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MANUFACTURING DATA + AI PREDICTIONS 2024

Recent advances in artificial intelligence (AI) will change — and are actively changing — how we live and work. Generative AI (gen AI) is already impacting manufacturing by improving efficiency and making it easier to collaborate globally, and it promises to do more. To learn more about the impact AI and other developments will have in the coming year, we sat down with our in-house experts to hear their predictions. In our report **Data + AI Predictions 2024** we cover AI, cybersecurity and open-source technologies that will transform the broader landscape in the years to come. Here, we'll focus on what's next for the manufacturing industry in particular.

THESE ARE THREE OF THE MOST IMPORTANT MANUFACTURING DATA AND AI TRENDS WE'RE TRACKING FOR 2024:

1. Gen AI will overhaul how manufacturers work by driving efficiency, productivity and innovation.
2. AI and data will inform critical business decisions across the value chain.
3. During this period of intense AI-driven transformation, a robust data foundation will distinguish leaders in manufacturing.

In an industry where technological innovation has been a constant for decades, there's still room for surprises. Gen AI is going to change how we solve problems, work together and improve operational performance.

GEN AI WILL DRIVE EFFICIENCY, PRODUCTIVITY AND INNOVATION

Manufacturers are always looking for ways to make their operations more efficient and cost-effective. Snowflake's Global Head of Manufacturing, Tim Long, says smart manufacturing — the use of advanced technologies to improve the efficiency of traditional processes — is a "huge area of interest" that industry leaders can supercharge with data and AI.

It all begins with centralizing data — bringing OT data off the shop floor and into the cloud

To use AI to its full potential, data should be consolidated in one place. Historically, manufacturers have struggled to consolidate data — derived from information technology (IT), operational technology (OT), and second- and third-party data sources — which is commonly housed in multiple siloed environments. We are seeing manufacturers overcome this challenge by bringing data off the shop floor and into the cloud, where they can coalesce it with other operational data from the factory.

Integrating data from the equipment with other manufacturing process data has been a big trend among manufacturers, and it will continue to be a major focus in 2024. Long says, "Whether it's oil and gas or high tech or industrial manufacturing, there is high demand to bring the data out into an environment where it can be merged with other data."

"It's about gathering more and more data," Long continues. "All of it's just to give you additional perspective on what could be elevating your yield to the next level."

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> Global Head of Manufacturing, Snowflake

Gen AI and LLMs will orchestrate analytical tasks that are outside of traditional BI

The intrinsic value of gen AI and large language models (LLMs) is their ability to distill complex data and analytics into actionable insights through conversational language. In 2024, gen AI and large language models will lower the barrier for people across manufacturing to get valuable insights from data. The earliest return on investment of gen AI and LLMs will be experienced most significantly by large multinational manufacturers. International employees will access data and collaborate in their native language, thereby breaking down barriers that make work inefficient.

Gen AI and LLMs will help manufacturers analyze data beyond traditional business intelligence (BI) tools. Manufacturers can use the technology to pinpoint the root causes of issues by repeatedly asking questions and using LLMs to analyze quality problems in different ways. For example, they will begin to use gen AI and LLMs to simulate models to predict the outcomes of changing control points without actually having to turn a dial. They can perform data queries such as "Can we speed up the process?" "Can we more tightly control variance?" and "Can we improve quality?" — and get straightforward answers through simulations.

When unexpected outages or downtimes occur, LLMs can help engineers get equipment back online quickly. They can use LLMs to find the most efficient ways to troubleshoot equipment maintenance, speed up the troubleshooting process and more. "Manufacturing lines live and die by the efficiency and operational availability of their equipment," Long says. "Adding more equipment is incredibly capital-intensive. So the goal is to keep equipment running at peak performance as much as possible, often 24 hours a day."

Gen AI and LLMs will also reduce the barriers for analyzing data and synthesizing unstructured data. Manufacturers can easily troubleshoot manufacturing problems or optimize the process itself. Through iteration, engineers can explore data, test hypotheses, and leverage machine learning and simulation capabilities — all fully managed with generative AI.

