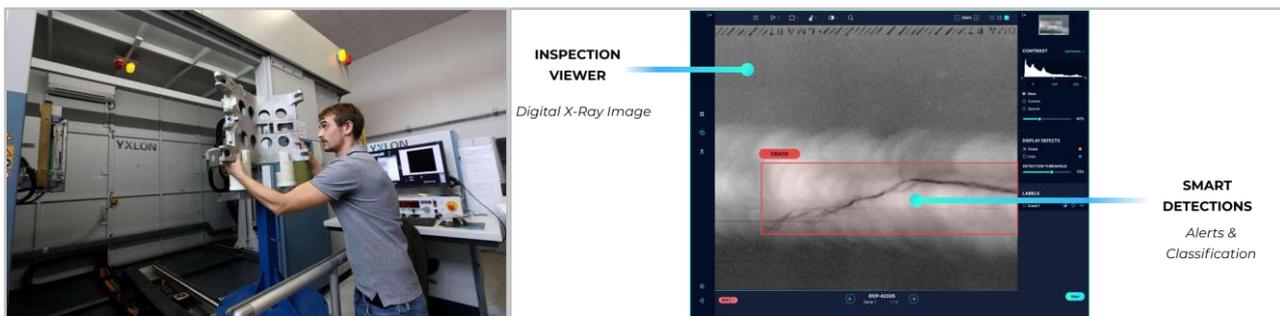


XAINDT, a zApp to bring Explainable AI to Quality Control on ZDMP

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Project Details and Motivation

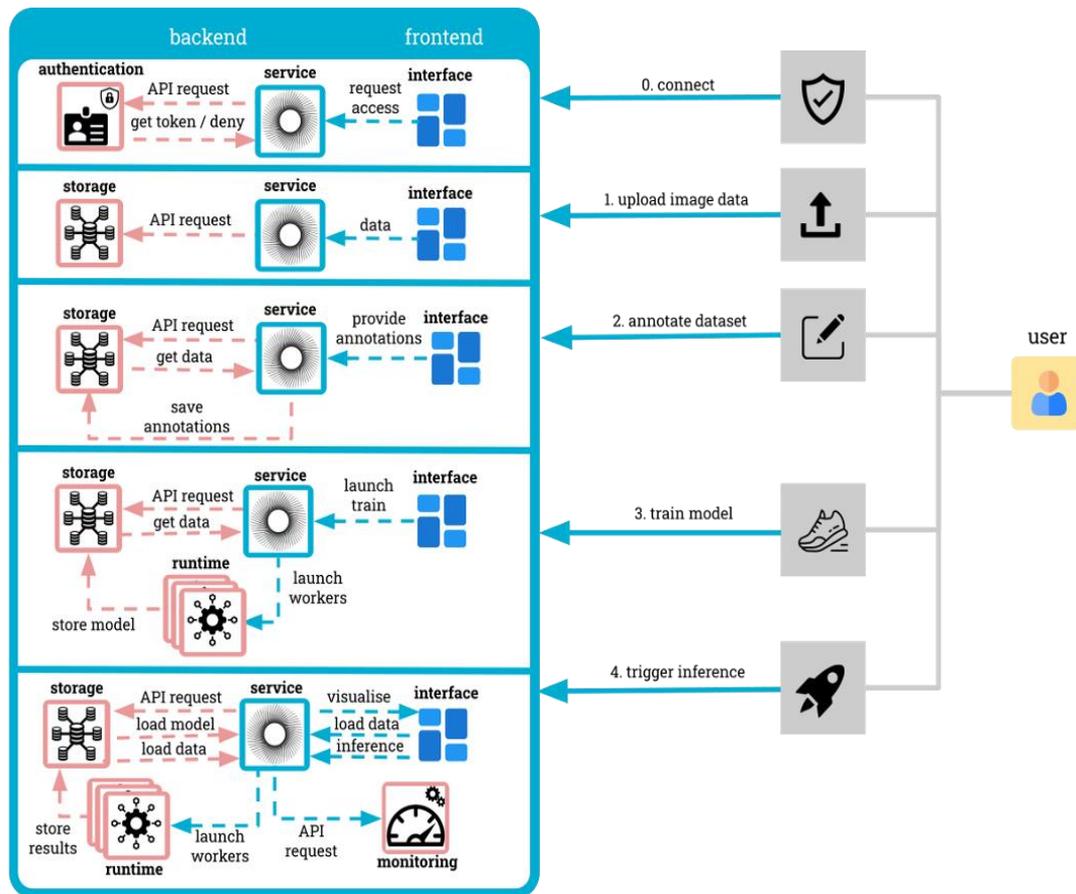
ThinkDeep AI is designing a new application to integrate ZDMP's marketplace of Industry 4.0 solutions. The new application, named XAINDT (short for **Explainable AI for NDT**) aims to provide quality control teams in manufacturing with a visual decision support software to better detect defects on production lines with the help of artificial intelligence. ThinkDeep AI is partnering with Ventana's aerospace foundries in France to build the first XAINDT use case focused on AI-powered defect detection on digital radiographic images of cast parts. By leveraging Ventana's data, the objective is to generate AI models that help quality inspectors automate the detection of non-conformities (cracks, holes, porosity, etc.) and provide explanations of the results (explainable AI) regarding the AI model inner workings to guarantee trust in the detections and allow for future certification.



