RE4DY

MANUFACTURING DATA NETWORKS

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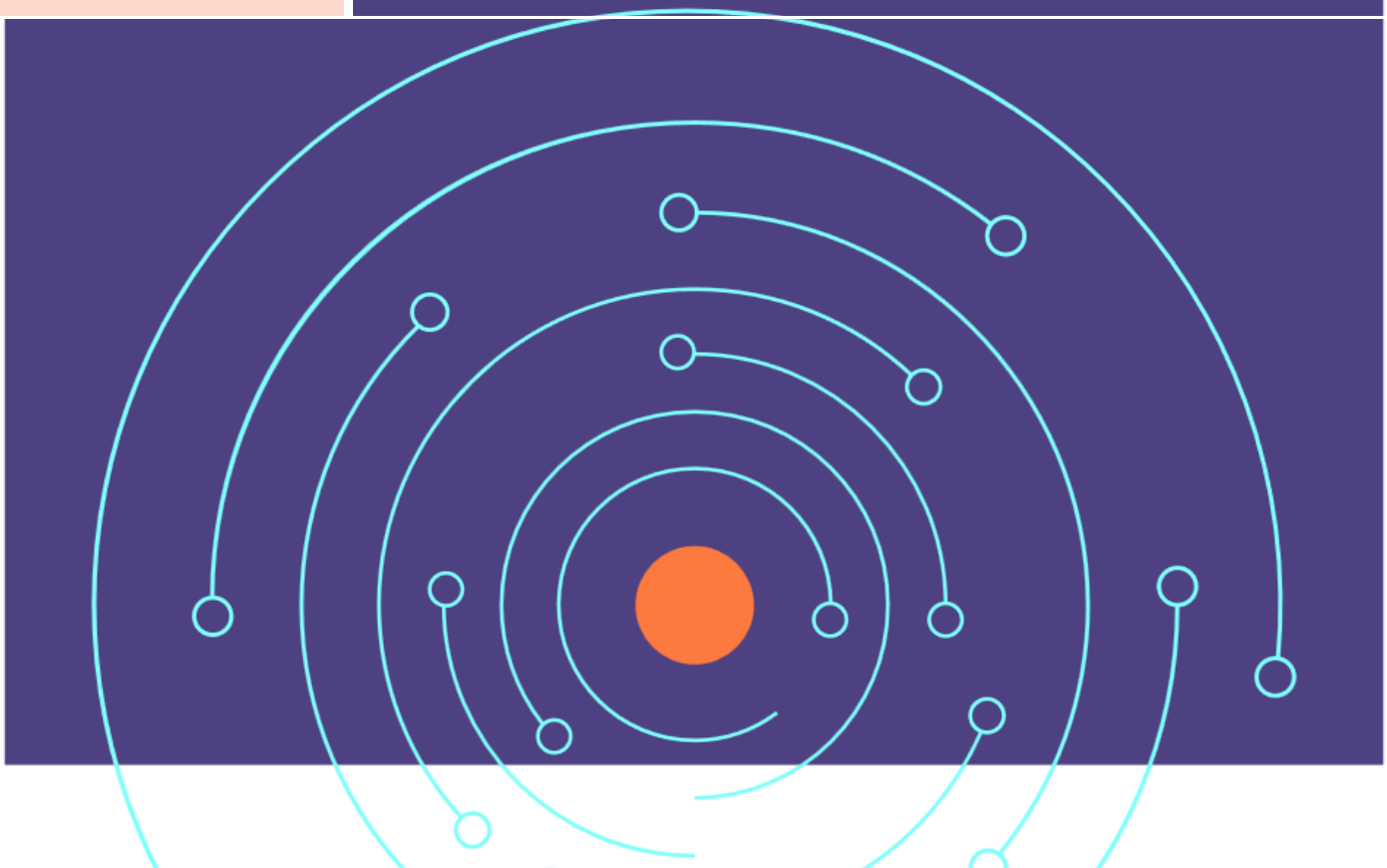

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PROJECT PARTNERS

Number	Participant organization name	Acronym
1	ASOCIACIÓN DE EMPRESAS TECNOLÓGICAS INNOVALIA INNO	INNO
2	CHALMERS TEKNISKA HOGSKOLA AB	Chalmers
3	INTERNATIONAL DATA SPACES EV	IDSA
4	VOLKSWAGEN AUTOEUROPA, LDA	VWAE
5	ASSECO CEIT AS	CEIT
6	UNINOVA-INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOSIACAO	UNI
7	FILL GESELLSCHAFT MBH	FILL
8	AVL LIST GMBH	AVL
9	VISUAL COMPONENTS OY	VIS
10	UNIVERSIDAD MIGUEL HERNANDEZ DE ELCHE	UMH
11	ATLANTIS ENGINEERING AE	ATLANTIS
12	DATAPIXEL SL	DATA
13	CORE KENTRO KAINOTOMIAS AMKE	CORE
14	UNIVERSITETE I OSLO	UiO
15	GE AVIO	AVIO
16	ENGINEERING-INGENIERIA INFORMATICA SPA	ENG
17	POLITECNICO DI MILANO	POLIMI
18	ATOS IT SOLUTIONS AND SERVICES IBERIA SL	Atos
18.1	ATOS SPAIN SA	Atos-ES
19	KATHOLIEKE UNIVERSITEIT LEUVEN	KU
20	NETCOMPANY-INTRASOFT SA	INTRA
21	NOVA ID FCT - ASSOCIACAO PARA A INOVACAO E DESENVOLVIMENTO DA FCT	NOVA
22	INDUSTRY COMMONS FOUNDATION (INSAMLINGSSTIFTELSE)	ICF
23	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH
24	GRUPO S 21SEC GESTION SA	S21SEC
25	UNIVERSITAT POLITECNICA DE VALENCIA	UPV
26	CONSIGLIO NAZIONALE DELLE RICERCHE	CNR
27	SOCIEDAD ANDALUZA PARA EL DESARROLLO DE LAS TELECOMUNICACIONES SA	SANDETEL
28	SWITZERLAND INNOVATION PARK BIEL/BIENNE AG	SSF
29	GF MACHINING SOLUTIONS AG	GFMS ADVMAN
30	FRAISA SA	Fraisa SA
31	SIEMENS SCHWEIZ AG	SIE

EXECUTIVE SUMMARY

D6.5, Exploitation and Value Network Ecosystem Development, represents the final deliverable of WP6 and an updated version of D6.4. It aims to fulfill the core objectives of RE4DY by addressing both the exploitation and business planning of project results, as well as the development of the RE4DY value network. This deliverable integrates stakeholder engagement and network considerations. It also provides an updated report on the progress of all WP6 tasks, reflecting the latest achievements and strategic directions for post-project exploitation and ecosystem development.

Section 2 focuses in the **dissemination and communication activities** executed throughout the project duration (M1-M40) encompassing a comprehensive strategy aimed at maximizing the project's visibility, impact, and uptake among diverse audiences. These activities include raising awareness about the project, promoting its results through tailored messages for different stakeholder groups such as the scientific community, industry, policymakers, and the general public, and actively engaging these audiences via multiple channels like websites, social media, events, publications, and press releases. The dissemination efforts have focused on making the technical and research results accessible and usable, while communication ensures broader public engagement by highlighting the societal and European value of the project's work. Throughout the project, these activities have been intensively managed to support knowledge exchange, foster collaborations, facilitate future exploitation, and ultimately ensure the long-term uptake and scaling of project innovations beyond the project lifecycle.

Section 3 advances the **skills development activities** initiated in Task 6.2, building on the survey-based analysis reported in D6.3 and extending it through structured interviews, tailored training recommendations, and iterative evaluation. By applying the 6Ps methodology, the project identified 13 emerging roles and their associated skill requirements across the four RE4DY pilots. A comprehensive catalogue of approximately 60 training courses was curated from leading platforms and aligned with these roles through a structured assessment framework. Feedback collected through the second iteration survey confirmed a strong overall relevance of the recommended courses, with most partners reporting moderate to high alignment between training content and skill needs. The findings demonstrate significant progress in addressing both technical and strategic gaps, supporting re- and upskilling objectives, and reinforcing the pilots' ability to integrate digital and sustainable solutions in line with Task 6.2 goals.

Section 4 delves into **RE4DY's Exploitation Strategy** aiming to to ensure its results deliver lasting commercial, societal, and policy impact beyond the project's lifetime. Out of 38 Individual Exploitable Results (IERs), protected through a balanced IPR framework combining open access and commercial protection, the consortium identified 18 Key Exploitable Results (KERs) as the project's flagship legacy. These KERs were prioritized through pilot validation, market readiness, and cross-partner synergies, and are categorized into Commercial, Research, and Industrial outcomes.

Approximately half of the KERs are market-oriented, targeting immediate uptake in areas such as predictive maintenance, defect detection, simulation, and supply chain optimization, while the remainder strengthen long-term innovation through research and industrial refinement. Pilot feedback confirmed strong relevance and adoption potential, with two partners already committed to post-project deployment.

To maximize impact, RE4DY finalized detailed business cases and business plans for the four KERs with the highest commercial potential, building on proven scalability and pilot interest. This approach balances near-term commercialization with sustained contributions to research, standardization, and industry–academia collaboration, ensuring RE4DY's results achieve broad and lasting exploitation.

Section 5 presents the development of the **RE4DY Value Network Ecosystem**, led by IDSA. Stakeholder engagement activities focused on raising awareness of RE4DY results, mobilizing SMEs, and connecting the project with relevant industrial and legal communities. Targeted campaigns, the stakeholder engagement tracker, and outreach through high-visibility events enabled the project to extend its impact beyond the consortium and even beyond the EU. These actions helped embed RE4DY's outcomes in ongoing industrial conversations and laid the groundwork for sustained collaboration after the project's conclusion.

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List of acronyms

Acronym	Description
IERs	Individual Exploitable Results
KERs	Key Exploitable Results
IPRs	Intellectual Property Rights
ROL	Results Ownership List
EDM	Electrical Discharge Machining

1. Introduction

Dissemination and communication activities executed throughout the project duration (M1-M40) have encompassed a comprehensive strategy aimed at maximizing the project's visibility, impact, and uptake among diverse audiences. These activities include raising awareness about the project, promoting its results through tailored messages for different stakeholder groups such as the scientific community, industry, policymakers, and the general public, and actively engaging these audiences via multiple channels like websites, social media, events, publications, and press releases. The dissemination efforts have focused on making the technical and research results accessible and usable, while communication ensures broader public engagement by highlighting the societal and European value of the project's work. Throughout the project, these activities have been intensively managed to support knowledge exchange, foster collaborations, facilitate future exploitation, and ultimately ensure the long-term uptake and scaling of project innovations beyond the project lifecycle.

Skills development aims to strengthen the digital and human-centric capabilities of industrial partners. Task 6.2 addresses this objective by identifying emerging roles, mapping associated competencies, and designing training pathways that close identified skill gaps. The first stage of this process, documented in Deliverable D6.3, applied the 6Ps methodology to gather survey-based insights into priority roles and skills across the four pilots. The analysis resulted in the definition of 13 new roles, including logistics, data-driven, digital twin, and circular economy-oriented positions, each requiring tailored re- and upskilling interventions.

Building on these foundations, Section 3 of the current deliverable extends the **methodology through qualitative interviews**, the curation of specialized training resources, and a structured evaluation of their effectiveness. By integrating lessons from European initiatives such as EIT Manufacturing, I4MS Training, and DIH4AI, the task ensured that the proposed courses reflect both project-specific priorities and broader EU-level competence frameworks. The iterative approach "surveys, interviews, targeted training recommendations, and follow-up evaluation", provides a robust pathway for supporting organizational transformation while addressing human factors in digital innovation.

Furthermore, the main aim of T6.3 (Impact Analysis & Commercial Exploitation) is to ensure the practical and sustainable exploitation of RE4DY results by preparing detailed exploitation plans and supporting partners in applying the project's concepts across industrial, academic, and research contexts. It focuses on demonstrating commercial viability and enabling the transfer and integration of knowledge and technology.

Focusing on the objectives of T6.3, Section 4 of this document presents a comprehensive approach to the exploitation of RE4DY's results. It focuses on the Key Exploitable Results (KERs), detailing how they can be leveraged post-project and identifying the responsible stakeholders. Reaching this stage required a structured process in which Individual Exploitable Results (IERs), IPR mechanisms, exploitation routes, and pilot feedback were carefully analyzed. This deliverable consolidates these analyses, culminating in the identification of four prioritized KERs, each supported by a detailed business case and exploitation plan, demonstrating their potential for sustainable real-world impact.

Complementing these efforts, Section 5 addresses Task 6.4 on Value Network Ecosystem development. It highlights stakeholder engagement activities carried out under the leadership of IDSA, including the design of a stakeholder engagement strategy, the use of a stakeholder tracker, and targeted outreach campaigns. These actions ensured that RE4DY's results reached a wide audience across industrial and legal domains, fostering collaboration opportunities and embedding the project within international conversations on data spaces and resilient value networks.

1.1 Purpose and Scope

Deliverable 6.5 provides a consolidated and comprehensive overview of RE4DY's Impact Analysis and Commercial Exploitation activities. It also covers the development of the project's value network, updates on Dissemination & Communication efforts, and progress on skills development. As the final version of this report, it presents the latest findings, strategic considerations, and actionable insights, reflecting the full scope of WP6 and supporting the project's long-term exploitation and market impact objectives.

1.2 Document Structure

The D6.5 is structured with the following sections:

- Section 1: Provides the deliverable's introduction, its purpose and scope and the generic structure of the document.
- Section 2: Provides the final Dissemination and Communication actions and final results along with the updated KPIs.
- Section 3: Provides the skills development update
- Section 4: Provides the final phase of the Exploitation Plan, demonstrating the final Project's IERs and KERs. There is a focus on commercial KERs that have been applied to the pilots along with their analysis (KER summary, Business case, and Business Plan).

- Section 5: Provides the latest updates on RE4DY's Value Network Ecosystem.
- Section 6: Provides the concluding remarks based on each task's provided input.
- Section 7: Includes the document's references.

2 Dissemination & Communication

RE4DY' Dissemination & Communication (D&C) Strategy addresses the full range of potential users and uses along with the related issues concerning the dissemination, exploitation and management of intellectual property rights (IPR), by proactive planning and agreements. The following sections describe in detail the communication actions and tools of the dissemination used in the RE4DY Communication strategy.

As it was mentioned in the D6.1, the **Communication objectives are**:

(i) To reach to the public and raise awareness about the projects, its expected results, outcomes and impacts within defined target groups,
(ii) to make the project a valid source of information and,
(iii) to create synergies and exchange experience with projects and groups active in the field, to join efforts and maximize common potential.

On the other hand, the **Dissemination objectives** are:

(i) to create public awareness and generate scientific interest;
(ii) to directly involve stakeholders that could help bridging the gap between RE4DY and its market application;
(iii) to maximise the impacts of the project achievements;
(iv) to diffuse acquired knowledge, methodologies and technologies developed and tested during the project, and
(v) to facilitate cooperation with other projects.

Following with the among mentioned D&C objectives, the RE4DY project has worked following an overall **project timeline** to structure the D&C Actions in four stages following the AIDA model (Awareness, Interest, Desire, Action). Below the AIDA model-based D&C Strategy can be visually viewed as of D6.2, the second version of the Skills development, knowledge transfer and communication plan deliverable:

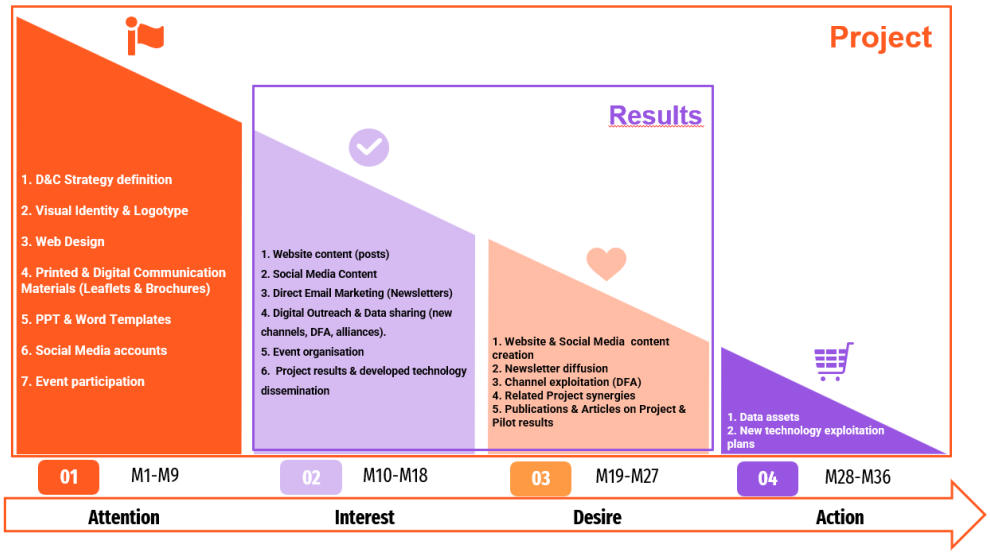


Figure 1. AIDA model-based RE4DY project D&C Strategy

Until month 24, the stages that the RE4DY project D&C strategy has followed are:

1. **Awareness / Initial Phase / M1-M9:** to build awareness for RE4DY, making the project visible and recognisable, sharing its objectives, values and technological innovation(s). Visual identity and logotype, templates website and social media accounts have been set. Channels & Tools: Website and social media.
2. **Interest / 1st Intermediate Phase / M10-M18:** the early results have been disseminated via publications and scientific papers to journals, to increase the interest to researchers and scientific communities, presenting in conferences and events. Communication actions have continued leveraging the potentials of social media, website and newsletters. Partnering with other projects is another important pursue during this phase. Channels & Tools: website, newsletters, social media, networks, publications.

By month 24-month 30, the RE4DY project was at the third D&C stage, as shown below:

3. **Desire / 2nd Intermediate Phase / M19-M27:** this phase is focusing on further engagement of the targeted audiences with the project. Dissemination of evolving results through events and publications are creating additional interest in RE4DY. Informing target markets about the technological breakthroughs and business benefits of RE4DY is also an important part of this phase that works as a preparatory stage for the final mature phase. Channels & Tools: website, newsletters, social media, networks, publications.

Finally, by month 40 of the project, the D&C strategy has reached the fourth stage, as explained below:

4. **Action / Mature-Final Phase / M28-M36:** this phase will focus on maximizing target market and industry awareness about RE4DY's exploitable results. All the results will be disseminated through the aforementioned channels. Communications and dissemination efforts will support the project's sustainability and its effective exploitation and market replication. All the efforts made in the previous phases will be leveraged in this final stage. Channels & Tools: website, newsletters, social media, events/conferences, videos, publications, articles, data

The D&C activities that correspond to the fourth and final stage of the D&C activities are detailed in this final deliverable of WP6, D6.5. For the present document, deliverable D6.5, the D&C Actions executed or planned throughout the RE4DY project have been categorized in three levels based on the channels and purpose of the D&C Action Category. Each D&C Action will outline all the dissemination and communication activities in each category from the beginning to the end of the project.

2.2 Communication actions and final results

2.2.1. Academic Publications

By the end of the RE4DY project the partners have delivered a total of 26 Academic publications as shown below:

#	Status	Type of publication	Title	Author(s)	Owner Organizations	Issue	Link	Publication date	Publisher
1	Published	Conference Paper	Anomaly Detection Through Unsupervised Federated Learning	Mirko Nardi, Lorenzo Valerio, Andrea Passarella	CNR	Conference: 2022 18th International Conference on Mobility, Sensing and Networking (MSN)	Available here	09/09/2022	Cornell University ArXiv
2	Published	Journal Paper	Envisioning maintenance 5.0: Insights from a systematic literature review of Industry 4.0 and a proposed framework	**Foivos Psarommatis**, Gökan May, Victor Azamfirei	**University of Oslo**, University of North Florida, **Politecnico di Milano**	Journal of Manufacturing Systems 68(4):376-399	Available here	01/05/2023	ELSEVIER
3	Published	Journal Paper	A Systematic Analysis for Mapping Product-Oriented and Process-Oriented Zero-Defect Manufacturing (ZDM) in the Industry 4.0 Era	**Foivos Psarommatis**, Gökan May	**University of Oslo (SIRIUS Centre)**, University of North Florida (Dept of Mechanical Englineering)	Sustainability 2023, 15, 12251	Not available	10/08/2023	MDPI Sustainability Journal
4	Published	Book Chapter / Conference Paper	A readiness level assessment framework for Zero Defect Manufacturing (ZDM)	**Foivos Psarommatis,** Gokan May, Victor Azamfirei,	**University of Oslo (SIRIUS Centre),** University of	FAIM 2023. International Conference on Flexible	Available here	25/08/2023	Cham: Springer Nature Switzerland

				Maria Chiara Magnanini, Daryl Powell	North Florida (Dept. of Mechanical Engineering), Malardalen University (School of Innovation), **Politecnico di Milano,** SINTEF Manufacturing AS	Automation and Intelligent Manufacturing (pp. 451-459) Part of the Lecture Notes in Mechanical Engineering book series (LNME)			
5	Published	White Paper	White Paper on the Definition of Data Intermediation Services	**Tervel Bobev,** Vilte Kristina Dessers, Charlotte Ducuing, Michiel Fierens, Andrea Palumbo, Bert Peeters, Leander Stähler	**KU Leuven**	CiTiP Working Paper Series	Available here	31/10/2023	SSRN
6	Published	Conference Paper	Modelling risk prioritization of a manufacturing supply chain using discrete event simulation	Chari, A., Marti, S., Lopes, P. V., Johansson, B. Despeisse, M., and Stahre, J.	CHALMERS	Winter Simulation conference, Texas, USA, 2023	Available here	31/01/2024	IEEE Press
7	Published	Journal Paper	Ecosystem Integration: the use of ontologies in integrating knowledge accross manufacturing value networks	**Michela Maga**s, Dimitris Kiritsis, María Poveda-Villalón, Lan Yang4 Sten-Erik Björling, Andreas Rudenå	ICF, UIO	Front. Manuf. Technol. Sec. Digital Manufacturing. Volume 4 - 2024	Available here	21/03/2024	Frontiers
8	Published	Conference Paper	5G UE and Network Asset Administration Shells for the Integration of 5G and Industry 4.0 Systems	J. Gómez-Jerez, J. Cañete-Martín, **M.C. Lucas-Estañ, J. Gozalve**z	Uwicore Laboratory, **Universidad Miguel Hernández de Elche, Visual Component**s	Proc. of 2024 IEEE International Conference on Emerging Technologies and Factory	Available here	01/09/2024	IEEE

						Automation (IEEE ETFA 2024)			
9	Published	Conference Paper	Integration of 5G and Industrial Digital Models: A Case Study with AGVs	J. Cañete-Martín, J. Gómez-Jerez, **M.C. Lucas-Estañ, J. Gozalvez**	Uwicore Laboratory, **Universidad Miguel Hernández de Elche, Visual Component**s	Proceedings of 2024 IEEE International Conference on Emerging Technologies and Factory Automation (IEEE ETFA 2024)	Available here	01/09/2024	IEEE
10	Published	Conference Paper	Characterising the relationship between environmental sustainability and resilience in manufacturing	**Arpita Chari,** Mélanie Despeisse, Björn Johansson, Maria Holgado, Johan Stahre	CHALMERS	Advanced Production and Manufacturing Systems (APMS) conference, Chemnitz, Germany	Available here	07/09/2024	Springer
11	Published	Journal Paper	Zero Defect Manufacturing: A complete guide for advanced and sustainable quality management	**Foivos Psarommatis,** Victor Azamfirei	University of Oslo (SIRIUS Centre), Zerofect GmbH, Albisblick 49, Allenwiden, Switzerland c Department of Economics, Management, Industrial Engineering and Tourism (DEGEIT), University of Aveiro, Portugal	Journal of Manufacturing Systems 77 (2024) 764–779	Available here	23/10/2024	ELSEVIER
12	Published	MSc Thesis	Leveraging standard manufacturing resource representations in production simulation software: Concept, potential applications	Kusti Hämäläinen	VIS	Aalto Univeristy	Available here	18/11/2024	Aalto Univeristy

			and prototypical use cases						
13	Published	Book Chapter	Secure, Trusted, Privacy-Protected Data Exchange in an Edge-Cloud Continuum Environment	Salvador Cuñat Negueroles, Matilde Julian, Andreu Belsa, Clara I. Valero, Manuel Esteve and Carlos E. Palau	UPV	Book Name "IoT Edge Intelligence"	Available here	10/12/2024	Springer
14	Published	Journal Paper	Resilience Compass Navigation through Manufacturing Organization Uncertainty - a Dynamic Capabilities Approach using Mixed Methods	**Arpita Chari,** Mélanie Despeisse, Björn Johansson, Jon Bokrantz, Sandra Morioka, Claudia Gohr, Johan Stahre	CHALMERS	CIRP Journal of Manufacturing Science and Technology, 2024 55, 375-389	Available here	10/12/2024	ELSEVIER
15	Submitted	Conference Paper	Connected Logistics Design & Planning – A RE4DY approach	Luis Lourenço, Ruben Costa, Paulo Figueiras, Diogo Graça, Michela Magas, Foivos Psarommatis, Sacha Yortholt, Ricardo Jardim-Gonçalves	UNINOVA, UIO, ICF	ICE IEEE 2024 - International Conference on Engineering, Technology	Available here	18/12/2024	IEEE Press
16	Published	Conference Paper	Evaluation of the Digital Product Passport for Remanufacturing: A Case Study Using Asset Administration Shell	Tasnim A. Abdel-Aty, Bilal Doliman, Elisa Negri, Sam Brooks, Duncan McFarlane, Marco Macchi	POLIMI	11th IFAC Conference on Manufacturing Modelling, Management and Control – IFAC MIM2025	Available here	10/01/2025	Elsevier
17	Published	Conference Paper	Synthetic Simulated Environment for Discrete Manufacturing Systems: A Demonstrator through	Silvan Marti, Paulo Victor Lopez, Elham Rekabi Bana,	CHALMERS	WSC '24: Proceedings of the Winter Simulation	Available here	05/02/2025	IEEE Press

			a Computational Modeling Approach	Mélanie Déspeisse, Johan Stahre, Björn Johansson		Conference, Orlando, USA			
18	Published	Conference Paper	Data-as-a-Product to enable data-driven value networks in Industries 4.0 & 5.0: The Swiss Smart Factory experiment	**Alexandros Nizamis, Matilde Julian, Clara I. Valero, Magda Foti, Ioanna Drigkopoulou, Miguel Ángel Esbrí, Ruben Costa, Alexandre Yortholt**, Dimosthenis Ioannidis, Panagiotis Gkonis, Panagiotis Trakadas, Dimitrios Tzovaras, **Carlos E. Palau**	National and Kapodistrian University of Athens (NKUA), **Center for Research and Technology Hellas (CERTH), Universitat Politècnica de València (UPV), Netcompany-Intrasoft S.A, Eviden, CTS-UNINOVA and School of Science and Technology, NOVA University of Lisbon, Switzerland Innovation Park Biel/Bienne Ltd**	The 8th International Conference on Emerging Data and Industry (EDI40) - 2025	Available here	25/04/2025	ELSEVIER
19	Published	Journal Paper	The manufacturing resilience dashboard – compass and radar navigation through uncertainty	Arpita Chari, Johan Stahre, Mélanie Despeisse, Björn Johansson	CHALMERS	Manufacturing Letters 45 (2025) 84–87	Available here	05/08/2025	ELSEVIER
20	Submitted	Conference Paper	Real-Time Environmental Monitoring in Smart Buildings Using Federated Learning	Pedro Ventura, Mohammad Khodamoradi, Ruben Costa, Paulo Figueiras, Ricardo Jardim-Gonçalves	UNINOVA	iSCSi – International Conference on Industry Science and Computer	Available here	13/08/2025	Elsevier

						Sciences Innovation 2024			
21	Published	Book Chapter / Conference Paper	Human factors in the design of advanced quality inspection systems in the era of Zero-Defect Manufacturing	Victor Azamfirei, **Foivos Psarommatis**, Yvonne Lagrosen	Mälardalen University (School of Innovation), **University of Oslo (SIRIUS Centre)**	FAIM 2023. International Conference on Flexible Automation and Intelligent Manufacturing (pp. 797-804). Part of the Lecture Notes in Mechanical Engineering book series (LNME)	Available here	25/08/2025	Cham: Springer Nature Switzerland
22	Published	Book Chapter / Conference Paper	Reference Architecture to Exploit Data as a Product through the Cloud-Edge Continuum	Nima Rahmani Choubeh, Walter Quadrini, Danish Abbas Syed, Riccardo Zanetti, Angelo Marguglio, and Luca Fumagalli	POLIMI, ENG	6th International Scientific Conference "Digital Transformation in Industry: Trends, Management, Strategies" (DTI2024)	Available here	01/10/2025	Springer
23	Submitted	MSc Thesis	Impact of ontologies and data structures for applying LLMs in Manufacturing Simulation Software	Milan Gautam	VIS	Aalto Univeristy	NA	01/12/2025	Aalto Univeristy
24	Submitted	Bulletin	Open innovation in the Industry Commons	Michela Magas, Ivo Emanuilov	ICF	European IP Helpdesk - Open Innovation Bulletin No. 7	NA	NA	NA
25	Submitted	Conference Paper	Distributed and trusted access to data spaces'	**Matilde Julian, Miguel Ángel Esbrí, Ignacio**	**Universitat Politècnica de València (UPV),**	Global IoT and Edge Computing	TBD	TBD	Springer

			products employing Sovity and Data Fabric	**Lacalle**, Lucía Cabanillas, **Rafael Vaño, Carlos E. Palau**	**EVIDEN**, Telefónica I+D	Summit (GIECS) 2025			
26	Submitted	Conference Paper	Resilient Smart Connected Factory 4.0 Process Engineering – A RE4DY use-case approach	Luis Lourenço, Ruben Costa, Paulo Figueiras, Diogo Graça, Oscar Lazaro and Ricardo Gonçalves	UNINOVA, INNOVALIA	I-ESA 2024 - International Conference on Interoperability for Enterprise Systems and Applications	Available here	TBD	TBD

Table 1. RE4DY Academic Publications (M40)

2.2.2. Events

By the end of the RE4DY project the partners have organized, attended as speakers or attended as participants in a **total number of 117 events** as shown below: 44 Industry Events, 23 EU Networking Events, and 44 Conferences & Academic Events.

