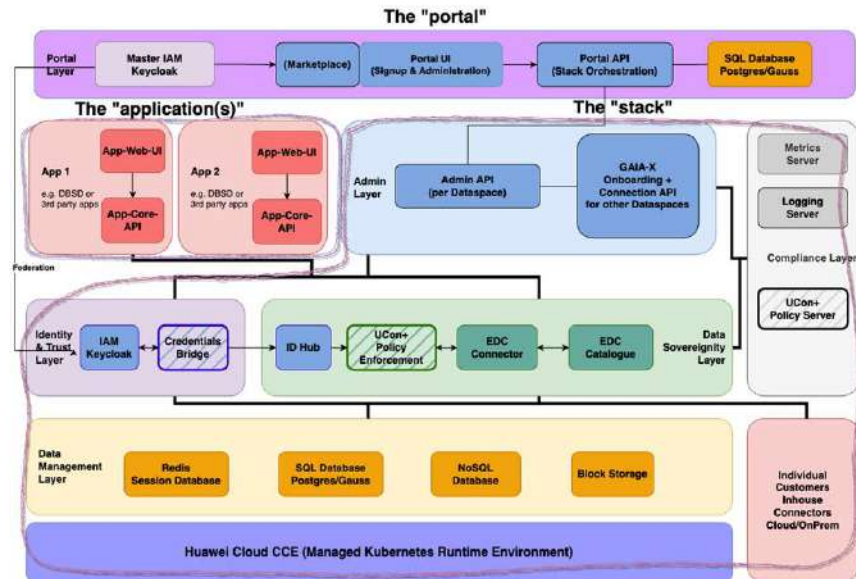
Utilización del Lighthouse BOOT-X

¿Porqué BOOT-X?

Boot-X forma parte de EDS (Exchange Data Space) y proporciona la infraestructura y la tecnología necesarias para crear **un entorno de espacio de datos completo** o unirse a uno ya existente.

Boot-X es **compatible con el marco de confianza de Gaia-X** y ofrece interfaces para el GXDCH, lo que facilita la incorporación de nuevos participantes o servicios. Sigue el marco EDC, implementando funciones de transferencia de datos, catalogación y gestión de identidades. Además, mejora estas funciones con gestión avanzada de identidades, gestión de políticas y supervisión en un entorno listo para la producción.


Boot-X es el habilitador técnico para **casos de uso y aplicaciones del mundo real** que utilizan tecnologías de espacio de datos. **Tecnalia e Inkolan** es un ejemplo de un **caso de uso plenamente operativo**



CASO DE NEGOCIO DE INKOLAN CON BOOT-X

Participantes Espacio de Datos

 **Servicio de Registro**
Autoridad central del espacio de datos

 **Centro de Identidad**
Credenciales verificables y proveedor de identidad mediante DID:web

INKOLAN (Data Broker)


 **Conector Espacio Datos**
Negociación de contratos, inicialización transferencia de datos, supervisión


 **Catalogo**
Publicación Datos, filtrado

 **Interfaz de Usuario**
Acceso cómodo y gestion de recursos


 **Identity Hub**
Credenciales verificables y proveedor de identidad mediante DID:web

Operador de red (Data Provider)

 **Conector Espacio Datos**
Negociación de contratos, inicialización transferencia de datos, supervisión

 **Catalogo**
Publicación Datos, filtrado

 **Interfaz de Usuario**
Acceso cómodo y gestion de recursos

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Comunicación a través de DSP y su especificación para peticiones al **catalogo**, **negociación de contrato**, y **gestion de las transferencias** (inspección)

Ayuntamiento (Data consumer)

