



D8.10 AI REGIO Pan-Eu and International cooperation Program V1

Author:	POLIMI
Work Package:	WP8
Delivery date:	27.04.2022
Due date:	31.03.2022
Classification:	PU

The AI REGIO Project owns the copyright of this document (in accordance with the terms described in the Consortium Agreement), which is supplied confidentially and must not be used for any purpose other than that for which it is supplied. It must not be reproduced either wholly or partially, copied or transmitted to any person without the authorization of the Consortium.



H2020 Innovation Action - This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 952003



Status of deliverable

Action/role	Name	Date (dd.mm.yyyy)
Submitted by	Silvia Razzetti (POLIMI)	22.04.2022
Responsible (WP leader)	Steve Bageritz (SEZ)	22.04.2022
Approved by (internal reviewer)	Annalisa Giavarini (IMECH) Alissa Zaccaria (IMECH)	21.04.2022

Revision History

Date (dd.mm.yyyy)	Version	Author	Comments
19.11.2021	v0.1	POLIMI	ToC initial draft
27.03.2022	V0.2	POLIMI	Chapter 1,2,3,4,5,7 and contribution from DIHs (Ch6)
10.04.2022	V0.3	POLIMI	Chapter 1,8
12.04.2022	V0.4	POLIMI	Finalisation
22.04.2022	V0.5	IMECH	Peer review
27.04.2022	V1.0	POLIMI	Final version

Author(s) contact information

Name	Organisation	E-mail
Silvia Razzetti	POLIMI	silvia.razzetti@polimi.it
Sergio Gusmeroli	POLIMI	Sergio.gusmeroli@polimi.it
Elena Mossali	AFIL	elena.mossali@afil.it
Sandra Perez	EURECAT	sperezmartinez@gencat.cat
Guida, Domenico	ARTER	domenico.guida@art-er.it
Steve Bageritz	SEZ	Steve.Bageritz@steinbeis-europa.de
Sami Rustholkarhu	TAU	sami.rustholkarhu@tuni.fi
Jur van den Bosch	BIC	j.vandenbosch@brainportindustries.nl
Ingrid Meijer	Oost NL	Ingrid.meijer@oostnl.nl
Gustavo Dalmarco	INESCTEC	gustavo.dalmarco@inesctec.pt
Natalja Kleiner	FZI	natalja.kleiner@fzi.de
Nancy Tarjenian Astour	AIN	NTarjenian@ain.es
Maxime VERMEULEN	POLYMERIS	maxime.vermeulen@polymeris.fr
Riccardo Zanelli	COMET	riccardo.zanelli@clustercomet.it
Maja Sušec	UM	maja.susec2@um.si
Pedrero Iñiguez, Manu	TECNALIA	jmanuel.pedrero@tecnalia.com



Contents

Executive Summary	6
1 Introduction.....	9
1.1 About this deliverable	9
1.2 Document structure	9
2 Cooperation with I4MS DT-ICT-03 projects.....	11
2.1 Cooperation with KITT4SME Innovation Action about AI Innovation	12
2.1.1 The AI REGIO – KITT4SME joint webinar for I4MS (4 th October 2021).....	14
2.2 Cooperation with other Innovation Actions in I4MS.....	15
2.3 Cooperation with I4MS CSA, ICT Innovation for Manufacturing SMEs	17
2.3.1 The I4MS Networking Event (28 th January 2022).....	17
2.3.2 The I4MS events	19
3 Cooperation with DT-ICT-07 IAs, DMP Cluster and AI related initiatives.....	20
3.1 The DT-ICT-07 Innovation Actions, Digital Manufacturing Platforms.....	20
3.1.1 The DMP cluster	22
3.2 The ConnectedFactories CSA	23
3.2.1 ConnectedFactories 1 objectives and main actions	24
3.2.2 ConnectedFactories 2 objectives and main actions	26
3.2.3 AI REGIO and Connected Factories	29
3.3 The ICT-38 RIA: Artificial Intelligence for Manufacturing.....	32
3.3.1 The AI-MAN cluster meetings	35
3.4 The AI4Europe Initiative and the Manufacturing Vertical.....	36
3.4.1 The Manufacturing Vertical	38
4 Cooperation with DIH Focus Area in 2018-2020 Work Programme.....	40
4.1 The DIH Focus Area DT-ICT-01/05 Innovation Actions.....	40
4.2 The European DIH Network and the Digital Europe call.....	43
4.3 The AI TEF for Manufacturing initiative in Digital Europe	45
4.4 The DIH4INDUSTRY Marketplace.....	47
5 Cooperation with other initiatives at EU level	50
5.1 Manufacturing Industry Initiatives	50
5.1.1 The VANGUARD Initiative Efficient and Sustainable Manufacturing	50
5.1.2 The JRC Catalogue of DIHs	51
5.1.3 The Made in Europe Partnership	51
5.1.4 AI REGIO Experiments in the EFFRA Innovation Portal	53
5.2 Data and AI Technological Initiatives.....	55
5.2.1 The BDVA and DAIRO Partnership (EBDVF)	55
5.2.2 The Data Space Business Alliance DSBA and Data Spaces for Manufacturing in Digital Europe	57



6	National and Regional Cooperation through AI REGIO DIHs	60
6.1	STEINBEIS – FZI Digital Innovation Hub	60
6.2	POLYTRONICS Digital Innovation Hub	62
6.3	AFIL Digital Innovation Hub	62
6.4	CATALONIA Digital Innovation Hub (ACCIO/EUT)	64
6.5	BRAINPORT Digital Innovation Hub	65
6.6	BOOST Digital Innovation Hub	66
6.7	TAMPERE UNIVERSITY Digital Innovation Hub	67
6.8	PRODUTECH Digital Innovation Hub	68
6.9	ARTER Digital Innovation Hub	69
6.10	IRIS Digital Innovation Hub	70
6.11	Digital Innovation Hub at University of Maribor	71
6.12	COMET Digital Innovation Hub	72
6.13	TECNALIA Digital Innovation Hub	73
7	International Cooperation via World Manufacturing Forum	75
7.1	The World Manufacturing Forum – past editions	75
7.2	The 2021 World Manufacturing Week	77
8	Conclusions and Future Outlook	80

Table of Figures

Figure 1	The projects funded under DT-ICT-03 call	12
Figure 2	Banner of the joint webinar AI REGIO-KITT4SME	15
Figure 3	I4MS Networking Event on 28 th January 2021	18
Figure 4	The I4MS Networking Session - online board	18
Figure 5	The six DT-ICT-07 projects	20
Figure 6	The Autonomous & Smart Factories pathway	25
Figure 7	The Hyper-connected Factories pathway	25
Figure 8	The Collaborative Product-Service Factories pathway	26
Figure 9	The Data Spaces pathway	27
Figure 10	The Circular Economy pathway	28
Figure 11	The AI for Manufacturing pathway	29
Figure 12	Online Board of the DMP Plenary Cluster Web Meeting (3 rd Dec '20)	30
Figure 13	Panel 1 - Positioning the Experiments on the AI for Manufacturing Pathway	31
Figure 14	Panel 2 - AI Manufacturing Technologies for AI REGIO Experiments	32
Figure 15	ICT-38 AI MAN Projects	35
Figure 16	The AI4EU platform landing page	37
Figure 17	A screenshot from the AI4EU platform about users	38
Figure 18	The DIH4INDUSTRY Ecosystem of initiatives	43
Figure 19	EDIH Manufacturing Network map	44
Figure 20	The AI REGIO network of Didactic Factories	47
Figure 21	The DIH4INDUSTRY landing page	48
Figure 22	The European ecosystems of DIHs	51
Figure 23	The AI REGIO profile page on the EFFRA Innovation Portal	54
Figure 24	The DSBA partners	57



Figure 25 Cyber Valley ecosystem (source Cyber Valley)..... 61
 Figure 26 Data and AI initiatives in Navarra 66
 Figure 27 The cover pages of 2019 and 2020 WMF Report..... 77
 Figure 28 The Roundtable moderated by AI REGIO 78
 Figure 29 An extract from the AI REGIO introduction to Panel 2 78

Abbreviations and Acronyms:	
AI	Artificial Intelligence
ADRA	AI, Data and Robotics Association
APDT	Action Plan for the Digital Transition
API	Application Programming Interface
AQ	Autonomous Quality
AR	Augmented Reality
BEST	Business, Ecosystem, Skills, Technology
BDVA	Big Data Value Association
BW	Baden-Wuerttemberg (Germany)
CE	Circular Economy
CM	Circular Manufacturing
CSA	Coordination and Support Action
DAIRO	Data, AI and Robotics
DEP	Digital Europe Program
DF	Didactic Factory
DIH	Digital Innovation Hub
DMP	Data Management Plan
D BEST	Data, Business, Ecosystem, Skills, Technology
DR BEST	Data, Remote, Business, Ecosystem, Skills, Technology
DS	Data Space
DSBA	Data Space Business Alliance
DSM	Digital Single Market
DT	Digital Twin
DT	Digital Transformation
EC	European Commission
EDIH	European Digital Innovation Hub
EEN	Enterprise Europe Network
EFFRA	European Factories of the Future Research Association
ESM	Efficient and Sustainable Manufacturing
GDPR	General Data Protection Regulation (Regulation EU 2016/679)
HEP	Horizon Europe Program
HPC	High-Performing Computer
IA	Innovation Action
ICT	Information Communication Technology
IDS	International Data Space
IDSA	International Data Space Association
IoT	Internet of Things
IP	Intellectual Property
IR	Industrial Robotics
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
ML	Machine Learning
OSAI	Observatory on Society and Artificial Intelligence
PA	Public Administration
PLM	Product Lifecycle Management



PPP	Public Private Partnership
RAMP	Robotics and Automation MarketPlace
RIA	Research Innovation Action
SAE	Smart Everything Everywhere
SC	Strategic Objective
SME	Small Medium Enterprise
SMI	Smart Manufacturing Industry
SRIA	Strategic Research and Innovation Agenda
TEF	Testing and Experimentation Facility
TERESA	TEchnological and REgulatory SAndbox
TRL	Technology Readiness Level
UI	User Interface
VI	Vanguard Initiative
VR	Virtual Reality
WMF	World Manufacturing Forum
WG	Working Group
WP	Work Package
ZDM	Zero Defect Manufacturing



Executive Summary

Deliverable **D8.10 – “AI REGIO Pan-Eu and International cooperation Program V1”** aims at providing a full **overview of some international, European, national and regional initiatives relevant for AI REGIO project**, with a specific focus on: projects funded under the same call (DT-ICT-03-2020); projects funded under the similar calls dealing with Digital Innovation Hubs (DT-ICT-01, 02, 04, 05), Artificial Intelligence (ICT-38) and Manufacturing platforms (DT-ICT-07); national and regional initiatives interesting for AI REGIO purposes and occurring in the 13 different DIHs' regions.

Deliverable D8.10 is the result of the activities run in Task WP8.6 – “Collaboration with I4MS projects and DIHs”, that addresses the liaison and co-operation activities with other projects that will contribute to the I4MS and Digital Innovation Hubs initiatives.

This version of the deliverable is the initial one and has identified the following Collaboration Streams (CSs) and two milestones at M18 and M36.

- CS1. KITT4SME, AI DIHs for Manufacturing. M18** Privileged liaisons have already started with the twin Innovation Action KITT4SME. They're concerned with all the major outcomes of AI REGIO: the 6Ps method, the METHODIH and D BEST frameworks, the DIHIWARE platform and DIH4INDUSTRY portal, the DF Network and TERESA experimentations. **M36** In next months, the current collaboration will be extended to the more technological outcomes such as the Data4AI platform, the AI4MAN Toolkit (and AI4Europe on demand platform) and the Industry 5.0 platform which is the main focus of KITT4SME.
- CS2. DT-ICT-03 Ecosystem. M18** The other DT-ICT-03 Innovation Actions do not have the AI focus, but all of them use AI in their solutions. Moreover, they are all DIHs for Manufacturing. In this period, thanks to webinars and workshops also organised by I4MS, AI REGIO had the possibility to show its main outcomes in the field of AI Digital Transformation (6Ps) and DIH analysis (METHODIH and D BEST). **M36** In next months, the current collaboration will be extended by involving the different communities of Digital Innovation Hubs for Manufacturing, to be provided with the METHODIH tools, and inviting them to create their profile of DIH4INDUSTRY platform.
- CS3. H2020 I4MS Phase IV Cluster. M18** The pan-EU dimension of collaboration between DIH for Manufacturing Innovation Actions is focussing on dissemination and preparation to exploitation actions. **M36** The collaboration will be intensified especially in the People dimension of the 6Ps framework, in the identification of new Roles and Professions and their Digital Skills and in the enrichment of a portfolio of training actions for the whole cluster. HEP I4MS2.0 projects in the three bullets of edge AI, cybersecure IoT and Human Robot Interaction will also be included.
- CS4. H2020 DT-ICT-07 Digital Manufacturing Platforms for Connected Smart Factories. M18** The four application domains of DT-ICT-07 Innovation Actions (agile value networks, zero defect manufacturing, human factors and circular economy) are very relevant opportunities for testing and experimenting AI and for materialising DIHs' services for SMEs. At the moment, collaboration is ongoing with QU4LITY, its virtual DIHs and TEF network in the domain of Zero Defect Manufacturing (cluster 4ZDMP). **M36** In the next period we will intensify our collaboration towards the themes of Twin Transition, sustainability and circularity of Manufacturing.



- CS5. H2020 ConnectedFactories I and II CSAs. M18** AI REGIO has opened an intense collaboration channel especially along the validation of the Data Spaces and the AI for Manufacturing pathways through its 17 application experiments. Dedicated interactive workshops (MURAL) have been held to position as-is to-be experiments in the 5 levels frameworks of both pathways. **M36** In the next period, till the conclusion of CF2 in November 2022, we will intensify such a collaboration also involving the first wave of open calls winning experiments.
- CS6. H2020 ICT38 Research and Innovation Actions, AI MAN cluster. M18** The current portfolio of advanced AI applications at disposal of Manufacturing SMEs will be substantially expanded by the nine ICT38 RIAs (e.g. explainable AI, trustworthy AI, Human-AI interaction). Currently AI REGIO is closely monitoring the developments in such projects and especially in XMANAI, COALA, TEAMING-AI and START projects. **M36** As soon as ICT38 advanced AI applications will be ready, AI REGIO will be considering their integration into the AI4MAN Toolkit and the pan-EU AI on demand platform.
- CS7. H2020 ICT-26, -48, -49 and the AI on demand Platform (AI4Europe). M18** Two levels of collaboration are considered: the AIoD experimentation platform and the Manufacturing vertical Portal (AI Assets Catalogue and Experiments). Regarding the former collaboration, AI REGIO has tested the platform with the IMECH experiment, developing AI pipelines in the online environment and then deploying the pipelines locally in proper execution environments. **M36** Regarding the AI Assets catalogue, AI REGIO will be proposing a three levels taxonomy in order to better specify the characteristics of the assets as well as an ontology-based experiments catalogue, so that it could be easier to perform search and discovery of cases and relevant technologies.
- CS8. H2020 DEIT ICT DIH Focus Area. M18** The DIH4INDUSTRY service portal is the one stop shop for the community of DIH Focus Area (01-06). The current implementation includes the insertion of DIHs, D BEST service portfolio and Experiments. **M36** Next implementations will include customer journey analysis and success stories of Digital Transformation through DIHs.
- CS9. DEP EDIH Network and AI TEF for Manufacturing. M18** AI REGIO is boosting the adoption of the DIH4INDUSTRY platform disseminating it to the DEP communities of EDIHs for Manufacturing, inviting them to create their own profile, to catalogue their services according to the DBEST framework, to present technologies, success stories, and they will have the possibility to talk and establish relationships with other DIHs (EDIH4MAN network). **M36** In the next period, when EDIHs will be selected, we will materialise their presence in the DIH4INDUSTRY portal. Moreover, closer relations will be sought with AI TEF for Manufacturing candidates (deadline of the call is May 17th) in order to insert them in our DF network initiative and in our DR BEST validation program.
- CS10. Manufacturing domain Partnerships and Initiatives. M18** Current collaborations are in place with the Vanguard Efficient and Sustainable Manufacturing Pilot (see 9th December 2021 agenda) and with the EFFRA innovation Portal where AI REGIO cases have been positioned and described. **M36** Further collaborations will be put in place with the VANGUARD AI Pilot, with MANUFUTURE DTI working group and with further evolutions of the HEP Made in Europe partnership. Moreover, a collaboration channel will be open with the Process Industry and the Processes4Planet Partnership.
- CS11. Data and AI Partnerships and Initiatives. M18** At the moment, the D BEST methodology has been presented to the HUBS working group in DSBA. **M36** As soon as AI REGIO Data and AI technologies achieve a certain level of maturity and TRL, they will be properly



presented in the working groups of BDVA (SMI), ADRA Partnership and DSBA Alliance (HUBS).

CS12. International collaboration via the World Manufacturing Forum and ICT38 EU-JAPAN CSA. M18 The 2021 WMF Report was aiming at sharing circular, resilient and sustainable manufacturing expertise within its global network, at building the resilience and competitiveness of stakeholders, and at making possible a prosperous and sustainable future for all. AI REGIO experiments participated in a WMF workshop on Oct 20th in Cernobbio (Gualini Lamiere case). **M36** AI REGIO will promote actions especially through its experiments and open call winners in order to support the WMF ambitions. A specific collaboration with EU-JAPAN CSA is also envisaged in the domain of DIHs for Manufacturing.



1 Introduction

1.1 About this deliverable

Deliverable **D8.10 – “AI REGIO Pan-Eu and International cooperation Program V1”** aims at providing a full **overview of some international, European, national and regional initiatives relevant for AI REGIO project**, with a specific focus on: projects funded under the same call (DT-ICT-03-2020); projects funded under the similar calls dealing with Digital Innovation Hubs (DT-ICT-01, 02, 04, 05), Artificial Intelligence (ICT-38) and Manufacturing platforms (DT-ICT-07); national and regional initiatives interesting for AI REGIO purposes and occurring in the 13 different DIHs' regions,.

Deliverable D8.10 is the result of the activities run in Task WP8.6 – “Collaboration with I4MS projects and DIHs”, that addresses the liaison and co-operation activities with other projects that will contribute to the I4MS and Digital Innovation Hubs initiatives. In addition to that, the current document provides even a wider perspective, including possible collaborations with other initiatives related to AI, Data and Manufacturing.

With respect to the activities foreseen in WP8.6, deliverable D8.10 provides evidence of current and future **participation to common dissemination events, synergies exploitation among projects, collaboration with innovation networks** and the **participation to mentoring activities**.

This version of the deliverable is the first of two and so, it is strongly related to D8.11 – “AI REGIO Pan-Eu and International cooperation Program V2” expected at Month M36 (at end of the project). The current document provides a detailed overview of the ecosystem of initiatives and organisations relevant for AI REGIO, together with some collaborations started so far; the second version will update about the activities already started at M18 and about those for which a planning has been provided in D8.10, to be run from month M18 to month M36.

1.2 Document structure

The document is organized in six main chapters (Section 2 – Section 7), beside the introductory chapter (the current **Section 1**, where the purpose of document and the structure are described) and the conclusive one (**Section 8**, summarizing main achievements and addressing future activities).

Section 2 - Cooperation with I4MS DT-ICT-03 projects provides an overview of the other projects funded under the DT-ICT-03 call, highlighting the aspects in common with AI REGIO and planning a set of actions for future collaborations. A specific focus is dedicated to KITT4SME project with whom AI REGIO has established a privileged collaboration regarding several topics and to I4MS CSA, with whom AI REGIO constantly collaborates for communication/dissemination purposes.

Section 3 - Cooperation with DT-ICT-07 IAs, DMP Cluster and AI related initiatives provides an overview of the projects funded under the DT-ICT-07 call about manufacturing platform, in order to identify possible areas of cooperation. A specific focus is dedicated to ConnectedFactories, the DT-ICT-07 CSA with whom AI REGIO is already collaborating, for instance by validating and adopting the CF2 Pathways.

Section 3 presents also some initiatives related to Artificial Intelligence, relevant for AI REGIO: an overview of the projects funded under the ICT-38 call about AI is provided, also describing the



activities of the AI-MAN cluster; the AI4Europe Initiative and platform are presented, identifying possible contributions from AI REGIO.

Section 4 - Cooperation with DIH Focus Area in 2018-2020 Work Programme provides an overview of the projects funded under the DT-ICT-01, 02, 04, 05 call about Digital Innovation Hubs, highlighting the aspects in common with AI REGIO and planning a set of actions for future collaborations. A specific attention is paid to the DIH4INDUSTRY platform, that is expected to be the main tool to exploit synergies among the different DIHs communities.

Section 5 - Cooperation with other initiatives at EU level defines possible future collaborations between AI REGIO and the following initiatives, presented in details: the S3P-Industry Vanguard Initiatives, the Made in Europe Partnership, the BDVA and DAIRIO Partnership, the Data Space Business Alliance and the AI TEF for Manufacturing initiative.

Section 6 - National and Regional Cooperation through AI REGIO DIHs summarises the main initiatives taken at national and regional level in the 13 different European regions, represented by the 13 DIHs of the AI REGIO ecosystem.

Section 7 - International Cooperation through the World Manufacturing Forum, provides a broader perspective, moving from the European to the international level, and focusses on the World Manufacturing Forum initiative, providing an overview of past editions and topics discussed, and presenting the session organised by AI REGIO during the 2021 World Manufacturing Week.



2 Cooperation with I4MS DT-ICT-03 projects

The **DT-ICT-03-2020** call¹ “**I4MS (phase 4) - uptake of digital game changers**” of 2019 (which AI REGIO is part of) has the objective of accelerating the design, development and uptake of advanced digital technologies by European industry – especially SMEs and mid-caps, where typically the digital and technological transformation is slower. The call aims at identifying and shaping the most suitable tools, methods and organisations to support SMEs and mid-caps.

As part of I4MS Phase 4, in the call a key role is played by **Digital Innovation Hubs**, as supporting organisations toward the digital transformation, specifically of the manufacturing domain. The main topics of the call are: Digital Twins, Additive Manufacturing, Artificial Intelligence, Human-Robot interaction, DIHs for under-represented regions. Additionally, a Coordination and Support Action (CSA) is envisaged to support the network of Digital Innovation Hubs and to help the achievement of broad coverage in technological, application, innovation, and geographic terms, and to link up with regional/national innovation initiatives, and other Digital Innovation Hubs. The AI REGIO project falls under the subtopic of Artificial Intelligence, but due to the strong synergy existing among them to achieve the same objective, AI REGIO (and WP8 in particular) is working to foster the collaboration also with relevant projects under other subtopics.

The Innovation Action (IA) funded projects, all started in 2020, are:

- **DIGITBRAIN** and **CHANGE2TWIN** under the topic of **Digital Twin**
- **PULSATE** under the topic of **Additive Manufacturing**
- **AI REGIO** and **KITT4SME** under the topic of **Artificial Intelligence**
- **BETTER FACTORY** and **VOJEXT** under the topic of **Cognitive Automation Systems**
- **DIHWORLD** under the topic of **DIHs for under-represented regions**

The CSA, started in 2020 as well, is:

- **I4MS4Ts**

Not surprisingly, among the five groups, AI REGIO wishes to set up a privileged collaboration relations with KITT4SME, which is part of the same topic, but it is planning to reinforce the cooperation also with DIHWORLD and other projects, to enhance the collaboration of the DIHs ecosystems, proposing its METHODDIH methodology. In next paragraphs, the high-level collaboration plan is provided, putting in light the commonalities between AI REGIO and the other DT-ICT-03 projects and the main points of contact to create synergies.

¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-03-2020>

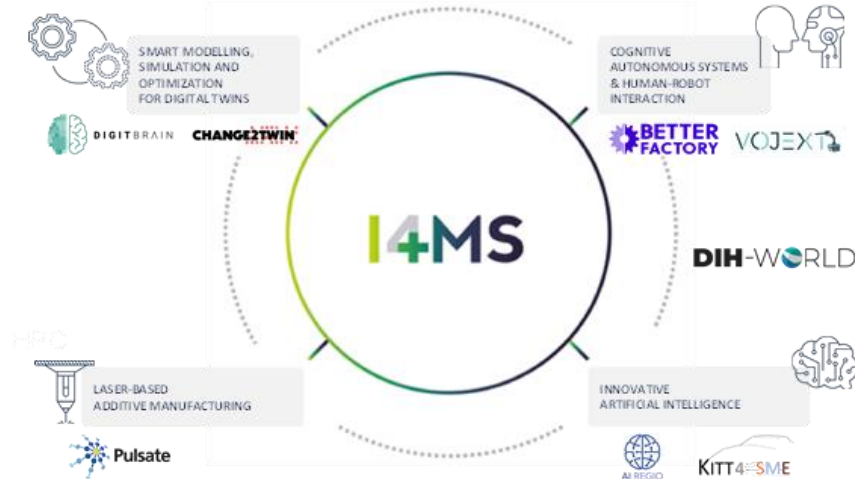


Figure 1 The projects funded under DT-ICT-03 call

2.1 Cooperation with KITT4SME Innovation Action about AI Innovation

KITT4SME² - platform-enabled KITs of arTificial intelligence FOR an easy uptake by SMEs is the other Innovation Action falling with AI REGIO under the topic of Artificial Intelligence. The project “is developing scope-tailored and industry-ready hardware, software and organisational kits for European SMEs and mid-caps, aiming at delivering these as a modularly customisable digital platform that can seamlessly introduce artificial intelligence in their production systems.”

The project is addressed both to SMEs, Technology Providers and DIHs:

- **SMEs** are the final target of the project, since the digital platform (output of the project) is addressed mainly to them. They can benefit from an hardware/software tool that allows to introduce Artificial Intelligence in their production system.
- **Technology Providers** can benefit from the business opportunities deriving from the platform, but also from the possibility to test and assess new AI-based solutions.
- **DIHs** can benefit from the KITT4SME approach by enriching AI-based services and products as well as fostering the collaboration among existing ecosystems interested in the digital platform.

So far, AI REGIO is interested in the collaboration with KITT4SME from a twofold perspective: (i) from the technological point of view, both the projects are developing a platform for boosting the adoption of AI, so it may be useful to analyse the requirements to identify features to be exploited; (ii) about DIHs, AI REGIO is developing a set of tools and methods that can be shared with KITT4SME to support its community of DIHs.

During last months, AI REGIO started a fruitful discussion about a number of different topics, putting the basis for further future collaborations.

Envisaging a collaboration about technical and business topics, AI REGIO presented to KITT4SME two main assets/topics: the 6Ps methodology and Industry5.0.

6Ps METHODOLOGY

Within Task WP2.5 – “Socio-Business continuous assessment, 6Ps Digital Transformation model and Recommendations”, AI REGIO has performed the 6Ps assessment to its 17 Experiments of the first iteration, with the objective of measuring the impact of the experiments on the manufacturing pilots.

² <https://kitt4sme.eu/>



In next month, AI REGIO would like to **apply the methodology also to KITT4SME's pilots**, with a twofold objective:

- To collect an additional number of success stories and lessons learnt to enrich the portfolio of cases related to the 6Ps methodology;
- To provide to KITT4SME's pilots a detailed analysis of the impact of the project on their production process.

From both sides (AI REGIO and KITT4SME), it is considered as a good opportunity to exploit synergies but also a starting point for further collaboration, to improve the KITT4SME platform.

INDUSTRY5.0

Within Task WP5.1 – “AI DIH Collaborative Intelligence and Industry”, AI REGIO has conducted a detailed research about Industry5.0 at theoretical level and the subject has been included also in the Open Calls topics.

At this point, AI REGIO would like to **start a collaboration with KITT4SME to do further investigations** about technological solutions and platform, required to implement the Industry5.0 paradigm.

