



DATA-DRIVEN MANUFACTURING FOR RESILIENCE & INNOVATION

Three key strategies that smart manufacturers must develop



TABLE OF CONTENTS

- 3** Introduction: Three key strategies for smart manufacturers
- 5** Strategy 1: Improve supply chain resiliency
- 7** Strategy 2: Power Industry 4.0 analytics
- 9** Strategy 3: Drive customer experience and new revenues
- 11** Snowflake for data-driven manufacturing
- 13** About Snowflake

INTRODUCTION: SMART STRATEGIES FOR SMART MANUFACTURING

Despite market turbulence, the digital transformation plans of UK manufacturers are forging ahead with a focus on investments that will help boost resilience and innovation. Data-driven approaches to manufacturing hold out the promise of leaner, more sustainable operations and agile responses to disruption and changes in customer demand.



For UK manufacturers, market conditions remain challenging. Brexit, the ongoing impact of Covid-19, geopolitical upheaval, soaring energy costs and global supply chain disruption have all conspired to send supply and demand order books and output on a rollercoaster ride.

With uncertainty set to continue in the sector, the leaders of these businesses are on a mission to build more resilience into their operations and to identify new opportunities for growth.

Many see digital technologies as their best chance of achieving these goals, a view widely shared by their global peers. In KPMG's Global Manufacturing Prospects 2022 survey of CEOs from the sector, supply chain risk is seen by respondents as the top risk to organisational growth. And the top operational priority they give for achieving growth objectives is advancing the digitisation and connectivity of all functional areas.

Data generated by equipment, employees, vehicles and key business partners holds valuable clues as to how they might mount more agile responses to disruption—run leaner, more sustainable operations and more accurately predict future demand patterns and customer needs.

In line with that thinking, UK manufacturers have solid investment plans for 2022 and beyond, according to a report from industry body Make UK and global professional services giant PWC, Executive Survey 2022: Harnessing Agility and Resilience.

Based on a late 2021 survey of almost 230 UK manufacturing executives, 45% of those surveyed had made concrete plans to invest in automation, artificial intelligence (AI), additive manufacturing or other forms of digital technologies during 2022. A further 20% said they had plans to do so, if not in 2022, then in 2023, while a similar proportion said plans were under consideration but they had yet to come to a final decision. Only 15% of those surveyed had no plans to invest in digital technologies within the 2022/2023 time frame.

These spending intentions suggest they will be required to point to a sharp increase in information to collect, secure and analyse data in greater volumes than ever before in an industry that already faces considerable data management challenges. Increased supply chain connectivity, smarter factories and more connected products will add to the avalanche of data, much of it in unstructured and semi-structured formats.

But the ability to unlock meaningful insight from that data is on track to become a major point of competitive differentiation for manufacturers. In this ebook, we will look at how some manufacturing organisations are using the Snowflake Data Cloud to achieve that all-important edge over their competitors by adopting three key strategies:

➤ **IMPROVE SUPPLY CHAIN RESILIENCY**

➤ **POWER INDUSTRY 4.0 ANALYTICS**

➤ **ENHANCE CUSTOMER EXPERIENCE
AND GENERATE NEW REVENUE**



STRATEGY 1: IMPROVE SUPPLY CHAIN RESILIENCY

THE CHALLENGE

UK manufacturers urgently require greater resilience to withstand and respond to supply chain shocks. These have become all too common in recent years with the impact of COVID-19, but ongoing issues include shortages of raw materials/components, transportation bottlenecks, delayed shipments and staffing problems.

In a late 2021 survey of UK manufacturing executives conducted by innovation agency Digital Catapult, almost two out of three respondents (64%) confirmed that strengthening supply chains was their top priority for digital transformation in 2022.

But the fact remains that getting a product manufactured and into the hands of customers typically relies on data that resides on numerous systems. These belong not only to the manufacturer itself but also to the ecosystem of third parties with which it works, including customers, suppliers and logistics companies.

The challenge is to bring that data together to create a 'big picture' view of real-time situations so that partners can work together on effective responses – and in some cases, predict and mitigate supply chain risks before they even arise.

