Visibility for Velocity

Analytics-powered resilience in the
ever-changing supply chain landscape
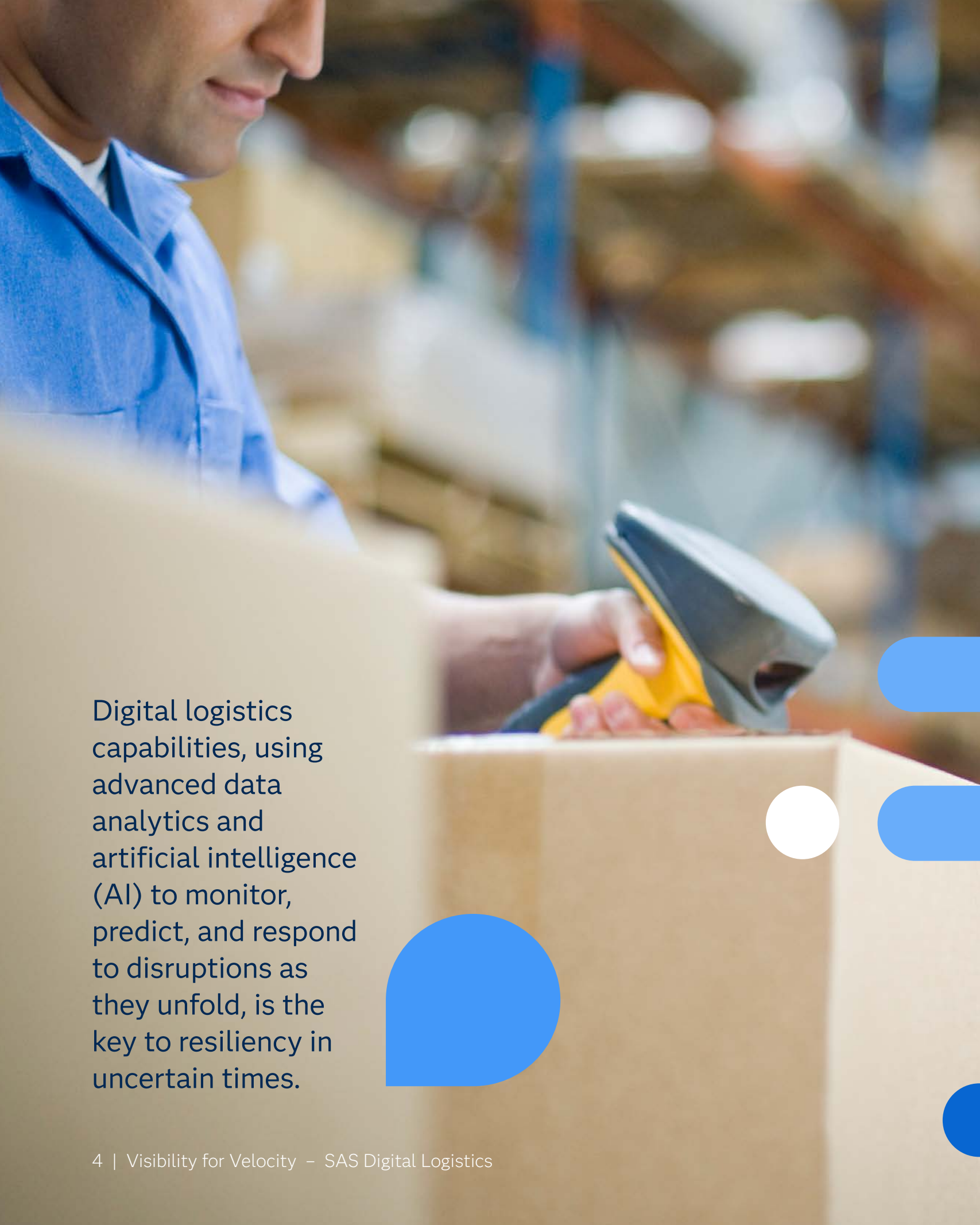
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Introduction

Supply chains are still vulnerable. Here's what comes next.

