

The Humanity of AI: How Oilfield Operations Need to Balance Humans and Technology



www.detechtion.com

Table of content

- 1. Introduction
- 2. The Evolving Role of AI in Oil and Gas
- 3. Applications of Artificial Intelligence in the Oil and Gas Industry
 - a. AI and Worker Safety
 - b. Al's Role in Reducing Environmental Impact
 - c. AI and Skill Development in the Oil and Gas Workforce
- 4. <u>The Critical Role of Human Oversight: Balancing AI and Human</u> <u>Expertise</u>
- 5. The Impact of AI on Key Performance Indicators (KPIs)
- 6. The Future of AI in Oil and Gas
- 7. Conclusion: A Symbiotic Relationship

Introduction: What Artificial Intelligence Means for the Oil and Gas Workforce

"Seems like we're not going to live in the metaverse after all." This bold statement from a billboard by IMPACT, a company specializing in construction and technical jobs, perfectly captures the current state of the oil and gas industry. While tech buzz surrounds concepts like virtual realities and the metaverse, the energy sector remains firmly grounded in real-world skills and expertise. The billboard's claim, "Your skills are irreplaceable," highlights a critical truth in oil and gas: the industry's reliance on human experience and knowledge, even as artificial intelligence (AI) reshapes the landscape.



Pictures of billboards on an unfinished building for only 9 days in June in Antwerp, Belgium. It was long enough to go viral. The advertising was created for IMPACT, a Belgian employment agency that specializes in construction and technical jobs. To the AI community, it was an unfair dig. For everyone who is worried about losing their jobs to AI, it was a rallying point. Image: IMPACT.

The Evolving Role of AI in Oil and Gas

Al is actively changing the sector, complementing—not replacing—human workers. Despite advancements in Al, intuition and hands-on experience remain irreplaceable, whether it's a geologist identifying optimal drilling spots or a field operator making crucial, on-the-ground decisions. Al is here to assist and elevate the workforce, especially in operational efficiency and safety management.

AI and Workforce Enablement in the Field

Al in oil and gas serves to enhance workforce productivity, not displace workers. <u>A McKinsey study</u> reveals that operational inefficiencies and unplanned downtime cost the industry up to \$50 billion annually. Al helps tackle these inefficiencies by automating repetitive tasks, allowing field operators to focus on decision-making that leverages their deep expertise.

For example, AI helps create optimized work schedules and routes based on real-time data, enabling workers to prioritize tasks more effectively. Rather than micromanaging their day, operators could start their shift with a clear plan, focusing on high-impact tasks like equipment maintenance and troubleshooting.

Importantly, AI does not take away control from workers; it supplements their decision-making with datadriven insights. Operators remain in the driver's seat, adjusting plans as necessary while AI ensures they stay efficient and safe.

EZØPS	(ezops
Today's Items Dashboard Locations Reports - Org Configuration -	
Day Planner Spend less time driving and planning your route.	
1 Tell us about your day	(2) Pick and edit your optimized route
Click on any location to see what outstanding items are due. Optimized route for most points	View as a list @
Map Satellite ETA1 (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c)	Item, Nervit, 2023 Summary Locations 13 locations Approx. three in field 5 hrs 28 mins Approx. drive time 6 hrs 33 mins Approx. points serimed 033 pts Approx. drive time 6 hrs 32 mins Approx. drive time 6 hrs 33 mins Approx. drive time 0.052 pts/m Approx. distance driven 489.52 km Accept EZ-Route 0.052 pts/m
and and	#

The Challenges of Information Overload

In the age of data, there's no shortage of information, but often it's scattered, unstructured, or irrelevant. Despite having access to data, what's often missing are the tools and systems to process, analyze, and derive actionable insights from it. Many managers are reliant on outdated systems that aren't equipped to handle modern operational challenges.

This information overload could lead to decision paralysis or, worse, incorrect decisions based on incomplete or misinterpreted data. Field operators, in particular, face the daunting task of managing numerous fields and operations simultaneously. They must ensure tanks and pumps function correctly, maintain the right injection rates, conduct timely inspections for health and safety, send pigs on schedule, and address ad-hoc tasks promptly. All while trying to package locations to minimize travel time and juggle thousands of variables, including external factors like weather, road bans, site accessibility, and contractor availability.

