EuPro Gigant

EuProGigant

Magazine for sovereign data usage

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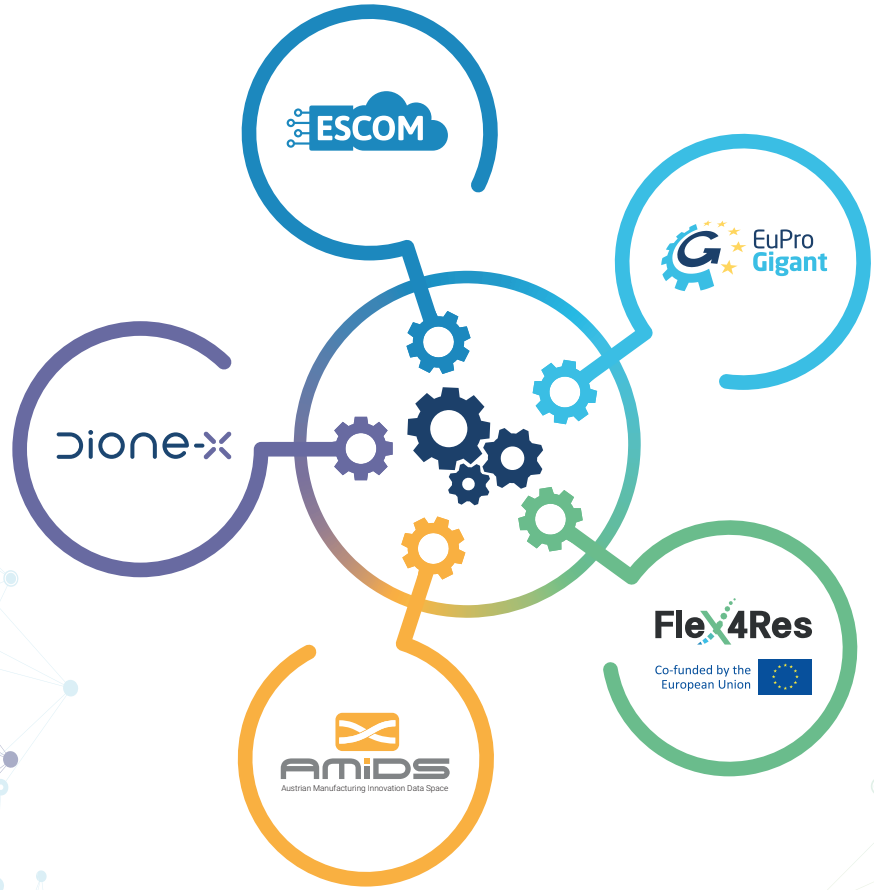
Project ecosystem for European manufacturing data & services



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Editorial

The European data strategy envisages a single market for data. This will allow data to flow freely within the EU. Realising this single market means businesses, researchers and public administrations will be able to leverage the full potential data hold for innovation, stability and growth.

Thus, speeding up the digital transformation, including the setup of interoperable data spaces for secure, sovereign data sharing and usage across industries, is of the essence.

In this context, data spaces have gained momentum. The Artificial Intelligence Act, the Cyber Resilience Act, the Data Act, the Data Governance Act, the Ecodesign for Sustainable Products Regulation with its Digital Product Passport and the NIS2 Directive, the second directive on Network and Information Security, have additionally pushed the topic.

In the manufacturing industry, the digital product passport for collection of data from diverse sources has driven companies to engage with data spaces and ecosystems – despite the complexity that differing approaches have created.

Especially for small and medium-sized companies, this complexity can be overwhelming. Interoperability is a way out. It lowers barriers to use data spaces and enables data exchange across organisations, sectors and countries. To reach interoperability, using open standards such as OPC UA, AAS or Gaia-X is vital.

For manufacturing, research and innovation projects such as AMIDS, DIONE-X, ESCOM, EuProGigant and Flex4Res use these open standards when they focus on building and using interoperable data spaces, or when they are educating industrial companies on how to approach data sharing and usage.

Their use cases allow stakeholders from the industry to utilise the concepts for their own challenges. Demonstrators make solutions tangible. Publications help explain how to work with data spaces, illustrate benefits and inspire data-driven business models.

The research projects reflected in this edition of The EuProGigant are forerunners in realising the EU's vision of a single market for data. By providing insights, knowledge and necessary frameworks to navigate data spaces, they help to enable companies to fully leverage their data.

Wishing you an inspiring read!

Your Project Management

EuPro Gigant

Imprint

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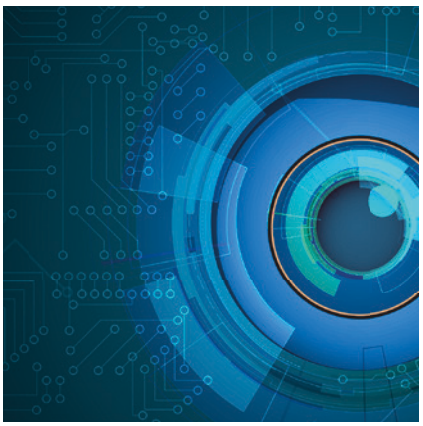
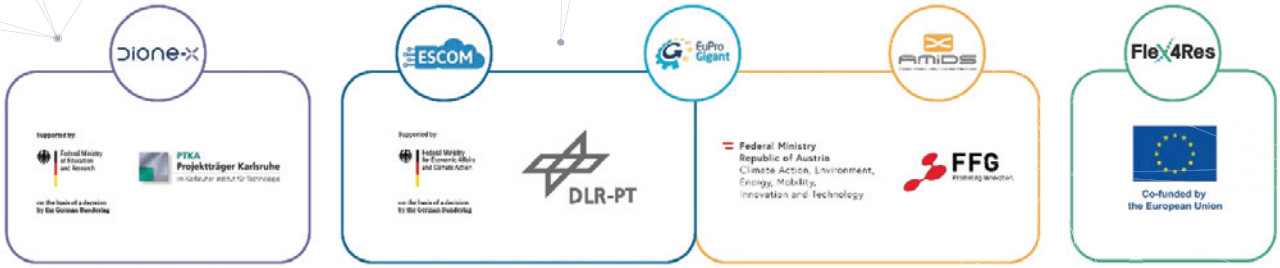