To enhance to collaboration among DIHs' communities, AI REGIO presented to KITT4SME four main assets/topics: the METHODIH methodology, the DIHIWARE platforms, the Didactic Factories network and TERESA sandbox.

METHODIH

In WP3, AI REGIO developed **METHODIH – a METHOdology for DIHs** (see D3.1 – “Service Portfolio and Customer Journeys” and D3.5 – “AI REGIO DIHs Business and Governance”), that is, a set of tools and methods to ease and better shape the activity of DIHs (Service Portfolio, Customer Journey and Business Model analysis). These tools are applicable not only to DIHs but also to any organisations offering services, such as Didactic Factories and Competence Centres.

The objective is to **extend the network of 13-DIHs in AI REGIO**, also including those from KITT4SME ecosystem, **offering them the METHODIH tools**.

It is expected to be a win-win collaboration, since from one side AI REGIO has at disposal a wider audience to validate its approach, on the other side KITT4SME ecosystem can benefit from a set of tools useful to better shape the activity of DIHs.

DIHIWARE

AI REGIO is involved in the development and implementation of two platforms: the **AI REGIO portal**³, aiming at fostering collaboration inside the project's community of 13 DIHs, and the **DIH4INDUSTRY platform**⁴, with the objective of creating a community of communities, involving DIHs from several initiatives.

Both the platforms can be exploited by KITT4SME's Digital Innovation Hubs, that can take advantage of the collaborative services offered in the platforms as well as showcase their portfolios to other DIHs.

As soon as the portal is finalised for the AI REGIO community, a demo of both platforms will be proposed to KITT4SME's Hubs, to understand the feasibility of **integrating it with the Robotics and Automation MarketPlace (RAMP)**⁵, which is a common marketplace for manufacturers (mainly SMEs) and technological providers where DIHs offer services on top of assets and that it is currently used by KITT4SME's community.

³ <https://airegio-portal.eu/>

⁴ <https://dih4industry.eu/welcome/>

⁵ <https://www.ramp.eu/#/>



Regarding DIH4INDUSTRY platform (see Chapter 4 for more details), the section dedicated to I4MS initiatives has been already created and the KITT4SME's Digital Innovation Hubs have been invited **to create their own profile, including their Service Portfolios and their Experiments.**

DIDACTIC FACTORIES and TERESA

Within WP7, AI REGIO is creating its own network of Didactic Factories, with the perspective of extending it, including additional organisations. KITT4SME participated to the Didactic Factory Kick Off Meeting on 3rd September 2021, presenting a use case to be evaluated for further extension of the network.

Additionally, in WP7 AI REGIO has developed the concept of TERESA, that is, a “Technical and Regulatory Sandboxes for AI, enabling a direct testing environment for innovative products and services aimed at addressing ethical challenges of the regulatory framework”.

Following the “test before invest” paradigm, the TERESAs allow to test/experiment innovative AI applications/tools/services for Collaborative Intelligence-driven human-machine interaction by running experiments on a limited scale, in a secure, gradual and controlled way.

Didactic Factories represent the ideal place within the project to implement the TERESAs, since the experiments can be run in facilities and situations close to real factories and constraints can be relaxed to some extent, while at the same time guaranteeing the safety of the participants involved in the experiment itself.

Of course, the plan is to propose it to any organisation joining the network of DFs.

2.1.1 The AI REGIO – KITT4SME joint webinar for I4MS (4th October 2021)

On 4th October 2021, I4MS CSA organized a workshop about Artificial Intelligence, involving the two projects from DT-ICT-03 call that support SMEs by experimenting and testing Artificial Intelligence techniques in manufacturing: AI REGIO and KITT4SME.

The webinar dealt with “**Unveiling potential of Artificial Intelligence for the manufacturing industry**”, introducing the key concepts on the use of AI and getting first-hand information about the opportunities and support offered by these two projects.

AI REGIO presented its offering for DIHs and SMEs, focusing on one-stop-shop platform that it is building and that enables access to resources for AI-based solutions, with particular emphasis on resources that can lower the barriers related to the AI adoption for SMEs.

KITT4SME presented its offering specifically targeting European SMEs and mid-caps to provide them with scope-tailored and industry-ready digital platform, that seamlessly introduces artificial intelligence in their production systems.

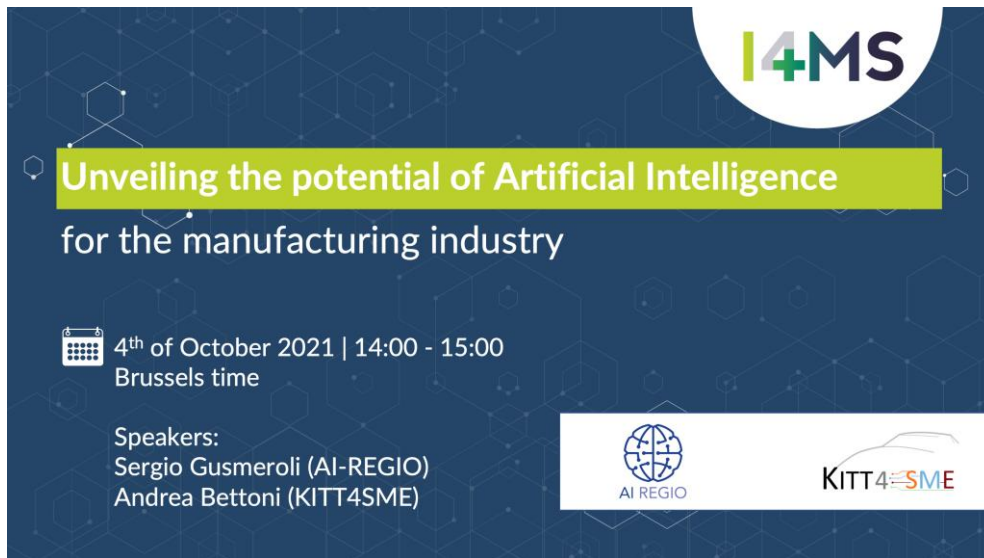


Figure 2 Banner of the joint webinar AI REGIO-KITT4SME

COLLABORATION STREAM I: KITT4SME, AI DIHs for Manufacturing. Many points of contact between AI REGIO and KITT4SME have been identified and discussed, both regarding technical aspects (AI for Manufacturing and Industry5.0 reference implementation), business aspects (the 6Ps methodology and the AI for Manufacturing maturity assessment) and regarding Digital Innovation Hubs (METHODIH, the DIHIWARE platforms, the Didactic Factory Network and TERESA sandboxes).

In next months, a more intensive collaboration is expected to be materialised especially in the context of AI4Europe on-demand platform and in the DIH4INDUSTRY service portal.

2.2 Cooperation with other Innovation Actions in I4MS

Beside AI REGIO and KITT4SME, the other projects funded by the DT-ICT-03 call are the following:

Topic: DIGITAL TWIN

- **DIGITBRAIN**⁶ (July 2020 – December 2023): the project aims at extending the well-known concept of Digital Twin by developing the '**Digital Product Brain**' which will store data throughout the entire life cycle of a production line or a machine. This will enable a new manufacturing model, called **Manufacturing-as-a-Service** (MaaS), which will allow for on-demand production of much more specialised products, even in smaller quantities and still in an economically profitable way.

The final solution technology is addressed to enterprises, especially SMEs and mid-caps, and Digital Innovation Hubs are expected to play a key role, by creating a critical mass of companies in the manufacturing sector interested in it, to facilitate the creation of the MaaS business model. The **DIGITbrain consortium includes 6 DIHs** (initial consortium), with an overall European coverage, that accompany the experiment pilots providing mainly technical and business support.

⁶ <https://digitbrain.eu/>



- **CHANGE2TWIN⁷** (June 2020 – May 2024): the project aims at supporting manufacturing SMEs in their digitalization process by providing **Digital Twin solutions**. Within the Experiments, the pilots are developing their own Digital Twin solution that must be accurate but covering only required aspects, interoperable with other solutions, re-usable for different purpose.

To this regard, the role of Digital Innovation Hubs is fundamental: DIHs are expected to perform the digital assessment of the company, before adopting any new solution, and to support the implementation of the Digital Twin. The project itself is working to **develop a service model facilitating DIHs** in providing support to manufacturing companies.

Topic: **ADDITIVE MANUFACTURING**

- **PULSATE⁸** (September 2020 – August 2024): the project aims at **facilitating the adoption of Laser-Based Advanced Additive Manufacturing (LBAAM) technologies** by SMEs, by promoting the development of SME-friendly laser-based equipment and solutions but also by setting-up a robust Pan European Network, connecting technology providers with final users, **leveraging on Digital Innovation Hubs as brokers**.

Hence, the resulting ecosystem built-up by the project will count many DIHs, providing a wide catalogue of services.

Topic: **COGNITIVE AUTOMATION SYSTEMS**

- **BETTER FACTORY⁹** (October 2020 – September 2024): the project aims at **redesigning customizable products and service portfolios using new digital technologies**, by creating a network of artists, SMEs and technology providers that collaborate toward a more digital business model. Better Factories provides an Open and Standardized Advance Production Planning and Scheduling (APPS) system for manufacturers to test commercial tools to optimize waste, energy, resources and logistic.
- **VOJEXT¹⁰** (July 2020 – December 2023): the project aims at **transforming the way of the manufacturing automation and at guaranteeing a flexible reconfiguration**, improving also the human-robot collaboration in the plants. To reach the objective, the project is designing, developing and demonstrating affordable, market-oriented, multipurpose and easy-to-repurpose robotic systems.

Topic: **WIDENING DIGITAL INNOVATION HUBS**

- **DIHWORLD¹¹** (July 2020 – June 2023): the project aims at accelerating the uptake of advanced digital technologies by European manufacturing SMEs in all sectors, leveraging on the figure of **Digital Innovation Hubs**, particularly **boosting those in the underrepresented regions across Europe**. The final aim is to accelerate the matureness of DIHs and the development of their collaboration capabilities.

Hence, Digital Innovation Hubs are the core of the project and the DIHWORLD network has currently reached 55 Hubs, from several European regions.

Due to the wide presence of Digital Innovation Hubs in the DT-ICT-03 projects, AI REGIO wishes to present to the network the tools and solutions developed to support the DIHs.

In particular, the **METHODIH framework** could be of great value for the Digital Innovation Hubs of the other projects, as it allows to describe in a structured way their services (DBEST Service Portfolio

⁷ <https://www.change2twin.eu/>

⁸ <https://www.pulsate.eu/>

⁹ <https://betterfactory.eu/>

¹⁰ <https://vojext.eu/>

¹¹ <https://dihworld.eu/>



analysis), to match their offering with the customers' demand (Customer Journey analysis and Service Pipeline) and to validate the sustainability of their business (DIH Business Model canvas). Shaping their services according to the DBEST taxonomy speeds up also the creation of the profile on the **DIH4INDUSTRY platform**, which is the second step to be proposed to them, as part of the I4MS community. Being registered on the platform and so, being part of the DIH4INDUSTRY ecosystem, make the DIHs more visible, allowing other DIHs and policy makers to identify that they are active in the Manufacturing domain and it represents also a showcase for their experiments and success stories.

Finally, aiming at extending the AI REGIO network of Didactic Factories, the next step is to identify additional DFs willing to join the community.

COLLABORATION STREAM II: DT-ICT-03. With DT-ICT-03 Innovation Actions, AI REGIO is planning to start a collaboration involving the different communities of Digital Innovation Hubs for Manufacturing, to be provided with the METHODIH tools, and inviting them to create their profile of DIH4INDUSTRY platform. A workshop to present it will be organised in next months, to kick-off the collaboration.

2.3 Cooperation with I4MS CSA, ICT Innovation for Manufacturing SMEs

I4MS Tools and Technologies for Transformation¹² is the Coordination and Support Action of DT-ICT-03 call started at June 2020 and running till November 2022. The main objective is to support the ICT Innovation for Manufacturing SMEs (I4MS) ecosystem, leveraging on Digital Innovation Hubs. The project is providing a strong communication and dissemination platform and DIHs are provided with tools, to reinforce their value proposition and being more appealing for SMEs and mid-cap, particularly those from underrepresented regions and/or sectors.

AI REGIO is naturally involved in the activities of the CSA, both in communication/dissemination events and providing content to be displayed on the platform.

The collaboration between the two projects is expected to grow in next months, as AI REGIO will reach a more mature stage with more results to be disseminated.

Similarly to what was done for the first Open Call wave, also the second wave will be advertised on the I4MS portal dedicated to Open Calls¹³.

Here below, we report the most significant and recent examples of collaborative activities with I4MS, beside the "AI REGIO – KITT4SME joint webinar for I4MS" on 4th October described in Section 2.1.1.

2.3.1 The I4MS Networking Event (28th January 2022)

On 28th January 2022, AI REGIO participated to the "I4MS Networking Event"¹⁴ about the "**most burning topics of SMEs digital transformation in manufacturing**".

¹² <https://i4ms.eu/>

¹³ <https://i4ms.eu/open-calls/>

¹⁴ <https://i4ms.eu/event/i4ms-networking-event/>



Figure 3 I4MS Networking Event on 28th January 2021

The networking event agenda was based on two main sessions:

- i) The **I4MS interactive session**, to discuss about four different topics, leveraging on an online board. AI REGIO moderated the fifth topic “EDIHs Participation in I4MS”, asking to participants to provide their comments about challenges, available tools and methods and the role that EDIHs can play in new projects. As moderator, AI REGIO provided some examples, mainly related to tools and methods since it has developed METHODIH, that represents an effective set of tools not only for DIHs, but also for EDIHs.

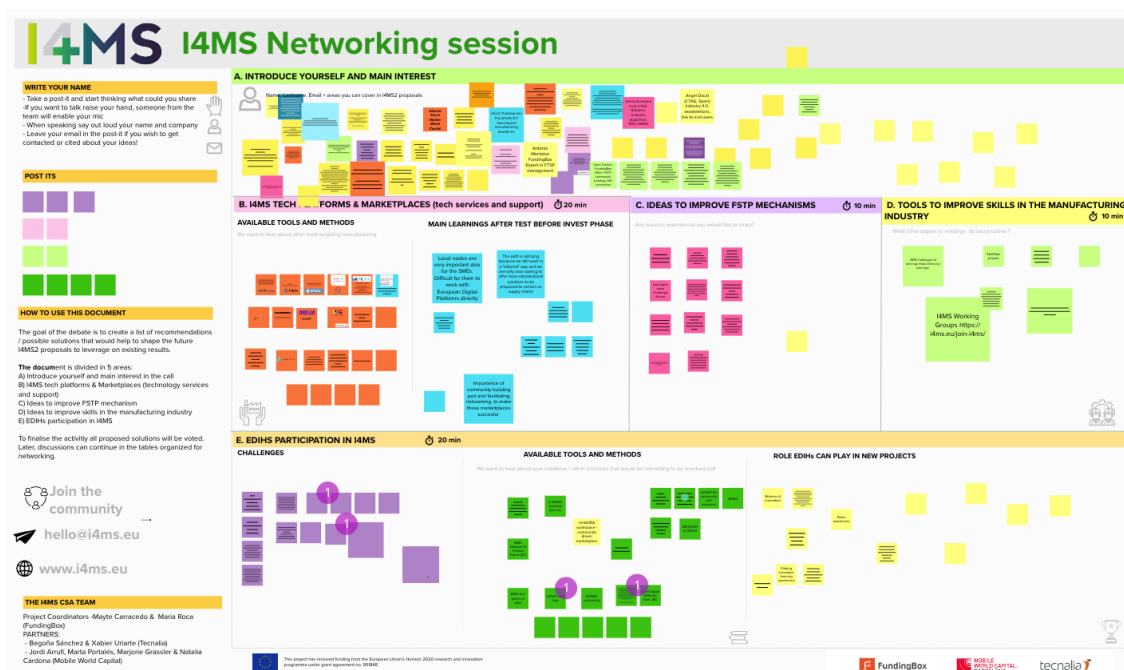


Figure 4 The I4MS Networking Session - online board

- ii) The **Networking session** where participants have been “virtually” invited to sit at the AI REGIO table, to know more about the project, the session previously presented and to do networking.



2.3.2 The I4MS events

On 3rd March 2021, AI REGIO participated to the “**I4MS Talk: The digital transformation of the employment in manufacturing**”¹⁵, organised by I4MS “*to show ongoing and future digital skills activities within several projects funded by the European Commission and the challenges to solve the gap of skill shortage will be explored*”.

AI REGIO provided an overview of the project and presented its methodology, with a specific focus of the approach followed for Skills development, inherited by Boost4.0 project¹⁶.

On 16th February 2022, AI REGIO participated as a speaker to the “**I4MS Collaboration on Training and Digital Skills**” to discuss about the contribution of the project to the Working Group on Skills.

The meeting agenda was based on two main sessions: i) the presentation of the I4MS Catalogue of training and the Working Group on Digital Skills (see paragraph 2.3.2.1) and ii) the contribution of the DT-ICT-03 IA projects to that.

2.3.2.1 The I4MS Catalogue of Training and Digital Skills WG

The **I4MS Catalogue of Training**¹⁷ is available in the I4MS online portal and it contains more than 200 Training activities of different types (lectures, workshops, videos, webinars, exercises, etc.), about different technologies (Artificial Intelligence, Robotics, IoT, cybersecurity, etc.) and market sectors (Energy, Chemical, Automotive, etc.).

The trainings’ providers are typically funded projects and AI REGIO is willing to contribute to it. In particular, I4MS is updating the Catalogue, including a list of contents and **trainings developed by I4MS projects to support DIHs and EDIHs**. This will include guidance to set up new hubs, reusable support tools (templates, webinars, guidelines, good practices, reusable capacities, etc.), carefully selected good practice cases, twinning programmes, provisioning of training services and material (e.g., on-line videos / tutorials, physical and on-line workshops) covering the needs of the EDIH. Technological and financial aspects should be covered as well.

To this regard, AI REGIO (within T8.4) explored and developed a methodology to identify and update job profiles and relevant skills in AI, data science management, and I4.0 area, at three different levels: Managers, Professionals, and Workers levels.

To reinforce the catalogue, the **Digital Skills Working Group** has been established. It is made up of a number of Innovation Actions that provide and present their digital skills training activities, such as DIGITBrain's "Training Module on the Platform", AMABLE's "Experience Labs", AI REGIO's "6Ps - People Dimension", and so on.

COLLABORATION STREAM III: I4MS Cluster. With I4MS, AI REGIO is keeping an intensive collaboration participating to dissemination and communication events, about several topics. In particular, our methods and tools for 6Ps Digital Transformation especially in the domain of Digital Skills (P People) will be communicated in order to substantially contribute to the I4MS Catalogue of Training and to the Digital Skills Working Group.

¹⁵ <https://www.linkedin.com/events/i4mstalk-thedigitaltransformati6765190533481545728/>

¹⁶ <https://boost40.eu/>

¹⁷ <https://i4ms.eu/trainings/>



3 Cooperation with DT-ICT-07 IAs, DMP Cluster and AI related initiatives

Following Chapter deals with two main topics (and related initiatives) relevant for AI REGIO:

- **Manufacturing Platform**, by exploring the projects funded under the call DT-ICT-07-2018-2019, with a specific focus on the ConnectedFactories 2 CSA and the DMP cluster grouping the projects;
- **Artificial Intelligence**, by exploring the projects funded under the call ICT-38-2020 and the AI-MAN cluster grouping them and by exploring the AI4EU platform.

3.1 The DT-ICT-07 Innovation Actions, Digital Manufacturing Platforms

The **DT-ICT-07-2018-2019 call**¹⁸ “**Digital Manufacturing Platforms for Connected Smart Factories**” of 2019 has the objective of exploiting new concepts and technologies (as Digital Manufacturing platforms) that allow manufacturing companies (especially mid-caps and SMEs) to fulfil the demands from changing supply and value networks.

The Innovation Actions funded by the call aim at developing and establishing platforms to support manufacturing companies to improve their productive processes and integrating different technologies.

The projects are the following:



Figure 5 The six DT-ICT-07 projects

- **DigiPrime**¹⁹ (January 2020 – December 2023): the project aims at defining the concept of “**circular economy digital platform**” and at developing it, in order to create circular business models based on data, to recover and reuse functions and materials. The final platform is a federated model of digital platforms for cross-sector business in the circular economy.

¹⁸ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-07-2018-2019>

¹⁹ <https://www.digiprime.eu/>



The use cases deal with three different domains: batteries (4 use cases), textile (4 use cases) and mechatronics/electronics (4 use cases).

Additionally, DigiPrime has defined the concept of “Circular Innovation Hub”, that is an organisation designed as a set of connected pilot facilities to serve companies in multiple sectors and across existing value chains. Since “Circular Innovation Hubs” are also DIHs, the network represents a fertile ground to disseminate AI REGIO methods and tools for DIHs (METHODIH).

There are some partners in common with AI REGIO: Politecnico di Milano is coordinator of both projects, Tecnalìa, Polymeris are DIHs participants and this may speed up possible collaboration.

- **EFPF²⁰** (January 2019 – December 2022): the project aims at offering a platform that enables users to utilise innovative functionalities, experiment with disruptive approaches and develop custom solutions. It is addressed to the EFPF **federated smart factory ecosystem** and the objective is to maximise **connectivity, interoperability and efficiency** across the supply chains and to interlink different stakeholders of the digital manufacturing domain. The platform and the power of federation are demonstrated in three different pilots dealing with aerospace, furniture manufacturing and waste management sectors.
- **KYKLOS 4.0²¹** (January 2020 – December 2023): the project aims at developing a system which automatically and autonomously creates the configurations, methodologies, production techniques, autonomous decision-making processes and actions at all different levels and stages of the manufacturing value chain. A key concept for the project is **Circular Manufacturing (CM)**, to ensure scalability of novel technologies and to demonstrate in a realistic, measurable, and replicable way **the transformative effects that Circular Production Systems, PLM , LCA, AR and AI** technologies and methodologies will have to **the Circular Manufacturing Framework**. 7 pilots have been defined to demonstrate the platform, dealing with the medical, aerospace, Equipment, shipyard, food, automotive sectors.
- **QU4LITY²²** (January 2019 – March 2022): the project aims at defining and **demonstrating the Autonomous Quality (AQ) concept** by developing, deploying and adopting innovative Cognitive Manufacturing solutions for Zero Defect Manufacturing. To this regard a reference architecture for AQ solutions is introduced as well as an edge equipment platforms for ZDM. Furthermore, to support the AQ services development processes end-to-end and the adoption by SMEs, QU4LITY has established a DIHs network for AQ/ZDM, leveraging on the digital innovation hubs of the consortium. The network represents a fertile ground to disseminate AI REGIO methods and tools for DIHs (METHODIH); the common partners with AI REGIO (Politecnico di Milano, Engineering, Intellimech, Unparallel, TXT, CEA) may ease possible collaborations.
- **Smart Human Oriented Platform for Connected Factories - SHOP4CF²³** (January 2020 – December 2023): the project aims at creating a unique infrastructure for the convenient deployment of human-centric industrial applications, following the concept of Industry5.0 paradigm that states that people should not be replaced by automated process but can gain new relevance through usage of their individual abilities within the factory.

²⁰ <https://www.efpf.org/>

²¹ <https://kyklos40project.eu/>

²² <https://qu4lity-project.eu/>

²³ <https://shop4cf.eu/>



Four use cases are defined to identify the functional requirements for the architecture and to test the platform.

The Industry5.0 paradigm is part also of the AI REGIO program: in T5.1 – “AI DIH Collaborative Intelligence and Industry 5.0” AI REGIO is developing a module to support orchestration of human-centred processes in terms of process management and a more technical collaboration could be useful.

- **Zero Defect Manufacturing Platform - ZDMP²⁴** (January 2019 – December 2022): the project aims at providing an **extendable platform** for supporting factories with a high interoperability level to cope with the concept of connected factories **to reach the zero defects goal**.

The final platform is a system that captures the information from the physical world to create digital records (sensor integration), analyses this information (advanced analytics and data-visualisation), makes decisions and translates them for the physical world.

13 manufacturing use cases have been defined, related to four main sectors: Automotive, Machine Tools, Electronics and Construction.

3.1.1 The DMP cluster

The **Digital Manufacturing Platform (DMP)** cluster was born at the beginning of 2019 under the initiative of the ZDMP project, gathering together the six Innovation Actions of the DT-ICT-07 call – “Digital Manufacturing Platforms for Connected Smart Factories” (see Sections 3.1), pursuing joint activities in a number of areas (platform interoperability, dissemination, business models, standardisation, etc) to synchronise the related activities taking place in different projects.

So far, 8 Working Groups (WG) have been established, involving partners of the six sister projects:

- **WG1 - Standardisation²⁵**. Standardization clustering activities will connect standardization forums to facilitate the compliance of the cluster results with existing standards. Furthermore, the cluster will also contribute to new standardization activities where possible.
The Working Group is managed by ConnectedFactories 2, that organise regular meetings every three-months.
- **WG2 – Dissemination**. Events participation is an important activity to disseminate/discuss the clusters’ advances. This topic considers the active participation in joint dissemination actions to communicate and promote the cluster results to technology and service providers as well as other business users and/or stakeholders. This activity foresees a) Joint event(s) participation, with joint booths, and b) Production of joint dissemination materials such as cluster brochure, poster, or video.
- **WG3 – Research**. Digital Manufacturing Platforms for Connected Smart Factories is a massive field of application, technology, and research on relevant innovation areas. Even within innovation projects, there is space to publish innovative results in leading journals and conferences. This will ensure an effective transfer of produced knowledge to the relevant industry and technical communities, research, and academic practitioners, as well as the next generation of stakeholders such as students in academia. The main objective is to publish joint research papers on cluster projects’ common topics.
- **WG4 – Performance Management and KPIs**. Reference architectures for digital industrial platforms will increase productivity with relevance for SMEs. Assessment frameworks with core indicators to assess overall performance, including circular economy aspects, will be addressed in a common way. The main objective is to define and implement common performance management and common KPIs for success measurement. As an example, a common set of KPIs and a benchmarking tool has been proposed.

²⁴ <https://www.zdmp.eu/>

²⁵ <https://www.connectedfactories.eu/dmp-standards>



- **WG5 – Market Analysis and Business Models.** The cluster vision is to bring the project's outcomes to market, thus creating jobs and enhancing Europe's economic development. Cluster activities will place strong emphasis on turning the outcomes and innovation/technological developments of the cluster projects into value--creating products and services. The main objective is to establish a joint DMP Market Analysis and portfolio of Business Models for DMP. This topic's strategy will be revised taking into consideration the confidentiality issues that are involved.
- **WG6 – Open Calls.** The open calls approach will enable external stakeholders (software developers, services providers...) to permanently improve components and develop new applications. Joint work will be done to make external stakeholders aware of the available resources, to potentiate the open calls participation and to combine efforts on their evaluation. The open calls will be widely promoted through a number of channels in collaboration, including stakeholder networks, social media and other online marketing, links with relevant CSAs such as OPENDEI and Connected Factory and other H2020 communication means (including the Official Journal of the EC), presentations at various events, flyers, newsletters, etc.
- **WG7 – Platforms.** Joint activities will exploit synergies between technology-based platforms addressing issues such as architecture, interoperability and standard approaches. This approach will enlarge the ecosystems surrounding the projects, facilitate the access for entrepreneurs / API developers/Makers and SMEs in general, and support the transfer of skills and know--how to industry. Activities will involve the analysis of existing reference architectures, specific requirements and needs.
- **WG8 – Pilots.** Pilot activities will be jointly addressed by the three + three projects to increase knowledge on pilots' description, conducting, and assessment. Analysis of existing pilots' templates and descriptions will be used to achieve a possible common representation methodology and semantic interoperability. The collection of strategies to raise SME engagement and common strategies on privacy GDPR issues will also be addressed.