#	Type of event	Name of the Event	Date and duration	City/Country	Links	Attending Partners
1	Conference	IOT Solutions World Congress	2023/01/31 - 2023/02/02 (3 days)	Barcelona, Spain	https://www.iotsworldcongress.com/	INNO: Óscar Lázaro
2	Industry Events / Exhibitions / Fairs / Trade Shows	Mobile World Congress Barcelona	2023/02/27 - 2023/03/02 (4 days)	Barcelona, Spain	https://www.mwcbarcelona.com/	INNO: Óscar Lázaro
3	Industry Events / Exhibitions / Fairs / Trade Shows	European Robitcs Forum 2023	2023/03/14-16	Odense, Denmark	https://eu-robotics.net/erf2023/	VIS
4	Industry Events / Exhibitions / Fairs / Trade Shows	Visual Components Partners Days 2023	2023/03/21-23	Helsinki, Finland		VIS
5	Conference	Data Spaces Symposium	2023/03/21-23 (3 days)	The Hague, Netherlands	https://data-spaces-symposium.eu/	INNO: Óscar Lázaro POLIMI: Sergio Gusmeroli IDSA:

						Carlos González, Antoine Garnier
6	Industry Events / Exhibitions / Fairs / Trade Shows	Hannover Messe	2023/04/17-21 (5 days)	Hannover, Germany	https://www.hannovermesse.de/de/hannover-messe-2023/	INNO: Óscar Lázaro IDSA: Carlos González
7	Conference	METROMEET 2023	2023/04/19-20 (2 days)	Bilbao, Spain	https://metromeet.org/	INNO: Oscar Lázaro, Jesús Alonso DATAPIXEL: Borja de la Maza, Alicia González
8	Conference	Digital Manufacturing Industrial Summit	2023/04/25-27 (3 days)	Valencia Spain	https://dmis.zdmp.grisenergia.pt/	UiO: Foivos Psoramm atis; INNO: Lucía Castiñeira
9	Conference	Technarte	2023/05/19 (1 day)	Bilbao, Spain	https://technarte.org/es/	INNO: Oscar Lázaro

10	Industry Events / Exhibitions / Fairs / Trade Shows	FIWARE Global Summit	2023/06/12-13 (2 days)	Vienna, Austria	https://www.fiware.org/2023/06/19/15-memorable-takeaways-from-the-fiware-global-summit-2023/	INNO: Oscar Lazaro
11	Conference	Baidata Forum 2023: Data Meets Business	2023/06/14 (1 day)	Bilbao, Spain	https://internationaldataspaces.org/events/baidata-forum-2023/	INNO: Óscar Lázaro, Jesús Alonso IDSA: Thorsten Hülsmann
12	Conference	FAIM2023 (Flexible Automation and Intelligent Manufacturing International Conference)	2023/06/18-22 (5 days)	Porto, Portugal	https://www.faimconference.org/	UiO: Foivos Psoramm atis
13	Industry Events / Exhibitions / Fairs / Trade Shows	Automatica 2023	2023/06/27-30	Munich, Germany	https://www.visualcomponents.com/events/meet-us-at-automatica-2023/	VIS
14	Industry Events / Exhibitions / Fairs / Trade Shows	Smart Factory Expo 2023	2023/06/7-8	Birmingham, UK	https://www.visualcomponents.com/events/smart-factory-expo-2/	VIS
15	Industry Events / Exhibitions / Fairs / Trade Shows	Schweissen & Scheneiden 2023	2023/09/11-15	Essen, Germany	https://www.visualcomponents.com/events/schweissen-schneiden-2023/	VIS

16	Conference	APMS 2023 (Advances in Production Managment Systems)	2023/09/18-21 (4 days)	Trondheim, Norway	https://www.apms-conference.org/	UiO: Foivos Psoramm atis
17	Industry Events / Exhibitions / Fairs / Trade Shows	EMO	2023/09/18-23	Hannover, Germany	https://www.visualcomponents.com/events/emo-hannover-2023/	VIS
18	Conference	Data Sharing in Europe: DA / DGA	2023/09/19 (1 day)	Paris-Dauphine, France	https://www.fondation-dauphine.fr/agenda/2023/06/data-sharing-europe-dga-and-da-legal-consensus-achievement-implementation	INNO: Óscar Lázaro
19	EU Networking Event	EOSC Symposium 2023	2023/09/20-22 (3 days)	Madrid, Spain	https://symposium23.eoscfuture.eu/	INNO: Óscar Lázaro
20	EU Networking Event	EFFRA Manufacturing Partnership Day	2023/09/25-26 (2 days)	Brussels, Belgium	https://effra.glueup.com/event/the-manufacturing-partnership-day-76855/	INNO, IDSA
21	Conference	EU Industry Days	2023/10/04-06 (3 days)	Málaga, Spain	https://eu-industry-days.ec.europa.eu/index_en	INNO: Oscar Lazaro
22	EU Networking Event	IDSA Ecosystem Building Calls	2023/10/09 (1 day)	Online	Not available	IDSA, INNO
23	EU Networking Event	2023 Discovery Day Naples	2023/10/17	Naples, Italy	https://internationaldataspaces.org/data-spaces-discovery-day-naples/	INNO, MADE
24	Conference	QA Test	2023/10/18-20 (3 days)	Bilbao, Spain	https://embedded.qatest.org/	INNO, DATA
25	Conference	Data Spaces Discovery Day in Vienna	2023/10/19 (1 day)	Vienna, Austria	https://internationaldataspaces.org/fairs-events/	IDSA

26	Conference	CIRP CMS2023 (CIRP International Conference on Manufacturing Systems)	2023/10/24-26 (3 days)	Cape Town, South Africa	https://cirp-cms2023.org/	UiO: Foivos Psoramm atis
27	Industry Events / Exhibitions / Fairs / Trade Shows	European Big Data Value Forum (EBDVF)	2023/10/25-27 (3 days)	Prague, Czech Republic	https://european-big-data-value-forum.eu/	INNO
28	RE4DY-organized Demonstration	RE4DY TO TALK about Legal Taxonomies & Ontologies	2023/10/31 (1 day)	Online	https://digitalfactoryalliance.eu/event/re4dy-to-talk-industry-challenges-in-intellectual-property-ontologies-taxonomies/	INNO, KU LEUVEN, ICF
29	Conference	Data Spaces Discovery Days in Napoli	2023/10/5-6/(2 days)	Naples, Italy	https://internationaldataspaces.org/fairs-events/	IDSA, ENG, POLIMI
30	EU Networking Event	2023 SM4RTENANCE Launch event - Kick off Meeting	2023/11/06	Boroa, Spain	https://digitalfactoryalliance.eu/event/sm4rtenance-eu-project-launch/	INNO, ALL
31	Industry Events / Exhibitions / Fairs / Trade Shows	16th Maintenance Forum	2023/11/08-09 (2 days)	Athens, Greece	Sharing with you some photos of the presentation during the event and the link of the event.	ATLANTIS ENGINEE RING
32	Conference	Smart Machining Event 2023	2023/11/2022	Bellach, Switzerland	MC Event 2023 | JANUS Engineering Schweiz (janus-engineering.com)	GF, Fraisa, Siemens
33	Conference	ISM2023 (International Conference on	2023/11/22-24 (3 days)	Valencia Spain	https://www.msc-les.org/ism2023/	UiO: Foivos

		Industry 4.0 and Smart Manufacturing)				Psoramm atis
34	Industry Events / Exhibitions / Fairs / Trade Shows	Industry Tec	2023/11/24-26 (3 days)	Peania, Greece	https://industry-tec.gr/en/	ATLANTIS ENGINEE RING
35	EU Networking Event	2023 International Manufacturing-X Council	2023/12/01	ONLINE	Not available	INNO
36	RE4DY-organized Events	Digital Product Passports and Data Spaces Workshop	2023/12/01 (1 day)	Online	https://digitalfactoryalliance.eu/event/how-to-drive-business-value-with-digital-product-passports-data-spaces/	INNO: Jesus Alonso, IDSA: Ilknur
37	RE4DY-organized Events	Transforming Manufacturing Together – Worker-Centric I4.0 Solutions	2023/12/05 (1 day)	Online	https://digitalfactoryalliance.eu/event/transforming-manufacturing-together-worker-centric-i4-0-solutions/	INNO: Katia Lavin
38	Conference	Robot Revolution & Industrial IoT Initiative RE4DY Project display Conference	2023/12/07 (1 day)	Online / Japan	https://www.jmfrri.gr.jp/english/	INNO: Jesus Alonso
39	Industry Events / Exhibitions / Fairs / Trade Shows	World Manufacturing Forum (WMF) 2024	2024/01/27-28	Milano, Italy	Available here	INNO
40	Conference	Data Space 4.0 Final Event	2024/01/31 (1 day)	Brussels, Belgium	https://manufacturingdataspace-csa.eu/dataspace-4-0-final-event/	INNO, UIO, ENG,

						POLIMI, SIE
41	EU Networking Event	2024 International Manufacturing-X Council February	2024/02/15-16	Paris, France	Not available	INNO
42	EU Networking Event	2024 Global Data Space Round Table	2024/02/26	ONLINE	Available here	INNO
43	EU Networking Event	2024 DSSC Symposium	2024/03/12-14	Darmstadtium, Germany	Available here	INNO, DSSC, VDMA
44	Industry Events / Exhibitions / Fairs / Trade Shows	Technishow 2024	2024/03/12-15	Utrech, Netherlands	https://www.visualcomponents.com/events/technishow-2024/	VIS
45	Industry Events / Exhibitions / Fairs / Trade Shows	European Robitcs Forum 2024	2024/03/13-15	Rimini Palacongressi, Italy	https://www.visualcomponents.com/events/erf-european-robotics-forum/	VIS
46	Industry Events / Exhibitions / Fairs / Trade Shows	R-24	2024/03/13-15	Odense, Denmark	https://www.visualcomponents.com/events/r24/	VIS
47	Industry Events / Exhibitions / Fairs / Trade Shows	Advanced Factory Congress - Barcelona	2024/04/09-11	Barcelona, Spain	Available here	INNO
48	Conference	METROMEET 2024	2024/04/10-12 (3 days)	Bilbao, Spain	https://metromeet.org/	INNO, UiO

49	Industry Events / Exhibitions / Fairs / Trade Shows	Hannover Messe 2024	2024/04/22-26	Hannover, Germany	Available here	FF, VDI, BPI, IDSA, INNO, VDMA, SOVITY
50	Conference	11th Technology Forum	2024/04/25 (1 day)	Thessaloniki, Greece	https://technology-forum.eu/	ATLANTIS ENGINEERING SA
51	EU Networking Event	20234 IDSA Ecosystem Building Calls	2024/05	ONLINE	Available here	IDSA, INNO, SOVITY
52	EU Networking Event	2024 BAIDATA FORUM III	2024/05/08	Bilbao, Spain	Available here	INNO, FF
53	Conference	Baidata Forum 2024: WHERE DATA ECONOMY HAPPENS	2024/05/08 (1 day)	Bilbao, Spain		INNO, IDSA,
54	Industry Events / Exhibitions / Fairs / Trade Shows	Elmia 2024	2024/05/14-17	Jököping, Sweden	https://www.visualcomponents.com/events/elmia/	VIS
55	EU Networking Event	2024 Welcome Italians	2024/05/20	Italy	Not available	INNO
56	EU Networking Event	2024 DATASPACE 4.0 Final Event	2024/05/30-31	Brussels, Belgium	Available here	INNO, FF, MADE
57	Conference	LAILEC 2024 – Beyond the Rules: Regulatory Frontiers of AI and Data	2024/06/06-07 (2 days)	Leuven, Belgium		KUL, ICF
58	EU Networking Event	2024 5th INTERNATIONAL SMART FACTORY SUMMIT - SSF	2024/06/12-14	Biel/Bienne, Suiza	Available here	INNO

59	Conference	Data Space Workshop	2024/06/13	Bergamo, Italy	Not available	IMECH, INNO;, MADE
60	Conference	Madeira Digital Transformation Week 2024	2024/06/20-28 (8 days)	Madeira Island, Portugal	https://mdtweek.digit-madeira.pt/	UNINOVA
61	Conference	Digital Transformation Summit 2024	2024/06/24-28 (8 days)	Madeira Island, Portugal	https://mdtweek.digit-madeira.pt/summit/	UNINOVA
62	Industry Events / Exhibitions / Fairs / Trade Shows	Smart Factory Expo 2024	2024/06/5-6	Birmingham, UK	https://www.visualcomponents.com/events/smart-factory-expo-3/	VIS
63	EU Networking Event	2024 High level roundtable with the European Commission on Media and AI	2024/09/01	Venice, Italy	Not available	INNO
64	EU Networking Event	2024 IDSA Data Space Protocol	2024/09/09	Brussels, Belgium	Available here	INNO
65	EU Networking Event	2024 International Manufacturing-X Council 2024 September / Technology Talks Vienna - Session on Manufacturing-X	2024/09/12-13	Vienna, Austria	Available here	INNO, PIA, INNO, AVL
66	Industry Events / Exhibitions / Fairs / Trade Shows	AMB 2024	2024/09/14	Stuttgart, Germany	https://www.visualcomponents.com/events/amb-2024/	VIS

67	Industry Events / Exhibitions / Fairs / Trade Shows	Interoperability Summit 2024 / VDMA - IO Summit	2024/09/16	Frankfurt, Germany	Available here	VDMA, INNO
68	Conference	Euromaintenance 2024	2024/09/16-17	Rimini Palacongressi, Italy	https://www.euromaintenance24.com/	ATLANTIS ENGINEERING SA
69	Conference	1st Deep Dive	2024/09/17	ONLINE	Available here	INNO, ITEMA, IMECH, OTE, BEMAS
70	EU Networking Event	2024 European Manufacturing Conference	2024/09/24-25	Schaerbeek, Belgium	Available here	INNO
71	RE4DY-organized Demonstration	RE4DY TO TALK about Resiliency Framework	2024/09/26	Online	https://digitalfactoryalliance.eu/event/re4dy-to-talk-about-resilient-manufacturing/	INNO, CHALMERS
72	Conference	2nd Deep Dive	2024/10/01	ONLINE	Available here	INNO, FILL, OTE, BEMAS
73	EU Networking Event	2024 EBDVF	2024/10/02-04	Budapest, Hungary	Available here	ENG, INNO
74	Industry Events / Exhibitions / Fairs / Trade Shows	World Manufacturing Forum 2024	2024/10/14-15	Milano, Italy	Available here	INNO
75	Conference	3rd Deep Dive	2024/10/22	ONLINE	Available here	INNO, TRIMEK
76	Conference	Eclipse Foundation	2024/10/22-24 (3 days)	Mainz, Germany	https://www.ocxconf.org/event/778b82cc-6834-48a4-a58e-f883c5a7b8c9/summary	CERTH

		Conference - OCX 2024 ESAAM 2024				
77	Industry Events / Exhibitions / Fairs / Trade Shows	Visual Components Partners days 2024	2024/10/29-30	Helsinki, Finland		VIS
78	Industry Events / Exhibitions / Fairs / Trade Shows	Motek 2024	2024/10/8-11	Stuttgart, Germany	https://www.visualcomponents.com/events/motek-2024/	VIS
79	Industry Events / Exhibitions / Fairs / Trade Shows	17th Maintenance Forum	2024/10/9-10	Athens, Greece	https://www.eventora.com/en/Events/maintenance-forum-2024 (https://maintenance-forum.boussiasevents.gr/)	ATLANTIS ENGINEERING SA
80	Industry Events / Exhibitions / Fairs / Trade Shows	BIMU exhibition	2024/10/9-12	Milan, Italy	https://www.bimu.it/en/	ATLANTIS ENGINEERING SA
81	Conference	4th Deep Dive	2024/11/19	ONLINE	Available here	INNO, COMAU
82	Industry Events / Exhibitions / Fairs / Trade Shows	EDIH Networks Annual Summit 2024	2024/11/26-27	Brussels, Belgium	Available here	INNO, MADE
83	EU Networking Event	2024 BDVA Data Week	2024/12/10	Luxembourg, Luxembourg	Available here	INNO
84	Conference	5th Deep Dive	2024/12/10	ONLINE	Available here	INNO, AVL

85	Conference	Winter Simulation Conference - WSC 2024	2024/12/13-15 (3 days)	Orlando, USA	https://meetings.informs.org/wordpress/wsc2024/	CHALMERS
86	Industry Events / Exhibitions / Fairs / Trade Shows	CORE Innovation Days	2025/01/14	Athens, Greece	https://www.core-innovation.com/blog-posts/cid-2025	CORE IC
87	EU Networking Event	2025 CORE Innovation Days	2025/01/15-16	Athens, Greece	Available here	INNO, CORE
88	RE4DY-organized Events	EUDDIC Cluster: Data-driven Distributed Industrial Response to Industry 4.0 Challenges	2025/01/29 (1 day)	Online	https://digitalfactoryalliance.eu/event/euddic-cluster-data-driven-distributed-industrial-response-to-industry-4-0-challenges/	INNO, IDSA,
89	Conference	6th Deep Dive	2025/02/04	ONLINE	Available here	INNO, PIACENZA
90	Conference	7th Deep Dive	2025/02/18	ONLINE	Available here	INNO, PRIMA
91	Conference	Next Steps for Manufacturing Resilience – From Insight to Action!	2025/03/04	Online		CHALMERS
92	Industry Events / Exhibitions / Fairs / Trade Shows	Global Industrie 2025	2025/03/11-14	Lyon, France	https://www.visualcomponents.com/events/global-industrie-2025/	VIS
93	Industry Events / Exhibitions /	Global Industrie Lyon 2025	2025/03/11-14	Lyon, France	Available here	TRIMEK, DATAPIXEL, INNO

	Fairs / Trade Shows					METROLOGY
94	Conference	8th Deep Dive	2025/03/18	ONLINE	Available here	INNO, FIDIA, DGS
95	Industry Events / Exhibitions / Fairs / Trade Shows	8ra Cloud-Edge Continuum General Assembly	2025/03/21-28	Gdansk, Poland	Available here	INNO
96	RE4DY-organized Events	Data, AI and Digital Twin Convergence for Efficient and Sustainable Manufacturing	2025/03/24	Brussels, Belgium	https://www.effra.eu/events/data-ai-and-digital-twin-convergence-for-efficient-and-sustainable-manufacturing/	INNO, ENG, KUL, ICF, CHAMERS, POLIMI, GF, AVIO AERO, FILL
97	EU Networking Event	2025 EFFRA General Assembly - Manufacturing Partnership Days	2025/03/25	Brussels, Belgium	Available here	INNO, MADE
98	Industry Events / Exhibitions / Fairs / Trade Shows	European Robotics Forum 2025	2025/03/25-27	Stuttgart, Germany	https://www.visualcomponents.com/events/erf-2025/	VIS
99	Industry Events / Exhibitions / Fairs / Trade Shows	Hannover Messe 2025	2025/03/31 - 2025/04/04	Hannover, Germany	Available here	INNO, DATA, VDMA (umati), FH

100	Industry Events / Exhibitions / Fairs / Trade Shows	Beyond Expo	2025/04/06	Athens, Greece	https://www.core-innovation.com/blog-posts/2025-beyond-expo	CORE IC
101	Conference	9th Deep Dive	2025/04/08	ONLINE	Available here	INNO, IJSSEL
102	Conference	1st SM4RT-PIN Deep Dive	2025/04/29	ONLINE	Available here	INNO, UNDERPIN
103	Industry Events / Exhibitions / Fairs / Trade Shows	Control Fair Stuttgart	2025/05/06-09	Stuttgart, Germany	Available here	INNO METROLOGY
104	Industry Events / Exhibitions / Fairs / Trade Shows	SPS Italia 2025	2025/05/12-13	Parma, Italy	Available here	EIT Manu, INNO, TXT, DGS, FIDIA, PRIMA
105	Conference	2nd SM4RT-PIN Deep Dive	2025/05/13	ONLINE	Available here	INNO, UNDERPIN
106	Conference	3rd SM4RT-PIN Deep Dive	2025/05/27	ONLINE	Available here	INNO, UNDERPIN
107	Conference	4th SM4RT-PIN Deep Dive	2025/06/10	ONLINE	Available here	INNO, UNDERPIN
108	Industry Events / Exhibitions / Fairs / Trade Shows	Visual Components Partners days	2025/06/23-24	Augsburg, Germany		VIS

109	Industry Events / Exhibitions / Fairs / Trade Shows	Automatica 2025	2025/06/24-27	Munich, Germany	https://www.visualcomponents.com/events/automatica-2025/	VIS
110	EU Networking Event	2025 BAIDATA Forum IV	2025/06/26	Bilbao, Spain	Available here	INNO, INNO METROLOGY, IDSA
111	Conference	CISERO webinar "From Infrastructure to Data: Exploring Interoperability Across Architectural Layers in European Cloud Initiatives"	2025/09/03	Online	Available here	INNO, OTE
112	Industry Events / Exhibitions / Fairs / Trade Shows	Schweissen & Scheneiden 2025	2025/09/15-19	Essen, Germany	https://www.visualcomponents.com/events/schweissen-und-schneiden/	VIS
113	Industry Events / Exhibitions / Fairs / Trade Shows	EMO Hannover Messe 2025	2025/09/22-27	Hannover, Germany	Available here	FILL, INNO METROLOGY
114	Conference	Webinar Data Act (Legal, Digital Infrastructure and Business Perspectives)	2025/09/30	Online	Not available	INNO

115	Industry Events / Exhibitions / Fairs / Trade Shows	Hi Tech & Industry Scandinavia 2025	2025/09/30-2025/10/02	Herning, Denmark	https://www.visualcomponents.com/events/hi-tech-industry-scandinavia/	VIS
116	Industry Events / Exhibitions / Fairs / Trade Shows	Metromeet 2025	2025/10/16-17	Bilbao, Spain	Available here	INNO METROLOGY
117	Industry Events / Exhibitions / Fairs / Trade Shows	Blechexpo 2025	2025/10/21-24	Stuttgart, Germany	https://www.visualcomponents.com/events/blechexpo/	VIS

Table 2. RE4DY Events (M40)

2.2.3. Articles, News & Press Media Coverage

By the end of the RE4DY project the partners have delivered a **total of 30 Articles, News and Press Media Coverage**: concretely, 10 Articles in the RE4DY website, 9 articles in Partner websites and 11 Articles in other media, as shown below:

No	Article Title	Article Link	Article Type
1	RE4DY project Presentation INNOVALIA	Available here	Partner Article - INNO
2	Be RE4DY – for the transformation of the European manufacturing industry	Available here	Partner Article - IDSA
3	RE4DY PROJECT TITLE : European Data as a PRoduct Value Ecosystems for Resilient Factory 4.0 Product and ProDuction ContinuitY and Sustainability	Available here	Partner Article - KUL
4	RE4DY ayuda a la industria a ser más sostenible y competitiva mediante la gestión digital de datos	Available here	Other media Article
5	RE4DY | European Data as a PRoduct Value Ecosystems for Resilient Factory 4.0 Product and ProDuction ContinuitY and Sustainability	Available here	Other media Article
6	RE4DY: Manufacturing Data Networks	Available here	Partner Article - ENG
7	PRoduct Value Ecosystems for Resilient Factory 4.0 Product and ProDuction ContinuitY Sustainability (RE4DY)	Available here	Partner Article - UNINOVA
8	RE4DY ayuda a la industria a ser más sostenible y competitiva mediante la gestión digital de datos	Available here	Other media Article
9	HORIZON projects unite and spark Innovation in European Industries	Available here	Other media Article
10	European Data as a PRoduct Value Ecosystems for Resilient Factory 4.0 Product and ProDuction ContinuitY and Sustainability	Available here	Partner Article - KUL
11	EFFRA - RE4DY Project	Available here	Other media Article

12	RE4DY: European "data as a pRoduct" Value Ecosystems for resilient factory 4 .0 Product and proDuction continuitY and sustainability	Available here	Partner Article - CHALMERS
13	Video and conference presentations about the Industry Commons concept and the creative methodology that builds radical innovation on top of existing industry capabilities	Available here	Partner Article - ICF
14	Welcome to our new RE4DY Website	Available here	RE4DY Website Article
15	Some Facts about RE4DY	Available here	RE4DY Website Article
16	What is RE4DY	Available here	RE4DY Website Article
17	Know more about the E4DY Pilots and Use cases	Available here	RE4DY Website Article
18	Horizon projects unite and spark innovation in european industries	Available here	RE4DY Website Article
19	The General Assembly of the RE4DY project is here	Available here	RE4DY Website Article
20	Thank you to all our project partners for your participation and assistance in the july 2023 general assembly in Biel	Available here	RE4DY Website Article
21	A readiness level assessment framework for zero defect manufacturing ZDM	Available here	RE4DY Website Article
22	re4dy has been present in 2023 EFFRA hosted manufacturing partnership day	Available here	RE4DY Website Article
23	RE4DY to talk about industry challenges on IP taxonomies ontologies check our video out	Available here	RE4DY Website Article
24	50 projects attend the Manufacturing Partnership Day	Available here	Other media Article
25	EFFRA Innovation Portal	Available here	Other media Article
26	RE4DY To Talk: Industry Challenges in Intellectual Property, Ontologies & Taxonomies	Available here	Other media Article
27	RE4DY To Talk: Industry Challenges in Intellectual Property, Ontologies & Taxonomies	Available here	Other media Article
28	RE4DY TO TALK about Resilient Manufacturing	Available here	Other media Article
29	RE4DY project & EARPA	Available here	Other media Article
30	SATRD role in the RE4DY project	Available here	Partner Article - UPV

Table 3. RE4DY News, Articles & Press Releases (M40)

2.2.4. Videos

By the end of the RE4DY project partners have delivered a **total of 9 Videos** concretely, 6 public videos and 4 sensitive-private videos, as shown below:

No.	Video Title	Video Date	Link
1	RE4DY To Talk: Industry Challenges in Intellectual Property, Ontologies & Taxonomies	2023/10/31	https://vimeo.com/882475023/7f833923a0
2	RE4DY To Talk about Resilient Manufacturing	2024/09/26	https://vimeo.com/1014723801
3	Pilot Video 1: VWAE Pilot	2024/09/27	https://vimeo.com/1013076748
4	Pilot Video 2: AVL+FILL Pilot Video 1	2024/09/27	https://vimeo.com/1013079144
5	Pilot Video 2: AVL+FILL Pilot	2025/07/02	Not PUBLIC
6	Pilot Video 3: FRAISA Pilot	2024/09/27	https://vimeo.com/1013087383
7	Pilot Video 4: AVIO AERO Pilot Video 1	2025/07/02	Not PUBLIC
8	Pilot Video 4: AVIO AERO Pilot Video 2	2025/07/02	Not PUBLIC
9	EUDDIC Clustering Event Video	2025/01/14	https://vimeo.com/1046741155

Table 4. RE4DY Videos (M40)

2.2.5. Datasets

By the end of the RE4DY project the partners have delivered a **total of 10 datasets** as shown below:

N#	Dataset Name	Dataset Owner	Description of Dataset
1	Insights Hub Energy data	SSF	1 set of energy data combining CO2 footprint cumulated, current and Power cumulated and current
2	Insights Hub Environmental data	SSF	1 set of environmental data combining atmospheric pressure, humidity, temperature and vibration
3	POLIMI LAB4.0 Assembly Line Dataset	POLIMI TEF	5 sets of data collected from several station of Industry 4.0 Lab assembly line in ".csv" format including MES, energy and operational signals as well as sensors data
4	UR5e robot Controller	POLIMI TEF	1 set of data collected from ur5e RTDE controller in ".csv" format
5	ROSbag of UR5e robot movement and joint states	POLIMI TEF	1 set of ur5e simple pick and place task in as a ROSbag in ".bag" format including robot parameters and joint states
6	AAS Packages of POLIMI LAB4.0 Assembly Line stations	POLIMI TEF	The Asset Administration Shell package of the assembly line stations and ur5e robot in ".aasx" format
7	VW Logistics Knowledge Graph	VWAE	We are building the VW Logistics Knowledge Graph - this is data that maps the logistics dependencies on the manufacturing shop floor that can be also used in other use case scenarios and therefore works very well for the data marketplace
8	Supply Chain Reference Ontology (SCRO)	ICF	We will use the novel elements of this knowledge graph to amplify the Supply Chain Reference Ontology (SCRO) which is developed by the Industrial Ontologies Foundry and the IOF Core ontology and take those beyond the state of the art. These will be provided as reference data for use by all industry.
9	Legal Ontology of IP Rights	ICF	The Legal Ontology of IP Rights is another evolving data set that is applicable to any industrial scenario that requires legal aspects.
10	Resilience Ontology	CHALMERS+ICF	The Resilience Ontology is another one that applies for all industry.

Table 5. RE4DY Datasets (M40)

2.2.6. Newsletters

By the end of the RE4DY project partners have delivered a **total of 9 newsletters: to a total number of 1040 newsletter subscribers,** as shown below:

#	Date	Newsletter Title	Link
1	2023/07/26	DFA July 2023	Available here
2	2023/10/10	DFA October 2023	Available here
3	2023/11/24	DFA November 2023	Available here
4	2023/10/19	DFA RE4DY TO TALK about Ontologies	Available here
5	2024/03/14	EUDDIC Cluster Newsletter	Available here
6	2025/09/20	DFA RE4DY TO TALK about Resiliency	Available here
7	2025/01/16	EUDDIC Event January 2025	Available here
8	2025/04/23	DFA April 2025	Available here
9	2025/05/21	DFA May 2025	Available here

Table 6. RE4DY Newsletters (M40)

2.2.7. Website

By the end of the RE4DY project the partners have two active websites to communicate project results: the RE4DY website and the DFA website.

RE4DY Website

In month 6, the first version of the RE4DY website was already available. The RE4DY website includes a responsive design and therefore the display adapts to all devices. The website serves as the information hub and ultimate reference for all the project activities updates, playing a key role in the online campaign and for communicating online performance evaluation. The home page is structured to demonstrate the mission statement, project basic information, RE4DY network map, events and news items, an interactive part to attract webpage visitors to subscribe to newsletters and contact information. The initial RE4DY project website included the following sections: Scope, Mission, Objectives and Partners, together with a footer that includes direct access to LinkedIn, Twitter / X, Privacy Policy and Cookies.

Figure 2. RE4DY Website. Version 1

Initially from M1 to M9 the project website included the following sections: Scope, Mission, Objectives and Partners. After the M9 Review, some changes were applied into the website: By month 12, the D&C team incorporated more sections. First, the website added a contact email into the RE4DY website footer. Secondly, the website added 2 more sections: News (including project Articles) and Results (for project results). In fact, the Results section at M24 includes two subsections with Academic Publications and (public) Deliverables. Before M36, the D&C team planned to add Videos into the Results section and they are available in the pilots' subsection.

Regarding the **impact of the RE4DY website**, the website had received more than 1.1K visitors by month 12:

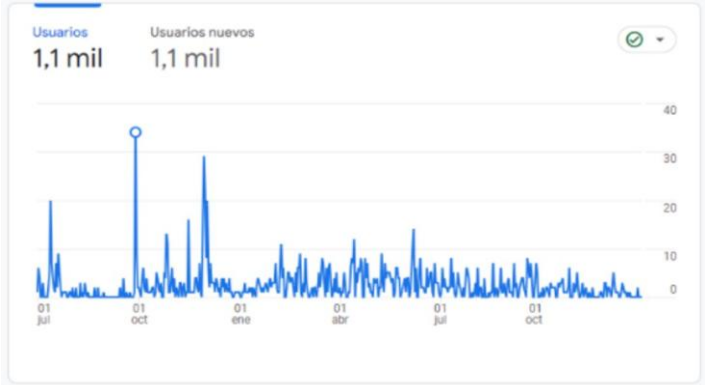


Figure 3. RE4DY website visits M12

In addition, the RE4DY website received an **extra 1500 visitors in the last 365 days of the project (September 2024 to 2025):**

	Primer grupo de...redeterminado)	Total de usuarios
	Total	1.497 100 % respecto al total
1	Direct	829 (55,38 %)
2	Organic Search	467 (31,2 %)
3	Referral	142 (9,49 %)
4	Organic Social	57 (3,81 %)
5	Email	2 (0,13 %)
6	Unassigned	1 (0,07 %)

Figure 4. RE4DY website visits M24-M36

The website has had a **global impact** as it can be show in the graph below in Spain, United States, Greece, China, Switzerland, among others:

Figure 5. RE4DY website global impact

In the **News section**, the D&C team has included the RE4DY articles, some of them below:

Date	Title	Link
25/09/2023	Some facts about RE4DY	Here
25/09/2023	What is RE4DY?	Here
25/09/2023	Know more about the RE4DY Pilots and use cases!	Here
25/09/2023	HORIZON Projects unite and spark innovation in European Industries	Here
25/09/2023	The #GeneralAssembly of the RE4DY project is here!	Here
25/09/2023	Thank you to all our project partners for your participation and assistance in the July 2023 General Assembly in Biel!	Here
25/09/2023	A Readiness Level Assessment Framework for Zero Defect Manufacturing (ZDM)	Here
26/09/2023	RE4DY has been present in 2023 EFFRA hosted Manufacturing Partnership Day	Here
09/11/2023	RE4DY To Talk about Industry Challenges on IP, Taxonomies & Ontologies? Check our video out!	Here
10/06/2024	📢 LATEST RE4DY NEWS 📢 General Assembly in Gurten, Austria	Here

Figure 6. RE4DY Website Articles & News

Therefore, there has been a total of **10 RE4DY website articles** published. In addition, in the RE4DY Results section, at the Publications sub-section some RE4DY-related published and public Academic Publications can be found (4):

- A readiness level assessment framework for Zero Defect Manufacturing (ZDM)
- Human factors in the design of advanced quality inspection systems in the era of Zero-Defect Manufacturing.
- A Systematic Analysis for Mapping Product-Oriented and Process-Oriented Zero-Defect Manufacturing (ZDM) in the Industry 4.0 Era.
- White Paper on the Definition of Data Intermediation Services.