High five for the European manufacturing industry

The vision: a resilient, data-driven and sustainable data and service ecosystem that makes the European manufacturing industry resilient. This unites the five research and innovation projects AMIDS, DIONE-X, ESCOM, EuProGigant and Flex4Res. They even envision to bring back manufacturers to Europe.

The five initiatives form a project ecosystem around data spaces. It comprises more than 80 project partners from six European nations, spanning industry and academia. Supported by four funding providers from Germany, Austria and the European Union, the projects have collectively raised more than 25 million euros in grants.

Partnering for progress

The five projects focus on secure and sovereign cross-company data exchange through different approaches:

AMIDS enhances innovation by providing companies with an accessible, sustainable platform for complex innovation projects and easy access to data spaces.

DIONE-X facilitates secure data and service exchange across the machining industry's process chain, enabling new data-driven business models.

ESCOM focuses on balanced edge cloud environments for sovereign component service systems in the production environment, using AI to transform simulation models into services.

EuProGigant develops a multi-location, digitally connected production ecosystem for sovereign data management and cross-company data sharing, enabling improved analysis of production processes.

Flex4Res strengthens supply chain resilience by enabling stakeholders to quickly reconfigure supply chains and production lines in response to disruptions.

Together towards trust

By joining forces, the project partners not only learn from each other and build on their findings. They also collectively illustrate the benefits of data-driven business models and generate the trust necessary for broader data sharing across the industry.

While larger companies can more easily leverage data-driven insights, many SMEs face barriers to data sharing, such as a lack of infrastructure or staff for data analysis, low cloud adoption and lack of trust.

This is where the Gaia-X principles each project integrates come into play. The project ecosystem enables production companies to process data securely and efficiently without users handing over their data. Thereby, they preserve data privacy and sovereignty.

amids.at

AMIDS Demonstrator: Real-time quality measurements

AMIDS addresses critical challenges in data integration and transparency in the plastics industry. The project works on an innovative solution for comprehensive data sharing across the polymer value chain.

By leveraging the Asset Administration Shell combined with decentralised data sharing concepts, the AMIDS project partners have developed a system to handle the information flow through every stage of the manufacturing and recycling of plastic products.

The AMIDS demonstrator showcases the system's capabilities through real-time quality measurements tied to specific products. The accompanying dashboards visualise data upload and sharing with external stakeholders.

Digital Product Passport applied

A sophisticated, digital product passport based on the Asset Administration Shell (AAS) is at the core of this innovation. It has been uniquely created for each injection moulding product and unites collected quality data as well as production information throughout the product's lifecycle. It thus forms a basis for machine learning methods to provide actionable insights for the entire product line. This solution ensures standardised data representation, secure data exchange, and real-world applicability.

The demonstrator has been developed collaboratively by teams from the three universities JKU Linz, TU Wien and TU Graz as scientific partners along with leading experts from ENGEL, Haidlmair, Motan, Siemens and T-Systems. It has been tested in production environments at LIT Factory and shown significant improvements in product quality, process efficiency and supply chain transparency.

More functionalities under development

Further research includes integrating more advanced AI functionalities for predictive maintenance and proactive quality assurance. Moreover, providing detailed information about material composition and production processes will promote a circular economy, enabling strategies for more effective recycling and reuse of materials.

dione-x.euprogigant.com

DIONE-X Demonstrator: Monetising data

A demonstrator from the DIONE-X research project depicts data exchange between three parties, two manufacturing companies and a digital service developer. Manufacturer A and Manufacturer B both have milling machines of the same design, equipped with vibration sensors that continuously record data. Both manufacturers use an instance of Software AG's Cumulocity IoT platform, to which the machines continuously stream data during production.

Manufacturer A wants to monetise their data. They offer access to it via the Pontus-X data ecosystem, based on in the Gaia-X framework.

A developer buys access and uses the data to train an AI for a service offering that uses the data of the vibration behaviour to determine if a wear-related tool change in the machine is needed. They offer this service on Pontus-X as a pay-per-use model to be paid via cryptocurrency.

Manufacturer B decides to use this service regularly. Their IoT platform instance automatically purchases it and initiates calculations based on data from the machines' production routine. A dashboard at the machine's shows the results.

A one-off purchase of the service would be less efficient. The pay-per-use model allows flexible adjustments and up-to-date solutions without high initial investments.

Compute-to-data preserves sovereignty

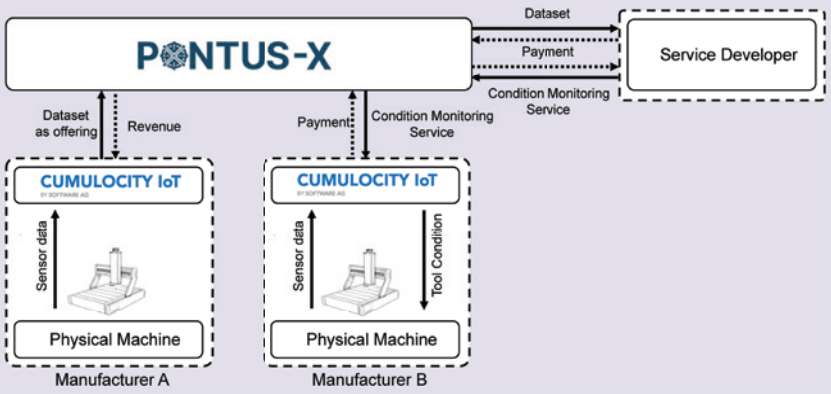
Manufacturer B's data do not leave their premises, as the calculations are carried out as compute-to-data processes. No data is passed from Manufacturer B to the service offering developer, thereby preserving data sovereignty.

