Moving to an Autonomous Supply Chain

An Essential Guide for Manufacturing & CPG Firms

A white paper for Capgemini

January 2021

Introduction

Supply chains today are under pressure like never before, with a more volatile and complex global trade environment putting pressure on business leaders to move to more autonomous supply chains.

The purpose of this paper is to assist supply chain leaders in major manufacturing and CPG enterprises in understanding and benchmarking their supply chain issues and approaches to supply chain transformation.

The study is based on interviews with 50 supply chain leaders in major enterprises across North America, U.K., and Europe and identifies:

- The key challenges faced by supply chain organizations
- The suitability of current supply chain processes
- The key benefits sought from and the characteristics of autonomous supply chains
- The pattern of autonomous supply chain initiatives planned
- The key technologies within a reimagined autonomous supply chain capability
- The extent of vendor involvement and the key selection criteria in choosing a services partner to assist in autonomous supply chain adoption
- The challenges and key success factors in supply chain transformation.

Note that infographics in this paper show percentage values, which indicate the proportions of supply chain leaders that perceive specific characteristics to be highly important.

Current Pressures on Supply Chains

Supply chains have been under pressure for some time as customer expectations have increased, and the current combination of the pandemic and its aftereffects and the recent trade wars has compounded any frailties in current supply chains.

In particular, supply chain executives need to develop more resilient and agile supply chains that can meet rising customer expectations within a more volatile and complex global trade environment while relieving their operational cost pressures.

"The main issue is a combination of legacy systems that are incompatible and expensive to update. There is a need to standardize more"

Supply Chain leader at a major cosmetics firm

Volatility and complexity

68%
A rapidly changing global trade environment

90%
Increased supply chain ecosystem complexity

56%
A more volatile supply chain environment

60%
A high level of change in regulations & compliance requirements

"Global trade is in a constant state of exception, creating the need to increase supply chain resilience via increased agility and flexibility."

Dharmendra Patwardhan, Global Head of Digital Supply Chain Practice, Capgemini's Business Services

"We need to reduce the cost of the supply chain and the errors that occur as a result of manual processes"

Supply Chain leader at a major automotive manufacturer

Agility & resilience

74% A need for increased agility & flexibility

72% A need for increased operational resilience

74% Increased customer expectations

NelsonHall analysis:

- The pandemic has stress-tested many supply chains beyond previous expectation, identifying and magnifying any process shortfalls
- The resulting need for greater agility and reduced cost has accelerated the need for digital transformation and the removal of manual processes

Operational efficiency

92% Cost pressure

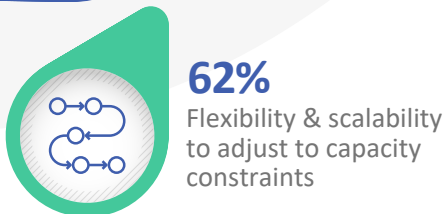**66%** high level of manual processing

Current Process Shortfalls

Current supply chain processes often lack the flexibility and scalability to adjust to global trade volatility and capacity constraints. These issues are frequently compounded by a high dependence on fragmented legacy systems that are highly dependent on manual processes to achieve an element of end-to-end integration.

While basic automation can partially address some of these process joins, greater standardization and integration of the end-to-end supply chain requires a common framework and data definitions and ideally use of an API and microservice-based infrastructure.

Standardization & integration

46% ● Supply chain standardization   **54%** ● End-to-end supply chain integration

Flexibility & scalability

64%
Ability to adjust to global trade volatility

62%
Flexibility & scalability to adjust to capacity constraints

50%
Independence from global language complexities

Visibility & forecasting

End-to-end visibility of supply chain information **56%**

High demand forecasting accuracy **56%**

Logistics planning & optimization **48%**

"The lack of centralization, consolidation, and disjointed technology landscapes can lead to low productivity and an inability to scale across the organization."