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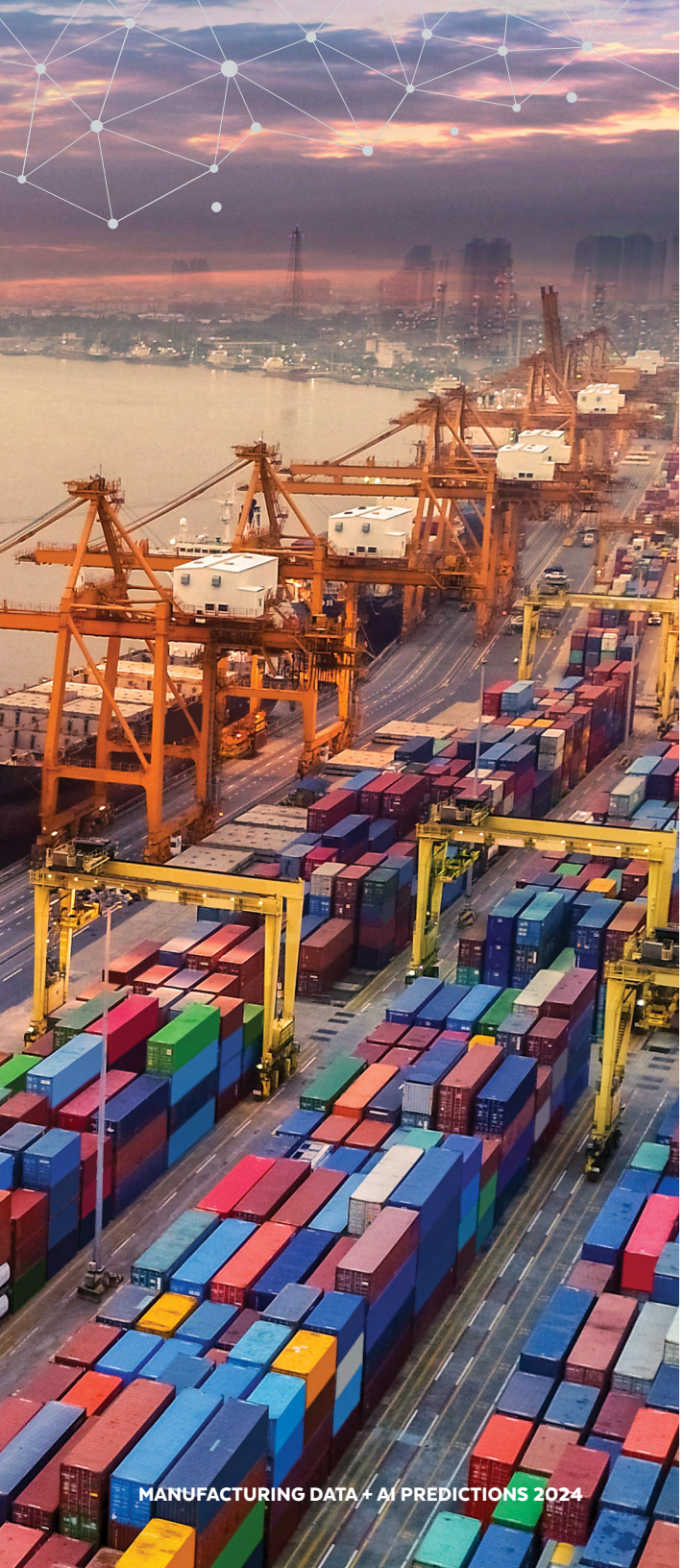
IN 2024, LEADING MANUFACTURERS WILL EVALUATE AND ADOPT GEN AI AND LLM SOLUTIONS. SOME WILL EVEN BUILD THEIR OWN.

Companies that have already invested in automation are ahead of the AI game and are poised to lead in gen AI and LLM optimization. Long says, "The readiness for manufacturers in these particular technologies correlates very well to the amount of investment they've made in automating manufacturing steps."

Over time, these forward-thinking manufacturers are likely to have developed effective strategies for consolidating and utilizing data. The manufacturers who haven't invested in automation, especially when data is collected manually, will face more challenges in adopting and taking full advantage of gen AI and LLMs.

Long advises that all manufacturers should embrace emerging AI — with a focus on solving specific business problems. "Manufacturers should identify the areas with the biggest potential payback and where the biggest business challenges exist, then assess whether gen AI is the right solution to make the impact they need in those areas," he says.