Software AG implemented the IoT platform and created a microservice for the automated consumption via Pontus-X. DeltaDAO AG implemented this in Pontus-X. The Institute for Production Management, Technology and Machine Tools (PTW) of TU Darmstadt set up the physical demonstrator representing Manufacturer A and B and developed the service offering.

In the test phase, machining tests were made with tools that were worn to varying degrees. The service offering was consumed after each test. The tests showed high reliability of the AI predictions on tool wear and the consumption cascade. The consumption processes automation was particularly challenging and is orchestrated using built-in functions of Cumulocity IoT.

Ready for deployment

This use case simplifies the 'Collaborative Condition Monitoring' use case, which has great potential for commercialisation. In general, this concept could cover various production data-driven use cases within the industrial production domain. In contrast to commercially operating data ecosystems in Gaia-X, the demonstrator concept is concluded.



Schematic overview of Gaia-X compliant data sharing among three participants

escom.euprogigant.com

ESCOM Demonstrator: Mapping the data value chain

Collecting data at one manufacturing site has not exactly become the standard yet, but at least it has become more common. Moving outside one's own premises is still uncommon – especially when integrating data from the entire value chain into the equation. The ESCOM demonstrator does exactly that, employing an Asset Administration Shell (AAS) and the Gaia-X framework.

The ESCOM demonstrator records, administrates and analyses data in the context of machine tool components. This enables the simple provision of information and cross-company use of digital twins.

Sensors on the Heller ProfiTrainer PT 16 demonstrator machine continuously stream data. Time series segments, which are generated in the AAS, enable access to specific process data of individual components. To process the data, a containerised instance of the specific service is created and executed, e.g., the condition monitoring service for analysing the friction torque curve of a ball screw.

The applied technologies and methods rely on the compute-to-data principle. This means the algorithm that processes the data is sent to the data holder. The necessary data records are obtained via the standardised AAS-API. The Pontus-X ecosystem controls the service's access to the data, ensuring secure and efficient data processing. The system architecture is displayed below.

Advantages for machine tool manufacturers

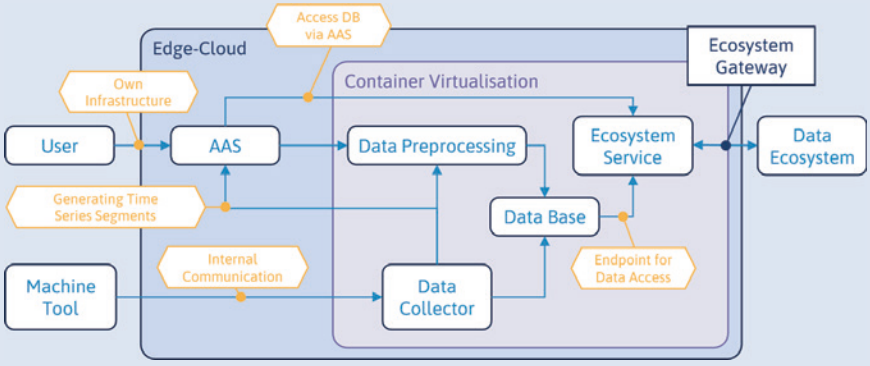
Thanks to the combination of technologies, the demonstrator has advantages in comparison to existing solutions. Proprietary and manually adapted processes are standardised and automated, enabling new, innovative business models. Open standards such as the AAS improve interoperability and scalability, while Gaia-X principles ensure data sovereignty for companies.

A team from the PTW of TU Darmstadt developed this demonstrator in close collaboration with multiple project partners. The implementation of the AAS for one component and its successful transfer to other components were crucial steps. In tests, the integration of the various technologies worked smoothly and was validated in practice with two use cases.

Evolution for standardisation

Integrating OPC UA to standardise data queries and simplifying the asset connection via the Asset Interface Description submodel are planned as next steps. In addition, distributed AAS should provide the information on different devices without any loss of usability.

Especially component manufacturers could benefit from the demonstrator; implementing component service systems in sovereign edge cloud environments could see a shift towards demand-driven innovation, which could lead to expanded market penetration.



Architectural concept ESCOM demonstrator

euprogigant.com

EuProGigant Demonstrator: Turning 'big data' into 'smart data'

The data generated in the EuProGigant project is big and multi-fold. Soon after the project started, it became evident that data from various sources needed to be processed immediately and synchronised in time. As a result, the initial 'big data' objective evolved into a 'smart data' concept.

Data in EuProGigant stem from Enterprise Resource Planning (ERP), Manufacturing Executiion Systems (MES) as well as manufacturing processes. To meet the challenge of processing this data, developers and data analysts from IGH Infotec AG, a project partner in EuProGigant, built on their interface service X-Maschine and turned it into a flexible edge device with data switching functions.