DFA Website

In the DFA Website, RE4DY has benefitted from the long-lasting impact of the [DFA Knowledge Hub] by uploading the project results information:

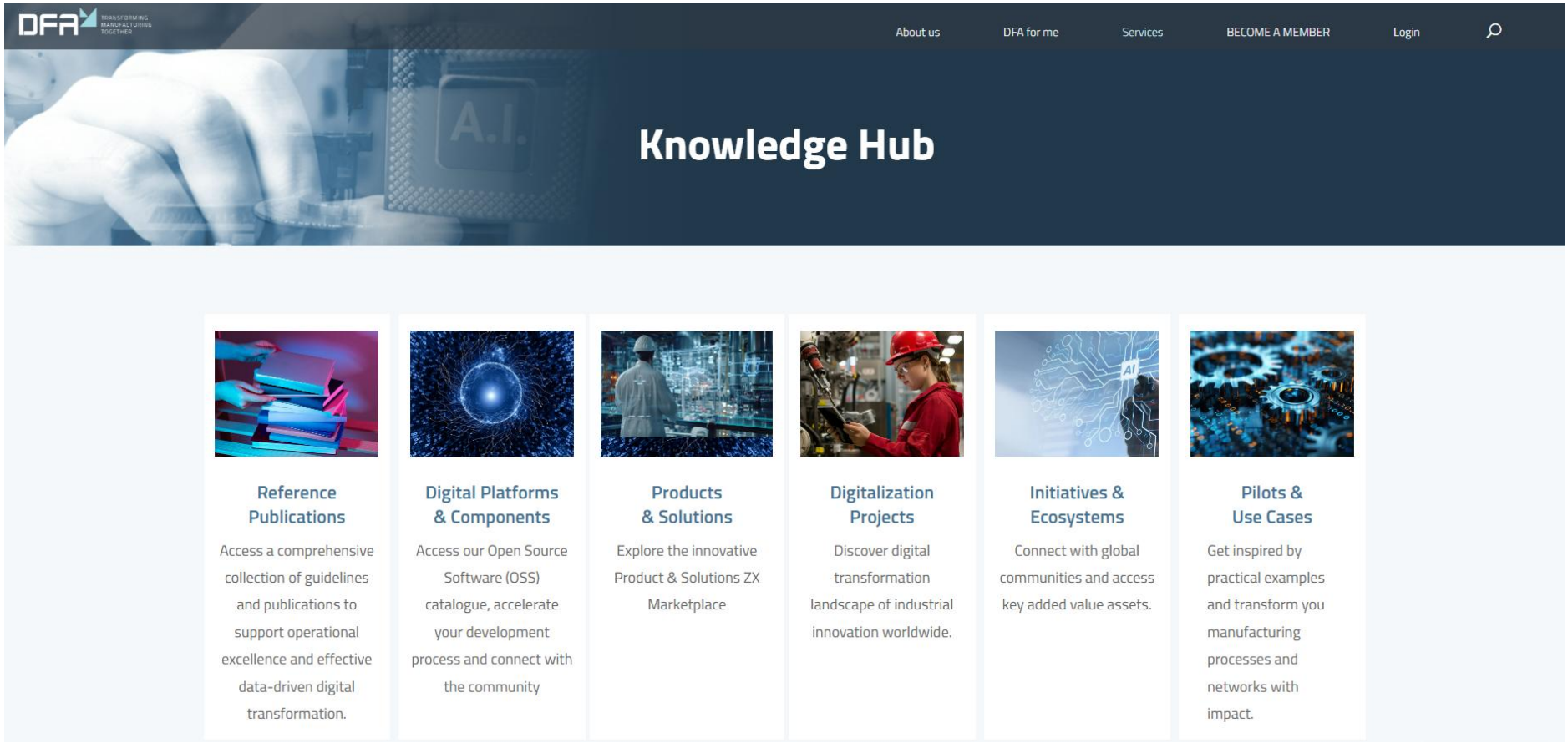


Figure 7. DFA Knowledge Hub

In the **Pilots and Use Cases Catalogue the 4 RE4DY pilots** can be found with a lot of key added value information:

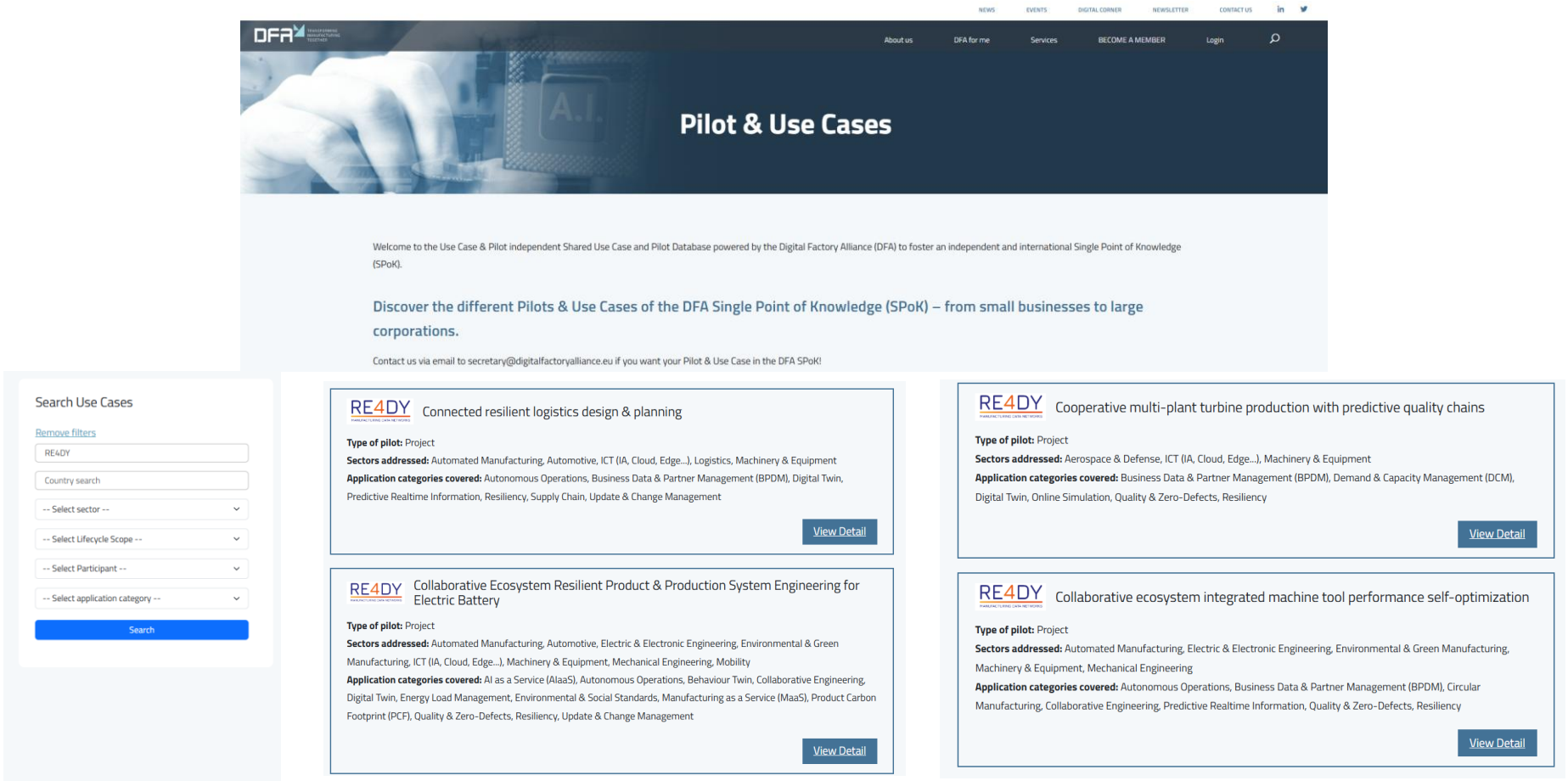


Figure 8. RE4DY Use Case example in the DFA Knowledge Hub

Figure 9. RE4DY Use Case example in DFA Knowledge Hub Use Case Catalogue

Connected resilient logistics design & planning	Collaborative Ecosystem Resilient Product & Production System Engineering for Electric Battery
Cooperative multi-plant turbine production with predictive quality chains	Collaborative ecosystem integrated machine tool performance self-optimization

2.2.8. Social Media

By the end of the RE4DY project counting on RE4DY and Digital Factory Alliance (DFA) LinkedIn Pages and X Accounts the **total audience of the project has been of near 2100 followers: counting on 1235 followers in LinkedIn and 860 followers in X. Below both RE4DY and DFA LinkedIn Pages can be found.** The **RE4DY LinkedIn Page** analytics show the results in the last 365 days with 2.372 **total impressions and 111 reactions, whereas the DFA LinkedIn Page analytics show the results in the last 365 days with 565 impressions and 11 reactions.**

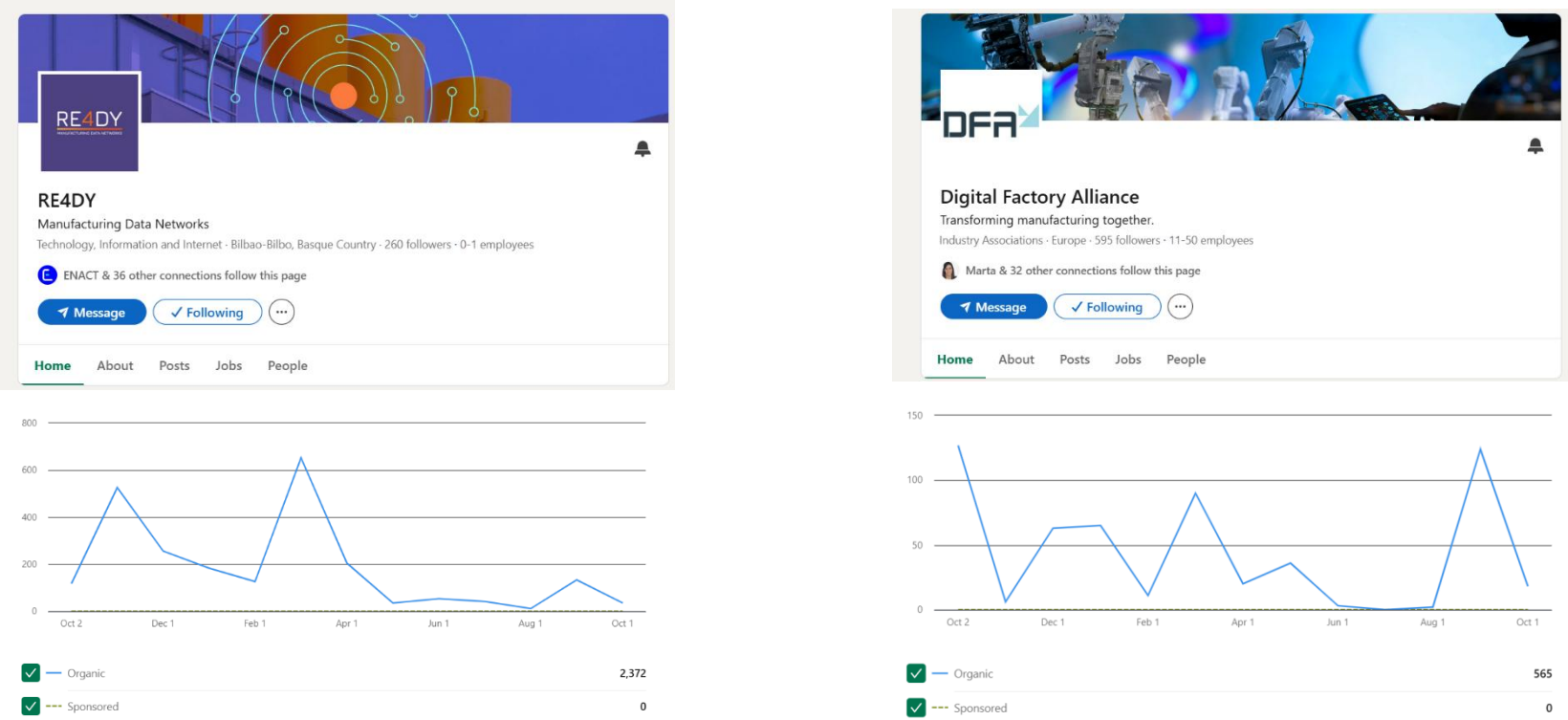
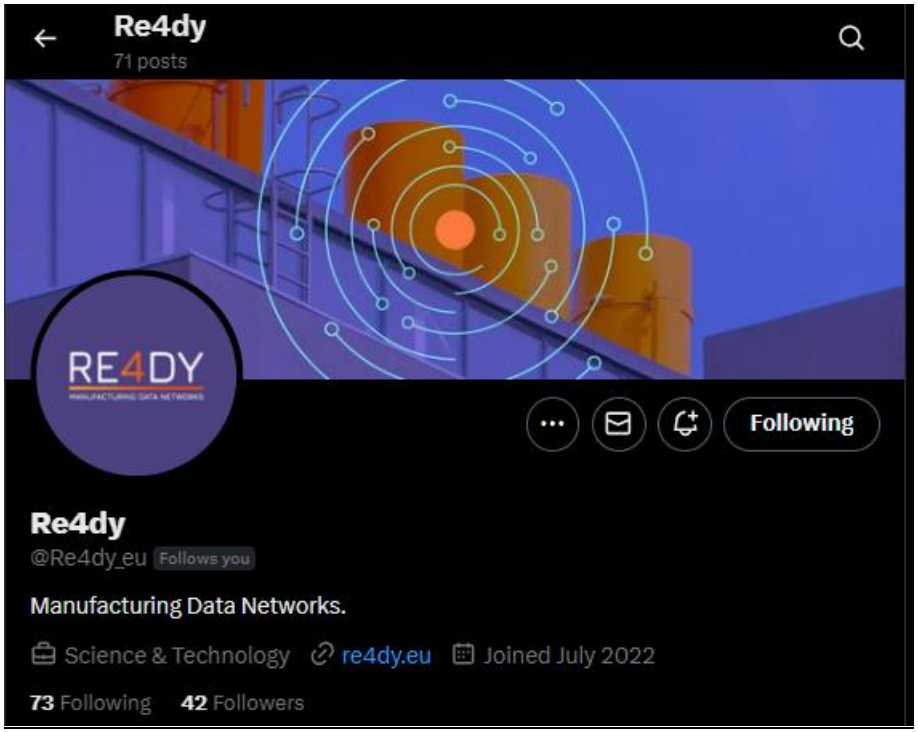


Figure 10. RE4DY & DFA LinkedIn Pages , Followers & Analytics

Below both RE4DY and DFA X Accounts can be found with a total of 71 posts in RE4DY and 1300 posts in DFA.



2.3 Key Performance indicators (KPIs) updated M40

The D&C Plan includes relevant Key Performance Indicators (KPIs) as described in the Table below, these KPIs are established as a success criterion of the project communication progress. What was established in the Grant Agreement is taken as a reference of Planned and there is a new column for M40 status where it can be seen that **all the Dissemination and Communication KPIs have been achieved or overachieved (+100%).**

Communication KPIs	# Planned M36	M18	M24	M40
Website	1	1	1	1
Articles in RE4DY website	7	10	10	10
Articles in Partner websites	10	2	3	9
Articles in other media	5	3	6	11
Publications	10	10	12	26
Newsletter posts/campaigns	9	3	4	9
Newsletter subscribers	1000	1076	1076	1036
Industry Events / Fairs / Exhibitions	3	6	6	44
EU Networking Events	2	3	3	23
Conferences / Academic-Scientific Events	20	16	26	44
RE4DY-organized Innovation Events	2	3	4	4
RE4DY-organized Demonstrations	1	1	1	2
Datasets	8	8+	10	10
Twitter Followers	600	1164	1253	1235
LinkedIn Followers	800	658	807	860
Videos	9	5	7	9
Views per video	50	140+	140+	140+

3 Skills Development

This section provides a follow-up to the activities conducted under Task 6.2 (Didactic & Learning Factory Network Academy and European Network of DIHs), which commenced in M7 of the project, and its initial outcomes were reported in Deliverable D6.3. The subsequent analysis presented here builds upon the methodology (6Ps) introduced in D6.3.

As outlined in D6.3, the initial phase involved analyzing activities across RE4DY pilots to identify a set of emerging roles and corresponding skills aligned with the project's scope and pilot-specific activities. These roles included:

- Resilient Internal Logistics Analyst.
- Smart Logistics Systems Engineer.
- Product Systems Integration Specialist.
- Digital Twin Developer for Battery Manufacturing.
- AI Quality Assurance Engineer.
- Predictive Maintenance System Architect.
- Machine Tool Digital Twin Developer.
- Data Science Manager.
- Data / AI Architect.
- Data / AI Scientist.
- Visual Data Designer.
- Data / AI Specialist.

The first iteration of surveys was then conducted to:

i. Prioritize skills associated with each role: To obtain this information, a survey was conducted among all partners within the project consortium.

ii. Assess the AS-IS and expected TO-BE conditions for each role and skill: This information was collected through a second survey administered to all four pilots.

iii. Identify skill gaps requiring intervention: Consequently, the analysis of the survey results enabled the identification of preliminary insights regarding existing skill gaps.

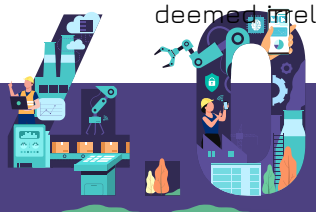
In line with the objectives of Task 6.2, namely, to prepare and recommend introductory and advanced training materials aimed at lowering the skills gap of personnel encountering modern digital skills and concepts emerging from RE4DY, such as cognitive digital twins, big data analysis, data containerization, data as a product, etc. while also addressing human factors and re/up-skilling needs, the current deliverable advances this work.

It also contributes to evaluating the effectiveness and relevance of the proposed training programs with pilot activities. Furthermore, Task 6.2 is dedicated to the development of a re- and upskilling program for RE4DY. To achieve this objective, the task leverages alignment with other EU initiatives, such as EIT Manufacturing, I4MS Training, DIH4AI, and others, by integrating their valuable inputs into the catalogue of training courses. Accordingly, the subsequent phase of activities was devoted to conducting in-depth interviews with project partners to precisely identify their training needs. Based on these findings, customized and targeted training courses were recommended to address the identified gaps and support the achievement of Task 6.2 objectives..

3.1 6Ps methodology - Interviews

This section represents the continuation of the previous stage of the 6Ps methodology, moving from the initial survey-based assessment towards a more detailed, qualitative analysis. To gain an in-depth understanding of the specific requirements and expectations of each pilot, structured interviews were conducted with the respective pilot owners. These interviews aimed to explore in greater detail their priorities regarding training programs, with a particular focus on identifying the formats, topics, and delivery methods that would be most valuable for them. The insights gathered from these discussions provide an accuracy for tailoring the recommended training programs.

The interview questions were developed based on the responses provided by partners during the initial survey round, with particular attention to their stated current status regarding the aforementioned roles and skills, as well as their expectations. Each question was addressed individually, allowing for the collection of more precise and detailed information about their training needs. Additionally, a key objective of this phase was to resolve any ambiguities or gaps in the information collected during the first survey round. Furthermore, partners were invited to identify additional skills or roles not included in the original list that they considered valuable, as well as to indicate any skill sets, they deemed irrelevant and suggested for removal. These efforts were fully aligned with the



objectives of the initial survey, thereby supporting the fulfilment of Task 6.2 requirements within the RE4DY project.

The interview with the GF pilot owner highlighted training needs across technical, analytical, and strategic areas. For the Smart Logistics Systems Engineer role requires introductory-level training on Industry 4.0-enabled logistics solutions. AI-focused roles, including AI Quality Assurance Engineer and Predictive Maintenance System Architect, require courses on predictive and statistical modelling, programming (C#, Python), and sensor integration. Strategic skills were also prioritized, particularly in the Circular Economy Strategist role, with an emphasis on product portfolio management and sustainable business models.

Data-oriented roles showed consistent gaps in business process knowledge, performance measurement, data integration, advanced visualization using AI, and managing large datasets. Overall, GF's needs call for a blended training approach, combining foundational courses with targeted advanced modules to address both operational efficiency and strategic transformation, in line with Task 6.2 objectives.

The interview with the VW pilot owner identified critical skill needs primarily within logistics-focused and data-driven roles. For the Resilient Internal Logistics Analyst position, priority was placed on the ability to develop and test multiple logistical scenarios using simulation tools for automated transport systems, create intuitive dashboards and reports to translate complex operational data into strategic insights, and leverage AI and machine learning to optimize logistics efficiency and accuracy. These skills were deemed the most relevant to the activities of the pilot and represent key areas for future development.

Similar requirements were noted for the Smart Logistics Systems Engineer and Circular Economy Strategist roles, with emphasis on integrating IoT devices, automating logistics processes, and ensuring alignment of technology projects with strategic objectives. For the Product Systems Integration Specialist, Data and AI Specialist, and Machine Tool Digital Twin Developer roles, the partner stressed the importance of linking technical capabilities to the pilot's operational goals, particularly in simulation-based optimization and AI-driven decision support.

To address current skill gaps, training programs should focus on three main areas:

i. Advanced use of simulation tools for automated transport systems,
ii. Dashboard and data visualizations development for logistics planning,
iii. AI&ML applications for process automation.

The interview with the AVL pilot owner revealed multi-dimensional training needs across logistics, digital twin development, circular economy strategy, and advanced data & AI roles.

For the Resilient Internal Logistics Analyst role, the highest priorities were skills in creating intuitive dashboards and reports, applying advanced analytics and predictive models, and improving risk identification for AGV and AMR operations. These capabilities were seen as essential to the pilot's operations, with a clear need for training in data visualization and analytics to bridge existing gaps.

In the Smart Logistics Systems Engineer role, key priorities included leveraging AI and machine learning to automate and optimize logistics processes, alongside implementing Industry 4.0 solutions for interconnected and automated logistics. Both skills require targeted training, particularly in AI and ML application to logistics. For the Digital Twin Developer for Battery Manufacturing, integrating real-time data into accurate manufacturing simulations and creating 3D digital twins were critical, with a need to strengthen analytical capabilities for identifying process inefficiencies.

Strategic and sustainability-focused roles also emerged as important. The Circular Economy Strategist role called for training in designing innovative business models and building collaborative stakeholder networks, while also developing expertise in strategies for reducing raw material and energy consumption. For data-focused positions, such as Data Science Manager, Data & AI Architect, Data & AI Scientist, and Data & AI Specialist, the partner stressed the need for expertise in big data architecture, mathematical and statistical modelling, domain-specific processes, and integration of AI technologies into existing systems. Additional technical needs included cloud computing, collaborative robotics, AI security and quality assurance, and hardware platform knowledge.

Based on the insights obtained from these interviews, together with the initial analysis conducted during the early months of the project and reported in D6.3, the next section presents the detailed set of training courses that have been analyzed, tailored, and recommended in alignment with the specific needs of each pilot. These recommendations are designed to address identified skill gaps, support the operational and strategic objectives of the pilots, and contribute to achieving the overall goals of Task 6.2.

3.2 RE4DY Academy and Analysis Result

This section begins with a high-level overview of the recommended training courses, presented in tabular format. It is important to note that detailed information on each course is available in the project's internal SharePoint repository, as well as on the official project website.

By Month 40 (M40) of the project, approximately 60 training courses had been evaluated to address the competency requirements of the 13 roles identified within the use cases. These courses were sourced from reputable and well-established platforms, including the I4MS catalogue, POLIMI Open Knowledge, DIH4AI, and AIREGIO projects' learning plans, Coursera, Udemy, Alison, among others.

An assessment framework was applied to classify the courses into three progressive learning levels: Awareness, Foundation, and Extended Know-How. The Awareness level comprises introductory materials intended to provide a general understanding of the subject matter. The Foundation level offers structured, practical content aimed at developing essential competencies. The Extended Know-How level consists of advanced resources designed to deepen expertise and support the practical implementation of relevant technologies.

Each course was systematically reviewed within this framework, followed by a mapping exercise to evaluate the alignment between course content, the defined roles, and the corresponding skill requirements.

Table 7: Training Courses

Roles	Courses	Knowledge level	Organizational level
Resilient Internal Logistics Analyst	Mastering Industrial Robotics	Mid-Level Employee	Foundations
	Predictive Modeling with Python	Mid-Level Employee	Foundations
	HPC4SME – A Practical Approach in Preparing and Running HPC Simulations	Mid-Level Employee	Foundations
	Supply Chain Operations	Mid-Level Employee	Foundations
	Data science, visualization and interactive narratives for CCIs	Junior (Fresh Employee)	Foundations

Smart Logistics Systems Engineer	IoT Devices	Mid-Level Employee	Foundations
	Complete A.I. & Machine Learning, Data Science Bootcamp	Senior Employee	Foundations
	Industry 4.0 Fundamentals & Certification	Expert	Extended Know-How
	Master Industry 4.0: Automation, Robotics & Cybersecurity	Junior (Fresh Employee)	Foundations
	Supply Chain Management and Analytics	Mid-Level Employee	Foundations
	Artificial Intelligence for Supply Chains and Logistics	Mid-Level Employee	Foundations
	Logistics and Supply Chains - Fundamentals, Design, Operations	Senior Employee	Extended Know-How
	Logistics, transportation and Supply Chain management	Junior (Fresh Employee)	Awareness
	Logistics Excellence	Expert	Extended Know-How
	Supply Chain Management Specialization	Mid-Level Employee	Foundations
Product Systems Integration Specialist	Fundamentals of Product Development and Systems Engineering	Expert	Extended Know-How
	Product Management & Product Design with Generative AI	Senior Employee	Foundations
	Functional Safety for Safety Instrumented Systems	Mid-Level Employee	Foundations
	Kaizen Event: Become a Certified Kaizen Event Specialist	Mid-Level Employee	Foundations
	Product Design: The Delft Design Approach	Mid-Level Employee	Foundations
Digital Twin Developer for	Digital Twins Explained (Digital Twins in Industry 4.0)	Junior (Fresh Employee)	Awareness

Battery Manufacturing	Simulation Skills: This is Your Brain on the Future	Mid-Level Employee	Foundations
	Battery Technologies	Mid-Level Employee	Foundations
	Advanced Plant Modelling (APM) & 3D Digital Twin	Mid-Level Employee	Foundations
	Battery State-of-Charge (SOC) Estimation	Expert	Extended Know-How
AI Quality Assurance Engineer	AI For Everyone	Mid-Level Employee	Foundations
	Learn Artificial Intelligence & Your Business 2025 & beyond	Mid-Level Employee	Foundations
	Generative AI Leadership & Strategy Specialization	Expert	Extended Know-How
	IBM Generative AI Engineering Professional Certificate	Mid-Level Employee	Foundations
Predictive Maintenance System Architect	Leveraging AI in Predictive Analytics, Automation, and Data Management	Mid-Level Employee	Foundations
	Introduction to Predictive Modeling	Mid-Level Employee	Awareness
	Process Mining and Predictive Process Monitoring	Mid-Level Employee	Foundations
	Data Science Math Skills	Junior (Fresh Employee)	Awareness
	Programming in Python	Mid-Level Employee	Foundations
	Data Visualization with Python	Expert	Foundations
Circular Economy Strategist	Circular Economy - Sustainable Materials Management	Junior (Fresh Employee)	Foundations
	Become a Product Manager | Learn the Skills & Get the Job	Junior (Fresh Employee)	Foundations
	Energy Management and Regulation	Senior Employee	Extended Know-How
	Business Sustainability in the Circular Economy	Expert	Awareness

	Strategic Planning & Strategic Thinking | Business Strategy	Expert	Foundations
	Supply Chain Management Specialization	Mid-Level Employee	Foundations
Machine Tool Digital Twin Developer	Digital Twins Explained (Digital Twins in Industry 4.0)	Mid-Level Employee	Foundations
	Leveraging AI in Predictive Analytics, Automation, and Data Management	Mid-Level Employee	Extended Know-How
	Circular Economy - Sustainable Materials Management	Junior (Fresh Employee)	Foundations
	Digital Twins	Junior (Fresh Employee)	Foundations
Data Science Manager	Foundations of AI and Machine Learning	Mid-Level Employee	Foundations
	Effective Communication in the Workplace	Mid-Level Employee	Foundations
	Fundamentals of Data Analytics	Junior (Fresh Employee)	Awareness
Data / AI Architect	Fundamentals of Certified Data Management Professional (CDMP)	Junior (Fresh Employee)	Awareness
	Introduction to Big Data with Spark and Hadoop	Senior Employee	Extended Know-How
	IBM Data Engineering Professional Certificate	Expert	Extended Know-How
Data / AI Scientist	Data science for Business Intelligence	Senior Employee	Foundations
	Introduction to Domain Models	Junior (Fresh Employee)	Foundations
	IBM Data Science Professional Certificate	Expert	Foundations
Visual Data Designer	Data Visualization	Expert	Extended Know-How
	Graphic Design Specialization	Junior (Fresh Employee)	Foundations
Data / AI Specialist	Master Generative AI (Artificial Intelligence)	Junior (Fresh Employee)	Foundations

	Industry IoT & Security	Mid-Level Employee	Awareness
	Complete A.I. & Machine Learning, Data Science Bootcamp	Junior (Fresh Employee)	Foundations
	Databases and SQL for Data Science with Python	Junior (Fresh Employee)	Foundations

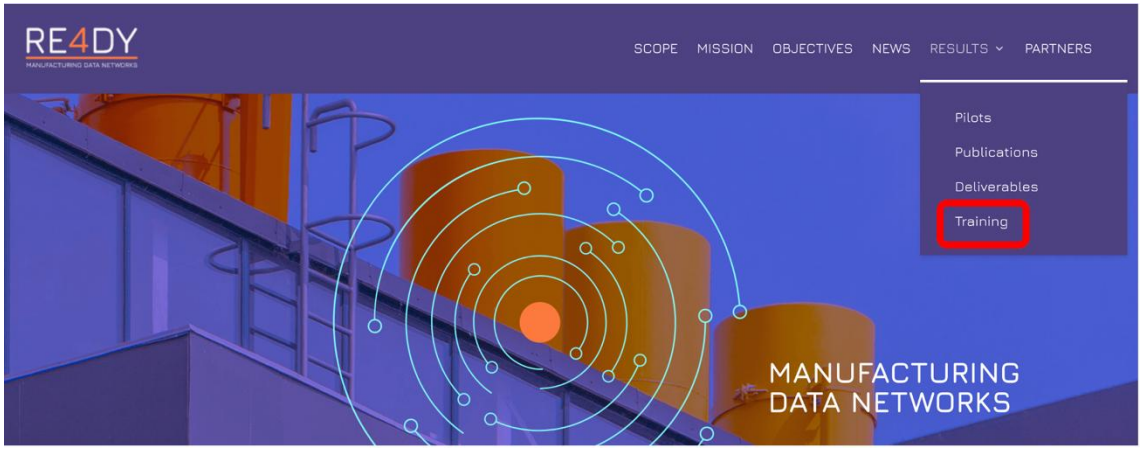
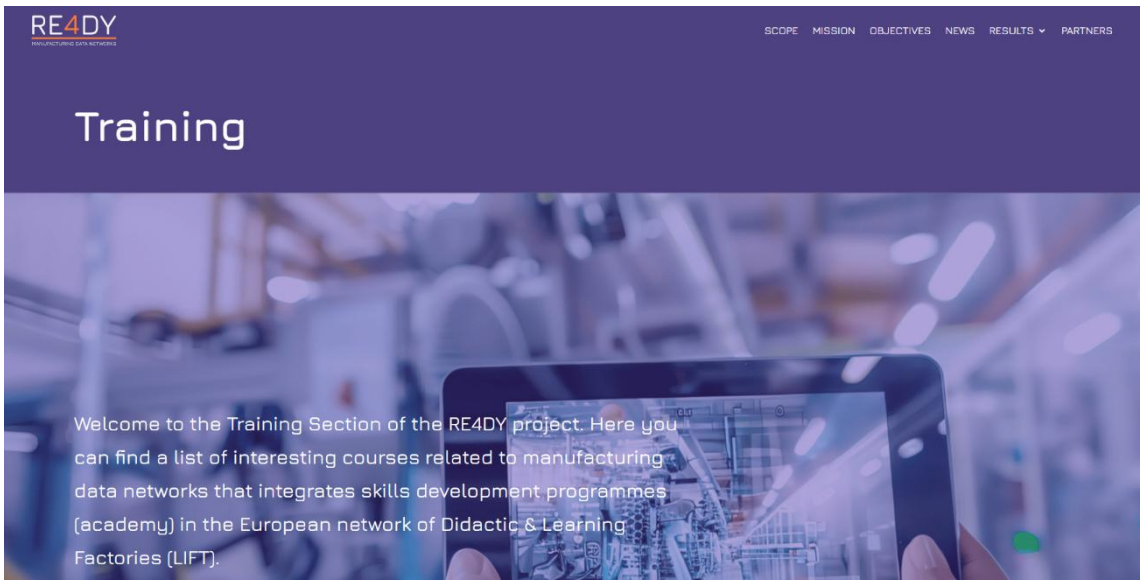


Figure 11: Training course tab in project website (NETWORKS, n.d.)



