HUB TECH IA

Deliverable report 41

AI and IAGEN Application Use Case

Predictive Asset Maintenance with AI for optimization and Predicting equipment failures through operational data analysis in real time

Executive Summary – Application of AI and IAGEN for Maintenance Predictive in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the energy sector, specifically oriented to the predictive maintenance of critical assets in oil and gas operations gas in Vaca Muerta. This is a key opportunity to maximize efficiency and operational reliability in one of the most important unconventional reserves in the world world.

Use case classification

The report classifies this AI application based on four axes:

1. By primary resource: oil and gas (primary); water and energy (secondary).
2. By activity: optimization of production processes.
3. By technology: generative AI models, machine learning, vision artificial, intelligent agents and big data platforms.

4. By strategic impact: optimization of production and infrastructure.

1. Opportunities for using AI and IAGEN in the sector

AI and IAGEN technologies enable a suite of advanced solutions in the oil and gas industry, including: predictive maintenance through analysis of real-time data; automated equipment fault detection; simulation of deposits and operational scenarios; intelligent inspection with applied artificial vision to drones; and exploration of new geological resources. These tools enhance decision making in demanding operating conditions and remote environments such as Dead Cow.

2. Expected benefits

The implementation of these technologies allows:

- Optimize the operational availability of equipment and reduce unforeseen failures.
- Raise industrial safety standards through visual monitoring automated.
- Reduce operating costs by avoiding unplanned stops and executing proactive maintenance.
- Accelerate strategic decision-making based on predictive analysis and simulations.
- Promote sustainability with less waste of resources and efficiency improved energy.

3. Application of AI

The proposed approach is based on flows that integrate IoT sensors, SCADA platforms and AI algorithms to capture operational data, process it and generate alerts,

recommendations and actions. Computer vision allows to identify defects in
critical structures, while IAGEN enhances scenario generation
Predictive and continuous process optimization through data learning
historical and real-time.

4. Proposed AI Agent

The report proposes the creation of an intelligent agent based on IAGEN, designed
to integrate into the predictive maintenance operational flow. This agent captures
Real-time images using cameras and drones, analyzes them with artificial vision to detect anomalies
(such as corrosion or structural fatigue), and generates alerts
automatic. It also accesses IoT sensors and historical data, executing
maintenance recommendations independently.

Its main function is to automate fault diagnosis and planning.
preventive interventions, reducing dependence on human inspections. It is
designed with a no-code/low-code architecture, which makes it easy to use by
non-technical staff. This approach improves operational efficiency, enables action in
real time and adapts to the remote and demanding conditions of Vaca Muerta.

5. Conclusion

The incorporation of AI and IAGEN technologies in predictive maintenance of
assets in Vaca Muerta represents a qualitative leap towards a more
efficient, safe, and sustainable. The convergence of computer vision, agents
Intelligent and analytical platforms allow us to move from a reactive logic to a management
proactive, data-driven. This digital transformation positions the energy sector
Argentine at the forefront of technological innovation.