



# AI on-demand platform for regional interoperable DIHs Network

Overview and interoperability layers

<https://www.dih4ai.eu/>

Tomás Pariente (Atos)  
AI4EU TGB meeting  
04/03/2022



# The Consortium

**12 partners** from 6 EU countries.  
covering 3 key dimensions:

- Regional specialization
- Methodological
- AI tech providers

- **CEA** (representing the DIGIHALL Hub)
- **IMT Transfert**

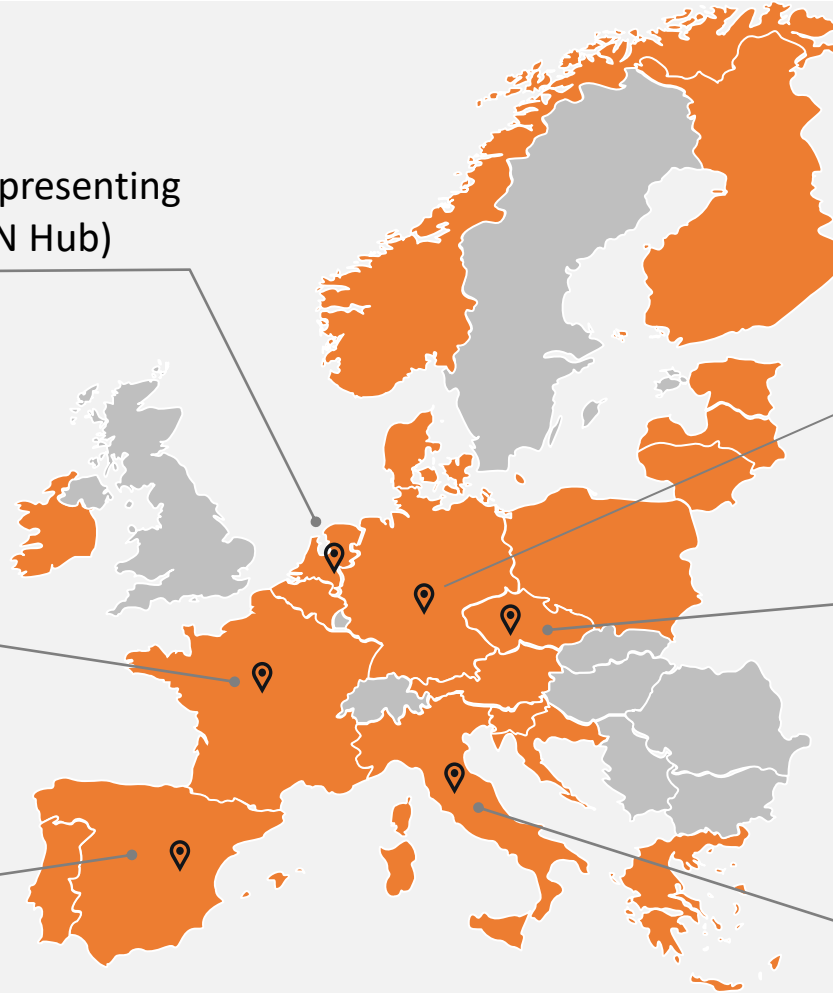
- **INNOVALIA**
- **ATOS**

**TNO** (representing the SCSN Hub)

- **Fortiss** (representing the Munich Innovation Hub)
- **Fraunhofer IFF** (representing the DIH Saxony-Anhalt Hub)

- **CIIRC CTU** (representing the Czech Innovation Hub)

- **POLIMI** – Project Coordinator
- **PwC (Intellera Consulting)**
- **EKA**
- **ETA**



