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# **Quick Answer: What to Expect When Expecting Generative AI in Oil and Gas**

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Initiatives: Energy and Utilities Digital Transformation and Innovation

Operational efficiency strategies in oil and gas depend on intelligent surveillance and automation. Generative AI can be a key enabler for creating these capabilities at the required scale and pace. This research clarifies why CIOs must act now to utilize generative AI or risk falling behind.

## Quick Answer

**What should I expect to come with generative AI (GenAI) in oil and gas?**

- Fast, no-regret use cases will prove value quickly and develop expertise.
- Over time, game-changing use cases will proliferate, altering competitive dynamics.
- Generative AI will bring unanticipated risks, requiring new governance processes and controls.

## More Detail

### Fast, No-Regret Use Cases Will Prove Value and Develop Expertise

Oil and gas business strategies continue to place more weight on technologies that optimize performance, reduce risk and increase efficiency. This includes GenAI technologies that learn representations of artifacts from data and use those representations to generate brand-new, completely original artifacts that preserve a likeness to original data.

For most companies, the focus of the first wave of GenAI use cases can be organized into four areas:

- **Assisted design and development** that will alleviate tedious tasks and allow developers to focus on creative solutions. Examples include:
  - Reducing the time to create and debug code.
  - Remediating metadata by automatically correcting mistakes/omissions and consistently applied standards.
- **Artificially generated data for machine learning (ML) model training** when insufficient data is available. Examples include:
  - Integrating and strengthening historical operating data pools, improving discovery and characterization of performance patterns.
  - Enabling creation of new virtual sensors (ML models) by generating missing data based on the data distribution of directly measured operating data.
- **Creation of media, images, text, video and audio** to support community relations, align multicompany project teams and train technical field workers. Examples include:
  - Facilitating the consolidation of plant and equipment data (e.g., operating manuals, specifications, user guidelines, maintenance requirements, etc.) using generative AI to replace key-term searches and custom-made programming to formulate the answer to questions directly.
  - Producing materials for project pitches to regulators, communities and investors to build support and momentum for project approval.
- **Deploying smart assistants that deliver consistent and relevant information** to teams making fast decisions, performing infrequent, but complex tasks, or that create multidisciplinary alignment. Examples include:
  - Expanding access to relevant content in enterprise knowledge systems for customers, employees and partners through conversational queries to large language models (LLMs).
  - Integrating information on specific business assets to optimize operation responses related to logistics, manufacturing, trading, pricing, maintenance and operations.

## Over Time, Game-Changing Use Cases Will Proliferate, Altering Competitive Dynamics

Initial use cases will lay a foundation for understanding the business value of GenAI. GenAI, however, has potential to significantly reshape future innovation investments by providing disruptive opportunities for increasing revenue, reducing costs and improving productivity, and better managing risk. As illustrated in Figure 1, examples include:

### Cost and Productivity Opportunities:

- Worker augmentation — GenAI can augment workers' abilities to create a wide range of artifacts that describe or imagine, quickly and at scale. Examples include: drafting and editing text, creating images and other media, summarizing, simplifying and classifying content, generating software code, translating and verifying, and improving chatbot performance.
- Process improvement — GenAI can derive real, in-context value from vast stores of content, such as documents, correspondence and transcripts. Until now, a wealth of data has gone largely unexploited.

### Revenue Opportunities:

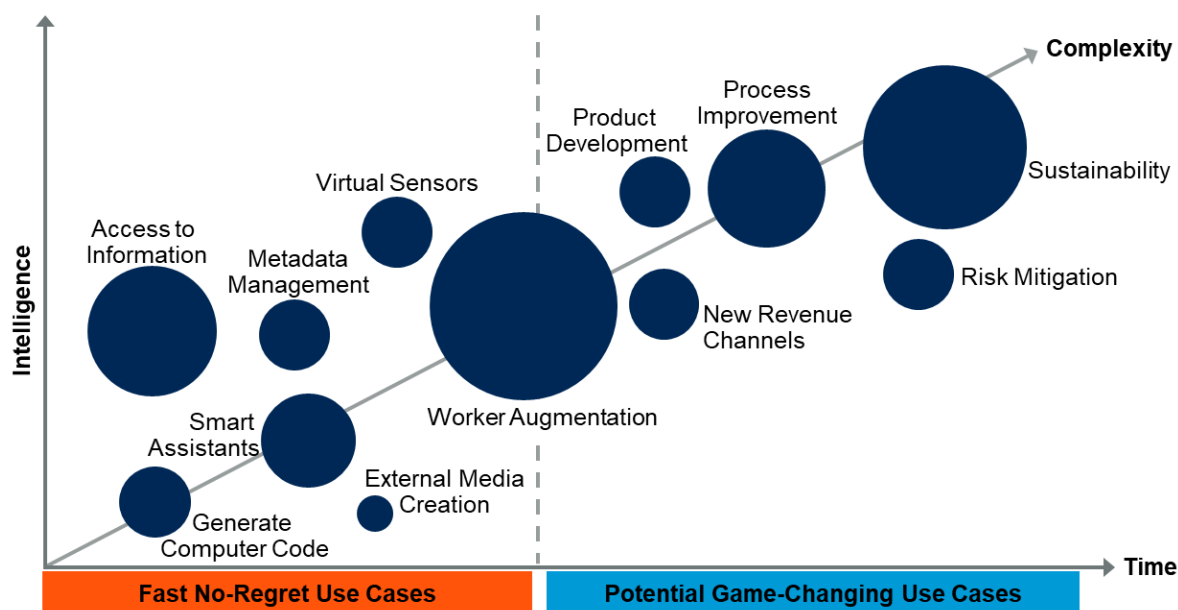
- Product development — Manufacturing (energy, sustainability, chemicals, and materials science), pharma and healthcare may become GenAI-first industries to create alternative energy sources and new catalysts and alloys.
- New revenue channels — Enterprises with greater levels of AI maturity may acquire new revenue faster. A service company may use GenAI to create a service providing open-ended access to their proprietary data. For example, what well completion techniques will be more effective in a newly characterized rock formation?

### Risk Opportunities:

- Risk mitigation — GenAI can enhance pattern recognition and risk identification by analyzing vast amounts of data, providing broader and deeper visibility across data and reducing faulty software code.
- Sustainability — GenAI can help enterprises comply with sustainability regulations by capturing the knowledge and experience of environmental experts in human-friendly ways (e.g., stories, drawings, etc.) and make it available companywide.

Figure 1: Preliminary Spectrum of Generative AI Use Cases in Oil and Gas

### Preliminary Spectrum of Generative AI Use Cases in Oil and Gas



Note: Size of circle indicates potential enterprise impact and value.

Source: Gartner

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## Generative AI Will Bring Novel Risks, Requiring New Governance Processes and Controls

Oil and gas companies face new challenges when adopting generative AI. Digital leaders must consider the following challenges:

- **Performance validation.** GenAI can automate generation and draft solutions, but it may not be complete. Human supervision is still essential to quality check and validate the recommendation. The result may fail to deliver the intended impact, requiring testing.
- **Ethical considerations.** GenAI models learn from existing datasets, which may unintentionally replicate preexisting biases or flawed patterns in the training data, such as priority given to one customer class over another.
- **Intellectual property and legal considerations.** There may be legal implications when associated with the training data used by generative AI. Companies must ensure that solutions comply with licensing and intellectual property requirements.

## Recommended by the Authors

Board Brief on Generative AI

Use Generative AI in Applied Innovation to Drive Business Value

Quick Answer: What Are Intelligent Assets and Why Are They Important?

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