



TRANSPORTATION & LOGISTICS FOCUS

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TECHNOLOGY PRIORITIES FOR A MORE RESILIENT SUPPLY CHAIN

2023

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Introduction

Emerging from disruption

In recent years, the resilience of modern supply chains has been tested like never before.

Unprecedented structural challenges have affected every aspect of operations and planning.

Covid-19 lockdowns further accelerated the trend toward e-commerce sales channels. They also disrupted global supply chains. The impact of the Ukraine conflict then sent global energy costs soaring.

At the same time, a litany of other factors, including Brexit-related changes, global scarcities of key components, such as semiconductor chips, and the Suez Canal obstruction in 2021, combined to present unique challenges and opportunities.

The overall impact was a general increase in supply chain volatility and unpredictability. Supply chain issues became headline news. They also tested the ingenuity and adaptability of supply chain leaders, forcing a fundamental re-think of approaches.

Against this backdrop, attitudes have naturally changed. Companies are even more keenly aware of the need to mitigate supply chain risks. Pressure has also grown to improve efficiency and to reduce dependence on challenging labour markets.

Supply chain leaders are also increasingly conscious of the need to harness new technologies to underpin their evolving strategies. There has been an acceleration in the rates of supply chain technology adoption.

Efficient, technology-enabled supply chains can help deliver competitive market differentiation to many organisations.

The difficulty often comes in defining to what ends these technologies should be applied, and which to choose.

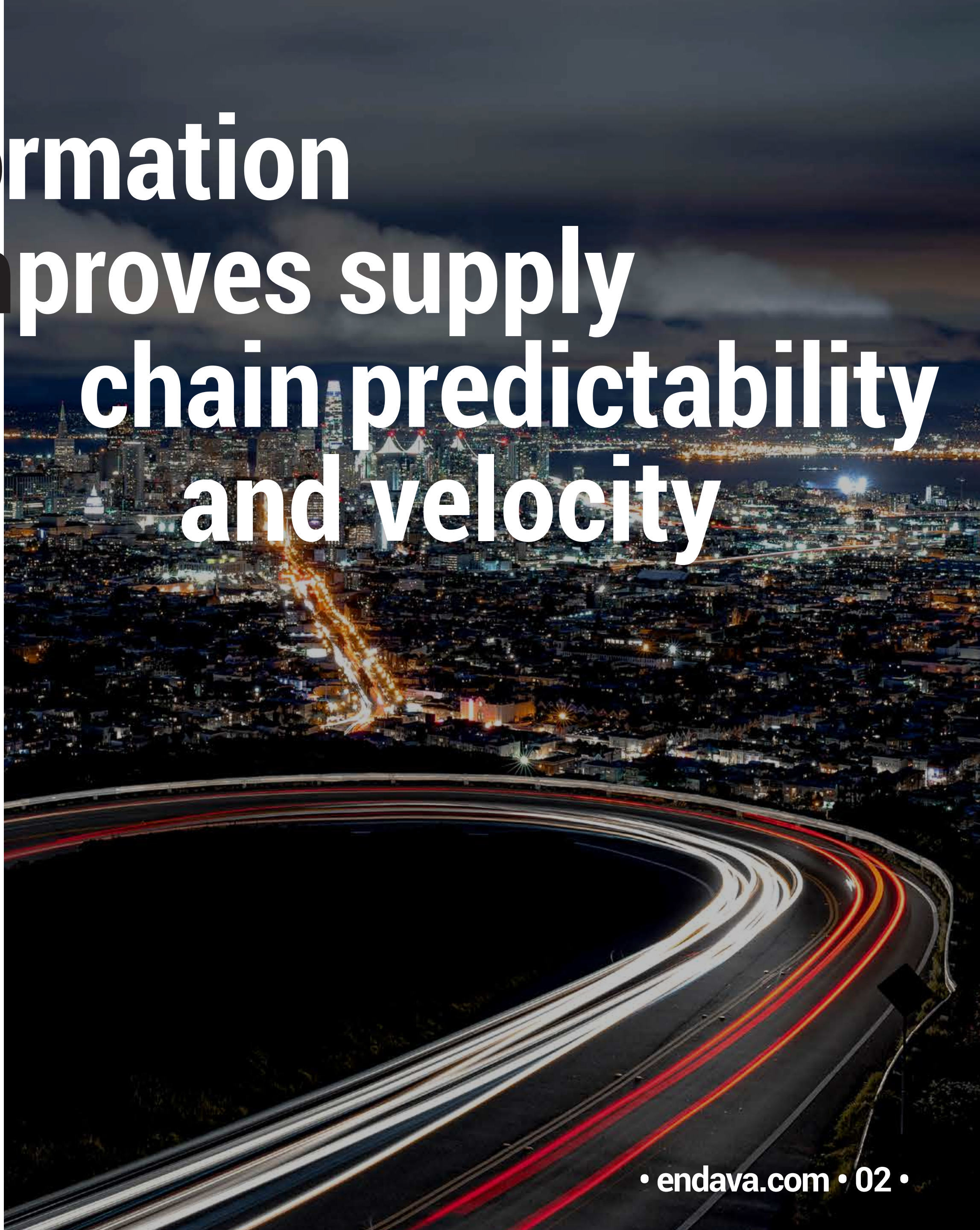
This paper outlines the top technologies to consider when building capabilities, and how each might contribute to supply chain resilience.