# The DIH4AI Innovation Action

**DURATION:** 36 months (January 2021 – *ongoing*)

**COORDINATOR:** Politecnico di Milano

**FUNDING:** € 4,999,863 (2M Open Calls)

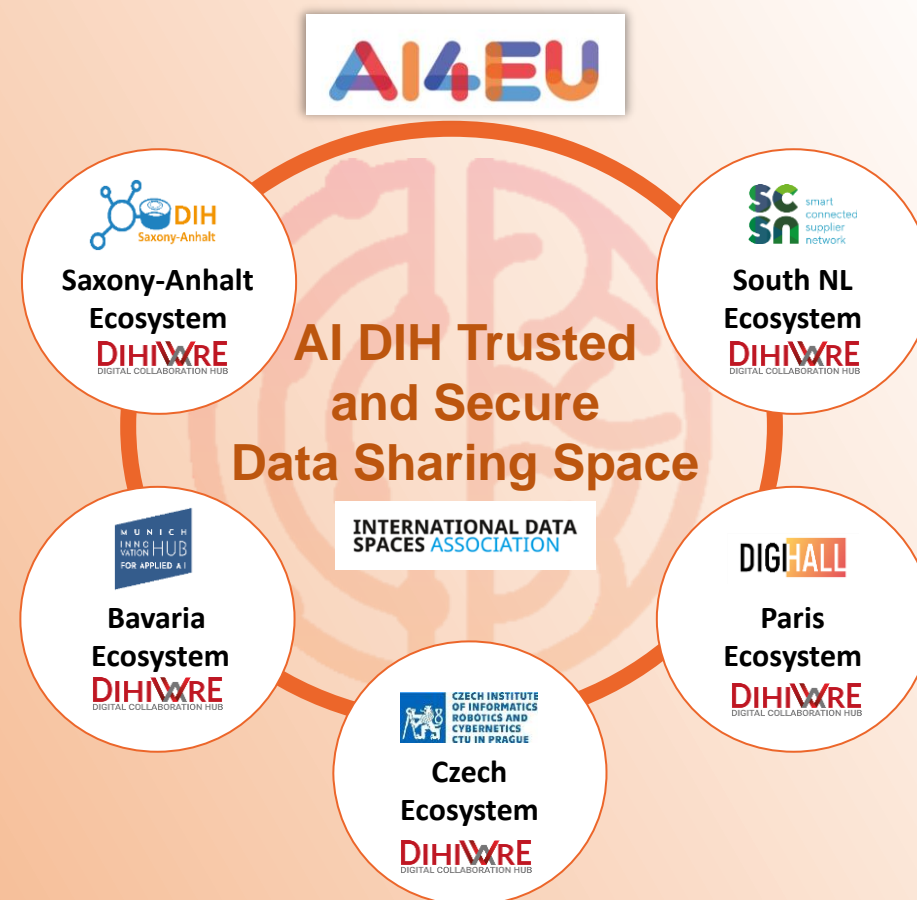
**CONSORTIUM:** 12 Partners from 6 countries

**OPEN CALLS:** 10+10 new DIH-driven SME-oriented

**DIHs:** 5 AI DIHs selected from AI DIH Network

**EXPERIMENTS:** 20+ AI Best Services implementations

<https://www.dih4ai.eu/>



# How to exploit Regional Services in the AloD Platform



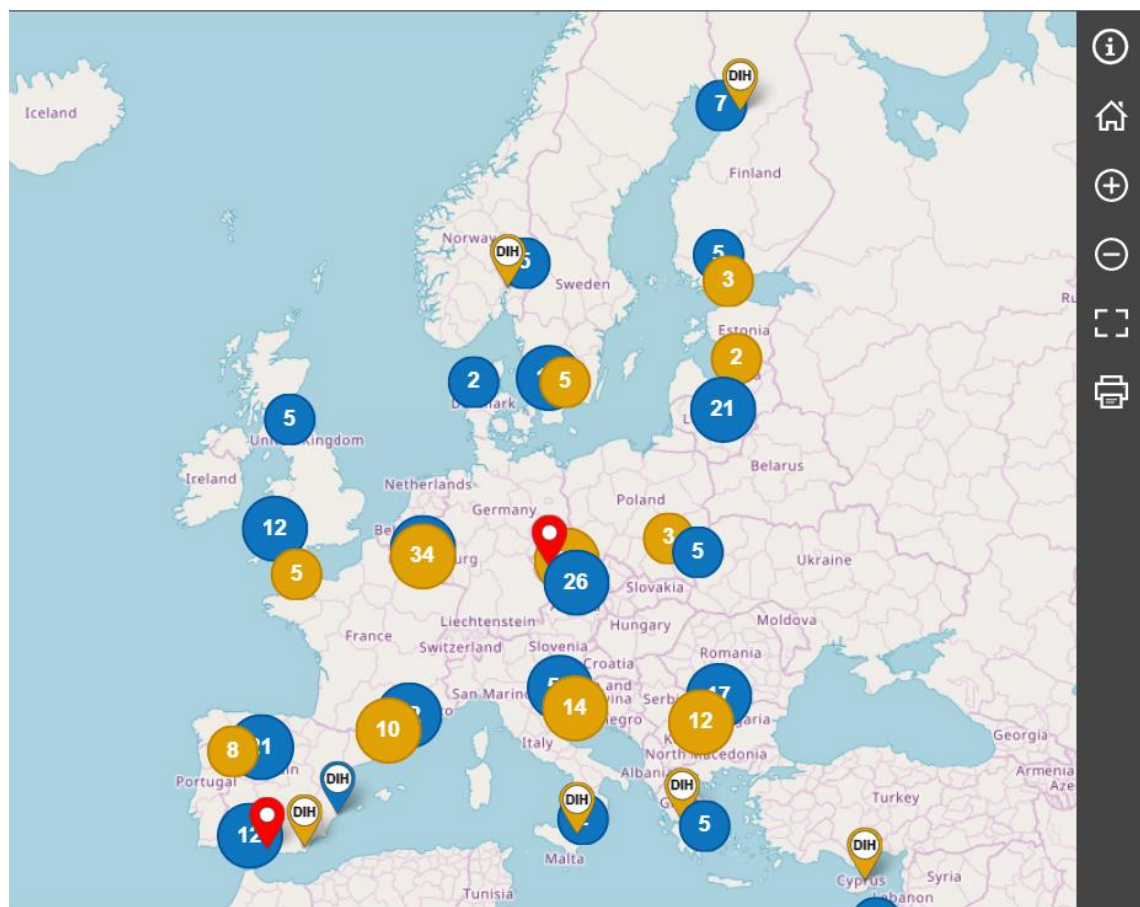
## How to structure DIH Service Offer / Demand for SMEs

Definition of the key characteristics of an AI DIH, service offering, competences, business model, customer Journeys...