Augmenting Human Intuition with Machine Intelligence

The solution lies in augmenting human intuition with machine intelligence. Al-powered platforms could enhance the decision-making capabilities of operations and logistics managers. These systems enable field and logistics personnel to overlay their human intuition on data-driven insights for holistic decision-making. By processing vast amounts of data and presenting it in an actionable format, Al helps operators make more informed decisions faster. For instance, an Al system might analyze historical data, current conditions, and predictive models to suggest the optimal route for an operator's daily rounds. This route would balance factors like urgency of tasks, travel time, and potential production impacts.

Moreover, AI systems continuously evolve based on user input and feedback. When operators make decisions based on AI-driven recommendations, their actions—whether successful or not—serve as positive or negative reinforcement for the algorithm. Over time, the platform learns from these outcomes, refining its future recommendations to enhance operational efficiency and drive continuous improvement. This iterative process strengthens the synergy between human expertise and machine intelligence, leading to ever-greater optimization in the field.



Applications of Artificial Intelligence in the Oil and Gas Industry

AI and Worker Safety

The oil and gas industry is inherently hazardous, with offshore platforms, drilling rigs, and remote sites posing risks daily. A total of 82,366 work-related severe injuries were <u>reported to OSHA</u> during January 2015–July 2022; among these, 2,101 (2.6%) were reported by the OGE industry. In this context, AI has become an indispensable tool in enhancing worker safety.

Predictive Maintenance

Al-driven predictive maintenance identifies potential equipment failures before they occur, allowing for timely repairs and reducing the likelihood of accidents. These systems analyze data from sensors and historical maintenance records to predict when a piece of equipment is likely to fail. For example, <u>Al systems are now capable of predicting 75% of equipment failures with significouldt lead times</u>, giving operators the chance to perform preventive maintenance before a malfunction escalates into a major incident.

This predictive capability not only improves safety but also reduces downtime and maintenance costs. By addressing issues before they become critical, companies could avoid expensive emergency repairs and production interruptions.

Real-time Monitoring and Hazard Detection

Al-driven computer vision systems could monitor work sites and detect unsafe behavior or potential hazards in real-time, ensuring that issues are addressed before they become serious. These systems could analyze video feeds from multiple cameras simultaneously, identifying issues that human observers might miss.

For instance, an AI system might detect a worker not wearing proper protective equipment, a vehicle in an unauthorized area, or a developing leak in a pipeline. By alerting supervisors or the workers themselves immediately, these systems could prevent accidents before they happen.



Environmental Safety Monitoring

Al plays a crucial role in environmental safety by monitoring for gas leaks and emissions, alerting operators to risks that could lead to both environmental damage and health hazards. Advanced sensors coupled with Al analytics could detect minute changes in air composition, identifying potential leaks far earlier than traditional methods.

This capability is particularly important for methane detection, as methane is a potent greenhouse gas and a significouldt contributor to climate change. Early detection and rapid response to methane leaks could substantially reduce the industry's environmental impact.

Emergency Response Optimization

In the event of an emergency, AI could assist in coordinating response efforts. By analyzing real-time data from various sources, AI could help incident commanders make quick, informed decisions about resource allocation, evacuation routes, and containment strategies.

AI's Role in Reducing Environmental Impact

In the event of an emergency, AI could assist in coordinating response efforts. By analyzing real-time data from various sources, AI could help incident commanders make quick, informed decisions about resource allocation, evacuation routes, and containment strategies.

Emissions Reduction

Environmental sustainability is increasingly critical in the oil and gas industry, and AI is pivotal in helping companies reduce their carbon footprint and minimize environmental risks.

Al optimizes flaring operations and identifies methane leaks more effectively than traditional methods. By analyzing data from multiple sources, including satellite imagery, ground sensors, and production data, Al could pinpoint the sources of emissions with high accuracy.

For flaring operations, AI could optimize the process to ensure maximum efficiency, reducing the amount of gas wasted and minimizing environmental impact. In some cases, <u>technology and optimization have led to</u> reductions in flaring of up to 50%, significouldtly decreasing both economic waste and environmental harm.



Energy Efficiency Optimization

Al algorithms could analyze vast amounts of data from drilling operations, refineries, and transportation networks to identify opportunities for energy efficiency improvements. By optimizing processes and equipment usage, companies could reduce their overall energy consumption, leading to both cost savings and reduced environmental impact.