The DMP cluster is organising periodical meetings about several topics, some of them specific for the Working Groups, other more general, open to the partners of the DT-ICT-07 projects. The meeting organised on 3rd December 2020 (see Paragraph 3.2.3.1.1) is an example.

AI REGIO is not part of the cluster; however, there are many partners in common: for instance, Politecnico di Milano is coordinating AI REGIO and is part of ConnectedFactories 2, leading WG1 and working in WG8; Engineering is partner of AI REGIO and has a key role in WG7.

COLLABORATION STREAM IV: DT-ICT-07 and DMP Cluster. With DT-ICT-07 projects, AI REGIO already started a collaboration involving the different technological platforms developed in the project, especially the Data4AI pipelines and the AI4MAN Toolkit which can become main pillars in a DMP reference architecture. Zero Defect Manufacturing and Circular Manufacturing could be interesting domains where AI REGIO Data and AI technologies could be adopted and exploited. QU4LITY and digiPrime projects are in this perspective privileged collaboration channels.

3.2 The ConnectedFactories CSA

The DT-ICT-07-2018-2019 call is funding also the **ConnectedFactories 2 (CF2)** CSA, in order to “cross-fertilise the Industrial Platform communities [...] and support the transfer of skills and know-how”.



ConnectedFactories 2²⁶ is the sequel of **ConnectedFactories**²⁷ and, similarly to the previous one, it aims at establishing a structured overview of available and upcoming technological approaches and best practices with regard to the digitalisation of manufacturing.

In particular, the two projects were conducted with the goal to create **pathways facilitating the digital and sustainable transition of manufacturing companies**.

In the next two sub-chapters their results and activities are summarised, together with the collaborative activities conducted with AI REGIO project and future planning.

3.2.1 ConnectedFactories I objectives and main actions

ConnectedFactories - Industrial scenarios for connected factories project finished in October 2019 with the main objectives of:

- developing the concepts of “**digitisation**” and “**digital platforms**” in manufacturing,
- providing a structured overview of both **available and upcoming technological approaches**,
- **developing** forward-looking scenarios or **pathways**,
- **stimulating consensus**,
- **creating trust** and deepen the links within the community.

As just anticipated, one of the main results (exploited also in CF2) is the “scenarios and pathways” definition: they represent the tools through which companies can develop their innovative strategy in the context of digitalization. Each path relies on different levels of maturity which are linked to a set of milestones to be achieved to move to the next level becoming more advanced.

ConnectedFactories 2016-2019 defined the following three pathways and it validated them by mapping the related projects’ pilots.

Autonomous Smart Factories pathway

The **Autonomous Smart Factories pathway**²⁸ focusses on intra-factory manufacturing automation and optimization, including advanced human-in-the-loop workspaces and it is based on five levels of maturity as depicted in Figure 6. Companies willing to improve their status of “autonomous smart factories” are required to position themselves on a level and to evaluate a final level, in order to develop their innovative strategy, following milestones.

²⁶ <https://www.connectedfactories.eu/>

²⁷ <https://cordis.europa.eu/project/id/723777>

²⁸ <https://www.connectedfactories.eu/autonomous-smart-factories-pathway>

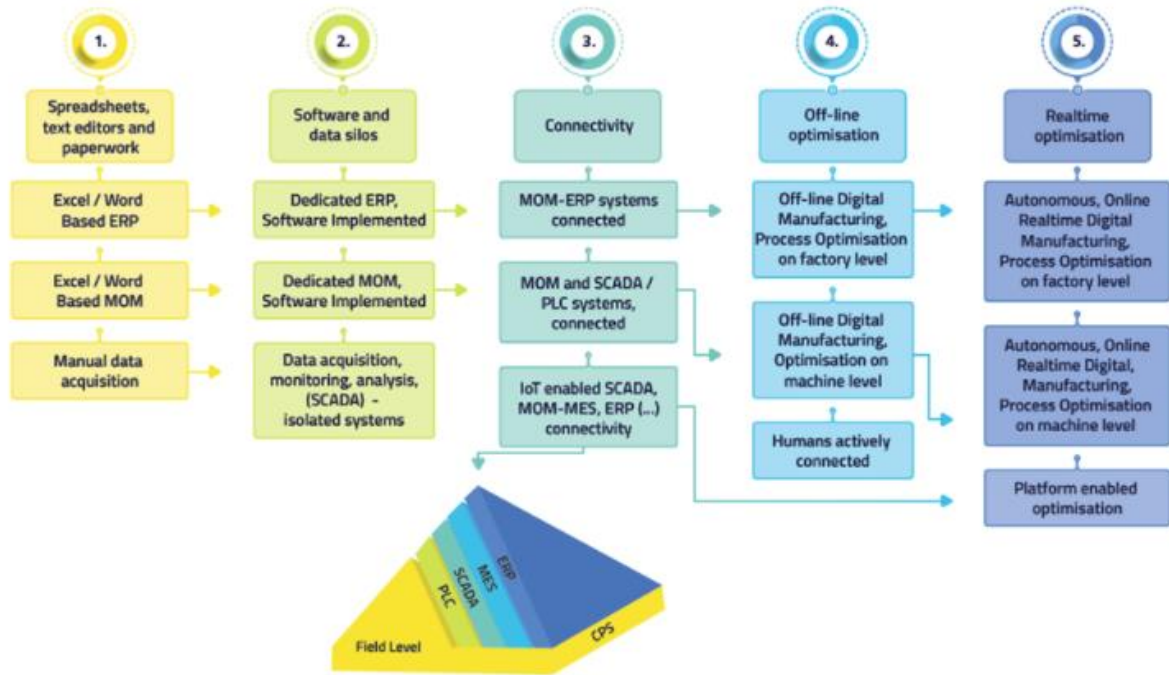


Figure 6 The Autonomous & Smart Factories pathway

Hyper-connected Factories pathway

The **Hyper-connected Factories pathway**²⁹ focusses on networked enterprises in complex, dynamic supply chains and value networks. It relies on 5 levels of maturity as depicted in Figure 7.

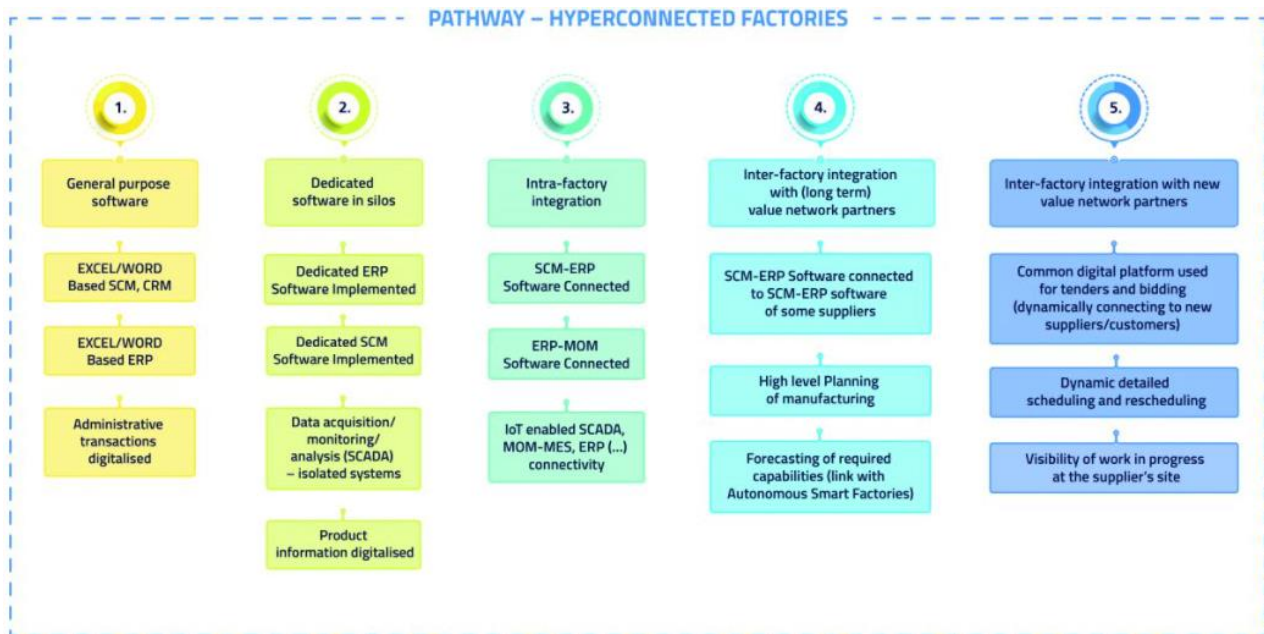


Figure 7 The Hyper-connected Factories pathway

Collaborative Product-Service Factories pathway

²⁹ <https://www.connectedfactories.eu/hyperconnected-factories-pathway>

The **Collaborative Product-Service Factories pathway**³⁰ focusses on data-driven product-service engineering in knowledge intensive factories and it relies on five levels of maturity as depicted in Figure 8.

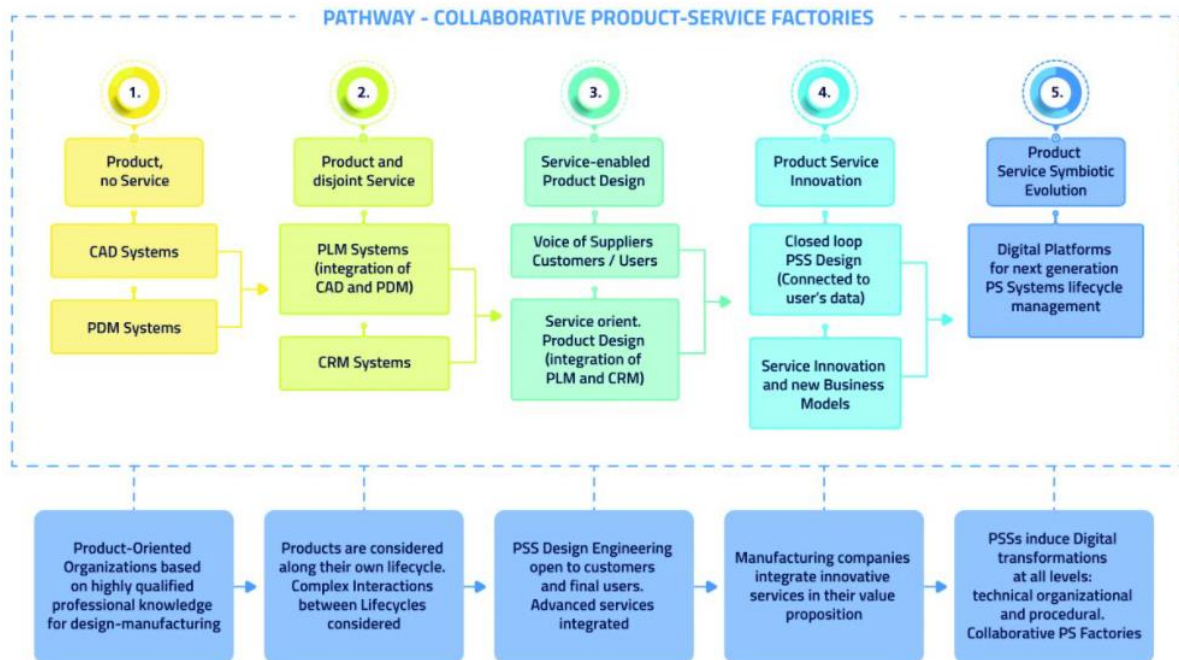


Figure 8 The Collaborative Product-Service Factories pathway

3.2.2 ConnectedFactories 2 objectives and main actions

The **ConnectedFactories 2 - Global-leading smart manufacturing through digital platforms, cross-cutting features and skilled workforce** project started in December 2019 and it is expected to finish in November 2022.

It provides an overview on advanced technologies and best practices with regard to the digitalization of the manufacturing sector by highlighting present and future needs of manufacturing companies. The main objectives are:

- to create a **common understanding of key enablers and cross-cutting factors** for the development of digital technologies platforms for manufacturing,
- to **deepen pathways** by considering legacy systems, industrial requirements and challenges and to create a broad awareness about them,
- to **engage with the research and industrial** organisations,
- to **stimulate visibility and impact of Digital Manufacturing Platforms** for Connected Smart Factories projects (funded under the call DT-ICT-07-2018-2019).

Similar to ConnectedFactories, the project developed two pathways (supporting the data driven and sustainable transition of companies) and it is validating a third one, not yet published on the website.

Data Space pathway

The **Data Spaces pathway** relies on the increasing need to create a common EU Data Space for Manufacturing Industry. The pathway is the result of a detailed analysis of many relevant European

³⁰ <https://www.connectedfactories.eu/collaborative-product-service-factories-pathway>



publications on the topics, that allow to understand the EC's value and position: the BDVA positioning paper, "**Toward a European-Governed Data Sharing Space**"³¹, to understand what Data Spaces, Data Platforms and Data Marketplaces are within EU Data Ecosystem and the BDVA "**SRIA Strategic Research and Innovation Agenda version 4.0**"³² reference model where five plus one data-oriented challenges have been identified and materialized.

The final result is a 6x5 evolutionary matrix, having

- six **dimensions** on the rows, that is, six different processes related to data exploitation:
 - **Data Management,**
 - **Data Protection,**
 - **Data Processing Architectures,**
 - **Data Analytics,**
 - **Data Visualisation and User Interaction,**
 - **Ecosystems for Data Sharing.**

- five **maturity levels** for a Manufacturing company, to be crossed with the data dimensions:
 1. **No Data Control,**
 2. **Data Silos,**
 3. **Data Bridges,**
 4. **Data Interoperability,**
 5. **Data Valorisation.**

The DS Pathway evolutionary matrix					
Digital Transformation - Industry 4.0					
Dimensions / Levels	Level I No Data Control	Level II Data Silos	Level III Data Bridges	Level IV Data Interoperability	Level V Data Valorization
Data Management			Data Engineering & Security Privacy	Data Sovereignty and GDPR	Data-driven Business Models
Data Protection					
Data Processing	Data are generated, processed and visualized by CPPS and I4.0 systems	Enterprise Applications (ERP, SCM, PLM, CRM) collect, store and visualize Data	Complex applications require data from different sources	AI-driven applications; Digital Assistants; VR/AR	Data Economy and Industrial Data Platforms
Data Analytics					
Data Visualization					
Data Sharing			Data Spaces Interoperability	Data Sharing Spaces	Flexible Data Marketplaces

Figure 9 The Data Spaces pathway

Circular Economy pathway

31

https://www.bdva.eu/sites/default/files/BDVA%20DataSharingSpaces%20PositionPaper%20V2_2020_Final.pdf

32 <https://www.bdva.eu/node/874>



The **Circular Economy pathway** rises to highlight the importance of the Circular Economy (CE) paradigm for the sustainable development of the manufacturing sector. It is a maturity assessment model which allows companies to estimate their position into the CE paradigm.

Similar to the Data Space pathway, the final result is a 6x5 evolutionary matrix, having

- six **dimensions** on the rows, corresponding to six different aspects of the production process:
 - **Product,**
 - **Process,**
 - **Platform,**
 - **People,**
 - **Partnership,**
 - **Performance.**

- five **maturity levels** of “circularity”, to be crossed with the horizontal dimensions:
 1. **Linearity,**
 2. **Industrial CE piloting,**
 3. **Systemic Material Management,**
 4. **Circular Economy Thinking,**
 5. **Circularity.**

	1	2	3	4	5
Products	Any toxic substances should not be used to create products	Material used should be the minimum amount required to respect product functionalities and design (resource sufficiency)	Systematical identification of possibilities to reuse, refurbish and remanufacture	Ecodesign of products (must be easy to be disassembled, repaired, remanufactured and its components should be recyclable)	Changing business model towards product-service-systems and X as service approaches at ecosystem level
Process	Quality monitoring to avoid unnecessary scraps	Production processes must require limited amount of energy	Transportations modes (reverse logistics), internal recycling of materials	Building industrial synergies/closed loop models	Circular systems and process at value network/ecosystem level
Platform	Information technologies to gather processes data	Company systems integration (e.g. ERP, MRP, PDM, PLM...)	Disassembly and Remanufacturing enabling technologies introduced on the shop-floor	Digital platform integration enabling the interaction among value chain actors	Collaborative business processes and workflows are used over the product life cycle
People	Ad-hoc engagement of individuals, not comprehensive engagement	Engagement and awareness raising, systemic empowering through champions	Cultural transformation and qualified people (skills)	Circular suppliers selection and value network level indicators	Sustainable government requirements and European Green Deal?
Partnership	Contractual obligations based on regulations	Code of conduct guidelines for circularity/sustainability of materials. There are occasional collaboration around circularity/sustainability	Circularity objectives discussed at value chain level. Stakeholder engagement systematically considered.	Capabilities to dynamic collaboration new partners, research and innovation partnerships launched	Digital ecosystems enabling circularity, partnering with customers making use of knowledge
Performance	Reporting and measuring only the legal responsibilities related to recycling and other environmental obligations	Targets and KPIs set up for circularity pilots	Operative KPIs for resource sufficiency/ decrease of waste etc.	LCA analysis over the product lifecycle, KPIs for footprint.	Circularity indicators (based on the forthcoming standard)

Figure 10 The Circular Economy pathway

AI for Manufacturing pathway

The **AI for Manufacturing pathway** is the most recent one, still on validation, and it deals with the adoption of Artificial Intelligence in the manufacturing process, toward a more autonomous production.

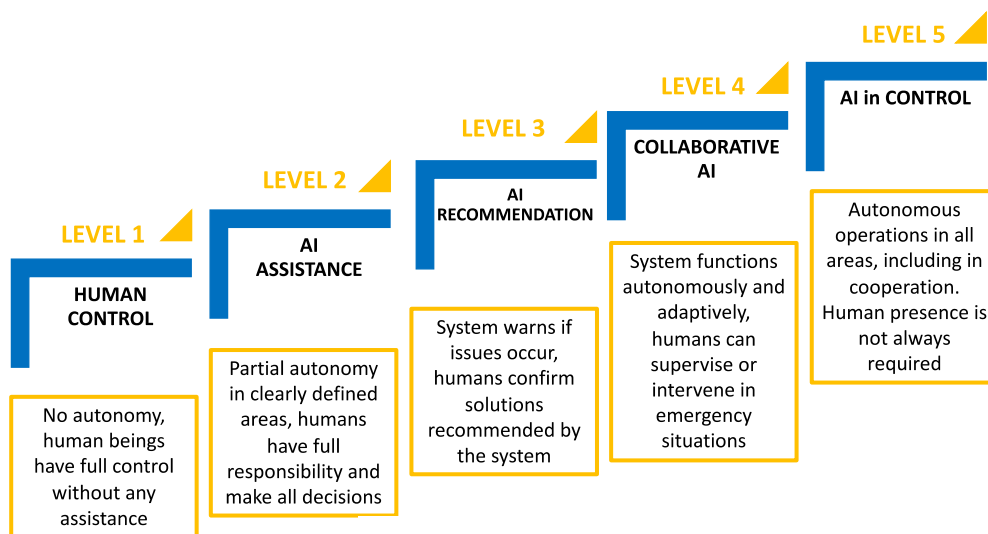


Figure 11 The AI for Manufacturing pathway

The five levels are depicted in Figure 11. To define a strategy to jump from one to another, several enablers and technologies can be exploited, taking into account also the main challenges to be faced (often related to legal and ethical issues deriving in the AI adoption).

The main AI technologies identified are:

- **Machine vision and Robotics**
- **Embedded AI in Products**
- **Machine Learning and Knowledge Discovery**
- **Recommendation and decision support**
- **AI forecasting and prediction**
- **AI for planning and maintenance**
- **AI Standards**

3.2.3 AI REGIO and Connected Factories

AI REGIO is collaborating with ConnectedFactories 2 providing the use cases to validate the Data Space and AI for Manufacturing pathways.

Additionally, as soon as the 17 AI REGIO Experiments will be finalised, the results will be displayed in the EFFRA innovation portal, associating each experiment to the relevant(s) pathway(s) (see Section 5.1.4 for more details).



3.2.3.1 Pathways validation

To validate the Data Space and AI for Manufacturing pathways, two different workshops have been organised:

- On 3rd December, 2020, ConnectedFactories 2 organised a **DMP Plenary Cluster Web Meeting** inviting all members of the DMP cluster (see Section 3.1.1), to discuss about the Data Space Pathway;
- On 13th December, 2021, AI REGIO organised an **internal meeting with WP6 partners** to present and validate the AI for Manufacturing pathway.

3.2.3.1.1 The DMP Plenary Cluster Web Meeting about Data Space Pathway

Provided that the Data Space Pathway was already validated, the objective of the meeting was not to go into details of rows and levels, but to make participants reflect about following topics, related to Data Spaces:

- **Obstacles and challenges:** Which are the barriers that keep manufacturing enterprises stuck to the lowest levels? Or more in general, which obstacles do enterprises face when they want to improve their “data maturity”?
- **Industrial cases:** According to personal experience, which projects/activities (and in which way) have supported and stimulated the implementation of Data Space in Manufacturing?
- **Future Opportunities:** Which are the most relevant opportunities in manufacturing industry derived from Data Economy?

The goal was to collect comments, ideas and personal opinions in order to:

- create a shared awareness and a profitable starting point about the main issues that are currently affecting the manufacturing domain,
- depict the current state of the art of Data Space in manufacturing in projects and research,
- identify the advantages of adopting Data Economy as an incentive to be showed to enterprises to drive them in the transformation.



Figure 12 Online Board of the DMP Plenary Cluster Web Meeting (3rd Dec '20)

AI REGIO participated to the workshop providing some comments and examples both in the panel about “Obstacles and Challenges” and in the “Success Stories” and “Future Opportunities” ones. For instance, we identified the “*lack of awareness of data potential*” as a very common blocking point in the initial stage of Data Space adoption, as well as “*need of money to be invested in infrastructure*”, while one typical barrier at last step is “*lack of awareness of possible Business Models*”.



About "Success Stories", the workshop was organised at a very early stage of AI REGIO project, when very few activities had been run. However, the main example provided is the one about the "Network of Digital Innovation Hubs" as a key enabler towards the implementation of Data Spaces and the exploitation of data.

Finally, in the "Future Opportunities" panel, the role of Digital Innovation Hubs has been stressed again, as well as the increasing availability of Open Source solutions and incentives for joining Data Sharing Spaces.

3.2.3.1.2 The AI for Manufacturing Pathway validation with AI REGIO pilots

To validate the AI for Manufacturing Pathway, on 13th December, 2021, AI REGIO organised an internal meeting with WP6 Experimenters. The workshop consisted of two main sessions:

- **Panel 1 - Positioning on the AI for Manufacturing Pathway:** the Experimenters were required to position their company at the adequate level and to evaluate the expected final status at the end of the Experiment.

In case of an Experiment run by a DIH, the Hub was asked to wear the cap of the SME involved to test the solution.

The goal of the exercise was: first of all, to understand if **the five maturity levels are applicable** to any use case and secondly, to have a **general picture of the current and expected level** of the Experiments. As shown in Figure 13, most of the Experiments start from Level 1 (Human in Control - No autonomy, human beings have full control without any assistance) and are expected to reach Level 3 (AI Recommendation - System warns if issues occur, humans confirm solutions recommended by the system).

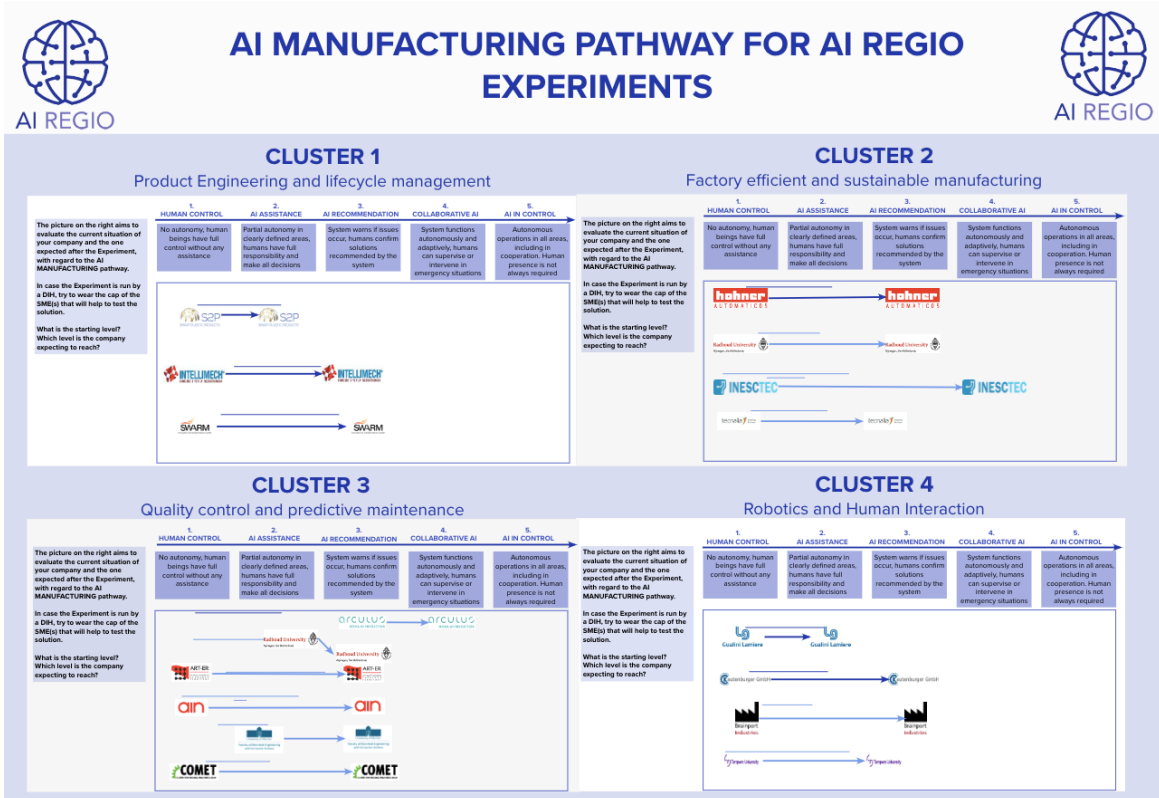


Figure 13 Panel 1 - Positioning the Experiments on the AI for Manufacturing Pathway

- **Panel 2 - AI Manufacturing Technologies for AI REGIO Experiments:** the Experimenters were required to reason about the **Manufacturing Technologies involved in the Experiment** (to move from the initial to the final level of the AI for Manufacturing Pathway), as well as about Manufacturing Technologies already in used in the company.

For each category, the Experimenters were required to evaluate also the (possible) **adoption of standards** and to consider **expected ethical challenges and issues**.

In the below Figure, the Experiments are positioned on the rows, grouped by cluster and

- orange sticky notes are technologies already employed,
- green sticky notes are technologies involved in the Experiment,
- yellow sticky notes are standard adopted,
- pink sticky notes are expected ethical challenges and issues.