Instead of transmitting all data as a separate stream, the individual values are now transmitted based on trigger signals, which can be configured. The system architecture of the X-Maschine, as depicted on this page, has been adapted to reflect this change with the following enhancements:

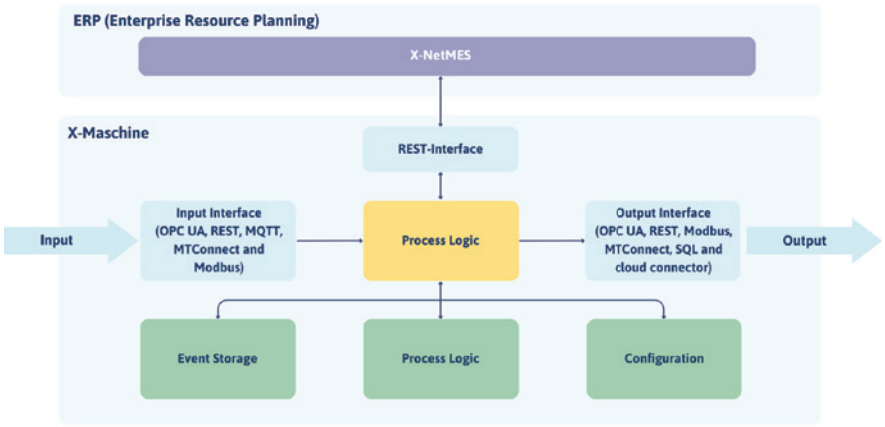
- Expansion of the process logic with new commands
- Integration of new data storage
- Addition of cloud connectivity

An example production process might look like this: After the start of a production order, the MES and ERP data, such as material number, machine identification and initial serial number, are transmitted to the X-Maschine and stored there.

As soon as the machine signals the start of production through an event, the X-Maschine reads the current energy meter value and stores it. Each time a unit is counted, the X-Maschine again determines the current energy meter value.

Subsequently, all data is compiled into a dataset and sent to the EuProGigant data ecosystem via the IGH Cloud Service. To achieve the necessary flexibility, each output interface can use different triggers and generate configurable datasets.

The evolution of the X-Maschine has enabled IGH Infotec AG to reduce data volumes and improve the temporal accuracy of the values. Furthermore, the application scope of the X-Maschine has expanded. IGH Infotec AG customers currently use it for production track & trace projects.



System architecture of the X-Maschine

EuProGigant Demonstrator: Perfect matches

When two parts from different suppliers need to match, tolerances are usually set extremely tight to make sure the parts really fit. This may result in a greater quantity of rejected parts, thus increasing waste of resources – as well as enlarging the environmental footprint. EuProGigant uses data and data sharing to combat this waste.

In the use case focusing on ideal part matching, EuProGigant project partners look at two carriers, one with outer bushings, the other with inner bushings. They are produced by different manufactures who use a Manufacturing Execution System (MES), in this case, SAP Digital Manufacturing, to measure the quality data of their produced parts and publish them on the EuProGigant Pontus-X ecosystem. This is done using the Asset Administration Shell format.

Preserving proprietary data

In the next step, an assembler needs one inner and one outer bushing to manufacture a CNC spindle. To do that, SAP Digital Manufacturing was extended to trigger an algorithm deployed on the ecosystem. The algorithm can access supplier data and thus identify available parts with the least tolerance to each other. The assembler is only shown the result of the algorithm, which means they can choose the parts that best match, while the quality data remains known only to the part manufacturers.

The ideal part matching was mainly developed by Concircle Österreich GmbH with the help of the EuProGigant partners and the Pontus-X ecosystem from deltaDAO AG.

Working on the ideal part matching use case is the story of a successful collaboration. The goal of EuProGigant is to demonstrate and scale a multi-location, digitally networked production ecosystem to enable resilient, data-driven and sustainable value creation. Thus, the ecosystem itself was in development and evolving during the development of the demonstrator for the ideal part matching. At first, this brought along difficulties in the integration and performance, but with growing maturity, potential benefits became more and more visible.

Inspiring new developments

The ideal part matching is a generic example with the potential to inspire various other industry processes. Future extensions can leverage the compute-to-data technology to further increase the protection of sensitive data. As such, it has the power to strengthen the pioneering role of European industry.

EuProGigant Demonstrator: Leveraging data for smaller carbon footprints

Reducing carbon emissions in production has become a key driver of industrial innovation. To this end, one of the EuProGigant project's use cases looks at product development in the injection moulding industry. A new, service-based approach enables carbon footprint predictions during product design – a breakthrough, considering reliable data have traditionally been scarce.

The above-mentioned approach leverages the Gaia-X data infrastructure to facilitate secure data sharing across supply chains. It integrates real-time feedback and scenario comparisons for insights that enable companies to make sustainable choices early in the development process. The initial results are promising: A case study on an injection-moulded cup highlights that the primary sources of emissions are the plastic granules and energy consumption.

Manufacturers in the driver's seat

The prediction service is a great step towards active CO2 management. It enables companies to minimise their environmental footprint. As the methodology matures, its potential to impact the market is immense. Future applications are likely to extend across various manufacturing processes, driving the next wave of sustainable industrial practices.

Obstacles to overcome

However, challenges such as data confidentiality, the complexity of emission calculations and the integration of diverse data sources remain significant barriers. These obstacles complicate the accurate prediction of carbon footprints and the broader adoption of such services across the industry. Yet, overcoming the barriers of data transfer and standardisation is a prerequisite for broader industry impact.

If this is achieved, carbon footprint prediction opens opportunities for new business models. With sustainability at their centre, services will help companies optimise their supply chains for minimal environmental impact.

flex4res.eu

Flex4Res Demonstrator: Reconfiguring running operations

When a metal manufacturer offers a wide range of specialised steels, fulfilling varying requirements for shapes and sizes, production can become complex. If these products can only be processed on machines with the appropriate capabilities, and if these depend not only on the machines but also, e.g. on tooling, this adds layers of complexity. The project partners of Flex4Res, a project focused on the resilience of value chains, are working on a solution.