DATA-DRIVEN RESPONSE

The first goal of manufacturers intent on tackling supply chain disruption should be visibility. In other words, they need to assemble relevant data in such a way that it can be analysed to identify risks and

potential breaks in the supply chain, preferably, before they strike. This potentially involves a wide range of data, not just from internal sources, but also from partners: the availability of supplies, location of delivery trucks and order histories of customers. This might include data from sensors on warehouse shelves and vehicle telemetry systems, as well as from back-end inventory management and supply chain application software.

The Snowflake Data Cloud provides a venue in which all of this data can be stored and managed securely, regardless of its origins or format. Elastic scalability combined with usage-based pricing means that manufacturers can cast the net wider and capture more data from more diverse sources, boosting insights and leading to better decision-making.

Using secure data sharing, partners can work together on enriching data sets with their own contributions to create the end-to-end view that keeps everyone informed about what's going on across the entire supply chain. This approach vastly improves on traditional data-sharing methods, eliminating the need for copying data and moving it around, a practice which frequently introduces unacceptable data security and data quality risks.

The second goal is agility—the ability to spot a problem and to act on it quickly, based on an accurate understanding of the real-time situation. This depends on applying analytical technologies, including AI and machine learning, so insights can be drawn from data and presented to those best placed to act on them, most commonly in the form of business intelligence reports, alerts and forecasts.

In this way, when hit by disruption, manufacturers can alter their plans quickly—perhaps switching to another supplier, using another material or part, or adjusting delivery dates or routes. Data sharing, meanwhile, means that the wider ecosystem of business partners can be kept up to date on any changes and adjust course accordingly. These collaborations, in turn, can strengthen business relationships, as partners in an ecosystem come to better understand and help resolve each other's challenges.



In action: Cemex

Based in Monterrey, Mexico, CEMEX is a global building materials company that provides high-quality products and reliable service to customers in the Americas, Europe, Africa, the Middle East and Asia. It evaluates GPS and traffic data stored in Snowflake to determine the best routes for the company's ready-mix concrete trucks.

A similar application calculates the optimal distribution of trucks based on the location of the company's ready-mix concrete plants and forecasted demand. This helps CEMEX save on transportation costs and better meet its customers' needs.

"Snowflake has given us near instant access to technical capabilities that, in the past, took months or even years at high prices and low success rates. With Snowflake, we get close to unlimited data at high performance, delivered almost instantly."

Fausto Sosa,
VP of Information Technology, CEMEX

STRATEGY 2: POWER INDUSTRY 4.0 ANALYTICS

THE CHALLENGE

Factories need to be smarter and more sustainable. The fourth industrial revolution—or Industry 4.0—promises to change the way they operate to achieve these goals.

Key to this vision is the Industrial Internet of Things (IIoT). Equipped with the intelligent sensors that make up the IIoT, traditional factory floor machinery, newer robotics, smart tags and the handheld and wearable technologies increasingly used by workers create a deluge of data that, once combined and analysed, can deliver a hefty boost in efficiency and quality to production processes. Faults, bottlenecks and waste are more quickly identified, energy usage curbed and unplanned downtime avoided.

Confronted by market turbulence, higher costs and increasing government mandates around sustainability, UK manufacturers are keen to tap into these benefits. The UK government's Net Zero 2050 goal, in particular, looms large on executive agendas.

According to the Make UK/PWC 2022 Executive Agenda report, 49% of UK manufacturers say they plan to invest in green technologies or energy efficiency measures over the next 12 months, while a further 22% say they will make these investments within the next 24 months.

The challenge is to come to grips with the data produced by connected factory equipment and use it to drive measurable improvements that are both good for business and good for the planet.

DATA-DRIVEN RESPONSE

At many manufacturing organisations, data relating to production processes resides in a vast array of silos, including ERP (enterprise resource planning) platforms, supply chain management applications and SCADA (supervisory control and data access) systems. As new equipment is introduced on factory floors, still more silos are created.

The Snowflake Data Cloud provides a common and scalable environment in which IIoT data can be integrated, even when it arrives in large volumes, at high frequency, and in diverse formats—from temperature/humidity measurements to video footage captured by smart cameras overseeing production lines.

