# Energy Meets AI
The Smart Revolution in Oil & Gas

Vidya Meenakshi M.R.

1.Introduction

Industries worldwide are undergoing a shift toward digitalization, integrating advanced technologies into their operations. Sectors such as manufacturing, healthcare, and finance have incorporated artificial intelligence, automation, and data analytics to streamline processes.

As digitalization continues to expand, AI is becoming an essential tool in transforming the oil and gas sector.
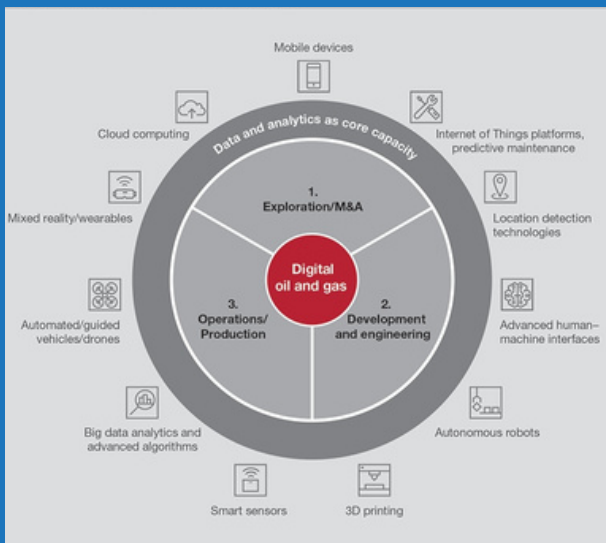
This image from PwC's *Drilling for Data* report highlights 11 essential technologies driving digitization in the oil and gas industry. Big data analytics, predictive maintenance, and autonomous systems leverage AI to carry out their functions.

Similarly, the above mentioned advanced human-machine interfaces and autonomous robots integrate AI .

United Petro Group ®
(A unit of United Oil & Gas Group Inc.)

**Vol 5.4
April 2025**

2. Artificial Intelligence in O&G Sector

Artificial Intelligence (AI) is reshaping the world around us, making processes smarter and unlocking new possibilities for the future. By automating routine tasks and analyzing complex data, AI-driven solutions are empowering businesses to make better decisions and operate more efficiently. Across industries, AI is driving growth and transformation, helping organizations thrive in a fast-paced world. AI is becoming an integral part of industries seeking to enhance productivity and innovation. As more sectors adopt AI, its potential to transform industries and redefine how we approach challenges continues to grow, paving the way for a more innovative future.

Traditionally, the oil and gas sector has been slow to modernize, only relying on conventional practices and manual labor to sustain operations. However, it has now begun leveraging AI to become more innovative and efficient.

United Petro Group®
(A unit of United Oil & Gas Group Inc.)

**Vol 5.4
April 2025**

ENERGY WORLD

Major corporations are increasingly collaborating with technology firms to incorporate advanced technological solutions into their operations. These partnerships facilitate the adoption of innovative tools that enhance productivity, strengthen strategic planning, and improve overall operational effectiveness. By integrating emerging technologies, companies can better adapt to industry demands and maintain a competitive edge in a rapidly evolving market.

- U.S. energy group ExxonMobil is working with Microsoft, using cloud technology to enhance operations in the Permian Basin
- Total of France is working with Google, using artificial intelligence (AI) to optimize subsurface image interpretation; and the U.S. oil services company
- Baker Hughes (formerly known as BHGE) has teamed up with C3.ai, an AI software provider, to use AI in order to improve productivity [2]

This partnership is particularly valuable for the oil and gas sector, as it optimizes production by tackling challenging situations like subsea tiebacks where the integration of advanced solutions enhances efficiency and resource recovery. "Annual savings using these solutions have been estimated to range from $600,000 to $1 million."