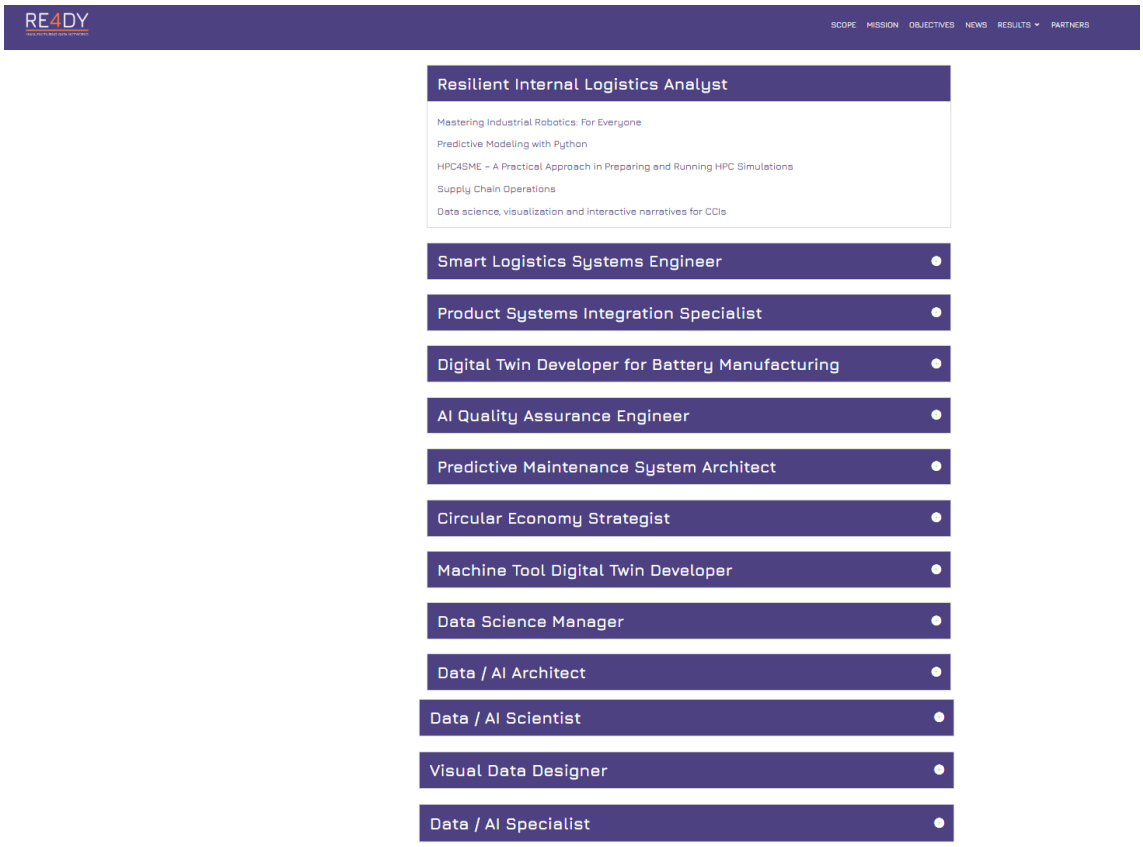


Figure 12: Training course section on project website

Evaluation Feedback on Recommended Training Courses (POLIMI, 2025)

Based on partners' feedback on the recommended training courses, the following diagram presents the overall relevance of all courses to the previously identified roles and associated skill requirements. These ratings reflect the average responses collected from all partners.

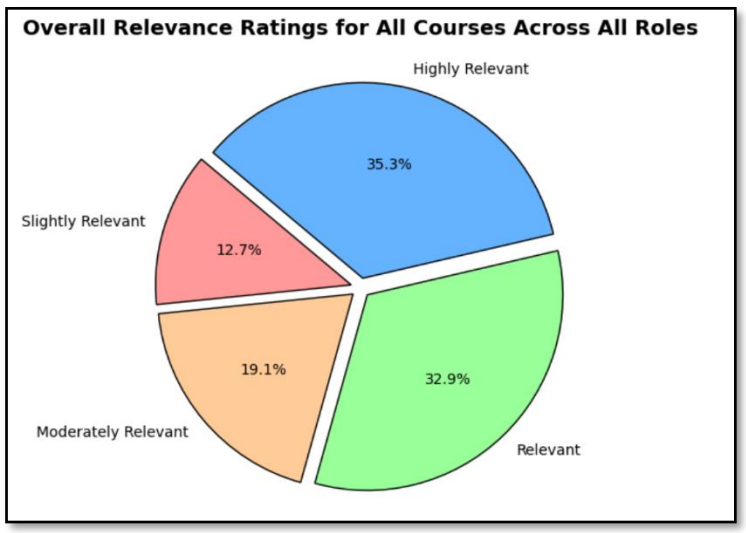


Figure 13: Overall relevance rating for all courses across all roles

The overall evaluation of all courses across all roles shows that over two-thirds of the feedback rated them as either highly relevant (35%) or relevant (33%). Around one-fifth (19%) considered them moderately relevant, while a smaller share (13%) found them only slightly relevant. Responses indicating that the courses were not relevant at all were negligible (less than 1%), demonstrating a strong overall alignment between the recommended training content and the identified role requirements in the previous steps.

Analysis of the second Iteration - Survey (POLIMI, 2025)

Following the recommendation of relevant training courses, a second iteration of the survey was conducted during the final month of the project. The aim was to evaluate the progress made by the partners throughout the duration of the project. A consolidated overview of this assessment, together with feedback on the recommended training courses for each role, is presented below. Please note that, for each pilot, the roles applicable to its scope will be analyzed based on the responses provided by the respective partners.

GF – Integrated Machine Tool Performance Self-Optimization

Table 8: Summary of result – 2nd iteration - GF

Roles	Skills	Level
Smart Logistics Systems Engineer	A: IoT logistics management	Expert
	B: AI logistics optimization	Intermediate
	C: Industry 4.0 implementation	Intermediate
	D: Reliable system integration	Expert
	E: Logistics project management	Expert
Product Systems Integration Specialist	A: Product technology integration	Upper Intermediate
	B: Cross-team collaboration	Upper Intermediate
	C: Performance compliance testing	Expert
	D: Regulatory compliance management	Expert
	E: Continuous improvement innovation	Intermediate
Predictive Maintenance System Architect	A: Predictive systems design	Expert
	B: Real-time monitoring	Expert
	C: Scalable architecture integration	Upper Intermediate

	D: Continuous system improvement	Upper Intermediate
Circular Economy Strategist	A: Innovative business models	Intermediate
	B: Product lifecycle optimization	Upper Intermediate
	C: Resource efficiency strategies	Expert
	D: Collaborative stakeholder engagement	Upper Intermediate
	E: Market-driven sustainability	Lower Intermediate
Machine Tool Digital Twin Developer	A: Digital twin development	Expert
	B: Predictive maintenance application	Expert
	C: Circular economy integration	Expert
	D: Sustainable industry innovation	Expert
	E: Real-time performance monitoring	Upper Intermediate
	F: Sustainability metrics tracking	Upper Intermediate
	Roles	Level (average rate)
Data-driven roles	Data Science Manager	Upper Intermediate
	DATA / AI Architect	Upper Intermediate
	DATA / AI Scientist	Upper Intermediate
	Visual Data Designer	Upper Intermediate
	Data / AI Specialist	Upper Intermediate

- GF reported skill development across several technical and strategic domains during the project. In **smart logistics**, while certain capabilities such as IoT integration, system reliability, and technology project management are already strong, other areas like AI and ML application for logistics and Industry 4.0 integration remain less developed. The partner noted that some skills are present to a certain extent, and support was provided through the development of the

platform, particularly in production environments for milling machines. The training courses recommended for the Smart Logistics Systems Engineer role were generally assessed as moderately to highly relevant by partner, with the majority receiving ratings between 3 and 5 on the relevance scale (1 = Not Relevant at All, 2= Slightly relevant, 3=Moderately relevant, 4= Relevant, 5 = Highly Relevant). This indicates strong alignment between the proposed training content and the skill gaps identified, particularly in advanced supply chain management, Industry 4.0 concepts, AI/ML applications, and analytics for logistics operations.

- In **product systems integration**, although this was not the main focus of the pilot, activities around the data container facilitated integration and supported current production capabilities. The training courses recommended for the Product Systems Integration Specialist role were generally assessed as having moderate relevance, with ratings ranging from 2 to 4 on the relevance scale. The highest alignment was noted for topics related to product design with generative AI, while other areas such as systems engineering, functional safety, and structured improvement methodologies (e.g., Kaizen) were considered moderately applicable. This distribution of ratings reflects the partial overlap between the training content and the current skill requirements of this role within the context of the pilot's activities.
- For **predictive maintenance**, GF highlighted the creation of a dedicated application for milling machines as a major outcome. This was achieved through exchanges with consortium partners specialized in the field, enabling joint developments. The training courses recommended for the Predictive Maintenance System Architect role were rated as moderately to highly relevant, with most scores ranging from 3 to 5 on the relevance scale. Highest alignment was observed for courses on predictive modelling, process monitoring, and AI-driven predictive analytics, reflecting the strong match between these topics and the technical competencies required for the role. Additional skills in data science, mathematical foundations, and programming, though slightly less central to the immediate pilot scope, were still considered beneficial for enhancing the role's overall effectiveness.
- In the area of **circular economy strategy**, skills were strengthened mainly through the implementation of RE4DY digital tools related to product traceability, lifecycle management, and carbon footprint optimization. The training courses recommended for the Circular Economy Strategist role were evaluated as moderately to highly relevant, with ratings predominantly between 3 and 4 on the relevance scale. The highest alignment was observed for courses on sustainable materials management, energy management, and business sustainability within the circular economy, reflecting their direct applicability to the pilot's objectives.

Other topics, such as strategic planning, supply chain management, and product management, were deemed moderately relevant, offering complementary skills that could further strengthen the strategic and operational dimensions of circular economy implementation.

- **Digital twin development for machine tools** was another strong area, with pilot business scenarios on tool and machine lifetime management contributing to expert-level capabilities. The training courses recommended for the Machine Tool Digital Twin Developer role were rated as highly relevant, with all receiving the maximum score of 5 on the relevance scale. The highest alignment was observed for courses on digital twins in Industry 4.0, predictive analytics, and sustainable materials management, reflecting their direct and critical applicability to the pilot's objectives. This uniform rating underscores the close match between the training content and the technical skill requirements of this role, reinforcing its strategic importance within the RE4DY framework.
- **Data-driven roles** (such as Data science manager, Data/AI architect, Data/AI scientist, and others) also saw significant enhancement. Work on the data container advanced the organization's data science and AI capabilities, including architecture for real-time machine-to-cloud data flows. Collaboration with consortium partners supported AI model and solution development for the pilot business cases. GF's existing expertise in visualizations and user interface design was further enriched through joint developments, while participation in collaborative activities, training, conferences, and seminars helped expand skills in data & AI integration, security, and big data applications. The training courses recommended for these roles were largely assessed as moderately to highly relevant, with most ratings falling between 3 and 5 on the relevance scale. Highest alignment was observed for comprehensive AI and machine learning programs, data science bootcamps, and advanced topics such as big data processing, generative AI, and data visualization. Courses on data management, business intelligence, and IoT security were also considered highly pertinent, reflecting the multifaceted nature of competencies required for these roles. Meanwhile, certain courses with narrower applicability, such as specific professional certification tracks, received lower ratings, suggesting more selective relevance to the immediate project context.

VW – Logistics of the future: Connected Resilient Logistics Design & Planning

Table 9: Summary of result – 2nd iteration - VW

Roles	Skills	Level
Resilient Internal Logistics Analyst	A: Logistics risk management	Expert
	B: Predictive analytics optimization	Intermediate
	C: Simulation-based scenario planning	Lower Intermediate
	D: Robust logistics frameworks	Expert
	E: Data visualization reporting	Lower Intermediate
Smart Logistics Systems Engineer	A: IoT logistics management	Upper Intermediate
	B: AI logistics optimization	Intermediate
	C: Industry 4.0 implementation	Intermediate
	D: Reliable system integration	Expert
	E: Logistics project management	Lower Intermediate
Predictive Maintenance System Architect	A: Predictive systems design	Expert
	B: Real-time monitoring	Expert
	C: Scalable architecture integration	Lower Intermediate
	D: Continuous system improvement	Expert
	Roles	Level (average rate)
Data-driven roles	Data Science Manager	Intermediate
	Data / AI Architect	Upper Intermediate
	Data / AI Scientist	Intermediate
	Visual Data Designer	Expert
	Data / AI Specialist	Intermediate

- For the **Resilient Internal Logistics Analyst role**, VW reported very strong capabilities in risk management for AGV/AMR operations and in designing robust internal logistics frameworks that maintain operational integrity under varying conditions. Moderate proficiency was noted in applying advanced analytics to internal transport systems, while skills in developing simulation-based logistical scenarios and creating dashboards/reports for internal logistics remain at an early stage of development. Complementary comments highlighted ongoing recruitment for simulation expertise, internal training programs for AGV/AMR operations, and active knowledge exchange with partners. The training courses

recommended for this role were considered highly relevant overall, with strong alignment for topics such as robotics, predictive modelling with Python, and HPC simulations. Training on supply chain operations was regarded as less directly applicable to the immediate needs of the role.

- For the **Smart Logistics Systems Engineer role**, VW demonstrated strong capabilities in designing scalable and reliable logistics systems and in integrating and managing IoT devices for enhanced tracking, monitoring, and data exchange. Moderate proficiency was indicated in leveraging AI and machine learning to optimize logistics processes and in implementing Industry 4.0 technologies for interconnected and automated solutions. Skills in managing logistics technology projects were identified as an area for further development. The training courses recommended for this role were considered highly relevant overall, with particular alignment to IoT applications, AI and machine learning, Industry 4.0 concepts, robotics and cybersecurity, and advanced logistics and supply chain management. Only supply chain management specialization training was seen as less directly applicable to the role's immediate focus.
- For the **Predictive Maintenance System Architect role**, partner demonstrated strong capabilities in designing and integrating predictive maintenance systems using IoT and machine learning, managing real-time data from multiple sources to monitor equipment health, and continuously improving system performance through the adoption of new technologies. The ability to ensure scalable, multi-plant integration for predictive analytics was identified as less developed. Knowledge exchange with partners and participation in training activities supported these advancements. The training courses recommended for this role were viewed as highly relevant overall, with strong alignment for predictive modelling, process monitoring, and AI-driven predictive analytics. Courses in mathematical foundations, programming, and data visualization were considered less central to the immediate skill requirements of the role.
- **Data-related roles** also showed a mix of strong capabilities and areas for growth. For the Data Science Manager, high competence in AI/data processes, business understanding, and strategy execution was contrasted by lower capacity in team management, addressed through targeted training. Data/AI Architect skills were solid in integration and architectural standards, but less developed in big data platform and hardware selection, with upskilling and recruitment planned. For advanced technical roles, the Data/AI Scientist position showed strong expertise in statistical modelling, programming, and AI technologies, but domain-specific communication and advanced optimization algorithms require further development. Visual Data Designer skills were consistently strong, with advanced capabilities in user interface design, visualizations, and infographics creation.

Data/AI Specialist roles displayed high proficiency in AI integration, machine learning, data workflows, and robotics interaction, while gaps remained in AI model development from scratch, data security management, and cloud computing applications. These are being addressed through training programs, internal initiatives, and targeted recruitment. The training courses recommended for these roles showed varied relevance, with high alignment for topics such as data visualization, graphic design, business intelligence, big data processing, and database management. Communication skills training was also considered beneficial. Courses on AI/machine learning foundations, professional certification programs, IoT security, and general AI bootcamps were rated as less directly applicable to the immediate skill priorities.

AVL – Electric Battery Product/Production System Engineering

Table 10: Summary of result – 2nd iteration - AVL

Roles	Skills	Level
Smart Logistics Systems Engineer	A: IoT logistics management	Upper Intermediate
	B: AI logistics optimization	Intermediate
	C: Industry 4.0 implementation	Expert
	D: Reliable system integration	Upper Intermediate
	E: Logistics project management	Upper Intermediate
Product Systems Integration Specialist	A: Product technology integration	Expert
	B: Cross-team collaboration	Upper Intermediate
	C: Performance compliance testing	Lower Intermediate
	D: Regulatory compliance management	Lower Intermediate
	E: Continuous improvement innovation	Upper Intermediate
Digital Twin Developer for Battery Manufacturing	A: 3D digital simulation	Upper Intermediate
	B: Real-time data integration	Expert
	C: Process inefficiency analysis	Intermediate
	D: Predictive maintenance optimization	Expert
	E: Collaborative platform development	Expert
Predective Maintenance System Architect	A: Predictive systems design	Upper Intermediate
	B: Real-time monitoring	Expert
	C: Scalable architecture integration	Basic
	D: Continuous system improvement	Upper Intermediate
Circular StrategistCircular Economy Strategist	A: Innovative business models	Upper Intermediate
	B: Product lifecycle optimization	Expert
	C: Resource efficiency strategies	Expert
	D: Collaborative stakeholder engagement	Upper Intermediate
	E: Market-driven sustainability	Upper Intermediate
	A: Digital twin development	Expert

Machine Tool Digital Twin Developer	B: Predictive maintenance application	Upper Intermediate
	C: Circular economy integration	Lower Intermediate
	D: Sustainable industry innovation	Intermediate
	E: Real-time performance monitoring	Expert
	F: Sustainability metrics tracking	Upper Intermediate
	Roles	Level (average rate)
Data-driven roles	Data Science Manager	Upper Intermediate
	Data / AI Architect	N/A
	Data / AI Scientist	Upper Intermediate
	Visual Data Designer	Upper Intermediate
	Data / AI Specialist	Upper Intermediate

- For **the Smart Logistics Systems Engineer** role, AVL demonstrated strong capabilities in implementing Industry 4.0 technologies for interconnected and automated logistics solutions, as well as designing scalable and reliable logistics systems. Competence was also high in integrating and managing IoT devices for enhanced tracking, monitoring, and data exchange, and in managing logistics technology projects to align with strategic objectives. Moderate proficiency was observed in leveraging AI and machine learning to optimize logistics processes. Training activities included courses for Visual Components and knowledge exchange with partners, particularly FILL and VC. The training courses recommended for this role were generally regarded as highly relevant, with strong alignment for Industry 4.0 concepts, robotics and cybersecurity, logistics excellence, and supply chain management and analytics. Other topics, such as AI for supply chains, general AI/ML bootcamps, and certain logistics fundamentals, were considered moderately relevant.
- For the **Product Systems Integration Specialist** role, the partner demonstrated strong capabilities in integrating new product technologies with existing systems and facilitating collaboration across engineering, manufacturing, and design teams. Proficiency was also noted in applying innovative approaches for continuous improvement in product system integration. Skills in ensuring compliance with safety and environmental regulations, as well as in meeting performance and safety standards through comprehensive testing and validation, were identified as areas for further development. The training courses recommended for this role were generally of moderate relevance, with higher

alignment for product design using generative AI and continuous improvement methodologies such as Kaizen. Courses on functional safety and foundational product systems engineering were seen as partially relevant, while certain product design fundamentals were considered less directly applicable to immediate needs.

- For the **Digital Twin Developer for Battery Manufacturing** role, AVL demonstrated strong capabilities in integrating real-time data into digital twins for accurate manufacturing process simulation, implementing predictive maintenance to optimize equipment performance, and developing collaborative platforms for digital twin access. Solid skills were also shown in creating digital twins using 3D simulation tools, while the analysis of digital twin data to identify and address inefficiencies was identified as an area for further development. Training activities mentioned by partners included courses for Visual Components. Additionally, the training courses recommended for this role were considered highly relevant overall, with strong alignment for digital twin concepts, advanced plant modelling, and simulation skills for future battery technologies. Battery state of charge training was viewed as less directly applicable to the immediate priorities of the role.
- For the **Predictive Maintenance System Architect** role, they demonstrated strong capabilities in managing real-time data from multiple sources to monitor equipment health, as well as in designing and integrating predictive maintenance systems using IoT and machine learning. Proficiency was also noted in continuously evaluating system performance and adopting new technologies to enhance predictive capabilities. The ability to ensure scalable, multi-plant integration for predictive analytics was identified as a key area for further development. AVL mentioned that knowledge exchange with FILL supported the advancement of these competencies. Additionally, the training courses recommended for this role were generally rated as highly relevant, particularly in AI-driven predictive analytics, predictive modelling, process monitoring, and data visualization. Courses covering mathematical foundations and Python programming were viewed as moderately relevant to the immediate needs of the role.
- For the **Circular Economy Strategist role**, AVL demonstrated strong capabilities in analyzing and optimizing product lifecycles to ensure adherence to sustainable principles, and in implementing strategies to reduce raw material usage and energy consumption, thereby minimizing environmental impact. Proficiency was also evident in designing innovative business models that extend product lifespans and encourage reuse and recycling, as well as in building collaborative relationships across the supply chain to support circular economy objectives.

Skills in conducting market research and integrating emerging technologies into sustainable practices were well developed. The training courses recommended for this role were viewed as moderately to highly relevant, with strong alignment for energy management, business sustainability in the circular economy, sustainable materials management, and strategic planning. Supply chain management specialization was seen as less directly applicable to the immediate role priorities.

- For the **Machine Tool Digital Twin Developer** role, the partner demonstrated strong capabilities in developing digital twins for machine tools to optimize performance throughout their lifecycle, implementing real-time monitoring and control systems, and leveraging twin data for predictive maintenance to reduce downtime and extend tool life. Competence was also shown in integrating sustainability metrics into digital twin models to track and improve environmental performance. Skills in supporting circular economy objectives and applying advanced digitalization principles in the machine tool industry were identified as moderately developed. As a complementary comment, partners mentioned that working on energy consumption analysis contributed to an enhanced understanding of energy-efficient production processes. The training courses recommended for this role were considered highly relevant overall, with strong alignment for digital twin concepts, predictive analytics, and Industry 4.0 applications. Courses on sustainable materials management were viewed as moderately relevant to the immediate needs of the role.
- **Data science and AI roles** showed strong competence in data processes, strategy execution, and statistical modelling, though domain-specific process knowledge was less developed. Visual data design capabilities were advanced in graphics creation and user experience evaluation, with further improvement possible in AI-based complex information handling. Data/AI specialists demonstrated high performance in AI integration, data security, and workflow development, with cloud computing, robotics interaction, and hardware platform knowledge remaining as focus areas for further development. The training courses recommended for these roles were considered highly relevant overall, with strong alignment for AI and machine learning, data analytics, business intelligence, data visualization, databases and SQL, and IoT security. Graphic design and generative AI courses were also seen as valuable, while domain model training was viewed as moderately relevant to the current role requirements.

AVIO – Multi-plant Predictive ZDM Turbine Production

Table 11: Summary of result – 2nd iteration - AVIO

Roles	Skills	Level
Resilient Internal Logistics Analyst	A: Logistics risk management	Intermediate
	B: Predictive analytics optimization	Lower Intermediate
	C: Simulation-based scenario planning	Intermediate
	D: Robust logistics frameworks	Upper Intermediate
	E: Data visualization reporting	Intermediate
Smart Logistics Systems Engineer	A: IoT logistics management	Expert
	B: AI logistics optimization	Upper Intermediate
	C: Industry 4.0 implementation	Expert
	D: Reliable system integration	Upper Intermediate
	E: Logistics project management	Upper Intermediate
Product Systems Integration Specialist	A: Product technology integration	Expert
	B: Cross-team collaboration	Expert
	C: Performance compliance testing	Expert
	D: Regulatory compliance management	Expert
	E: Continuous improvement innovation	Upper Intermediate
AI Quality Assureance Engineer	A: AI model validation	Expert
	B: Automated inspection optimization	Expert
	C: Feedback-driven model improvement	Expert
	D: Regulatory compliance assurance	Expert
Predective Maintenance System Architect	A: Predictive systems design	Expert
	B: Real-time monitoring	Expert
	C: Scalable architecture integration	Expert
	D: Continuous system improvement	Expert
Machine Tool Digital Twin Developer	A: Digital twin development	Expert
	B: Predictive maintenance application	Expert
	C: Circular economy integration	Expert
	D: Sustainable industry innovation	Intermediate
	E: Real-time performance monitoring	Upper Intermediate
	F: Sustainability metrics tracking	Upper Intermediate
	Roles	Level (average rate)
Data-driven roles	Data Science Manager	Expert
	Data / AI Architect	Expert
	Data / AI Scientist	Upper Intermediate

	Visual Data Designer	N/A
	Data / AI Specialist	Expert

- For the **Resilient Internal Logistics Analyst role**, AVIO demonstrated moderate capabilities in identifying and mitigating risks in AGV/AMR operations, creating dashboards and reports for internal logistics, and designing adaptable logistics frameworks. Skills in applying advanced analytics and predictive models to optimize internal transport systems, as well as in developing simulation-based logistical scenarios, were identified as less developed. The role is considered necessary for the future, with basic competencies already acquired through knowledge exchange with partners. The training courses recommended for this role were generally viewed as relevant, with strong alignment for predictive modelling with Python and HPC simulations. Robotics-related training and supply chain operations were seen as moderately applicable to the current role needs.
- For the **Smart Logistics Systems Engineer role**, they demonstrated strong capabilities in integrating and managing IoT devices, implementing Industry 4.0 technologies for interconnected and automated logistics solutions, and designing scalable and reliable logistics systems. Proficiency was also evident in leveraging AI and machine learning to optimize logistics processes and in managing technology projects to align with strategic objectives. The company noted that their Industry 4.0 focus extends across manufacturing and the broader logistics supply chain, rather than being limited to logistics alone. The training courses recommended for this role were generally relevant, with high alignment for IoT applications, robotics and cybersecurity, and Industry 4.0 fundamentals. AI and machine learning training was also considered valuable, while supply chain management, logistics fundamentals, and logistics excellence courses were rated as less directly applicable to the current scope of the role.
- For the **Product Systems Integration Specialist role**, partner demonstrated very strong capabilities across all key areas, including integrating new product technologies with existing systems, facilitating seamless collaboration between engineering, manufacturing, and design teams, ensuring compliance with safety and environmental regulations, and meeting performance and safety standards through comprehensive testing and validation. The use of innovative approaches for continuous improvement was also well developed. Training activities and the hiring of new personnel were highlighted as measures to further strengthen this role. As per Avio's opinion the training courses recommended for this role were considered highly relevant, particularly those on product systems engineering, product design using generative AI, Kaizen methodologies, and the Delft design

approach. Functional safety training was seen as less directly applicable to the immediate needs of the role.

- For the **AI Quality Assurance Engineer role**, AVIO demonstrated very strong capabilities in validating AI model accuracy, detecting and mitigating biases, and ensuring reliable defect detection to enhance product quality. Proficiency was also high in optimizing AI-driven inspection processes to reduce manual effort and inspection time, overseeing AI learning processes by integrating operator feedback, and ensuring compliance with industry regulations and internal data security policies. These competencies were further strengthened through training, knowledge exchange with partners, and collaborative, cross-functional activities. The training courses recommended for this role were considered highly relevant, particularly in generative AI engineering, leadership, and strategy. Introductory and business-focused AI courses were also viewed as valuable in supporting broader understanding and alignment between technical and strategic objectives.
- For the **Predictive Maintenance System Architect role**, they demonstrated very strong capabilities across all core competencies, including designing and integrating predictive maintenance systems using IoT and machine learning, managing real-time data from multiple sources, ensuring scalable multi-plant integration for predictive analytics, and continuously improving systems through the adoption of enhanced technologies. These skills have been further reinforced through training, knowledge exchange with partners, and the recruitment of new personnel. The training courses recommended for this role were considered highly relevant overall, with strong alignment for predictive modelling, process monitoring, AI-driven predictive analytics, and data science mathematics. Python programming and data visualization courses were regarded as moderately relevant to the immediate role requirements.
- For the **Machine Tool Digital Twin Developer role**, AVIO demonstrated very strong capabilities in developing digital twins for machine tools, optimizing their performance throughout the lifecycle, leveraging twin data for predictive maintenance, and supporting circular economy goals such as tool reuse and recycling. Proficiency was also shown in implementing real-time monitoring and control systems and integrating sustainability metrics into digital twin models to enhance energy efficiency and material conservation. Skills in advancing sustainability and efficiency in the machine tool industry through digitalization and circular economy principles were identified as moderately developed. These competencies were supported through targeted training activities. The training courses recommended for this role were considered highly relevant, with strong alignment for digital twin concepts, predictive analytics, and sustainable materials management.

- **Data-oriented roles** were a core strength for AVIO. Data Science Manager and Data/AI Architect positions showed advanced to expert capabilities across data strategy, architecture, and big data platforms, supported by training and recruitment. Data/AI Specialist roles demonstrated strong skills in AI integration, robotics interaction, big data application development, and operational analytics, with further improvement possible in workflow design. Overall, AVIO's feedback reflects a consistently high technical baseline, reinforced by structured training programs, active knowledge exchange with partners, and targeted hiring to address specific skill gaps. In addition, the training courses recommended for these roles were considered highly relevant overall, with strong alignment for AI and machine learning, big data processing, generative AI, IoT security, data analytics, and database/SQL skills. Communication skills and certified data management training were viewed as moderately relevant to the immediate priorities of these positions.

4. Exploitation Plan

In the context of EU-funded research and innovation projects, exploitation refers to the concrete use of results generated during the project. (Commission, Dissemination and exploitation of research results, n.d.) This may involve developing, creating, manufacturing, or marketing a product or process; providing a service; contributing to standardization activities; or shaping policy. (Commission, Exploiting Horizon results: what are the rules for transfers and licences? , 2022) Exploitation is not limited to commercial pathways; it can also be societal, political, or educational, to ensure that research results deliver tangible value to end-users and to society at large.

Having a well-defined exploitation strategy is essential because it ensures that project outcomes do not remain confined to academic or experimental contexts but instead are translated into real-world impact. A strong exploitation strategy enables results to be adopted by industry, policymakers, public authorities, or civil society, fostering innovation, supporting economic growth, addressing societal challenges, and even guiding legislation or policy recommendations. By providing a roadmap for post-project use, exploitation strategies help sustain the value of results well beyond the project's lifetime and maximize their contribution to tackling pressing problems and responding to market or societal needs. (European Research Executive Agency (European Commission), 2023)

In Phase 1 of the RE4DY Project (D6.4), the consortium focused on laying the groundwork for the effective exploitation and commercialization of project results. This involved assessing the European automotive, aerospace, and machine tools markets to identify growth trends, regulatory requirements, and technological opportunities, while mapping potential exploitable outcomes across areas such as industrial security, decentralized data management, AI models, federated learning, and manufacturing dataspace solutions. Preliminary IPR strategies were defined, assigning patents, copyrights, open-source licenses, and licensing agreements to safeguard innovations. Stakeholder input was gathered through workshops, surveys, and questionnaires to identify market needs, value creation opportunities, and potential exploitation routes. A structured work plan was established across these three phases (see Figure 14), providing a roadmap toward TRL9 and commercialization, while exploring both individual and joint exploitation scenarios aligned with partner intentions and industry trends.

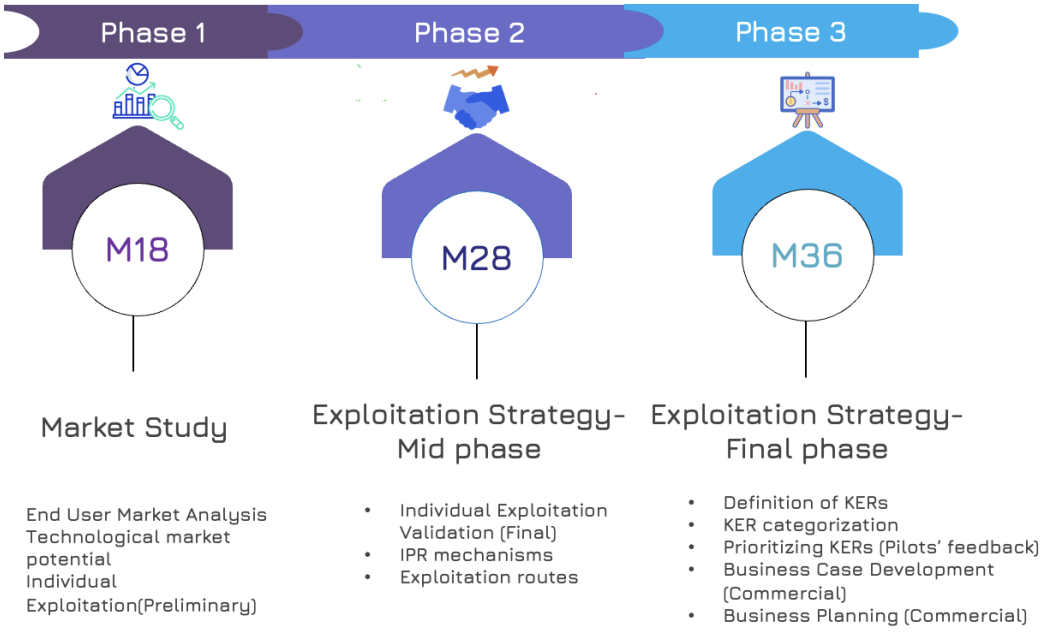


Figure 14: RE4DY's Exploitation Strategy

In this deliverable (D6.5), Phases 2 and 3 of the exploitation strategy are presented. Phase 2 focused on finalizing the Project's Individual Exploitable Results (IERs), assigning appropriate IPR mechanisms, and defining preferred exploitation routes. Building on this, Phase 3 identified the most important outcomes of RE4DY, the Key Exploitable Results (KERs). These were categorized according to their post-project intentions and project applicability; with a prioritization process applied to the commercial KERs based on pilot feedback. Finally, business cases and business plans were developed for the selected commercial KERs in collaboration with the responsible technology partners.

