Prolifics®

Oil & Gas Company Fuels the Future with Digital Twins

Our Client:

Our client is one of the world's leading international oil and gas companies (OGC), operating in over 80 countries. They play a crucial role in providing fuel for transportation, energy for heat and light, retail services, and petrochemical products.

Challenge:

The Oil and Gas industry is quick to embrace technology incorporating advanced tools like AI, IoT, Big Data, and cloud computing to streamline processes and increase overall productivity. A notable innovation gaining ground in this sector is the concept of a 'Digital Twin' with potential to offer unparallel insights into operations.

A 'Digital Twin' is a dynamic, virtual representation of a physical asset or system created using real-time data. The "twin" serves as an exact digital counterpart to run simulations on integration, monitoring, and maintenance.

These virtual replicas are transforming the oil and gas industry by enabling real-time monitoring and predictive maintenance of assets. The technology optimizes drilling operations, facilitates safety simulations, and expedites facility planning. Beyond operational enhancements, digital twins contribute to efficiency, safety, and sustainability across supply chain management and environmental impact assessments. Through the integration of data analytics, these digital replicas empower informed decision-making, marking a transformative shift towards a more streamlined, responsive, and environmentally conscious landscape.

Our client, OGC, recognizes the potential of this emerging technology and aims to leverage its benefits. However, as they delve into digital twin technology, they encounter a gap between the digital replica and reality due to complex and manual data processing.

In the ideal scenario, OGC captures a facility using a high-resolution 3D system and imports it into a comprehensive application platform designed as the ultimate single source of truth. In this scenario, they can effortlessly click on any valve, tank, or pipe, gaining detailed insights. The platform reveals associated documents from repositories, including piping and instrumentation diagrams, isometrics, CAD files, and more. It may even provide perks like extracting synthetic data for future AI training for _connected workers_ (those utilizing advanced technologies for improved performance and safety).

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Challenge: *Cont.*

Yet, OGC's manual processes hinder reaching this ideal state. To digitize details, they navigate through various source documents and applications, dealing with complex data that requires domain expertise. This manual process is time-consuming and error-prone, involving the scrutiny of tens of thousands or hundreds of thousands of assets. Aligning all digital information seamlessly becomes a challenge.

For example, if a discrepancy arises between the 3D representation and the piping and instrumentation document, OGC must update the latter to match the visual discovery. This linking process obstructs OGC from unlocking the full benefits of digital twins. To overcome this challenge, OGC needs comprehensive assistance in bridging the gap between their digital twin technology aspirations and the current challenges they face.

Action:

Enter the autonomous pipeline – a system developed by Prolifics that uses artificial intelligence to carry out a significant chunk of these manual activities. Prolifics is actively involved in developing and implementing this autonomous pipeline for OGC, utilizing AI technologies to enhance the accuracy and efficiency of digital twin processes while providing comprehensive support for a successful and scalable deployment.

While achieving full autonomy may be a long-term goal, the current approach involves leveraging AI to autonomously perform most process steps, with a final validation check by a human gatekeeper. This semi-autonomous process reduces the reliance on extensive human resources, expedites the reconciliation process, and lays the groundwork for future operational enhancements.

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Action: *Cont.*

Prolifics is actively engaged in this initiative, working with the client (OGC) to implement an autonomous pipeline for their digital twin processes. Here's how Prolifics is contributing to the project:

- Proof-of-Concept (POC): Prolifics conducted a proof-of-concept using its AI accelerator, serving as a reconciliation tool with AI capabilities specifically designed for visual digital twins.

- Incremental Feature Development: Leveraging our unique capabilities, Prolifics is building incremental features for OGC's autonomous processes. This involves enhancing the AI tools to address specific requirements and challenges within OGC's operations.

- Limited Iterations: The project is currently undergoing two limited iterations, focusing on specific facilities and a restricted scope of assets. This phased approach allows for careful testing and refinement before scaling the solution.

- Scaling Efforts: The ultimate goal for OGC is to extend the autonomous efforts across all their assets and digital sources. Prolifics aims to assist in this scaling process, ensuring a seamless transition to a fully autonomous pipeline for digital twin management.

- Comprehensive Support: Prolifics is not only focusing on autonomy but also providing comprehensive support. This includes assistance with data integration, real-time data connectivity, customized solutions, user training, scalability planning, cybersecurity measures, and collaboration with stakeholders.

- Holistic Implementation: Prolifics is dedicated to ensuring a holistic and effective implementation of digital twins for OGC's operations. This involves addressing not only the technical aspects but also considering scalability, security, user adoption, and collaboration with various stakeholders.

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Results:

The tangible results are twofold: immediate hard savings in terms of time and money and future soft savings, allowing for faster innovation. This, in turn, empowers better planning, improved connected worker experiences, accurate digital twin development, precise simulations, enhanced failure predictions, and more efficient cost reduction. So, there's a clear win-win – saving now and unlocking a cascade of advantages down the road. Additional results include:

- Immediate Hard Savings: Realized in terms of both time and money, providing an instant boost to operational efficiency.