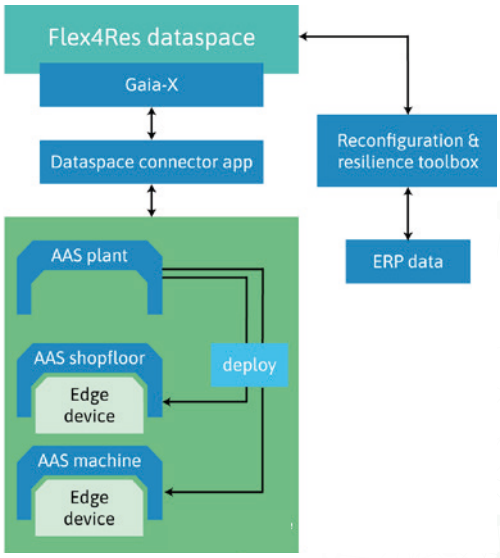
Enabling operators to reconfigure manufacturing during production is the goal in this use case. To achieve this, production planning and scheduling need to become highly flexible and at the same time take machine status and available resources into account.

Data enable reconfiguration

The Flex4Res project partners are currently developing a tool that allows the reconfiguring the shopfloor: the reconfiguration toolbox. It integrates data from the Enterprise Resource Planning (ERP) system and reflects machine capabilities as well as the current configuration status into a unified product, process and resource model.

They use the Asset Administration Shell (AAS) as a standardised digital representation of industrial assets that enables seamless integration and management of these assets. The AAS facilitates smooth communication between different system components by providing a unified interface for exchanging data between machines, systems and the ERP.

Based on this, a reconfiguration mechanism will be implemented to enable a flexible flow of products through the factory. Sensors will monitor for errors, which will be evaluated through case-based reasoning. When needed, the reconfiguration toolbox suggests appropriate reconfiguration measures.



The vision of the future process

Prepared for disruptions

For disruptions originating from the supply chain, the resilience toolbox will assess missing capabilities and identify the need for reconfiguration. The resulting flexible and agile matrix production system will allow manufacturers to reconfigure the production process during ongoing operations.

portal.minimal-gaia-x.eu

Gaia-X: Interoperable data spaces

Gaia-X was founded with the mission to establish a trusted, decentralised digital ecosystem that fosters collaboration and innovation while ensuring data sovereignty. Gaia-X and its over 300 members are committed to creating a robust infrastructure for the digital economy. At the centre: the concept of data spaces, i.e. secure, interoperable environments for effective sharing and utilisation of data among multiple participants.

One of the most innovative aspects of Gaia-X is its multi-layered approach to data sovereignty. Gaia-X offers different levels of conformity and labelling, which organisations can adopt based on their specific needs and regulatory requirements. Thus, Gaia-X-conform data spaces facilitate a balance between openness and control, allowing organisations globally to share data while maintaining sovereignty over their assets.

Democratising trust

The interoperable Gaia-X Digital Clearing Houses (GXDCH) are instrumental in ensuring adherence and conformity with the Gaia-X compliance levels. The GXDCH providers are operating these components as part of a federated trust framework to simplify and enforce conformity with the Gaia-X policy and rules, enabling participants to engage in secure and sovereign data spaces.

Innovative data exchange policies

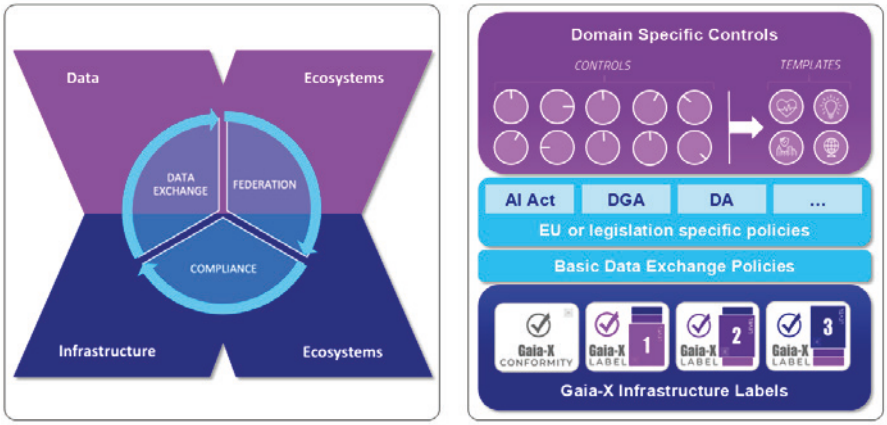
Gaia-X also introduces a sophisticated data exchange policy framework that supports the dynamic and diverse needs of its participants. This framework includes:

- Participant declarations to ensure that all participants declare their adherence to specific rules and standards.
- Contractual and legal compliance via technologies like Open Digital Rights Language (ODRL) to enforce contract terms and legal obligations.
- Domain-specific, customisable controls to allow for industry-specific regulations and standards defined by the data space authorities. They are applied on a 'per use case basis'.

Making data sovereignty a reality

Gaia-X currently has twenty lighthouse projects, of which EuProGigant is an outstanding example of the adoption of the Gaia-X framework and interoperability for the manufacturing industry.

Looking forward, Gaia-X's commitment to further developing its trusted, decentralised digital ecosystem will be key to unlocking the full potential of global data spaces.



Implementation of sovereignty controls (labels)

Asset Administration Shell: Whizz kid

From shopfloor systems to Industrial Internet of Things (IIoT) platforms to IT software systems: The Asset Administration Shell (AAS) is a problem solver for challenges in application interoperability. In the past year, AAS turned from back-bencher to whizz kid. But why?

