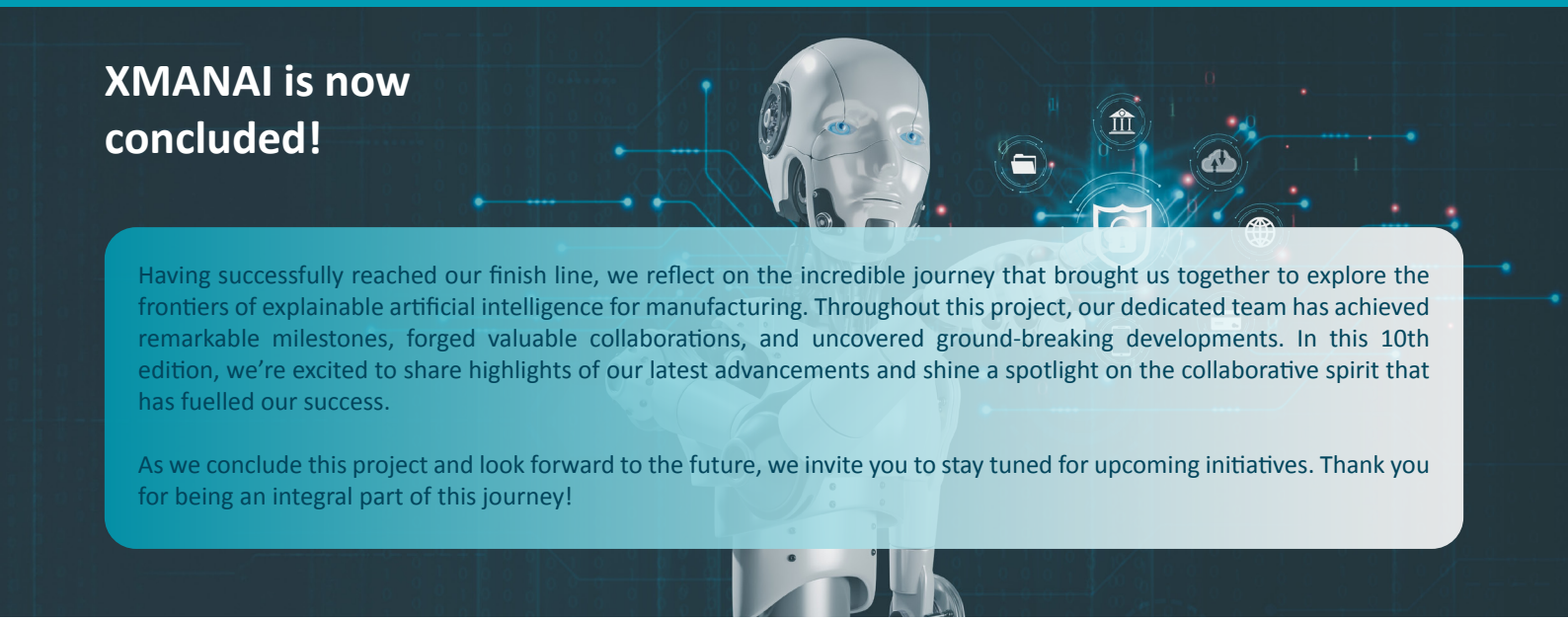
XMANAI
MAKING AI UNDERSTANDABLE

Moving from 'black box' to 'glass box' Artificial Intelligence in Manufacturing

Newsletter #10 - May 2024



XMANAI is now concluded!

Having successfully reached our finish line, we reflect on the incredible journey that brought us together to explore the frontiers of explainable artificial intelligence for manufacturing. Throughout this project, our dedicated team has achieved remarkable milestones, forged valuable collaborations, and uncovered ground-breaking developments. In this 10th edition, we're excited to share highlights of our latest advancements and shine a spotlight on the collaborative spirit that has fuelled our success.

As we conclude this project and look forward to the future, we invite you to stay tuned for upcoming initiatives. Thank you for being an integral part of this journey!

Project Highlights

XBYDESIGN
FREE THE POWER OF AI WITH EXPLAINABILITY

X-by-Design methodology represents the next frontier in AI innovation, marking a significant outcome of the XMANAI project. By prioritizing explainability from the outset, our approach empowers AI designers, engineers, and data scientists to construct AI systems that inherently offer transparent insights into their decision-making processes. X-by-design **supports explainability across all stages of AI development**, including data preparation, model creation, and result interpretation.