4.1 Exploitation Strategy – Mid phase (Phase 2)

During Phase 2 of the Exploitation Strategy, the focus was on the final identification and validation of the Project's Individual Exploitable Results (IERs). This process allowed for the emergence of new results that had not been considered in the preliminary Phase 1 (M18). In parallel, appropriate IPR mechanisms were assigned to safeguard the Project's innovative solutions. Furthermore, partners outlined their intentions for post-project use by defining Exploitation Routes, specifying how they plan to exploit their respective results. Phase 2 was a crucial step, as it laid the foundation for shaping the Project's Key Exploitable Results (KERs).

4.1.1 Individual Exploitable Results

In this section, the updated Individual Exploitable Results of the RE4DY Project are depicted along with significant information providing a detailed overview. In the previous deliverable (D6.4), a structured methodology for capturing and evaluating exploitable outcomes through a standardized template prepared by CORE was introduced. This template enabled partners to systematically document their individual exploitable results (IERs), covering technological, commercial, and intellectual property aspects, and ensured alignment with the project's technical developments. Building on that foundation, the current deliverable presents the updated and consolidated list of IERs, reflecting the latest project progress and adjustments. The following table highlights these final results, which represent both continuity with earlier findings, refinements, and new entries made to capture the most relevant exploitation opportunities. However, it is of great importance to provide a clear definition of what an Individual Exploitable Result is and why it is important.

An Individual Exploitable Result refers to any tangible or intangible output of a project, such as knowledge, data, software, methodologies, prototypes, or processes that have the potential to be used, transferred, or further developed. (Commission, Join the new and improved Horizon Results Platform!, 2020) While not all IERs will evolve into Key Exploitable Results, they form the foundation from which the most impactful outcomes can be identified and prioritized for exploitation.

The following Table 12 presents the final set of individual exploitable results defined during the last three months of the Project. This list had several adjustments, additional results emerged, and modifications were required to remain aligned with ongoing developments.

Table 12: Updated Individual Exploitable Results

IER #	Individual Exploitable Result	ER Owner	Description	Utility
1	DC threat testing & operational security	S21SEC	Threat testing & operational security awareness services	Improve the cybersecurity incident detection and response enhancing network protection against threats
2	Decentralized data management & analytics component	CNR	A set of algorithms and prototypes for decentralized data analytics	Provide to EU industrials sectors with a set of algorithms to extract knowledge from data in decentralized industrial networks without moving them from generation point they are generated

3	Knowledge acquired in Manufacturing dataspaces domain	IDSA	Asset for knowledge transfer/sharing	Incorporate RE4DY into Dataspace radar, showcase in events and conferences to introduce new data sharing scenarios and promote the dissemination of the Data Spaces concept
4	Data as a Product Container	UPV	Abstraction layer to access the data following the Data as a Product approach	Enable access to the data (Data as a Product principles) considering the consumer's requirements in terms of format and data quality, with the proper considerations about security, privacy, and performance.
5	Data Connection Profile	UPV	A standardized definition of the access and use of the data, with the proper privacy, data governance and quality considerations	Facilitate the integration among complex systems in a standard, simple, durable, and context-sensitive way
6	Didactic Factories and Experimentation Facilities Network	POLIMI	Network of Didactic and Learning Factories (as well as Digital Innovation Hubs) to leverage on, in the building of an ecosystem of skills and services providers	Provide to EU community a geographically granular network of competences able to accompany SMEs in designing and developing their road towards their digital transformation, as well as an ecosystem of actors supplying these realities with services and competences
7	FEDMA (Federated Learning for Milling machines)	CORE	A federated learning-based software solution for predictive maintenance that ensures data privacy and security. It estimates the Remaining Useful Life (RUL) of milling tools to maximize usage, reduce downtime, prevent malfunctions, and improve equipment reliability. Collaborative	This solution introduces a paradigm shift in how AI models are trained, prioritizing data privacy while fully complying with EU data protection regulations. It significantly enhances the accuracy of wear prediction by leveraging real-time and historical data within a secure, distributed environment. The system enables continuous learning and model refinement, allowing predictive capabilities to adapt over time to evolving operational conditions. By delivering smarter, privacy-preserving

			learning takes place across machines or factories without sharing raw data, preserving confidentiality. This approach enhances prediction accuracy and boosts operational efficiency while ensuring compliance with data regulations.	analytics at the edge, it offers practical, high-impact value across industrial settings.
8	Data Spaces Test Bed	SANDETEL	A demo environment for showing the functionality of the data spaces	Provide a novel test bed to facilitate the showcasing and demonstration of advanced data spaces
9	Predictive Maintenance Application for Milling Machines (My rConnect platform)	GFMS	Software module for critical component health diagnosis and residual lifetime prediction using artificial intelligence	Provide EU industries using milling machines a service for controlling the health of the equipment and program repair or component replacement
10	Tool Management Application (My rConnect platform)	GFMS	Software module for monitoring tool wear and residual useful lifetime during manufacturing of parts	Provide to EU industries using milling machines an application for maximizing the use of tools and reduce part manufacturing costs, while guaranteeing part quality and facilitating the recycling of such tools and the reduction of the CO2 footprint of the manufacturing process
11	Data exchange model and cloud connectivity framework	GFMS	Software and data exchange infrastrcuture for critical component health diagnosis, residual lifetime prediction and quality control using artificial intelligence	Provide EU industries using milling machines a data service for enabling controlling the health of the equipment and program repair or component replacement in due time without risk of unplanned interruption of production processes
12	FPdM (Federated Predictive Maintenance)	ATLANTIS	A Federated Learning Framework enhanced with ML algorithms for tool wear monitoring and	The FPdM aims to provide EU industrial sectors with a holistic view of their production lines by monitoring critical parameters and estimating tool wear.

			predictive maintenance applications	The analytics are integrated to a custom Federated Learning Framework solution for enhanced privacy and data sovereignty, able to be trained and optimized with multiple data sources.
13	Analysis Center	ATLANTIS	Analytics component able to detect and interpret production quality defects	The Analysis Center consists of analytic algorithms, trained on EDM machine data obtained from multiple geographical locations to efficiently detect potential production failures. The component is integrated to the ALIDA Federated Learning Framework and using an interactive UI, through which the operator gets notified for endangered situations.
14	eIDAS Compliant Identity Management Solution **Data**	INTRA	Middleware Solutions enabling the management of user's base on eIDAS proof of identify	Enable the development of identity and Access Management) solutions that are compliant to the eIDAS proof of identify
15	Decentralized Data Provenance and Traceability	INTRA	Blockchain solution offering Decentralized Provenance and Traceability for Industrial Data	Boost the trustworthiness of industrial data, which are inherent unreliable due to various factors
16	Active Resilience framework	CHALMERS	The resilience framework forms the basis for creating a resilience dashboard comprising a compass and a radar	A resilience compass to provides EU manufacturing companies and their supply chains with a holistic view of the different dynamic capabilities they need to develop in the three resilience stages of anticipation, coping and adaptation. The radar helps in analysing risks in the different stages and understanding corresponding resilience capabilities
17	RE4DY Framework	CHALMERS	Resilience dashboard (compass and radar) including a flexible Time-Series based AI-model which can adapt to heterogenous industry data	Enable companies to combine heterogenous data from multiple sources and use them in one model. This will enable higher model performance for quantitative risk management or forecasting ,enhancing operational management performance.

18	Sovity Data Space Connector	ATOS	The Sovity Connector is built on top of the Eclipse Dataspace Connector (EDC), an opensource framework from the Eclipse Foundation, which is implemented around modular and standardized data exchange protocols. It provides the underlying architecture for secure data transfers, allowing for interoperability between different systems. It is designed to facilitate secure and efficient data exchange within data spaces, such as Gaia-X, enabling organizations to exchange data safely while maintaining control over how their data is used.	A service to support: Data Governance and Compliance Improved Accessibility: · Efficiency · Interoperability Quality and Consistency Cost Reduction: · Automation and Scalability · Security Monetization: · Contract management
19	Digital Twin deployment framework	SIE	Continuous delivery services for executable cognitive digital twin engineering, commissioning, and operation	Open Test and experimentation (TEF) demonstrator of the resilient a sustainable distributed computing and data space for connected factories and supply network service experimentation
20	XAI and Active Learning Platform	CERTH	A defect detection & localization platform in hard metal Industry accommodated by AI explainability and human-AI in the loop mechanisms	Provide to EU industrial sectors (sectors involving machine tools and hard metal) a complete solution for the enhancement and automation of Quality Control in the cases it is related to visual inspection
21	Sovereign Data	CERTH	Service that provides data transformation and integration services	Provide to various EU sectors a solution as a service that will enable the 'on-

	Transformation Services		between different components	the-fly' data integration and transformation
22	Testbed	SSF	Test and demonstration facility for industrial collaboration, real-world application development, and exploratory research	Expansion and enrichment of the SSF ecosystem of demonstrators and knowledge to support industry adoption of cutting-edge technologies. New Additions: -Metrology and quality control station -Industrial IOT and energy monitoring demonstrator -Virtual machine demonstrator -Customizable machining demonstrator (integration of components: NX/ virtual machine/ Insights Hub) -AGV location tracking and analysis demo
23	Robotic energy optimization application	FILL	Software application for monitoring and optimizing the energy consumption of robots	Provide to EU industries using robots in manufacturing an application to reduce energy consumption and power peaks in the manufacturing process
24	Design for Manufacturing (DfM)	FILL	Software application for the resilience of the product and the production process to rate its flexibility and reconfiguration potential	Provide EU industries using automated manufacturing with a service to assess the product flexibility of their production line to increase long-term sustainability and enable future scalability
25	Logistics Knowledge Graph	UIO	Knowledge reference for automotive assembly logistics	Provide Automotive sector with a knowledge reference framework to increase the accuracy of analysis of big data instances in assembly lines and improve the quality of decision making
26	Dynamic interface	ICF	Interface for improved decision-making across manufacturing value networks	Improved decision-making systems integrating production data instances dynamically with ontology reference

				data and interaction with third party data from external IPR systems
27	Asset/IPR Management	ICF	Integration of IPR and innovation landscape databases	Provide Manufacturing Value Networks with integrated overview of IPR landscape of available assets by access to IPR reference (WIPO, EPO, worldwide patenting databases) (normalized) via NLP query and API allowing for more effective exploitation of IP gaps and asset resilience management
28	Asset Administration Shell of 5G	UMH	A standardized digital representation or Digital Twin of 5G. The 5G AAS is integrated by the AAS of the 5G User Equipment and the AAS of the 5G Network	It provides to relevant EU stakeholders with the digital twin or digital model of the 5G User Equipment (UE) and of the 5G network that supports the industrial plant or manufacturing processes. The digital twin of the 5G network and UE can be integrated with the digital twin of the industrial plant or manufacturing processes to construct the digital twin of the complete production system
29	TEF Services	INNO	Testing & Experimentation Facilities to support manufacturing organizations and developers bringing products and machinery to the market more efficiently	INNO as a TEF has developed exploitable Technical and Business Services such as: · Data spaces / Data sharing services · Real Time Industrial Data Platform, Assets Administration Shell, and Monitoring platform · Connection to funding sources, consortia creation and proposal development) · Ecosystem building services · Skills and maturity assessment services · Industry 4.0 & AI Ideas generation, technology readiness assessment, strategic and specific R&D, Proof of Concept development
30	Testbed platform	ENG	AI/ML-based defect detection tools support quality inspections, guiding operators to	Support the industrial stakeholders involved:

			potential areas of concern	· Favor the training, the up-skilling, and the re-skilling of both senior and junior employees. · Empower the training of junior operators, decoupling training from the availability of senior inspectors · Increase in operational efficiency enhancing precision in key process stages · Optimize the component quality inspection process, providing a range of benefits and positive outcomes
31	Digital 4.0 continuum Reference Architecture	ENG	A Reference Architecture which aims to facilitate the implementation of digital continuity across Digital Threads, Data Spaces, Digital Twin workflows and AI/ML/Data pipelines	To provide EU industrial sectors (Automotive, machine & cutting tools, aeronautics, and eBattery industries) with a digital Continuum Reference Architecture that leads solutions capable of: · Reinforce decentralization on infrastructures, services, and data planes. · Ease the exploitation of the digital thread, regardless of where data and applications are · Exploit the concept of DaaP, as a marketable digitization of the value chain (data space); · Create convergence for Manufacturing and IT operations, natively by integrating toolkits covering the whole lifecycle of an Industrial Data Platform
32	Data Analytics and Visualisation Environment	UNI	A platform for developing, configuring and managing data-oriented and AI-oriented pipelines, respectively	· Creation of Data/AI Pipelines through a visualization component. · Provide a list of prebuilt data manipulation operators. · Provide a list of ML/AI algorithms.

				· Scheduling and monitoring of execution of pipelines. · Creation of data visualizations and dashboards.
33	Legal Ontology of IP Rights	KUL & ICF	Machine-readable ontology for IP rights management within MVNs	Establishes a standardized vocabulary that may be used by automated solutions (including Knowledge Graphs) to improve IPR tracking and discoverability, as well as enable reasoning (e.g. wrt. predicting permitted use)
34	Resilience Ontology	CHALMERS	Machine-readable ontology for manufacturing resilience	Ontology built using the manufacturing resilience semantics identified with the Resilience Compass (see entry 16 above)
35	Time Series Anomalies Analysis	CHALMERS	Survey on Neural Networks for Tine Series with Irregularity and Missingness	Establishes knowledge of methods addressing two main challenges of neural networks. Having time series with missingness and irregular time sampling. This enables enhanced network deployment
36	META Repository Demonstrator (MRD)	ICF	Management infrastructure for related data and meta-data for objects, knowledge resources, interconnectivity resources, and relationships	Omnis-based system prepared to integrate data from several databases and services into a specific context, acting like a hub, including search mechanisms such as multilingual hierarchical keyword search approaches and vector database searches across multiple domains
37	Sub-layouts simulation	VIS	Simulation functionality to ensure fast, efficient and colaborative development of complex simulations	The development and deployment of a production system can be a large project that involve several teams' experts. Simulation has demonstrated to be an efficient tool to assist on the fast development and deployment of production systems, this functionality will facilitate the fast and efficient collaboration between the teams'

				cutting errors and accelerating the process from concept to operation
38	Interoperability plug-in	VIS	Plug-in for Visual Components 4.0 to support CAD data management	Extending the CAD capabilities to enhance seamless integration between CAD design tools and Simulation

Out of the 38 Individual Exploitable Results (IERs) identified in the project, **16 have been updated during this final period**, representing **42% of the total portfolio**. Among these, 8 results were modified to better align with the project's evolving technological and exploitation landscape (IERs: 7, 11, 12, 16, 17, 18, 22, 28) while 8 entirely new results were introduced (IERs: 13, 32, 33, 34, 35, 36, 37, 38), reflecting the consortium's ability to capture emerging opportunities and adapt to ongoing developments. This dynamic update process ensures that the final list of exploitable results remains both comprehensive and representative of the project's innovation potential.

4.1.2 IPR Mechanisms [Updated]

Having identified the final list of the Project's Individual Exploitable Results, it is now crucial to map them against appropriate IPR mechanisms. Why is it so important? Protecting RE4DY's results with proper Intellectual Property Rights (IPRs) is essential to safeguard the consortium's innovations, secure competitive advantage, and ensure that project outcomes can generate lasting impact beyond its lifetime. Effective IPR management not only prevents unwanted spillovers and imitation but also enables controlled knowledge flows, facilitating collaboration within the consortium and with external stakeholders in line with open innovation principles. (Michele Grimaldi, 2021) By securing appropriate protection mechanisms, RE4DY partners can maximize the adoption and diffusion of their results while avoiding potential conflicts or infringements. Furthermore, evidence from the EPO and EUIPO highlights that IPR ownership is strongly linked to improved economic performance, particularly for SMEs (Office, 2022), underlining that timely and strategic protection of RE4DY's results will strengthen partners' positions in the market and enhance opportunities for sustainable exploitation.

Table 13: Updated Individual Exploitable Results & their IPRs

IER #	Individual Exploitable Result - Owner	Exploitable Result Owner	IPR mechanism

1	DC threat testing & operational security - S21SEC	S21SEC	Open-source license
2	Decentralized data management & analytics component - CNR	CNR	Open-source license
3	Knowledge acquired in manufacturing data spaces domain	IDSA	Open-source access
4	Data as a Product Container	UPV	Open-source access
5	Data Connection Profile	UPV	Open-source access
6	Didactic Factories and Experimentation Facilities Network	POLIMI	Open-source license
7	FEDMA (Federated Learning for Milling machines)	CORE	Copyright, Licensing
8	Data Spaces Test Bed	SANDETEL	Open-source license
9	Predictive Maintenance Application for Milling Machines - Spindle Diagnostics and Machine Care (My rConnect platform)	GFMS	Patent
10	Tool Management Application (My rConnect platform)	GFMS	Copyright, Patent
11	Data exchange model and cloud connectivity framework	GFMS	Patent
12	FPdM (Federated Predictive Maintenance)	ATLANTIS	Copyright, Licensing
13	Analysis Center	ATLANTIS	Copyright, Licensing
14	eIDAS Compliant Identity Management Solution Data	INTRA	Licensing
15	Decentralized Data Provenance and Traceability	INTRA	Licensing
16	Active Resilience framework	CHALMERS	Open-source access
17	RE4DY Framework	CHALMERS	Open-source access
18	Sovity Data Space Connector	ATOS	Open-Source Access (Sovity Community Edition)
19	Digital Twin deployment framework	SIE	Copyright, Licensing
20	XAI and Active Learning Platform	CERTH	Copyright, Licensing
21	Sovereign Data Transformation Services	CERTH	Copyright, Licensing
22	Testbed	SSF	Licensing
23	Robotic energy optimization application	FILL	Commercial License, Copyright

24	Design for Manufacturing (DfM)	FILL	Commercial License, Copyright
25	Logistics Knowledge Graph	UIO	Open-source license, Copyright
26	Dynamic interface	ICF	Open-source license, Copyright
27	Asset/IPR Management	ICF	Commercial License, Copyright
28	Asset Administration Shell of 5G	UMH	Licensing
29	TEF Services	INNO	On-demand service
30	Testbed platform	ENG	Commercial License, Copyright
31	Digital 4.0 continuum Reference Architecture	ENG	Open-source access
32	Data Analytics and Visualisation Environment	UNI	Open-source access
33	Legal Ontology of IP Rights	KUL & ICF	Open-source access
34	Resilience Ontology	CHALMERS	Open-source access
35	Time Series Anomalies Analysis	CHALMERS	Will be published and available in literature by end of project
36	META Repository Demonstrator (MRD)	ICF	Copyright, Commercial Licensing
37	Sub-layouts simulation	VIS	Copyright, Commercial Licensing
38	Interoperability plug-in	VIS	Copyright, Commercial Licensing

The analysis of the IPR mechanisms associated with the 38 Individual Exploitable Results (IERs) reveals a balanced strategy between openness and protection, reflecting both the collaborative and commercial ambitions of the project. A significant portion of results (approx. 40%) will be made available through open-source licenses or open access, particularly those that support knowledge transfer, interoperability, and ecosystem building (e.g., Data Spaces components, ontologies, and reference architectures). This approach maximizes dissemination, fosters adoption, and ensures alignment with European priorities around data sovereignty, openness, and cross-sectoral collaboration.

At the same time, several results are safeguarded through patents, copyright, or commercial licensing models, especially those with direct industrial application and high market potential, such as predictive maintenance solutions, tool management platforms, robotic energy optimization, and advanced simulation tools. This ensures that project

partners can protect their competitive advantages while generating sustainable revenue streams.

Interestingly, the portfolio also includes hybrid exploitation models, where results combine open-source accessibility with additional commercial or licensing pathways (e.g., Sovity Connector, Logistics Knowledge Graph, Dynamic Interface). This dual strategy allows for both widespread adoption and targeted monetization. Finally, some results will be exploited as services or publications, extending the impact of the project beyond software or tools and into knowledge dissemination and long-term capacity building.

4.1.3 Exploitation Routes

The effective exploitation of project results is a cornerstone for ensuring their long-term impact. Exploitation can take multiple forms, depending on the nature of the result and the strategic priorities of the partners involved. Broadly, these routes can be categorized as direct or indirect (see Figure 15). Direct routes focus on the immediate application of results, such as commercialization through new products or services, contract research, launching follow-up projects, or integrating outcomes into educational activities like university courses. Indirect routes, on the other hand, emphasize broader value creation through mechanisms such as licensing or transferring Intellectual Property Rights (IPR), establishing spin-offs, forming joint ventures, or contributing to standards development. By pursuing these exploitation pathways, the consortium can maximize both the economic and societal value of the project's innovations, ensuring that its outcomes continue to deliver benefits well beyond its duration.

Direct Exploitation Routes	Indirect Exploitation Routes
•Commercialisation: deployment of a novel product/service •Contract research (new contracts signed by the research group with external clients) •A new research project (application to public funded research programmes)/further research •Implementation of a new unversity course (note that a training course is a service)	•Assignment of the IPR •Lisensing of the IPR •Development of a new legislation/contribution to standards •Spin- off/ Joint Ventures •Other

Figure 15: Exploitation Routes

The following Table 14 presents the preferred exploitation routes identified by Project Partners for each Individual Exploitable Result. These routes reflect their intentions for post-project use of the developed solutions. Defining exploitation routes has also been essential for structuring the Project's Key Exploitable Results (KERs), serving as one of the main criteria in their selection.

Table 14: Exploitation Routes for RE4DY's Individual Exploitable Results

IER #	Individual Exploitable Result	Exploitable Result Owner	Exploitation Routes
1	DC threat testing & operational security	S21SEC	New research projects and further research
2	Decentralized data management & analytics component	CNR	Contribution to standards and policymaking
3	Knowledge acquired in manufacturing data spaces domain	IDSA	Open/Community Use: Open-source libraries
4	Data as a Product Container	UPV	New research projects and further research
5	Data Connection Profile	UPV	New research projects and further research
6	Didactic Factories and Experimentation Facilities Network	POLIMI	New research projects and further research
7	FEDMA (Federated Learning for Milling machines)	CORE	Commercialisation
8	Data Spaces Test Bed	SANDETEL	Open/Community Use: Open-source libraries
9	Predictive Maintenance Application for Milling Machines -Spindle Diagnostics and Machine Care (My rConnect platform)	GFMS	Commercialisation
10	Tool Management Application (My rConnect platform)	GFMS	Commercialisation
11	Data exchange model and cloud connectivity framework	GFMS	Commercialisation
12	FPdM (Federated Predictive Maintenance)	ATLANTIS	Commercialisation
13	Analysis Center	ATLANTIS	Commercialisation
14	eIDAS Compliant Identity Management Solution Data	INTRA	New research projects and further research
15	Decentralized Data Provenance and Traceability	INTRA	New research projects and further research
16	Active Resilience framework	CHALMERS	New research projects and further research

17	RE4DY Framework	CHALMERS	New research projects and further research
18	Sovity Data Space Connector	ATOS	New research projects and further research
19	Digital Twin deployment framework	SIE	New research projects and further research
20	XAI and Active Learning Platform	CERTH	New research projects and further research
21	Sovereign Data Transformation Services	CERTH	New research projects and further research
22	Testbed	SSF	New research projects and further research
23	Robotic energy optimization application	FILL	New research projects and further research
24	Design for Manufacturing (DfM)	FILL	New research projects and further research
25	Logistics Knowledge Graph	UIO	New research projects and further research
26	Dynamic interface	ICF	Commercialisation
27	Asset/IPR Management	ICF	Commercialisation
28	Asset Administration Shell of 5G	UMH	New research projects and further research
29	TEF Services	INNO	New research projects and further research
30	Testbed platform	ENG	New research projects and further research
31	Digital 4.0 continuum Reference Architecture	ENG	New research projects and further research
32	Data Analytics and Visualisation Environment	UNI	New research projects and further research
33	Legal Ontology of IP Rights	KUL & ICF	New research projects and further research
34	Resilience Ontology	CHALMERS	New research projects and further research
35	Time Series Anomalies Analysis	CHALMERS	New research projects and further research
36	META Repository Demonstrator (MRD)	ICF	Commercialisation
37	Sub-layouts simulation	VIS	Commercialisation
38	Interoperability plug-in	VIS	Commercialisation

The analysis of the identified Individual Exploitable Results (IERs) highlights a balanced exploitation landscape, with a clear distinction between results geared toward post-

project commercialisation and those primarily serving as a basis for further research and innovation. Out of the 38 IERs, 10 results **(≈26%)** are positioned for direct **commercialisation**, reflecting strong market orientation and a readiness to deliver tangible industrial impact in the short to medium term. These include solutions in predictive maintenance, decision-support systems, IPR management, simulation, and federated learning, all of which have demonstrated clear commercial value and scalability potential.

Meanwhile, **the majority of results (around 70%)** are expected to be exploited through new **research projects, standardisation activities, or community-oriented open use**, ensuring that RE4DY's innovations continue to shape the research agenda and support the evolution of manufacturing data spaces and resilience frameworks.

Overall, this distribution underscores the project's holistic impact; RE4DY has generated both commercially viable solutions and long-term strategic assets that strengthen the knowledge base, policy landscape, and future innovation pipelines.

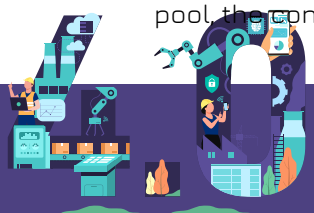
4.2 Exploitation Strategy – Final phase (Phase 3)

In the final phase of the Exploitation Plan, the main objective is to ensure that RE4DY's results are translated into concrete and sustainable exploitation pathways, supported by a market-oriented strategy. The focus is on demonstrating that RE4DY's innovations can deliver real-world impact beyond the project's lifetime. Building on the previous phases, this stage consolidates the knowledge gained and finalizes RE4DY's Key Exploitable Results (KERs). The following sections present the KERs in detail, from their definition to the analysis of the commercial ones, including their business cases and business plans.

4.2.1 The process towards Key Exploitable Results (KERs) Definition

After identifying and validating the Project's IERs, the next step is to define RE4DY's KERs. At this stage, it is important to clarify what constitutes a KER, how it differs from an IER, and how the two are connected.

The project produces a wide range of Individual Exploitable Results (IERs), which include all tangible and intangible outputs with potential for use beyond the project. From this broad pool, the consortium identifies and prioritises a smaller number of Key Exploitable Results



(KERs), which represent the most strategic, impactful, and sustainable outcomes. These KERs are positioned as the main legacy of the project, guiding future exploitation activities.

Having in mind the previous info, a Key Exploitable Result is a project outcome that has been identified as particularly valuable and prioritized for its high potential to generate impact. A KER can be exploited in different ways: commercially, societally, or through policy, further research, or education, by enabling the creation of new products, processes, or services, or by serving as a critical input to standardisation, policymaking, or capacity building. In essence, a KER represents the most promising results of a project, selected for their ability to deliver concrete benefits beyond the project's lifetime. (Helpdesk, 2022)

Summarising:

IERS:

- all potentially exploitable results (a broad set of results)
- tangible and intangible
- usually owned by single partners

KERs:

- Strategic subset
- High exploitation potential
- Sometimes combined IERs
- Project's flagship legacy

Basically, KERs are the strategically selected IERs, a narrower, prioritised set with the highest potential for exploitation and impact. In other words, RE4DY's KERs result from a filtering and prioritisation process applied to the broader set of IERs (see Figure 16). Their definition was guided by four main criteria: first, the identification and validation of IERs to ensure that all potential outcomes were captured and assessed; second, their application within the RE4DY pilots to demonstrate practical value and relevance in real industrial contexts; third, the examination of connections between IERs, either within a single pilot or across the project, to highlight synergies and complementarities; and fourth, their categorisation according to intended exploitation routes, distinguishing between research-oriented, industry-driven, and commercially viable results. This process ensured that the KERs reflect the most impactful, mature, and strategically relevant outcomes of the project.

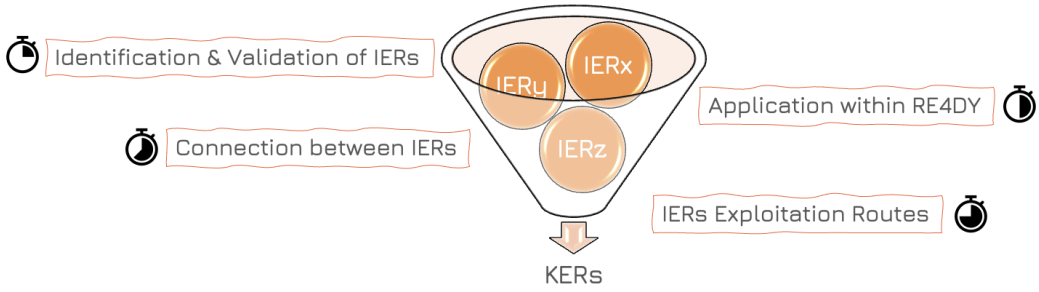


Figure 16: The process towards KERs definition

4.2.2 Result Ownership List (ROL) for identified KERs

As a result of this structured filtering and prioritization process, the final list of RE4DY's Key Exploitable Results (KERs) was established. The following Table 15 presents the Results Ownership List, outlining the KERs together with their respective owners and ensuring clarity on responsibilities for post-project exploitation.

Here, it is also important to clarify the terms Individual and Joint KER, as it impacts ownership and post-project exploitation by the Project's Partners:

Individual KER

- Ownership: Belongs to a single partner (100% ownership).
- Exploitation: That partner alone decides how to exploit, commercialize, or use the result in research.
- Independence: No need for licensing agreements with other partners.
- Examples: KER6: SmartCAD Integration Plug-in developed by VIS.

Joint KER

- Ownership/Contribution: Involves 2+ partners, either through shared ownership or each contributing their own result. The KER is usually formed by bundling complementary results into one offering.
- Exploitation: Requires some level of coordination, agreements, or licensing between partners. A KER Owner/Coordinator may be appointed to integrate and promote the bundle.
- Forms:
    1) Joint ownership (equal or proportional shares): All contributing partners hold equal or proportional ownership (e.g., 25% each, or proportional to

effort/IP contribution). This is a rarer form of ownership as it is quite difficult and time-costly for Partners to define the ownership percentages.

2) Individual ownership, jointly exploited KER: Each partner retains 100% ownership of their component/result. The KER is formed by bundling complementary results into one offering. Exploitation requires licensing agreements between partners. A KER Coordinator may be appointed to integrate and promote the bundle.
3) Lead partner ownership with licensing (others license their contributions): One partner (usually the industrial partner with commercial intent) is assigned as the owner/exploiter. Other partners retain 100% ownership of their parts but license them (exclusive or non-exclusive) to the lead partner. Revenue can be shared via royalty or lump-sum agreements.

- Examples: KER1: Federated AI Services (CORE + GFMS + ATLANTIS) could be a lead partner ownership (form 3), KER10: Data-as-a-Product Service Stack for Trustworthy and Sovereign Data Sharing (UPV + INTRA + CERTH + S21SEC) could be individual ownership, jointly exploited (form 2).

Table 15: Results Ownership List (ROL)

Key Exploitable Result (KER) #	Exploiting Partners & (IERs)	IPR Ownership
KER1: Federated AI Services for Predictive Maintenance & Analytics	GFMS (#10), COR (#7), ATL (#12)	Joint KER: Each Partner holds 100% of its IP.
KER2: Predictive Maintenance Application for Milling Machines – Spindle Diagnostics & Machine Care	GFMS (#9), UiO	Joint KER: Each Partner holds 100% of its IP.
KER3: Collaborative Industry 4.0 Testing & Digital Innovation Platform	GMFS (#11), INNO (#29), SIE (#19), SSF (#22)	Joint KER: Each Partner holds 100% of its IP.
KER4: Analysis Center	ATL (#12), optional ENG (#30)	Individual KER: ATL holds 100% of its IP.
KER5: Collaborative Sub-layout Simulation Tool	VIS (#37)	Individual KER: VIS holds 100% of its IP.
KER6: SmartCAD Integration Plug-in	VIS (#38)	Individual KER: VIS holds 100% of its IP.
KER7: Dynamic Decision-Making Interface for Vertical Integration of Knowledge in Manufacturing Value Networks	ICF (#26)	Individual KER: ICF holds 100% of its IP.

KER8: Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient Manufacturing Value Networks	ICF (#27)	Individual KER: ICF holds 100% of its IP.
KER9: Repository Demonstrator (MRD): Multimodal Knowledge Integration Hub	ICF (#36)	Individual KER: ICF holds 100% of its IP.
KER10: Data-as-a-Product Service Stack for Trustworthy and Sovereign Data Sharing	UPV, INTRA, CERTH, S21SEC	Joint KER: Each Partner holds 100% of its IP.
KER11: RE4DY Data Space Knowledge Toolkit for Manufacturing	IDSA (#3)	Individual KER: IDSA holds 100% of its IP.
KER12: Data Space Demonstration & Experimentation Network	PLM, SIE, SSF, INNO, ENG, SANDETEL	Joint KER: Each Partner holds 100% of its IP.
KER13: Sovity Data Space Connector for Trusted and Interoperable Data Exchange	ATOS (#18)	Individual KER: ATOS holds 100% of its IP.
KER14: Federated & Decentralized AI for Defect Detection and Quality Control	ENG (#30), ATL, CERTH, CNR	Joint KER: Each Partner holds 100% of its IP.
KER15: Digital 4.0 continuum Reference Architecture	ENG (#31)	Individual KER: ENG holds 100% of its IP.
KER16: Data Analytics and Visualization Environment (DAVE)	UNI (#32)	Individual KER: UNI holds 100% of its IP.
KER17: Logistics Knowledge Graph	UIO (#25)	Individual KER: UIO holds 100% of its IP.
KER18: Asset Administration Shell of 5G	UMH (#28)	Individual KER: UMH holds 100% of its IP.