Jörg Junghanns, Vice President Europe - Digital Supply Chain, Capgemini's Business Services

Digitalization & automation

66%
Supply chain digitalization

60%
Supply chain automation
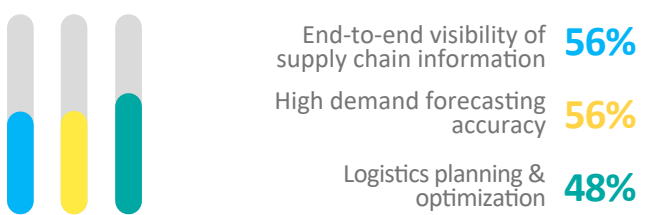
NelsonHall analysis:

- Standardization of the supply chain is a critical precursor in supply chain optimization
- Digitalization and automation are key to reducing manual processing, but the majority of enterprises exhibit low maturity in these respects
- Visibility within the supply chain is key to customer satisfaction and reduces stock-outs and late delivery

Importance of Improving the Supply Chain Information Flow

The majority of supply chain executives perceive a significant need to improve their supply chain information flow with information flow improvements frequently needed across demand information, supplier information, and logistics information.

Data availability and quality can be significant issues within supply chains, with data not always being captured. Data also often have to be manually validated to avoid misinformation, causing disruption across the supply chain.

The removal of "information blindspots" within the end-to-end supply chain will lead to enhanced supply chain visibility and enhanced logistics planning and optimization.

Improvements in demand forecasting accuracy can be achieved by incorporating lead information alongside orders and using digital order processing, incorporating real-time order changes and status to ensure that forecasts are based on the most current information. Real-time access to retailer POS data can also make a major contribution to demand forecasting accuracy.

"The flow of information to connect systems and stakeholders in real-time is a perfect candidate for automation."

Dharmendra Patwardhan, Global Head of Digital Supply Chain Practice, Capgemini's Business Services

56% Need to improve overall information flow

Improving demand information

"We need to combine lead information into the ordering process as get little notice of orders until they are signed"
Supply Chain leader at major truck manufacturer

"We need to enable order changes to be processed digitally in real-time without manual intervention. We need real-time status information to act upon"
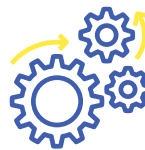Supply Chain leader at a global food company

Improving supplier information

"Some suppliers are not integrated with our supply chain systems, so we have a lot of manual processes currently"
Supply Chain leader at major supplier of agricultural machinery

"We need faster insight into supplier shortages"
Supply Chain leader at major aircraft manufacturer

NelsonHall analysis:
- Demand forecasting remains a challenge in many supply chains due to inaccurate order information and a lack of future order indicators
- Greater depth and timeliness of supplier information is necessary to avoid supply shortfalls and inaccurate pricing data
- Maximizing full loads and accurate shipment status requires tight integration with logistics providers

Improving logistics integration

"Logistics is a bit of a blind spot in some product categories…with an inability to track in real-time"
Supply Chain leader at global food & beverage company

"We need to maximize shipment capacity …which requires better data exchange with logistics providers…"
Supply Chain leader at major automotive company

Benefits Sought from Autonomous Supply Chains

Supply chain executives in major enterprises view the introduction of an autonomous supply chain as a means of eliminating many of the day-to-day transactional issues that currently take up much of their time, enabling them to devote an increased proportion of their time to longer-term and more strategic activity.

The use of an autonomous supply chain is expected to lead to improved and more timely information flow, which will lead to improved inventory and logistics optimization, generating reductions in working capital.

Enhanced access to information is also expected to lead to a more timely ability to anticipate and address exceptions, improving supply chain flexibility and resilience.

Simultaneously, the use of intelligent automation to handle many transactional tasks will certainly lead to reduced levels of exception handling and hand-offs. In addition to reducing the supply chain cost base, it will also enhance the ability to provide transparent and seamless delivery to customers. Supply chain automation is highly important to 98% of supply chain executives.

"Moving goods faster and fewer out-of-stock instances and production shutdowns"

Supply Chain leader at a global cosmetics firm

Inventory & logistics optimization

90% Inventory optimization

98% Improved logistics planning & optimization

70% High demand forecasting accuracy

"As companies process more, faster, with fewer errors, they create added value for their customers and achieve a healthy combination of margin and revenue increase."