Oil Spill Prevention and Mitigation

Al could contribute to minimizing oil spills and their subsequent damage. Predictive algorithms could identify potential weak points in pipelines or storage facilities, allowing for preventive maintenance before a spill occurs.

In the event of a spill, <u>experts are theorizing that AI-powered robots could be deployed to assist in clean-up</u> <u>efforts</u>, often working in swarms to contain spills more efficiently and limit environmental degradation. These robots ccould operate in conditions too dangerous for human workers, improving both the speed and safety of spill response efforts.



UBC Okanagan researcher Saeed Mohammadiun's work involves reviewing marine oil spill management including how computational techniques based on realtime data could be applied to an effective oil spill response.

Water Management

Water usage and disposal is a significouldt environmental concern in oil and gas operations, particularly in hydraulic fracturing. Al could help optimize water usage by analyzing geological data, historical production data, and current operational parameters to determine the optimal amount of water needed for each operation. This not only reduces water waste but also minimizes the risk of induced seismicity associated with wastewater disposal.

AI and Skill Development in the Oil and Gas Workforce

One of AI's most significouldt impacts on the oil and gas workforce is its role in reshaping job requirements and driving the need for continuous skill development.

Evolving Skill Requirements

With AI becoming more integrated into daily operations, the demand for workers with programming, software engineering, and data science skills is increasing. <u>According to recent industry surveys</u>, two-thirds of oil and gas professionals expect AI to require them to acquire new technical skills.

However, it's not just technical skills that are in demand. The integration of AI also increases the need for workers with strong analytical and problem-solving skills who could interpret AI-generated insights and make strategic decisions based on this information.

Bridging the Skills Gap

To address this evolving skills landscape, many oil and gas companies are investing heavily in training and development programs. These programs often use AI-powered tools themselves to deliver personalized learning experiences.

Al-driven training platforms could assess each worker's current skill level and learning style, then create customized learning paths that efficiently close skill gaps. These systems could adapt in real-time based on the learner's progress, ensuring that training is always challenging but achievable.

Continuous Learning and Adaptation

The rapid pace of technological change in the industry means that continuous learning is becoming a necessity rather than a luxury. AI-powered systems could help identify emerging skill gaps based on industry trends and company-specific needs, allowing for proactive training initiatives.

Moreover, AI could assist in knowledge transfer from experienced workers to newcomers. By capturing and analyzing the decision-making processes of veteran workers, AI systems could help codify institutional knowledge, making it easier to train new employees and preserve critical expertise even as experienced workers retire.

The Critical Role of Human Oversight: Balancing Al and Human Expertise

While the potential of AI in the oil and gas industry is undeniable, It'sI'ts crucial to remember that AI is a tool to augment human capabilities, not replace them. The human element remains indispensable in ensuring the responsible and effective use of AI technologies. This section explores the importance of balancing AI capabilities and human oversight:

AI as a tool, not a Savior

It's tempting to view AI as a panacea for all industry challenges, but this perspective could be dangerous. AI, despite its sophistication, is fundamentally a tool designed to process data and provide insights based on predefined parameters. It lacks the nuanced understanding, ethical considerations, and contextual awareness that human professionals bring to the table.

For instance, while an AI system might suggest the most efficient route for an operator's rounds, it may not account for factors like the need to maintain personal relationships with on-site personnel or the value of occasional unscheduled checks. Human operators, drawing on their experience and intuition, could make judgment calls that go beyond pure efficiency metrics.



The Necessity of Human Checks and Balances

Implementing a system of human checks and balances is crucial when deploying AI solutions in the oil and gas industry. This approach ensures that AI recommendations are vetted by experienced professionals before implementation, reducing the risk of errors and unintended consequences.

Key areas where human oversight is essential include:

- **Decision Validation:** While AI could process vast amounts of data to generate recommendations, the final decision-making authority should rest with human experts. These professionals could evaluate AI suggestions in the context of broader business goals, regulatory requirements, and ethical considerations.
- Ethical Considerations: AI systems, by their nature, could not make ethical judgments. Human oversight is crucial in ensuring that AI-driven decisions align with company values, community expectations, and ethical standards, particularly in areas like environmental impact and worker safety.
- Handling Exceptions: AI systems excel at managing routine operations but may struggle with unprecedented situations. Human expertise is invaluable in navigating unique challenges that fall outside the AI's training parameters.
- Interpreting Ambiguous Data: In cases where data is incomplete or ambiguous, human judgment is
 essential. Experienced professionals could fill in gaps and make informed decisions based on their
 understanding of the broader context.
- **Continuous Improvement**: Human experts play a crucial role in refining and improving AI systems over time. By providing feedback on AI recommendations and outcomes, they help these systems learn and adapt to the specific needs of the industry.