 **Conector Espacio Datos**
Negociación de contratos, inicialización transferencia de datos, supervisión

 **Catalogo**
Publicación Datos, filtrado

 **Interfaz de Usuario**
Acceso cómodo y gestion de recursos

 **Identity Hub**
Credenciales verificables y proveedor de identidad mediante DID:web

CASO DE NEGOCIO DE INKOLAN CON BOOT-X

Espacio de Datos- Proceso

INKOLAN



Servicio de Registro

Autoridad central del espacio de datos



Centro de Identidad

Credenciales verificables y proveedor de identidad mediante DID:web

- Proporciona el formulario de aplicación web
- Procesos de aplicación actualizados para activar el backend del espacio de datos
- Define las políticas para el conjunto de datos (bundles)
- Persiste los acuerdos contractuales
- Registro y supervisión
- Procesa los datos obtenidos de las utilidades y genera archivos KML
- [Mejor control del uso de los datos salientes](#)
- [Infraestructura reutilizable para futuros casos o actualizaciones en las políticas](#)

- Inicia la aplicación como siempre
- Se autentica con la identidad del espacio de datos (CV diferente de Utilidad)
- Solicitud de datos (por ejemplo, seleccionar rango, añadir capa) mediante el formulario de la aplicación Web.
- Desde el visor SIG, cuando se solicita KML se da la uri del conector
- [Si se concede el acceso y se acuerdan las políticas, los datos se transfieren al visor del GIS y se muestran en el mapa.](#)

Ficheros (KML)
Keyhold Markup Language



Operador de red

- Carga el archivo en OBS (en el futuro será a través de FTP/otro)
- Se autentica con la identidad del espacio de datos (VC)
- La petición de los datos acciona la petición vía conector del dataspace
- Contratos persistentes como prueba
- Seguimiento de los intercambios de datos con fines de auditoría. Información proporcionada a través de un panel de control

La UX se proporciona en la misma plataforma GIS en la que se gestionan otros datos espaciales (por ejemplo, abiertos gubernamentales: [qué son los datos abiertos | data.europa.eu](#)) para proporcionar contexto a la información ofrecida por INKOLAN (privada y segura, relacionada con infraestructuras críticas...) y se tratan conjuntamente como [Espacios Comunes de Datos Europeos | Shaping Europe's digital future \(europa.eu\)](#)

Ayuntamiento



Espacio de Datos de INKOLAN - Demo

Desde los Proveedores de Datos (Operador de Red a los Consumidores de Datos (Ayuntamientos)

The screenshot displays the 'Área de clientes' (Customer Area) of the INKOLAN website. At the top, a dark blue header contains the phone number 'Atención telefónica 944 792 008'. Below this, a navigation bar features the INKOLAN logo and several menu items: 'Servicios Inkolan', 'Nuestro servicio', 'Tarifas', 'Información Técnica', and 'Proyectos'. A prominent blue button labeled 'Área de clientes' is positioned on the right side of the navigation bar.

The main content area is titled 'Área de clientes' and includes the sub-header 'Todos en Área de clientes'. On the left, a sidebar menu lists various services: 'Desazugas', 'Reserva desazuga', 'Consulta de descargas', 'Apoyos', 'Localización apoyo', and 'Consultas de apoyo'. The main content area contains a welcome message: 'Bienvenido al Área de Clientes.' followed by a paragraph explaining that users have access to various services from INKOLAN, such as digital services for water, gas, electricity, and municipal networks. It also mentions the ability to consult invoices and manage subscriptions. A blue button labeled 'Síguenos en LinkedIn' is located at the bottom of the main content area.

The footer of the website is dark blue and contains four links: 'Aviso legal', 'Política de Privacidad', 'Condiciones Generales de Contratación', and 'Inkolan © 2023'.

DASHBOARD para métricas



Se ha desarrollado un panel para obtener métricas en tiempo real de todas las transacciones que se realizan dentro del espacio de datos de forma que esta información se pueda usar para AUDITORIAS.