Jörg Junghanns, Vice President Europe - Digital Supply Chain, Capgemini's Business Services

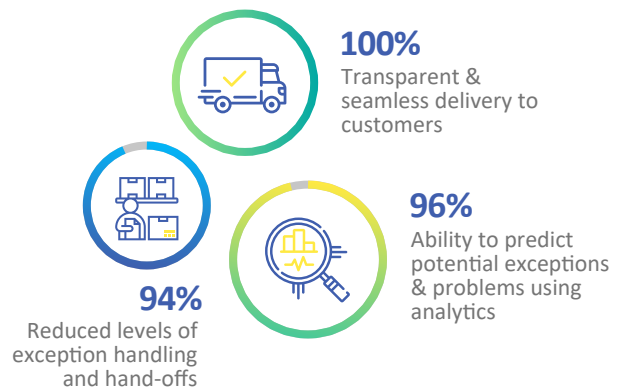### Improved supply chain resilience & flexibility

90% Increased supply chain resilience

94% Improved supply chain flexibility

"A more robust supply chain with management looking at long-term supply issues rather than solving short-term operational issues"

Supply Chain leader at global food company

Smoother fulfillment

100% Transparent & seamless delivery to customers

94% Reduced levels of exception handling and hand-offs

96% Ability to predict potential exceptions & problems using analytics

"Improving the flow of information and making real-time decision-making possible"

Supply Chain leader at a major apparel company

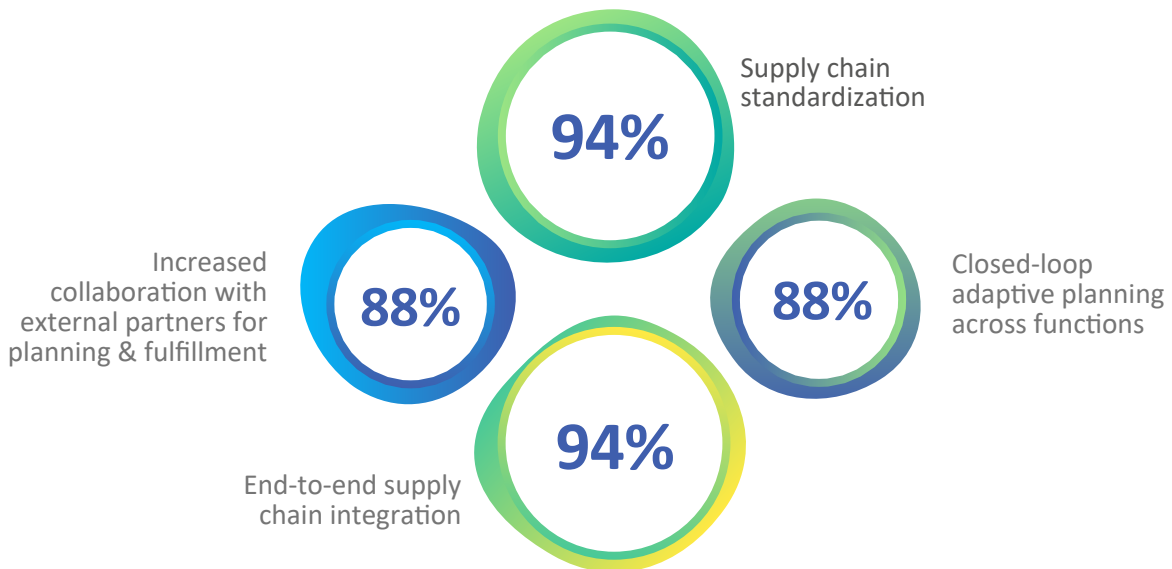# Key Characteristics of Autonomous Supply Chains

The key characteristics sought in an autonomous supply chain are improved standardization and integration of the supply chain and enhanced supply chain visibility and forecasting.

Indeed, end-to-end supply chain standardization and integration is a critical precursor for establishing real-time visibility of supply chain information and performance, and the potential ability to predict, sense, and promptly take appropriate actions, all of which are viewed as key characteristics of autonomous supply chains.

> *"Machine learning has considerable potential, for example, increasing accuracy in demand planning and connecting interactions and decision-making in fulfilment"*
>
> Dharmendra Patwardhan, Global Head of Digital Supply Chain Practice, Capgemini's Business Services

Improved standardization & integration

94% — Supply chain standardization

88% — Closed-loop adaptive planning across functions

94% — End-to-end supply chain integration

88% — Increased collaboration with external partners for planning & fulfillment

Improved supply chain visibility & forecasting

100% End-to-end visibility of supply chain information

100% End-to-end visibility of supply chain performance

96% Ability to predict, sense, and adjust in real-time

NelsonHall analysis:

- Standardization of the supply chain and supply chain data is critical in establishing reliable and consistent sources of information
- Improved collaboration and digital communication with external partners is critical to matching demand and supply
- An ability to predict, sense, and adjust in real-time is the holy grail of an autonomous supply chain

Key Supply Chain Transformation Technologies

Standardization of data nomenclature and processes is key to establishing an autonomous supply chain, and supply chain processes should be reinvented using techniques such as design thinking.