When did supply chains become a topic of widespread public conversation and analysis, rather than something that was primarily discussed deep within the meeting rooms of retail, manufacturing, pharmaceutical and defense organizations?

It happened as soon as the world discovered just how fragile supply chains could be in the face of unpredictable geopolitical events – like a global pandemic – when goods that were once readily available were suddenly on backorder for months, or not available at all. Today we are all acutely aware of the ripple effects of geopolitical events across global supply chains, which not only affect the availability of goods, but can dramatically increase costs.

When the disruptions of recent years are analyzed as a real-world stress test for supply chains, a number of weaknesses reveal themselves. Global organizations need even greater visibility into operations and more insight into mounting vulnerabilities. Having visibility into threats beyond direct control like natural disasters, wars, global pandemics, shifting trade agreements, worker strikes – and the unforeseen challenges that are sure to come – are more critical than ever.

According to McKinsey, the total cost of supply chain disruptions to a business over ten years, can equal 45% of a year's worth of profit.*

* McKinsey & Company. (n.d.). What is supply chain? McKinsey & Company. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-supply-chain

Achieving this level of visibility requires going beyond gathering, managing, and analyzing data being generated by all the various ERP, warehouse management systems, transportation management systems, RFID and barcoding systems. It requires integrating a wider variety of external data sources connected to potential disruptions, from weather to war.

Digital logistics capabilities, using advanced data analytics and artificial intelligence (AI) to monitor, predict, and respond to disruptions as they unfold, is the key to resiliency in uncertain times.