TECH-X Conference & **HACKATHON** #7

23 & 24 May 2024
Luxembourg

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 Hub Luxembourg

#GaiaX #TechX24

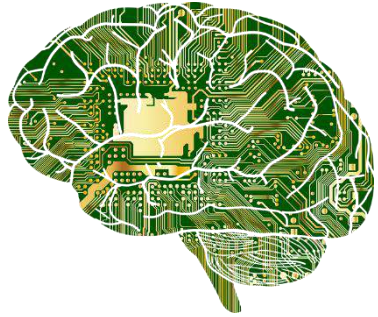


How to make a data product for Gaia-X

Yesús María Santamaría

CTO Digital Unit, Tecnia Research & Innovation

#GaiaX #TechX24



OASEES

Open Autonomous programmable cloud appS & Smart EdgE Sensors

The OASEES project aims to create a new programmability framework that will allow edge devices to work together in a decentralized and secure way, using advanced technologies such as AI/ML accelerators (FPGAs, SNNs, Quantum) and a privacy-preserving Object ID federation process. This framework will be fully open-source and developed specifically for Europe.

USE CASES



E-Health: Smart Nodes for Analysis of Voice, Articulation and Fluency Disorders in Parkinson Disease



Energy: EVs fleet coordinated recharging to support optimal operation of electricity grid.



Drone Swarm for area and infrastructure inspection: Drone Swarm over 5G for High Mast Inspection.



Structural Safety for Building and Critical Infrastructure: Swarm powered intelligent Structural safety assessment for Buildings

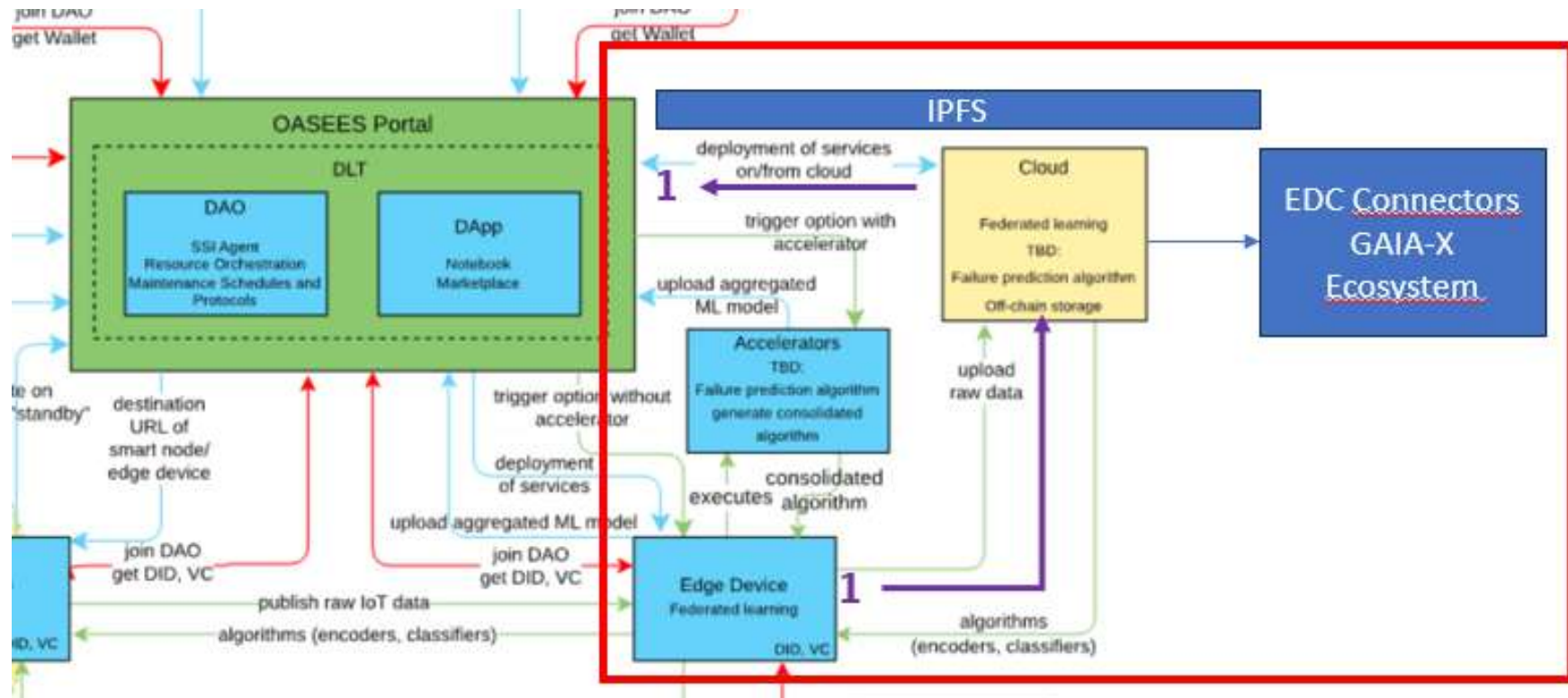
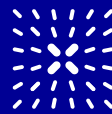


