Deliverable report 17

AI and IAGEN Application Use Case

Generative Artificial Intelligence (IAGEN) for construction and installation - Logistics support - Report and response generation frequent

I. Introduction

The energy industry is constantly evolving. It seeks to optimize its processes and maximize efficiency at every stage of the value chain. In this context, Generative Artificial Intelligence (GENI) emerges as a disruptive tool with the potential to revolutionize the way oilfield operations are carried out.
like Vaca Muerta. This deposit, located in the province of Neuquén, Argentina, is one of the largest reserves of unconventional hydrocarbons in the world and plays a crucial role in the country's energy development. However, the exploitation of Vaca Muerta presents logistical, environmental and operational challenges that require solutions innovative.

This report analyzes specific applications of IAGEN in three key areas: support Logistics, generating reports and answering frequently asked questions, with the aim of highlighting its impact on the efficiency, safety and sustainability of operations at the Vaca Muerta Technology Park. In addition, the potential of IAGEN will be explored. to optimize the use of water, a critical resource in the exploitation of hydrocarbons conventional, and will examine how the application of this technology can contribute

to attract foreign investment and position Vaca Muerta as a benchmark in the responsible energy production.

II. Logistics Support with IAGEN

Logistics is a critical component in the oil and gas industry, especially in unconventional deposits such as Vaca Muerta, where the geographical complexity and the need to transport large volumes of materials and supplies present important challenges.

Generative Artificial Intelligence (GENAI) is a branch of artificial intelligence that focuses on creating new content, such as models, images, code, or text, from existing data. This technology uses advanced algorithms to analyze large amounts of information, identify patterns and generate new content and original that is often indistinguishable from that created by humans.

IAGEN offers innovative solutions to optimize logistics in Vaca Muerta, including:

- Route optimization: IAGEN can analyze traffic data, road conditions, weather, road conditions and vehicle availability in real time for generate optimal routes that minimize delivery times, transportation costs and fuel consumption. This is especially relevant in Vaca Muerta, where Routes and roads are affected by weather conditions and heavy traffic of trucks.
- Demand Prediction: IAGEN can analyze historical production data, market demand and external variables to accurately predict demand of materials and supplies, allowing for more efficient inventory management and avoiding costly delays. The ability to anticipate the needs of materials is essential to avoid interruptions in production and optimize storage costs.
- Predictive vehicle maintenance: IAGEN can analyze sensor data installed in vehicles to predict possible failures and schedule maintenance

preventive, minimizing downtime and optimizing the useful life of the fleet. In a demanding operating environment like Vaca Muerta, the availability of the vehicles is crucial to ensure continuity of operations.

- Warehouse automation: IAGEN can control robots and systems automated in warehouses to optimize storage, management inventory and order preparation, improving efficiency and reducing occupational hazards. Warehouse automation allows for more efficient management efficient use of materials and reduces the need for manual labor in tasks repetitive and potentially dangerous.
- Predictive maintenance of critical infrastructure: The combination of sensors IoT with IAGEN allows predicting failures in critical equipment and infrastructure, such as pipelines and processing plants. Sensors collect real-time data on the status of the equipment, and IAGEN analyzes this data to identify patterns that indicate potential failures. This allows for maintenance scheduling. preventive measures, avoiding costly interruptions in production and improving the security of operations.

III. Report Generation with IAGEN

Generating accurate and timely reports is essential for decision making. informed decisions in the oil and gas industry. IAGEN can automate and Improve reporting in Vaca Muerta, including:

- Production Reports: IAGEN can analyze production data in real time to generate reports that include information on extraction volumes, well efficiency, production costs, and other key indicators. These Reports allow operators to monitor well performance and take action. decisions to optimize production.
- Safety Reports: IAGEN can analyze data from incidents, inspections, and working conditions to generate reports that identify trends, areas of risk and opportunities for improvement in operational safety. The Information provided by these reports allows for the implementation of measures

preventive measures to reduce accidents and improve working conditions.

- Environmental Reports: IAGEN can analyze emissions data, fuel consumption, water, impact on biodiversity and other environmental indicators to generate reports that allow monitoring the environmental performance of operations and comply with regulations. These reports are essential to ensure that operations in Vaca Muerta are carried out responsibly and minimize their impact on the environment.
- Financial Reports: IAGEN can analyze financial data to generate reports that include information on costs, revenues, profitability, and other indicators. key, facilitating strategic decision-making. These reports allow the management evaluate the financial performance of operations and make decisions informed about investments and development strategies.

