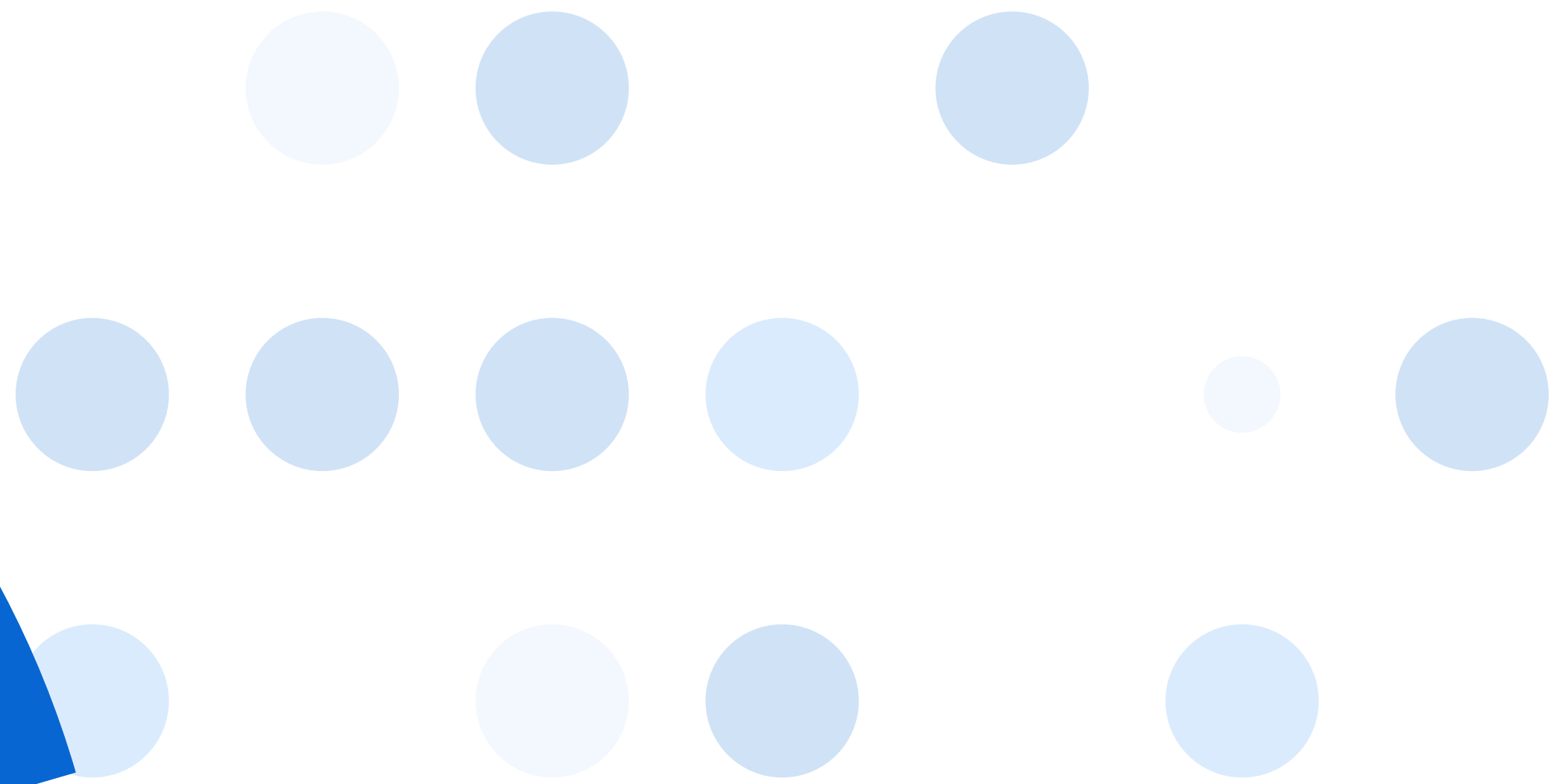




Industrial AI

Transforming Operations in Primary Industries, Energy & Manufacturing

For COOs and Operational Leaders



This eBook explores how Industrial AI is revolutionising asset-intensive industries.
The focus is on practical applications in Predictive Maintenance, Worker Safety, Edge Deployment, Operations Optimisation, and Agentic AI, with examples from Energy, Utilities, Oil & Gas, Steel, Forestry, and Mining.
It also spotlights how SAS empowers engineers with self-service tools to rapidly build and deploy AI models at scale.