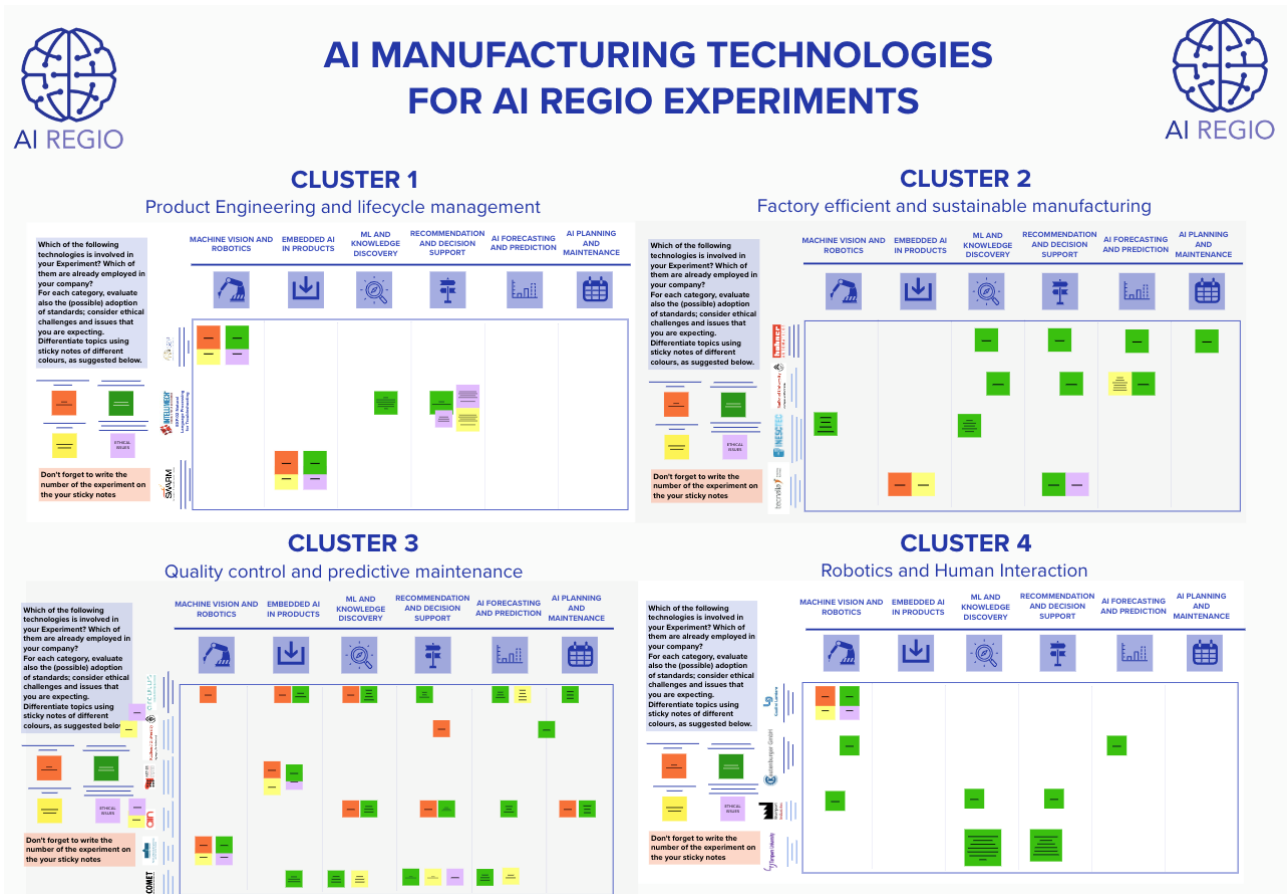


Figure 14 Panel 2 - AI Manufacturing Technologies for AI REGIO Experiments

COLLABORATION STREAM V: Connected Factories. In particular with the CF2 CSA, AI REGIO has opened an intense collaboration channel especially along the validation of the Data Spaces and the AI for Manufacturing pathways. AI REGIO experiments (and in future open calls winners) could position and benchmark their DS and AI maturity along the 5 levels identified by CF2.

3.3 The ICT-38 RIA: Artificial Intelligence for Manufacturing

The **ICT-38-2020 call**³³ **“Artificial intelligence for manufacturing”** of 2020 has the objective of integrating AI technologies in manufacturing systems in order to exploit their potential in productive processes (discrete and process industry).

³³ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-38-2020>



The call funded eight Research and Innovation Actions (RIA), aiming at developing innovative concepts and tools that take into account the status and availability of all relevant production resources, to integrate Artificial Intelligence technologies, touching key topics as human-machine collaboration and ethical issues deriving from AI adoption.

- **AI-PROFICIENT**³⁴ (November 2020 – October 2023): the project aims at designing and developing a **cloud/edge platform to integrate AI systems** in manufacturing. The platform has an edge component (for data ingestion and control) and a number of AI services to the cloud-based platform and includes development of digital twins, predictive AI analytics, and holistic generative optimisation to meet predefined goals.
- **ASSISTANT**³⁵ (November 2020 – October 2023): the project aims at **creating an intelligent digital twin**, by combining machine learning, optimization, simulation and domain models, to provide all required information to help production managers designing production lines, plan production and improve machine settings for effective and sustainable decisions that guarantee product quality and safety.
- **COALA**³⁶ (October 2020 – September 2023): the project aims at developing a solution for cognitive assistance that consists of a composition of trustworthy **AI components with a voice-enabled digital intelligent assistant** as an interface, to support workers that need to use analytics tools. The objective is to reduce the number of quality incidents in manufacturing, the time needed for on-the-job training of workers in manufacturing and to improve the competencies of blue-collar workers in managing AI opportunities.
- **knowlEdge**³⁷ (January 2021 – December 2023): the project aims at boosting industries towards agile and flexible strategies, able to respond to the fast-changing customers' needs, and at the same time to optimise their processes and quality control mechanisms. To achieve it, the project proposes 6 major innovations in the areas of data management, data analytics and knowledge management: a set of **"edge" AI services**, a **digital twin** able to test the AI models, a **data management framework**, **Human-AI Collaboration** and Domain Knowledge Fusion tools, a set of **standardisation mechanisms** for the exchange of trained AI-models, a **knowledge marketplace** platform for AI trained models.
- **MAS4AI**³⁸ (October 2020 – September 2023): the project aims at developing and testing a distributed and interoperable **AI architecture based on multi-agents technology** in such a way that it contributes to hyper-agility of European factories through modular and flexible production while at the same time keeps the humans in control of the AI technology. A basic concept is to integrate all Smart Components in a holistic system architecture to enable the easy development and deployment of industrial AI technologies. Tecalia from AI REGIO is also partner of MAS4AI project.
- **STAR**³⁹ (January 2021 – December 2023): the project aims at deploying standard-based secure, safe, reliable and trusted **human centric AI systems, based on edge technologies**

³⁴ <https://ai-proficient.eu/>

³⁵ <https://assistant-project.eu/>

³⁶ <https://www.coala-h2020.eu/>

³⁷ <https://www.knowledge-project.eu/>

³⁸ <https://www.mas4ai.eu/>

³⁹ <https://star-ai.eu/>



with wide applicability in manufacturing environments. The project research and integrate leading-edge AI technologies like active learning systems, simulated reality systems, explainable AI, human-centric digital twins, advanced reinforcement learning techniques and cyber-defence mechanisms, to allow the safe deployment of sophisticated AI systems in production lines.

Unparallel from AI REGIO is also partner of STAR project.

- **TEAMING.AI**⁴⁰ (January 2021 – December 2023): the project aims at realising a **true human-AI teaming working schemes** (developing a software platform for human-AI teaming), combining advanced methods for the representation of complex manufacturing processes (as knowledge graphs and relational machine learning). The goal is to overcome the lack of flexibility as a limiting factor of current Industry 4.0 while ensuring the role of the human being in the future industrial scenario by means of a human centred AI collaboration.
- **XMANAI**⁴¹ (November 2020 – April 2024): the project aims at placing the indisputable power of **Explainable AI at the service of manufacturing and human progress**, overcoming the idea of “black box” in machine learning and by developing a platform able to support AI-driven decision making processes. The solution will be tested in four real-life manufacturing use cases, exploiting Explainable AI for demand forecasting, plant optimisation and prediction, scheduling maintenance and quality control.
Politecnico di Milano from AI REGIO is also partner of XMANAI project.

Also one CSA have been funded, about the topics of **Cooperation EU-Japan**, in order to support possible collaboration with Japan in areas relevant for AI driven innovation in manufacturing and digital industrial platforms.

- **EU-JAPAN.AI**⁴² (January 2021 – October 2022): the project aims at supporting cooperation between EU and Japan in areas relevant for AI-driven innovation in manufacturing and digital industrial platforms, using an online platform to enhance knowledge and information exchange between all the area-relevant stakeholders.
Tecnalia from AI REGIO is also partner of EU-JAPAN.AI project.

⁴⁰ <https://www.teamingai-project.eu/>

⁴¹ <https://ai4manufacturing.eu/>

⁴² <https://project.eu-japan.ai/>



AI-PROFICIENT
Artificial intelligence for improved production efficiency, quality and maintenance

Artificial Intelligence for improved PROduction eFFICIency, quality and maintenance.

Grant Agreement N° 957391

VISIT WEBSITE



Cognitive Assisted agile manufacturing for a Labor force supported by trustworthy Artificial Intelligence.

Grant Agreement N° 957391

VISIT WEBSITE



Towards AI powered manufacturing services, processes, and products in an edge-to-cloud-knowlEdge continuum for humans [in-the-loop].

Grant Agreement N° 957331

VISIT WEBSITE



Advancing Collaboration and Exchange of Knowledge Between the EU and Japan for AI-Driven Innovation in Manufacturing.

Grant Agreement N° 957339

VISIT WEBSITE



leArning and robuSt decisiOn SupportT systems for agile mANufacTuring environments.

Grant Agreement N° 101000165

VISIT WEBSITE



Multi-Agent Systems for Pervasive Artificial Intelligence for assisting Humans in Modular Production Environments.

Grant Agreement N° 957204

VISIT WEBSITE



Safe and Trusted Human Centric Artificial Intelligence in Future Manufacturing Lines.

Grant Agreement N° 956573

VISIT WEBSITE



Human-AI Teaming Platform for Maintaining and Evolving AI Systems in Manufacturing.

Grant Agreement N° 957402

VISIT WEBSITE



Explainable Manufacturing Artificial Intelligence.

Grant Agreement N° 957362

VISIT WEBSITE

Figure 15 ICT-38 AI MAN Projects

The nine projects funded under the ICT-38-2020 call are collaborating as “AI-MAN cluster”⁴³, sharing knowledge, experiences and discussing about many topics related to AI, exploiting synergies between the projects and increasing their impact.

The cluster is supported by EFFRA⁴⁴ and the ConnectedFactories project.

3.3.1 The AI-MAN cluster meetings

The first of a series of **ICT-38 Projects Cluster (AI-MAN) workshops** took place on 7th May, 2021⁴⁵. The workshop aimed to make the participants aware of each project’s objectives, activities and technologies that are being developed and to further expand the potential areas of collaboration. The next steps include the organisation of a series of joint open/public workshops, collaborating in

⁴³ <https://ai4manufacturing.com/>

⁴⁴ <https://effra.eu/>

⁴⁵ <https://cordis.europa.eu/article/id/430362-ict-38-projects-cluster-s-ai-man-joining-forces-for-the-best-of-ai-in-manufacturing>



production and sharing the AI assets, joint publications and common standardization activities. A specific shared space for the cluster is also envisaged and the work for its implementation is already under way.

More than 50 people participated to the meeting, including some AI REGIO's representatives interested in better knowing the projects of the AI-MAN cluster to identify point of contacts for future synergies exploitation.

The first workshop has been followed by several other meetings, dealing with AI but focussing on different topics:

- Workshop on **Explainable Artificial Intelligence in Manufacturing** on 11th October 2021⁴⁶,
- Workshop on **Ethical and Legal Issues of Artificial Intelligence in Manufacturing** on 25th November 2021⁴⁷,
- Workshop on **Workshop on Ethical and Legal Issues of Artificial Intelligence in Manufacturing** on 14th March 2022⁴⁸.

COLLABORATION STREAM VI: ICT38 AI MAN cluster. The adoption of Artificial Intelligence in Manufacturing is key both for AI REGIO and the nine ICT-38 projects and it represents the main point of contact among them to start future collaborations. With AI MAN cluster and STAR in particular, AI REGIO is collaborating for the sustainability of the AI4EU on-demand platform's Manufacturing Vertical (see section 3.4.1).

3.4 The AI4Europe Initiative and the Manufacturing Vertical

The **AI4EU**⁴⁹ project is funded under the ICT-26-2018-2020 call⁵⁰ about **Artificial Intelligence** and it run from January 2019 to December 2021, with the objective of **developing a platform** that

- serves as a **central point** to gather and provide access to **AI-related knowledge**, algorithms and tools;
- **supports potential users of AI** in order to facilitate the integration of AI into applications;
- facilitate the **interaction with existing data portals** needed for AI algorithms, and resources, such as HPC or cloud computing, and support interoperability.

The platform provides a number of services, directly accessible from the AI4EU website, both as anonymous and registered user (ECAS login):

- The **AI community** gathers a number of Association, Centre, Company, Education and Research Institution dealing with AI topics, as well as projects and Working Groups;
- The **Business & Industry** section provides information about Industrial Vertical (see section 3.4.1), about the Open Calls funded by several EU projects and about Case Studies (filtered by domain);

⁴⁶ <https://ai4manufacturing.com/ethical-and-legal-issues-of-artificial-intelligence-in-manufacturing-whorkshop/>
<https://www.youtube.com/watch?v=APwXz5GZi70>

⁴⁷ <https://ai4manufacturing.com/ethical-and-legal-issues-of-artificial-intelligence-in-manufacturing-workshop-material/>

⁴⁸ <https://ai4manufacturing.com/human-centered-manufacturing-in-the-industry-5-0-era/>

⁴⁹ <https://www.ai4europe.eu/>

⁵⁰ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-26-2018-2020>



- The **Research** section contains the **AI catalogue of assets**, related to Collaborative, Explainable, Integrative, Physical and Verifiable AI (AI As a Service, Datasets, Docker containers, Executables, Jupyter Notebooks, Libraries, ML Models, Tutorials) and the **Research Bundles** (as micro-project in human-AI-Net, PhD projects and student projects);
- The **Education** section contains the **Catalogue of AI courses** (Education catalogue from leading institutions, European Education Initiatives, Education related news);
- The **Ethics** section provides access to the **Ethics Guide** (Articles, Reports, Centres, Networks, Assessment Tools) and informs about the **Ethics Working Group**, about **Workshops** related to AI Ethics and to **OSAI initiative**;
- The **Service** section provides access to a number of **AI on-demand services** (Open space for AI developers, Matchmaking [coming soon], Planning [coming soon], Cyber Physical Systems (AI as a Service for Deep Edge) [coming soon], Digital Innovation Hubs [coming soon], Copernicus datasets [coming soon], Energy Analytics Application and Digital Twin [coming soon]);
- The **News & Events** section inform about most relevant News in the AI field and about upcoming and past events (as the Webcafes).

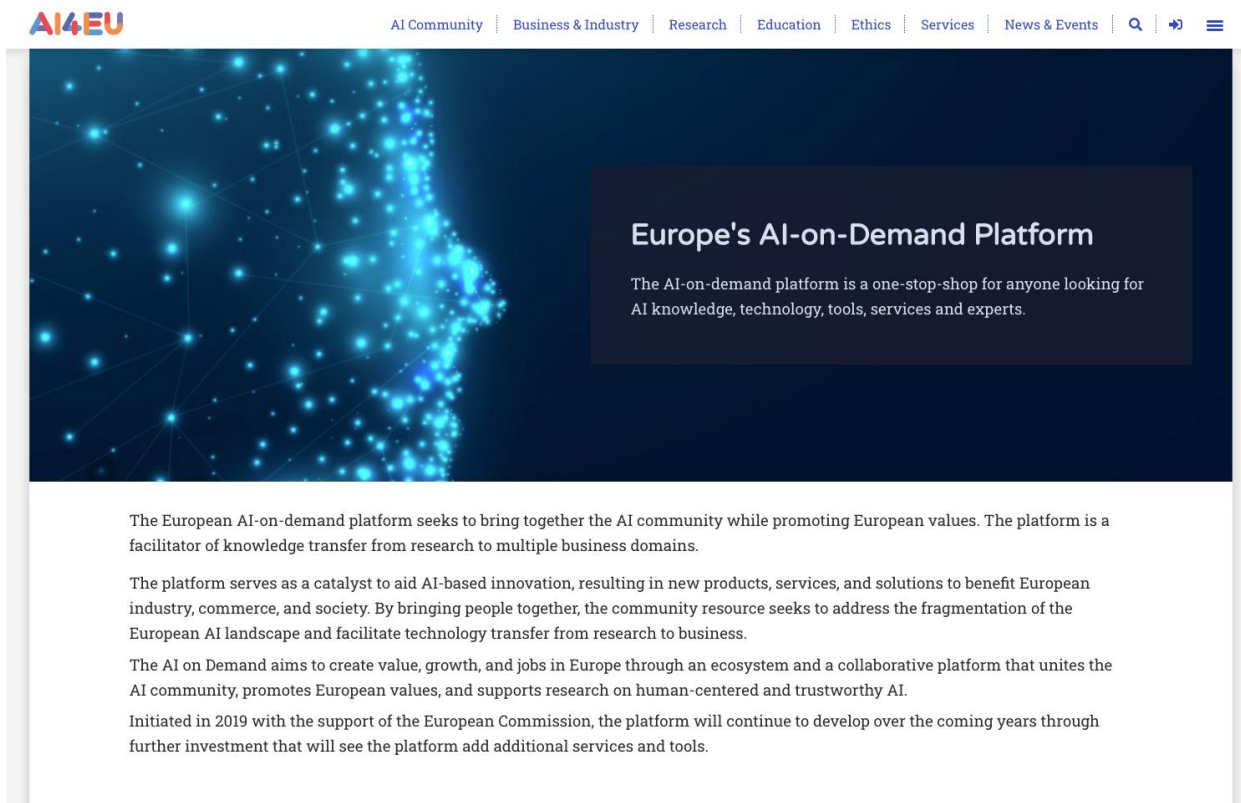


Figure 16 The AI4EU platform landing page

The platform is addressed to several types of users:

- **SMEs:** the AI4EU platform supports their digitalisation by providing Case Studies, access to Open Calls, Ethics Guide about trustworthy AI, the catalogue of AI courses and the catalogue of AI on-demand services;

- **Technology providers:** the AI4EU platform puts at disposal a showcase where it is possible to share assets, access to Open Calls, Ethics Guide about trustworthy AI, the catalogue of AI courses and the catalogue of AI on-demand services;
- **Digital Innovation Hubs:** the AI4EU platform supports DIHs from five main perspective: providing Ethics Guide about trustworthy AI, the catalogue of AI courses, the catalogue of Business and Industry initiatives, the catalogue of AI assets and the community News;
- **Researchers:** the AI4EU platform supports researcher in the domain of Artificial Intelligence, providing a number of appealing topics to be explored. In particular, the focus is on Collaborative, Explainable, Integrative, Physical and Verifiable AI.



Figure 17 A screenshot from the AI4EU platform about users

The platform is a living portal to be constantly enriched adding always new assets related to AI. The main assets required in the platform, to be shared in the “contribution gateway”, are:

- Projects
- News
- Events
- Opportunities
- Documents
- Educational contents
- Research Bundles
- Working Groups
- Open Calls

Regarding DIHs, the platform aims at offering a dynamic European network of regional AI DIHs and AI TEFs (Testing and Experimental Facilities), able to support SMEs providing Business, Ecosystem, Technical, Skills (BEST) and Ethics services. To this regards, the platform offers to DIHs supporting assets and solutions to increase their portfolios. Of course, AI REGIO DIHs can benefit of it.

3.4.1 The Manufacturing Vertical

The AI4EU platform offers a number of services and assets related to Artificial Intelligence, however, it's worth to take into account that the nature of AI varies greatly depending on the application domain. To identify the applications and innovations of AI that are of most relevant to a specific business, AI4EU presents a section⁵¹ dedicated to the leading industry sectors, to show how AI is developed across them.

The AI assets, Case Studies and Organisations mentioned above are grouped by following sectors:

- Agriculture
- Cloud, Edge and Infrastructure
- Cultural Heritage

⁵¹ <https://www.ai4europe.eu/business-and-industry>



- Earth Observation
- **Manufacturing**
- Regional Engagement – DIHs
- Energy
- Maritime Sector
- Telecommunications
- Healthcare
- Public Services
- Transportation

Regarding the Manufacturing domain, the platform displays 11 organisations, 9 assets (3 Datasets, 1 Python Library, 2 Dockers, 2 Jupiter Notebooks and 1 Executable), provided by different organisations and 4 case studies.

AI REGIO, together with the sister project KITT4SME (DT-ICT-03 call, see Chapter 2) and AI MAN cluster (ICT-38 call, see section 3.3) and STAR project in particular, wishes to contribute to the sustainability of the Manufacturing Vertical in the AI4EU platform.

The project is investigating about the type of assets required: for instance, the expected TRL of the assets, their status (only those concluded or even those still on-going), the scale (large, medium, small), etc.

Additionally, the “Experiment 02 – Natural Language Processing for Troubleshooting” led by Intellimech is based on ACUMOS technology and so could leverage on AI4EU platform.

COLLABORATION STREAM VII: AI on demand Platform (AI4Europe). Two levels of collaboration are foreseen: the AIoD experimentation platform and the Manufacturing vertical Portal (AI Assets Catalogue and Experiments). Regarding the former collaboration, AI REGIO will contribute providing use cases from the Experiments and the Open Calls, developing AI pipelines in the online environment and then deploy the pipelines locally in proper execution environments. Regarding the AI Assets, AI REGIO is proposing a three levels taxonomy in order to better specify the characteristics of the assets as well as an ontology-based experiments catalogue, so that it could be easier to perform search and discover cases and relevant technologies..



4 Cooperation with DIH Focus Area in 2018-2020 Work Programme

4.1 The DIH Focus Area DT-ICT-01/05 Innovation Actions

To enhance the investments done by regional, national and European initiatives for Digital Innovation Hubs and to valorise their role, the European Commissions launched a number of calls dedicated to DIHs:

- **DT-ICT-01-2019 - Smart Anything Everywhere⁵²**, to *“accelerate the design, development and uptake of advanced digital technologies by European industry - especially SMEs and midcaps - in products that include innovative electronic components, software and systems, and especially in sectors where digital technologies are underexploited”*.

Projects funded under this call are:

- **BOWI⁵³** (January 2020 – June 2023), Innovation Action;
- **DigiFed⁵⁴** (January 2020 – December 2022) , Innovation Action;
- **DIH4CPS⁵⁵** (January 2020 – December 2022), Innovation Action;
- **HUBCAP⁵⁶** (January 2020 – December 2022), Innovation Action;
- **SMART4ALL⁵⁷** (January 2020 – December 2023), Innovation Action;
- **Smart4Europe2⁵⁸** (January 2020 – December 2021), Coordination and support action;
- **SmartEEs2⁵⁹** (January 2020 – December 2022), Innovation Action;

- **DT-ICT-02-2018 - Robotics - Digital Innovation Hubs (DIH)⁶⁰**, to *“provide a sustainable ecosystem of robotics stakeholders covering the entire value network to facilitate and accelerate a broad uptake and integration of robotic technologies, and supporting the digitisation of industry through robotics”*.

Projects funded under this call are:

- **agROBOfood⁶¹** (June 2019 – May 2023), Innovation Action;
- **DIH-HERO⁶²** (January 2019 – June 2023), Innovation Action;
- **DIH²⁶³** (January 2019 – June 2023), Innovation Action;
- **RIMA⁶⁴** (January 2019 – December 2022), Innovation Action;
- **RODIN⁶⁵** (November 2018 – October 2023), Coordination and support action;

⁵² <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-01-2019>

⁵³ <https://bowi-network.eu/>

⁵⁴ <https://digifed.org/>

⁵⁵ <https://dih4cps.eu/>

⁵⁶ <https://hubcap.eu/>

⁵⁷ <https://smart4all-project.eu/>

⁵⁸ <https://smart4europe.eu/>

⁵⁹ <https://smarteess.eu/smarteess2-project/>

⁶⁰ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-02-2018>

⁶¹ <https://agrobofood.eu/>

⁶² <https://dih-hero.eu/>

⁶³ <http://www.dih-squared.eu/>

⁶⁴ <https://rimanetwork.eu/>

⁶⁵ <https://rodin-robotics.eu/>



- **TRINITY**⁶⁶ (January 2019 – June 2023), Innovation Action;
- **DT-ICT-03-2020 - I4MS (phase 4) - uptake of digital game changers**, see Chapter 2.
- **DT-ICT-04-2020 - Photonics Innovation Hubs**⁶⁷, to “provide a sustainable ecosystem of research and innovation support (the Photonics Innovation Hubs) for the benefit of SMEs facilitating a broad uptake and integration of photonics technologies”.
The project funded under this call is:
 - **PhotonHub Europe**⁶⁸ (January 2021 – April 2025), Innovation Action;
- **DT-ICT-05-2020 - Big Data Innovation Hubs**⁶⁹, to “break “data silos” and stimulate sharing, re-using and trading of data assets by launching a second-generation data-driven innovation hub, federating data sources and fostering collaborative initiatives with relevant digital innovation hubs. This shall promote new business opportunities notably for SMEs as part of the Common European Data Space”.
Projects funded under this call are:
 - **EUHubs4Data**⁷⁰ (September 2020 – December 2023), Innovation Action;
 - **i4Trust**⁷¹ (October 2020 – September 2023), Innovation Action;
 - **MediaFutures**⁷² (September 2020 – August 2023), Innovation Action;
 - **REACH**⁷³ (September 2020 – February 2024), Innovation Action;

AI REGIO has established a privileged collaboration with some projects, as **DIH4CPS** and **HUBCAP** under the call DT-ICT-01-2019 - Smart Anything Everywhere, also due to the large number of partners in common:

- **DIH4CPS**: the project aims at creating a **network of DIHs and solution providers, focussed on cyber-physical and embedded systems**, that so far consists of 13 initial DIHs from 9 European countries and 12 additional DIHs after the first Open Call wave. To connect and support the DIHs, especially those from digitally underdeveloped sectors and regions, the project has implemented an integrated platform for DIHs.
- **HUBCAP**: the project aims at creating a **network of Digital Innovation Hubs with the goal to bring new microelectronics-enabled products**, processes, and business models to life. The network consists of 7 initial DIHs, supported by a platform, conceived with a space to learn about new technologies, to meet other SMEs and larger businesses, to find partners for your next project.

Both DIH4CPS and HUBCAP have adopted the DBEST taxonomy and the Service Portfolio analysis, developed in MIDIH project and enhanced in AI REGIO, in order to better describe the offering of their Digital Innovations Hubs.

Describing services according to a common framework eases possible future collaboration among the DIHs. Moreover, the three projects have developed their own platform (specifically, the AI REGIO

⁶⁶ <https://trinityrobotics.eu/>

⁶⁷ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-04-2020>

⁶⁸ <https://www.photonhub.eu/>

⁶⁹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-05-2020>

⁷⁰ <https://euhubs4data.eu/>

⁷¹ <https://i4trust.org/>

⁷² <https://mediafutures.eu/>

⁷³ <https://reach-incubator.eu/>



and HUBCAP ones leverage on the DIHIWARE architecture), all based on the same DBEST reference model.

This cross-project analysis has been presented during the **I-ESA 2022 (11th International Conference) – Interoperability for Enterprise systems and applications**⁷⁴ on 23rd – 25th March 2022, where AI REGIO participated as a speaker in the workshop “**The D-BEST model supporting SMEs digitisation in different technological domains**”.

Beside DIH4CPS and HUBCAP that already adopted the D-BEST taxonomy in the ecosystem of DIHs, AI REGIO wishes to make all the other DIHs networks to adopt it to describe their portfolios. Within the framework of **DIH4INDUSTRY**⁷⁵ platform (see paragraph 4.4 for more details), the goal is to create a section for each community of DIHs, asking to them to:

- Create their own profile, specifying the sector(s) and technologies of competence, as well as the project/initiatives they are part of;
- Compile their Service Portfolio according to the DBEST taxonomy;
- Describe their Experiments, to be shown on the platform as possible use cases and/or success stories.

Starting from the services offered and the competences of DIHs, next step is to enhance collaboration among them, exploiting synergies and reinforcing the network.