Collaborative robotic automation: : Robotic Swarm powered Smart Factory for I4.0



Wind Energy: Smart Swarm Energy harvesting and Predictive Maintenance Wind turbines

Close view on Use case data gathering



Wind energy Data Product definition








The Data Product Canvas

Name of Data Product: **Blade Acoustic Monitoring Swarm System**

Who is the customer? **Wind Farms owners – Wind turbine Maintenance companies**

We create the data analytics solution

... for the following customers and users

Data Sources	Analytics	Data Product	Customer benefits	Pains and Gains
 <p>What data sources do we need to create customer value?</p> <p>Wind turbines (WT) acoustics monitoring systems: This refers to systems that monitor the acoustic characteristics of wind turbine blades. These systems collect raw acoustic data, providing insights into the sound produced by the blades during their operation.</p> <p>WT blade failure and stop historic. This involves gathering information about the historical occurrences of blade failures and instances where the wind turbine had to be stopped.</p> <p>WT blade maintenance plan. It outlines the schedule and procedures for maintaining and servicing the blades, ensuring optimal functionality and preventing potential failures.</p>	 <p>With which data analytics methods do we generate insights from the data?</p> <p>Signal Processing Methods: identifying relevant features in the sound patterns failures associated with turbine performance and potential.</p> <p>Neural Networks Trained by Distributed Learning Algorithms: Neural networks, a type of artificial intelligence, will be employed to recognize complex patterns in the acoustic data.</p>	 <p>In which form do we provide the data service to our users and customers?</p> <p>Technical Reports Based on Processed Acoustic Dataset: information included in the reports consists of datetime, wind turbine id, wind turbine height and diameter, and labelled anomalies.</p> <p>Wind Turbine Blades anomaly detection: Unusual patterns or anomalies in the acoustic data that can indicate issues with the blades.</p> <p>Maintenance Prediction and Impact on LCOE (Levelized Cost of Energy): potential impact of maintenance activities on the Levelized Cost of Energy</p> <p>Dynamic Maintenance Plan According to Blade Health Status: The data product includes a dynamic maintenance plan that adapts based on the real-time health status of the turbine blades.</p> <p>Anonymized Blade Acoustic Data: To address privacy concerns, the product includes anonymized versions of the raw acoustic data.</p>	 <p>What added value and what advantages does the data service generate to our users and services?</p> <p>This data service adds value by improving turbine performance, offering non-intrusive monitoring, enabling proactive analysis and detection, ensuring algorithm reliability, evaluating maintenance cost impact, and providing anonymized data for further analysis and development.</p> <p>These advantages collectively contribute to a more efficient and cost-effective management of wind turbine operations.</p>	 <p>What wishes, problems and challenges do our customers and users have?</p> <p>Wishes:</p> <ul style="list-style-type: none"> - Privacy and data protection between stakeholders (Wind Farms owners – Maintenance companies) <p>Problems:</p> <ul style="list-style-type: none"> - Lack of availability, quality and veracity of the raw acoustic blade data. - Expensive blade failure detection methods. - Wind turbine shutdown for blade inspection. <p>Challenges:</p> <ul style="list-style-type: none"> -Improve Operational and Maintenance Expenditure elaborating dynamic maintenance plans. -New and innovative alternatives to diagnose blade status.