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Monitor

Predict

Respond
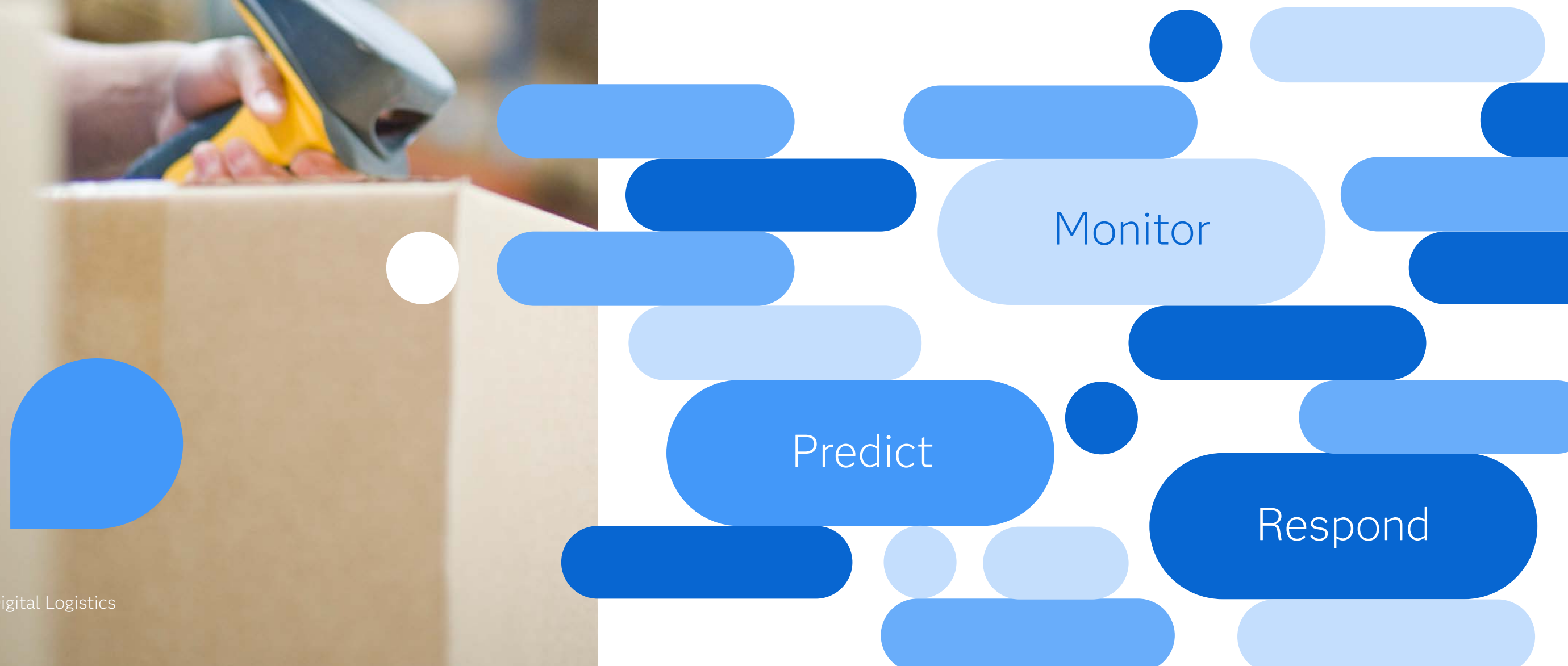
The challenges

Predicting Supply Chain Disruptions

Having Real-Time **Visibility** into Supply Chain Operations

Developing **Contingency** Plans

Improving **Insight** Into Operations

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In recent years, organizations learned the importance of being resilient and quick on their feet. With supply chain challenges and talent shortages persisting, the need for AI and IoT is crucial. To succeed in this ever-changing landscape, organizations must not simply adapt, but must lead the way in embracing innovative solutions that will shape the future of business.

Jason Mann
VP, SAS IoT

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The power and potential
of digital logistics

Digital logistics offer end-to-end supply chain planning tools that combine robust analytics with flexible, scenario-based planning models to deliver capabilities that extend well beyond a virtual model of operations. Because digital logistics integrates information across the supply chain, it helps supply chain leaders achieve a holistic view of their current operations, identify potential vulnerabilities, and choose from a range of potential responses.