1. Data and Analytics

Insufficient data was historically a primary impediment to visibility, velocity and efficiency. Contemporary technologies and techniques have progressively removed these barriers. This has created a faster flow of goods, greater transparency and improved efficiency, as well as improvements in customer service.

Modern supply chains are increasingly internet-connected. A proliferation of systems and devices generate huge quantities of data, providing granular views of activity. Many organisations are now 'data rich', with billions of data points to draw from. The key challenge is turning this data into actionable insights which inform management decisions

Today's advanced analytic tools can make sense of diverse data sets, identifying trends, anomalies, and associated potential disruption, and present options to mitigate or offset issues.



**Information
improves supply
chain predictability
and velocity**

2. Mobile Customer Solutions

The proliferation of mobile devices and apps has created an expectation for 'always-on' insights to be seamlessly delivered to the end-user. Customers expect to know exactly where their products and materials are and when they will arrive.

Well-designed applications with a greater emphasis on the User Interface (or 'UI') design principles, deliver improved convenience, ease of use and accessibility across devices and platforms. They also allow users to flexibly 'self-serve' information.

This profusion of intuitive, easily available software creates opportunity for solutions to be tailored to specific industry sectors, or even individual customers. Delivering information in a frictionless, seamless fashion allows it to be embedded more easily in day-to-day ways of working.

Fingertip access to information



3. Visibility

Today's supply chains can often be very complex, with multi-tiered structures for parts, materials, or commodities. Historically it was difficult to deliver transparency of items (for example, automotive components) beyond the first or second tier.

Some of this will naturally be alleviated by the natural trend away from dependencies on single source suppliers in more distant geographies. Inventory is being increasingly re-positioned, re-sourced and stored closer to the point of manufacture or consumption.

While this continues, newer technologies and applications can access and assemble data across a network of diverse suppliers. This makes supply chain processes radically more transparent, allowing participants to identify issues as soon as they arise. This also improves the ability to quickly respond to issues to reduce potential disruption.

A woman in a dark blue uniform with orange accents is using a handheld barcode scanner on a stack of cardboard boxes in a warehouse. The background shows more boxes and warehouse shelving.

Technology delivers transparency

4. Internet of Things (IoT)

The explosion in the connectedness of every-day objects, or 'things', is transforming supply chains. These range from vehicles, mobile devices, temperature sensors, fork-lift trucks, rolling stock, and shipping containers may all now share location and status information.

IoT captures data at the most granular level, creating huge volumes of raw data that can be translated into useful insights on key events.

Global Positioning Systems (GPS) can track vehicle, train, trailers or other movements. RFID (Radio Frequency Identification) tags can monitor key components, packages or containers. These technologies provide a window onto how items are utilised, and how they move through supply chains.

Integrating IoT capability can increase supply chain velocity, accuracy and transparency.



**Supply chain
devices are
increasingly
connected**

5. Trading Partner Integration

The recent supply chain challenges have encouraged organisations to forge ever-closer relationships with their trading partners. These might be with customers, product suppliers, shipping and logistics service providers, specialist advisers or providers of technology solutions and expertise. Information may include, for example, inventory levels, order details, shipping status, location, or ETA.

The common thread here, as ever, is data. A reliable flow of goods rests largely on the timely flow of information between trading partners. Even above the presence of the data itself, what matters most is how trading partners conduct this exchange.

Deeper integration (more detailed and complete, insightful information exchange) and broader integration (across a wider span of the supply chain) can provide greater understanding and cooperation between trading partners.