The final list of RE4DY's Key Exploitable Results (KERs) demonstrates both the diversity and maturity of the project's outcomes. With 18 KERs identified, ownership is distributed across individual, joint, and non-joint arrangements, ensuring that each partner retains full rights over their intellectual property while fostering opportunities for collaboration. Most KERs are held individually, highlighting the strong innovation capacity of specific partners, while several non-joint KERs reflect successful cooperation and complementary contributions across organizations. The distribution of IPR ownership guarantees clarity, avoids conflicts, and provides a solid foundation for post-project exploitation, whether through commercialization, integration into partner offerings, or contribution to broader industrial and research ecosystems.

4.2.3 KERs categorization

In this section, the defined KERs can be categorised based on their post-project exploitation routes. These KERs can present three distinct directions as they are depicted in Figure 17.

Figure 17: Categorization of RE4DY's KERs

- **Commercial KERs**: These are results developed and validated within the pilots with a post-project intention toward commercialization. Their exploitation may take the form of new products, services, or licensing opportunities. In some cases, different results can be combined to form an integrated solution or value-added service, which can then be exploited jointly or individually (e.g., KER2 as a Joint KER with two Partners collaborating to offer a completed solution, KER1 as a non-Joint KER with three Partners developing solutions around the same topic, and KER5 as an Individual KER).
- **Research KERs**: These represent horizontal outcomes, not directly linked to specific pilots, that provide conceptual, methodological, or enabling value for future research and innovation. They serve as a foundation for further R&D activities and can be leveraged in follow-up initiatives such as Horizon Europe calls or collaborative projects involving academic and industrial research consortia.
- **Industrial KERs**: Results validated within pilots that demonstrate strong industrial relevance but still require further research or refinement to reach full market readiness. These outcomes can be advanced through joint industry–research exploitation, technology transfer initiatives, or lab-to-field adaptation activities.

Table 16: KERs per Category, KER Owner/Leader, and Pilot

Key Exploitable Result (KER) #	KER Owner/Leader	Category
KER1: Federated AI Services for Predictive Maintenance & Analytics	GFMS	Commercial

KER2: Predictive Maintenance Application for Milling Machines – Spindle Diagnostics & Machine Care	GFMS	
KER3: Collaborative Industry 4.0 Testing & Digital Innovation Platform	GMFS	
KER4: Analysis Center	ATL	
KER5: Smart Sub-layout Simulation Design	VIS	
KER6: SmartCAD Integration Plug-in	VIS	
KER7: Dynamic Decision-Making Interface for Vertical Integration of Knowledge in Manufacturing Value Networks	ICF	
KER8: Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient Manufacturing Value Networks	ICF	
KER9: Repository Demonstrator (MRD): Multimodal Knowledge Integration Hub	ICF	
KER10: Data-as-a-Product Service Stack for Trustworthy and Sovereign Data Sharing	UPV	Research
KER11: RE4DY Data Space Knowledge Toolkit for Manufacturing	IDSA	
KER12: Data Space Demonstration & Experimentation Network	PLM	
KER13: Sovity Data Space Connector for Trusted and Interoperable Data Exchange	ATOS	
KER14: Federated & Decentralized AI for Defect Detection and Quality Control	ENG	Industrial
KER15: Digital 4.0 continuum Reference Architecture	ENG	
KER16: Data Analytics and Visualization Environment (DAVE)	UNI	
KER17: Logistics Knowledge Graph	UIO	

KER18: Asset Administration Shell of 5G	UMH	

Overall, the distribution highlights that half of the KERs are already targeting commercialization, showcasing RE4DY's strong market orientation (see Table 16). At the same time, the presence of research and industrial KERs ensures continuity of innovation, laying the groundwork for future exploitation through research consortia, technology transfer, and industry–academia collaboration.

4.2.4 Overview of Key Exploitable Results (KERs)

Now, in this sub-section, the defined KERs are described, focusing on their result type, target market, potential KER Owner, and their potential post-project exploitation routes.

Commercial KERs

KER1: Federated AI Services for Predictive Maintenance & Analytics (Commercial, Joint KER deployed in GFMS-FRAISA - GFMS)

A federated learning-based ecosystem combining advanced software modules and AI frameworks for predictive maintenance in milling operations. It enables accurate estimation of the Remaining Useful Life (RUL) of tools while preserving data privacy across manufacturing sites. The system ensures operational continuity, optimized tool usage, and cost-effective, eco-conscious production. It combines:

- FEDMA (CORE) – IER#7: Federated AI for RUL estimation across distributed machines without sharing raw data.
- Tool Management App (GFMS) – IER#10: Software module within the My rConnect platform for tool wear monitoring and sustainability.
- FPdM (ATLANTIS) – IER#12: A flexible, privacy-preserving framework for multi-source predictive analytics and tool wear prediction and monitoring.

Result type: A software application designed to deliver predictive maintenance through federated AI and multi-source analytics. IP protection is ensured via copyright, licensing, and patents, allowing commercialization via Software as a Service (SaaS), OEM integration, or modular licensing while safeguarding the underlying AI algorithms and software components.

Target Market & Users: Manufacturing, CNC machinery, metalworking, aerospace, automotive, medical, and watchmaking; operators, maintenance staff, production managers, and digital factory integrators.

Exploitation Route: Via licensing, SaaS, or OEM integration. Partners retain 100% ownership of their contributions, with ATLANTIS and CORE able to license their results (exclusive or non-exclusive) to GFMS (based on terms that would be defined under separate licensing agreements). Post-project, GFMS could be considered the KER owner, selecting to integrate the most suitable result into their Tool Management App. Revenues can be shared via royalty or lump-sum agreements.

KER2: Predictive Maintenance Application for Milling Machines – Spindle Diagnostics & Machine Care (Commercial, Joint KER deployed in GFMS-FRAISA)

A software module integrated into the My rConnect platform that enables real-time health monitoring of critical components in milling machines, with a focus on the spindle. By leveraging advanced analytics and sensor data, it predicts residual lifetime, schedules preventive maintenance, and reduces the risk of unplanned downtime, enhancing operational efficiency and tool longevity.

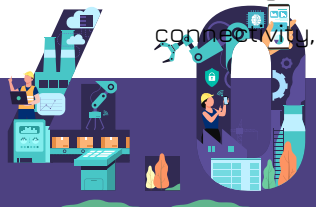
Result Type: A software application/service designed to provide predictive maintenance for milling machines, focusing on spindle diagnostics. IP protection is ensured through copyright and licensing, enabling commercialization via SaaS, OEM integration, or embedding within digital factory platforms, while safeguarding the underlying analytics and software components.

Target Market & Users: CNC machinery, metalworking, and industrial milling operations; manufacturing environments where spindle reliability directly impacts productivity and product quality; aerospace, automotive, medical, and precision engineering sectors. Users include operators, maintenance staff, production managers, and digital factory integrators.

Commercialization: Via SaaS, licensing, or OEM integration. The software can be deployed independently or integrated into existing digital platforms. Post-project, GFMS is considered the KER owner, embedding the deployment of UiO (Knowledge Graphs) in the My rConnect platform and managing commercialization, while UiO retains ownership of their individual contributions, and licensing terms can be agreed as needed. Together, they form one combined exploitable result, so it's treated as a Joint KER. GFMS could negotiate exclusive commercialization rights, but only under a joint agreement with the UiO.

KER3: Collaborative Industry 4.0 Testing & Digital Innovation Platform (Commercial/Research, non-Joint KER deployed in GFMS -FRAISA)

KER3 combines four complementary solutions into a modular and secure ecosystem that helps manufacturers monitor equipment, predict failures, and improve production efficiency using real-time data and digital twins. By integrating data exchange, cloud connectivity, testbeds, digital twin deployment, and TEF services, the platform allows



factories to test, validate, and adopt advanced AI, IoT, and digital twin technologies faster and with reduced risk. The solution supports Industry 4.0 transformation, particularly for the milling and discrete manufacturing sectors, enabling modernization, reduced downtime, and smarter production processes.

Result Type: A software module/service (new or improved) delivering an Industry 4.0 innovation platform.

Target Market & Users: Sectors: Milling, CNC machinery, discrete manufacturing, and other industrial sectors transitioning toward Industry 4.0. Users: Manufacturers, production managers, R&D teams, system integrators, and digital innovation hubs seeking to pilot and validate AI- and IoT-enabled solutions with lower integration risks.

Exploitation Route: Each partner retains 100% ownership of their contributions (#11 Data Exchange & Cloud Connectivity – GFMS; #22 Testbed – SSF; #19 Digital Twin Deployment – Siemens; #29 TEF Services – INNO). They all have rights to use and exploit their results post-project. For commercial exploitation, GFMS (commercial/KER leader/Owner) could negotiate with SSF, Siemens, and INNO to obtain exclusive rights to bundle the full solution. An Exploitation Agreement would define terms, including possible revenue-sharing arrangements. Post-agreement, GFMS could integrate the platform into its portfolio and launch a commercial Industry 4.0 service offering for discrete manufacturing clients.

KER4: Analysis Center for Quality Assessment based on Fault Detection (Commercial, Individual KER deployed in AVIO-AERO)

The Analysis Center is an analytics-driven software application designed to detect and interpret quality defects in EDM production lines. It leverages machine learning algorithms trained on distributed data from multiple production sites and it is integrated within ENG's Testbed Platform (IER#30) to ensure secure, privacy-preserving training. The application enables near real-time defect detection, with operators notified via an intuitive user interface that flags anomalies and potential endangered conditions.

Result Type: A software application/service focused on defect detection and analytics in EDM processes. IP protection via copyright and licensing ensures secure commercialization, while preserving, background knowledge, proprietary ML models and federated learning framework.

Target Market & Users: Sectors: EDM machinery manufacturers looking to enhance their offerings with software applications,, precision machining, aerospace, automotive, medical device production, and other high-precision manufacturing sectors. Users: Shop-floor Operators and maintenance staff for defect alerts, production managers for enhanced process monitoring, and digital factory integrators for embedding analytics into broader manufacturing suites or digital twin ecosystems.

Exploitation Route: This KER can be commercialized as a standalone solution or as an integrated module within manufacturing analytics suites, with licensing opportunities for EDM machine manufacturers and third-party platform providers. It can also offer potential for partnerships with platform integrators or integration into digital twin ecosystems. ATLANTIS retains full ownership, with optional collaboration from ENG (Testbed Platform IER#30) to support validation and deployment. There is a dual commercialization approach for ATLANTIS: ATLANTIS could license its result to ENG for a specific use, with royalties paid accordingly; otherwise, ATLANTIS can commercialize its KER independently, with minor modifications, or integrate it into other federated learning frameworks, such as their own FPdM.

KER5: Smart Sub-Layout Simulation Design (Commercial Individual KER deployed in AVL-FILL, VIS)

The Smart Sub-Layout Simulation Design is a software feature integrated into a simulation environment that enhances the fast, efficient, and collaborative development and deployment of production systems. By leveraging sub-layout functionality, it enables multi-team workflows, accelerates the transition from concept to operation, and reduces errors while streamlining system integration efforts.

Result Type: A software feature/product (new or improved), classified as PROD: Product, with IP protection through copyright and licensing.

Target Market & Users: Sectors: Industrial automation, production system design, and manufacturing solution providers. Users: System providers (to design and validate layouts), System integrators (to coordinate and streamline deployment), and End-users /factories (to accelerate commissioning and reduce integration risks).

Commercialization: The result will be commercialized as a licensed software feature within VIS's simulation tools. VIS retains 100% ownership, including copyright and licensing rights, ensuring control over exploitation. The feature strengthens VIS's product portfolio by addressing the growing need for collaborative, simulation-driven production design and offers scalability for different production system configurations.

KER6: SmartCAD integration plug-in (Commercial Individual KER deployed in AVL-FILL, VIS)

The SmartCAD Integration Plug-in is a software feature developed from Visual Components 4.0 that enables seamless integration between CAD tools and simulation environments. It supports CAD data management and ensures smooth exchange of product manufacturing information (PMI), bridging the gap between design and production simulation to improve efficiency, accuracy, and interoperability.

Result Type: A software feature classified as Product, with IP protection through copyright and licensing.

Target Market & Users: Sectors: Manufacturing, production system design, and industrial automation. Users: System providers: to streamline CAD-to-simulation workflows, System integrators: to ensure interoperability across digital design and manufacturing environments, End-users (factories): to enhance efficiency in layout planning and product design validation.

Commercialization: The plug-in will be commercialized as a licensed software feature integrated into VIS's simulation environment, extending the functionality of Visual Components 4.0. VIS retains 100% ownership, including copyright and licensing rights, allowing them to control exploitation. The plug-in strengthens VIS's offering by meeting industry demand for interoperability, accurate CAD data handling, and integrated workflows in digital factory environments.

KER7: Dynamic Decision-Making Interface for Vertical Integration of Knowledge in Manufacturing Value Networks (Commercial Individual KER deployed in VWAE, ICF)

KER7 introduces a software-based interface solution that enhances decision-making across complex manufacturing supply chains. By dynamically integrating real-time production data with ontology-based reference models and incorporating external data sources such as Intellectual Property Rights (IPR) systems, it provides a highly adaptable decision-support system. The solution improves transparency, responsiveness, and collaboration across interconnected industrial environments, enabling smarter and faster decisions.

Result Type: A software-based interface solution/service classified as Service. IP is managed through a dual approach:

- Open-source license to foster community uptake and collaborative evolution.
- Copyright retained for core software components to protect intellectual value and allow for potential dual-licensing models.

Target Market & Users: Sectors: Manufacturing supply chains, value networks, and industrial ecosystems requiring collaborative decision-making. Users: Primarily supply chain managers and decision-makers, but also relevant for production planners and integrators seeking improved visibility and responsiveness across manufacturing networks.

Commercialization: The solution will be commercialized through an open-source release to maximize adoption, while maintaining copyright over the core components to enable dual-licensing opportunities for commercial deployments. ICF retains 100% ownership, ensuring strategic control over exploitation pathways.

KER8: Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient Manufacturing Value Networks (Commercial Individual KER deployed in VWAE, ICF)

This Key Exploitable Result is an interactive interface and patent search system that integrates data from major international IPR and innovation databases (e.g., WIPO, EPO) using Natural Language Processing (NLP) and API connectivity. The system enables manufacturers to identify IPR gaps, ensure IP compliance, and uncover innovation opportunities to enhance asset management and strengthen supply chain resilience.

Result Type: A software-based product (new or improved), classified as PROD: Product, with IP protection through copyright.

Target Market & Users: Sectors: Manufacturing supply chain technology, industrial innovation, and IP management. Users: B2B manufacturing supply chain technology providers, component suppliers, and industrial innovators seeking to optimize asset management and monitor IPR landscapes for resilience and compliance.

Commercialization: The system could be commercialized through a tiered licensing model, offering standard and premium access/features depending on client needs. ICF retains 100% ownership of the software and system interface, ensuring control over commercialization and strategic exploitation. The KER provides manufacturers and suppliers with actionable insights to enhance supply chain resilience, IP compliance, and innovation potential.

KER9: Repository Demonstrator (MRD): Multimodal Knowledge Integration Hub (Commercial Individual KER deployed in VWAE, ICF)

The META Repository Demonstrator (MRD) is a multimodal interface database integrator designed to manage, integrate, and contextualize heterogeneous data and metadata across industrial ecosystems. Built on the Omnis platform, it enables advanced search and discovery of interconnected data, knowledge, and service relationships, serving as a central hub for knowledge integration and exploration.

Result Type: A software-based product (new or improved), classified as Product, with IP protection through copyright.

Target Market & Users: Sectors: Industrial logistics, manufacturing knowledge management, and enterprise data integration. Users: Industry logistics managers and knowledge management teams seeking unified access to distributed and heterogeneous industrial data for operational and strategic decision-making.

Exploitation Route: The MRD will be commercialized through a licensing model for enterprise deployments, allowing companies to adopt it within their industrial ecosystems. ICF retains 100% ownership of the software and underlying infrastructure, ensuring

strategic control over exploitation. The demonstrator supports enhanced data-driven decision-making, improved interoperability, and streamlined access to industrial knowledge across diverse ecosystems.

Research KERs

KER10: Data-as-a-Product Service Stack for Trustworthy and Sovereign Data Spaces or Data Sharing (Research Joint KER, UPV)

This KER combines six interoperable results into a modular service stack that enables organizations to expose, manage, and protect data as a product, fully aligned with European Data Spaces principles and architecture. It provides a trusted ecosystem for secure and governed data sharing, including data abstraction, standardized connection profiles, identity and access management, blockchain-based traceability, sovereign data transformation, and integrated cybersecurity testing. Together, these capabilities ensure interoperability, compliance, and trust in cross-sector data ecosystems.

It consists of the following components:

- (IER #1) DC Threat Testing & Operational Security – S21SEC
- (IER #4) Data as a Product Container – UPV
- (IER #5) Data Connection Profile – UPV
- (IER #14) eIDAS Compliant Identity Management – INTRA
- (IER #15) Decentralized Data Provenance and Traceability – INTRA
- (IER #21) Sovereign Data Transformation Services – CERTH

Result Type: A Combination of software modules, middleware, and methodologies, and it can be provided as a modular service.

Target Market & Users: Industrial and public-sector data providers, Data intermediaries and marketplace operators, Digital service providers building tools for Data Spaces.

Exploitation Routes: Post-project, the KER will primarily follow a research-driven exploitation path, serving as a foundation for Horizon Europe, DEP, and EDIH initiatives targeting sector-specific Data Space pilots. The KER can be expanded by improving each exploitable result and testing it in real-world industrial or public-sector contexts.

IPR Ownership: Each partner retains full ownership of their respective result. IPRs are primarily managed under open-source licenses, with optional dual licensing models for commercial reuse. The KER is formed by bundling complementary results into one offering. Therefore, potential post-project exploitation requires licensing agreements between partners. UPV will be appointed (KER leader) to coordinate, integrate, and promote the bundle.

KER11: RE4DY Data Space Knowledge Toolkit for Manufacturing (Research Individual KER, IDSA)

The RE4DY Data Space Knowledge Toolkit, developed by IDSA, captures and systematizes knowledge acquired in the manufacturing data spaces domain. It acts as an asset for knowledge transfer and sharing, supporting organizations in adopting and implementing data space concepts. By incorporating RE4DY into the Dataspace Radar and showcasing it in events and conferences, the toolkit promotes new data sharing scenarios and disseminates the principles of data sovereignty and interoperability.

Result Type: A knowledge-based toolkit, classified as BUS: Business model (new or improved), with open-source access.

Target Market & Users: Sectors: Data space ecosystems, manufacturing networks, digital platforms. Users: IDSA, Gaia-X, DSSC members and stakeholders, as well as industry and manufacturing networks looking to explore and adopt data space-enabled business models.

Exploitation Routes: IDSA holds 100% ownership of the result, which will be made available under an open/community use model. Post-project, exploitation will focus on open-source dissemination, community adoption, and knowledge transfer through events, conferences, and ecosystem engagement. The toolkit will serve as a reference resource for stakeholders in the Data Space Ecosystem, enabling the development of new data sharing scenarios and reinforcing the dissemination of the Data Spaces concept across industries.

KER12: Data Space Demonstration and Experimentation Network (Research Joint KER, PMI)

An ecosystem combining physical and digital experimentation platforms, training environments, and demonstrators to support SMEs and industry stakeholders in the development, validation, and adoption of advanced technologies such as digital twins, AI/ML, data spaces, and IoT. The network provides hands-on environments where solutions can be tested, validated, and scaled, reducing barriers for industrial uptake and supporting knowledge transfer. It includes the following components:

- (IER #6) Didactic Factories and Experimentation Facilities Network – POLIMI
- (IER #8) Data Spaces Test Bed – SANDETEL
- (IER #19) Digital Twin Deployment Framework – SIEMENS
- (IER #22) Testbed – SSF
- (IER #29) TEF Services – INNO
- (IER #30) Testbed Platform – ENG

Result Type: Platform, infrastructure, and software environment and it can be provided as a Service

Target Market & Users: Manufacturing SMEs, Industrial stakeholders and factory operators, educational institutions and technical schools, Researchers and developers of smart manufacturing systems

Exploitation Routes: Further EU research (e.g., Horizon Europe projects) to extend KER capabilities by enhancing each individual exploitable result. Meaning, continued use as a test and experimentation facility under EU-funded projects (Horizon Europe, DEP). Finally, integration into the European network of TEFs and Learning Factories to support wide-scale adoption and cross-sector collaboration.

IPR Ownership: Each partner keeps 100% ownership of their own exploitable result (e.g., POLIMI: Didactic Factories Network, SANDETEL: Data Spaces Test Bed, SIEMENS: Digital Twin Deployment Framework, etc.). IPRs are managed under open-source licenses and copyrights with optional dual licensing for commercial reuse. Post-project, the KER will be exploited jointly through a coordination agreement, with POLIMI acting as coordinator to ensure integration, promotion, and alignment in future research projects and TEF networks. Importantly, no joint ownership shares are created; partners retain full control of their individual results while collaborating on the KER as a bundled offering.

KER13: Sovity Data Space Connector for Trusted and Interoperable Data Exchange (Research Individual KER, ATOS)

The Sovity Data Space Connector (#18), developed by ATOS, builds on the open-source Eclipse Dataspace Connector (EDC) to enable secure, interoperable, and governed data exchange within and across data spaces. It implements modular, standardized protocols and integrates mechanisms for usage control, data sovereignty, contract enforcement, and compliance with Gaia-X principles, making it a reference tool for trusted data sharing in line with EU data strategies.

Result Type: A software environment, classified as a Service, distributed under an open-source access model (Sovity Community Edition).

Target Market & Users: Sectors: Public and industrial data providers, data space and marketplace operators, digital sovereignty ecosystems. Users: Data space operators, marketplace platform providers, and digital sovereignty service integrators.

Exploitation Routes: Post-project, exploitation will follow a research-driven pathway. The connector can be integrated into new EU R&I projects (e.g., Horizon Europe) targeting federated data spaces and data sovereignty. It can also contribute to open-source ecosystems (Eclipse EDC) and act as a reference implementation in testbeds and real-

world pilots. Collaboration with academia and standardisation bodies (e.g., IDSA, Gaia-X, ISO) will ensure broad adoption and alignment with emerging European standards.

Industrial KERs

KER14: Federated & Decentralized AI for Defect Detection and Quality Control (Industrial Joint KER developed in AVIO-AERO, ENG)

This KER delivers a suite of decentralized and federated AI-based tools for production-quality analytics, defect detection, and process monitoring. It integrates components for decentralized data management and analytics (CNR), federated quality defect detection via the Analysis Center (ATLANTIS), XAI and Active Learning for quality control (CERTH), and testbed validation (ENG). Together, the suite enables cross-site learning, explainable AI in quality control, and training-enhanced defect inspection systems, supporting more transparent, reliable, and distributed manufacturing analytics.

Result Type: A combination of algorithms, models, software applications, and platforms, provided as a Service

Target Market & Users: Sectors: Advanced manufacturing, quality assurance, industrial automation, aerospace, automotive, electronics. Users: Production managers, quality control engineers, digital factory integrators, and research/innovation ecosystems exploring federated AI for defect detection.

Exploitation Routes: Each partner retains 100% ownership of their result, while ENG coordinates the overall KER to ensure coherence and exploitation. IPRs are managed under open-source licenses with optional dual-licensing models for commercial reuse. Post-project, exploitation will focus on integration into collaborative research projects (e.g., federated AI, quality monitoring pilots) and potential commercial adoption via special licensing agreements (e.g., ATLANTIS licensing the Analysis Center).

Exploitation models:

- As one bundle (joint exploitation): ENG (as coordinator) could act as the "orchestrator" that integrates the components into a full service. Other partners license their contributions (e.g., ATLANTIS licensing Analysis Center) to ENG under agreed terms. This way, the KER could be marketed as a single solution for federated defect detection and quality control.
- As individual components (independent exploitation): Each partner could also exploit their own component (e.g., ATLANTIS commercializes the Analysis Center separately, CERTH focuses on XAI).

KER15: Digital 4.0 continuum Reference Architecture (Industrial Individual KER, all pilots, ENG)

The Digital 4.0 Continuum Reference Architecture provides a blueprint for digital continuity across Digital Threads, Data Spaces, Digital Twin workflows, and AI/ML pipelines. It is designed to support the integration of decentralized infrastructures and services while enabling lifecycle-wide data flows in industrial platforms, ensuring consistency, interoperability, and scalability for Industry 4.0 applications.

Result Type: A Reference Architecture, classified as METH: Methodology, material, technology, design (new or improved), with open-source access to promote adoption and collaboration.

Target Market & Users: Sectors: Manufacturing industries such as automotive, aerospace, and electronics. Users: System integrators, solution providers, platform developers, and technology vendors seeking standardized frameworks for digital continuity and interoperability.

Exploitation Route: Although validated in an industrial pilot, the technology provider intends to pursue further research. ENG retains 100% ownership of the result, making it available as an open-source reference architecture. Exploitation will focus on integration into future research projects (e.g., Digital Twins, Data Spaces) and fostering open-source collaboration for the evolution of architecture tooling.

KER16: Data Analytics and Visualization Environment (DAVE) (Individual Industrial KER developed in VWAE, UNI)

DAVE is an open-source platform for building, configuring, and managing data and AI pipelines. It integrates data processing, machine learning, and real-time visualization into a single environment, enabling streamlined development and deployment of complex data workflows. By simplifying pipeline creation and monitoring, DAVE supports faster experimentation and adoption of AI-driven analytics. It is based on the following component:

- IER #32 Data Analytics and Visualization Environment (DAVE)

Result Type: It is considered an open-source Platform, and it can be characterized as a product.

IPR Ownership: UNI holds 100% ownership of the result. The solution is released as open-source, ensuring broad accessibility and encouraging community-driven evolution.

Target Market & Users: Academic and industrial researchers working with data and AI, Developers and data scientists creating advanced analytics workflows, and SMEs and organizations seeking accessible AI/ML pipeline tools

Exploitation Routes:

- Research: Further use and extension in EU-funded research (Horizon Europe, DEP) focusing on AI, data analytics, and visualization.
- Community-driven uptake: Adoption through the open-source community, with potential integration into data space and digital twin ecosystems.
- Educational use: Deployment in universities and technical training programs as a hands-on tool for teaching AI and data pipeline management.

KER17: Logistics Knowledge Graph (Individual Industrial KER developed in VWAE, UiO)

The Logistics Knowledge Graph is an open-source reference framework tailored to the automotive assembly logistics domain. It provides a structured representation of logistics concepts, data relationships, and process semantics, enabling enhanced data integration, improved analytics accuracy, and higher-quality decision-making in complex, high-volume production environments. Its main is:

- IER #25 Logistics Knowledge Graph – UiO

Result Type: It is a Reference framework, and it can be considered as a Methodology.

IPR Ownership: UiO holds 100% ownership of the result, protected under an open-source license and copyright.

Target Market & Users: Automotive logistics sector, Manufacturing supply chain managers, Researchers, and solution developers in logistics data integration and decision support.

Exploitation Routes:

- Research: Extension through Horizon Europe or DEP projects focusing on data spaces, supply chain optimization, and logistics AI.
- Open-source adoption: Use as a reference framework for industry stakeholders to model, test, and standardize logistics processes.

KER18: Asset Administration Shell of 5G (Individual Industrial KER developed in AVL-FILL, UMH)

The Asset Administration Shell (AAS) of 5G is a standardized digital representation of a 5G system, combining the AAS of both the 5G User Equipment (UE) and the 5G Network. It provides EU stakeholders with a digital twin of 5G components that can be integrated with the digital twin of industrial plants or manufacturing processes, enabling the construction of a complete, system-level digital twin of production environments. This strengthens interoperability, monitoring, and optimization in Industry 4.0 scenarios. Its main component is:

- IER #28 Asset Administration Shell of 5G – UMH

Result Type: Reference framework, and it can be characterized as a methodology.

IPR Ownership: UMH holds 100% ownership of the result, with open-source licensing to ensure accessibility and broader adoption.

Target Market & Users: Manufacturing industries adopting 5G-enabled industrial networks, System integrators and solution providers for industrial connectivity, Researchers and developers of digital twin and Industry 4.0 frameworks, Telecom providers supporting industrial 5G deployments.

Exploitation Routes:

- Research: Integration into Horizon Europe projects and standardization efforts related to 5G, digital twins, and Industry 4.0.
- Open-source adoption: Use by industry stakeholders to model, test, and validate 5G-based industrial systems.

4.2.5 Bridging Pilots with Commercial KERs

As the RE4DY Project reaches its final stages, a key priority is to evaluate the commercial potential of its Key Exploitable Results (KERs) that have been tested and demonstrated within the pilots. By focusing on results with clear post-project market relevance, the consortium aims to ensure that the technological innovations developed do not remain confined to the research environment but can transition into real-world industrial adoption.

To assess this commercial relevance and exploitation potential, pilot partners were invited to provide structured feedback through a dedicated questionnaire. This evaluation focused on four key criteria:

- **Awareness & Understanding**: comprehending how familiar pilots are with the developed solutions.
- **Perceived Value**: identifying which KERs are most relevant, valuable, and aligned with the pilot's needs.
- **Likelihood of Adoption**: exploring the pilot's intention to continue using or exploiting the solutions after the project's end.
- **Organisational Readiness**: assessing the level of preparedness for integration, including technical, organisational, and strategic aspects.

This structured approach ensures that pilots' input not only validates the project's outcomes but also informs tailored exploitation strategies, guiding the transition of RE4DY

solutions toward long-term sustainability and tangible impact for both technology providers and industrial stakeholders.

Therefore, RE4DY's Commercial KERs that are evaluated in the questionnaire are:

- KER1 – KER3: Deployed in GFMS-FRAISA
- KER4: Deployed in AVIO-AERO
- KER5 – KER6: Deployed in AVL-FILL
- KER7 – KER9: Deployed in VWAE

In total, nine (9) KERs.

GF-FRAISA Pilot Feedback

As part of the RE4DY pilot evaluation, GF-FRAISA provided valuable insights on the tested solutions and their potential for post-project adoption.

Awareness & Understanding

GF-FRAISA reported being very familiar with the RE4DY solutions developed and tested within the project, confirming strong engagement with the outcomes.

Perceived Value

When ranking the RE4DY Key Exploitable Results (KERs), GF-FRAISA identified KER2: Predictive Maintenance Application for Milling Machines (Spindle Diagnostics & Machine Care) as their top priority, followed by KER1: Federated AI Services for Predictive Maintenance & Analytics, and KER3: Collaborative Industry 4.0 Testing & Digital Innovation Platform. The perceived value of KER2 was rated at the highest level (5 out of 5). GF-FRAISA emphasised that the quality of machine services is a critical success factor for their organisation. The ability to enable real-time monitoring and predict potential failures directly addresses operational challenges and enhances machine reliability.

Likelihood of Adoption

GF-FRAISA confirmed that they intend to continue using KER2 beyond the project. Their strategy is to both commercialise the solution and integrate it into their portfolio of Digital Applications services, highlighting strong business exploitation potential.

Organisational Readiness

In terms of readiness, GF-FRAISA rated themselves at 4 out of 5, showing high preparedness for adoption. To fully integrate the solution post-project, they identified the need for system integration with existing infrastructures and staff training to maximise operational impact.

Concluding, GF-FRAISA's feedback clearly positions KER2, the Predictive Maintenance Application for Milling Machines, as the most valuable RE4DY solution, rated extremely useful for addressing critical challenges in machine reliability and real-time monitoring. With strong organisational readiness (score 4/5) and a clear intention to integrate the solution into their digital services portfolio, the pilot confirms a concrete path to post-project commercialisation, contingent mainly on system integration and staff training.

VWAE Pilot Feedback

As part of the RE4DY pilot evaluation, VWAE provided valuable insights on the tested solutions and their potential for post-project adoption.

Awareness & Understanding

VWAE reported being very familiar with the RE4DY solutions developed and tested within the project confirming strong engagement with the outcomes.

Perceived Value

They highlighted KER8: Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient Manufacturing Value Networks as their top choice, ranking it highest in perceived value. They rated this solution 4/5, emphasizing its relevance in addressing recurring challenges in logistics planning and execution. Specifically, VWAE underlined the importance of having a user-friendly, flexible, and real-time interface to interact with AI-driven simulation and optimization outputs, which is currently hindered by the fragmentation of logistics data across multiple systems.