We'll also begin to see leading manufacturers go beyond examining existing gen AI and LLM solutions. Some will even start to build their own solutions, but at a much smaller scale. What might hold some back? "Until gen AI and LLMs have proven to be effective and safe for their intellectual property, there's not going to be wide-scale adoption," Long says.



DATA AND AI WILL DRIVE CRITICAL BUSINESS DECISIONS AND REDUCE RISK ACROSS GLOBAL SUPPLY CHAINS

Supply chain challenges are nothing new to the manufacturing industry, but they continue to have a big impact even after some of the strain of the global pandemic has eased. Data collaboration can help, and is already helping, Long says. Data collaboration is the process of gathering and sharing data from various sources. This typically involves combining datasets from internal teams and empowering domain experts to contribute their unique perspectives to provide insights. Data collaboration also takes the form of data-sharing partnerships or supplementing existing data with third-party datasets. This is where Long says he is seeing some manufacturers get ahead of supply chain issues.

Data sharing will continue gaining traction in shipping and logistics, production planning and supply chain risk management

There are three specific areas where manufacturers are seeing the benefits of data sharing:

- **There is a notable emphasis on data collaboration** in the shipping and logistics sector, particularly with third-party entities facilitating the flow of products from manufacturers to customers. By collaborating with third parties, manufacturers can get products out the door and to customers more efficiently, boosting customer satisfaction.
- **Manufacturers are interested in using data** to understand the availability and projected costs of raw materials and energy, to plan more effective production processes.
- **It's crucial to understand the supply chain risk.** This is where manufacturers monitor potential suppliers' performance against various risk indicators so they can be proactive in addressing or mitigating supply chain disruptions.

"Manufacturers are getting more insight across their global supplier network," Long says. "By understanding supply chain risks, manufacturers can learn in near-real time how certain supplies are performing against risk indicators. We're seeing some leading manufacturers build predictive models based on their supplier network to better predict shipment arrivals to minimize risk and disruption."

A combination of data and AI helps reduce global supply chains risks

At a macro level, supply chain challenges have been, as Long describes, a "large ship to turn." Some manufacturers are still investing in on-shoring critical components of their supply chain, which takes a long time to shift the balance back from off-shoring strategies. However, with data and the right AI tools, manufacturers can more quickly find strategies to solve critical supply chain issues.

Industry consolidation is causing many major manufacturers to use multiple enterprise resource planning systems. Manufacturers are trying to stitch together different systems from the companies they acquire, but the compartmentalized nature of these systems makes it difficult to get a comprehensive understanding of the supply chain network.

The goal is to have enterprisewide visibility of all supplier data to better understand how to build a portfolio of suppliers at a global level, Long points out. Leveraging tools like LLMs to do this helps manufacturers avoid having a critical component get stuck with a single source, especially in a high-risk location. It improves the transparency, accessibility, context and more of the manufacturer's data. Streamlined access to probabilistic techniques such as forecasting, planning and route optimization promises to elevate supply chain resilience and efficiency. Ultimately, this leads to increased profitability and heightened customer satisfaction.

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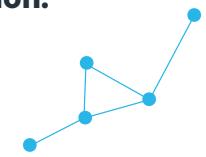


IF THERE'S ONE AREA IN WHICH THE NEW AI ERA CHALLENGES THE IT STATUS QUO, IT'S HOW AN ENTERPRISE STORES ITS DATA.

"Gen AI will increase the trend toward centralized data on a managed service platform that provides the security and governance you need, and creates a single source of truth for LLMs and everything else," Snowflake CIO Sunny Bedi says.

Anoosh Saboori, Snowflake's Head of Product Security, says that the many cloud-adoption laggards will have to step up quickly. "Gen AI will make it hard to keep your data on-prem," he says. "That's still a significant discussion today, because the majority of workloads are still not in the cloud."

This push to the cloud, Saboori notes, will complicate security and compliance strategy. "Customers adopting a multi-cloud strategy often end up distributing data and models across many platforms with different security and governance capabilities," he says. "It becomes very challenging to manage your security and governance posture across such distributed environments."