Data makes closer collaboration possible

Traditionally these exchanges were generally performed by batch-based Electronic Data Interchange ('EDI') methods. While these continue to play a role, they are being superseded by newer, more flexible and adaptable platforms. Application Programming Interfaces (APIs) running on the cloud deliver agile, real time data

6. E-Commerce & Omnichannel

Public health measures during the Covid-19 pandemic further accelerated the growth in e-commerce, and in particular home delivery.

The continued change in shopping patterns through the adoption of e-commerce by mobile-first, social media-native customers, has required retailers to adapt at speed.

As the sales channels have evolved, so have supply chains. Traditional store retailing continues to be replaced by online shopping. Many suppliers offer a 'hybrid' combination of both traditional stores and e-commerce. Products often now flow across a much more diverse systems landscape than pure 'bricks-and-mortar' retailing.

This introduces much greater complexity for logisticians. Large stock replenishment orders can be fulfilled in bulk, for example from national distribution centres to retail outlets. However, individual e-commerce orders, each for much lower product quantities, requiring delivery to domestic delivery locations, present a very different logistical profile.

Supply chains continue to adapt to changing consumer habits

In response, many hybrid retailers have adopted an 'Omnichannel' approach, whereby e-commerce and store orders are managed in parallel. The customer experiences are highly personalised, while the underlying logistics and inventory management are optimised for operational and cost efficiency.

7. Automation & Robotics

The number of robotics and automation tools used in the supply chain, and the variety of uses, have expanded greatly in the last decade. Supply chains may now include autonomous guided vehicles, truck platooning, drones, automated warehouses, and virtual reality solutions for operative training.

Specialist robotic process automation (RPA) software emulates human decisions and interactions with systems.

Robots are now faster and more reliable than humans at performing repeatable tasks, like responding to the contents of a screen with appropriate keystrokes, identifying and extracting salient data and performing pre-defined actions.

To optimise their value, each of these tools require close integration in the overall supply chain systems landscape.

As labour costs in developed economies continue to increase, so will robotics adoption.

Smart robotics are reducing logistics costs



8. Supply Chain Optimisation (SCO)

Process-driven operations like advanced logistics involve complex, high-volume scheduling challenges. Specialist software is evolving to optimise these processes, and the tools ally mathematical algorithms with powerful database and computing technology.

SCO tends to be of most value in scheduling large-scale, or high-value, complex operations, where scarce resources must be optimised to meet demand.

In these environments, many apparently marginal improvements are extrapolated to deliver significant percentage savings in overall efficiency, improvements in service quality, and elimination of human scheduling errors.

Software improves overall supply chain efficiency

9. Artificial Intelligence (AI)

Accurately forecasting consumer demand is notoriously difficult. AI can be a big part of the answer.

AI-driven demand forecasting allows manufacturers, service providers and retailers to pre-emptively adapt their supply chains in advance of probable demand trends. The result is often a reduction in supply chain costs and increased sales volume.

AI solutions, often used in conjunction with SCO tools, allow organisations to predict future product demand, likely product return or failure profiles, out-of-stock items, and optimise stockholding and price.

They also support improvements in shipment patterns and strategies, predict bottlenecks, and enable upgrades to automated distribution centres, warehouses, and other operations.

As well as providing demand forecasts, AI tools can model 'what-if' scenarios, such as supply issues in a particular geography. This allows partners to simulate and plan their response to potential disruptions.

AI helps supply chain leaders plan with greater confidence

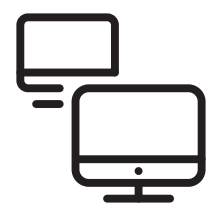
'Digital twin' models are another new AI frontier. These simulations run in parallel with the company's live, physical operations, assisting with strategy formulation, real estate planning, asset management and other operational decisions.

Supporting your digital acceleration

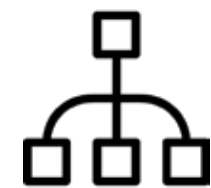
In this fast-changing sector, Endava helps organisations respond to their new problems by embracing new technology.

Our analysts consult with leaders to define their priorities and build watertight cases for action. Our delivery teams can then translate these objectives into next-generation software solutions.

For over two decades, we have supported many of the world's leading logistics and transportation service providers in their technology journeys. We build resilience through services including:



Best practice advisory



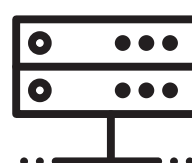
Architecture maturity assessment



Platform benchmarking



Testing and quality assurance



Performance monitoring and optimisation



Cyber assessment

Let's talk about how we can help you grow.

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