Combined with deep analytics and AI, digital logistics gives decision-makers practical, real-world insights to inform production and supply chain strategies. The result? A significantly improved ability to react swiftly to sudden shifts in demand or supply, accelerated by optimization techniques that balance supply chain costs and constraints with organizational needs. While enhanced agility and responsiveness have always been central goals of any sophisticated supply chain improvement strategy, the velocity at which supply chains must be prepared to shift today is new. That's where digital logistics become even more important, allowing organizations to run many different scenarios rapidly and accurately, drawing on current, historical, and real-time data. By simulating different potential outcomes, decision makers can zero-in on the best response and gain real confidence in short-term decision-making during moments of peak uncertainty and volatility.
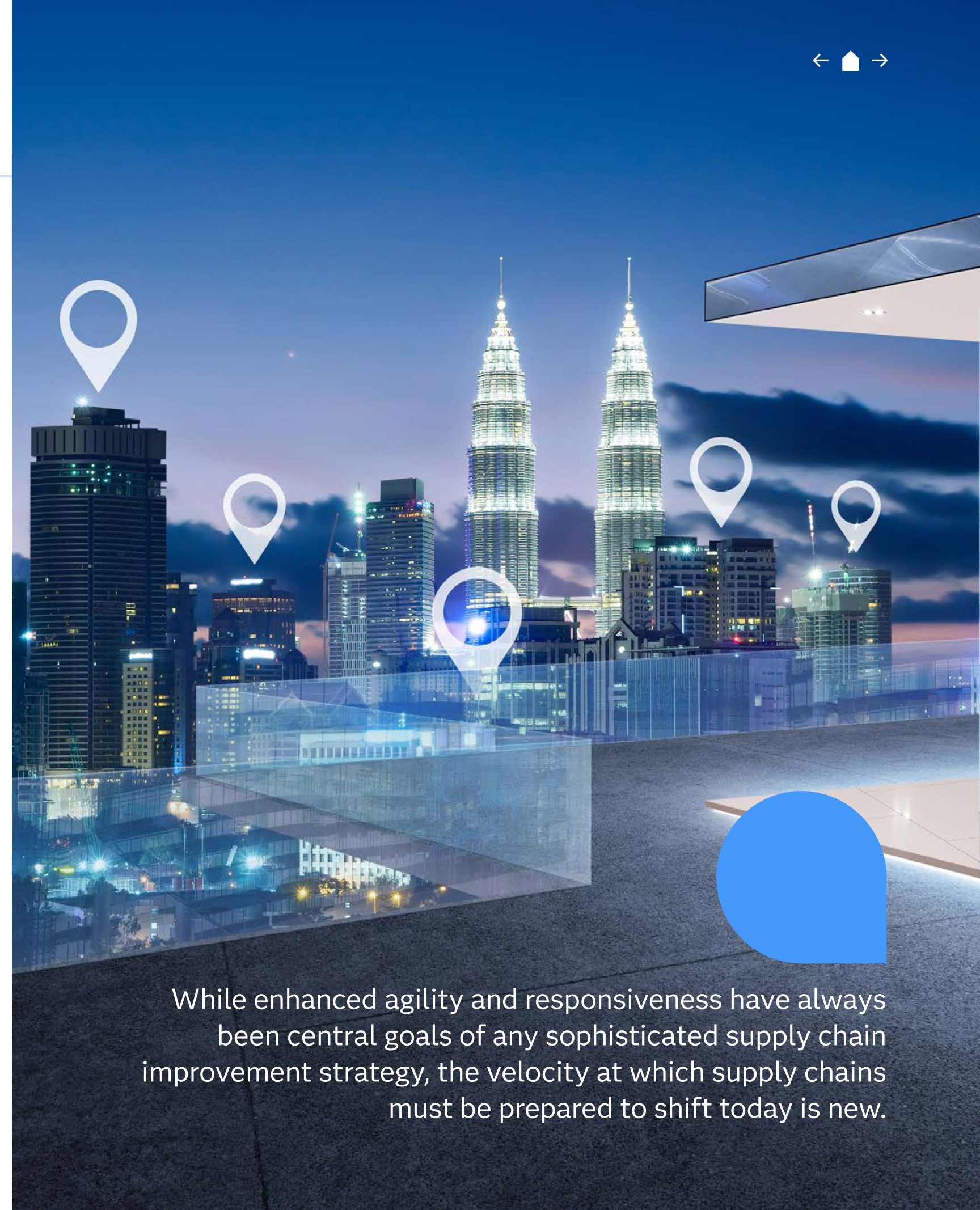
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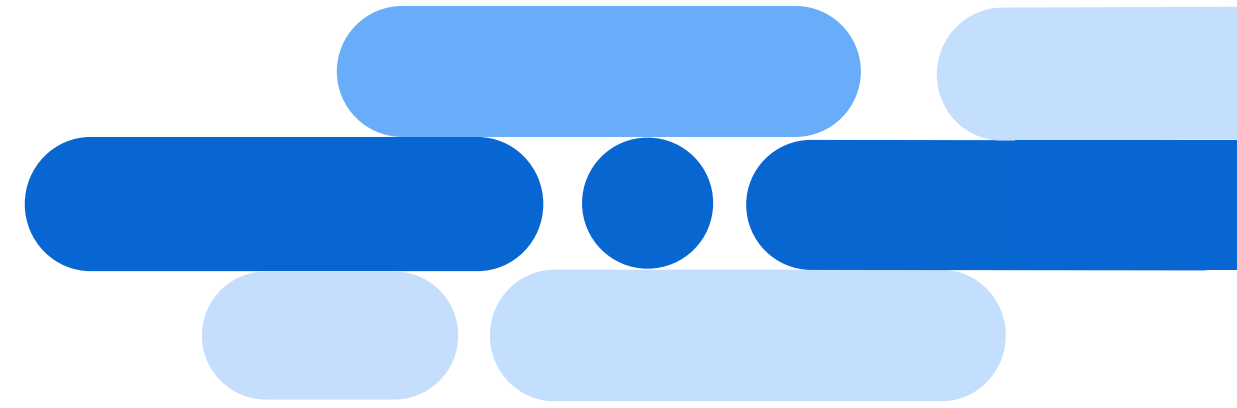
The missing link:

Integrated AI
and IoT capabilities

Fast-moving developments in AI and IoT provide supply chain-focused digital logistics solutions with a powerful new source of insight. At the most basic level, AI and IoT draw from thousands or even millions of data points that are being constantly delivered by connected devices, using analytics to instantly synthesize this data, and feed the resulting trends, patterns, and insights to digital logistics nerve centers. Only a decade ago, neither AI nor IoT capabilities were advanced enough to deploy in this manner, much less in an integrated way. Today, AI and IoT are already proven and at work in some of the world's leading supply chain organizations.