- 01 **Predictive Maintenance:** From Reactive to Proactive Asset Management
- 02 **Worker Safety:** AI-Powered Safety Monitoring and Incident Prevention
- 03 **From Edge to Cloud:** Decentralised, Real-Time Intelligence at the Source
- 04 **Operations Optimisation:** AI-Driven Efficiency and Throughput Improvements
- 05 **Agentic AI:** Assisted Decisioning in Industrial Operations
- 06 **SAS Feature Spotlight:** Self-Service Industrial AI with SAS Viya and SAS ESP

Introduction

Industrial AI for Operational Excellence

Today more than ever, industrial companies face intense pressure to maximise asset uptime, ensure safety, and optimise operations amid skilled labour shortages and rising costs. Industrial AI, the application of artificial intelligence in industrial contexts, has emerged as a game-changer for COOs in heavy industries.

Energy demand continues to rise on the back of increasing momentum towards electrification. This is pushing large, high demand companies, to invest themselves in generation and demand-side response measures at the same time as network operators are investing heavily in new grid infrastructure.

While many companies rush to appoint the new role of Chief AI Officer (CAIO), this ebook argues that for these industries it should be the office of the Chief Operating Officer (COO) that owns the AI playbook.

SAS provides a modern AI platform specifically designed to be user-friendly for domain experts. Engineers and operations managers can leverage self-service AI tools to build models and deploy solutions quickly. SAS's cloud-native platform, SAS® Viya®, provides a unified environment for data preparation, modelling, and deployment. Streaming analytics platforms like SAS Event Stream Processing (ESP) allow real-time analysis of IoT sensor data with low-code interfaces that dramatically reduce time to deploy.



01

Predictive Maintenance: From Reactive to Proactive Asset Management

Unplanned equipment failures halt production, drive up repair costs, reduce productivity and impair service levels. Predictive maintenance uses AI to foresee equipment issues and schedule repairs proactively, avoiding unplanned outages and extending asset life. While human experts define which assets are mission-critical, AI algorithms handle the scale, monitoring thousands of pumps and valves simultaneously to flag anomalies that humans might miss.. This approach becomes powerful when you are able to monitor almost all of your pumps, valves, cylinders and motors.

In addition, a well designed predictive maintenance programme enables proactive inventory and procurement management to reduce overstocking and and free up working capital that would otherwise be tied up in spare parts inventory. Improving the ability of businesses to optimise their capital allocation has a material impact on investment decisions and profitability.

For the board, effective outage management directly improves “Return on Assets (ROA) and ensures predictable production output.

Maintenance Strategy Comparison

Maintenance Approach	Characteristics	Impact on Downtime & Cost
Reactive (Breakdown)	Run until failure, then repair	High downtime and repair costs
Preventive (Scheduled)	Regular servicing regardless of condition	Moderate downtime, potentially unnecessary maintenance
Predictive (Proactive)	Condition-based, AI-driven alerts	Low downtime and optimized maintenance costs

Industry Applications

- **Energy:** The energy industry has one of the most diverse portfolios in terms of asset classes as much of the network has been in service for decades. At the same time new asset classes are being deployed in the field at increasing pace. From turbines to transformers, SAS customers are using AI to keep the lights on.
- **Oil & Gas:** Oil and gas companies operate in some of the most demanding conditions in the world. Unplanned equipment failures, in addition to production impacts can have severe environmental consequences, attracting fines, reputational loss and reduced investor confidence.
- **Steel Manufacturing:** From virgin steel to plate and long products, the steel industry has one of the highest energy demand profiles of any industry and a large number of continuous processes where unplanned outages can be particularly costly. By effectively combining planned and predictive maintenance techniques, manufacturers can deliver increased productivity and avoid costly downtime.
- **Forestry & Mining:** As users of heavy plant in remote locations the forestry and mining sectors need to react quickly and intervene before those assets become stranded. AI can help separate the signal from the noise of the flood of remote telemetry to keep things moving.

Key Metrics



Customer Story: Salt River Project

The Salt River Project (SRP), one of the largest public power utilities in the U.S., uses SAS analytics to improve grid reliability and customer service. SRP uses SAS to monitor and predict equipment performance, optimize maintenance schedules, and analyse customer usage patterns.