Once in the data cloud, this data can be combined and analysed in ways that uncover new insights. Possible use cases in a factory environment might include:

- **Predictive maintenance:** With IIoT data available from factory floor operations, machine learning can be applied. In this way, data generated by equipment about the stressors they are undergoing such as temperature, pressure, vibration and cycles can indicate when a breakdown is imminent. Armed with that information, engineers can intervene and make necessary adjustments to prevent production processes from grinding to a halt.

In action: Bonfiglioli

Based in Bologna, Italy, Bonfiglioli is a multinational Italian engineering group that designs, manufactures and distributes a complete range of gear motors, drive systems, planetary gearboxes and inverters to a range of industrial sectors. Using Snowflake, the company's digital transformation has seen an increasing amount of IoT data ingested from the factory floor, providing more and more relevance to daily business operations. As a result, data-driven manufacturing is fast becoming the new standard at Bonfiglioli. The company now has a long-term vision to integrate sensors into the products it produces, to create new lines of business that will prove valuable to customers.

"The future of manufacturing is to have connected devices generating valuable data. Snowflake is key to enabling that vision."

Gabriele Zennaro,
Corporate IT Manager, Bonfiglioli

- **Asset tracking:** When raw materials and inventory are equipped with smart tags, production planners can be confident of their location in the factory or warehouse and organise them to keep production moving along on schedule. Likewise, workers can also track the journeys made by finished products, keeping customers informed of their likely delivery times.
- **Worker safety:** Factories can be dangerous environments for humans. Wearable devices used to track worker activity and behaviours and as the basis for safety training and instruction will help them stay safe and healthy. Alerts regarding exposure to extremes in temperature or proximity to dangerous equipment, for example, can be sent to managers, warning them of risky situations.
- **Environment control:** When the manufacture, transportation or storage of a product demands a specific set of environmental conditions, sensors that measure temperature or humidity can alert managers to conditions likely to lead to poor product quality.
- **Energy usage:** When a company is looking to optimise its energy usage, data relating to consumption by particular machines or parts of the production line, combined with data on energy type and cost, can be a useful way to formulate production plans that take advantage of the right type of energy, at the right time of day and cost.



STRATEGY 3:

DRIVE CUSTOMER EXPERIENCE AND NEW REVENUES

THE CHALLENGE

Many manufacturers now design, build and sell smart, connected products– from industrial equipment, such as wind turbines, to consumer goods, such as smart home appliances. Once sold to a customer, these products continue to report back to the manufacturer in a stream of data about their performance and condition.

This data stream creates an ongoing relationship between the manufacturer and the customer, giving the manufacturer opportunities to offer the customer differentiating sales and services or to develop entirely new business models based on usage-based pricing, rather than a one-time, upfront cost.

But the challenge is that smart, connected products can only be successful as a platform for improved customer experiences and new revenue streams if the data they generate is collected, analysed and acted upon promptly.

DATA-DRIVEN RESPONSE

IoT data from smart, connected products helps manufacturers understand how a product is used, to upgrade it remotely and to predict when maintenance is needed. Combine that device data with customer data, and manufacturers are presented with an opportunity to enhance the customer experience.

The Snowflake Data Cloud provides an environment where the integration and analysis of this data can happen. Findings achieved through analytic approaches can then be presented to customer service and support staff in the form of actionable information, enabling them to proactively get in touch with the customer if the product is not operating as it should and schedule a visit from a field engineer, for example, or advise them that a consumable such as printer ink or washing detergent is running low and suggest they order more.

Typically, this journey for manufacturers begins with simple remote monitoring, giving them live insights into the use and performance of products and enabling them to deliver software and firmware updates.



Performance management, meanwhile, is an evolution of remote monitoring—most commonly associated with costly industrial equipment—in which manufacturers work to continuously improve the customer experience based on metrics such as overall equipment effectiveness (OEE). Here, there is an opportunity for manufacturers to launch outcome-based services, in which customers are charged based on improved uptime, lower energy consumption or higher output quality.