The AAS goes back eight years and has evolved gradually from this point on. In 2018, its metamodel was specified in the first part of the specification series 'Details of the Asset Administration Shell'. One year later, the AAS interface specification followed.

In 2021, the newly founded Industrial Digital Twin Association (IDTA) inherited the specification of the AAS itself and their submodels from the Platform Industry 4.0. In 2023, the AAS went beyond the German research arena and was turned into an international standard called IEC 63278.

Increasing number of submodels

More and more companies are recognising the benefit of the AAS. The number of developed submodels (SM) for the AAS reflects this – as well as the growing number of members of the IDTA. At the beginning of 2023, a total of 32 SMs were listed. Today, this number has increased to 89 SMs.

New challenges arise from this increasing number of SMs. The harmonisation between the SMs needs to be focused to, avoid duplicated data in several SMs, but also to support the interconnection between them.

As SMs are mostly developed in research projects, they need to become part of the daily routine of the industry. Thus, there is a huge need to promote the usage of SMs. It is important to consider this at an early stage of the SM development, so that robust SMs can achieve wide acceptance and foster the concept of the AAS.

Outlook: Are there alternatives?

In almost every technical discussion, the use of OPC UA is doubted and debated. The IDTA, together with the OPC Foundation and the AML Association, published a discussion paper in 2023 to address these doubts.

The paper shows the connections between all three standards and outlines that each standard is valid in the lifecycle of a plant. AutomationML starts in the engineering phase, while OPC UA is primarily used in the commissioning and operating phase.

The AAS integrates the information provided from all lifecycle phases into SMs to act as a central access point for all plant-relevant information.

Digital Product Passport: Milestone for circularity

The circularity of products is one building block on the road to net zero. The concept involves creating less waste by completely using, reusing and recycling materials or components. The Digital Product Passport (DPP) enables the collection, storage, publication and retrieval of information on materials and their origin, recycling options and environmental impact throughout a product's lifecycle.

Regulatory framework

The European Commission established the European Green Deal as a comprehensive strategy to make the European Union (EU) climate neutral by 2050. It emphasises the urgent need to leave behind an economy built on consumption for growth and shift to a circular economy model.

The Digital Product Passport (DPP) is rooted in this Green Deal. It promotes a circular economy by making a product's material and lifecycle transparent. The Ecodesign for Sustainable Products Regulation (ESPR) specifies the details of the DPP.

With the adoption of the ESPR in July 2024, the EU has established another key component to promote the circular economy and sustainable products on the European market.

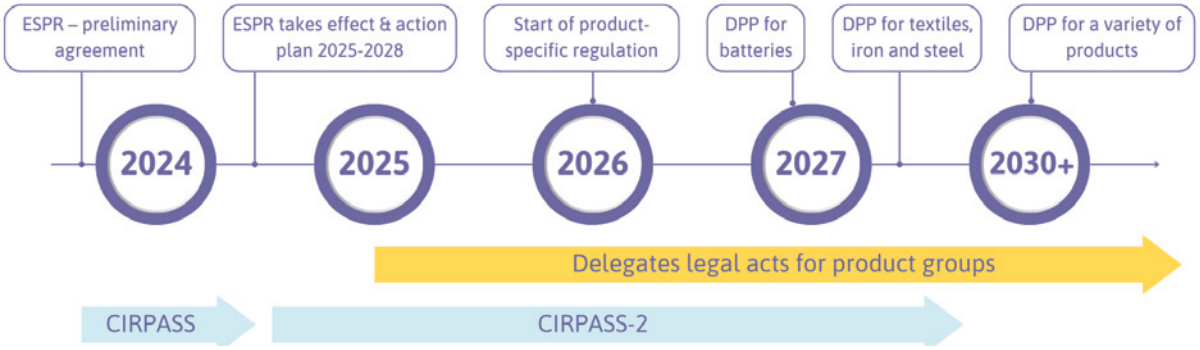
DPP implementation

The introduction of product-specific requirements for DPPs will follow in the upcoming years through EU delegated acts for different product categories, including batteries, electronics and textiles. The first product category to require a DPP is batteries, as the new EU regulation for batteries will come into effect in early 2027. Further categories will follow shortly after.

Impact on manufacturing

The ESPR extends the regulation from energy-related to non-energy-related products. This means that the regulation will affect manufacturing companies both directly and indirectly via the value chain. The DPP of a company's product will reflect the information conveyed via the DPPs of the components the product is made of.

On the one hand, the ESPR aims at enabling consumers to make informed decisions regarding the sustainability of products. On the other hand, it is an impulse for manufacturers to significantly improve the recyclability, energy efficiency and other aspects of environmental sustainability of products on the EU market.



Timeline of CIRPASS

Digital Product Passport: Manufacturing use cases

As Digital Product Passports will gradually be needed, they play a role in data space-focused research and innovation projects today.

DPP in ResearchLin-X

ResearchLin-X is an Austrian research project delivering the first two industrial use cases for the Austrian Manufacturing Innovation Data Space (AMIDS).

In one of these, TU Wien and JKU Linz establish a framework for the integrative usage of data along the value chain regarding injection moulding of plastic components, creating transparency through the DPP. The use case combines the Asset Administration Shell (AAS) and Gaia-X principles.

The AAS, a key concept of Industry 4.0, acts as the foundation. It provides a standardised way to manage and share asset information throughout the product's lifecycle. Aligned with the principles of Gaia-X, a federated data infrastructure promoting interoperability and data sovereignty is established.