- Improved predictive maintenance reduced outages and extended asset life.
- Enhanced forecasting supported better resource planning and renewable integration.
- Customer insights enabled more personalised programs and improved satisfaction.

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02

Worker Safety: AI-Powered Safety Monitoring and Incident Prevention

In addition to the human impact, countless hours of productivity are lost globally through workplace sustained injuries. When the costs of unplanned downtime, compensation, fines, regulatory interventions and loss of consumer trust are included the global impact is in Trillions. In 2020 EU OSHA estimated the cost to be around 3.9% of GDP or \$2.7T¹.

¹ European Agency for Safety and Health at Work (2021)



Industrial AI enhances safety through computer vision, wearable sensors, and predictive analytics. It identifies risks in real time and predicts unsafe conditions before incidents occur. This enables safety managers to proactively improve safety culture and prevent or reduce the risks to workers.

Computer Vision

Camera based solutions are considered the best available technology (BAT) for detecting PPE compliance and hazardous behaviours². Computer vision enables employers to detect unsafe behaviour and intervene early to ensure safety procedures are followed and safety briefings are enhanced. Camera based technology can also detect environmental hazards such as chemical spills or high pressure steam leaks, reducing accidental exposure to employees. Modern camera based solutions are capable of doing this while ensuring adherence to privacy and security regulations and requirements.

Predictive Risk Analytics

Forecasting high-risk conditions based on historical data particularly around environmental hazards such as storms, flooding or heatwaves enables companies to plan activities accordingly and take proactive measures to minimise the risk to employees and of unplanned downtime.

Key Metrics

Number of reportable incidents

Number of fatalities

Time lost

² A systematic review of computer vision-based personal protective equipment compliance in industry practice: advancements, challenges and future directions (Vukicevic et al., 2024)

Customer Story: SSAB

SSAB have deployed SAS solutions to deliver:

- **80% reduction in unplanned or unwanted events**, improving safety and operational reliability.
- Enhanced **production efficiency and product quality** through automated decision-making.
- Dynamic component replacement based on performance, reducing downtime and costs.
- Enable operators to detect anomalies early and act proactively.

"Before SAS, predicting accidents took too long. Now we can quickly identify red flags and act immediately."

– Carl Orrling, Head of R&D, SSAB Europe.

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SSAB

03

From Edge to Cloud: Decentralised, Real-Time Intelligence at the Source

Decentralised computing processes data close to where it's generated, enabling real-time responsiveness and resilience in remote or time-sensitive environments. Deploying decentralised AI, integrating directly against OT dramatically reduces latency. For large, distributed operations processing or pre-processing data flows at the edge reduces the increasingly scarce bandwidth required to return data to a central hub for processing.

As distributed systems become more complex edge autonomy dramatically increases the number and frequency of operational decisions that can be taken. This enables the control room to focus on macro level decision-making and delegate operational optimisation to the source.

Decentralised AI deployments can be also help to de-couple from OEMs or avoid OEM lock-in. For example, SCADA systems can be improved significantly by adding decentralised AI on device with SAS without modifying the underlying system. This saves cost and increases self-sufficiency. For remote operations in the field, on-device decision making has significant benefits operationally. Whether automating OTA fixes while in continuous operation or triaging alert data to separate signal from noise.

Any edge deployment of AI needs to take into account IT/OT network segmentation, patching/ orchestration for distributed edge nodes, safety constraints and validation for control-adjacent AI.

Key Metrics

Latency

Response time

Data volume

Quality

Customer Story: Lockheed Martin

Each C-130J aircraft generates 72,000 rows of sensor data per flight hour from 600 sensors, creating massive IoT data streams. Using SAS enables:

- **1,400 hours of downtime saved in just three months**, significantly improving fleet availability.
- **95% reduction in data cleanup time**, accelerating insights.
- Transition from reactive to proactive sustainment, reducing costs and increasing uptime. Dynamic component replacement based on performance, reducing downtime and costs.
- Intelligent diagnostics and spares optimisation, improving supply chain efficiency.

LOCKHEED MARTIN

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"By knowing everything happening on the aircraft when a failure occurs, we can build stronger anomaly detection algorithms with SAS Viya. The machine learning and AI algorithms help us see into the future – to see when things start to degrade. We can say with better accuracy, this part is going to fail in the next 50, 30 or 20 hours. Customers can plan for maintenance downtime prior to failure, especially before a critical deployment."