Currently, 6 initiatives are registered on the platform:

- **SAE – Smart Anything Everywhere** gathering DIHs from DT-ICT-01 projects
- **Rodin** gathering DIHs from DT-ICT-02 projects
- **I4MS Phase 4** gathering DIHs from DT-ICT-03 projects
- **EUHubs4Data** gathering DIHs from DT-ICT-05 projects
- **SCoDIHNet** gathering DIHs from the Internet of Things DIHs initiative⁷⁶
- **DIH4AI** gathering DIHs from DIH4AI project⁷⁷ and AI DIH Network

⁷⁴ <https://i-esa2022.webs.upv.es/>

⁷⁵ <https://dih4industry.eu/welcome/>

⁷⁶ <https://aioti.eu/scodihnet/>

⁷⁷ <https://www.dih4ai.eu/>

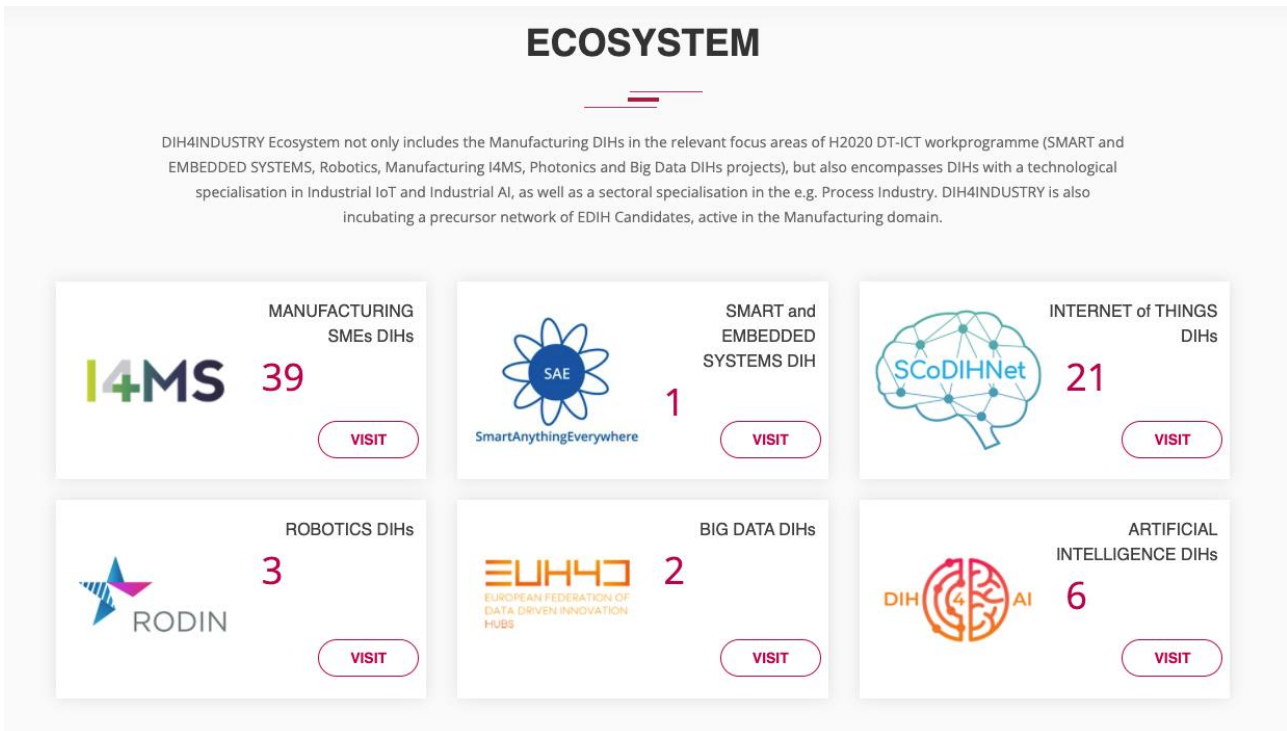


Figure 18 The DIH4INDUSTRY Ecosystem of initiatives

COLLABORATION STREAM VIII: DIH Focus Area for DEI implementation. The DIH4INDUSTRY service portal is the one stop shop for the community of DIH Focus Area (DT-ICT-01,06). The current implementation includes the insertion of DIHs, D BEST service portfolio and Experiments. Next implementations will include customer journey analysis and success stories of Digital Transformation through DIHs and EDIH (see section 4.2).

4.2 The European DIH Network and the Digital Europe call

European Digital Innovation Hubs (EDIHs) will play a central role in the Digital Europe Programme to stimulate the broad uptake of Artificial Intelligence, High Performance Computing (HPC) and Cybersecurity as well as other digital technologies by industry (in particular SMEs and midcaps) and public sector organisations in Europe. EDIHs are one-stop shops that help companies become more competitive with regard to their business/production processes, products or services using digital technologies, by providing access to technical expertise and experimentation, so that companies can “test before invest”.

In November European Commission opened a call for proposal to select the initial Network of European Digital Innovation Hubs (EDIH) from all candidate entities designated by Member States. The call aims at upgrading these entities to provide the complete set of services of an EDIH, including the necessary infrastructure, in a specific geographical area, covering the needs of the local SMEs, small mid-caps and/or public sector organisations with respect to their digital transformation. Network these EDIHs with each other and with other projects selected in Digital Europe Programme developing capacities in High Performance Computing, Artificial Intelligence, Cybersecurity, Advanced Digital Skills and accelerating the best use of technologies.

Each EDIH will

1. provide services based on a **specific focus/expertise**, which will support the local private and public sector with their digital and green transformation;

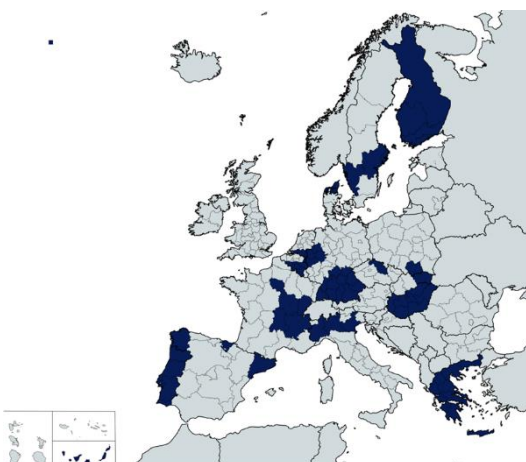


2. make available the **relevant experimentation facilities** related to its specialisation, so that SMEs, small mid-caps and the public sector will be able to test the technologies proposed, including where relevant their environmental impact, and the feasibility of applying these technologies to their business before further investing in it;
3. act as an **access point to the European network of EDIHs**, helping local companies and/or public actors to get support from other EDIHs in case the needed competences fall outside their competence, ensuring that every stakeholder gets the needed support wherever it is available in Europe. Reversely, each EDIH will support companies from other regions and countries presented by other EDIHs that need their expertise;
4. be active in **networking with other hubs**, sharing best practices and specialist knowledge, in bringing companies into contact with other companies of their value chain. For this specific objective, EDIH will be supported by the Digital Transformation Accelerator for matchmaking, training and capacity building events;
5. **play a brokering role between public administrations and companies** providing e-government technologies;
6. maintain structured long-term relationships with the relevant local actors like regional authorities, industrial clusters, SME associations, business development agencies, incubators (including European Space Agency Business Incubators, the ESA BICs), accelerators, chambers of commerce, and partners of the European Enterprise Network (EEN). EDIHs will offer a seamless service with EEN and Startup Europe, e.g. by offering joint investor-related events, organising common trainings, workshops or info days, directing SME from EEN to EDIHs and from EDIHs to EEN as needed.

EDIH Manufacturing Network (**EDIH4Manu**) is an informal multi-country, interregional, open collaboration network (corridor) of **25 EDIHs candidates, coming from 25 regions and 15 Countries with a Smart Specialization in Manufacturing** . EDIH4Manu connects more than 60 Universities and R&I centers, 25 business associations and technology clusters and 3 EIT nodes (Manufacturing, Digital, Raw Materials). EDIH4Manu regions encompass the essentials of the EU manufacturing industry: 40% of EU manufacturing added value, 25% of EU manufacturing companies and 30% of employees. However, the network is in the initiation phase and will be open to other EDIHs from other regions during the expansion phase, expanding its services offer.

The mission of EDIH4Manu network is leading digital and sustainable transformation of EU manufacturing small and medium-sized enterprises through a bouquet of complementary, interoperable and composable services.

Figure 19 EDIH Manufacturing Network map



EDIH4Manu members cooperate on a voluntary basis to meet the **Green-Digital Transformation needs** of regional SMEs (as identified in **regional Smart Specialisation Strategies**) and of the overall European companies' issue. In order to fill this gap and meet SMEs expectations, the EDIH4Manu network leverages activities and achievements of existing interregional initiatives including: **Smart Specialisation Platform on**



Industrial Modernisation⁷⁸, Vanguard Initiative⁷⁹, 4 Motors of EU⁸⁰, European Alpine Macroregion (EUSALP⁸¹) and European Danube Macroregion (EUSDR⁸²).

EDIH4Manu builds on a long-term experience in **supporting EU SMEs digital transformation** with dedicated services. All partners have been cooperating in several Horizon 2020 funded projects to create and support EDIH capacity building within Smart Anything Everywhere (SAE)⁸³ and I4MS initiatives⁸⁴, in supporting digital transformation of SMEs through innovation experiment (e.g. Test Before Invest, Training and Skills development, Ecosystem building and Business development/funding).

EDIH4Manu cooperation builds on:

- **EU-local approach**, connecting the most competitive EU industrial regions, collecting local SMEs needs and signposting it to the relevant EDIH with the necessary technology and sectoral expertise.
- **Manufacturing sustainable and digital transition**, sharing sectoral and technology expertise, infrastructures, and facilities to EDIH4Manu customers as described in the MoU attached.
- **Access European value chain**, engaging local SMEs and creating pan-EU value ecosystems, sharing knowledge and composing services for more complex needs.
- **Community building and best practice exchange** networking with Digital Transformation Accelerator to boost best practice exchange and capacity building activities.

Each EDIHs will provide services such as **testing before investing, training and skills development, support to find investments, networking and access to innovation ecosystems**. EDIH4Manu agreed on a preliminary list of service portfolio to be provided on a cross regional level, to be assessed and reviewed as soon as EDIHs European network will be selected. For this purpose, some of EDIH4Manu members are involved in AI Regio network and inspired its service portfolio structure on DBEST methodology.

4.3 The AI TEF for Manufacturing initiative in Digital Europe

The **Artificial Intelligence Testing and Experimental Facilities (AI TEF)** have been introduced by the European Commission as part of the Digital Europe Programme⁸⁵ with the final aim to optimise, develop and deploy AI strategies in Europe. The AI TEFs will operate as a relevant brick required to build an AI-based excellence ecosystem in Europe founded on trust and high experience. On one side, AI TEFs aim to attract funding of investments to improve the facilities, on the other side, they aim to attract innovative players to collaborate with.

The AI TEFs act as relevant bridges to bring technological innovation, related to AI, to market in Europe. Therefore, these AI TEFs will be open to all the technology providers across Europe in order to test and experiment AI-based software and AI-based hardware solutions and products developed in research studies. Indeed, these solutions are aimed to be deployed to market by first testing them into real-world environment and at scale which will enhance and facilitate the uptake and advancing of AI diffusion in Europe. Testing and experiment at large will be based on a combination of physical and virtual facilities which will enable the technological providers to integrate their solutions, validate and demonstrate them also in real environment.

The AI TEFs cover four main areas:

⁷⁸ <https://s3platform.jrc.ec.europa.eu/industrial-modernisation>

⁷⁹ <https://www.s3vanguardinitiative.eu/>

⁸⁰ <https://www.4motors.eu/en/>

⁸¹ <https://www.alpine-region.eu/>

⁸² <https://danube-region.eu/>

⁸³ <https://smartanythingeverywhere.eu/>

⁸⁴ <https://i4ms.eu/>

⁸⁵ <https://digital-strategy.ec.europa.eu/en/activities/testing-and-experimentation-facilities>



- 1) manufacturing,
- 2) healthcare,
- 3) agri-food and
- 4) smart cities and communities.

Looking at the **manufacturing sector**, following key points have been identified by the EC:

- The main challenge is to improve the quality of both products and processes by integrating AI technologies with advanced manufacturing technologies.
- There is the need to guarantee access to TEFs for SMEs and Start-Ups.
- There is the need to create collaborations in manufacturing by connecting all the players and actors and by developing common standards.
- There is the need to reinforce the main attracting point of TEFs which is the possibility to empower the existing facilities and expertise in manufacturing.
- The TEFs must be as close as possible to real contexts to ensure the proper testing and experimentation.
- The TEFs can have a prominent role in deploying certifications by improving trust.

Consequently, manufacturing TEFs, are expected to:

- Increasing and ensuring the end-users involvement,
- Improving the quality and sustainability of production processes relying on AI-driven manufacturing facilities,
- Creating a trustable, transferable, and scalable Industrial AI Europe based on the integration between AI and robotics technologies within the manufacturing sector,
- Creating facilities seen as reference for the testing and experimenting of solutions which can be fully integrated, validated, demonstrated and certified,

The key areas in which the manufacturing TEFs operate are reported below:

- **Optimization at factory level of production processes**, and testing if AI-driven technologies used for the autonomous decision-making solutions,
- **Development of collaborative robots**,
- Reduction of resource consumption through **circular economy adoption**.

AI REGIO project is developing the concept of Didactic Factory (DF), by creating its own network of DFs and expecting to be a precursor of the European AI Testing and Experimentation Facilities (TEFs), boosted in the Digital Europe program to optimize development and deployment of AI. This will include support for full integration, testing and experimentation of latest AI-based technologies to solve issues/improve solutions in a given application sector, including validation and demonstration.

AI REGIO aims to create a network which facilitates cooperation between DFs, allows exchanges of resources, best practices and lessons learned, but also to collect and share manufacturing data spaces (metadata, ontologies, datasets) to be used for didactic purposes all over Europe.

The first group of Didactic Factories has been identified inside the project's borders, looking at the consortium partners. A set of "10 Champions" represents the core of the AI REGIO network of DF, as shown in the Figure below.

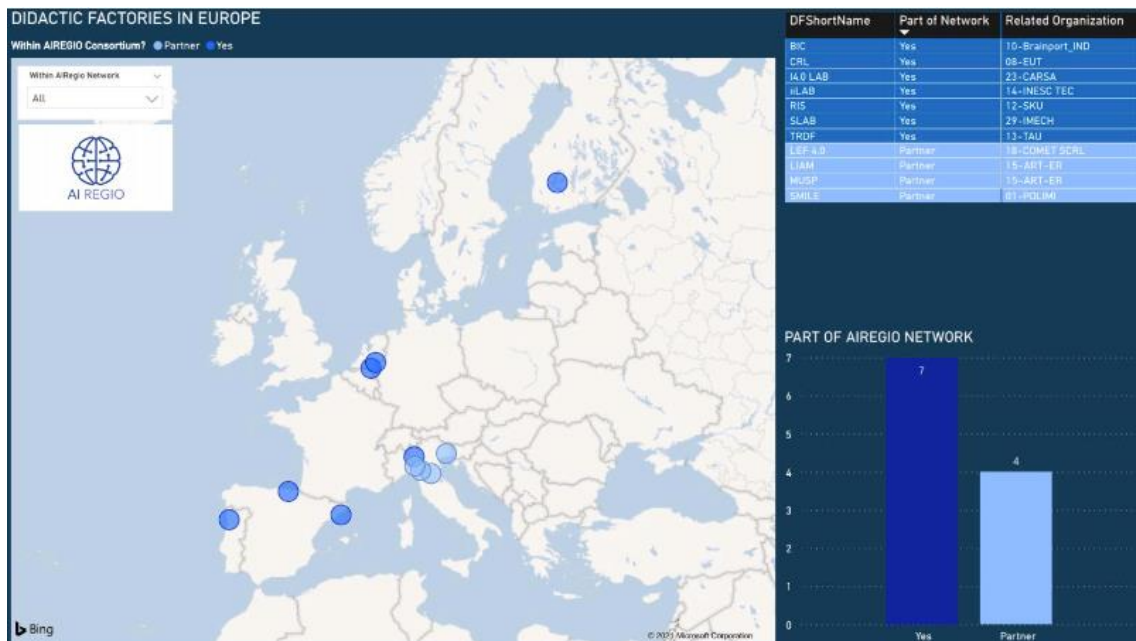


Figure 20 The AI REGIO network of Didactic Factories

The Champions cover different European regions and are specialised in different domains, both from the didactic and technological point of view.

Next steps will be to create an interoperating network of DFs with a pan-EU AI-oriented portfolio and AI REGIO is working to define the strategy and scope for the extended network. Actually, AI REGIO is not the only initiative actively involved with Didactic Factories: currently, at different places in Europe, DFs have started and they are facing new challenges. So, to exploit synergies and to prevent reinventing the wheel and instead learn from each other, it is useful to set-up a European network of Didactic Factories and this is why AI REGIO is trying to extend its network involving even more organisations.

4.4 The DIH4INDUSTRY Marketplace

DIH4INDUSTRY is a new environment for the exchange of services, expertise and knowledge, aiming at creating, nurturing and governing an Ecosystem of Digital Innovation Hubs with a regional Smart Specialization in Manufacturing.



The vision of DIH4INDUSTRY is to boost innovation and digitalization by **a platform where opportunities of collaboration between DIHs can arise**, sharing assets and needs in an innovative approach driven by knowledge and experience, within a single access point.

The DIH4INDUSTRY platform offers:

- an **Ecosystem**, enabling the creation of hubs for all DIHs focused on Industry 4.0;
- a **Marketplace**, in the form of a showcase of D-BEST (Data, Business, Ecosystem, Skills and Technology) digitalization support services made available by the DIHs for the benefit mainly of other DIHs;
- a **Community**: a collaborative environment that DIHs may use to foster innovation by forming new projects and supporting the networking among members.

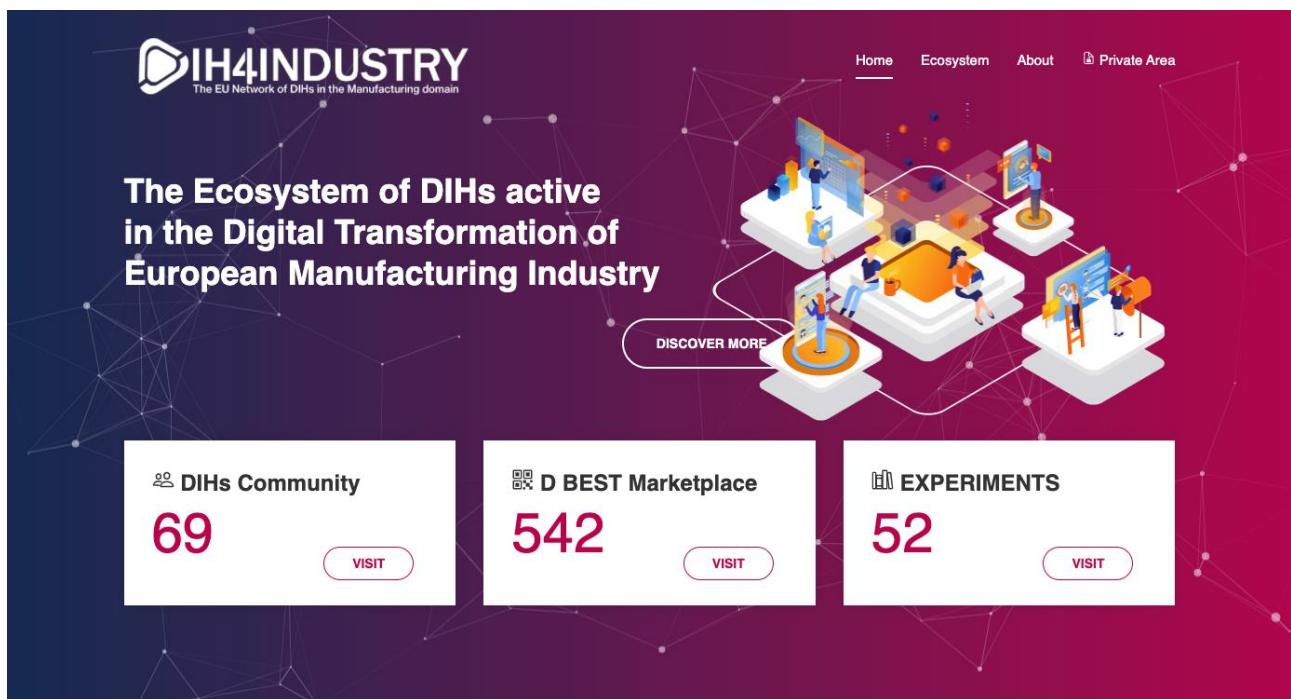


Figure 21 The DIH4INDUSTRY landing page

The present configuration of DIH4INDUSTRY consists of a public area and a private area, with the following contents.

In the public area:

- a **DIHs Community**, where DIHs are shown in a map and in a list, that can be filtered by DIH's Name, Initiative, Project, Country, Sectors, Technologies; 69 DIHs have registered, at present.
- a **D BEST Marketplace**, where services are classified according to the new DBEST taxonomy, which is fundamental to facilitate the collaboration among DIHs; services can be filtered by Initiative, Project, DIH and Country. This standardisation of services greatly facilitates the exchange of information, communication and collaboration between DIHs and helps enhancing the collaboration among providers and consumers of digital technologies (DIHs, SMEs...). This structure has been adopted by the DIH4INDUSTRY platform and can be considered a prerogative of the platform that makes its value proposition unique.
- a dedicated section for each **Initiative** participating in the platform, by which DIHs are grouped according to the Initiatives in which they participate; the creation of Initiatives within the platform favours the strengthening of relations between DIHs within their group of origin, respecting the identity of each one; at the same time, Initiatives are integrated in a context of



other Initiatives, allowing DIHs to widen their experience at European level.

- sharing of the **Experiments** conducted by the DIHs and their constituents; the experiments can be visualized by a map and a list, and can be filtered by Initiative, Project, DIH, Country; 52 experiments descriptions have been entered so far.

Additionally, in the private area:

- a **Knowledge space** (publish, organize and access community information in one central location) and resources cataloguing (managing information by the use of powerful metadata, so enabling the cataloguing of resources and their dynamic modelling and visualization).

COLLABORATION STREAM IX: EDIH and AI TEF in DEP Program. AI REGIO will boost the adoption of the DIH4INDUSTRY platform disseminating it to the DEP communities of EDIHs for Manufacturing, inviting them to create their own profile, to catalogue their services according to the DBEST framework, to present technologies, success stories, and they will have the possibility to talk and establish relationships with other DIHs. In the near future, AI REGIO is going to better structure the DR BEST model, so that future DEP AI TEF for Manufacturing could find their home for collaboration and co-innovation.



5 Cooperation with other initiatives at EU level

5.1 Manufacturing Industry Initiatives

5.1.1 The VANGUARD Initiative Efficient and Sustainable Manufacturing

The **Smart Specialisation Strategies (S3)**⁸⁶ introduced by the European Commission are a set of initiatives and actions defined by Member States and regions, dealing with strategic areas for intervention based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement.

So far, over 180 Smart Specialisation Strategies have been developed, at regional and national level, prioritising domains, areas and economic activities where regions or countries have a competitive advantage or have the potential to grow.

To design and implement the Smart Specialisation Strategies, the EC has created the S3 Platform, open to regional and national administrations of the European Union.

A relevant regional initiative in the Smart Specialisation Strategies is **Industrial Modernisation**. The **Smart Specialisation Platform for Industrial Modernisation**⁸⁷ (S3P-Industry) aims to support EU regions committed to generate a pipeline of industrial investment projects following a bottom-up approach - implemented through interregional cooperation, cluster participation and industry involvement.

One of the Thematic Areas of S3P-Industry is the Vanguard PILOT **Efficient and Sustainable Manufacturing**⁸⁸ (ESM) where 20 vanguard EU regions, chaired by Lombardy and Catalunya, share the objective of providing industry with innovative solutions from research and exploiting the potential of smart specialisation to promote new efficient supply chains with added high value. The idea is to conceive and develop a European network of infrastructure and pilot plants in key-manufacturing areas, where companies can test innovative solutions before the industrial uptake.

By exploiting and valorising available research results, ESM European pilot plants have the potential to support innovation of companies in breakthrough technologies and applications that require manufacturing efficiency and sustainability. This approach will increase the competitiveness and development of European value chains, exploiting synergies and complementarities of different regional specialisation. The ESM Vanguard pilot is aimed at overcoming the barriers limiting innovation and transfer of research results to the European industry through the development of a European synergic network of pilot plants accessible to companies in a logic of Smart Specialisation. Each Region will develop and operate pilot plant nodes coherent to regional industry and competences, offering European companies a “one-stop shop” for the industrial uptake of new technologies and innovative business models.

In AI REGIO, 13 VANGUARD regions are represented by their Digital Innovation Hubs, that are running experiments in collaboration with SMEs.

⁸⁶ <https://s3platform.jrc.ec.europa.eu/what-we-do>

⁸⁷ <https://s3platform.jrc.ec.europa.eu/industrial-modernisation>

⁸⁸ <https://s3platform.jrc.ec.europa.eu/efficient-and-sustainable-manufacturing>



5.1.2 The JRC Catalogue of DIHs

As part of the S3 Platform, the **Digital Innovation Hubs (DIH)** catalogue⁸⁹ was set up to provide a comprehensive picture of DIHs in the EU across varying competences, structures and service offerings. Today, it is a repository with more than 600 DIHs, over 400 of which are fully operational, including information on the technology and application specialisation, geographical coverage, markets addressed and general digitisation support available. The Catalogue represents therefore a fundamental source for information where to disseminate Open Calls announcements and where to exploit AI REGIO assets.

In particular, by selecting the 13 different sectors of **Manufacturing**, an ecosystem of **256** operational DIHs is selected in many EU Countries and represented in the following picture.



Figure 22 The European ecosystems of DIHs

5.1.3 The Made in Europe Partnership

The **Made In Europe Partnership**⁹⁰ will be the leading European lighthouse and driver for both a twin ecological and digital transition, bringing together the leading actors from manufacturing and relevant European industrial ecosystems, coming from academia, industry, non-governmental organisations and the public sector. It will serve as a platform for national and regional manufacturing technology initiatives and the required disciplines and technologies, creating economies of scale, common understanding and alignment of objectives and priorities. Strategic cooperation with key

⁸⁹ <https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-catalogue>

⁹⁰ https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/ec_rtd_he-partnership-made-in-europe.pdf



actors at national, regional and local level will be developed, to ensure take-up of research results. Based on joined expertise and resources, the Made In Europe partnership will be the voice and driver for sustainable manufacturing in Europe. It will boost European manufacturing ecosystems towards global leadership in technology, towards circular industries and flexibility. The Partnership will contribute to a competitive, green, digital, resilient and human-centric manufacturing industry in Europe.

On 23rd of June 2021, EFFRA has officially signed the Memorandum of Understanding with the European Commission, which marks the beginning of the Made in Europe partnership⁹¹.