The Impact of AI on Key Performance Indicators

The integration of AI into oil and gas operations is having a significant impact on key performance indicators across the industry. By providing data-driven insights and enabling more efficient operations, AI is helping companies improve their performance in several critical areas.

Maximizing Production

Al helps reduce production alarms and minimize the time to resolve these alarms. By analyzing real-time data from sensors throughout the production process, Al can predict potential issues before they lead to production interruptions. This proactive approach not only increases overall production but also reduces the stress on operators who previously had to react to alarms as they occurred.

For example, an AI system might detect subtle changes in pump performance that indicate an impending failure. By alerting maintenance crews early, the pump can be serviced or replaced during scheduled downtime, avoiding an unexpected production halt.



www.detechtion.com

Reducing Operational Expenses (OPEX)

Al can ensures timely tank readings and pig sendings, optimizing operational expenses. By automating these routine tasks and optimizing their timing, companies can reduce labor costs and improve efficiency.

Moreover, AI-driven predictive maintenance, as mentioned earlier, can significantly reduce maintenance costs by addressing issues before they become critical. This approach not only saves on repair costs but also minimizes expensive production downtime.

Improving Compliance

Al helps manage events that need to be completed within set timelines, ensuring better compliance with regulatory requirements and company policies. By automatically tracking deadlines and sending reminders, Al systems reduce the risk of missed inspections or late reports, which could result in fines or other penalties.

Furthermore, AI can assist in generating compliance reports by automatically collecting and organizing relevant data, reducing the administrative burden on workers and minimizing the risk of human error in reporting.

Enhancing Operator Efficiency

Al optimization can increase the number of locations visited weekly and the number of actions completed by operators. By creating optimized routes and schedules, Al helps operators make the most efficient use of their time.

For instance, an AI system might consider factors such as the urgency of tasks, travel time between locations, and the estimated time for each task to create an optimal daily schedule for each operator. This not only increases productivity but also reduces operator stress and improves job satisfaction by eliminating the need for operators to make these complex logistical decisions on their own.

Improving Actions per Billable Hour

By optimizing routes and prioritizing tasks, AI helps improve the number of actions completed per billable hour. This metric is crucial for service companies in the oil and gas industry, as it directly impacts profitability.

Al can analyze historical data to identify patterns in task completion times and travel times, allowing for more accurate scheduling and bidding on contracts. Over time, this can lead to significant improvements in operational efficiency and profitability.

DETECHTION

Improving Actions per Billable Hour

Al can ensures timely tank readings and pig sendings, optimizing operational expenses. By automating these routine tasks and optimizing their timing, companies can reduce labor costs and improve efficiency.

Moreover, AI-driven predictive maintenance, as mentioned earlier, can significantly reduce maintenance costs by addressing issues before they become critical. This approach not only saves on repair costs but also minimizes expensive production downtime.

Improving Compliance

Al helps manage events that need to be completed within set timelines, ensuring better compliance with regulatory requirements and company policies. By automatically tracking deadlines and sending reminders, Al systems reduce the risk of missed inspections or late reports, which could result in fines or other penalties.

Furthermore, AI can assist in generating compliance reports by automatically collecting and organizing relevant data, reducing the administrative burden on workers and minimizing the risk of human error in reporting.

Reducing Operational Expenses (OPEX)

<image>

Al optimization can increase the number of locations visited weekly and the number of actions completed by operators. By creating optimized routes and schedules, Al helps operators make the most efficient use of their time.

For instance, an AI system might consider factors such as the urgency of tasks, travel time between locations, and the estimated time for each task to create an optimal daily schedule for each operator. This not only increases productivity but also reduces operator stress and improves job satisfaction by eliminating the need for operators to make these complex logistical decisions on their own.

The Future of AI in Oil and Gas

As we look to the future, it's clear that AI will play an increasingly central role in the oil and gas industry. However, this doesn't mean that human workers will become obsolete. Instead, the industry is moving towards a model of human-AI collaboration, where each complements the strengths of the other.

