XMANAI
MAKING AI UNDERSTANDABLE

May / 2021

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

Newsletter #1

Project Objective

XMANAI aims at placing the indisputable power of Explainable AI at the service of manufacturing and human progress carving out a "human-centric", trustful approach that is respectful of European values and principles, adopting the mentality that "our AI is only as good as we are". It will do so by developing and deploying a novel Explainable AI (XAI) Platform powered by a catalogue of explainable hybrid and graph AI models and a set of manufacturing apps that, together, inspire trust, augment human cognition and solve concrete manufacturing problems with value-based explanations.

XMANAI will validate its results in 4 realistic, exemplary manufacturing demonstrators with high impact in:

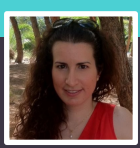
- optimizing performance and manufacturing products' and processes' quality,
- accurately forecasting product demand,
- production optimization and predictive maintenance, and
- enabling agile planning processes.

This demonstration will help the manufacturing value chain to shift towards the amplifying AI "glass-box".

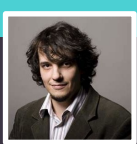
Meet our Team

XMANAI consists of 15 partners from 7 countries: Italy, Germany, Spain, Estonia, Portugal, Greece and Cyprus. The consortium is very well balanced in terms of research-industry collaboration, containing a well though constructed mixture of collective expertise from industry, research, academia, technology providers with solid background on manufacturing, data science and AI, and big data, and human-machine ethics sectors.

Michele Sesana (TXT)
Project Coordinator



Fenareti Lampathaki (Suite5)
Technical Coordinator



Yury Glikman (Fraunhofer)
Scientific Coordinator

XMANAI Concept and Approach

What is artificial intelligence (AI) and how does it work? For many people, these questions are not easy to answer: this is due to the fact that many machine learning and deep learning algorithms cannot be examined after their execution. The inner workings of such algorithms are not exactly transparent, and as they become more complicated, fears of undetected bias, mistakes, and miscomprehensions creeping into decision making, naturally grow among practically any stakeholder.

In order to enable fair, accountable and transparent machine learning and deep learning applications, XMANAI shall make AI models for manufacturing more explainable by design during the pre-modelling, modelling and post-modelling phases. To this end, AI explainability is addressed under three perspectives in a novel XAI platform:

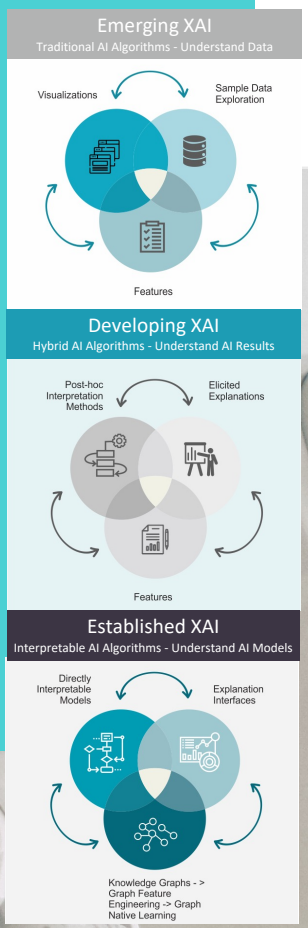
Emerging Explainable AI - traditional AI algorithms in which the focus is on understanding the data and visualising the AI models results to inform business experts on how to take action.

Developing Explainable AI - that refers to post-hoc explainability techniques (e.g., model-agnostic approaches like LIME and SHAP) that accompany the typical machine learning and deep learning algorithms. Explainability of results is also pursued through elicited explanations by the data scientists and by highlighting the features that are essentially present/absent from a prediction.

Established Explainable AI - associated with explainable by design models (e.g. graph AI models) that are inherently directly interpretable. Usage of interfaces that are intuitive and help understand to how data, predictions and algorithms actually influence their decisions, will be provided.

Across the three XAI perspectives, different AI models always need to be trained and validated while detecting and mitigating bias in training datasets. A portfolio of trained AI models will be created, addressing core manufacturing problems (indicatively related to production and performance optimization, product demand forecasting, product/process quality optimization, semi-autonomous planning) as expressed by the projects' manufacturing demonstrators.

The XMANAI Team launched a series of blog posts on topics related to the project activities. Enjoy the read on our Website! - www.ai4manufacturing.eu/blog



XMANAI Scientific Workshop

Data Management and Use of AI in Manufacturing

AI is finding its way into a broad range of industries, manufacturing amongst them. Indeed, together with big data techniques, the sorts of decisions and predictions being made by AI-enabled systems is becoming much more profound, and in many cases, critical to success and profitability. Machine learning's inherent advantages in finding anomalies in the production and packaging processes have significant potential to increase throughput and quality of products as well as to reduce machinery downtime and maintenance costs. In the cusp of Industry 5.0 that brings human-machine collaboration and personalization in the foreground, the need for diffusion of data management, cyber physical systems, and AI to solve existing and future manufacturing problems across diverse innovation pathways towards the 2025 Factories of the Future has never been greater

Supported by four European funded projects (XMANAI , i4Q , INEDIT and ZDMP) with a focus on different aspects of data management and the use of artificial intelligence in the manufacturing domain, the workshop brings together data scientists and industrial representatives from the digital manufacturing domain alongside the researchers from the areas of smart manufacturing, enterprise information systems, IoT, and AI. The workshop will promote discussion and knowledge sharing about the state-of-the-art developments and research perspectives for the next 5 years in the broad area of Connected Factories.

Join us on the 23rd June at the 27th ICE/IEEE ITMC 2021 Conference: https://www.ice-conference2021.org

International Conference on Engineering, Technology and Innovation

Collaboration

The Project is actively engaged in collaboration activities with other research and innovation projects and industrial working groups. In February 2021 XMANAI has been presented at a cluster meeting organised by EFFRA (European Factories of the Future Research Association) in the context of the Connected Factories coordination and support action (DMP Cluster plenary) . As a consequence of that , EFFRA agreed to create an ICT-38 mailing list for the XMANAI brother and sister projects and XMANAI was represented in the first online workshop of ICT-38 projects («AI-MAN») under organisation by STAR project (star-ai.eu)

Future Activities: XMANAI will be presented at BDVA workshop in Data Week 2021 (www.big-data-value.eu/data-week-2021)

EFFRA EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION

BDV BIG DATA VALUE ASSOCIATION

XMANAI - Explainable Manufacturing Artificial Intelligence
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Visit us at: www.ai4manufacturing.eu

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