– Mike Isbill, Fellow of Data Analytics, Lockheed Martin



04

Operations Optimisation: AI-Driven Efficiency and Throughput Improvements

The use of AI can improve production processes, resource allocation, and cost efficiency. It enables adaptive control and strategic optimisation. Process optimisation is applicable in a broad range of scenarios and has a direct impact on productivity.

Optimising Energy Consumption

For any manufacturer the cost of energy is a, if not *the*, major cost component of the finished goods. As manufacturers adopt distributed energy technologies, they become prosumers, simultaneously consuming and generating power. This shift allows companies to treat energy as a tradeable asset, opening revenue streams through demand-side response markets while lowering the cost of finished goods. This also opens up new opportunities to participate in new markets as part of demand-side response. In hard to abate industries, the ability to adjust production line parameters in real time based on atmospheric and feed stock conditions can make a huge difference to the process energy requirement while still maintaining the same quality of finished goods.

Advanced Digital Twins

By combining high fidelity gaming-engine visualization with SAS AI, companies can create functional digital twins that do more than monitor; they simulate. Leaders can now stress-test facility changes, optimize automated vehicle pathing, and identify safety blind spots (using virtual avatars) in a risk-free virtual environment before making physical changes.

Workforce Planning

For large or complex projects ensuring the right people and materials are in the right place at the right time can be a difficult challenge. By leveraging mathematical optimisation techniques projects can maximise the effectiveness of both worker and plant. Combining workforce optimisation with other predictive and optimisation techniques drives productivity without the need for additional capital investment.

Key Metrics

Quality

Yield

Margin

Customer Story: Wienerberger

Wienerberger AG, the world's largest brick manufacturer, operates 200+ production sites across 28 countries and produces materials for the entire building process, including bricks, roof tiles, and piping systems. The company is committed to becoming climate-neutral by 2050, aligning with the European Green Deal.

By partnering with SAS, Wienerberger have achieved:

- 15% reduction in specific energy consumption
- Plant tuning time reduced from months to days
- New insights into KPIs like quality, throughput, and moisture
- Recognized with multiple sustainability awards, including the *Microsoft Intelligent Manufacturing Award* and *MIMI Award for Sustainability*

"SAS analytics brings intelligence to the kiln, helping engineers and frontline workers gain insights into each step and make brick drying and firing more economical."

- Florian Zittmayr, Team Lead for Data Science, Wienerberger

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05

Agentic AI: Assisted Decisioning in Industrial Operations

Agentic AI refers to autonomous systems that perceive, reason, act, and learn. These agents can manage operations with minimal human intervention. It is recognised that there is a global skilled labour shortage across the sector twinned with an aging workforce who will take their institutional expertise with them when they retire. When deployed with the correct controls and governance in place AI Agents act as a workforce multiplier and a long-term accessible source of institutional knowledge.

Robust retrieval augmented generation (RAG) frameworks enable operations and maintenance engineers to use specialist agents to reliably query past maintenance logs and technical documentation in the field in the context of the current plant data. This reduces the time to fix, increases first fix rates and avoids unnecessary parts replacement.

Key Metrics

Time to fix

First fix rate

Capital cost
of inventory



Customer Story: Georgia Pacific

“ChatGP” is presented as Georgia Pacific’s plant floor GenAI assistant that pairs LLM style prompting with live telemetry, SAS Intelligent Decisioning, and process models to recommend actionable operational steps. It is an operator upskilling tool that uses captured institutional knowledge to turn a ‘3 year employee into a 5–7 year employee’.

“The advanced analytics enabled by SAS allows us to find the optimal balance of speed and quality to maximise profitability. We’re constantly pushing the envelope of what’s possible with analytics.”

– Roshan Shah, Vice President of Collaboration and Support Center Operations, Georgia-Pacific