Smart field services are also an important part of this picture; data collected from a faulty product gives engineers an accurate idea of what issue they're likely to encounter, the recommended fixes for it and what spare parts and tools they might need before they even arrive at a customer's site. That can result in reduced costs for the manufacturer and a better, more efficient service for customers.

Finally, there are also opportunities for some manufacturers to launch equipment-as-a-service (EaaS) offerings. These involve renting out equipment to end users and collecting periodic payments for their use of the equipment. This enables customers to lower the total cost of ownership associated with equipment and acquire it on a more flexible basis, often paying for it in ways that link closely with desired business outcomes.



In action: Valmet

Valmet, based in Espoo, Finland, is the leading global developer and supplier of process technologies, automation and services for the pulp, paper and energy industries. Using Snowflake, the company offers Valmet Industrial Internet, a set of data-driven services for customers that combine advanced monitoring and prediction applications for the company's modern paper machines. These machines generate a huge amount of data, typically some 20,000 to 50,000 process tags and 5-10 terabytes of raw data per year. Using these services, customers are moving towards autonomous mills and plants, becoming more resource-efficient, more flexible in their operations and less dependent on operating location.

“Snowflake was the best fit. It's secure and provides governed access to all data. Another big factor was concurrency and scalability. We are able to auto-scale during peak load hours.”

Antti Sirkka,
Chief Data Architect, Valmet

THE SOLUTION: SNOWFLAKE FOR MANUFACTURING

Smart manufacturers aren't just investing in the automation of manufacturing operations, they're also focusing on increased productivity, lower costs and greater sustainability through the use of advanced analytic technologies.

Using data analysis to streamline operations isn't a new concept for most manufacturers, but many rely solely on an on-premises infrastructure that isn't up to the task of processing, storing and analysing the variety and volume of data generated by today's manufacturing operations.

The [Snowflake Data Cloud](#) offers near-unlimited storage and compute power, allowing manufacturers to aggregate large amounts of data in structured, unstructured and semi-structured formats. This powerful platform allows teams to quickly access and analyse data without worrying about integration and interoperability issues.

Because Snowflake Data Cloud supports [secure data sharing](#), they can easily bring in data from business partners to supplement their own data sets, such as suppliers and logistics companies.

Additionally, the [Snowflake Marketplace](#) provides access to live and ready-to-query data sets from a large number of third-party data providers and data service providers, for enhanced data-driven decision-making.

Snowflake's Data Cloud delivers the performance, scalability and data-sharing capabilities needed for supply chain optimisation, production quality and efficiency, manufacturing automation, and robotics and IoT initiatives.

THE SOLUTION: DATA-DRIVEN MANUFACTURING IN ACTION

Today, manufacturers worldwide rely on Snowflake to deliver real-time insight into manufacturing throughput and critical processes. They use it to:

INCREASE EFFICIENCY ACROSS THE SUPPLY CHAIN

Increase transparency into the entire supply chain with data to track tools, parts, shipments, and inventory in real time to reduce bottlenecks, interruptions and delays.

IMPROVE QUALITY AND SPEED OF PRODUCTION

Align resources with manufacturing operations to identify costly production gaps, lower energy and utility waste, and gain insight into throughput and critical processes with comprehensive, real-time data.

POWER IOT INNOVATION WITH SENSOR AND DEVICE DATA ANALYSIS

Easily manage always-on streams of sensor and device data, customer data, transaction data, and supplier data to build efficient data pipelines for IoT initiatives.

To learn how your manufacturing organisation can unlock the power of data, visit [Snowflake for Manufacturing](#).

MANUFACTURING USE CASES ENABLED WITH SNOWFLAKE DATA CLOUD



PLAN

Enhance Forecasting models with internal ERP data linked with macro-economic and consumer trends from Snowflake's marketplace.



SOURCE

Proactively manage Supply Chain Risk with supplier risk, transportation capacity and speed forecasts, and projected raw material availability.



MAKE

Mine massive datasets to improve Yield and Quality, blending internal production data with direct data shared from key suppliers.