IV. Frequently Asked Questions with IAGEN

In a complex operational environment like Vaca Muerta, the availability of information Accurate and accessible information is crucial for efficiency and safety. IAGEN can be used to create FAQ response systems that provide information fast and reliable to workers, including:

- Chatbots: IAGEN can be used to develop chatbots that respond to Frequently asked questions about operating procedures, safety regulations, information on equipment and other relevant topics, providing 24/7 assistance. Chatbots allow workers to access the information they need quickly and easily, without having to consult manuals or contact experts.
- Intelligent search systems: IAGEN can be used to create intelligent search systems. search engines that allow workers to quickly find information relevant in large volumes of technical documentation, manuals operation and other resources. These search systems use algorithms IAGEN to understand natural language and provide accurate and relevant to user queries.

- Dynamic content generation: IAGEN can generate responses customized to complex questions, adapting the language and level of detail to the user's needs. This allows information to be accessible and understandable to all workers, regardless of their level of experience or technical knowledge.

VII. Application of agents driven by IAGEN in the activity

1. Concept of IAGEN agents

In recent years, generative artificial intelligence (GAI) has revolutionized the way we interact with technology, enabling the development of systems capable of generating content, answering complex questions and assisting with tasks high-demand cognitive skills. From this capacity, a new architecture emerges Technological: IAGen-powered agents. These agents are not simple conversational interfaces, but autonomous systems that can interpret instructions, make decisions, execute tasks and learn from their interactions with the around.

An IAGen agent combines large language models with components additional features such as external tools, memory, planning and autonomous execution. This allows them to operate in complex environments, with the ability to break down Step-by-step objectives, coordinate multiple actions, interact with digital systems (such as databases, APIs or documents) and adapt to changes in context in real-time. These qualities distinguish them from traditional chatbots and open up a range of more sophisticated and customizable applications.

At the organizational level, these agents are being used to automate processes, generate data analysis, assist in decision making and improve the user experience, both internally and externally. For example, they can assume human resources, legal, financial or logistical tasks, and even those linked to the technical areas of production processes, acting as intelligent assistants that

collaborate with human teams. This ability to integrate knowledge and execute tasks autonomously transforms the way organizations can scale your operations without losing quality or control.

In addition, agentic workflows—structures where multiple agents collaborate with each other to solve complex problems—allow responsibilities to be distributed between different agent profiles, each with specific functions. This generates Hybrid work environments where humans and agents coexist, optimizing times, costs and results. The ability to connect agents with tools such as Google Drive, CRMs or document management platforms further expands their capabilities.

The development of IAGen-powered agents represents a crucial step towards a new era of intelligent automation.

Among the benefits of authentic workflows powered by generative AI models is the ability to automate processes complete, end-to-end production systems, and even add value from the leveraging the skills of language models based on these technologies.

However, its implementation also poses technical, ethical and legal challenges, from responsible design to human oversight. Therefore, understanding your architecture, its operational logic and its potential impacts is fundamental to its effective and safe adoption in various professional contexts.

2. IAGEN Implementation Flow Design Proposal

Stage 1: Data Collection and Preprocessing

- Automatic capture in real time of updated operational information from

various sources (sensors, ERP systems, manual reports).

- Advanced cleansing and precise data structuring using agents specific based on artificial intelligence techniques to ensure high quality in training.

Phase 2: Training and Validation of the GPT-4 Turbo Model

- Custom and specific development of GPT-4 Turbo models, optimized for Answer frequent logistics queries, highly tailored to the context Vaca Muerta operation.
- Continuous validation process using real historical and current scenarios to ensure that the model maintains accuracy and effectiveness in various operational contexts.

Phase 3: Implementation of the Intelligent Chatbot

- Efficient integration of the chatbot with operational technology platforms current, ensuring immediate compatibility.
- Real-time monitoring of chatbot performance and immediate application of dynamic adjustments based on continuous user feedback, to ensure satisfaction and accuracy of responses.

Phase 4: Automation in Report Generation

- Automatic generation of detailed daily operational reports, incorporating In-depth analysis and relevant insights that enable decision-making proactive.
- Incorporation of predictive analysis through specific agents that detect and anticipate critical operational trends, facilitating forward planning and the prevention of logistical incidents.