3. How AI is Transforming the Oil and Gas Industry :

i) UPSTREAM

a) Drilling Optimisation
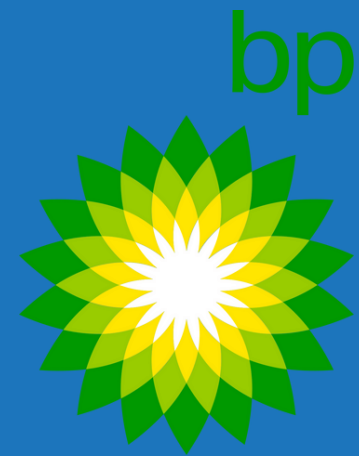
AI has significantly transformed various industrial processes, with drilling being one of the areas where its impact is most evident. Major oil companies, including BP (BP.L), Devon Energy, and Chevron (CVX.N),[4] have acknowledged the role of AI in enhancing efficiency and optimization in drilling operations. The following points outline the key ways in which AI contributes to improved drilling performance:

- Detects potential well failures before they occur, allowing for early intervention and reducing operational disruptions.
- Analyzes geological data to identify viable drilling locations, enabling exploration in areas previously considered unfeasible.

- Identifies faults in geological formations, allowing drilling paths to be adjusted in real time to minimize risks and improve accuracy.
- Helps guide drill bits in real-time, improving accuracy and reducing errors.

b) Seismic Imaging

Artificial intelligence (AI) is transforming seismic imaging by significantly reducing the data requirements compared to traditional methods. Conventional seismic imaging relies on processing vast amounts of shot data. However, advancements in machine learning, neural networks, and computer vision have accelerated the seismic imaging workflow.

In May 2023, the oil and gas giant Shell joined forces with AI company SparkCognition and created the SparkCognition Oil & Gas Exploration Advisor software to do seismic imaging using machine learning. Unlike conventional methods, SparkCognition's AI model processes only 1% to 3% of historical shot data and intelligently fills in the missing data points,[5] after which the AI system generates seismic images almost instantly, enhancing the speed and precision of exploration efforts.

United Petro Group ®
(A unit of United Oil & Gas Group Inc.)

Vol 5.4
April 2025

ENERGY WORLD

ii) MIDSTREAM

AI-driven analytics are transforming logistics in the oil and gas industry by optimizing transportation routes and mitigating risks.

- Data-Driven Route Planning – Processes weather patterns, route hazards, port congestion, and vessel conditions to determine the most cost-effective transportation routes.
- Real-Time Risk Mitigation – Optimization algorithms continuously assess risks and dynamically adjust routes without extending transit time.
- Enhanced Delivery Precision – Ensures on-time deliveries by adapting to changing conditions while maintaining operational efficiency.[6]

iii) DOWNSTREAM

- Predictive Maintenance and Demand Forecasting - By analyzing historical operational data to identify patterns that indicate potential equipment failures Artificial intelligence enhances predictive maintenance. This minimizes downtime and improves overall operational efficiency.

United Petro Group®
(A unit of United Oil & Gas Group Inc.)

Vol 5.4
April 2025

ENERGY WORLD

- AI-driven analytics, leverage advanced algorithms to accurately forecast transportation, route plan efficient and cut down cost and delivery delays.

4. CONCLUSION

In conclusion, AI is revolutionizing the oil and gas industry by enhancing efficiency, and decision-making across upstream, midstream, and downstream operations. As companies continue integrating AI, the industry will become more agile and data-driven, ensuring greater operational resilience and sustainability in the evolving energy landscape.

About United Petro Group :

Established in 2004, United Petro Group (UPG), a subsidiary of United Oil and Gas Group Inc.,a global leader in energy trading founded by Dr. Ganapathi Dhiwaghar In 2019, UPG expanded into the LNG and LPG markets. UPG now trades over 1 million metric tonnes of petroleum products monthly

Our Mission

To forge strategic partnerships and deliver world-class oil trading solutions that empower businesses to thrive and excel globally.