# The JRC Catalogue and the AI (E)DIH (434, 126)

1. Be part of a **regional**, national or European policy initiative to digitise the industry;
2. Be a **non-profit** organisation;
3. Have a **physical presence** in the region and present an **updated website** clearly explaining the DIHs' services
4. Have at least **3 examples** of how the DIH has helped a company with their digital transformation



# L BEST SERVICE PORTFOLIO

Developed an L-BEST 3-levels taxonomy of Services

## L

### Legal

- LEGAL AND IPR ASSISTANCE
- ETHICAL AI ORGANISATIONAL SUPPORT
- ETHICAL AI LIFE CYCLE ASSISTANCE & ASSESSMENT

## B

### Business

- INCUBATION ACCELERATION SUPPORT
- ACCESS TO FINANCE
- OFFERING HOUSING
- BUSINESS TRAINING AND EDUCATION
- PROJECT DEVELOPMENT

## E

### Ecosystem

- COMMUNITY BUILDING
- DIH INNOVATION DEVELOPMENT
- ECOSYSTEM GOVERNANCE

## S

### Skills

- PROCESS & ORGANIZATIONAL MATURITY
- HUMAN CAPABILITY MATURITY
- SKILLS IMPROVEMENT

## T

### Technology

- IDEAS MANAGEMENT AND MATERIALIZATION
- CONTRACT RESEARCH
- PROVISION OF INFRASTRUCTURE
- TECHNICAL SUPPORT ON SCALE UP
- VERIFICATION AND VALIDATION
- DATA MANAGEMENT

# CUSTOMER JOURNEY – TECHNOLOGY USER



## OBSERVATION



### Search Information

- Passive behaviour
- Access to proposed contents
- Come across the concept of I4.0 by chance

## AWARENESS



### Understand benefits and challenges

- Active behaviour
- Set targeted information
- Evaluate opportunities

## EXPERIMENT



### Proof of Concept

- Introduce new technologies
- Introduce new skills
- Access to technological and business opportunities

## EXPERIENCE



### Test the prototype inside company's facility

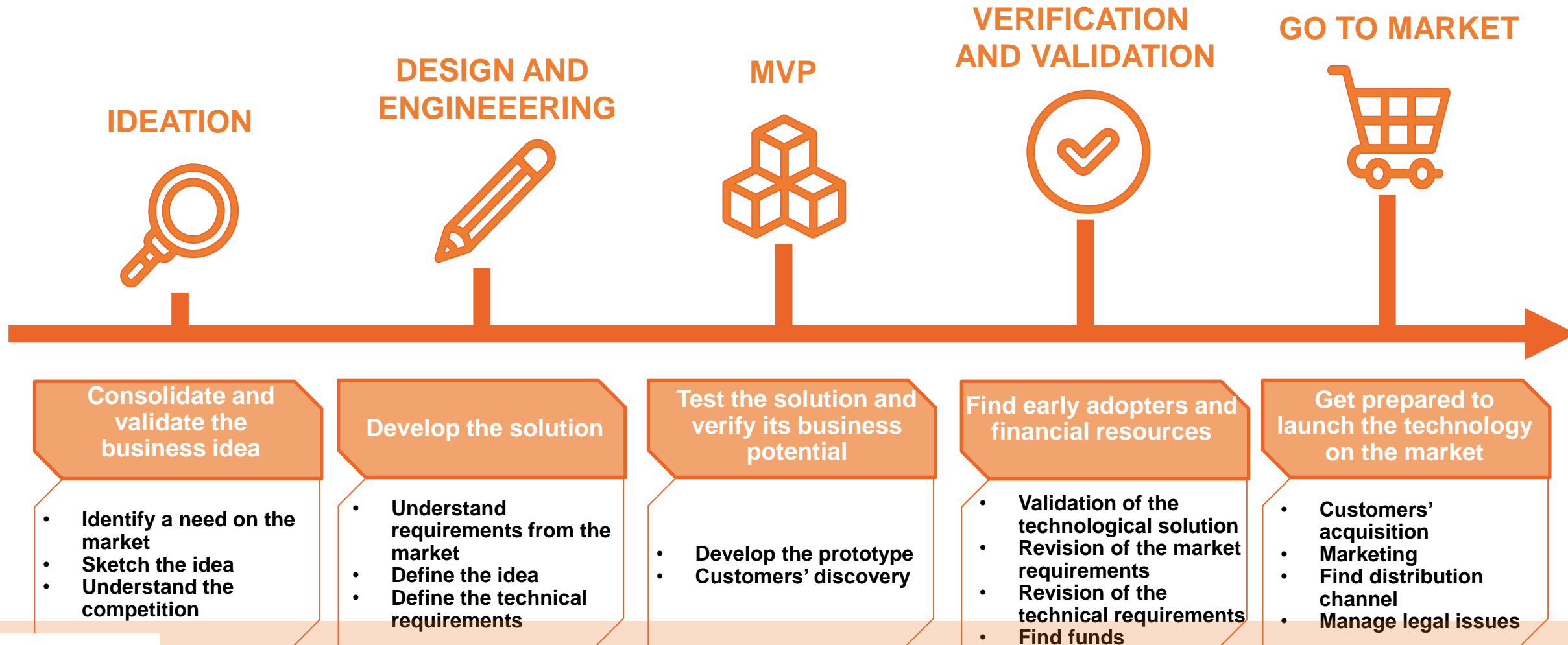
- Prototype testing in the company's environment
- KPIs analysis
- Organizational roadmapping



