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# EngineeringBeat: Accelerating legacy system modernization

**Cloud migration strategies for oil, gas and chemicals organizations**


The oil, gas and chemicals (OG&C) sector is accelerating its adoption of cloud-enabled technologies to support the digital transformation necessary to stay competitive. These technologies, including artificial intelligence (AI) and machine learning, can provide critical business insights that can help enhance operations, enable predictive maintenance, optimize and strengthen supply chains—and support integrating real-time data analytics to improve forecasting, regulatory compliance, and production management.

However, OG&C companies face unique challenges in cloud migration, which can sometimes place them at a disadvantage compared to other sectors and industries. Unlike other sectors that have been “cloud-first” for years, or even perhaps a decade or longer, many OG&C organizations continue to rely on commercial off-the-shelf software or purpose-built legacy systems to support mission-critical business functions. These systems, fine-tuned over the years as needs changed, can often be deeply embedded in business processes, and migrating them to cloud can present challenges that require careful planning and execution of strategic programs.

# Challenges to modernization and strategies to address them

Legacy system modernization, whether it's from customized systems or off-the-shelf software, is a complex process, but sound integration practices—especially if they're augmented by AI, an effective cloud migration approach, adoption of risk-based security, and a holistic collaboration process with trusted partners—can help overcome these complexities and accelerate their modernization.

## 1 Systems integration during cloud migration can be an arduous process. Accelerate it with modern integration technologies

Many OG&C organizations rely on legacy systems like supervisory control and data acquisition, manufacturing execution system, and enterprise resource planning systems that have supported their operations for decades. Because these systems don't natively integrate with modern cloud platforms and AI-driven analytics tools, the process can be complex. As well, third-party tools like engineering simulation and process control applications can lack cloud-native support, which can potentially affect operational continuity during the cloud migration process.

To address this challenge, OG&C organizations should explore new data integration technologies such as AI-powered middleware, which enable a progressive approach to cloud migration. These technologies can replicate changes on legacy systems and on-premises databases to cloud data platforms in real time, reducing migration risks and enabling incremental service improvements. Further, application programming interfaces and microservices architectures can help phase out legacy systems, and—if legacy systems are critical to keep use containers, that can enable those systems to operate on cloud platforms without refactoring, supporting operational continuity.

For instance, cloud-based high-performance-computing clusters can accelerate reservoir analysis by enabling rapid evaluation of seismic imaging and drill-site data, and real-time monitoring of subsurface conditions.

> Cloud-powered production forecasting and predictive maintenance capabilities can help improve well performance, reduce downtime and optimize extraction processes.

# 2 Multiple platforms can create operational complexity. Untangle it with the right management strategies.

The proliferation of multiple cloud platforms can lead to increased operational complexity, with various security protocols, applications, databases, and governance rules to manage. OG&C firms operate in challenging environments because many do business across multiple geographies—each with its own regulatory requirements—which can complicate governance and compliance efforts. Further complicating operations is the trend toward hybrid cloud environments that feature on-premises data centers co-existing with multiple clouds from multiple providers.

Implementing a metacloud or supercloud approach can help simplify multicloud management by providing a single pane of control. This layer of abstraction and automation can synchronize activities across different cloud platforms—enhancing control, visibility and operational efficiency while reducing costs and vendor lock-in. For example, modern orchestration tools, driven by AI, can allocate workloads in real time, based on demand, which can help optimize performance and costs. Automating compliance monitoring can also assist in enhanced threat detection, which can improve regulatory compliance across platforms and locations.

For example, oil field services, downstream and midstream transportation, and chemical plants are traditionally dependent on heavy equipment and machinery. In a cloud-based environment, these organizations can integrate their applications directly with that machinery, their plants and other facilities, and edge equipment to enhance monitoring and operations.

# 3 Cyberthreat exposure can increase during cloud migration. Mitigate threats with risk-based frameworks.

The convergence of information and operational technologies in the OG&C sector can potentially increase the attack surface, making it challenging to secure systems against cyberthreats. For example, a potential exposure of the industrial control systems that regulate critical processes like temperature, flow rate, pressure, etc., could have a catastrophic effect on equipment function and safety compliance. These threats are especially critical to contain during the migration process, when the transition can lead to increased operational complexity.