A ROBUST DATA FOUNDATION WILL SET LEADING MANUFACTURERS APART

For years, companies have been urged to develop a comprehensive and forward-looking data strategy. As more and more businesses tick that box, AI advances have accelerated and expanded data-driven insights and analytics.

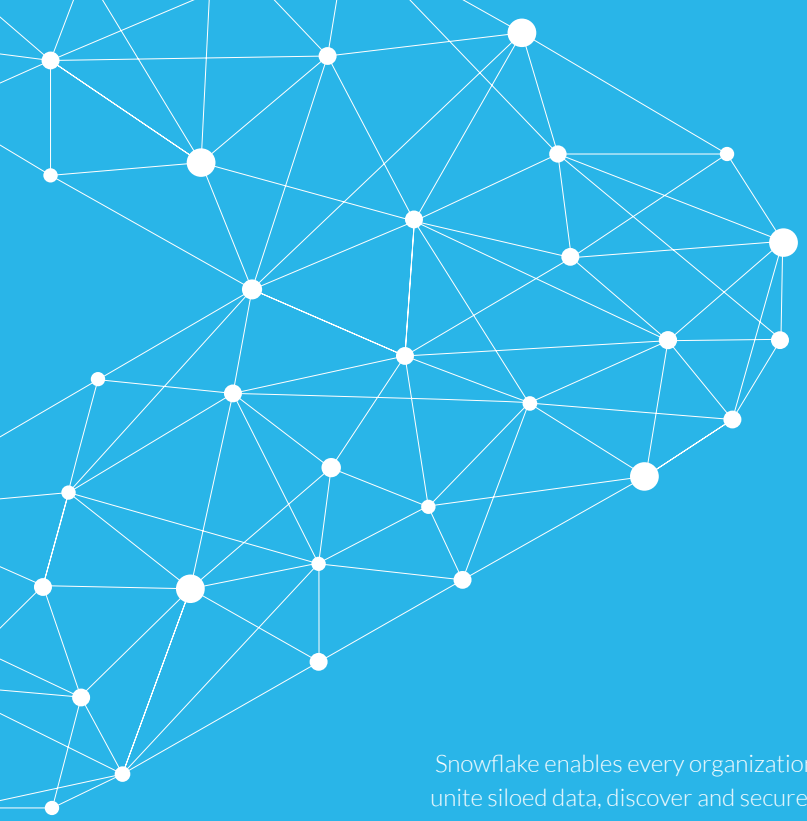
"The gen AI era does not call for a fundamental shift in data strategy," says Jennifer Belissent, Principal Data Strategist at Snowflake and a former Forrester analyst. "It calls for an acceleration of the trend toward breaking down silos and opening access to data sources wherever they might be in the organization."

A unified data structure is essential to properly train any gen AI and LLM models. Data silos will only make outputs incomplete or inaccurate, or require a lot of extra work to overcome. A single data platform also allows companies to set the relevant privacy features across their ecosystem, and preserve consent around data that customers have willingly shared.

Combining integration, storage, governance and management of data into a single platform establishes a single source of truth in a quickly evolving competitive environment. It improves data quality, cuts costs, improves efficiency and leads to better decisions. A holistic approach to data management will help to improve metadata, ensure consistency and raise the quality of what goes into gen AI and LLMs — and, thus, the quality of what comes out.

A modern data cloud platform is critical to successfully executing on such a robust data strategy, and the presence of one will fundamentally dictate the success of AI strategies going forward. Manufacturing companies need a data foundation that delivers faster time to value alongside a flexible future-ready foundation — one that makes it easy for everyone to access all the data they need, seamlessly, while keeping the data secure and easily governable.

Learn how the Data Cloud can help you build a strong data foundation and prepare for what's ahead.



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ABOUT SNOWFLAKE

Snowflake enables every organization to mobilize their data with Snowflake's Data Cloud. Customers use the Data Cloud to unite siloed data, discover and securely share data, and execute diverse artificial intelligence (AI) / machine learning (ML) and analytic workloads. Wherever data or users live, Snowflake delivers a single data experience that spans multiple clouds and geographies. Thousands of customers across many industries, including 639 of the 2023 Forbes Global 2000 (G2K) as of July 31, 2023, use the Snowflake Data Cloud to power their businesses.

Learn more at snowflake.com