

## XAI LEVELS

In order to enable fair, accountable and transparent machine learning and deep learning applications, XMANAI shall make AI models more explainable by design, during the pre-modelling, modelling and post-modelling phases. To this end, AI explainability is viewed under three Explainable Artificial Intelligence (XAI) levels:

### LEVEL 1 - Understand Data

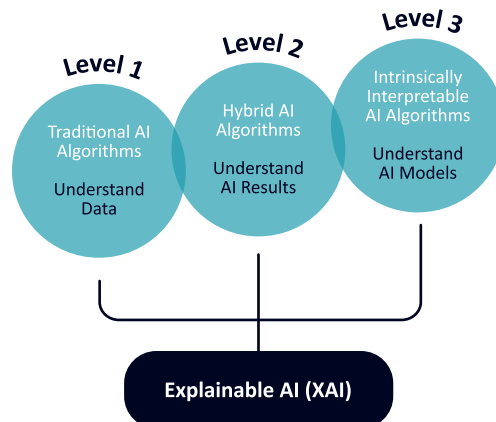
Corresponds to an emerging explainable AI perspective that refers to traditional AI models in which the focus is on understanding the data at hand, experimenting with the extracted features to build AI models and visualise results.

### LEVEL 2 - Understand AI Results

Corresponds to the development of the explainable AI perspective which refers to post-hoc explainability techniques (e.g., model-agnostic approaches like LIME and SHAP) that go together with the typical machine learning and deep learning algorithms. Explainability of results for the business experts is also pursued through data scientists elicited explanations and highlighting the features that are essentially present/absent from a prediction.

### LEVEL 3 - Understand AI Models

Corresponds to the established explainable AI perspective, associated with intrinsically interpretable AI models, including Graph AI models, that provide context for decisions with their knowledge graphs, efficiency and credibility by highlighting which individual layers and thresholds have led to a prediction.



## PARTNERS



**Field of science:** Natural sciences/computer and information sciences/artificial intelligence/machine learning/deep learning  
**Programme(s):** H2020-EU.2.1.1. – INDUSTRIAL LEADERSHIP – Leadership in enabling and industrial technologies – Information and Communication Technologies (ICT)  
**Topic(s):** ICT-38-2020 – Artificial intelligence for manufacturing  
**Call for proposal:** H2020-ICT-2020-1  
**Funding Scheme:** RIA – Research and Innovation action

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## WHAT IS ARTIFICIAL INTELLIGENCE (AI)?

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 EU-funded XMANAI project will focus on explainable AI, a concept that contradicts the idea of the 'black box' in machine learning, where even the designers cannot explain why AI reaches a specific decision. XMANAI will carve out a 'human-centric', trustful approach that will be tested in real-life manufacturing cases. The aim is to transform the manufacturing value chain with 'glass box' models that are explainable to the 'human in the loop' and produce value-based explanations.

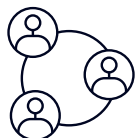
## PROJECT OBJECTIVES



**1 - Build a Catalogue of Explainable AI algorithms for different manufacturing solutions;**

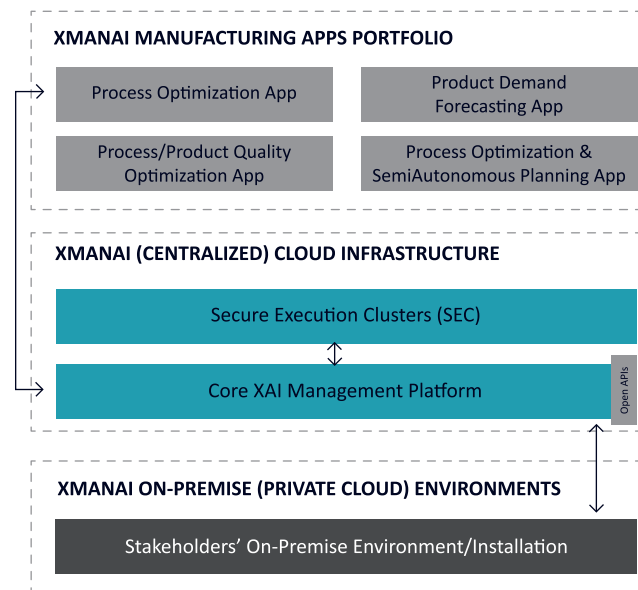


**2 - Deliver an Explainable AI platform that allows secure control and management of all AI-related assets;**



**3 - Bring forward novel AI-driven business models that enable collaboration between main actors involved in an AI system.**

## XMANAI ARCHITECTURE



As described in XMANAI deliverable D5.1  
System Architecture, Bundles Placement Plan and APIs Design

## XMANAI SERVICES IN A NUTSHELL

- Data & Models Collection Services
- Scalable Storage Services
- Data Manipulation Services
- XAI Model Lifecycle Services
- XAI Pipeline Execution Services
- XAI Insights Services
- Secure Asset Sharing Services
- Data & Models Governance Services

## XMANAI DEMONSTRATORS

### AI for Product Optimization

**Ford Motor Company (Spain)**, the Valencia engine plant will be focused on the application of artificial intelligence techniques on corporate production reporting systems, batches, quality, life tools, and maintenance actions, with the aim of implementing a recommendations system that will help to optimize and maximize production. Ford will build novel AI models to optimize the line throughput of the current and successive shifts.

### AI for Product Demand Planning

**Whirlpool Corporation (Italy)**, the leading kitchen and laundry appliance manufacturer business case will focus on improving the Direct To Consumer demand forecasting, a business channel that has been recently launched and activated in Whirlpool EMEA markets to generate effective and reliable input for demanding management decision taking processes. XMANAI will ensure visibility and the capability to understand complex multi-parameter processes.

### AI for Process Quality Optimization

**CNH INDUSTRIAL (Italy)**, a manufacturer of All Purpose tractor Light and All Purpose tractor Heavy drivelines, components used to equip tractors assembled by CNHi in its plants worldwide will create a more organized data management and sharing, and generate hybrid and graph AI models to simulate different scenarios related to optimizations and predictions, such as product quality, product measurements, and the tool change strategy based on line efficiency and tool life.

### AI for Semi-Auto Hybrid Measurement Planning

**UNIMETRIK (Spain)**, a company that offers industrial solutions related to Calibration, Measurement and Metrological engineering, seeks to evolve its metrological software to an intelligent and training environment that improves quality control prior to measurement planning definition, and indirectly contributes to generative design. XMANAI will increase the speed of metrological analysis and guide engineers through the best decisions.