The associated research and innovation actions will address key priorities, named Specific Objectives:

1. **Specific Objective 1: Efficient, responsive and smart factories and supply chains.** This objective refers to the efficiency of the manufacturing processes and their capability to self-adaptation and self-configuration. In AI REGIO, the **Cluster 2 of Experiments “Factory Efficient and Sustainable Manufacturing domain”** goes in that direction. In particular, the Specific Objective 1 focusses on:
 - 1.1 Zero-defect and zero-downtime high-precision manufacturing, including predictive quality and non-destructive inspection methods
 - 1.2 Manufacturing for miniaturisation and functional Integration
 - 1.3 Scalable, reconfigurable and flexible first-time-right manufacturing
 - 1.4 Artificial intelligence for productive, excellent, robust and agile manufacturing chains - Predictive manufacturing capabilities & logistics of the future
 - 1.5 Advanced manufacturing processes for smart and complex products
 - 1.6 Data ‘highways’ and data spaces in support of smart factories in dynamic value networks
2. **Specific Objective 2. Circular products & Climate-neutral manufacturing.** This objective refers to manufacturing environmental sustainability and the Green Deal EU policy. In particular, the Specific Objective 2 focusses on:
 - 2.1 Ultra-efficient, low energy and carbon manufacturing
 - 2.2 De-manufacturing, re-manufacturing and recycling technologies for circular economy
 - 2.3 Manufacturing with new and substitute materials
 - 2.4 Virtual end-to-end life-cycle engineering and manufacturing from product to production lines, factories, and networks
 - 2.5 Digital platforms and data management for circular product and production-systems life-cycles
 - 2.6 Predictive Manufacturing capabilities & Logistics of the future
3. **Specific Objective 3: New integrated business, product-service and production approaches; new use models.** This objective mostly refers to the relationship between physical product and digital service associated to it. Maintenance (remote, predictive, prescriptive) is one of the most popular examples of such services. In AI REGIO, the Cluster 3 of Experiments “Quality Control and Predictive Maintenance domain” goes in that direction. In particular, the Specific Objective 3 focusses on:

⁹¹ <https://www.effra.eu/news/made-europe-partnership-officially-launched>



- 3.1 Collaborative product-service engineering for customer-driven manufacturing value networks
 - 3.2 Manufacturing processes and approaches near to customers or consumers (including urban manufacturing)
 - 3.3 Transparency, trust and data integrity along the product and manufacturing life-cycle
 - 3.4 Secure communication and IP management for smart factories in dynamic value networks
4. Specific Objective 4: **Human-centered and human-driven manufacturing innovation.** Autonomous quality needs the definition of new roles and skills for humans. In AI REGIO, Task 5.1 – “AI DIH Collaborative Intelligence and Industry 5.0” and the Cluster 4 of Experiments “Robotics and Human Interaction domain” go in that direction. In particular, the Specific Objective 4 focusses on:
- 4.1 Digital platforms and engineering tools supporting creativity and productivity of manufacturing development
 - 4.2 Improving human device interaction using augmented and virtual reality and digital twins.
 - 4.3 Human & technology complementarity and excellence in manufacturing
 - 4.4 Manufacturing Innovation and change management
 - 4.5 Technology validation and migration paths towards industrial deployment of advanced manufacturing technologies by SMEs

5.1.4 AI REGIO Experiments in the EFFRA Innovation Portal

EFFRA – European Factories of the Future Research Association⁹² is a non-for-profit, industry-driven association promoting the development of new and innovative production technologies, representing the private side of the manufacturing partnership with the EU Commission. Named under Horizon 2020 program, the European Factories of the Future **has become Made in Europe nowadays** under Horizon Europe (see Section 5.1.3 for more details).

EFFRA deployed the **EFFRA Innovation Portal**⁹³ in cooperation with the European Commission, with the objective of providing an online resource for sharing information about research and innovation projects and associated project results in the area of manufacturing. In the section “Project”, AI REGIO has its own page⁹⁴, displaying the main information about the project.

⁹² <https://www.effra.eu/>

⁹³ <https://portal.effra.eu/panel/2>

⁹⁴ <https://portal.effra.eu/project/1989>



Project / AI REGIO

Regions and DIHs alliance for AI-driven digital transformation of European Manufacturing SMEs

Summary

The AI REGIO project aims at filling 3 major gaps currently preventing AI-driven DIHs from implementing fully effective digital transformation pathways for their Manufacturing SMEs:

- at policy level the Regional vs. EU gap;
- at technological level the Digital Manufacturing vs. Innovation Collaboration Platform gap;
- at business level the Innovative AI (Industry 5.0) vs Industry 4.0 gap.

POLICY.

Regional smart specialization strategies for Efficient Sustainable Manufacturing and Digital Transformation (VANGUARD initiative for Industrial Modernisation) are so far insufficiently coordinated and integrated at cross-regional and pan-EU level. SME-driven >AI innovations cannot scale up to become pan-EU accessible in global marketplaces as well as SME-driven experiments remain trapped into a too local dimension without achieving a large scale dimension. Regional vs. EU Gap.

TECHNOLOGY.

Digital Manufacturing Platforms DMP and Digital Innovation Hubs DIH play a fundamental role in the implementation of the Digital Single Market and Digitising European Industry directives to SMEs, but so far such initiatives, communities, innovation actions are running in a quite independent if not siloed way, where very often Platform-related challenges are not of interest for DIHs and Socio-Business impact not of interest for DMP. DMP vs. DIH Gap.

BUSINESS.

Many Industrial Data Platforms based on IOT Data in Motion and Analytics Data at Rest have been recently developed to implement effective Industry 4.0 pilots (I4MS Phase III platforms). The AI revolution and the new relationship between autonomous systems and humans (Industry 5.0) has not been properly addressed in I4MS so far. AI I5.0 vs. I4.0 Gap.

AI REGIO is following the 4 steps for VANGUARD innovation strategy (learn-connect-demonstrate-commercialize) by constantly aligning its methods with the AI DIH Network initiative and its assets with I4MS/DIH BEinCPPS Phase II and MIDIH / L4MS Phase III projects. AI REGIO: Industry 5.0 for SMEs

More information

Web resources: <https://cordis.europa.eu/project/id/952003>
<https://www.ai-regio-project.eu>

Search

Google, YouTube, Facebook icons

Contacts

Not specified (see website if available)

Latest news

No news messages yet.

[Go to project forum](#)

Figure 23 The AI REGIO profile page on the EFFRA Innovation Portal

The “Results, demos, etc. overview” section displays the 17 Experiments run within AI REGIO project; for each one, following information are displayed:

- **Summary of the Experiment**, to provide an overview of the context, challenges and expected results/benefits;
- **Significant innovations and lessons learned**, to discuss about the main innovative aspects of the solution implemented and the relevant results for SMEs. This section will be further integrated as soon as the Experiments will be finalised, including also main achievements and lessons learnt;
- **Manufacturing performance characteristics**, to identify the main impact on the Economic, Environmental and Social sustainability.
- **Technologies and enablers**, to describe the main technologies adopted to run the Experiment, considering “Advanced material processing technologies”, “Information and Communication technologies”, “Engineering tools”, “Advanced materials in manufacturing systems”, “Mechatronics and robotics technologies” and “Skills-Knowledge workers”.



- **Applications areas and sectors**, to detail what type of manufacturing sector is impacted by the Experiment.

As soon as the Experiments will be finalised, also the **Digitalisation pathways** will be compiled (see section 3.2 for more details about the pathways), identifying those relevant for the use case and setting the initial and final level, as well as milestones and challenges required to reach it.

COLLABORATION STREAM X: Manufacturing domain and Business Initiatives. Current collaborations are in place with the Vanguard Efficient and Sustainable Manufacturing Pilot (see 9th December 2021 agenda) and with the EFFRA innovation Portal where AI REGIO cases have been positioned and described. Further collaborations will be in place with the VANGUARD AI Pilot, with MANUFUTURE DTI working group and with further evolutions of the HEP Made in Europe partnership. In this regard, a collaboration channel will be open with the Process Industry and the Processes4Planet Partnership.

5.2 Data and AI Technological Initiatives

5.2.1 The BDVA and DAIRO Partnership (EBDVF)

The **Big Data Value Association** (BDVA)⁹⁵, is an industry-led organization representing large businesses, small and medium-sized enterprises (SMEs), and research organizations in Europe. It represents the private part in the contractual Public Private Partnership (cPPP) on Big Data Value with the European Commission, that represents the public side. The overall goals, main technical and non-technical priorities, and a research and innovation roadmap for the BDV PPP is represented by the Strategic Research and Innovation Agenda (SRIA)⁹⁶ defined over the last years and published by the BDVA.

The availability of powerful data analytics techniques and tools has enabled a massive improvement in the availability of raw data, on one side, and has intensified, in general, all the activities around the Big Data aspects and related Value.

It's worth to note how the BDV PPP is also aligned with the **Digital Single Market Strategy** (DSM Strategy), promoted by the European Commission, especially in the specific pillar about **"Developing the European Data Economy"**. The DSM Strategy, in order to manage the digital transformation of our economy (and society) has identified four main dimensions to focus on: Digital skills; Start-ups and the digitization of all industry and service sectors; Digital innovation for modernising public services; Stepping up investments in digital technologies and infrastructures.

At the Big Data Value PPP side, it has been identified the respective four action lines to implement the DSM strategy by contributing to its different pillars:

- Digitising European Industry
- Building a European Data Economy
- Developing a European Data Infrastructure
- Digital Skills

⁹⁵ <https://bdva.eu/>

⁹⁶ http://bdva.eu/sites/default/files/BDVA_SRIA_v4_Ed1.1.pdf



As well as the DSM strategy, also the **Digitizing European Industry strategy**, adopted by the EC in April 2016, has been addressed by the BDV PPP by defining the Big Data Value chain as a key aspect provided by a digital industrial platform.

Expanding the concept of the Big Data Value chain, the BDVA SRIA identifies a number of related dimensions that are crucial to sustain the European competitiveness on Big Data for technological and business aspects. A strong Big Data ecosystem can then be established by developing the following dimensions:

- **Data:** Data is certainly the central element, starting from its availability together with all its other characteristics (e.g., structured or not, multilingual, human or machine generated). Value is produced by acquiring and combining data from various data sources.
- **Skills:** Europe needs to properly train its specialists on Big Data technologies and best practices in analytics, statistics, machine learning, data mining and data management.
- **Legal:** The growing interest on the usage of data needs to be properly regulated for what regards aspects such as data ownership and usage, data protection and privacy, security, liability, cybercrime and Intellectual Property Rights (IPRs).
- **Technology:** To enable new business opportunities (and to sustain competition) it is crucial to advance in aspects such as real-time analytics, low latency and scalable data processes, new and rich interactive user interfaces.
- **Application:** Applications based on Big Data technologies will be developed for all sectors and domains by 2020. Organizations and citizens will benefit from the exploitation of both data-at-rest and data-in-motion managed in secure environments.
- **Business:** By 2020 many sectors will be transformed thanks to the adoption of the Big Data applications and business models. European companies' competition will be reinforced thanks to innovative new business models.
- **Societal:** Big Data Value systems will be able to create impact also at societal level where volume, variety and velocity are key aspects of the data managed in that kind of domain.

The implementation of the Big Data Value research and innovation strategy is based on four pillars:

- **Innovation Spaces:** To support the proper uptake of research results on BDV technologies, the European Innovation Spaces (i-Spaces) provide the proper environment to deploy applications (at different kind of maturity level) for testing and piloting solutions in close collaboration with the market. The i-Spaces take into account not only the technical perspective but also the legal one in order to fully complement their offering to the BDV stakeholders.
- **Lighthouse projects:** With the main objective to create high-level impact in specific domains, the Lighthouse projects are high degree innovation actions focused on promoting data-driven applications and services. Those projects also demonstrate how applications and services can be replicated in the targeted domain and how, in both quantitative and qualitative terms, BDV solutions can lead to business growth and job creation.
- **Technical projects:** specific technical priorities for the Big Data Value chain are identified and described in the BDVA SRIA. Proper Research and Innovation Actions are setup (in the



context of the PPP) to address those technical priorities and provide the technological base for the Lighthouse projects.

- **Cooperation and coordination projects:** In order to properly complement the technical assets, the PPP has considered a Coordination and Support Action as the more adequate instrument to address non-technical topics such as skills, business, policy, regulations, legal and societal.

In the context of the Big Data Value Association, the **Working Group on Smart Manufacturing Industry** (SMI) is analysing the digital transformation of the Manufacturing domain that, the increasing adoption of Big Data, is producing.

Many research priorities of the SMI working group within the BDVA PPP are fully aligned with AI REGIO objectives, solutions and pilots. Many of the AI REGIO technology and knowledge providers are active members of the working group (i.e., currently led by POLIMI and ENG), therefore cross-fertilization actions are already in place and furthermore will be established in the future.

BDVA can therefore support AI REGIO in creating awareness about the AI REGIO project outcomes not only within their own community, but also creating possible synergies and complementarities with other EU-led initiative relying on cross-PPP collaborations.

To achieve these goals, the periodical meetings established as part of the operational activities of the SMI working group are used to present AI REGIO challenges and solutions, to share experience and approaches with other BDVA members, from both technical and business-oriented standpoints.

5.2.2 The Data Space Business Alliance DSBA and Data Spaces for Manufacturing in Digital Europe

The **Data Space Business Alliance** (DSBA)⁹⁷ is an alliance of four main organisations (BDVA, the FIWARE Foundation⁹⁸, Gaia-X⁹⁹ and the International Data Space Association – IDSA¹⁰⁰) with the objective of accelerating the business transformation in the data economy.

Together they represent more than 1,000 leading key industry players, associations, research organizations, innovators, and policymakers worldwide.

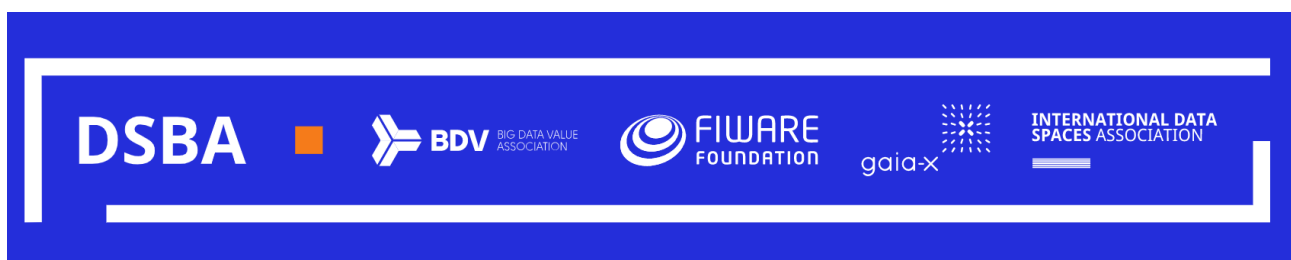


Figure 24 The DSBA partners

- The **Big Data Value Association** (BDVA) is an industry-led organisation, defining main technical and non-technical priorities and research and innovation roadmap in the Big Data domain, represents the private part in the contractual Public Private Partnership. See Section 5.2.1 for more details.
- The **FIWARE Foundation** is a legal independent body providing shared resources to help achieve the FIWARE mission by promoting, augmenting, protecting and validating the

⁹⁷ <https://data-spaces-business-alliance.eu/>

⁹⁸ <https://www.fiware.org/foundation/>

⁹⁹ <https://www.data-infrastructure.eu/GAIA/Navigation/EN/Home/home.html>

¹⁰⁰ <https://internationaldataspaces.org/>



FIWARE technologies as well as the activities of the FIWARE community. FIWARE is a set of open source software platform components which can be assembled together, to build platforms that support the development of Smart Solutions faster, easier and cheaper. Among the several components, FIWARE developed also those useful to support the activities of data management and data monetisation.

- **Gaia-X** is a European project born to create a federated and secure data infrastructure, allowing citizens and organisations to share their data in the respect of data sovereignty. It counts more than 850 members, 425+ organisations and the activities are driven by 10 Working Groups related to the same number of domains (Agriculture, Energy, Industry4.0/SME, Public Sector, etc), with the objective of creating a Data Space for each of them.
- The **International Data Space Association (IDSA)** groups 133 members from 22 countries with the mission of creating a secure, sovereign system of data sharing in which all participants can realize the full value of their data. To achieve it, the association has defined its Reference Architecture Model, to set the standard for building data-driven ecosystems, products and services. Additionally, it introduced the concept of IDS connector (to guarantee the control of data usage) and created the IDS Reference Testbed (to enable companies to develop IDS-compliant components and test them on their interoperability).

The mission pursued by the Data Space Business Alliance is perfectly in line with the values of the European Commission and specifically with the **European Strategy of Data**¹⁰¹, that aims at creating a single market for data that will ensure Europe's global competitiveness and data sovereignty.

In February 2020, the Commission announced the adoption of a European strategy for data, which aims at creating a single market for data to ensure Europe's global competitiveness, by creating the right incentives for data-sharing among companies. To encourage the adoption first steps are:

- The creation of a flow of data, both cross-sectorial and cross-borders;
- The definition of a set of European rules for data governance, easily understandable and applicable, that must be respected for compliancy.

More recently, with the purpose of boosting European digital transformation, the European Commission started to stress the advantages of implementing new AI solutions, both from companies and for private people, with the objective of increasing human well-being. But before deep diving into features that make an AI model reliable, it is fundamental to outline the best strategy to consolidate and manage the backbone of any solution of Artificial Intelligence: data availability.

A prerequisite to develop trust and efficient AI systems is to have at disposal a big amount of high-quality data and to achieve it, it is necessary to have a solid infrastructure to exchange data.

In the EC annex to the **"Proposal for a Regulation on a European approach for AI"**, 21 April 2021, it is stated that *"For the development of high-risk AI systems, certain actors [...] should be able to access and use high quality datasets. European common data spaces established by the Commission and the facilitation of data sharing between businesses and with government in the public interest will be instrumental to provide trustful, accountable and non-discriminatory access to high quality data for the training, validation and testing of AI systems."*

In the **"Coordinated Plan on Artificial Intelligence (AI)"** (2021), the EC outlined the first step to develop a roadmap toward for several common European Data Spaces, including a Manufacturing Data Space.

The creation of Data Spaces is supported by the EC with the Digital Europe program, a new EU funding programme aiming at bringing digital technology to businesses, citizens and public administrations, in order to achieve the so called Twin Transition (Digital and Green) in next years.

¹⁰¹ <https://digital-strategy.ec.europa.eu/en/policies/strategy-data>



A number of workshops have been organized to discuss about Manufacturing Data Space. Among the others, the European Commission organised:

- On 10th February 2021, the workshop “**Manufacturing Data Spaces – Workshop on initial ecosystems**” to provide an overview of initial ecosystems for manufacturing data spaces,
- On 16th March 2021, the workshop “**Manufacturing Data Spaces - Workshop on what role standards play with regard to data sharing**”, with the objective of providing an overview of the jungle of standards, focusing on those relevant for manufacturing domain.
- On 10th May 2021, the workshop “**Manufacturing Data Spaces - Workshop on interacting with GAIA-X and other initiatives**”, with the objective of advancing the debate on how infrastructure initiatives such as GAIA-X can help scale data spaces to enable the rapid deployment of Manufacturing Data Spaces for Europe.

COLLABORATION STREAM XI: Data and AI Technologies Initiatives. As soon as AI REGIO Data and AI technologies achieve a certain level of maturity and TRL, they will be properly presented in the working groups of BDVA (SMI), ADRA Partnership and DSBA Alliance. At the moment, the D BEST methodology has been presented to the HUBS working group in DSBA.



6 National and Regional Cooperation through AI REGIO DIHs

To have a complete overview of the initiatives running in Europe, relevant for AI REGIO topics, the 13 DIHs have summarised the main initiatives taken at National and Regional level (they represent 13 different European regions).

6.1 STEINBEIS – FZI Digital Innovation Hub

The **Baden-Wuerttemberg (BW) region** is working continuously on their strategic innovation policy, which is implemented almost across the entire federal state. These research and technology policies are defined by longstanding close cooperation of people and institutions from the science, business-enterprise and political sectors.

- To support and accelerate the process, the Ministry of Economic Affairs, Labour and Tourism Baden-Wuerttemberg has launched the initiative '**Wirtschaft 4.0**'¹⁰², which aims to support SMEs on the path to the digital future and make Baden-Wuerttemberg even more visible as a premium international location for the digital economy and in particular for Artificial Intelligence.
- In addition, the state **promotes the digitisation of the economy through currently 10 regional Digital Hubs**¹⁰³ (Heilbronn-Franken, Kurpfalz, Landkreis Böblingen, Neckar-Alb und Sigmaringen, Nordschwarzwald, Ostwuerttemberg, Region Bruchsal, St. Georgen, Suedbaden, Ulm/Alb-Donau/Biberach). Their aim is to support especially the exchange of experience, knowledge transfer, and establish customer and cooperation relationships. In this way, regional 'ecosystems' for digital innovations are created, which support the joint development of new business models and other digital projects among large industries, SMEs as well as start-ups and scale-ups.
- The ten regional digital hubs are supplemented by **three topic-specific digital hubs** focusing on '**Future Industries**' (Stuttgart), '**Artificial Intelligence**' (Karlsruhe) and '**Digital Chemistry and Health**' (Mannheim/Ludwigshafen).
- Besides official German and BW digital hubs, there are hubs providing technology transfer, individually initiated by various BW institutions of higher education, applied science and R&D institutions.
- In addition to the different regional and topic-specific digital hubs there are also **19 AI-Labs**¹⁰⁴, **funded by the Ministry of Economic Affairs, Labour and Tourism Baden-Wuerttemberg**. The AI-Labs are contact points for SMEs interested in the application of AI and provide them with the opportunity, to learn about the potentials of AI technologies. These efforts are also supported by eight digital innovations hubs to pool resources and deepen expertise, especially enhancing the quality of the services and digital infrastructures across the EU Member States.
- Another important initiative is the '**SME's Digital'-Initiative**¹⁰⁵ established by the German Federal Ministry of Economic Affairs and Climate Action. In BW, 25 contact points exist that

¹⁰² <https://www.wirtschaft-digital-bw.de/initiative-wirtschaft-40/initiative-wirtschaft-im-ueberblick>

¹⁰³ <https://www.wirtschaft-digital-bw.de/digital-hubs/digital-hubs>

¹⁰⁴ <https://www.wirtschaft-digital-bw.de/ki-made-in-bw/regionale-ki-labs>

¹⁰⁵ <https://www.mittelstand-digital.de/MD/Redaktion/DE/Artikel/Mittelstand-4-0/mittelstand-4-0-kompetenzzentren.html>



offer support for SMEs to start their digital transformation, providing information and concrete, practice-oriented demonstration and testing opportunities in the respective regions.

- Furthermore, from a supra-regional perspective, **BW takes part in the Vanguard Initiative**¹⁰⁶, an alliance of the 29 economically most powerful regions across Europe. The alliance aims to build synergies and complementarities based on their smart specialisation strategies and to foster world-class clusters and cluster networks, especially through pilots and demonstration activities. In addition, **BW belongs to the network 'Four Motors for Europe'**¹⁰⁷ (Auvergne-Rhône-Alpes, Baden-Wuerttemberg, Catalonia and Lombardy), one of the first European networks of regions. The network was primarily related to economics and research as well as to art and culture and is nowadays active in various areas (e.g., contributing to European affairs, especially by issuing common positions on EU policy initiatives and supporting inter-university agreements, etc.). Another international initiative is the project "French-German Networking on Industry 4.0 and Applied Artificial Intelligence"¹⁰⁸, which is supported by the Ministry of Economic Affairs, Labour and Tourism Baden-Württemberg and aims to lay down a foundation for a sustainable French-German ecosystem on AI and Industry 4.0.
- Finally, BW initiated in the end of 2016 the project of **Cyber Valley**¹⁰⁹ which is one of Europe's largest research cooperation in the field of Artificial Intelligence with partners from politics, science, business and society (see Figure 25). Cyber Valley strengthens research and education in the fields of machine learning, computer vision and robotics as well as the exchange between scientific disciplines. By promoting the exchange between science and industry as well as spin-offs, the technology transfer in this central future field is strengthened. Since the founding of the Cyber Valley research consortium, the partnership has fostered the development of a thriving ecosystem in southwestern Germany. Multidisciplinary initiatives are added every year, and the Stuttgart-Tübingen region is gaining momentum as a European hotspot for research and innovation in machine learning, robotics and computer vision.

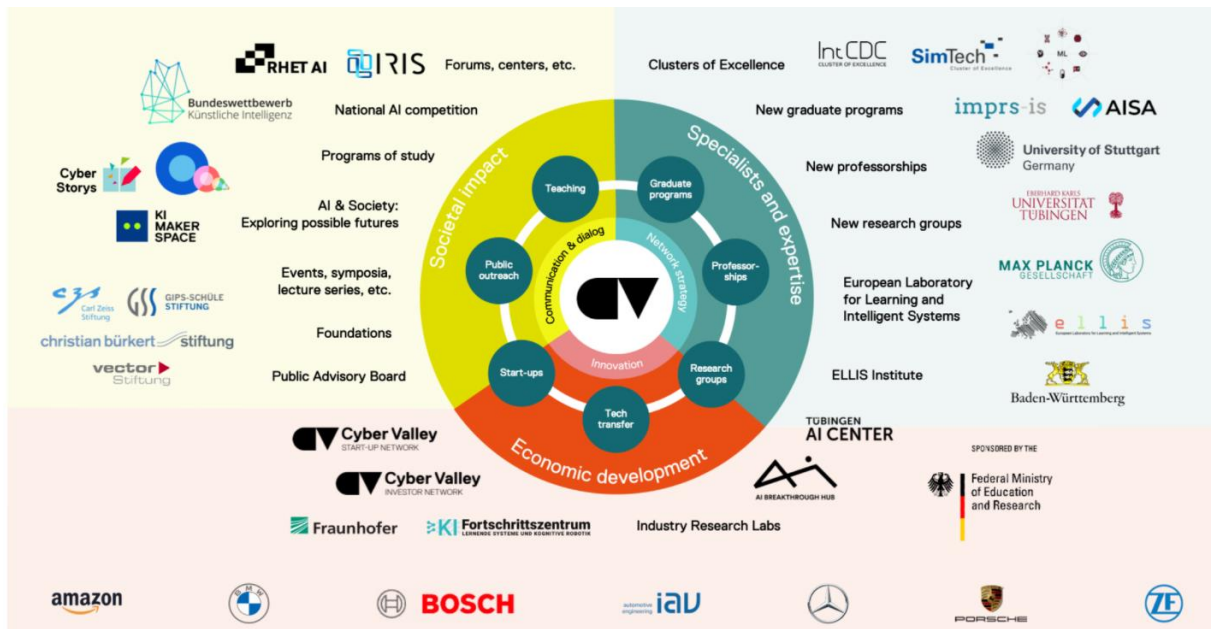


Figure 25 Cyber Valley ecosystem (source Cyber Valley)

¹⁰⁶ <https://www.s3vanguardinitiative.eu/>

¹⁰⁷ <https://www.4motors.eu/>

¹⁰⁸ <https://www.diz-bw.de/projekte/vernetzung-mit-frankreich/>

¹⁰⁹ <https://cyber-valley.de/>



6.2 POLYTRONICS Digital Innovation Hub

Clustering with other EDIHs selected in the restricted Digital Europe call will be performed. POLYMERIS will be leader in this action to coordinate the clustering efforts of all partners. Each EDIH will be reviewed and when synergies can be sought (e.g., with EASYHPC from PATRAS targeting HPC for the plastic industry), contacts will be established with the organisation of meetings, signature of partnerships agreement and organisation of common events. Participation from 2 to 4 events per year is foreseen, for sharing best practices, together with one EDIH event a year.

Relevant services from other EDIHs will be considered for integration into POLYTRONICS and the services portfolio will be promoted through marketing activities through the SEP channel. Clustering efforts will notably start with other EDIHs (Minasmart, DEDIHCATED and Loire Valley Data Hub) in the three french regions AURA, Centre Val de Loire and Bourgogne Franche-Comté given that companies located in these regions will be addressed by the different EDIHs. To avoid multiple promotion campaigns, POLYMERIS will contact other EDIHs to establish partnerships agreements, organise common promotion events and will seek synergies towards companies and therefore benefit from crossed networks to increase the Serviceable Obtainable Market.

We will consolidate interconnections with regional, national and EU intermediaries, including thematic scientific and industry associations, economic development agencies (Bpifrance ...), business incubators. A mapping of related projects and initiatives, detailing existing links and interactions with POLYTRONICS project partners will be established at the Kick-off meeting and integrated by SWARM to the Communication and Dissemination Plan with potential collaboration opportunities.