Where to start

While there are countless potential applications, businesses should start to focus on the following in their journey towards building a more resilient supply chain:

Real-time asset tracking for improved transparency:

○ Implement RFID, GPS, or sensor-based technologies to provide constant, real-time tracking of critical assets throughout the supply chain.

○ Enable location data continuous updating, offering instant visibility into the movement and status of materials.

Decisioning and scenario analysis for agility and resiliency:

○ Combine advanced algorithms and machine learning models with business rules to make real-time and batch processing decisions in the logistics process.

○ Using scenario analysis results, proactively identify vulnerabilities, assess potential risks, and develop contingency plans.

○ Conduct scenario analysis with tools that simulate various conditions and disruptions in the supply chain, including unexpected events like natural disasters, supplier issues, or geopolitical changes.

Live data streaming for real-time monitoring:

○ Use IoT devices to stream live data from points throughout the supply chain, providing up-to-the-minute information on inventory levels, production status, and transportation conditions.

○ Deploy a robust data streaming infrastructure to ensure seamless and low-latency transmission of critical information.

Edge analytics for immediate insights:

○ Integrate Edge computing devices at key points in the supply chain to process data locally, reducing latency and enabling immediate analytics at the Edge.

○ Employ Edge analytics to derive actionable insights from data generated by IoT devices without relying on centralized cloud processing, enhancing responsiveness.

Smart sensors for environmental monitoring:

○ Monitor environmental conditions during the transportation of sensitive goods, such as temperature-sensitive pharmaceuticals or perishable foods, with smart sensor data.

○ Enable real-time alerts and interventions based on sensor data to ensure the integrity of goods in transit.

Predictive maintenance with Edge analytics for enhancing productivity and efficiency:

○ Execute predictive maintenance of equipment and vehicles using insights from Edge analytics, using real-time sensor data to identify potential issues before they cause disruptions.

○ Enable automated alerts and notifications based on Edge analytics to accelerate proactive maintenance and minimize downtime as quickly as possible.

## Customizable thresholds and alerts for specialized materials:

○ Implement customizable thresholds for various parameters such as temperature, humidity, or inventory levels, allowing users to set specific criteria for triggering alerts.

○ Ensure immediate notification of any deviations from predefined thresholds to facilitate timely corrective actions.
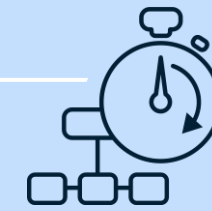
Best practices
for model management

Ensure
holistic view
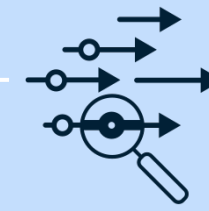
Automatically
monitor

Validate
models

Increase
efficiency

Ensure a holistic view of your models and their dependencies, model governance and transparency

A centralized, searchable repository for all types of models and analytical assets gives users complete visibility into their analytical processes, ensuring traceability and governance.

Validate models to ensure high-quality predictions

Automatically generate executable scoring code for SAS and Open-Source-based models, test models, and validate model scoring logic before models are pushed into production.

Automatically monitor model performance to keep them performing as expected

Automatically monitor the performance of models – from inception through usage and retirement – regardless of the language used to create them. Performance benchmarking reports display models' scoring performance (accuracy) and document conformity to required standards. Ongoing monitoring lets users know when it's time to refine or retire a model.

Increase efficiency by adapting models to reflect internal or external changes

Continuously update models to keep pace with changing market and business conditions. Retrain the existing model on new data or revise the model using feature engineering or new data elements.