Likelihood of Adoption

In terms of the likelihood of adoption, VWAE expressed a clear intention to adopt and scale KER8 post-project. Their plan involves a phased approach: first ensuring local stability and integration within plant logistics processes, followed by proposing its roll-out at a group-wide level, contingent on support from headquarters' IT and logistics functions. This illustrates both the scalability and the strategic importance of the solution for the company.

Organisational Readiness

VWAE assessed their organisational readiness as moderate (3/5), indicating that while adoption is feasible, it will require technical support to ensure smooth integration and strategic alignment with corporate priorities. These enablers are considered critical for unlocking the full exploitation potential of the solution.

Concluding, VWAE identified KER8 as the most valuable RE4DY solution, recognizing its potential to solve persistent challenges in logistics planning through a user-friendly, real-

time interface for interacting with AI-driven outputs. While they rated its value highly (4/5) and expressed a clear intention to adopt and scale it across local and group-level logistics processes, successful post-project exploitation will depend on securing technical support and strategic alignment within the wider organization.

AVL-FILL Pilot Feedback

As part of the RE4DY pilot evaluation, AVL-FILL provided valuable insights on the tested solutions and their potential for post-project adoption.

Awareness & Understanding

AVL-FILL reported being somewhat familiar with the solutions developed in the RE4DY Project, indicating a moderate awareness of the project outcomes.

Perceived Value

Among the RE4DY KERs, AVL-FILL identified KER5: Smart Sub-layout Simulation Desgin (VIS – IER #37) as the most valuable, followed by KER6: SamrtCAD integration Plug-in (VIS - IER #38). They rated KER5 with a score of 4 out of 5 on perceived value. The main benefits highlighted were time savings and improved cross-team communication, addressing concrete challenges in their current workflows.

Likelihood of Adoption

When asked about the continuation of use post-project, AVL-FILL responded maybe regarding KER5. If adopted, their intended exploitation would be through internal use and integration into existing operational systems and workflows, pointing toward a focus on organisational efficiency rather than external commercialisation.

Organisational Readiness

AVL-FILL rated their readiness level as 3 out of 5, reflecting moderate preparedness for adoption. They emphasised that integration with existing systems will be essential to enable effective post-project use of the solution.

Overall, AVL-FILL recognises the operational value of RE4DY's solutions, particularly KER5, for improving efficiency and collaboration. However, successful post-project exploitation will largely depend on ensuring seamless integration with their existing tools and workflows, highlighting the need for further technical alignment to unlock full adoption.

AVIO – AERO Pilot feedback

As part of the RE4DY pilot evaluation, AVIO-AERO provided valuable insights on the tested solutions and their potential for post-project adoption.

Awareness & Understanding

AVIO AERO reported being very familiar with the solutions developed in the RE4DY Project, indicating a strong awareness of the project outcomes.

Perceived Value

AVIO AERO evaluated KER4: Analysis Center (ATLANTIS – IER #13, integrated with ENG's Testbed Platform – IER #30) as it was the only deployed result with post-project commercial intentions in their pilot. They rated it 3 out of 5 in perceived value. The solution was considered important as it allows process engineers to promptly adjust parameters when anomalies are detected and confirmed, thereby reducing downtime and mitigating risks to product quality.

Likelihood of Adoption

When asked about post-project continuation, AVIO AERO responded maybe. If adopted, their exploitation would center on internal use, particularly improving traceability within production cycles. This would enable more accurate OEE calculations by incorporating quality losses, ultimately enhancing both process efficiency and product quality through the application of AI models.

Organisational Readiness

AVIO AERO rated their readiness level as 3 out of 5, reflecting moderate preparedness for adoption. They noted that technical support, integration with existing systems, and staff training would be critical to enable post-project deployment.

Overall, AVIO AERO sees clear potential in KER4 to improve quality control and process efficiency. However, successful post-project adoption will depend on addressing traceability challenges and ensuring the necessary technical and organizational support.

Conclusion on RE4DY Pilot Feedback and Commercial KERs

The pilot evaluations demonstrate that RE4DY's Key Exploitable Results (KERs) hold clear operational and commercial potential across multiple industrial contexts. Awareness among pilots is generally high, with all partners (pilots) reporting strong familiarity with the solutions.

While perceived value is moderate to high (approximately 4 out of 5), the likelihood of post-project adoption varies; two pilots indicated yes, and the other two indicated maybe as their response. Adoption depends heavily on enablers such as integration with existing systems, staff training, technical support, and alignment with internal processes. Organisational readiness is generally moderate (approximately 3.5 out of 5), suggesting that while the solutions are promising, structured support will be essential to unlock their full potential.

Overall, the feedback confirms that the commercial KERs are well-positioned to transition from pilot testing to real-world deployment. Post-project exploitation strategies should focus on system integration, technical assistance, and knowledge transfer to ensure scalable adoption, maximise operational impact, and facilitate commercialisation where relevant.

4.2.6 Analysing the Commercial KERs

In this sub-section, light is shed on the analysis of the commercial KERs deployed on the four Projects' pilots. Now, in response to the Project Officer's recommendation:

"We expect to see business impact during the next review meeting, and also a comprehensive business plan on how to go to market!"

We have prioritized a set of commercially oriented KERs. These results were chosen because they show the strongest potential for near-term market uptake, scalability, and value creation across the manufacturing ecosystem. Importantly, feedback from the pilots has confirmed their interest in adopting these solutions post-project, reinforcing both their commercial viability and the credibility of the exploitation plan. By focusing on these KERs, we ensure that the project not only delivers research excellence but also translates its innovations into tangible business opportunities and sustainable exploitation paths.

The following figure illustrates the framework used for analyzing the Key Exploitable Results (KERs) of the RE4DY Project. The analysis is structured around three main pillars, each comprising specific sub-criteria. Together, these pillars provide a comprehensive assessment, ensuring that every aspect of these KERs is systematically evaluated:

- KER Summary: This pillar includes the essential info for a specific KER.
- Business Case: This pillar justifies why this KER should be undertaken; if it is worth exploiting (Why to do this?)
- Business Plan: On the other hand, this pillar acts as an executional roadmap describing how the result could succeed over time (How do we make it reach the market/how do we make it work?).

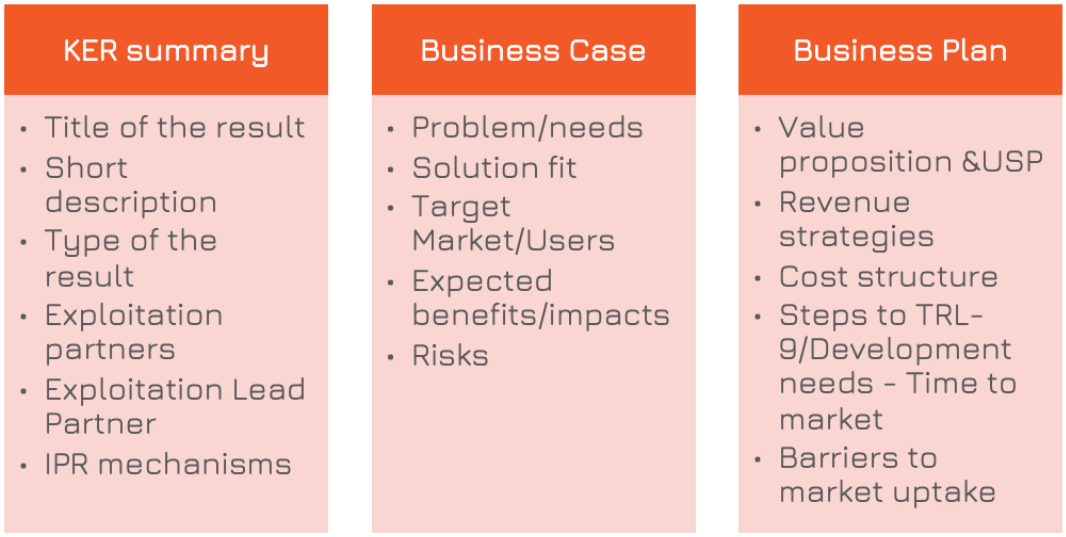
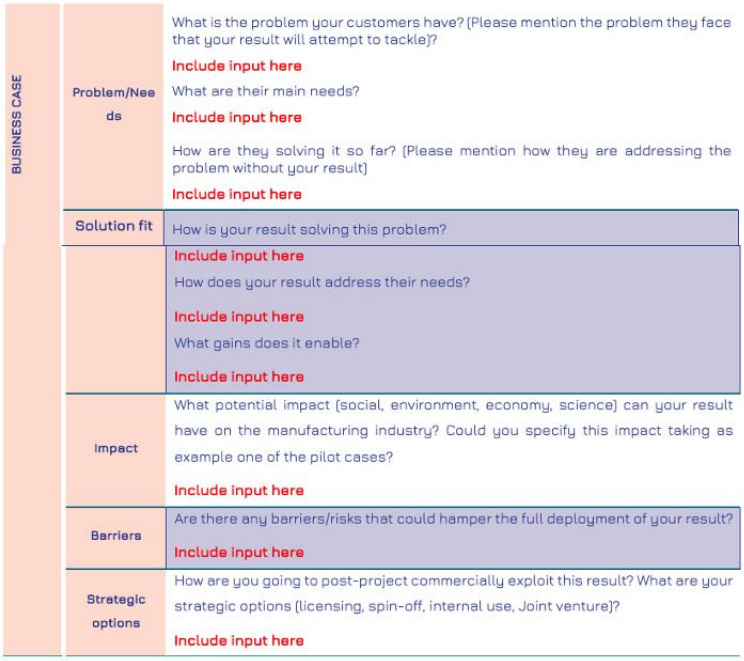


Figure 18: Commercial KERs' pillars of analysis

In addition, the analysis of the KERs was carried out through online discussions with the partners responsible for their deployment during the RE4DY project. To support these discussions, a detailed questionnaire (see Figure 19, Figure 20) was developed, designed to guide partners in analyzing their KERs and clarifying their intentions for post-project exploitation.

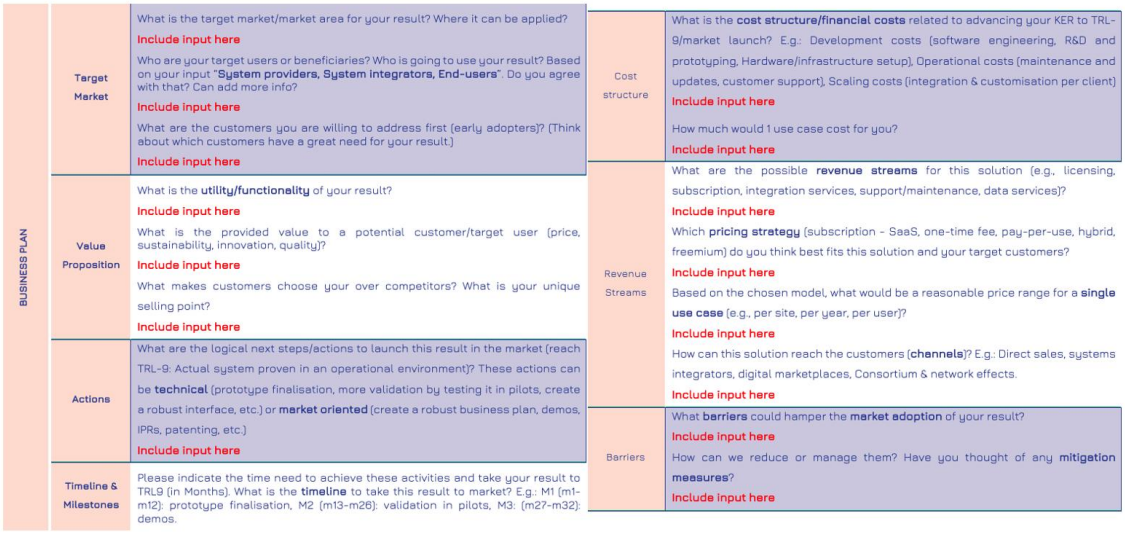
Pillars	Criteria	Input
KER SUMMARY	IP Ownership & name	Who is the Owner/Exploitation Leader of this Key Exploitable Result (KER)? **Include input here** What are the **IP components** for this KER? By IP (Intellectual Property) components, we mean the distinct assets that make up your solution (e.g., software/algorithms, data models, APIs/interfaces, datasets, UI/UX designs, methods, etc). **Include input here** Would you give a different name to your KER (to better characterize it)? For your result, we suggested the name "**Collaborative Sub-layout Simulation Tool**" in the second shared MS Excel. Do you agree with this name or is it better to remain as "**Sub-layouts simulation**"? **Include your explanation here**
	Type of result	Please characterize the type of your result (Algorithm, Methodology, software module, Framework, Software application, Hardware, Report/Study, Dataset, Platform, Other (Please specify)). **Include input here**
	Description	Describe in a few lines your result/solution. This is your provided description so far: "**Simulation functionality to ensure fast, efficient and colaborative development of complex simulations.**". Do you agree with this description? **Include input here**
	IPR Protection	Which IPR mechanism do you intend to apply for protecting this result (e.g. patent, copyright, trade secret, etc.)? This is your provided input: **Commercial Licensing, Copyright**. Do you agree with these options? **Include input here**

Figure 19: Part of the Questionnaire for the discussion around KER analysis (KER Summary Part)



BUSINESS CASE	Problem/Needs	What is the problem your customers have? (Please mention the problem they face that your result will attempt to tackle)? Include input here What are their main needs? Include input here How are they solving it so far? (Please mention how they are addressing the problem without your result) Include input here
	Solution fit	How is your result solving this problem? Include input here How does your result address their needs? Include input here What gains does it enable? Include input here
	Impact	What potential impact (social, environment, economy, science) can your result have on the manufacturing industry? Could you specify this impact taking as example one of the pilot cases? Include input here
	Barriers	Are there any barriers/risks that could hamper the full deployment of your result? Include input here
	Strategic options	How are you going to post-project commercially exploit this result? What are your strategic options (licensing, spin-off, internal use, Joint venture)? Include input here

Figure 20: Part of the Questionnaire for the discussion around KER analysis (Business Case Part)



BUSINESS PLAN	Target Market	What is the target market/market area for your result? Where it can be applied? Include input here Who are your target users or beneficiaries? Who is going to use your result? Based on your input "**System providers, System integrators, End-users**". Do you agree with that? Can add more info? Include input here What are the customers you are willing to address first (early adopters)? (Think about which customers have a great need for your result.) Include input here
	Value Proposition	What is the **utility/functionality** of your result? Include input here What is the provided value to a potential customer/target user (price, sustainability, innovation, quality)? Include input here What makes customers choose your over competitors? What is your unique selling point? Include input here
	Actions	What are the logical next steps/actions to launch this result in the market (reach TRL-9: Actual system proven in an operational environment)? These actions can be **technical** (prototype finalisation, more validation by testing it in pilots, create a robust interface, etc.) or **market oriented** (create a robust business plan, demos, IPRs, patenting, etc.) Include input here
	Timeline & Milestones	Please indicate the time need to achieve these activities and take your result to TRL9 (in Months). What is the **timeline** to take this result to market? E.g.: M1 (m1-m12): prototype finalisation, M2 (m13-m26): validation in pilots, M3: (m27-m32): demos.
	Cost structure	What is the **cost structure/financial costs** related to advancing your KER to TRL-9/market launch? E.g.: Development costs (software engineering, R&D and prototyping, Hardware/infrastructure setup), Operational costs (maintenance and updates, customer support), Scaling costs (integration & customisation per client) Include input here How much would 1 use case cost for you? Include input here
	Revenue Streams	What are the possible **revenue streams** for this solution (e.g., licensing, subscription, integration services, support/maintenance, data services)? Include input here Which **pricing strategy** (subscription - SaaS, one-time fee, pay-per-use, hybrid, freemium) do you think best fits this solution and your target customers? Include input here Based on the chosen model, what would be a reasonable price range for a **single use case** (e.g., per site, per year, per user)? Include input here How can this solution reach the customers (**channels**)? E.g.: Direct sales, systems integrators, digital marketplaces, Consortium & network effects. Include input here
	Barriers	What **barriers** could hamper the **market adoption** of your result? Include input here How can we reduce or manage them? Have you thought of any **mitigation measures**? Include input here

Figure 21: Part of the Questionnaire for the discussion around KER analysis (Business Plan Part)

Analysis of KER2: Predictive Maintenance Application for Milling Machines – Spindle Diagnostics & Machine Care (My rConnect platform) (GFMS & UiO)

KER Summary

Name and Exploitation Lead Partner: The ownership and exploitation lead of this KER is GFMS. The University of Oslo contributes by providing the ontology model, which defines the semantic structure of the system. This model captures relationships, parameters,

components, and variables, enabling efficient system-level interpretation. GFMS is responsible for the application's implementation within the My rConnect platform, ensuring practical deployment and integration. Here, the name of this KER is "Predective Maintenance Application for Milling Machines – Spindle Diagnostics & Machine Care (My rConnect platform).

IP Components: The main components for the deployment of this KER are the following:

- Ontology model (University of Oslo) defining semantic structure and relationships.
- Application development and implementation (GFMS) within the rConnect platform.
- Intelligent models for component diagnosis (not strictly AI/ML but incorporating advanced reasoning approaches) (GFMS).
- System interface for user interaction (non-critical for IP disclosure) (GFMS).

Type of Result: Software module provided as a service.

IPR Mechanism: The result will be protected at an internal level through copyright, avoiding patenting to prevent disclosure. Only the user-facing interface will be visible, while the critical models and algorithms will remain undisclosed.

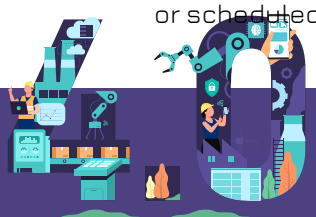
Description: A software module for critical component health monitoring and spindle diagnostics in milling machines. The solution leverages artificial intelligence to support residual lifetime prediction and proactive maintenance, ensuring improved reliability and reduced downtime.

Business Case

Problem: The main challenge faced by customers is the inability to predict exactly when critical machine components will fail. As a result, companies rely on periodic maintenance schedules, which require significant resources and generate additional costs. This approach often leads to unnecessary part replacements or, conversely, unexpected breakdowns that disrupt production.

Needs: What customers need is a solution that allows them to optimize maintenance, avoid wasted time and resources, and extend the lifetime of components without risking failure. In particular, they seek automated and reliable tools that provide accurate insights into when a component truly requires replacement.

Alternative solution: Currently, these tasks are handled manually. Companies typically track maintenance activities using spreadsheets or maintenance files, recording machine data without intelligent diagnostic support. This traditional method is inefficient, error-prone, and unable to provide predictive insights, leaving companies dependent on reactive or scheduled maintenance instead of data-driven decision-making.



Provided solution: The developed solution addresses this problem by leveraging sensor data from the spindle and other critical machine components to diagnose their current condition and predict the time before failure. Through an intuitive interface, users can continuously monitor component health, access sensor statistics, and track diagnostics in real time. This allows companies to move from manual, schedule-based maintenance toward predictive, data-driven decision-making.

By providing accurate insights into component status, the solution directly meets customer needs for reducing downtime, avoiding unnecessary maintenance, and optimizing resource use. The key gains enabled are lower operational costs, extended component lifetime, improved machine availability, and higher overall efficiency in maintenance planning and execution.

Impact: The solution has the potential to generate significant impact across environmental, economic, and scientific dimensions within the manufacturing industry. Environmentally, it reduces material waste by extending the useful life of machine components and avoiding premature replacements. Economically, it minimizes costly downtime and lowers maintenance expenses, directly reducing operational costs for customers. Scientifically, it advances the state of the art through the development and application of advanced algorithms by GFMS and the ontology-based knowledge graphs from the University of Oslo.

Potential Risks: The main barrier to the full deployment of the solution lies in connectivity challenges. For some customers, establishing a reliable connection to their machines can be difficult due to strict IT policies, security requirements, or the need for special authorizations. These technical and organizational constraints may slow down or complicate integration, representing the primary risk to large-scale adoption.

Business Plan

Target Market/User: The target market for this solution lies within the machine and tool industry, focusing on sectors where equipment maintenance and uptime are critical. The solution is designed for technicians working directly in the field or on the shop floor, particularly those responsible for servicing and maintaining machinery.

Early adopters are expected to be the internal service organizations of manufacturing companies, which can immediately leverage the solution to optimize maintenance operations. Following internal adoption, selected external customers with high maintenance needs will be targeted to demonstrate value and drive wider uptake.

Provided value: A clear value proposition for this solution is the following: ***"provides an intelligent service that transforms milling machine upkeep, maximizing operational efficiency and minimizing unexpected stoppages."*** The following text explains the rationale behind this sentence:

- Utility: The utility of this result lies in providing EU industries using milling machines with a predictive maintenance service that enables real-time monitoring of equipment health, along with intelligent scheduling for repairs or component replacement. This functionality allows maintenance to be planned precisely when needed, rather than at fixed intervals, optimizing resource use and extending component lifetime.
- Customer value: The key value offered to customers includes reduced maintenance costs, minimized unexpected downtime, and improved operational efficiency. This contributes not only to economic benefits but also to sustainability by reducing unnecessary component replacements and resource waste.
- Unique selling point: The unique selling point of this solution is its novelty in the market; there is currently no comparable service available. This gives the solution a strong competitive advantage, combining innovation with tangible cost savings and operational reliability for customers.

Roadmap to market (TRL-9): To successfully launch this result on the market and reach TRL-9, several technical and market-oriented actions can be planned. Initially, the solution will be deployed internally within the service organization, enabling service technicians to use it directly during their work at customer sites. This first stage will allow for real-world testing, performance monitoring, and efficiency measurement in operational environments. Based on these results, the solution will then be scaled to a broader customer base.

Technically, while the development phase is largely complete, additional validation tests are required to ensure robustness and reliability. Deployment will involve connecting machines, installing the software, and conducting thorough operational testing. On the market side, marketing activities, business planning, demonstrations, and stakeholder engagement will continue in parallel to ensure a smooth and effective rollout at scale.

Indicative timeline with these actions to reach TRL-9 and Market Launch (Post-project, starting from October):

- M1–M6: Validation of the solution through pilot deployments, involving real-world testing, performance monitoring, and efficiency measurements to ensure readiness for full-scale adoption.

- M7–M12: Focus on market-oriented actions, including finalizing the business plan, addressing IPR considerations, conducting additional demonstrations, and preparing for large-scale deployment.

Cost structure: The cost structure to advance this KER to TRL-9 and market launch primarily involves deployment, training, and operational support. Deployment costs include sending personnel to connect machines, install, and test the software on-site. Training costs cover preparing technicians to use the system effectively, requiring involvement from at least one engineer and one marketing specialist to conduct systematic communication campaigns and training sessions.

For a typical deployment, an estimated six months of work for two staff members is required, along with technician involvement, roughly one month of effort per 100 technicians, which represents a significant cost factor. Additional costs include ongoing operational support and updates.

The cost for a single use case would depend on the scale and complexity of deployment but should be calculated considering both personnel and logistical requirements.

Revenue strategy & streams: The primary revenue stream for this solution will come from licensing, structured as a subscription-based Software-as-a-Service (SaaS) model. The service will be monetized through annual subscription fees, charged per end-user, ensuring a predictable and sustainable revenue flow. This approach leverages the platform's existing structure, where applications are already offered under similar subscription schemes, making it a natural fit for customers.

To reach customers, the solution will be distributed through two main channels: direct sales, targeting key clients with tailored offerings, and digital marketplaces, broadening visibility and accessibility to a larger customer base. This dual-channel approach combines personal engagement with scalable outreach to maximize adoption.

Barriers to adoption: A potential barrier to market adoption lies in the perceived risk of investing in a new technology. Customers may hesitate without clear evidence of its efficiency and reliability. To overcome this, it will be essential to validate the solution with key early customers and demonstrate tangible results, thereby reducing uncertainty and building trust in its value.

Analysis of KER4: Analysis Center for Quality Assessment based on Fault Detection (ATLANTIS)

KER Summary

Name and Exploitation Lead Partner: The original name, "Analysis Center" is broad and does not fully convey the specific purpose of the KER. To better reflect its functionality and the exploitation purposes, there is an intention to rename it "Analysis Center for Quality Assessment Based on Fault Detection." This new name explicitly highlights that the KER is focused on detecting and interpreting quality defects in EDM production lines. It is owned and led by ATLANTIS for exploitation purposes.

IP Components: The primary IP of this KER is the Analysis Center (IER #13) itself, which includes its own interface, proprietary source code, and machine learning algorithms trained on distributed machine data from multiple production sites. Background knowledge and prior work belong to ATLANTIS.

Type of Result: Software application/module

IPR Mechanism: The result is protected through Copyright for the source code and interface, while Licensing governs its distribution and use, including commercial and research applications. Background knowledge remains the property of ATLANTIS. Optional dual licensing could allow integration with external platforms or commercialization by third parties under agreed terms.

Description: The Analysis Center for Quality Assessment based on Fault Detection is an analytics-driven software application designed to detect and interpret quality defects in EDM production lines. It leverages machine learning algorithms trained on distributed machine data from multiple sites and is integrated with ENG's Testbed Platform for secure, privacy-preserving training. The system provides near real-time defect detection, notifying operators via an intuitive user interface whenever anomalies or endangered conditions are identified.

Business Case

Problem: The main problem faced by the customers is the monitoring and analysis of data from multiple factory units, specifically EDM machines, and the difficulty in identifying data anomalies that correspond to quality degradation, due to the continuity of the production line. They require a solution that can track machine data in real time, detect anomalies, and enable early fault detection. This capability helps identify potential quality issues during production, allowing operators and engineers to take corrective actions promptly, reduce downtime, and maintain consistent product quality.

Needs: Their main need is to identify and resolve data anomalies that could lead to production problems. This involves detecting irregularities in machine data, understanding whether they are linked to potential faults, and taking timely corrective actions to prevent quality issues and maintain smooth production operations.

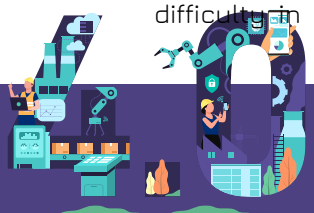
Alternative solution: So far, companies have addressed this problem in a limited and fragmented way. They may rely on existing sensors to detect some defects and perform basic statistical testing. Still, there is no comprehensive system for linking anomalies to potential faults or systematically analyzing machine data. The approach varies depending on the available data and infrastructure at each site, and the capacity to integrate additional sensors or advanced monitoring tools is often limited. As a result, error detection is partial, reactive, and lacks a consistent method for preventing quality issues.

Provided solution: The Analysis Center for Quality Assessment Based on Fault Detection solves these problems by continuously collecting and analyzing EDM machine data from multiple factory units in real time. Leveraging machine learning algorithms, it automatically detects anomalies that may indicate potential faults and links them to possible quality issues. Operators are notified through an intuitive interface, enabling them to take timely corrective actions, prevent production downtime, and ensure consistent product quality. By providing a systematic, data-driven approach, the Analysis Center replaces fragmented manual monitoring and improves fault detection efficiency across distributed production environments.

It enables significant operational gains by reducing production costs, minimizing material waste, and lowering energy consumption. Additionally, detecting anomalies early and preventing faults helps reduce unplanned downtime, ensuring smoother and more efficient manufacturing processes. In addition, the federated system offered (via joint exploitation or by integrating with custom federated solutions), allows the ML models to be trained on a broader range of datasets, thus providing concrete results. The reduced risk of sensitive data exposure results in higher usage acceptance.

Impact: The Analysis Center for Quality Assessment based on Fault Detection has the potential to create a broad impact across scientific, environmental, and economic dimensions of the manufacturing industry. From a scientific perspective, it advances the development of more general intelligence and automation, contributing to innovation in smart manufacturing and data-driven quality control. The environmental impact is reflected in the reduction of scrap and material waste, as well as lower energy consumption during production, supporting more sustainable manufacturing practices. On the economic side, the solution allows companies to reallocate human resources to higher-value tasks while ensuring more efficient and reliable production processes. For example, in one of the pilot cases, the tool demonstrated its ability to reduce quality-related issues in EDM processes, leading to measurable improvements in both resource efficiency and productivity.

Potential Risks: The main risk that could hamper the full deployment of the solution is the difficulty in securing sufficient resources to fully develop and scale the product. To



mitigate this risk, the solution benefits from having already been partially tested and validated within the project, where a working prototype was demonstrated in real pilot environments. This early validation provides concrete proof of its value.

Another potential deployment risk can be the security and IT infrastructure constraints on the customer's side (in this case, AVIO). Specifically, end users' strict security policies might initially limit the integration or deployment of the solution. However, these issues can be managed (e.g., by providing dedicated equipment, laptops, etc. or secure setup to bypass infrastructure restrictions).

Finally, another risk relates to the heterogeneity of production lines, meaning that not all EDM machine setups or factory units are identical. This creates the need for customizations to adapt the Analysis Center to each pilot or customer's specific processes.

Business Plan

Target Market/User: The primary market for this solution includes industrial partners and manufacturers using EDM machines who aim to reduce quality issues, enhance process monitoring, and optimize production performance. An additional interesting approach is that it can be provided as a value-added module for EDM machine manufacturers (e.g., GF) by integrating the solution as part of their machine package or service offering. In this way, they will have a competitive advantage by differentiating their machines through built-in advanced fault detection and quality assessment, and increase their customer trust and satisfaction. Key sectors are the aerospace companies looking for zero defects applications, OEMs and the automotive industry in general for machinery production, turbine and reactor producers, surgical tools manufacturers, etc.

This result can be applied across facilities that collect EDM machine data and are looking for actionable insights to improve operational efficiency and product quality. The actual users of this KER would be the people or roles directly interacting with the system in industrial production environments. These could include:

- Process Engineers: monitor production quality, adjust process parameters in real time, and act on flagged anomalies.
- Machine Operators / Technicians: receive notifications from the system about potential defects and take corrective actions on the machines.
- Quality Assurance Teams: analyze defect patterns, identify recurring issues, and optimize production processes.
- Plant Managers / Production Supervisors: use aggregated insights to make strategic decisions on process improvements, downtime reduction, and resource allocation.

Finally, the first early adopters of this KER are expected to be those already engaged in the project pilots, such as AVIO AERO, which is testing the solution in aerospace manufacturing. Aerospace companies, where precision and quality are critical, represent a natural starting point (based on the gained hands-on experience). Additionally, EDM machine manufacturers could adopt the solution early by integrating it as part of their machine packages or services, delivering added value to their customers.

Provided value: A clear value proposition for this solution is the following: ***"The Analysis Center delivers real-time insights to prevent EDM production failures, combining tested AI algorithms, client-tailored support, and continuous improvements to boost efficiency and reliability."*** The following text explains the rationale behind this sentence:

- Utility: The Analysis Center is designed to efficiently detect potential production failures in EDM processes by leveraging analytic algorithms trained on machine data collected from multiple geographical locations. Integrated into the ALIDA Federated Learning Framework, the solution provides operators with an interactive user interface that delivers real-time notifications of critical situations, enabling timely interventions to reduce downtime and quality issues.
- Customer value: For potential customers, the solution delivers tangible value through its focus on continuous improvements, dedicated client support, and customization to fit individual needs, all offered at a competitive price point.
- Unique selling point: What differentiates the Analysis Center from competitors is its experienced development team, which works in close collaboration with clients to refine and adapt the solution, as well as the validated functionalities of its prototype, already tested in real-world scenarios. This ensures not only reliability but also a shorter path to adoption and measurable impact in production environments.

Roadmap to market (TRL-9): To successfully launch this result on the market and reach TRL-9, several technical and market-oriented actions can be planned. On the technical side, the prototype can be finalized, with further software improvements implemented to ensure robustness and usability. Additional testing can be carried out in similar use cases to validate performance, as well as in other Federated Learning Frameworks to ensure wider applicability and scalability.

From the market perspective, IPR management can be addressed to secure the solution's ownership and exploitation rights. In parallel, promotional material and a business plan would need to be developed to support market entry and visibility. Finally, targeted stakeholders will be identified to build early engagement and foster adoption.

Indicative timeline with these actions to reach TRL-9 and Market Launch (Post-project, starting from October):

- M1–M3: Product design refinements and preparation of improvements.
- M3–M12: Prototype finalisation and software enhancements.
- M12–M24: Extensive testing in similar use cases and across different Federated Learning Frameworks, with systematic feedback collection.
- M24–M30: Implementation of improvements based on testing results and further validation activities.
- M30–M33: Development of promotional materials, preparation of business plan, and IPR management.
- M33–M36: Outreach and engagement with targeted stakeholders to foster adoption and market entry.