- Future Soft Savings: Enabling faster innovation, setting the stage for ongoing improvements and adaptability.

- Empowered Planning: Improved strategic planning facilitated by accurate digital twin development and precise simulations.

- Enhanced Worker Experiences: Connected workers benefit from a more streamlined and responsive environment, improving overall experiences.

- Cost Reduction: More efficient processes lead to substantial cost reduction, optimizing resource utilization.

- Single Source of Truth: Establishment of a centralized source ensures consistency and reliability across digital twin technologies and simulation capabilities.

- Alignment with Sustainability Goals: Strategic move aligns with OGC's sustainability goals, fostering a cleaner and energy-efficient organization, particularly in refining systems.

- Efficient Facility Planning: Digital twins and simulations enable efficient planning for facility upgrades and changes in processing systems.

- Anticipation through Simulation: Ability to anticipate the operation of modifications through simulation, minimizing potential issues.

- Versatile Technology Applications: Perspectives from maintenance managers, environmenta health and safety professionals, facility planning, and connected worker programs showcase the versatility of the technology.

- Potential for Significant Cost Savings: Various perspectives contribute to unlocking various use cases, potentially saving hundreds of millions of dollars for OGC.

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Technology:

Autonomous pipelines are the backbone of our technology, simplifying complex tasks in the oil and gas industry. They do two crucial things: help reconcile historical documents and make sure live data from the real world is constantly updated in the digital version. This ensures an accurate representation of the real world, allowing for various practical uses.

This technology relies on advanced tools like artificial intelligence (AI), computer vision, natural language processing (NLP), and large language models (LLMs). Together, these tools autonomously understand both text and images, addressing the challenge of merging different types of information.

Now, let's break down how this technology works with the digital twin data files owned by OGC. These files represent the real world in formats like 3D models, laser-captured point clouds, CAD files, and 2D data like piping and instrumentation diagrams (PND). The challenge is that these formats were initially designed for different purposes, making it hard to have a single, reliable source of truth.

To solve this, our autonomous pipelines use a mix of traditional AI vision models tailored for 2D data, specialized 3D point cloud models, and models trained for specific asset types. This smart combination ensures an accurate representation of the real world, aligning with our commitment to providing efficient solutions for OGC's unique challenges.

At Prolifics, we've added another innovation by using AI vision models with synthetic data. In simpler terms, we train our models on information not from the real world, making the identification process faster and more cost-effective for OGC. This combination of autonomous pipelines and advanced technologies reflects our dedication to delivering efficient, accurate, and tailored solutions for the oil and gas industry.

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More on this Prolifics offering

The "Industrial Metaverse" is the deep integration of information, communication, and the real economy. The same is true for the "Connected Worker." The ultimate goal is to build a new, efficient industrial system, both manufacturing and service, across the whole value chain.

Internet of Things (IoT) – IoT represents physical devices connected globally through the internet, all modified with sensors, software, processing abilities, and other tech so they can exchange data among devices and systems.

Digital twin – This is the digital representation of an actual physical product, system, or process. The "twin" serves as an exact digital counterpart to run simulations on integration, monitoring, and maintenance.

Virtual and augmented reality (mixed reality) – Virtual reality (VR) provides near real experiences in a virtual way, while augmented reality (AR) enhances the real world by superimposing computer-generated information on top of it. Both use specialized headset equipment, though a less immersive experience is available over normal devices.

AI computer vision – With equipment or in manufacturing, it provides analytics that can uncover nuanced issues undetectable through traditional quantitative data. This can predict failure earlier and prescribe steps to extend the useful life.

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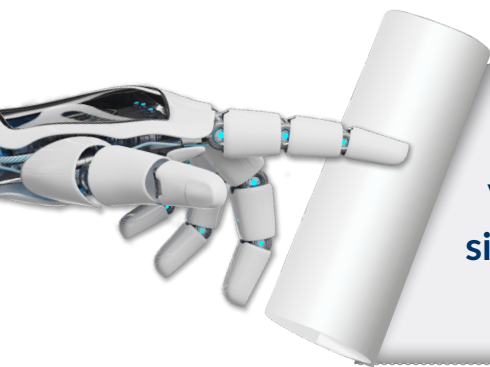
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About Prolifics

At Prolifics, the work we do with our clients matters. Whether it's literally keeping the lights on for thousands of families, improving access to medical care, helping prevent worldwide fraud or protecting the integrity and speed of supply chains, innovation and automation are significant parts of our culture. While our competitors are throwing more bodies at a project, we are applying automation to manage costs, reduce errors and deliver your results faster.

Let's accelerate your transformation journeys throughout the digital environment – Data & AI, Integration & Applications, Business Automation, DevXOps, Test Automation, and Cybersecurity. We treat our digital deliverables like a customized product – using agile practices to deliver immediate and ongoing increases in value. **_Visit prolifics.com_** to learn more.

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