DELIVER

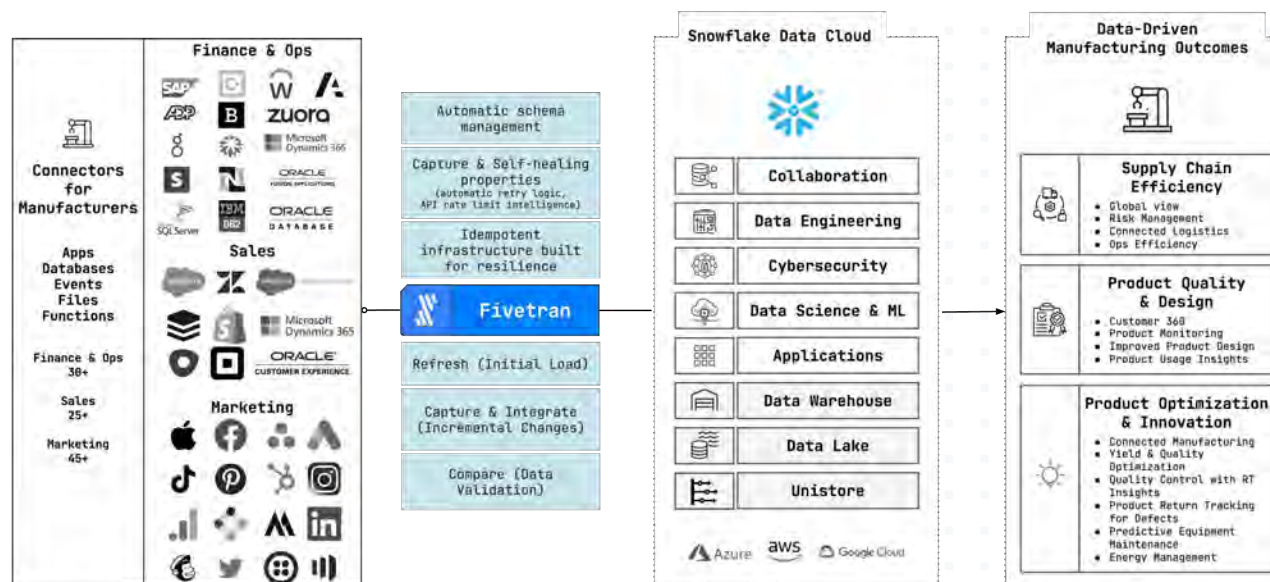
Optimize the value and service of field assets with IoT data, layering in context such as weather and service availability.

PARTNER SOLUTION

Fivetran automated data integration is designed to deliver ready-to-use connectors, transformations, and analytics templates that adapt as schemas and APIs change, ensuring reliable data access. Its automated data movement solutions connect data silos and centralize all data. The company's SAP data replication solution simplifies integration across a hybrid data landscape to provide complete visibility, access, and collaboration, which is key for manufacturers.

The high-performance log-based change data capture (CDC) technology is a nonintrusive and asynchronous replication method that reduces the load on the source system, and its intent is to enable optimum efficiency for continuous integration of large volumes of data. Fivetran supports data replication from SAP, Oracle, IBM, and other data sources to various cloud destinations such as Snowflake to deliver better business insights faster.

Manufacturing Analytics with Fivetran & Snowflake





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 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 543 of the 2022 Forbes Global 2000 (G2K) as of October 31, 2022, use Snowflake Data Cloud to power their businesses. Learn more at snowflake.com.

snowflake.com



ABOUT FIVETRAN

Fivetran is the global leader in modern data integration. Our mission is to make access to data as simple and reliable as electricity. Built for the cloud, Fivetran enables data teams to effortlessly centralize and transform data from hundreds of SaaS and on-prem data sources into high-performance cloud destinations. Fast-moving startups to the world's largest companies use Fivetran to accelerate modern analytics and operational efficiency, fueling data-driven business growth. Fivetran is headquartered in Oakland, California, with offices around the world.

fivetran.com



CITATIONS

¹ Global Manufacturing Prospects 2022, KPMG, January 2022

² Executive Summary 2022: Harnessing Agility and Resilience, Make UI/PWC, 2022

³ Bullet-proofing supply chains is a top priority for manufacturing bosses in 2022, Digital Catapult, January 2022