DPP in CliCE-DiPP

The German research project CliCE-DiPP, short for Climate-neutral Circular Economy enabled by Digital Product Carbon Passport, develops a digital product passport – including the associated data model – with which the carbon footprint of products can be recorded and tracked throughout the product lifecycle. In addition to that, it investigates how the information from the product passport could enable strategies and business models for circular economy.

The implementation of the digital product passport in CliCE-DiPP is based on the Asset Administration Shell and standardised AAS submodel templates from the Industrial Digital Twin Association. Demonstrators for energy- and resource-efficient shopfloor management are developed in the learning factories of the Institute for Production Management, Technology and Machine Tools (PTW) of TU Darmstadt and the wbk Karlsruhe Institute of Technology (KIT). In a second step, the DPP will be validated by transferring it to application scenarios of the participating industrial partners.

Pontus-X: Leaping forward

According to deltaDAO AG, Pontus-X is the largest publicly available digital service ecosystem, powered by Gaia-X and Smart Contracts. Initiated by deltaDAO AG, EuProGigant and further ecosystem participants, the ecosystem is based on Gaia-X, Ocean Enterprise, Oasis Network and EUROe. Even though it is still in the development and testing stage, it now works with real-life data.

As a project partner of EuProGigant, deltaDAO has demonstrated the viability and concept of data sovereignty and interoperable data spaces with the Pontus-X ecosystem for three years.

Built with SMEs in mind

For small and medium-sized companies (SMEs), keeping their business secrets under control is especially vital.They are often highly specialised and usually have limited bargaining power. In addition to that, SMEs usually do not have the capacity to join a larger number of different platforms for collaborating with suppliers and customers.

Pontus-X lowers the barrier for SME participation in an ecosystem, as it is not controlled by a few large corporations or single platform-provider. Its interoperability across domains allows SMEs to reach a broad range of markets and translates into less administration, allowing SMEs to focus on their core business.

Interoperable ecosystem

Since its start, Pontus-X has evolved into a B2B Digital Service Ecosystem for data, software and infrastructure services for domains such as manufacturing, industry 4.0, aviation, space, agriculture, cloud services, language models, AI services for SMEs and energy data spaces. Pontus-X enables these domains to achieve their goals for data-driven collaboration, sovereign data sharing, monetisation of services, privacy- and IP-preserving orchestration methods as well as sustainable business models for digital service ecosystem operation.

Several Gaia-X lighthouse projects, such as EuProGigant, Gaia-X 4 Future Mobility, COOPERANTS, ACCURATE and further X-initiatives have implemented Pontus-X, proving that functional, sovereign multi-company data exchange as well as interoperability across data spaces are possible today.

Tried and tested for real business

In manufacturing, various use cases have been enabled and implemented with industry leaders such as Airbus, Software AG and Gühring to validate and demonstrate the effectiveness and economic benefit of data value creation in an open, fair and transparent environment.

Now the ecosystem is ready to take the next step, together with data economy frontrunners from across the industry. Pontus-X ecosystem participants will offer real products for real money in an open and decentralised market. At the end of 2024, the system will be commercialised.

Companies can join today and test the ecosystem for free to prepare their teams, their products and their digital supply chain processes for tomorrow's business. The Pontus-X ecosystem and the Ocean Enterprise Collective community are open and proud to offer a digital service ecosystem that is owned and operated by its participants.

The Pontus-X Digital Service Ecosystem is currently the largest public ecosystem powered by Gaia-X

“-X” what?

The number of initiatives sporting an “-X” has grown over the past few years. Factory-X is the lighthouse project of the Manufacturing-X initiative. Both Manufacturing-X and Factory-X are key concepts to enable a networked, flexible and sustainable production world. They stand for the digital transformation of the manufacturing industry. Their aim: increasing efficiency and flexibility in production and improving sustainability, resilience and competitiveness.

The Manufacturing-X initiatives include various projects for different industries such as machine tool manufacturing (Factory-X), the semiconductor industry, automotive (Catena-X), aerospace, the process industry and others. The aim is to connect production processes across different companies and thus create a fully integrated value chain.

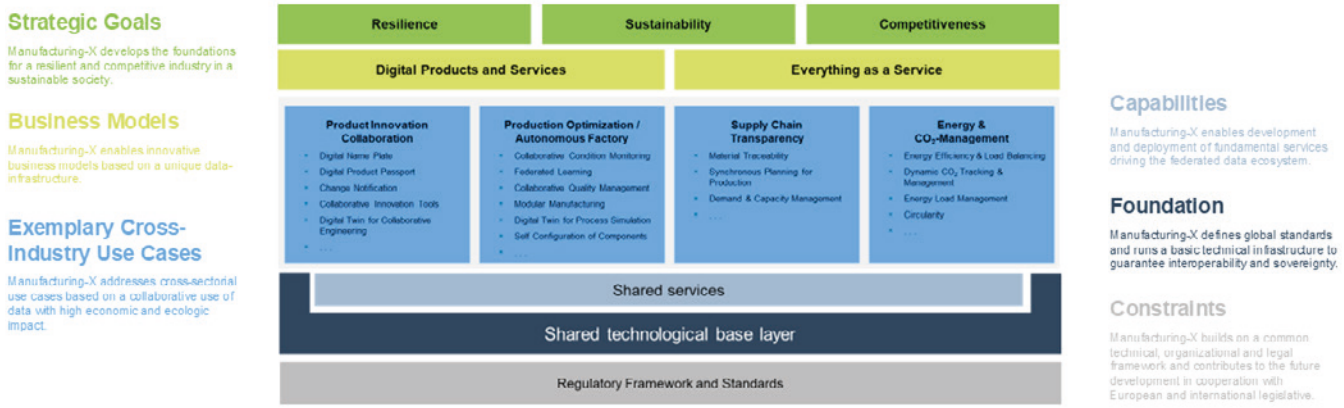
Data enable optimisation

By using technologies such as the Internet of Things, artificial intelligence and edge/cloud computing, data is to be collected, analysed and used in real time to optimise production and reduce costs.