### Decision of invest in the new technological facility

- Choice of technological adoption at company level
- New organizational models and schemas
- New business models

# CUSTOMER JOURNEY – TECHNOLOGY PROVIDER





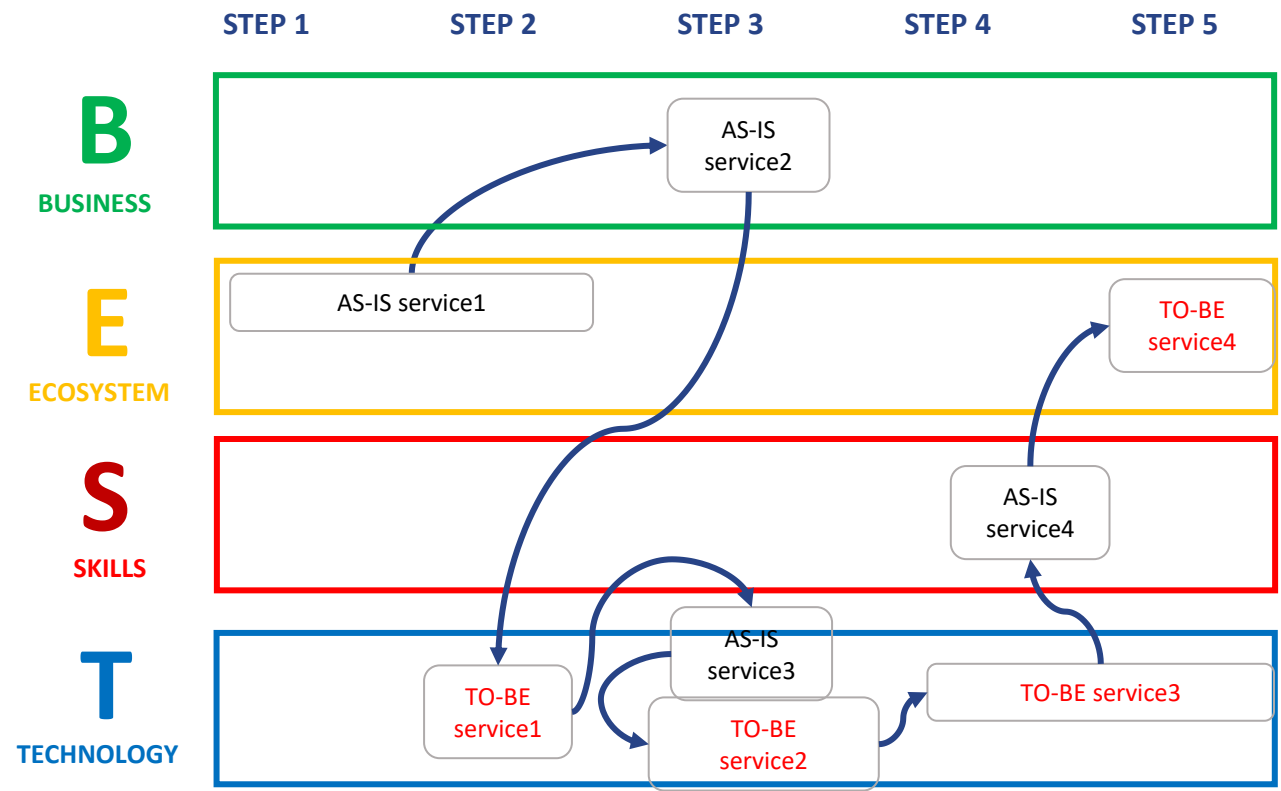
# CUSTOMER JOURNEYS PIPELINE



It is the graphical representation of a Customer Journey associated to a specific Customer profile