Extending frameworks like the Common Vulnerability Scoring System (CVSS) to consider safety, environmental and business consequences can help prioritize vulnerabilities and identify critical areas to tackle first. Couple that with the capability AI can offer to help businesses modernize their architecture and integrate CVSS frameworks, which enables OG&C organizations to automate vulnerability management with predictive analytics and real-time threat detection.

All this can create a proactive defense posture, enable faster incident responses, and reduce downtime.

> To reduce cyber vulnerabilities, adopting a risk-based approach is essential.

# 4 Cost concerns can delay cloud migration efforts. Assuage them with strategic partnerships and joint ventures.

As many OG&C companies rely on deeply integrated, homegrown legacy systems to control their operations, modernization can be an expensive effort. Additionally, the older IT architectures at many OG&C organizations may mean that they have lower levels of technical readiness, which can be a significant barrier to modernization.

Forming strategic partnerships and joint ventures can help OG&C companies share the costs and gain the know-how needed for modernization. For example, collaborating with external partners that have the necessary knowledge and resources can accelerate the transition and help achieve ambitious goals, such as product electrification and decarbonization.

# Cloud migration in action

How a large global energy company migrated legacy applications from an acquisition to its own public cloud ecosystem.

When a leading global energy producer acquired an electric vehicle charging company, the energy producer needed to migrate all the acquired company's applications, user accounts and email systems to its own domain within AWS Cloud. Since the migration included over 1,000 users and more than 30 applications, the energy company needed to implement a structured approach to migration to ensure a seamless transition without technical or operational disruptions.

To help the organization realize its goals, Deloitte used its cloud migration factory methodology to conduct a comprehensive design discovery, migration execution and testing process customized to the organization's defined objectives. This structured approach supported a smooth, efficient migration process and leveraged proven methodologies and automation tools to mitigate risks and accelerate the effort. As a result, all the acquired company's users, applications and emails were successfully migrated with minimal technical issues and disruptions. Additionally, the project produced a 30% reduction in effort while maintaining business continuity throughout.

# The modernization payoff

The challenges to modernization can be daunting, but they're not insurmountable, and cloud migration benefits can be substantial. By modernizing, OG&C organizations can gain actionable insights into their business. They can:

**Enhance data analytics:** Improve data analytics capabilities to enhance operations. For example, OG&C companies could leverage AI to improve analysis of time-series data to optimize drilling, understand production variations, project future performance, and optimize operations.

**Increase agility:** Enable faster deployment of applications and services. For instance, cloud could enable AI-powered remote asset monitoring so that OG&C organizations can leverage predictive and preventive maintenance capabilities to rapidly detect equipment failures before they happen.

**Support new business models:** Leverage the cloud environment to implement AI-powered data analytics to develop innovative new business models that accommodate sustained business growth. As an example, with the access to modern technology that cloud provides, OG&C organizations could use AI-driven demand forecasting to optimize liquid natural gas trading strategies and pricing, which can lead to higher margins in a volatile market.

**Ensure robust security and compliance:** Maintain strong security measures and comply with industry regulations. For example, in a cloud-based infrastructure an OG&C organization could use AI-enabled threat detection algorithms to prevent or mitigate cyberattacks on refinery control, pipeline, or plant-distributed control systems.

# The path forward

Legacy system modernization isn't optional, it's imperative, but it is also an incredibly complex undertaking that will present many challenges along the journey. However, with the right strategies—such as leveraging modern systems integration processes, structured cloud-migration approaches that help reduce complexity, and robust security frameworks that help ensure compliance and continuity—OG&C organizations can successfully navigate the journey and realize ongoing benefits of cloud migration: optimized costs, more efficient operations, deeper insights into the business, and the potential for innovative new business models that support lasting growth and business value.

# Get in touch


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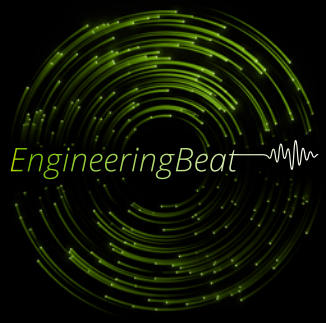


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