The process to make a Data Product for Gaia-X

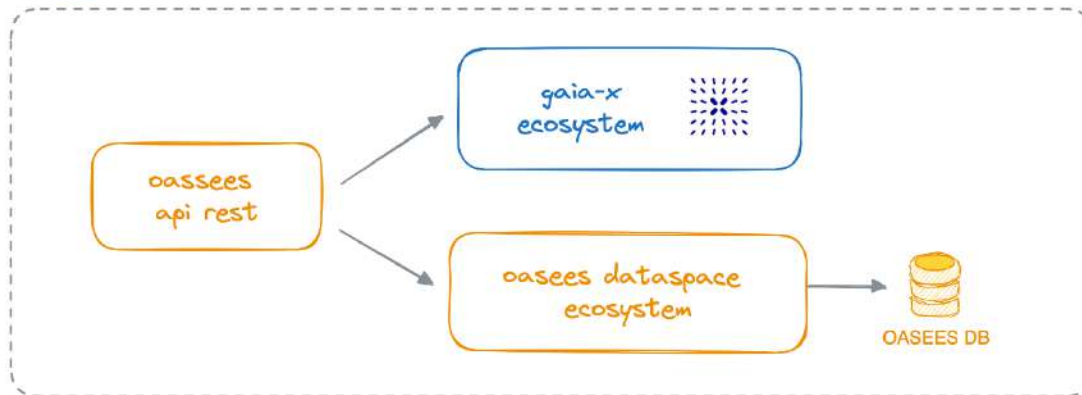
gaia-x



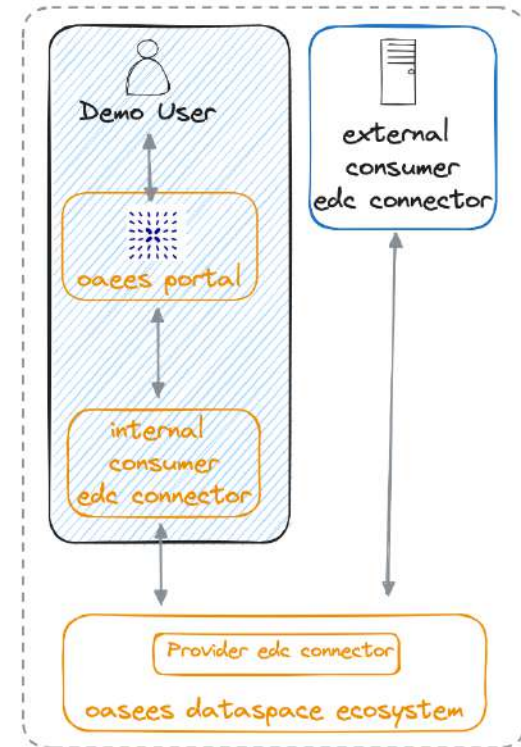
1 Store the data



2 Register the data-products



3 Consume the data



DATA PRODUCT generation (Technical Report)