- Not all customers of that typology behave in the same way
- Identify the different profiles and consider services involved
- Link services with arrows in order to create a digital transformation journey

**TO-BE services** are aimed to fill gaps in the pathway and to overcome blocking points limitations



# Interoperability with the AloD (Portal, Data, Cloud )



## The AloD Platform and DIH-Europe Interoperability

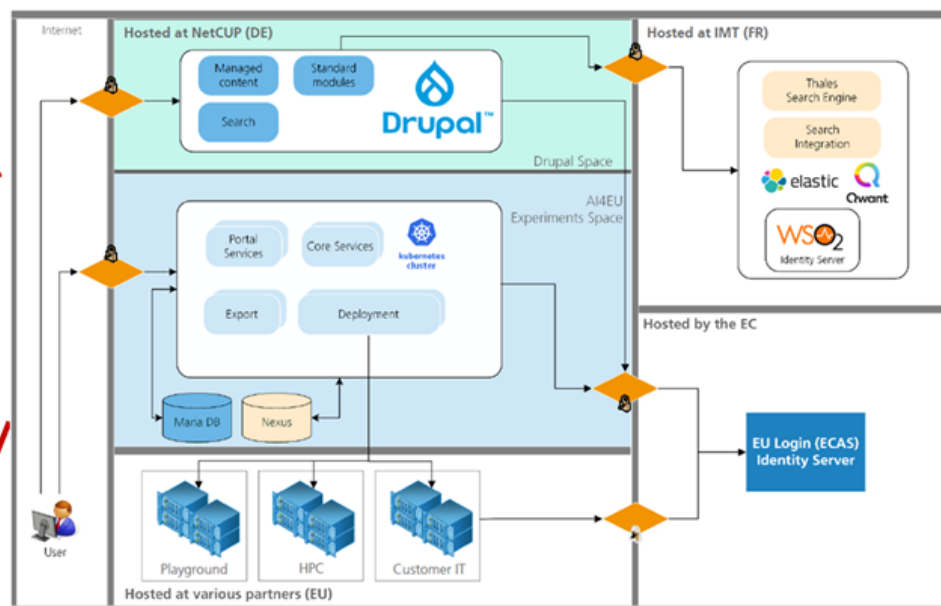
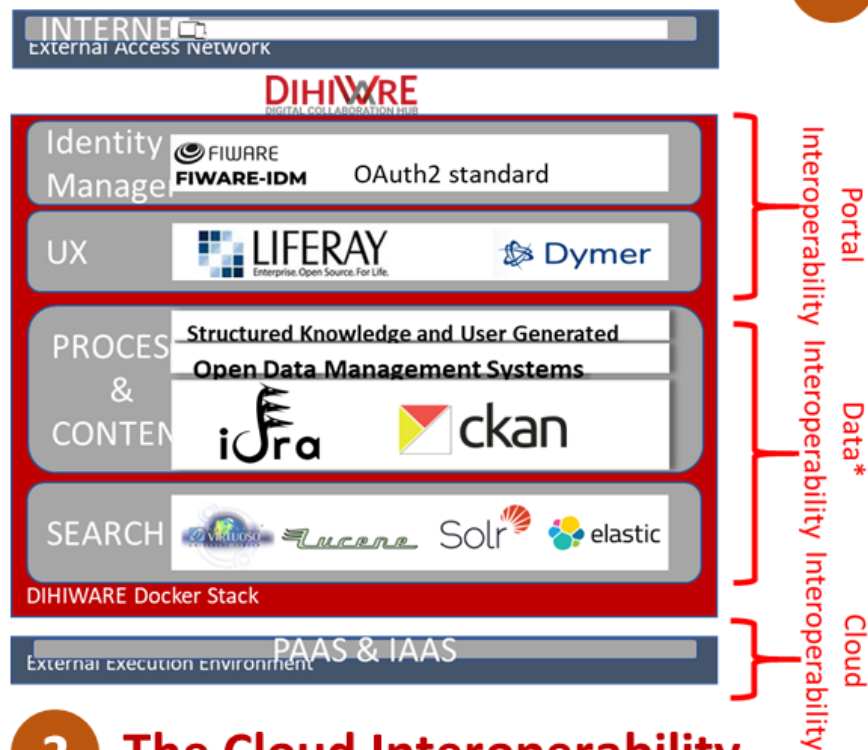
Regional DIH platforms (DIHIWARE) as IDS Network nodes with AloD Catalog / Marketplace / Experiments Platform (portal data cloud).

# DIH4AI Portal, Data & Cloud Interoperability with AloD

1

## The Portal Interoperability

To integrate **Users** and **search content** of both the Regional and the European platforms.



2

## The Cloud Interoperability

To integrate **Services** and **AI Infrastructures** of both the Regional and the European platforms.

3

## The Data Interoperability

To integrate **Data Repositories** of both the Regional and the European platforms

DIH  
content  
page

Cross  
Search

SSO?