SAS Model Manager can help organizations on their model management journey. To learn more about this solution, visit www.sas.com/model-manager

" *Building a resilient supply chain demands a strategic blend of foresight and adaptability. Embrace advanced analytics, fortify your digital logistics capabilities, and cultivate a culture of innovation to not just weather disruptions but to emerge stronger in their wake.*

Jason Mann
VP, SAS IoT

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Supply chain resiliency

Georgia-Pacific

in practice

As one of the world's leading makers of tissue, pulp, packaging, building products and related chemicals, Georgia-Pacific found itself at the center of a supply chain breakdown early in the COVID-19 pandemic. With 73% of US grocery stores reporting empty shelves in April 2020, the company saw demand for toilet paper and many other of its products increase sharply during the height of the pandemic. Manufacturers can't build new plants overnight to cope with surging demand. So, the company turned to its tried-and-true optimization tool: analytics.

Georgia-Pacific uses SAS® Analytics for IoT to optimize everything from equipment efficiency, customer churn, manufacturing operations, and more. These capabilities also play a central role in its supply chain strategy. For example, by putting IoT sensors in smart

dispensers, the company can predict stockouts of items like soap and paper towels before they occur, which improves the customer experience and reduces the cost to inspect stock manually.

On-time and in-full (OTIF) delivery is another key focus area for Georgia-Pacific's Decision Analytics team. Supplying some of the world's biggest retailers with consumer-packaged goods brings huge commercial opportunities, but also stiff penalties for late or incomplete deliveries. The team uses SAS to detect if an order is likely to be delivered late. When this happens, analysts can develop

algorithms to quickly find a solution, and automate the flow of insights back to key stakeholders so the company can deliver on its contracts. "The advanced analytics enabled by SAS allows us to find the optimal balance of speed and quality to maximize profitability. We're constantly pushing the envelope of what's possible with analytics," says Roshan Shah, the company's Vice President of Collaboration and Support Center Operations.

Get the Whole Story

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

GP Georgia-Pacific

The bottom line

Every link in the supply chain is brimming with data – a wealth of potential insight that could transform supply chain efficiency and improve overall supply chain resiliency. The question is how to transform all that potential insight into smarter decision-making and stronger business outcomes.

Made even more daunting by; the **number and location of links** in the supply chain, the **sprawling volumes of data (and data types)** available to an organization at any given time, and the **varied ownership of data sources** that makes data/information sharing more complicated.

- **Number and location of links**
- Sprawling volumes of data (and data types)
- Varied ownership of data sources

That's where SAS and Intel come in. When SAS' end-to-end supply chain analytics capabilities are combined with Intel's hardware and robust processing power, supply chain leaders are able to manage, analyze and act on data – at any scale, in real time, at every key step of the insight generation process. From data collection to governance, model management and ongoing monitoring, this powerful combination of hardware and software is already at work in some of the most sophisticated supply chain operations in the world, giving leaders the ability to conduct real-time decisioning and what-if analysis at a moment's notice.

Want to find out how your organization could put these capabilities to work?

Start by visiting SAS.com/IoT

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Intel's resilient supply chain helped mitigate the effects of the pandemic, chip shortages and geopolitical tensions. Together with the companies in our ecosystem, Intel continues to build an innovative and efficient supply chain to address future challenges around volatility and complexity. Digital transformation accelerates this innovation by using data and predictive analytics to increase visibility and information sharing while reducing risk.

Modern supply chains built on a unified, connected platform will provide the flexibility needed to minimize disruptions and offer opportunities for better collaboration and customer service. Intel's recognition in the Top 10 of Gartner's Supply Chain ranking for the past 11 years shows the leadership and performance attributed to our global supply chain.

Jackie Sturm
CVP of Global Supply Chain Operations, Intel

intel

SAS & Intel

Successful analytics initiatives require tight alignment between hardware and software in the hands of skilled technologists and strategists who can put them to work in support of organizational goals. Together, we know how to deliver practical solutions that deliver real, measurable results – at any scale.

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