Cost structure: Advancing the KER to TRL-9 and market launch will require a well-defined cost structure covering development, operational, and scaling needs. The estimated financial requirements are as follows:

- Development costs (€65,000): Focused on refining the prototype into a robust, market-ready product. This includes software engineering, R&D, and feature improvements based on pilot feedback.
- Sales and marketing (€35,000): Required to create visibility and attract early adopters through promotional material, demos, and outreach activities. This investment will support brand positioning and accelerate customer engagement.
- Equipment (€5,000): Covers testing infrastructure and necessary hardware to ensure reliable performance during validation and integration phases.
- Operational costs (€20,000): Includes ongoing maintenance, software updates, and customer support services, which are essential to guarantee continuity and reliability for early users.
- Scaling costs (€50,000): Represents the resources needed for integration and customization per client, enabling adaptation of the solution to different operational contexts and ensuring broad applicability across industries.

In total, the estimated investment for the first-year amounts to **€175,000**, as it is expected to have increased needs for development and promotion thus hiring new personnel. Therefore, the following years the investment will be significantly reduced. This allocation ensures the successful refinement, validation, and commercial preparation of the solution, while also enabling its scalability to different customer environments.

Revenue strategy & streams:

The solution will generate revenue primarily through a subscription-based SaaS model, priced at €8,000–€10,000 per year per use case. Additional revenue streams will include:

- Direct sales to industrial clients (e.g., companies operating EDM machines).
- Indirect sales through EDM machine manufacturers, integrating the solution into their offerings.
- Support and consulting services for clients requiring integration or customization.

The solution will reach customers through the following channels:

- Existing customer networks that are already familiar with the provider's solutions.
- Networking events and industry fairs where manufacturing technologies are showcased.
- Partnerships with associated companies and system integrators, enabling indirect sales channels and faster adoption.

Barriers to adoption: The main barrier that could potentially hamper the market adoption of the solution is the reluctance of customers to adopt a new tool or alter established workflows. This challenge can be mitigated by ensuring early involvement of users through pilot programs and early access schemes, allowing them to test the solution in real operational environments. By engaging users from the outset and incorporating their feedback, the solution can better align with their needs, reduce resistance to change, and build confidence in its value before full-scale release.

Analysis of KER5: Smart Sub-layout Simulation Design (VIS)

KER Summary

Name and Exploitation Lead Partner: The Key Exploitable Result (KER) can be referred to as "**Smart Sub-Layout Simulation Design**", a name that more clearly highlights its purpose and innovative aspect. It is owned and led by Visual Components Oy for exploitation purposes.

IP Components: This result consists of a software solution that will be integrated as a feature and commercialized in future product versions of the simulation platform (Visual Components 5.0). The feature will be accessible both through the User Interface (UI) and programmatically via the Python and .NET APIs, ensuring flexibility for different user groups.

Type of Result: Software module

IPR Mechanism: The result will be protected by Copyright, distributed under Commercial Licensing with access granted through an End-User License Agreement (EULA).

Description: The simulation functionality is seamlessly integrated into the simulation environment, enhancing the fast, efficient, and collaborative development and deployment of production systems. Leveraging the sub-layout feature enables multi-team workflows and accelerates the transition from concept to operation by minimizing errors and streamlining system integration efforts.

Business Case

Problem: The development and commissioning of modern manufacturing systems typically involve multiple stakeholders, from concept to operation. Equipment providers, integrators, and end-users require solutions that enable them to work quickly and efficiently, maintain digital continuity, and manage the digital thread throughout this process. Seamless integration is crucial for avoiding requirements while avoiding costly errors.

3D simulation manufacturing solutions have already proven reliable in supporting these workflows. However, in scenarios with higher demands, such as large-scale production layout, involving multiple stakeholders that require more detailed design, stricter standards, and confidentiality, this simulation functionality provided a powerful solution. It ensures rapid, efficient, and collaborative development of complex simulations while safeguarding confidentiality between stakeholders.

Focusing on the pilot in battery assembly reveals high variability in production requirements due to the rapid development of battery technology. Each time the battery cell configuration changes, the entire production environment often needs to be adjusted. This entails a complexity increase because:

- It requires reconfiguring the whole production plan, not just a simple process or related tasks.
- Multiple stakeholders and operators are involved simultaneously, which increases coordination challenges.
- Changes in one sub-system impact other parts of the production system.

As a result, current solutions lack flexibility and isolation in planning and reconfiguring the production layout for the new production demands, which makes adapting to variability time-consuming, error-prone, and costly.

Using sub-layouts shifts the solution approach, focusing on analyzing the entire layout and dividing it into sub-layouts to meet new requirements.

Needs: The main needs of end-users (for the RE4DY Project is AVL) and customers focus on fast responses to adapt production to new product variants. They aim to improve collaboration among all parties involved in production planning and commissioning,

prevent costly errors, and achieve the so-called "triple zero": zero unplanned downtime, zero defects, and zero waste. Simultaneously, they seek to accelerate production processes while maximizing return on investment (ROI).

Alternative solutions: Currently, companies rely on their own internal methods and procedures to address these challenges and support collaboration during automation project engineering and commissioning. These practices usually combine various tools and technologies but often lack the efficiency, integration, and scalability needed to fully meet modern industrial demands.

Provided solution: The Smart Sub-Layout Simulation Design feature provides a scalable and flexible solution for handling complex production environments that involve different system providers and multiple product variants. Although the AVL pilot was the target use case, the solution has been designed to be applicable across a wide range of industries and customers. It supports more flexible manufacturing systems by enabling stakeholders to focus on sub-layouts for reconfiguration without disrupting the overall layout deployment. This collaborative functionality allows different operators and stakeholders to work simultaneously while preserving digital continuity and confidentiality.

By integrating the Smart Sub-Layouts feature into existing internal methods and procedures, the solution streamlines workflows, accelerates deployment, and improves collaboration. Embedded within the Visual Components 3D simulation tool, it enables the rapid, efficient, and collaborative development of complex simulations, helping stakeholders adapt quickly to new production requirements and avoid errors during commissioning, ramp-up, and operation.

Gains enabled:

- Faster development and commissioning of manufacturing systems,
- Prevention of costly errors through improved digital thread management,
- Accelerated ramp-up of new configurations,
- Increased productivity and efficiency across stakeholders, and
- Higher ROI through more effective and flexible manufacturing systems.

Impact: Socially, the solution fosters collaboration between teams and improves digital continuity, supporting knowledge sharing and workforce upskilling. Environmentally, it promotes efficient resource use and reduces waste (e.g., reduced electricity consumption). Economically, pilot results demonstrate increased productivity, cost savings, reduced downtime, and enhanced market competitiveness for adopters.

Potential risks: The main deployment risk is related to legacy adapting systems components, adapting existing production setups to the new methodology may be challenging, requiring reconfiguration and potentially limiting immediate integration

Business Plan

Target Market/User: The Smart Sub-Layouts feature will be included in Visual Components' simulation portfolio and released in the upcoming product version (Visual Components 5.0). It addresses the entire manufacturing ecosystem, targeting system providers, system integrators, and end-users across multiple industries such as automotive, aerospace & defense, electronics, pharma & life sciences, food, and supply chain logistics. Early adopters are expected to be system integrators and end-users in the automotive and machinery sectors, where the feature has already been tested in near-market scenarios and received positive feedback.

Value: A clear value proposition for this solution is the following: ***"Simulate, collaborate, and optimize: Smart Sub-Layouts Simulation Design accelerates your production planning, reduces downtime, and turns complex manufacturing designs into reality, up to 50% faster."*** The following text explains the rationale behind this sentence:

- Value Proposition: The development and deployment of a production system often involves multiple teams of experts and can be a complex, time-consuming process. Simulation has proven to be an effective tool for accelerating these workflows. The Smart Sub-Layouts feature facilitates rapid and efficient collaboration between teams, reducing errors and shortening the time from concept to operation.
- Customer Value: Integrated into Visual Components' products at no extra cost, the feature helps users accelerate simulation and deployment processes by up to 50%, providing measurable improvements in efficiency, quality, and innovation. It also supports sustainability by reducing resource waste through optimized planning and virtual testing.
- Unique Selling Point: Visual Components´ solutions differentiate themselves through usability, versatility, and seamless integration capabilities. The user-friendly interface makes operation simple for non-experts, while advanced programming options allow customization through the programming APIs. These solutions can integrate real-time data, simulate complete 3D manufacturing systems at various levels of detail, and enable scenario planning and KPI monitoring. Industry-agnostic and scalable, the tools are adaptable to different providers and production environments, giving users a competitive edge over other simulation platforms.

Roadmap to market (TRL-9): The prototypes developed during the RE4DY project have already undergone next-to-market testing, with positive feedback documented through dissemination activities. The next steps focus on integration, validation, and market readiness:

Technical Actions:

- Integrate the Smart Sub-Layouts feature into the upcoming Visual Components 5.0 product, adding the necessary capabilities for full functionality.
- Conduct rigorous testing and validation through an early access program, allowing selected customers to trial the feature in real operational scenarios.
- Prepare for further testing with the upcoming new product platform, ensuring robustness and seamless performance across all target use cases.

Market-Oriented Actions:

- Finalize commercial release strategy aligned with Visual Components 5.0 launch schedules.
- Develop supporting documentation, demos, and training materials for customers and early adopters.
- Ensure IPR protection and licensing frameworks are in place to secure the commercial exploitation of the feature.

Timeline to TRL-9 and Market Launch (Post-project, starting from October):

M1 (M1-M3): Prototype Integration and Capability Finalisation

- Integrate the tested Smart Sub-Layouts feature into Visual Components 5.0.
- Add the remaining required functionalities and ensure compatibility with the new product platform.

M2 (M1 – M5): Early Access Testing and Validation

- Conduct validation through an early access program with selected customers.
- Collect feedback and refine the feature to ensure robustness and operational readiness.

M3 (M4 – M6): Market Preparation and Launch

- Finalize demos, documentation, and training materials.
- Implement commercial licensing and IP frameworks.
- Release the Smart Sub-Layouts feature commercially as part of Visual Components 5.0.

Expected Outcome: Full operational deployment (TRL-9) and market availability by Q1 2026.

Cost structure: The estimated development cost to bring the Smart Sub-Layouts feature to TRL-9 and integrate it into Visual Components 5.0 is about €50,000. This budget includes software engineering, R&D, prototyping, equipment for automated testing, and hands-on validation activities.

Operational costs include ongoing maintenance, updates, and customer support, while scaling costs involve integration and customization for individual clients. Based on pilot use cases, the cost to implement the solution for a single client scenario is estimated at up to €15,000.

Revenue Strategy and Streams: The primary revenue stream for the Smart Sub-Layouts feature will come from license sales, with potential additional income from consulting services for clients requiring specific customization of their development processes. The chosen pricing model is a time-limited subscription license, available for 6 or 12 months, with project-specific licenses also offered for the duration of a given project.

A premium one-year license, including all feature capabilities, is priced at approximately €35,000 per computer. Early access is offered through a pre-market program, which allows existing customers to test the feature for six months at no additional cost, ensuring feedback and validation prior to the commercial launch. Access is limited to existing Visual Components customers to maintain security and compatibility.

The solution will reach customers primarily through direct sales and partner channels, including resellers and engineering partners, and will be integrated as a state-of-the-art feature within Visual Components' software ecosystem. Subscription options include both 6-month and 12-month renewals, aligning with customer project cycles and usage needs.

Barriers to adoption: At this stage, no significant barriers to market adoption have been identified. However, potential challenges may emerge during the production and commercial testing phase, where the feature will undergo rigorous validation to ensure reliability, usability, and smooth integration within customer workflows.

Analysis of KER7: Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient Manufacturing Value Networks (ICF)

KER Summary

Name and Exploitation Lead Partner: The Key Exploitable Result (KER) is owned and led by ICF, which holds full responsibility for its exploitation. The result is named "**Intelligent Supply Chain Asset Management with IPR and Business Landscaping for Resilient**

Manufacturing Value Networks", a title that accurately reflects its scope and utility. Its initial designation, Asset/IPR Management (IER #27), served as a working title during development but was later refined to provide a clearer and more precise characterization of the solution's purpose and added value.

The post-project exploitation strategy for this solution is primarily based on a licensing model tailored to the needs of manufacturing companies. To maximize its value, the tool would need to be adapted to incorporate proprietary datasets from end-users, such as VW or FILL, ensuring relevance and usability within their specific contexts. Once customized, the solution can be licensed directly to these companies as part of their operational workflows. This approach has already been identified as the preferred pathway by potential users, making licensing the most viable commercial route, while also leaving room for further development or expansion into broader industrial applications.

IP Components: The solution is built primarily on original software developed by ICF, complemented by background IP from IP Screener. The user interface (UI) and interactive design were entirely developed by ICF, while the API is based on IP Screener's existing technology, to which ICF contributed updates and adaptations. The data currently used is publicly available or open datasets, applied exclusively for demonstration purposes and therefore not subject to IP registration.

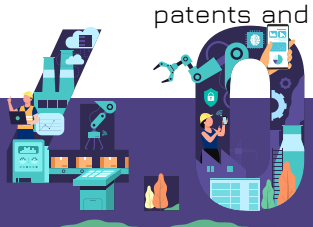
Type of Result: This KER is a software application, functioning as an interactive interface and patent search system. It is designed to be delivered as a standalone product, supporting user interaction and advanced search functionalities.

IPR Mechanism: The chosen IPR mechanisms for this result are commercial licensing and copyright, as the solution will be openly demonstrated and does not qualify for patenting. This approach ensures the result remains protected while enabling flexible exploitation in commercial contexts.

Description: This KER provides an interactive system that integrates data from major international IPR and innovation databases (e.g., WIPO, EPO) using Natural Language Processing (NLP) and API connectivity. The system supports manufacturers in identifying IPR gaps, ensuring IP compliance, and uncovering innovation opportunities for enhancing asset management and supply chain resilience.

Business Case

Problem: The solution addresses three key challenges faced by manufacturing companies. First, staying up to date with the latest innovations and intellectual property (IPR) in their field is difficult, as organizations need timely access to newly registered patents and developments related to components and materials. Second, supply chain

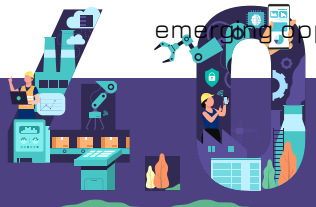


resilience is a critical issue; when disruptions or unexpected events occur, companies struggle to quickly identify and evaluate alternative suppliers to maintain continuity. Third, in product development, organizations face challenges in efficiently integrating new components and innovations into their designs, further complicating decision-making and time-to-market.

Needs: The main needs of potential users fall into three areas. First, they require a reliable way to stay continuously informed about innovations and patent activity in their field, enabling them to anticipate market shifts and align their logistics and product strategies accordingly. Second, when developing new components, they need tools to quickly map the business and patent landscape to ensure novelty, avoid overlaps, and streamline the patenting process, saving time and reducing dependency on slow, purely legal searches. Third, they need greater supply chain resilience, particularly after challenges experienced during events like COVID-19. The ability to instantly identify alternative suppliers and evaluate options in real time would allow them to react quickly to disruptions and make informed, efficient decisions.

Alternative solutions: Currently, companies address these challenges in limited and inefficient ways. For patent monitoring and innovation tracking, they rely heavily on legal teams, whose searches are based on legal terminology rather than the natural, technical language engineers and product developers actually need. This often results in misalignment and delays. Engineers themselves may attempt manual searches using tools like Google, but these are largely unstructured and inconsistent, only surfacing random patents or scattered information available online. Some also use IP Screener directly, but this tool was originally designed to support start-ups and patent-filing teams, not to address supply chain and manufacturing contexts. As a result, the process is slow, fragmented, and far from effective in supporting timely decision-making in product development or supply chain planning.

Provided solution: The solution directly addresses these challenges by providing an intelligent business landscaping and IPR management tool that maps the entire patenting landscape across the World Intellectual Property Organization and the European Patent Office. Using natural language processing tailored to technical terms it allows engineers and product developers to quickly identify relevant patents, understand where innovations have been registered, and adjust or position their own inventions accordingly to ensure patentability. Unlike traditional legal searches, which are slow, costly, and legally oriented, this tool delivers instant, accurate, and technically relevant insights, enabling faster decision-making, reduced development timelines, and significantly lower costs. By offering a clear overview of the business and innovation landscape, it helps companies strengthen resilience, secure a better market position, and align their R&D with emerging opportunities.



Impact: The result has the potential to generate significant economic and scientific impact in the manufacturing industry. For example, in the AVL and FILL pilot, it can enable faster patent filing by giving engineers immediate access to the global IPR landscape, reducing costs and accelerating time-to-market. In the VWAE pilot, the tool strengthens supply chain resilience by allowing companies to quickly identify alternative suppliers and make informed decisions during disruptions, ensuring continuity and competitiveness. On a scientific level, the systematic registration and mapping of IPRs fosters knowledge diffusion, making innovations more visible and accessible, and supporting future R&D efforts.

Potential risks: The main risks to the full deployment of the result lie in its reliance on several interconnected components. On the technical side, the front-end application must be continuously maintained and updated to ensure usability. At the same time, the solution depends heavily on IP Screener's background technology; if this system were discontinued or became unstable, it would pose a serious risk to sustainability. In addition, the APIs linking to WIPO and EPO databases need to remain accessible and regularly updated. Any disruption in these external sources, for example, restricted access or changes in data availability, could impact the reliability and functionality of the tool.

Business Plan

Target Market/User: The target market for this solution spans the manufacturing sector broadly, with a particular focus on supply chain and logistics managers as well as product development managers who need to track innovations, assess patentability, and ensure resilience in their supply chains. While applicable to any manufacturing domain where products and components must be checked against competitors and emerging technologies, the automotive industry has been identified as the initial focus. This is due to the sector's intensive patent activity, complex supply chains, and demonstrated interest during the RE4DY pilots. Early adopters are expected to include major players such as Volkswagen, as well as AVL, Austria's largest patent filer, and FILL, a family-owned manufacturer strongly incentivized by national tax relief policies to maximize patent filings. These early engagements will pave the way for wider adoption across the manufacturing landscape.

Value: A clear value proposition for this solution is the following: "**Accelerate innovation and strengthen your supply chain by instantly mapping the global IP landscape—spot gaps, track patents, and make smarter, faster decisions for resilient manufacturing value networks.**" The following text explains the rationale behind this sentence:

- Value Proposition: The solution enables manufacturing and supply chain managers to efficiently map and analyze the global IPR landscape for specific components, leveraging NLP queries and API access to WIPO, EPO, and other patent databases. By providing a normalized, integrated overview of available IP assets, it supports faster and more informed decision-making, identifies IP gaps, enhances business landscaping, and strengthens supply chain resilience, ultimately accelerating innovation and improving strategic positioning in manufacturing value networks.
- Customer Value: The value provided to potential customers lies in its innovative approach to managing intellectual property and supply chain resilience. Unlike traditional methods that rely solely on legal teams for patent searches, this solution enables engineers and product developers to quickly map the IP landscape, identify gaps, and make informed decisions. It enhances technical resilience, allowing organizations to develop, protect, and strategically position their innovations, ultimately supporting stronger, more agile, and future-proof business operations.
- Unique Selling Point: The unique selling point is its combination of technical precision and supply chain integration. Unlike generic web searches or conventional tools, this solution leverages IP Screener's proven NLP-trained engine to scan the global patent landscape with a focus on technical terminology. What makes it unique is the added connection to the manufacturing supply chain context, mapping competitive and collaborative opportunities that have never been addressed before. It is a dedicated, fast, and accurate platform that provides actionable insights for manufacturing resilience and innovation.

Roadmap to market (TRL-9):

Technical Actions: This result will need minor technical actions to be ready to penetrate the market. These are the following:

- Integration meetings with partners
    - Conduct technical workshops with each partner (e.g., VW, AVL, & FILL) to understand their proprietary data structures and integration requirements.
    - Define integration pathways between their data systems and the application.
- Prototype finalization
    - Refine the current prototype into a stable release version that supports industrial use.
- Data import and preprocessing functionality

    - Build and optimize tools that allow each client to import their proprietary IPR datasets as a starting point.
    - Develop preprocessing capabilities to handle variations in dataset quality, structure, and categorization (e.g., cleaning, normalization, mapping).
- Dataset-specific adaptation
    - Test the system with different client datasets to assess performance and identify where additional processing or customization is required.
    - Implement flexible data handling workflows that can be tailored per client.
- Validation with real-world datasets
    - Run pilot validations using partner datasets to confirm accuracy, speed, and usability.
    - Collect feedback from engineers, product developers, and supply chain managers to fine-tune technical performance.

Market-Oriented Actions: From a market perspective, the next involve:

- Define a clear commercialization pathway
    - most likely through a standard software licensing model similar to those commonly used for accounting and enterprise software
- Explore different licensing tiers and service levels
    - Tailoring them to the needs of different types of users and organizations
- Early-access program
    - Offer limited early access to 1–3 pilot customers to validate pricing, packaging, and perceived value.

Timeline to TRL-9 and Market Launch (Post-project, starting from October): These actions are mapped through the following actions:

- M1 (M1–M2): Integration Meetings & Data Preparation

Initial meetings with customers to agree on integration approach, assess benefits, and prepare proprietary datasets for testing.

- M2 (M2–M3): Prototype Finalization & Data Integration

Adaptation of the software to customer-specific datasets. For agile companies with well-prepared data, integration and prototype testing can be completed in 2–3 days.

- M3 (M3–M4): Validation with Early Adopters (Pilots)

Testing and validation of the solution in real operational environments (e.g., FILL, AVL, VWAE). Feedback collected to refine functionality and interface.

- M4 (M4–M5): Demonstrations & Licensing Preparation

Conducting demos for broader stakeholders, preparing licensing agreements, and structuring service tiers within a standard software licensing model.

- M5 (M6): Market Rollout (TRL9)

Full operational deployment with early adopters, paving the way for wider commercialization across the manufacturing sector.

As it seems ICF's result will be fully operational in approximately six (6) months post-project.

Cost structure: The cost structure for advancing this Key Exploitable Result (KER) to TRL-9 and market launch is shaped primarily by software development and operational requirements, while hardware and infrastructure costs remain minimal. Cloud infrastructure costs are negligible, as most clients using proprietary data would keep it on their own servers, transferring those expenses to their side. From our perspective, the main financial considerations lie in software engineering, R&D, prototyping, ongoing maintenance, and customer support, as well as potential scaling costs linked to integration and customization for each client.

The cost per use case is highly variable and depends on the complexity and quality of the client's data. For organizations with clean, well-structured data, costs could remain relatively low, while for those with extensive or fragmented supply chains requiring significant adaptation, costs may rise substantially.

Revenue Strategy and Streams: The primary revenue streams for this solution will come from software licensing and subscription fees. A subscription-based SaaS model is the most suitable approach, as it ensures sustainable funding for maintaining APIs, troubleshooting, and ongoing support. Customers would most likely pay on a per-site, per-year basis, reflecting the fact that the solution relies on their proprietary data, which is central to its value. While exact pricing will depend on the use case and data requirements of each client, the model ensures flexibility while securing predictable revenue for continued service delivery.

In terms of go-to-market channels, the solution will leverage consortium networks and network effects, particularly through established collaborations with initiatives like IDSA, RE4DY's task force, and Smart Factory communities (initially through SSF). These networks provide direct visibility to potential adopters and build credibility by association. Over time, customer reach can be expanded further through direct sales, strategic partnerships with systems integrators, and participation in relevant industrial ecosystems and digital marketplaces.

Barriers to adoption: A key barrier to market adoption lies in the lack of semantic interoperability across traditional manufacturing systems. Today, many systems simply list vast numbers of components and assign multiple codes to the same product across different stages of production. While these systems are machine-readable, they often fail to provide the intelligence needed for real decision-making. Converting such fragmented structures into a smart, integrated system is complex and resource intensive. Furthermore, the adoption of the solution relies heavily on the availability and quality of the data. Without standardized, well-structured datasets, it becomes challenging to fully realize the tool's potential. Therefore, the more standardized and aligned the manufacturing data becomes, the smoother and faster the adoption of this solution will be.

Potential mitigation measures to these barriers are the ongoing developments in digital product passports, standardized data management, and interoperability frameworks. While these improvements cannot immediately eliminate the complexity of existing component listings and data structures, they provide strategies to convert, standardize, and integrate data more efficiently.

5.RE4DY Value Network Ecosystem

This section focuses on the value network and ecosystem-building activities of the RE4DY project, carried out under Task 6.4. The task is responsible for elaborating concrete plans for engaging the stakeholder community in resilient value network development, ensuring their participation in piloting and innovation activities linked to RE4DY.

A draft engagement plan was developed early in the project to raise awareness, stimulate interest, and encourage participation of external stakeholders—particularly SMEs—in the RE4DY initiative. A core focus was placed on promoting the digital thread fabric "Data as a Product" and the Manufacturing Data Space concept across the four target sectors: automotive, aerospace, e-batteries, and machine tools.

In the second half of the project, IDSA led targeted outreach activities to promote RE4DY's outcomes within its extensive network of members and strategic partners. These actions successfully engaged organizations from both industrial and legal domains, fostering dialogue on RE4DY's relevance and application. As a result, RE4DY's outputs reached a wide international community, spanning dozens of organizations and hundreds of professionals.

IDSA's efforts ensured that RE4DY's research was not only disseminated but also embedded in relevant industrial conversations and communities.

5.1 Stakeholders Engagement Strategy [Update]

The stakeholder engagement strategy was implemented to ensure broader participation and alignment with project priorities. IDSA contributed through:

- **Stakeholder Mapping and Tracking**: Development of a stakeholder tracker, enabling the consortium to map and categorize relevant organizations according to their position in the stakeholder matrix. Beyond the creation of this tool, IDSA provided entries from its network to enrich the tracker with strategically relevant stakeholders.
- **Targeted Campaigns**: IDSA coordinated two major outreach campaigns to highlight specific RE4DY results. These efforts began with a structured mapping of IDSA's industrial and legal networks, which encompass SMEs, major companies,

research institutions, and other R&D projects. Following this mapping, each stakeholder was approached individually to promote the following project results:

1. The Resilience Compass, attracting interest from industrial stakeholders, including Brainport Industries (NL), which requested direct contact with Chalmers University to explore further collaboration.
2. The Extended Taskforce outputs, which sparked interest within IDSA's Task Force Legal Framework. Notably, Atsumi & Sakai (JP), a leading legal firm, engaged with ICF through IDSA's facilitation and subsequently joined Extended Taskforce meetings. This confirmed RE4DY's reach beyond the EU, expanding into global communities.

These activities ensured that key results gained visibility among relevant industrial and legal actors while also opening pathways for sustained collaboration. They further demonstrated RE4DY's reach beyond the EU, embedding the project in both European and global communities.

5.2 Stakeholders Engagement Monitoring & Evaluation [Update]

Monitoring and evaluation activities were carried out in a practical manner, focusing mainly on tracking interactions and capturing evidence of stakeholder interest.

- **Engagement Tracking**: A stakeholder engagement tracker was set up to log interactions, contacts, and outreach activities. This provided a structured overview of the stakeholders engaged throughout the project and facilitated follow-up where relevant.
- **Observation of Outcomes**: While no formal evaluation framework was applied, the tracker allowed the consortium to observe patterns of engagement, such as interest generated by targeted campaigns or follow-up requests for collaboration.
- **Concrete Examples**: Specific cases, such as Brainport Industries' request to connect with Chalmers and Atsumi & Sakai's participation in the Extended Taskforce, demonstrate the added value of these engagement efforts.

These activities confirm that outreach went beyond simple awareness-raising, enabling connections that can support the long-term sustainability of RE4DY's ecosystem.

5.3 Impact of Stakeholders Outreach

The impact of IDSA's ecosystem-building activities has been both broad and deep:

- **Extended Reach**: Outreach campaigns and stakeholder events brought RE4DY results to a global audience. For example, IDSA's Ecosystem Building Call on March 3, 2025, featured ICF's work on Legal Ontologies. The session attracted ~50 live participants and reached over 400 contacts through follow-up communication.
- **Cross-Project Synergies**: IDSA supported the coordination and content of the EUDDIC Cluster, linking RE4DY with related manufacturing projects (5GTimber and ZeroSwarm). This strengthened cross-project collaboration and dissemination.
- **High-Visibility Events**: RE4DY was showcased at IDSA's flagship Data Space Symposium in both 2023 and 2024. With 800–1000 participants annually, the event significantly boosted RE4DY's visibility within the European and international data space communities. Besides this, RE4DY has been presented in other events and webinars directed at the IDSA network and beyond.

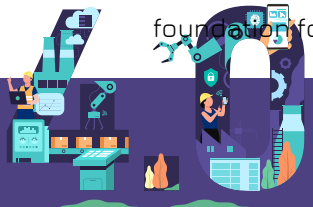
Through these activities, IDSA ensured that RE4DY's results were widely disseminated, embedded in relevant industrial and policy debates, and positioned for sustained visibility beyond the project's lifetime.

6 Conclusions

The RE4DY project's dissemination and communication strategy, as outlined in section 2 of this final deliverable and part of Task T6.1 of the RE4DY project, was comprehensive and multifaceted, designed to maximize the project's visibility, impact, and uptake among scientific, industrial, policymaker, and general public audiences. Key activities included publishing academic papers, attending and organizing high-profile industry and scientific events, maintaining an active online presence via project and partner websites, newsletters, social media, and producing videos and newsletters to facilitate knowledge exchange. Notably, partners participated in 117 events, released tens of articles and press releases, and ensured continuous project updates across relevant digital channels, making technical outcomes accessible and raising societal awareness. These efforts were structured according to best-practice models for awareness building, stakeholder engagement, and knowledge transfer, with targeted campaigns and tailored content for specific groups.

Progress against Key Performance Indicators (KPIs) established for dissemination and communication was significant: all KPIs, from the number of publications, events, media outputs, and newsletters to online engagement metrics such as website visitors and social media followers, were met or exceeded by project end. For example, the project achieved 26 publications (vs. 10 planned), held or participated in 44 industry events and 44 conferences, and attracted over 1,000 newsletter subscribers, far surpassing initial goals. These achievements were systematically tracked and validated through structured evaluation tools and stakeholder feedback, ensuring that outreach and engagement genuinely reflected project priorities and regional diversity. The project's global online presence and its active use of the DFA Knowledge Hub further cemented its profile across European and international digital manufacturing communities.

The consistent achievement and surpassing of all KPIs directly demonstrate the RE4DY project's real impact and growing market value. These milestones are not merely quantitative; they signify concrete advances in stakeholder engagement, ecosystem building, and post-project exploitation potential. The project's results have been embedded in ongoing industrial and policy dialogues and have established connections with influential organizations and new networks, which are key for sustained market adoption. Participation in high-visibility international forums, effective dissemination through credible knowledge channels, and robust stakeholder tracking confirm that RE4DY's innovations are recognized as valuable and market-ready, providing a strong foundation for future scaling, standardization, and real-world application.



The results confirm that Task 6.2 has successfully advanced the RE4DY skills development agenda by translating role-specific requirements into actionable training solutions. The alignment between recommended courses and pilot needs has been validated through both partner feedback and measurable improvements in skill levels across technical, analytical, and strategic domains. The combination of surveys, interviews, and structured course mapping has proven effective in capturing evolving requirements and ensuring targeted interventions. Ultimately, the work contributes to reducing the digital skills gap, enabling more resilient, sustainable, and human-centric industrial systems, and positioning the RE4DY pilots to achieve long-term impact beyond the project's lifecycle.

Moreover, the RE4DY project has developed a comprehensive exploitation strategy (Task 6.3) to ensure its results deliver tangible value across commercial, societal, educational, and policy domains. Through a structured phased approach (three phases), 38 Individual Exploitable Results (IERs) were identified, protected through a balanced IPR framework, and filtered into 18 Key Exploitable Results (KERs) representing the most impactful, mature, and strategically relevant outcomes. This framework balances openness, promoting knowledge transfer and ecosystem building, with commercial protection to maximize adoption and monetization.

The KER portfolio combines market-ready commercial solutions, industrial applications requiring further refinement, and research-oriented outcomes supporting future innovation and industry–academia collaboration. Pilot evaluations with leading industrial partners confirmed the relevance and potential adoption of the commercial KERs, while highlighting key enablers for full-scale implementation, such as system integration, technical support, and staff training.

Based on the pilots' feedback, four KERs have been prioritized for immediate go-to-market actions, with detailed business cases and plans ensuring sustainable exploitation. Overall, RE4DY demonstrates a strong alignment between research excellence and market impact, providing both short-term commercial benefits and long-term contributions to innovation ecosystems in manufacturing.

Finally, Task 6.4 has ensured that the RE4DY Value Network Ecosystem extends beyond the consortium by mobilizing stakeholders across industrial and legal domains. Through the design of an engagement strategy, the use of a stakeholder tracker, and targeted outreach campaigns, RE4DY results reached SMEs, industry associations, and international partners. High-visibility events, such as the Data Space Symposium and IDSA's Ecosystem Building Calls, amplified dissemination and embedded RE4DY in global conversations on resilient manufacturing and data spaces. These efforts lay the foundation for continued collaboration and knowledge transfer, ensuring that the RE4DY ecosystem remains active and impactful after the project's conclusion.

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