Data  
Space

Experiments

# Portal, Data & Cloud Interoperability with AloD

## Portal

GUI for the DIHs to the AloD

- DIHIWARE Portal for a single DIH
- For cross-DIH collaboration
- Cross-search capabilities with the AloD
- Studying authentication issues (SSO)

Knowledge Platform



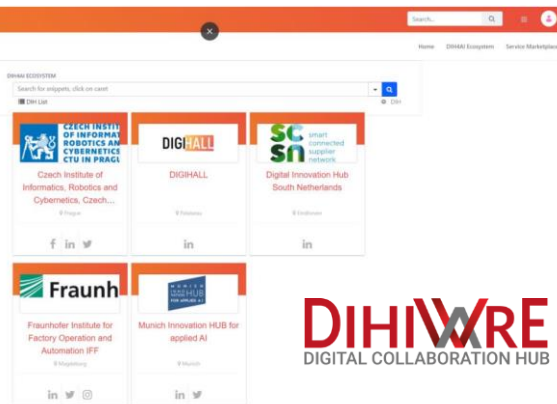
Innovation Capabilities



Marketplace



Collaboration Services

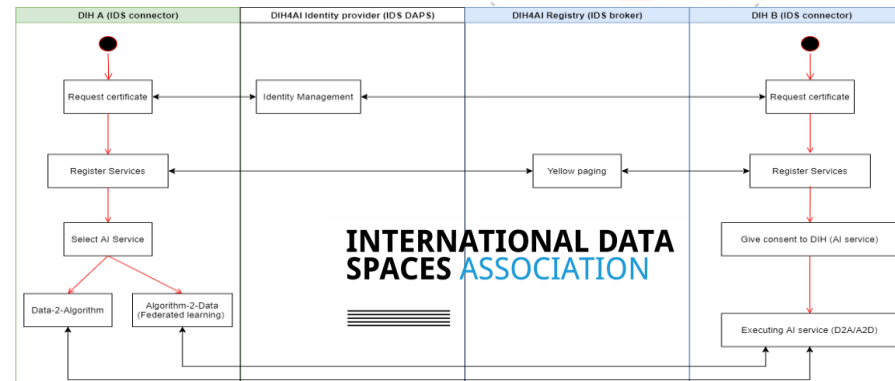
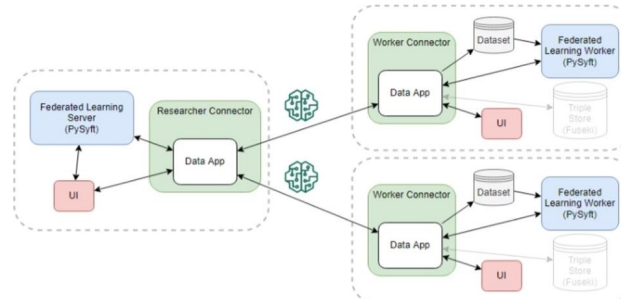


**DIHIWARE**  
DIGITAL COLLABORATION HUB

## Data

A data space for DIHs

- Following IDS approach
- Experiments with federated learning in several DIHs in progress
- Any connection to the AloD besides broker?

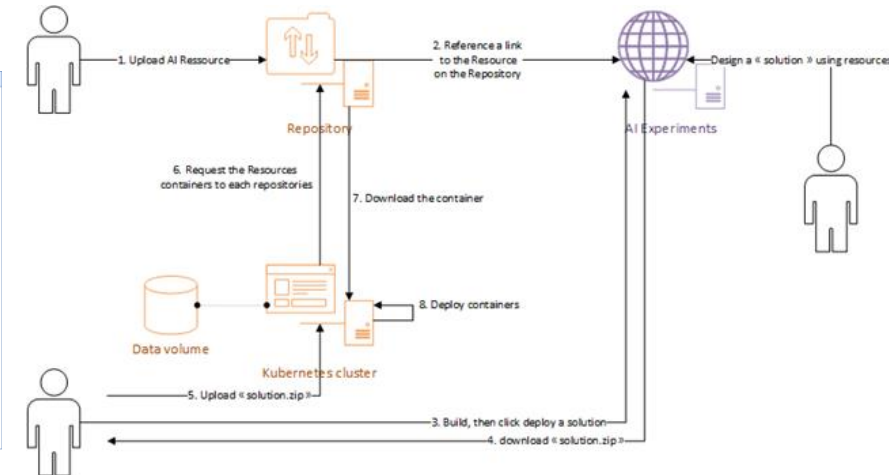


**INTERNATIONAL DATA SPACES ASSOCIATION**

## Cloud

A Playground for experimentation for DIHs connected to the AloD

- AloD Experiments playground for DIHs
  - Repository
  - Execution space
- Kubernetes cluster with the playground available for DIHs experiments
- Connection to the AloD platform
  - Towards automatic onboarding & publishing solutions to the AloD
- And more coming... (Benoit)



# DIH4AI Portal

## DIHIWARE

Main page

DIH4AI ECOSYSTEM

Search for snippets, click on caret

DIH List



Czech Institute of Informatics, Robotics and Cybernetics, Czech...