BAMS Laboratorio Madrid

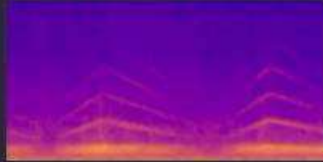
Capgemini

BAMS Laboratorio Madrid

[15:27:34] - ▲ Anomalia 1

Channels: 2, SampleRate: 48000, BitRate: 384000

Spectrogram Original WAV



Spectrogram Filtered WAV



Alert History



TEMPERATURE



HUMIDITY



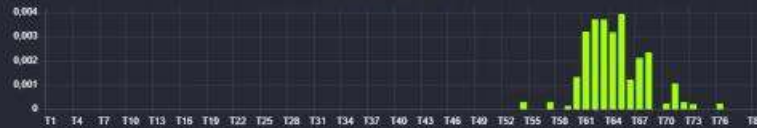
PRESSURE



WIND_SPEED



Audio Freq Filtered



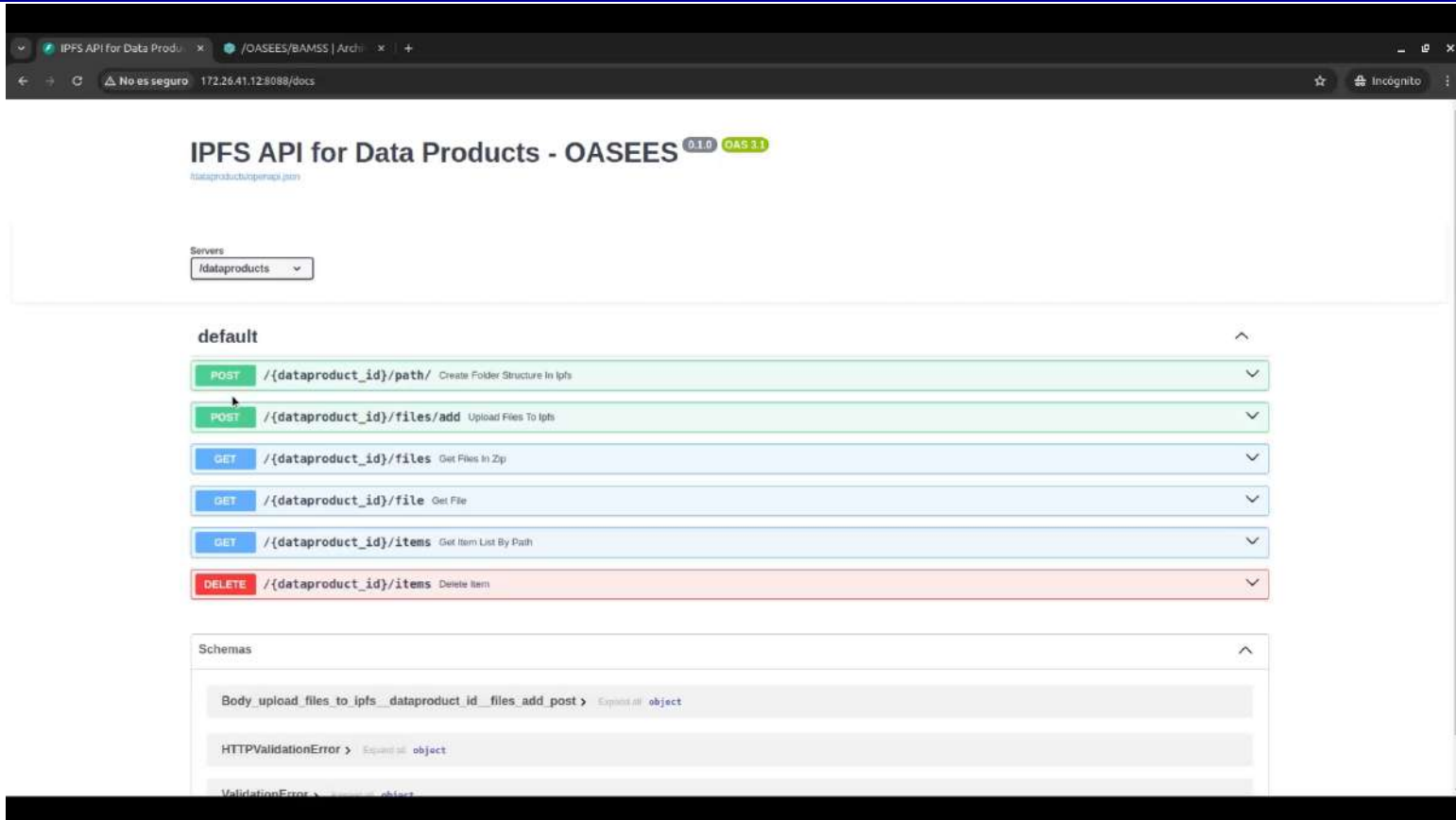
Audio Freq Filtered AVG



WIND_DIRECTION



Checking that the DATA PRODUCT is stored in IPFS



The screenshot shows a web browser displaying the documentation for the IPFS API for Data Products - OASEES. The page title is "IPFS API for Data Products - OASEES" with version "0.1.0" and "OAS 3.1" labels. The URL is "https://dataproduktopenapi.gov". A "Servers" dropdown menu is set to "idataproducts". The "default" section lists several API endpoints:

- POST** `/{dataprodukt_id}/path/` Create Folder Structure In Ipfs
- POST** `/{dataprodukt_id}/files/add` Upload Files To Ipfs
- GET** `/{dataprodukt_id}/files` Get Files In Zip
- GET** `/{dataprodukt_id}/file` Get File
- GET** `/{dataprodukt_id}/items` Get Item List By Path
- DELETE** `/{dataprodukt_id}/items` Delete Item

The "Schemas" section is partially visible, showing:

- `Body_upload_files_to_ipfs__dataprodukt_id__files_add_post` Expand all object
- `HTTPValidationError` Expand all object
- `ValidationError` Expand all object

Generating the Verified Credentials for the Data Product offer

A screenshot of a web browser displaying the Swagger UI for the Oasees API. The browser's address bar shows the URL "https://oasees9102/docs/#/". The page title is "Oasees 0.1.0 GA3.3". Below the title, it says "Oasees API documentation". The main content is divided into two sections: "Oasees API" and "Oasees testing API". Each section contains a list of API endpoints with their respective HTTP methods and descriptions. The endpoints are listed as follows:

- Oasees API:**
 - POST /didocument: Create Did
 - POST /legalparticipant: Create legal participant
 - POST /dataproducer: Create dataproducer with resources
 - GET /dataproducer: Get dataproducer by name
 - POST /publish-dataproduct: Create and publish dataproducer
 - GET /dataproducers: Get dataproducers list
 - GET /cesrecords: Get ces records
- Oasees testing API:**
 - POST /signVC: Sign VC
 - POST /sign-vp: Sign VP
 - POST /compliance: Call compliance
 - POST /credential-event-compliance: Call credential compliance

Data Product consumption

gaia-x



The screenshot shows a web browser at localhost:3000/catalogue. The page has a navigation bar with 'PRODUCTS', 'PRICING', and 'BLOG' links, a '+ DATA PRODUCT' button, and a user profile icon. The main content area is titled 'Catalogue' and features three data product cards:

- Blade acoustic monitoring swarm system technical Report**
Technical Reports Based on Processed Acoustic Dataset. Information included in the reports consists of datetime, wind turbine id, wind turbine height and diameter, and labelled anomalies.
[SEE MORE](#)
- Parkinson disease diagnostic and rehabilitation**
A data product that not only detects the presence of Parkinson's disease but also assesses its severity. The deep learning model will provide a quantitative measure of disease severity based on specific voice features. This information can assist...
[SEE MORE](#)
- Charging Points info for Electric Vehicles Fleet managers**
The data product is the result of advanced analytics methods applied to diverse data sources, providing a detailed overview of the electricity landscape for charging stations.
[SEE MORE](#)



Thank you!

Jesús María Santamaría

CTO Digital Unit, Tecnia Research & Innovation

jesusm.santamaria@tecnalia.com

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