The impact will be measured through outreach data, engagement indicators and qualitative stakeholder's feedback with KPIs (number of stakeholders reached, number of associations reached etc.). Updates will be made with joint initiatives. Liaisons with relevant research projects in the digital Europe, PPP and Horizon Europe programmes (DIGITAL TRAINING notably) will be established. The consortium will organize three workshops/stakeholder meetings and one conference in coordination with other EC projects or initiatives to identify TEC, CCI, ARAE, DEV'U P, CCI, ARAE, POL BEN COO AP - Call: DIGITAL-2021-EDIH-01 — European Digital Innovation Hubs EU Grants: Application form (DEP): V1.0 – 01.11.2021 44 synergies and validate outcomes. TEC will establish partnerships with ETC, EGIE and CONTEXT to initiate events dedicated to the AI in the textile industry. POL will establish partnerships with ECCP, ELCA, Vanguard Initiative. CCI Ain, CCI BFC, ARAE and DEVUP are all members of the EEN and will present the EDIH purposes to the EEN. They will co-organise an online event at M24 with at least 4 EDIHs to promote the actions of both EDIHs and EEN, directed at European companies.

6.3 AFIL Digital Innovation Hub

AFIL is representing Lombardy Region and is participating at different interregional initiatives and activities both at European and international level. Some of these initiatives, related to Artificial Intelligence, have been supported by AI REGIO project, that represents a mean of collaboration among the partner DIHs. To perform this activity, AFIL involves different types of stakeholders, including research organizations, competence centres, technology parks, institutions and industrial players. Below the list of the major national and regional collaborative initiatives and projects supporting AI REGIO:

- ***Vanguard Initiative and the S3Partnerships***

AFIL is co-coordinating the *Efficient and Sustainable Manufacturing Pilot*, where 22 European regions promote the exploitation of synergies and the collaboration towards the increase of production efficiency and manufacturing sustainability, both at environmental level with the reduction of waste and emissions and at social level for human inclusion in



industrial environments. One of the ESM demo-cases is specifically dedicated to Digital Transformation of SMEs and is dealing with Artificial Intelligence as supporting tool for enterprises to increase competitiveness and productivity, to optimize working parameters and conditions and to increase process flexibility. In this framework AI REGIO project has been ideated. Furthermore, AFIL is involved in *Artificial Intelligence Pilot*, led by Emilia Romagna and Baden-Wurttemberg regions. Through Vanguard Initiative, AFIL collaborates with other regional DIHs and promotes the achievement and opportunities related to AI REGIO project, such as the Open Calls. Both ESM and AI are also present as S3Partnerships, extending the collaboration beyond Vanguard regions.

- **CEUP2030 project (Interreg CE)**

Within CEUP2030 projects, four key topics for Advanced Manufacturing have been identified: Intelligent Production System, Robotics and Automation, Smart Materials and Artificial intelligence. AFIL is responsible for the AI related activities, such as the increase of awareness, the promotion of inter-regional collaborations and the development of regional network of interested stakeholders. Recently, has been organized a Transnational AI RoundTable to discuss current challenges, barriers and needs of AI with the comparison of regional initiatives in Lombardy, Norte, Catalonia, South Netherlands and Danube regions, as well as industrial best practices in Lombardy, Austria and Friuli Venezia Giulia. AI REGIO project has been mentioned as excellent example of interregional cooperation.

- **Watchman project (Call Hub – Lombardy region)**

WATCHMAN project aims at the creation of a competence centre for Artificial Intelligence applied to Machine Vision, which can support manufacturing companies, mainly SMEs, in the process of AI implementation. In this case AFIL is responsible for project communication and dissemination, highlighting the benefits of partners collaboration for the development and implementation of industrial AI solutions.

- **National collaboration with COMET DIH**

Through AI REGIO project, AFIL started a fruitful collaboration with Friuli Venezia Giulia region, organizing a dedicated event focused on technology parks and incubators. Both regional Digital Innovation Hubs and Competence Centres have been invited to show their services and collaboration methodologies, accompanied by EIT Manufacturing presentation on current available opportunities. Then the different parks and incubators presented themselves with particular attention to activities related to digital transformation and Artificial Intelligence. The event was also disseminated and supported by Cluster Fabbrica Intelligente, that is the national cluster for Advanced Manufacturing.

- **AI Forum Italy-Canada**

The Italy-Canada Business Forum aims to promote structured exchanges of information and know-how between policy makers in both countries. It also encourages the development of partnerships and networks between applied research centres, facilitating technology transfer pathways and optimising the promotion of research results. The annual meeting represents an opportunity to discuss opportunities for development and collaboration between the two countries and to encourage innovation. Lombardy region, represented by AFIL, was one of the main Italian interlocutors.

- **EDIH proposal**

The European Digital Innovation Hubs (EDIHs) network will build on one-stop shops that help companies dynamically respond to the digital challenges and become more competitive. The mission of EDIH Lombardia (EDIH L) is to lead and implement a digital and sustainable twin transition of Lombardy manufacturing industry via a rich portfolio of 13 services provided by EDIH L partners. The objectives of EDIH L are: a) to increase digital technologies adoption; b) to support digital skills development; c) to foster innovative business model adoption and go to market strategies; d) to integrate digital European value chain. EDIH L integrates AI REGIO classification defined as BEST services (Business



Ecosystem Skills and Technology) and collects the needs, structures the requirements in customer journeys and creates impact on industry, delivering tailor made customer journeys of interconnected services. EDIH L leads EDIH4Manu, an informal open collaboration network of 25 EDIH candidates focused on manufacturing from 15 EU countries.

6.4 CATALONIA Digital Innovation Hub (ACCIO/EUT)

The Digital Innovation Hub of Catalonia (hereinafter [DIH4CAT](#)) is a regional innovation ecosystem absolutely connected at national and regional level, that brings together the most relevant stakeholders in Catalonia to support SMEs in their digital transformation.

At regional level:

- DIH4CAT is led by the *Generalitat de Catalunya* (Government of Catalonia- ACCIO), in order to guarantee maximum alignment with regional policies and agents.
- It works as a dynamic community integrating 12 agents with complementary capacities such as research and technology organizations, universities, business schools and industrial and employer associations. It is structured around **7 advanced technology areas or Digital Innovation Nodes (hereinafter DINs)**, each one led by a Research and Technology organization or a University highly experienced in the field. The node of Artificial Intelligence (CIDAI) is led by **Eurecat**.
- Additionally, it has **19 associate partners** that contribute with infrastructure, know-how, own resources to perform services, as well as their network of contacts, when necessary.: **SECPHO** (Southern European Cluster In Photonics & Optics Association), **CSUC** (Consortium of University Services of Catalonia), **CIMNE** (International Center for Numerical Methods in Engineering), **URV** (University of Rovira Virgili), **IFAE** (Institute for High Energy Physics), **BASF** (BASF 3d Printing Solutions GmbH), **ATG** (RÖSLER International GmbH & Co), **RENISHAW** (Renishaw PLC), **MWCB** (Mobile World Capital Foundation), **ORANGE** (Orange Spain), **MEDIAPRO** (Mediaproduccion), **UPF** (University of Pompeu Fabra), **UdG** (University of Girona), **CSIC** (Spanish National Research Council - Institute of Robotics and Industrial Informatics), **UB** (University of Barcelona - Thermal Projection Center), **CESICAT** (Catalan Information Security Center), **NTT Data** (Technology Solutions Spain), **SDG** (SDG Group) and last but not least **MICROSOFT** (Microsoft Ibérica).
- ACCIÓ is as well the coordinator of the EEN Catalan node ([CATCIM](#)), so seamless cooperation between both networks is granted to promote the triple transition to **sustainability, digitalisation and resilience**, into the business ecosystem.
- DIH4CAT is connected and works closely with clusters (through the Catalonia's Clusters Programme, ACCIÓ has established 30 clusters that already include more than 2.600 companies and partners) to reach SMEs and adapt to the different sectors' needs.

At national level:

- DIH4CAT is fully aligned with the National Strategies and polices implemented by the Member State.
- It has been recognized by the Member State as the main candidate in Catalonia for the European Digital Innovation Call (proposal submitted to the EC on the 22nd February 2022), and has close conversations with the National Government to align funds dedicated to digital transformation.
- DIH4CAT is working on an agreement at National level (in the frame of the ADR- Regional Development Agencies Group) to formalize the cooperation among EDIHs appointed in Spain, so common services can be offered

At European level:



- With the aim of boosting the digital transformation and enlarging its impact, DIH4CAT has a clear and well-defined **collaboration strategy with other DIHs and European Innovation Hubs (EDIHs)**. DIH4CAT **structures its international collaboration initiatives and alliances in 3 dimensions**, as follows: (i) **Strategic region-wise collaborations**, promoted by *Generalitat de Catalunya* to facilitate mutual access to interest technologies, including the collaboration established within *Euroregió*, that considers *Occitània* and *Balears*, the *4 Motors of Europe (Auvergne Rhone-Alpes, Lombardy and Baden-Wurtemberg)* and also Lazio Region (Italy) and the EDIHs supported by the Spanish Innovation and Development Agencies participating in the ADR forum; (ii) **technology-wise collaborations**, promoted by DINs and aimed at maximizing access to specific technology solutions, including AI Regio, Euhubs4Data and BDVA i-spaces group, agROBOfood, DIH2, Data4Regions, DiGiNN (Cyprus), Attract DIH (Portugal), among others; and (iii) **synergies** with pan-European infrastructures and networks to facilitate seamless access to their services, such as PhotonHub Europe, PRACE, Confederation of Laboratories for Artificial Intelligence Research in Europe (CLAIRE), the European Cybersecurity Organisation and The Vanguard Initiative. Currently, DIH4CAT has **tangible agreements of dimension (i)** – 1 Memorandum of Understanding (MoU) with Lazio Region, 1 Letter of Intent (LoI) with Auvergne-Rhone-Alpes and 1 Letter of Support (LoS) with EuroRegió – **and 5 specific agreements of dimension (ii) (iii)** – 1 LoS from CLAIRE and 4 MoUs with DIH Attract (Portugal), DiGiNN (Cyprus), Cyber4IOT (Italy) and a very relevant MoU between 25 EDIHs in Manufacturing. It is also worth noting that the consortium believes this last agreement developed specifically for this call will be very fruitful.

6.5 BRAINPORT Digital Innovation Hub

The **NL AIC** (the Dutch AI Coalition) **has designated seven AI-hubs in the Netherlands**, those of Brainport, Brightlands, Midden-Nederland, Noord-Nederland, Oost-Nederland, 'AI Technology for People' (Amsterdam) and Zuid-Holland. Together, these AI-hubs form the **national AI network** and through the hubs-and-spokes model, the NL AIC supports and stimulates collaborations in and between them. Connection and interaction with the regional structure in hubs are important for the deployment of the knowledge and experience present in the national working groups.

In hubs, the crossover between **vertical working groups, or 'application areas'**, and the focus of particular hubs comes into play. The **horizontal working groups, or 'building blocks'** of NL AIC, deal with topics of common interest. They are therefore not specific to any area of application and as such, are best addressed in a national or even international context.

The AI-hub Brainport addresses the overarching bottlenecks that are particularly important in the light of the focus and challenges relevant to Brabant. This plan gives a broad overview of the initiatives and activities of the AI-hub Brainport in relation to the implementation instruments of the NL AIC. The activities align with and/or complement the plans of the working groups of the NL AIC for both the building blocks and the areas of application.

An important condition for the successful rolling-out of possibilities of AI for a broad public (citizens, knowledge institutions, SMEs, start-ups, scale-ups, OEMs, governments and others) is collaboration and alignment in a well-functioning regional innovation ecosystem. The **regional innovation ecosystem** consists of educational and knowledge institutions, innovation campuses, innovative business districts and public-private institutes, and has a direct relationship with the employment market (they generate a pool of talents), innovation (in particular, through public research and development), and entrepreneurship (start-ups, scale-ups, SMEs and MNEs). Each of the innovation campuses houses a mix of companies, and knowledge institutes, with their own talent and expertise including state-of-the-art experimentation and testing facilities in laboratories and field labs on a variety of areas of focus. The campuses are located in a relatively dense area, leveraging the

advantages of physical proximity to supercharge innovation activity. Thanks to the expertise of the knowledge institutions in the fields of systems engineering, technology, data and ethical, legal and societal aspects, in combination with innovative companies, the AI-hub Brainport is well positioned to integrate AI technology in an ethically responsible and human-centric way and make a contribution to some of the great societal challenges and sustainable development goals.

The AiNed programme proposes a set of implementation instruments for tackling five overarching bottlenecks:

- **Innovation:** accelerate the development of AI innovations in companies and government, which is now too slow;
- **Knowledge base:** educate more specialists and students, currently in short supply;
- **Employment market:** educate and train/retrain employees, to which insufficient attention is being paid at present;
- **Society:** make any uncertain socio-economic long-term effects of AI manageable;
- **Data sharing:** make more data available for machine learning, now severely limited. In order to tackle these bottlenecks, the NL AIC has structured its activities on 3 axes;
- The establishment of **horizontal working groups** in building blocks, with subjects of common interest for all areas of application;
- The establishment of **vertical working groups** in application areas, with domain knowledge;
- The regional ecosystems (hubs and spokes) where organisational capacity, target groups and knowledge come together.

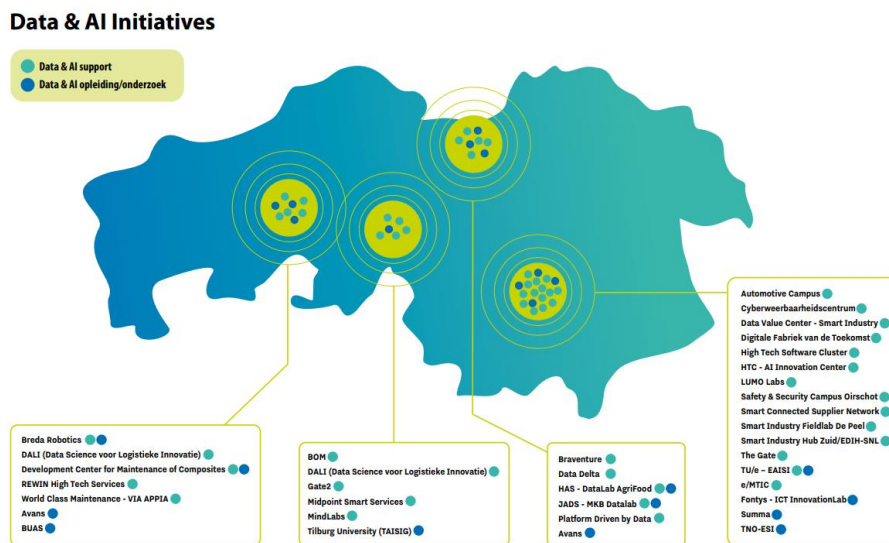


Figure 26 Data and AI initiatives in Navarra

6.6 BOOST Digital Innovation Hub

BOOST is the independent cooperation platform for the industry of the East of the Netherlands (provinces Gelderland and Overijssel). The network is large and consists of industrial companies and relevant partners in the field of smart and clean production from knowledge institutions, governments, industry organisations and field labs.



BOOST is one of the five Smart Industry Hubs in the Netherlands, working together with the other four Smart Industry Hubs and the national programme agency Smart Industry from the Ministry of Economic Affairs and Climate. Smart Industry encourages companies to apply smart technology and digitalisation to create new business opportunities. They learn from each other and work on joint activities to stimulate innovation. There are also links to Brussels and to other European networks such as Vanguard Initiative and cooperation partners.

Regional Initiatives

BOOST organizes numerous **events centred around the theme of Smart Industry**. In those events, regional SME's, knowledge institutions and other organizations are inspired by best practices of Smart Industry technologies implementation such as Artificial Intelligence, Vision, Digital Twinning and Cobot Intelligence. Also Circular economy is part of Boost.

BOOST has been involved in the establishment of **Smart Industry fieldlabs in the East Netherlands**. A Fieldlab is a practical environment in which Smart Industry solutions are developed, tested, implemented and where people can learn to apply them. A total of 32 Fieldlabs have been started in the Netherlands in which around 300 companies and various knowledge institutions and authorities work together. Through BOOST, regional SME's can gain access to the national network of fieldlabs. For the coming period, the existing Fieldlabs will be strengthened and its activities extended, in which the fieldlabs will also be connected to European networks and funding. BOOST together with other regional partners in the field of Health and Food form a **candidate European Digital Innovation Hub (EDIH)**.

Regional fieldlabs

The Fieldlab Industrial Robotics is an example of regional locations where SME's and knowledge institutions can work on technologies such as AI. The **Fieldlab Industrial Robotics (IR)** develops training courses in robotics together with training partners. IR reduces the lack of robot knowledge in the labour market. The fieldlab develops brand-independent training courses to prepare professionals for this work. Industrial robotics offers many opportunities and possibilities: both for companies and for education and professionals. The Fieldlab Industrial Robotics was set up to bring all these parties closer together.

TValley

the TValley fieldlab is another example of fieldlab in Netherland. In the **TValley Fieldlab**, machine builders, manufacturing companies, system integrators, suppliers, engineers and knowledge institutes work together towards a radical goal: first-time-right development and application of mechatronic systems. The goal is to reduce the development costs of new systems by at least 15% and to reduce the lead time by 30%. The field lab wants to achieve this through a clear focus on the design method (systems engineering) and modular mechatronic building blocks (modular robotics).

Industrial Reality Hub

The **Industrial Reality Hub** is a partnership of eleven companies that work together very actively and establish a clear technological profile in the Netherlands towards Europe. Together, the partners offer several competences for the manufacturing industry, which are necessary for the next phase of Smart Industry, namely improved interaction between man and machine. The main themes are Visualisation, VR training, Digital Twins, AR Assembly, but also Big Data and Artificial Intelligence, with applications in industry, healthcare and construction.

6.7 TAMPERE UNIVERSITY Digital Innovation Hub

Tampere University Digital Innovation Hub (later SIX Manufacturing EDIH) actively collaborates at the national and regional levels for improving the possibilities for SMEs to respond to the requirements for both the digital and green transition. SIX Manufacturing EDIH collaboration partners



include research organizations (e.g., Lappeenranta University, University of Vaasa, VTT), regional development agencies (e.g., Business Tampere), and public municipalities (e.g., city of Tampere) as well as private organizations (e.g., Dimecc, Tamlink). Collaboration is facilitated by projects, initiatives, as well as internal research and education activities. Below are listed projects and initiatives that support the development goals of the Pan-European AI REGIO project on a local level.

- **H2020 TRINITY (2019 – 2023)** The main objective of TRINITY is to create a network of multidisciplinary and synergistic local digital innovation hubs (DIHs) composed of research centers, companies, and university groups that cover a wide range of topics that can contribute to agile production: advanced robotics as the driving force and digital tools, data privacy and cyber security technologies to support the introduction of advanced robotic systems in the production processes.
- **Finnish Academy of Science project Sustainable Industry Ecosystem (SIE) (2020-2022)** SIE aims to develop the common access policy for research infrastructure on national level (including both physical, and digital laboratories) enabling the development of test before invest service portfolio for SME's.
- **ERDF TREDIH & TREDIH Invest (2021-2023)** The project is dedicated for supporting the service model development and investments to the robotics for agile manufacturing research infrastructure of Tampere University and Tampere University of Applied Sciences. This project will support the national and international EDIH collaboration.
- **SIX initiative** The aim of initiative is to form a unifying renewal vision & agenda in Finland together with the industry, research, and public sector. As one implementing element, SIX helps actors to form industry-driven clusters that promote innovation and competence development around different topics.
- **SIX Manufacturing EDIH proposal** SIX Manufacturing EDIH is selected as contender for one of Finland's European Digital Innovation Hubs.

6.8 PRODUTECH Digital Innovation Hub

PRODUTECH DIH has a national dimension, since it is a consortium of 19 entities including a Production Technology Cluster (PRODUTECH), a Science and Technology Park, 2 Technology Centres, 9 RTOs - Research and Technology Organizations and 4 universities and centres for teaching and professional qualification, with presence and capacity for multi-regional intervention (i.e., North, Centre, Lisbon Metropolitan Area, Alentejo, and Algarve). This level of territorial coverage is only possible through the articulation and integration of capabilities, competencies, infrastructures and services of the consortium entities that form PRODUTECH DIH.

The PRODUTECH DIH focus is on the digitalization of the manufacturing industry, thus supporting SMEs and small mid-caps in adopting industry 4.0 and circular economy methods, and in developing capacities in Artificial Intelligence, High Performance Computing, Cybersecurity, Advanced Digital skills and accelerating the best use of technologies. Manufacturing industry encompasses a multitude of industrial sectors and has an increasingly strategic importance in the National and European framework.

Regarding national and regional initiative, PRODUTECH DIH will be instrumental to the **Action Plan for the Digital Transition (APDT)**, which reflects the strategy defined for the digital transition in Portugal and condenses the Portuguese government's vision in this domain, including programs and national strategies, namely InCoDE.2030, i4.0, Start-up Portugal and AI Portugal 2030. APDT objectives are related with i) training; ii) entrepreneurship and investment attraction, iii) cybersecurity, iv) data, v) disruptive technologies and vi) consolidation of Portugal in Europe.

The hub's activities will contribute to APDT objectives through:

- i) its network of advanced technology laboratories in order to provide "hands-on" learning opportunities for high school students; digital skills trainings that will reskill and upskill the manufacturing workforce; immersive learning in learning factories;



- ii) its activities to support companies in raising finance and funding for digital technologies adoption and assessment of digital maturity;
- iii) adequate information and training to employees about their cybersecurity obligations and through case studies of companies that have suffered problems arising from a cybersecurity incident, which can help define better regulation;
- iv) increasing the number of companies using knowledge acquired from data/ developed and tested solutions based on large volumes of data. In this regard, PRODUTECH DIH will assume an open data policy, to contribute to this end;
- v) supporting technology-based companies to develop advanced technological solutions (e.g., AI for Production Technologies) increasing their availability in the market - in line with the Strategy for Artificial Intelligence (AI PT2030);
- vi) the sectorial pact signed between PRODUTECH cluster and the Government of Portugal, which includes, as a core element, the consolidation of PRODUTECH DIH and the intention of articulation with other national and European initiatives, as presented in this proposal.

PRODUTECH DIH will also support national and regional strategies, like **Portugal 2030 Strategy** and Portuguese recovery and resilience plan '**Recuperar - Portugal 2021-2026**' (RRP), and National and Regional Smart Specialisation (ENEI and RIS3). One of the five priority areas in the smart specialisation strategy of Portugal (ENEI and RIS3) is Industry and Production Technology that are the focus of the PRODUTECH DIH. The hub will support the growth and creation of more competitive and sustainable companies from production technologies and manufacturing industries through the provision of services on digital technologies that will involve stakeholders in testing and experimentation activities before investing. Moreover, Portugal 2030 Strategy document already provides for the continuity of this priority area translated into the Strategic Agenda for Innovation, Digitization and Qualifications as drivers of development and which encompasses the qualification of population, digital transition and science and technology; the country's reindustrialization and industrial reconversion, areas to which this hub will greatly contribute. RRP objectives respond to a set of new challenges and trends in the transformation of economies and societies, namely, the demographic challenge, inequalities, digitalization and climate change. Thus, the activities of this hub will give relevant contributions to the Investment and Innovation component and Companies 4.0 component of the RRP, by strengthening the workforce's digital skills and integrating digital technology into companies.

PRODUTECH DIH has established collaborative efforts on the regional and national level with the following Portuguese hubs: (i) DIGI4Fashion, (ii) DIH4 Global Automotive, (iii) PTCentro DIH, among others. The ongoing activities cover leveraging each other's strengths for mutual benefit, meeting the digitalization needs of the target audience and enhancing the digital transition considering competitive environment and environmental challenges.

6.9 ARTER Digital Innovation Hub

On the particular topic of AI, ART-ER DIH contributes to the establishment of an integrated Regional ecosystem of excellence and trust, with particular attention paid to the risks and ethical use of AI. ART-ER DIH is working to adopt and promote with local regional stakeholders the application of a Code of Conduct for the ethical use of technologies. This puts the aims and work programme of ART-ER DIH in accordance with the Commission's *White Paper on Artificial Intelligence*, the Coordinated Plan on Artificial Intelligence and also the seven key requirements outlined in COM (2019) 168. Particular attention will be given to make active choices to mitigate the risk of gender discrimination, especially in managing data.

ART-ER DIH is particularly focused on objective "**from research to business**" (M4C2) of the **National Recovery and Resilience Plan (NRRP)**, which aims to reinforce innovation, promote technology transfer and linkages between universities and businesses, by supporting relevant



upskilling and training for both public and private sector organisations and acting as a brokerage point and facilitator for innovation.

The vision and mission of ART-ER DIH are aligned to the *regional strategic policies* and goals of Emilia-Romagna. ART-ER has been directly involved in the definition and development of the region's new **Smart Specialisation Strategy (S3) for 2021-2027** and will play a pivotal role in its governance, supporting its implementation and the participation of stakeholders. Over the last years, the Region has implemented a series of coordinated policies and actions aiming to create a regional "*Data Valley*", linked to the innovative use of big data, its collection, storage, and processing, which are reflected in the new *Digital Agenda 2021-2025 'Data Valley as Common Asset'*.

Finally, ART-ER DIH has contributed to the update and development of a **Digital Economy and Society Index** at regional and local level for Emilia-Romagna region, as well as being part of the **Working Group for Regional DESI 2021** hosted by the *Osservatorio Agenda Digitale* of the Politecnico di Milano.

Especially significant are European-level projects in which ART-ER participates as DIH.

ART-ER DIH is a member and *regional contact point* of the **Enterprise Europe Network (EEN)**. This allows to continue and upscale its collaboration with the EEN, leveraging synergies between the DIHs network and the EEN in order to enlarge the portfolio of services provided to regional and national SMEs. In 2020 for example, ART-ER DIH collaborated with the EEN on an initiative entitled Shar-EEN—financed by the Commission in order to spur innovation in the sharing economy. Similarly, in response to the COVID-19 pandemic, ART-ER partnered with EEN for the development of the "Care & Industry together against CORONA" online platform, which enabled businesses of the healthcare sector to exchange and transfer technologies free of charge.

ART-ER extensive experience in supporting start-ups also positions the Hub perfectly for possible coordination with the Startup Europe programme. Indeed, in the last years, ART-ER has been supporting start-ups through the EmiliaRomagnaStartUp, a platform developed in collaboration with the Emilia-Romagna Region, bringing together start-ups and business support organisations to build competences in innovative entrepreneurship and provide specialised consulting, best practises, internationalisation, upscaling and support for fundraising.

All the enlisted activities are opportunities to interact with other DIHs, also AI REGIO DIHs, to develop, deploy and manage the onboarding of AI-related innovation from SMEs in manufacturing sector and in other sectors.

ART-ER DIH is also part of, or cooperating with, other European networks and associations, such as: the European Business and Innovation Centre Network (EBN), the European Regions Research and Innovation Network (ERRIN), the European Association of Development Agencies (EURADA), the Big Data Value Association (BDVA), the European Factories of the Future Research Association (EFFRA), Infrachain, Vanguard Initiative and Science|Business.

6.10 IRIS Digital Innovation Hub

AIN is a promoter member of IRIS¹¹⁰ (EDIH of Navarra – ES). ADItch¹¹¹ coordinator agent for the **Navarra R&D&I System SINAI**, and in charge of the IRIS coordination. AIN form part of the IRIS board. Since AI REGIO launching kick off meeting, IRIS was invited to participate and be involved in the main activities related to the DIH services and networking.