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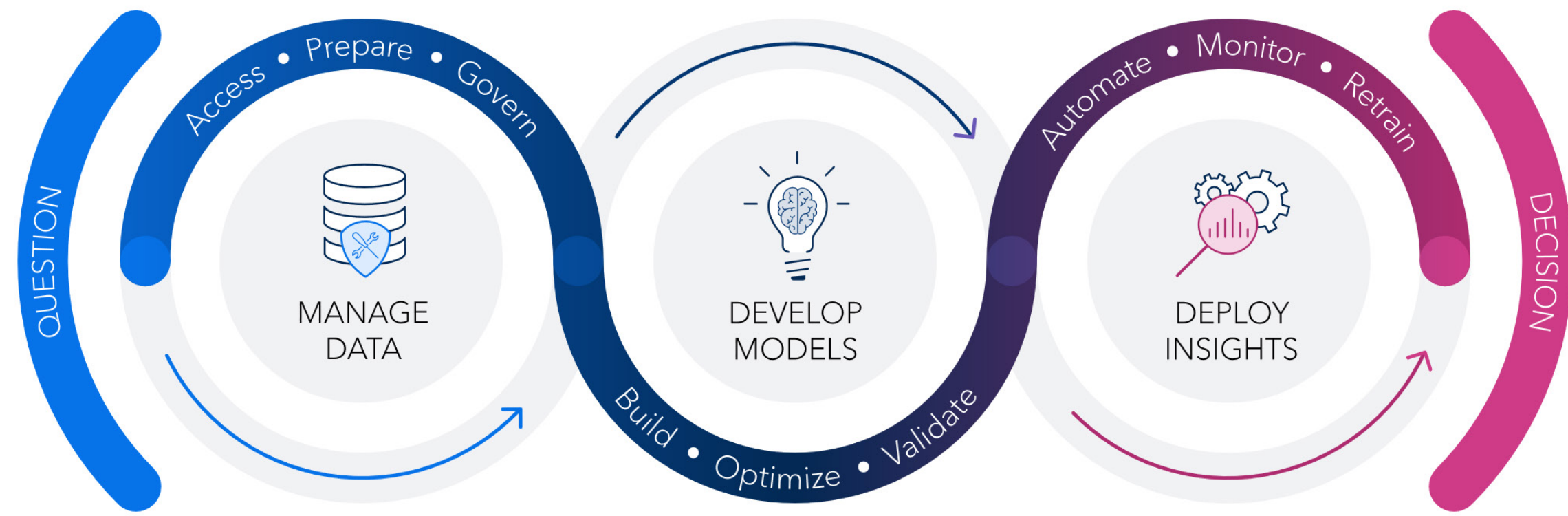


06

SAS Feature Spotlight: Self-Service Industrial AI with SAS Viya and SAS ESP

At SAS our focus in industrial AI is on usability and ease of deployment. SAS empowers engineers with tools to build and deploy AI models rapidly at enterprise scale, supporting the entire AI lifecycle from data to deployment.

By enabling subject matter experts (SMEs) to play a larger role in the development of AI tools SMEs get access to the tools they need to match their workflow faster. And for the enterprise, leveraging the institutional expertise of your SMEs delivers measurable results faster and a workforce ready to compete in the age of industrial AI.



SAS Viya

- Unified platform for analytics and model development
- Low-code/no-code interfaces
- Scalable and high-performance
- ModelOps and deployment at scale
- Governance and self-service capabilities
- Data source agnostic
- Language agnostic (SAS, Python, R)
- Supports complete analytics life cycle (data to decision)

SAS Event Stream Processing (ESP)

- Real-time streaming analytics
- Edge-to-cloud flexibility
- Integration of AI into live data streams
- Connectivity with industrial OT protocols

SAS Tool	Purpose	Industrial Use Cases
SAS Viya	Analytics and model development	Predictive maintenance, optimization, decision flows
SAS ESP	Real-time data processing	Safety monitoring, edge analytics, anomaly detection



Conclusion

Embracing Industrial Strategy for COOs

Unlike other executives, the COO is uniquely positioned to bridge the gap between strategic objectives and frontline execution. Because the path from operational excellence to revenue realization is direct, the COO must own the Industrial AI playbook to ensure technology serves the P&L.

By having clear alignment between AI and the operational needs of the business, the COO can ensure that AI projects focus on value delivery, not AI for the sake of AI.

Industrial AI offers transformative potential. COOs should:

1. **Develop an AI roadmap aligned to operational metrics**
2. **Empower frontline experts**
3. **Leverage self-service tools**
4. **Establish an operational data and AI governance framework**
5. **Start small, think big**
6. **Monitor and adapt**
7. **Foster cross-functional collaboration**
8. **Manage change and culture**
9. **Measure value and refine**

With platforms like SAS Viya and SAS ESP, the barrier to entry is gone. The transition from a single successful use case to a fully AI-integrated enterprise is the new frontier of competitive advantage.

Get in touch



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