*Cast part being placed in a digital x-ray scanner at Ventana Foundries (left)
Visual Inspection Module with AI-powered defect detection detections (right)*

ZDMP Fit

ZDM users are manufacturing companies subject to regulatory constraints, which make it impossible to use a "black box" AI model (a model whose performances are assessable, and often good, but whose mechanisms are incomprehensible, even for its author). Users must be able to explain their quality control procedures, and often engage their responsibility on their good execution; they cannot do either on the basis of a result whose origin they do not understand. These considerations are in line with those prevailing in the draft of the future European legal framework for trustworthy AIs: the users concerned are often in the so-called "high risk" category. They must be able to provide explanatory information on the decision-making process; they must be able to assess the risk associated with this process; the user must have clear information allowing him to keep full control over the final decision. For this reason, an explainable AI solution for quality control such as XAINDT is required.



The diagram above illustrates how XAINDT integrates itself with selected ZDMP components to help quality control operators detect defects with AI. The **Storage** component is used to set a database system that will keep track of metadata describing uploaded image data, the AI models used as well as the results metadata obtained from inference. The **Application Runtime** component is used for executing algorithms required for tasks such as the data processing, model training, inference, etc. Because it provides a means to instantiate docker containers, it will also be considered for the XAINDT backend and frontend. The **Monitoring and Alerting** component is integrated with the XAINDT application to provide users with performance indicators and KPIs as well as application-specific information such as the number of detected defects. The **portal** component is used to ensure the access to the XAINDT application for users. The **Secure Authorisation and Authentication** component provides the necessary interface for the secure authorisation and authentication component to validate the authentication of a user.

Results to Date

ThinkDeep AI is currently still performing XAINDT development, running tests and finalising the initial setup integration.

Participant Details

- **Organisation(s) involved: ThinkDeep AI:**
 - **Web:** <https://www.thinkdeep.ai/post/thinkdeep-ai-joins-the-zero-defects-manufacturing-platform>
 - **Contact:** contact@thinkdeep.ai
 - **Profile:** Founded in 2019 in Bordeaux, France by experts in artificial intelligence and image processing, ThinkDeep AI is developing a software platform that enables companies in Defence and Manufacturing to accelerate the deployment in production of AI Vision solutions. The platform is already used for the automation of critical visual analysis tasks such as the surveillance of sensitive sites (drone detection) and industrial quality control (detection of manufacturing defects). Designed to meet the high requirements of the targeted sectors, ThinkDeep AI solutions simplify the design, deployment and maintenance of AI and Computer Vision based systems in critical environments.

Environment

The ZDMP – Zero Defects Manufacturing Platform – is a project funded by the H2020 Framework Programme of the European Commission under Grant Agreement 825631 and conducted from January 2019 until December 2022. It engages 31 partners (Users, Technology Providers, Consultants and Research Institutes) with a mission to “Provide the platform, components, services, and marketplace to achieve the right product, at the right time, with the right conditions using the right resources.”. Further information can be found at www.zdmp.eu. ZDMP channels 3.2M€ of SME orientated funding to subprojects, such as this one to both facilitate SMEs with their innovations and increase the value of the ZDMP ecosystem.

Links

● Primary Partner:	contact@thinkdeep.ai
● Sub project website/blog	https://www.thinkdeep.ai/post/thinkdeep-ai-joins-the-zero-defects-manufacturing-platform
● Architecture Component/App(s)	Storage, Application Runtime, Portal, Monitoring and Alerting
● ZDMP Website	www.zdmp.eu