The final version of the **XMANAI Explainable AI (XAI) platform (v1.0) has been released.** Fully aligned with the manufacturing needs and idiosyncrasy and acting as a unified access point for data experts and manufacturing stakeholders, it integrates all AI and data-driven services into a platform for explainability. The XMANAI platform also offers different on-premise environments for increased end-to-end security while leveraging data assets locally.

XMANAI equips data scientists, data engineers and business experts with **8 services bundles** encompassing Data Collection, Storage, Secure Asset Sharing, Data Manipulation, AI Model Lifecycle Management, AI Insights, Data Governance, and Platform Management.

A **catalogue with 8 trained Graph ML models**, 16 trained XAI models and 45 baseline models is delivered. Each model is paired with specific XAI methods to address the needs of various use cases in production forecasting and planning, demand forecasting, optimal measurement, anomaly detection, anomaly forecasting and more. Some of the public models have been onboarded to the AIoD catalogue.

The XMANAI explainability services have been validated and integrated in 4 manufacturing apps that are tailored to provide valuable explanations to different stakeholder types. The apps leverage the deployed XAI pipelines and trained AI models to **solve concrete manufacturing problems in 4 industrial pilots**, covering production optimization, product demand planning, process and product quality optimization, semi-autonomous hybrid measurement planning.

The XMANAI consortium was very active throughout the project maintaining **a regular presence in the community**, publishing the project outcomes through 60 blog posts, 20 research papers, several industrial publications, demos and videos. The team participated regularly in various events of the AI4manufacturing community and organized >10 events for multiple audience types.

Research Excellence

The XMANAI team has demonstrated a significant commitment to advancing knowledge and expertise in our domain. We are thrilled to announce the successful successful publication of the Springer book "Artificial Intelligence in Manufacturing" in collaboration with the AI-MAN cluster, and additional 20 research articles, 12 of those in peer-reviewed conferences, and 3 in esteemed journals, each contributing valuable insights to the ever-evolving landscape. Among these, we are proud to highlight the distinguished achievement of our paper titled "Explainable Artificial Intelligence Bundles for Algorithm Lifecycle Management in the Manufacturing Domain", which received the prestigious ICE2023 Highly Commended Paper Award. These publications, represent not only the depth of our research but also the collaborative efforts of our dedicated team. All publications are available through our ZENODO (https://zenodo.org/communities/ai4manufacturing).

Stakeholder Engagement

In our relentless pursuit of collaborative excellence, XMANAI has organized a total of 11 events, being the last a workshop at the I-ESA 2024 conference where we counted with the distinguished participation of 3 advisory board members. The project actively participated in several international events, many of which within prominent communities such as BDVA/DAIRO, serving as forums for dialogue and shared vision-building that allowed us to contribute to the broader discourse. The wealth of interactions and feedback received from these engagements has been instrumental in shaping XMANAI's results which were reinforced by 13 pilot training sessions with real users testing the solutions developed.

Testimonies

Emerging Technologies Engineer

"In the XMANAI project, we have to recognize the significant potential of dependability algorithms in comparison to the conventional algorithms. In critical processes and critical decisions there is growing need to transition from the black box to black box to understanding of the outcomes of the algorithms that involved. The XMANAI project has been a reaching experience that opens the door to addressing high challenges using the aligning the predations or recommendations with the results known by the users."

ME & Emerging Technologies Supervisor

"Algorithms are used to help us to understand complex processes and help us for making critical decisions. The key here is how can we trust on the algorithms if they are not clear or understandable? Unlike traditional artificial intelligence, each AI provides a clear insight into how the results are obtained, looking for confidence and success in the decision making process. That is why the algorithms of each AI open a new paradigm for artificial intelligence."

Maintenance Engineer

"There are certainly great advantages from the point of view of the analyses that are carried out in the maintenance team. The possibility of studying the working machine fleet both macroscopically and microscopically and being able to make appropriate maintenance plans, and schedule activities more efficiently."

XMANAI - Explainable Manufacturing Artificial Intelligence

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