Enhanced Decision Making

Future AI systems will likely offer even more sophisticated decision support, potentially using techniques like reinforcement learning to continuously improve their recommendations based on real-world outcomes. This could lead to unprecedented levels of operational optimization, with AI systems capable of balancing complex factors like production targets, maintenance schedules, market conditions, and environmental regulations in real-time.

Autonomous Operations

While full autonomy is unlikely in the near future due to the complex and potentially hazardous nature of oil and gas operations, we may see increasing levels of autonomy in certain areas. For example, unmanned drilling rigs guided by AI could operate in remote or dangerous locations, with human operators supervising from a safe distance.

Advanced Predictive Capabilities

As AI systems gain access to more data and more powerful computing resources, their predictive capabilities will likely become even more accurate and far-reaching. This could extend beyond operational predictions to include market forecasting, helping companies make better long-term strategic decisions.

Integration with Other Technologies



The power of AI in oil and gas will be amplified by its integration with other emerging technologies. For instance, the combination of AI with Internet of Things (IoT) devices could lead to truly smart oilfields, where every piece of equipment is constantly monitored and optimized. Similarly, the integration of AI with blockchain technology could revolutionize supply chain management and trading in the industry.

Addressing the Energy Transition

As the world moves towards cleaner energy sources, AI will play a crucial role in helping oil and gas companies navigate this transition. AI could help optimize the production of natural gas as a transition fuel, assist in the development of carbon capture and storage technologies, and even aid in the exploration and production of geothermal energy, which uses many of the same skills and technologies as oil and gas extraction.

Conclusion: A Symbiotic Relationship

As we navigate the integration of AI into the oil and gas industry, it's clear that the path forward is not about choosing between AI and human expertise, but about fostering a symbiotic relationship between the two. AI should be viewed as a powerful tool that, when properly overseen and directed by human professionals, can drive unprecedented efficiencies, safety improvements, and environmental protections.

The future of the oil and gas industry lies in striking the right balance – leveraging the analytical power and efficiency of AI while maintaining the irreplaceable human elements of experience, judgment, and ethical reasoning. By embracing this balanced approach, the industry can harness the full potential of AI while ensuring that its application remains grounded in the real-world complexities and human considerations that define the sector.

As we move forward, continuous dialogue, adaptive policies, and ongoing education will be key to maintaining this delicate balance, ensuring that AI serves as a tool for empowerment rather than a force for displacement. The oil and gas industry of tomorrow will be defined not by AI alone, but by the powerful combination of artificial intelligence and human wisdom.



Start Implementing AI Capabilities Into Your Field Operations Today

At Detechtion, we leverage AI to empower oil and gas operators to maximize their daily contributions. Our EZ Ops oilfield mobile platform integrates a reinforcement learning algorithm that assists operators in planning their day based on available time, task importance, and location. This AI-driven approach addresses the challenge of identifying the most valuable tasks from an infinite list of possibilities, ensuring operators focus on actions that add the greatest value to the organization.

The system learns and adapts from the operators' choices. When an operator follows the AI-recommended route, the algorithm reinforces similar future suggestions. If the operator chooses a different path, the AI adjusts by prioritizing other tasks in subsequent recommendations. This continuous learning cycle ensures that the platform evolves with the operators' preferences and real-world insights, enhancing efficiency and productivity.

18% OPEX REDUCTION

EZ Ops equipped the company to reduce OPEX by decreasing maintenance and chemical costs, as well as chemical hauling and disposal costs.



1.	Road maintenance:	\$374,850
2.	Trades people, Parts & labor:	\$322,500
3.	Chemical methanol:	\$179,800
4.	Chemical hauling:	\$131,040
5.	Production / disposal trucking:	\$92,380



Man hours saved: 3,632 Operator savings: \$233,238.48



80% LESS ROAD TIME

Without EZ Ops

Ops With EZ Ops

Optimized work scheduling with EZ Ops reduced operator driving time and large truck traffic.



SDETECHTION

By embedding this intelligent algorithm into a user-friendly mobile application, we provide operators with real-time tracking of their activities and equipment performance. This not only streamlines their workflow but also enhances decision-making by combining human expertise with data-driven insights. Ready to Elevate Your Operations with Detechtion?

Unlock the full potential of your team with Detechtion's AI-powered solutions. Contact us today to discover how our innovative platform can transform your operations, enhance efficiency, and drive more excellent value for your organization.





We can help.

Assess how to improve your operations team performance.

info@ezops.ca I 1-877-219-0100