Manufacturing-X enables closer collaboration between suppliers, manufacturers and customers, thereby increasing innovation capabilities and competitiveness. This helps companies not only to make production more efficient but also to adapt to changing market conditions. The vision of Factory-X is an autonomous, self-optimising factory, in which human workers and machines work together seamlessly.

International Manufacturing-X – close cooperation worldwide

Through the International Manufacturing-X Council (IMX), in which cooperation with leading manufacturing countries and companies is being established, Manufacturing-X attains global reach. Major initiatives around the world exchange regularly to establish a worldwide network of compatible industrial data ecosystems. More initiatives and countries will join soon!



The foundational framework as common guideline for Manufacturing-X activities and international stakeholders

Digital business models: Data make the world go round

It is a truth universally acknowledged that data is of great value. Trading and sharing data means harnessing this value – the EuProGigant project explores how this can be done in an ecosystem of manufacturing companies. These ecosystems are formed by a variety of shared functions and value-added services and enable a data value chain between data owners, data providers and data users.

Orchestrating data exchange creates value by making data accessible in a granular and selective manner in accordance with data protection and security regulations and other applicable laws and regulations. This creates potential synergies and shared benefits for all stakeholders of production ecosystems.

Simplicity for easy access

For this to happen, all relevant stakeholders need access to essential, high-quality and affordable services without regional restrictions and in line with Europe's sustainable development goals. The simple, powerful, secure and cost-effective exchange of information is of essence for achieving these goals.

Therefore, EuProGigant designs and implements a common data infrastructure based on the principles of Gaia-X with the aim to establish and scale a multi-location, digitally networked ecosystem of manufacturing companies and other relevant stakeholders. The project focusses on connecting different machines and systems, regardless of manufacturers and software or firmware versions of the control components. Thus, it helps define the requirements for IT security, reliability and interface configuration for interoperability that a common data infrastructure needs to fulfil.

Data for a greener future

One of the EuProGigant use cases uses data for energy flexibility and thus increases the sustainability in industry. Energy flexibility describes the ability of a production system to adapt quickly and efficiently to changes in the energy market. It enables production systems in general, and machines in particular, to implement measures to control electrical demand.

There are three options for the economic use of energy flexibility in industry: Firstly, making it available for direct use by the grid operator, secondly, using fluctuating electricity prices and, thirdly, using it for internal load management, e.g. to avoid peak loads or to increase the use of self-generated, ideally renewable electricity.

How EuProGigant's data sharing creates value for its stakeholder

Energy flexibility for progress

Energy flexibility has already been implemented successfully with individual machines on the shopfloor. Using model predictive control, e.g. the electrical energy consumption of a cleaning machine can be adapted to a flexible electricity price while considering functional safety restrictions such as safety-critical temperature limits.

Implementing energy flexibility requires interaction between power grid operators and factory operators. This means that data exchange must be possible between power grid units and industrial units such as production machines.

On the consumer side, a business-side platform is connected to the factory and its machines. A software service of the business-side platform coordinates the machines to implement energy flexibility measures.

The energy flexibility potential of the machines is bundled on the business-side platform and offered to the market-side platform, which is managed by the grid operator. The bundled potential can be sold on the market-side platform's energy flexibility market.

When another market party purchases the offered energy flexibility, the market-side platform requests an energy flexibility measure from the business-side platform, which is implemented by the software service. The business-side platform, which is connected to the machine controllers via the so-called Smart Connector interface, interacts with the market-side platform using the energy flexibility data model. In the future, such cross-company data exchange could be handled via a data ecosystem such as EuProGigant.

Data exchange for business

Cross-company data exchange makes sense for many use cases. EuProGigant seeks to create a federated data infrastructure, a decentralised ecosystem where data can flow seamlessly while ensuring privacy, security and sovereignty. With this infrastructure, European manufacturers could more easily access and use data.

Manufacturers who recognise the benefits of data collaboration play a key part in driving change, helping to build resilient, data-driven and sustainable value chains and thus strengthening the leadership role of the European manufacturing industry.

By sharing data, companies can collaborate more effectively, leading to innovative solutions that may not have been possible in isolation. This collaboration can drive advancements in product development, process optimisation and new service offerings.

New technologies and the exchange and use of smart data revolutionise the way manufacturers operate. Overcoming financial, technical and cultural barriers to data sharing, and offering incentives, can boost efficiency, innovation and economic opportunities. This requires industry, government and tech providers to create a collaborative, secure data-sharing ecosystem.

Why SMEs should care

Data cooperation can save money and make money: It enables small and medium-sized companies (SMEs) to access highly valuable data to advance their business without having to bear the associated costs and resources alone. This can have a positive impact on their innovation capacity, competitiveness and long-term development.

The intelligent use of digitalisation technologies and data analysis not only enables new business models and services to broaden the company's base but also helps to make it more competitive and resilient. Process innovations are also possible by networking processes using software or artificial intelligence, thus increasing value creation.

Benefits go beyond single companies: New forms of cross-industry collaboration with partners and other service providers can actively integrate several companies into the digital process, thus enabling all to benefit from sharing data along the value creation and supply chains.

Powerful network

It is amazing to know that the project partners of the five projects include more than 90 companies and institutes. Several of the partners are active in more than one project, making sure knowledge is transferred. Thanks to everybody who is advocating for the ecosystem!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