Prague



DIGIHALL

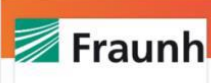
DIGIHALL

Palaiseau



Digital Innovation Hub South Netherlands

Eindhoven



Fraunhofer Institute for Factory Operation and Automation IFF

Magdeburg



Munich Innovation HUB for applied AI

Munich



Services marketplace

LBEST-PUBLIC

Service + Info

DIH  
Selected All



Legal & Ethics Services

1



Business Services

10



Ecosystem Services

14



Skill Services

16



Technology Services

29

Services Offered

L

Ecosystem

- Edge AI Ecosystem
- Information events
- Humane AI Ecosystem
- EU-IoT IDEathon/Hackathon 2021/22
- Energy Conference 2021 - Digital tr

B

E

S

T

Services detail

LBEST-PUBLIC

DIH  
Selected All



Ecosystem Services

14

Community building (3)  
Data innovation development (3)  
Ecosystem development (3)

Search

DIH	Title	Category	Type	Service
	Analysis of the Czech Industry	ECOSYSTEM	Community building	SME and People Engagement
	Analysis of the Czech Industry	ECOSYSTEM	Community building	Communication
	Barometr of the Czech Industry	ECOSYSTEM	Ecosystem Governance	Ecosystem strategy management
	Centre for Industrial Intelligence (CII)	ECOSYSTEM	Community building	SME and People Engagement

DIGIHALL

Ecosystem learning

Ecosystem learning through its animation is at the heart of Systematic's ecosystem. Systematic's ecosystem is centered around Deep Tech in the Paris-Region. Systematic brings together start-ups, SMEs, scale-ups, large groups, research and high education institutions. Conferences, workshops and welcome sessions are events organized by dedicated thematic communities. Participants can hear from experts on latest developments in their field and interact with them. Events are also an opportunity for networking.

Service

Category

Ecosystem

Type

Community building

Service

Communication

Target Audience

- Technology providers (Industry 4.0 Service and/or Equipment Providers)

Application Domain

- Artificial Intelligence and cognitive systems

Additional material

- 

Service providers

DIH

DIGIHALL

For further information, please contact [admin@di4ai-portal.eu](mailto:admin@di4ai-portal.eu)

AI4EU

Representatives



# Data interoperability – A data space for AI DIHs

IDS compliant Data Space for DIHs

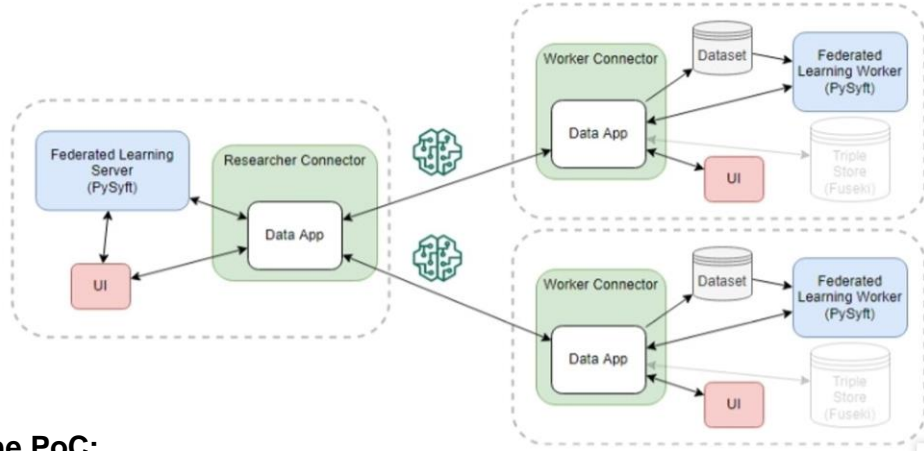
INTERNATIONAL DATA  
SPACES ASSOCIATION



## Federated learning PoC

Data remains at the source, the algorithm is only allowed to access the data, and performs an analysis locally. Then, it only returns the learned model from this location. In other words, the data remains at the source, but the algorithm is authorized to view the data and learn from it under agreements made.