Concrete Example:

A supervisor urgently needs to confirm the availability of chemicals
specific for hydraulic fracturing. Using the intelligent chatbot, receive
immediately accurate and up-to-date information on available quantities,
exact location of the product, estimated replenishment times and recommendations
proactive about available alternatives or contingency plans, allowing you to take
make informed decisions quickly and better manage critical resources.

IX. IAGEN Benefits in Vaca Muerta

The application of IAGEN at the Vaca Muerta Technology Park offers several significant benefits:

- Time Optimization: Reduction of more than 75% in time spent on
  answer common logistics queries.
- Improvement in Accuracy and Reliability: Significant reduction (90%) of errors in
  automatically generated operational reports.
- Increase in Operational Safety: Reduction of operational risk by having
  accurate and timely information on supply levels and personnel location.
- Cost Reduction: Estimated 20-30% reduction in logistics costs
  associated with operational delays and manual errors.
- Greater operational efficiency: IAGEN optimizes logistics, reporting and
  access to information, which translates into greater efficiency in
  operations and a reduction in costs.
- Improved safety: IAGEN helps prevent accidents, identify potential risks and improve
  working conditions, contributing to greater
  safety in operations.
- Greater sustainability: IAGEN optimizes resource consumption, reduces
  emissions and minimizes the environmental impact of operations, contributing to
  greater sustainability.
- More informed decision making: IAGEN provides accurate and
  timely for strategic decision-making, improving efficiency and

profitability of operations.

- Attracting foreign investment: The adoption of IAGEN in Vaca Muerta demonstrates a commitment to innovation and efficiency, which can make the region more attractive for foreign investment.
- IAGEN and environmental sustainability in Vaca Muerta: The exploitation of Unconventional hydrocarbons in Vaca Muerta raise concerns environmental, especially in relation to water use and pollution. IAGEN can help mitigate these impacts by:
  - Water usage optimization: IAGEN can analyze production data, climate and hydrology to optimize water use in operations fracking, reducing consumption and minimizing the impact on energy sources local water.
  - Water quality monitoring: IAGEN can analyze sensor data to monitor water quality in real time, detecting possible pollutants and allowing a rapid response to any incident.
  - Minimizing impact on biodiversity: IAGEN can analyze data on local flora and fauna to identify sensitive areas and plan for them. operations in such a way as to minimize the impact on biodiversity.
- Economic impact: The application of IAGEN can contribute to the reduction of costs, increased efficiency and improved profitability in operations of Vaca Muerta, generating economic benefits for the region and the country.

X. Challenges and Strategies to Overcome Possible Challenges

Identified Challenges:

- Technical: Integration with existing systems may require technical adjustments complexes.
- Regulatory: Strict compliance with local regulatory standards.
- Economical: Requires initial investment in technological infrastructure.
- Cultural: Possible resistance to change among operational staff.

Recommended Strategies:

- Short-term investment in AI agent implementation teams
  Technology and training: Investment in proof of concept and pilot testing is required. The focus here has to be on training talent to implement, since a trend of cost reduction is verified in systems that allow “no code” and “low code” automation. For the first stage, it is also recommended to use teams with experience in design and implementation of AI agents. Finally, it is key to form an “in” team house” for the accompaniment and appropriation of an agentic culture that redefines human-machine interaction.

- Conduct pilot implementations to verify effectiveness and adjust procedures.
- Intensive staff training in the new technology and clear benefits in its daily use.
- Establish regular audits to ensure regulatory compliance and adjust quickly processes.

XI. Conclusions

Generative Artificial Intelligence (GENI) has the potential to transform the oil and gas industry in Vaca Muerta, optimizing logistics, generation of reporting, access to information and management of critical resources such as water. Its Application in the Vaca Muerta Technology Park will contribute to greater efficiency, safety and sustainability in operations, consolidating the region as a a benchmark in the production of unconventional hydrocarbons. The investment in IAGEN and Collaboration between companies, academic institutions and the government will be key to fully exploit the potential of this disruptive technology and ensure the sustainable development of Vaca Muerta.

Furthermore, the combination of the vast resources of Vaca Muerta with the application of

IAGEN can position Argentina as a world leader in shale production oil and gas efficiently and sustainably. Vaca Muerta has the potential to become an example to follow for other countries seeking to develop their unconventional hydrocarbon resources responsibly, promoting the economic growth and energy security while minimizing the impact environmental.

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