At regional and national level, we can summarize the following activities completion and as a preparatory work to create trust and promote joint initiatives:

¹¹⁰ <https://www.irisnavarra.com/>

¹¹¹ <https://www.aditechcorp.com/en/what-is-aditech/we-are/>



- Active involvement in the WP3.3 AI DIH COLLABORATION SCENARIOS that helps AIN to identify synergies with other DIHs, where the most important subjects was the process of working the co-creation workshop and the customer journey.
- The intensive work on the "IRIS DIH" service portfolio and what are the priority for collaboration among others, was very important special for ADItech to find out how to materialize concrete actions.
- AIN suggested some DIHs from AI REGIO network to IRIS not only from Spain but also from other EU regions.
- AIN shared the "Didactic Factories" definitions and seminars with the rest of entities in our region involved in IRIS to inspire and understand the concept.
- AIN is lead partner for the WP2 Innovation and digital transformation services for SMEs (Testing and Experimentation) within the EDIH proposal submitted the 25th of February 2022.
- AIN collaborates sharing knowledge from AI REGIO experience mainly for the services definition and, within the EDIH proposal, leveraging on some activities related to the "customer journey".
- AIN was invited from other initiatives / EU projects to work in the files of AI on manufacturing to have some collaboration space, and in this case, AIN supports IRIS (ADItech) in defining needs and requirements.
- At least 3 letters of Intents were signed, 2 of them with DIH from AI REGIO network:
 - o DIZ Digitales Innovationszentrum", Karlsruhe - Baden-Wurtemberg, Germany
 - o Smart Industry HUB South Netherland

6.11 Digital Innovation Hub at University of Maribor

Many initiatives relevant for AI REGIO are run in Slovenia.

The National Program for the Promotion of the Development and Use of AI in the Republic of Slovenia until 2025¹¹². This national program for the period 2020-2025 includes 10 strategic goals that Slovenia will achieve through measures in six areas of implementation. The measures address the entire innovation cycle, in which individual measures address issues for which various ministries are responsible. The program therefore envisages the creation of an appropriate structure for the coordination of implementation at the national level, whereby all ministries will be able to properly lead or participate in individual activities, while coherently providing adequate resources for implementation.

HPC RIVR¹¹³. Within the Operational Program 2014–2020 at the level of Priority Axis 1, which includes investments in research infrastructure, the Ministry of Science, Education and Sports co-financed the upgrade of several national research infrastructures. In this context, the **HPC RIVR project** in the amount of EUR 20 million is important in the field of AI, which co-finances the upgrade of the computing capacity of the existing HPC research infrastructure. Through the cohesion project HPC RIVR, Slovenia has joined the leading EU project in the field of computing capacity EuroHPC and the total investment in HPC capacity (Slovenian part and part of the EU) will thus amount to EUR 26.5 million.

Digital Slovenia Strategy¹¹⁴. The overarching strategy document for the development of the information society is the Digital Slovenia Strategy. The strategy envisages actions aimed at eliminating the greatest development gaps in order to accelerate the digital transformation in all areas, increase the competitiveness of the country and the ICT industry, achieve the digitalisation of

¹¹² <https://www.gov.si/assets/ministrstva/MJU/DID/NpUI-SI-2025.docx>

¹¹³ <https://www.hpc-rivr.si/news/>

¹¹⁴ <https://www.gov.si/en/topics/digitalisation-of-society/>



society, develop and build the digital infrastructure, improve cybersecurity, and promote the development of an inclusive information society.

AI4SI¹¹⁵. Slovenia is internationally recognized in the field of research and development in the field of artificial intelligence, but its introduction into the business processes of both the economy and the state administration is still not running. Due to the faster transfer of artificial intelligence into practice, the AI4SI initiative (AI for Slovenia) was established, founded by the Association for Informatics and Telecommunications at the Chamber of Commerce and Industry and the ICT Horizontal Network (SRIP PMiS) together with some important stakeholders in Slovenia.

UNESCO International Research Center on AI (IRCAI)¹¹⁶. IRCAI is a UNESCO Center in Artificial Intelligence with headquarters in Slovenia and an international team across the world. IRCAI's overall objective cover Research, Advocacy, Capacity Building and Dissemination of information about artificial intelligence and other advanced ICTs.

EDIH DIGI-SI¹¹⁷. DIGI-SI will foster the digital transformation of Small and Medium-sized Enterprises (SMEs), start-ups, scale-ups and Public Administration (PAs) in four strategic priority areas identified in the forthcoming Slovenian smart specialisation strategy (S5): Agri-food, Health, Tourism and Manufacturing. DIGI-SI has access to the crucial infrastructure and highly skilled personnel central to foster the digital revolution in both NUTS2 regions of Slovenia (SI) and in Europe (EU). The consortium consisting of seven partners with proven complementary expertise in digital transformation support, will take advantage of the existing resources and provide a single point of contact in all four priority areas of Digital Europe Programme: Artificial Intelligence (AI), High Performance Computing (HPC), Cyber Security (CybSec) and Advanced Digital Skills (ADS). DIGI-SI also offers SMEs/PAs additional technology services within Robotics, Internet of Things (IOT), Big data, Blockchain and Augmented / Virtual reality (AR/VR). DIGI-SI will deliver digital transformation services on entry, basic, and advanced levels and offer collaboration opportunities to Slovenian ICT players to become our external digital technology/service providers providing complementary services to local and EU companies through the DIGI-SI online shop enabling matchmaking in demand and supply of digital resources.

6.12 COMET Digital Innovation Hub

Cluster COMET is member of IP4FVG¹¹⁸ (Industry Platform 4 Friuli Venezia Giulia), the Regional Digital Innovation Hub which aims to create a regional ecosystem to support the digital transformation of manufacturing SMEs. The initiative, directly supported and funded by the **Regional Administration**, is led and coordinated by Area Science Park¹¹⁹, one of the most important multi-sector science parks in Italy bringing together more than 30 local partners. IP4FVG is based on a "Hub & Spoke" model, articulated around 4 territorial nodes and a Control Room/Managing Authority. The areas of specialisation related to the enabling technologies of Industry 4.0 of each Node are: 1) Advanced Manufacturing Solutions, 2) Data analytics and Artificial Intelligence; 3) Internet of Things and 4) Data Optimisation & Simulation in the Trieste Node. The operational plans of the four Nodes are structured according to specific thematic specialisations and in accordance with a common matrix of activities. Each area of activity envisages the cooperation of different partners of the Node and the involvement of specialists and contacts outside the Node where appropriate.

¹¹⁵ <https://ai4si.gzs.si/>

¹¹⁶ <https://ircai.org/>

¹¹⁷ <https://digi-si.eu/shop/>

¹¹⁸ <http://www.ip4fvg.it/>

¹¹⁹ <http://www.areasciencepark.it/>



After having been selected among the 45 shortlisted DIHs, on 22nd April 2022 IP4FVG submitted its own application to become an **European Digital Innovation Hub**. Being partner of IP4FVG first two Nodes (“Advanced Manufacturing Solutions” and “Data analytics and Artificial Intelligence”), Cluster COMET has been involved in the submission of both the national and European applications and provided its contributions to the coordinator. At both levels, a clear reference to our commitment to **AI REGIO** has been made.

As reported on its (E)DIH application, IP4FVG is represented – through COMET - in **AI REGIO** and its collaborative network of 13 regions / DIHs. Among them: **Emilia Romagna / ART-ER and Lombardy Region / AFIL**, with whom COMET has an increasingly strong partnership that goes beyond AI REGIO. With this regard, it is indeed worth saying that ART-ER and AFIL, as well as COMET for Friuli Venezia Giulia, are members of the **National Technology Cluster “Fabbrica Intelligente”** and do actively participate as regional organisations.

So far, cooperation among COMET and the other two AI REGIO partners, has been substantiated as follows:

- exchange of experiences among them and actors of their relevant manufacturing ecosystems;
- involvement of AFIL and ART-ER in the RIS3 analysis and review work led by COMET on 2020-21;
- report of regional funding opportunities; with this regard, COMET reported to AI REGIO Italian partners an open call funded by IP4FVG itself, aimed at boosting the uptake of AI and digital technologies by manufacturing SMEs.
- organisation of a joint event named “La trasformazione digitale in Lombardia e Friuli Venezia Giulia.

Besides that, the collaboration with those two AI REGIO DIHs is taking place at the **Vanguard Initiative level**, where under mandate of Region Friuli Venezia Giulia COMET participates to the “Efficient and Sustainable Manufacturing” and “Artificial Intelligence” Pilots, respectively headed by Lombardy (AFIL) and Emilia Romagna (ART-ER).

Concurrently, IP4FVG is (inter)connected with other European and transnational DIH networks, namely, among the others a) **AI DIH NETWORK** (IP4FVG has been selected in 2018 by EC as one of 30 DIHs with a tech focus on AI to participate for one year in exploring DIH2DIH cooperation model), **AI4EU** (since IP4FVG supports the use/access of AI on demand platform), **SCODIHNET**, having an active role in setting structural cooperation ties with EEN.

6.13 TECNALIA Digital Innovation Hub

The Basque Country has been very active since the first presentation of the Industry 4.0 (i4.0) and has promoted a number of actions to extend all options to the whole industrial ecosystem due to its importance on the local economy.

Firstly, through the existing R&D organisations, the diffusion of the Industry 4.0 and the use of AI have been intense. Basque DIH (BDIH) has as main objectives to provide industrial enterprises, especially SMEs, with the technological capabilities needed to meet the challenges of Industry 4.0. This technology is provided by advanced manufacturing services and knowledge, training, research, testing and validation infrastructure and facilities distributed along the research and development entities, private companies and universities (totally 30 members) with a goal of connection between AI knowledge offer and demanding companies.

In relation with i4.0, there has been working for almost **9 years the initiative Basque Industry 4.0**, which covers mainly the research, development and implementation of i4.0 technologies on industrial sectors, and helping companies to implement new concepts in products and manufacturing. At this



point they are included some areas external to AI (though closely related to them) as cloud computing, communications, robotics, machine vision, sensing, additive manufacturing, etc.

Both initiatives are closely coordinated and together push SME companies, as well as bigger ones.



7 International Cooperation via World Manufacturing Forum

The current chapter provides a wider picture of relevant initiatives, moving from the European to the International perspective. It focusses on the World Manufacturing Forum initiatives: firstly, an overview of past editions and topics discussed is provided, then the session organised by AI REGIO during the 2021 World Manufacturing Week is described.

7.1 The World Manufacturing Forum – past editions

The **World Manufacturing Forum**¹²⁰ (WMF) is an annual event where global policy experts, industrial leaders and eminent academic and research innovators address and discuss the challenges and trends in global manufacturing.

The first edition of the WMF took place in 2011 getting year by year more and more relevant in its domain, inviting a number of speakers with an extensive knowledge of the most relevant themes of the manufacturing scenario, among those international institutions, research organizations, and companies.

Forums of last three years dealt with following topics:

- The **2019 WMF – “The Role of Digitisation for an Educated, Productive and Healthy Workforce”**¹²¹ focused on skills-oriented industrial policy agendas supporting future manufacturing, providing a clear picture of the required competences and skills to guarantee competitiveness and highlighting challenges and next steps.
- The **2020 WMF – “Artificial Intelligence for the Manufacturing Renaissance”**¹²² discussed about of the strategic importance of Artificial Intelligence as a key driver of resilient economy and about the impact of AI on the manufacturing sector.
- The **2021 WMF – “Digital Technologies as Key Enabler for Circularity Perspectives on the Future of Manufacturing”**¹²³ focused on Digital Technologies and Circular Economy as emerging topics to boost Manufacturing Resilience.

The subjects discussed during the Forum are detailed also in the **World Manufacturing Reports**. The Report is a yearly document focusing on specific topics related to manufacturing with global impact, result of several researches and investigation by experts in the domain, aiming at identifying the major challenges but also providing essential recommendations for future actions.

The Reports are developed in collaboration with an international group of 50+ experts from over 20 countries.

Here below the list of last editions:

- **2018 WMF Report – Recommendations for the Future of Manufacturing**¹²⁴ is a report that aims to provide a general picture of the manufacturing domain, including numbers and trends (comparing manufacturing with other productive processes, depicting Europe in the global scenario and deepening into the different technologies and their level of adoption), but also obstacles, barriers and challenges. One of the key sections is “10 Recommendations by the WMF”, to be adopted by the manufacturing stakeholders globally, collecting the advices of high-level industrial, governmental and academic experts.

¹²⁰ <https://worldmanufacturing.org/>

¹²¹ <https://worldmanufacturing.org/activities/forum-2019/>

¹²² <https://worldmanufacturing.org/activities/forum-2020/>

¹²³ <https://worldmanufacturing.org/activities/world-manufacturing-forum-2021/>

¹²⁴ <https://worldmanufacturing.org/report/report-2018/>



- **2019 WMF Report – Skills for the Future of Manufacturing**¹²⁵ aims at exploring the skills gaps existing in the manufacturing sectors, in the perspective of a more digital and technological future. The document identifies the top ten skills to be enhanced in the manufacturing workforce, as digital literacy (#1), AI and data analytics (#2), creative problem solving (#3), etc. One of the key sections is “10 Key Recommendations”, that can be adopted by governments, educational and training providers, companies and manufacturing workers to promote a skilled and educated workforce.
- **2020 WMF Report – Manufacturing in the Age of Artificial Intelligence**¹²⁶ aims at providing a detailed picture of the use and trends of AI, highlighting the benefits deriving from its adoption, to make the European manufacturing domain more competitive in the global scenario. Together with numbers about AI adoption in manufacturing, also possible applications and skills required to handle it are highlighted, as well as ethical, legal and policy implications. One of the key sections is “Key Recommendations”, listing ten suggestions addressed to different stakeholders to guide them toward a sustainable adoption of AI in manufacturing, focusing on key topics from promoting social awareness about AI to implementing standards and regulations.
- **2021 WMF Report – Digitally Enabled Circular Manufacturing**¹²⁷ is focused on the key role played by Circular Economy on environmental sustainability, also in manufacturing domain, by analysing the drivers, opportunities and challenges in the transition to achieve it. The Report presents the numbers of circular economy, as well as the existing digital technologies for a circular manufacturing and policies and enablers to support the transition. One of the key sections is “Ten Key Recommendations by the World Manufacturing Foundation”, addressed to manufacturing stakeholders to achieve digitally enabled circular manufacturing.

Due to their relevance for the AI REGIO topics, the 2019 and 2020 WMF Reports have been taken into account by the project and analysed in detail. In particular, the 2019 WMF Report about Skills for the Future of Manufacturing is mentioned also in D8.8 – “AI REGIO Skills Catalogue and Jobs Certification program”.

¹²⁵ <https://worldmanufacturing.org/report/report-2019/>

¹²⁶ <https://worldmanufacturing.org/report/report-2020/>

¹²⁷ <https://worldmanufacturing.org/report/report-2021-digitally-enabled-circular-manufacturing/>



Figure 27 The cover pages of 2019 and 2020 WMF Report

7.2 The 2021 World Manufacturing Week

From 18th to 22nd October 2021, the World Manufacturing Forum organised the World Manufacturing Week¹²⁸, an hybrid event (to be followed both in presence and online) in Cernobbio, Como Lake, Italy. The event has been organised to complement the programme of the Forum (taking place on 20th and 21st October, 2021) providing participants with further occasions to discuss and analyse key issues affecting the manufacturing sector. It was a five-days event, presenting webinars and speeches about to different topics related to manufacturing: Industry 4.0 skills, circular economy, the role of DIHs in the digital transformation, success stories, etc. During Day 3 (20th October 2021), AI REGIO project has participated as organiser together with Smart Everything Everywhere (SAE)¹²⁹ and I4MS, to the panel “**Smart Systems and Smart Platforms transformation towards Industry 5.0: experience and lessons learned from SAE and I4MS experiments**”¹³⁰.

The objective of the event was to raise awareness about the European vision and strategy on Industry 5.0, to discuss the key role of companies and DIHs, to present new socio-technical approaches for future-proof manufacturing and to showcase best practice examples. The participants were both SAE and I4MS initiatives that, in the last years, have paved the way to foster SMEs’ and mid-caps’ transition to Industry 5.0, together with their ecosystems of Digital Innovation Hubs. Hence, the goal was twofold: on one side it aimed to present some success stories and lessons learnt; on the other side attendants have been also informed about available opportunities and get practical information on how to benefit from SAE and I4MS pan-European networks of DIHs. After a general introduction about the two initiatives (SAE and I4MS) and the presentation from the European Commission (DG CONNECT) about the Horizon Europe programme for the Future of Manufacturing, the event was structured in two different sessions:

¹²⁸ <https://worldmanufacturing.org/activities/world-manufacturing-week-2021>

¹²⁹ <https://smartanythingeverywhere.eu/>

¹³⁰ <https://worldmanufacturing.org/activities/world-manufacturing-week-2021/sae-i4ms/>



- **Panel 1 – “Roundtable on trends, solutions, good practices for SME-driven Smart Systems 5.0”**, with the participation of KITT4SME and VOJEXT from I4MS and DIGIFED and DIH4CPS from SAE;
- **Panel 2 – “Roundtable on Digital Innovation Hubs and SMEs’ take-up of Digital Manufacturing Platforms”**, with the participation of AI REGIO and DIH WORLD from I4MS and HUBCAP and BOWI from SAE, moderated by AI REGIO.

The participants of Panel 2 were: Politecnico di Milano (AI REGIO) as moderator, Gualini Lamiere (AI REGIO) as manufacturing enterprise, the Aarhus University (HUBCAP) as Competence Center, the Latvian IT DIH (BOWI) and Carsa (DIH WORLD) as DIHs both.



Figure 28 The Roundtable moderated by AI REGIO

The main topic driving the discussion was the D-BEST taxonomy for DIH’s services, defined in AI REGIO and adopted also in other projects, in order to understand the benefit deriving from its adoption, considering both the DIH’s and the end user’s perspective.

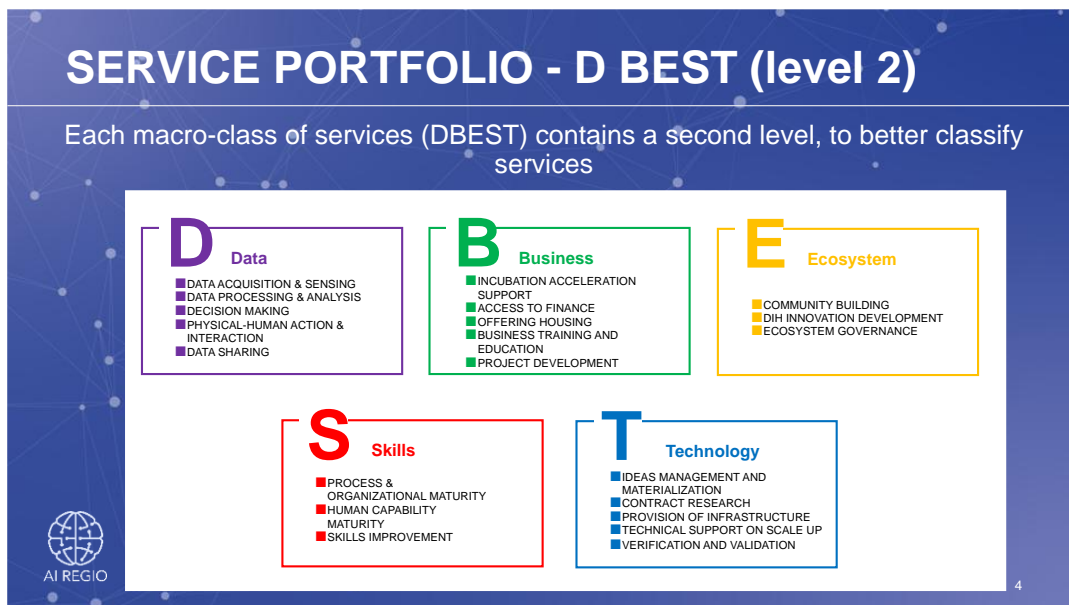


Figure 29 An extract from the AI REGIO introduction to Panel 2

To conduct the discussion, two different points of view have been adopted:

1. **Current service provision**, to provide some examples of:



- a. D-BEST services provided by DIHs, of which the manufacturing enterprise may benefit from the end user's perspective (Gualini);
 - b. D-BEST services provided and related best practices and/or success stories, from the DIH's perspective (Aarhus University);
 - c. requirements for D-BEST services that are coming from communities and ecosystems of underrepresented regions (Carsa and Latvian IT DIH);
2. **Future expected provision**, to investigate:
- a. what type of D-BEST services will be needed in the short-future, from the end user's perspective (Gualini);
 - b. which collaboration opportunities are envisaged for implementing new D-BEST services, from the service provider's perspective (Aarhus University);
 - c. which is the expected role of more mature DIHs with respect to less mature ones (Carsa and Latvian IT DIH).

COLLABORATION STREAM XII: International collaboration via the WMF. Regarding 2021 collaboration, the 2021 WMF Report was aiming at sharing circular, resilient and sustainable manufacturing expertise within its global network, at building the resilience and competitiveness of stakeholders, and at making possible a prosperous and sustainable future for all. AI REGIO will promote actions especially through its experiments and open call winners in order to support the WMF ambitions. A specific collaboration with EU-JAPAN CSA is also envisaged in the domain of DIHs for Manufacturing.



8 Conclusions and Future Outlook

Twelve Collaboration Streams (CS) have been identified in this D8.10 deliverable, as initial pathways for innovation in the Scientific and Technological domains addressed by AI REGIO. Each of them has been started in this initial period and will be further elaborated in the second half of the project, where more tangible results will be available and more collaboration opportunities could arise.

- CS13. KITT4SME, AI DIHs for Manufacturing. M18** Privileged liaisons have already started with the twin Innovation Action KITT4SME. They're concerned with all the major outcomes of AI REGIO: the 6Ps method, the METHODIH and D BEST frameworks, the DIHIWARE platform and DIH4INDUSTRY portal, the DF Network and TERESA experimentations. **M36** In next months, the current collaboration will be extended to the more technological outcomes such as the Data4AI platform, the AI4MAN Toolkit (and AI4Europe on demand platform) and the Industry 5.0 platform which is the main focus of KITT4SME.
- CS14. DT-ICT-03 Ecosystem. M18** The other DT-ICT-03 Innovation Actions do not have the AI focus, but all of them use AI in their solutions. Moreover, they are all DIHs for Manufacturing. In this period, thanks to webinars and workshops also organised by I4MS, AI REGIO had the possibility to show its main outcomes in the field of AI Digital Transformation (6Ps) and DIH analysis (METHODIH and D BEST). **M36** In next months, the current collaboration will be extended by involving the different communities of Digital Innovation Hubs for Manufacturing, to be provided with the METHODIH tools, and inviting them to create their profile of DIH4INDUSTRY platform.
- CS15. H2020 I4MS Phase IV Cluster. M18** The pan-EU dimension of collaboration between DIH for Manufacturing Innovation Actions is focussing on dissemination and preparation to exploitation actions. **M36** The collaboration will be intensified especially in the People dimension of the 6Ps framework, in the identification of new Roles and Professions and their Digital Skills and in the enrichment of a portfolio of training actions for the whole cluster. HEP I4MS2.0 projects in the three bullets of edge AI, cybersecure IoT and Human Robot Interaction will also be included.
- CS16. H2020 DT-ICT-07 Digital Manufacturing Platforms for Connected Smart Factories. M18** The four application domains of DT-ICT-07 Innovation Actions (agile value networks, zero defect manufacturing, human factors and circular economy) are very relevant opportunities for testing and experimenting AI and for materialising DIHs' services for SMEs. At the moment, collaboration is ongoing with QU4LITY, its virtual DIHs and TEF network in the domain of Zero-Defect Manufacturing (cluster 4ZDMP). **M36** In the next period we will intensify our collaboration towards the themes of Twin Transition, sustainability and circularity of Manufacturing.
- CS17. H2020 ConnectedFactories I and II CSAs. M18** AI REGIO has opened an intense collaboration channel especially along the validation of the Data Spaces and the AI for Manufacturing pathways through its 17 application experiments. Dedicated interactive workshops (MURAL) have been held to position as-is to-be experiments in the 5 levels frameworks of both pathways. **M36** In the next period, till the conclusion of CF2 in November 2022, we will intensify such a collaboration also involving the first wave of open calls winning experiments.
- CS18. H2020 ICT38 Research and Innovation Actions, AI MAN cluster. M18** The current portfolio of advanced AI applications at disposal of Manufacturing SMEs will be substantially



expanded by the nine ICT38 RIAs (e.g., explainable AI, trustworthy AI, Human-AI interaction). Currently AI REGIO is closely monitoring the developments in such projects and especially in XMANAI, COALA, TEAMING-AI and START projects. **M36** As soon as ICT38 advanced AI applications will be ready, AI REGIO will be considering their integration into the AI4MAN Toolkit and the pan-EU AI on demand platform.

- CS19. H2020 ICT-26, -48, -49 and the AI on demand Platform (AI4Europe). M18** Two levels of collaboration are considered: the AIoD experimentation platform and the Manufacturing vertical Portal (AI Assets Catalogue and Experiments). Regarding the former collaboration, AI REGIO has tested the platform with the IMECH experiment, developing AI pipelines in the online environment and then deploying the pipelines locally in proper execution environments. **M36** Regarding the AI Assets catalogue, AI REGIO will be proposing a three levels taxonomy in order to better specify the characteristics of the assets as well as an ontology-based experiments catalogue, so that it could be easier to perform search and discovery of cases and relevant technologies.
- CS20. H2020 DEIT ICT DIH Focus Area. M18** The DIH4INDUSTRY service portal is the one stop shop for the community of DIH Focus Area (01-06). The current implementation includes the insertion of DIHs, D BEST service portfolio and Experiments. **M36** Next implementations will include customer journey analysis and success stories of Digital Transformation through DIHs.
- CS21. DEP EDIH Network and AI TEF for Manufacturing. M18** AI REGIO is boosting the adoption of the DIH4INDUSTRY platform disseminating it to the DEP communities of EDIHs for Manufacturing, inviting them to create their own profile, to catalogue their services according to the DBEST framework, to present technologies, success stories, and they will have the possibility to talk and establish relationships with other DIHs (EDIH4MAN network). **M36** In the next period, when EDIHs will be selected, we will materialise their presence in the DIH4INDUSTRY portal. Moreover, closer relations will be sought with AI TEF for Manufacturing candidates (deadline of the call is May 17th) to insert them in our DF network initiative and in our DR BEST validation program.
- CS22. Manufacturing domain Partnerships and Initiatives. M18** Current collaborations are in place with the Vanguard Efficient and Sustainable Manufacturing Pilot (see 9th December 2021 agenda) and with the EFFRA innovation Portal where AI REGIO cases have been positioned and described. **M36** Further collaborations will be put in place with the VANGUARD AI Pilot, with MANUFUTURE DTI working group and with further evolutions of the HEP Made in Europe partnership. Moreover, a collaboration channel will be open with the Process Industry and the Processes4Planet Partnership.
- CS23. Data and AI Partnerships and Initiatives. M18** At the moment, the D BEST methodology has been presented to the HUBS working group in DSBA. **M36** As soon as AI REGIO Data and AI technologies achieve a certain level of maturity and TRL, they will be properly presented in the working groups of BDVA (SMI), ADRA Partnership and DSBA Alliance (HUBS).
- CS24. International collaboration via the World Manufacturing Forum and ICT38 EU-JAPAN CSA. M18** The 2021 WMF Report was aiming at sharing circular, resilient and sustainable manufacturing expertise within its global network, at building the resilience and competitiveness of stakeholders, and at making possible a prosperous and sustainable future for all. AI REGIO experiments participated in a WMF workshop on Oct 20th in Cernobbio (Gualini Lamiere case). **M36** AI REGIO will promote actions especially through its experiments and open call winners to support the WMF ambitions. A specific collaboration with EU-JAPAN CSA is also envisaged in the domain of DIHs for Manufacturing.