# Data interoperability- Federated learning PoC



## Federated learning configuration

**Datasets** [Search available datasets](#)

**Dataset to train** ☒ mnist

**Connectors to train** ☒ Fortiss ☒ CIIRC ☒ FraunhoferIFF ☒ CEA

**Federation**  rounds  
Number of times the trained model is shared with the Trusted Compute Node

**Epochs**  epochs/round  
Number of epochs per training round

**Batch size**  images  
Batch size used for training the model

**Validation split**   
Fraction of data used for validation

**Classes**   
Number of output classes to train

**Normalization**   
Normalization of input data, one of: minmax, mean, none

**Input Shape**  px  px  layers

**Label column**   
Column label in the input data

**Loss function**   
Keras name of loss function

**Metrics**    
  
Tensorflow metrics

**Model**     
Keras JSON representation of the model

**Optimizer**     
Keras JSON representation of the optimizer

**Initial model**

## Training statistics

urn:ids:tno:connectors:Fortiss	urn:ids:tno:connectors:CIIRC	urn:ids:tno:connectors:FraunhoferIFF	urn:ids:tno:connectors:CEA
Round 0	Round 0	Round 0	Round 0
Epoch 0	Epoch 0	Epoch 0	Epoch 0
Loss 3.15996e-1	Loss 5.01674e-1	Loss 5.22417e-1	Loss 4.09406e-1
Accuracy 9.25955e-1	Accuracy 8.77312e-1	Accuracy 8.66773e-1	Accuracy 8.92359e-1

## Logs

urn:ids:tno:connectors:Fortiss				urn:ids:tno:connectors:CIIRC		urn:ids:tno:connectors:FraunhoferIFF		urn:ids:tno:connectors:CEA	
Round	Epoch	Loss	Accuracy	Loss	Accuracy	Loss	Accuracy	Loss	Accuracy
0	0	3.15996e-1	9.25955e-1	5.01674e-1	8.77312e-1	5.22417e-1	8.66773e-1	4.09406e-1	8.92359e-1

[Download trained model](#)

## The PoC:

The quest is that each DIH in the example won't have all the data to recognize our 10 digits, however by learning from each other it is possible to recognize numbers data are not in your own data set (wisdom of the crowd).

- TNO DIH is the DIH providing the algorithm.
- The other DIH are the data providers.
- Example using EMNIST dataset in learning handwritten character digits.

Steps performed in the PoC:

- **Step 1** – TNO DIH (AI algorithm provider),
- **Step 2** – TNO DIH (Select other DIH and request access towards the data set. Then, configure the algorithm regarding federation rounds etc),
- **Step 3** – Each DIH to give access to their datasets. In this example each DIH offers an unique dataset (to avoid an overlap of data).
- **Step 4** – TNO DIH (end result of the learned model) and being able to recognize the number 0 to 9 due to the fact that the algorithm was allowed to learn locally and update the learned model constantly at TNO DIH location.

# An extra integration topic: The AloD Portal and its “AI DIH” section



## The [AloD Portal and the AI DIH pages](#)

A concrete operational proposal was approved in July 2021 TGB.

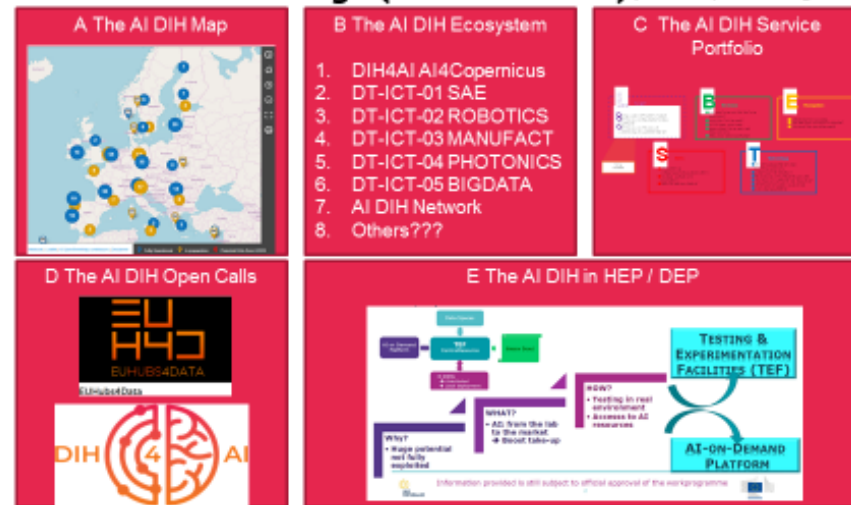


Applying to become a European

European Digital Innovation Hubs (EDIHs) shops that help companies dynamically and become more competitive.

Find out

### DIH section Main Page (5 sub-sections) plus news, community



- DIH4AI proposed to design, manage, and populate the section with the content.
- DIH4AI will do this with own resources.
- DIH4AI will involve and collaborate with other initiatives in the DIH space, such as DIH projects, DIH networks, EDIHs, etc. Initial contacts have been made with BOWI, AI REGIO, EUHubs4Data...
- DIH4AI, in collaboration with the AloD CMS team, will set up the governance for the DIH section – the Editorial Board, which will include representatives of other initiatives.
- **Next steps:** We need all together to sort out technical/organizational issues to allow DIH4AI to get editorial access to the CMS of the **the DIH section** of the AloD portal

# THANKS



[@dih4ai](https://twitter.com/dih4ai)



[DIH4AI  
Project](#)

## Follow the project updates

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