The reinvention should be based on:

- Its impact on key supply chain outcomes such as order fulfillment times and rates, customer satisfaction, and minimization of working capital
- Its impact on the journeys and experience of customers, supply and logistics partners, and supply chain personnel
- The potential offered by existing and **emerging** technologies

There are a number of **fundamental** technologies within supply chain transformation, with intelligent automation playing a major role in automating transactions and reducing manual exception handling levels.

Supply chain control tower and planning platforms are key building blocks in establishing integrated end-to-end visibility and management of the supply chain.

Subsequently, order management processes can be enhanced using dynamic order allocation and order management virtual assistants.

Technologies such as autonomous vehicles and blockchain are typically viewed as medium-term opportunities. However, autonomous vehicles are already perceived to be a critical element in an autonomous supply chain infrastructure by most supply chain executives.

"The level of autonomy in supply chain fulfillment can be increased by leveraging analytics to monitor supply chain fulfillment, predict potential exceptions, and automate mitigation or propose next-best actions."
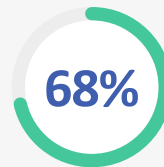
Jörg Junghanns, Vice President Europe - Digital Supply Chain, Capgemini's Business Services
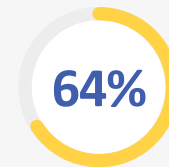
Fundamental

- **100%** Intelligent automation (RPA, ML, and AI)
- **98%** Supply chain control tower
- **94%** Supply chain planning platform
- **90%** CFR (case fill rate) analytics
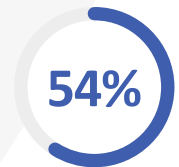- **88%** Sourcing analytics

Important

- **68%** Dynamic order allocation
- **64%** Order management virtual assistants
- **54%** Autonomous vehicles

Emerging

- **26%** Blockchain

NelsonHall analysis:

- Supply chain transformation requires an integrated combination of platforms, automation, and analytics
- Most supply chains have begun to automate using RPA, but the use of machine learning is still largely embryonic
- The use of autonomous vehicles is starting to be widely considered, but it is early days for blockchain

Autonomous Supply Chain Initiatives Planned

Roughly a third of enterprises plan to undertake significant autonomous supply chain initiatives over the next two years. These initiatives can be broadly grouped into three areas: planning & forecasting, supply chain optimization, and supply chain execution.

Consignment tracking is a major focus area for supply chain executives at the tactical execution level, with much frequently needing to be done to close gaps in the information available and digitalization of documentation to make it accessible in a more timely fashion.

Elsewhere, planning and forecasting are major forecast areas, with the need for enhanced supply and demand forecasting currently exacerbated by the pandemic and the resulting fluctuations in demand and supply impacting the supply chain more frequently and with greater magnitude than previously.

> *"The end game in an "autonomous supply chain" is a supply chain that operates without human intervention."*

Dharmendra Patwardhan, Global Head of Digital Supply Chain Practice, Capgemini's Business Services
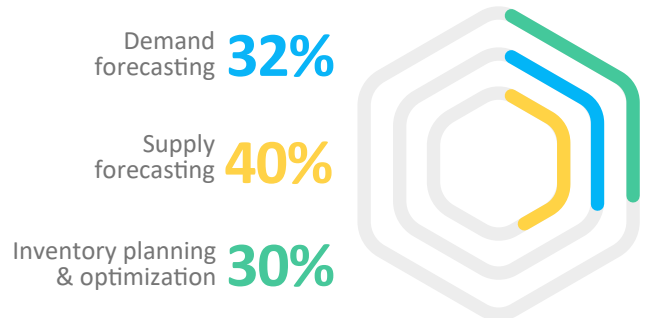
34%

of enterprises planning to undertake autonomous supply chain initiatives over the next 2-years

Planning & forecasting

Demand forecasting **32%**

Supply forecasting **40%**

Inventory planning & optimization **30%**

Supply chain optimization

22% Warehouse optimization

Transportation optimization **18%**

Supply chain execution

22%
52%
22%
24%

- Order management
- Logistics execution
- Consignment tracking
- Warranty management

Initiatives mentioned by individual supply chain executives include:

- Using wider sources of information such as social media and increasing campaign integration with major retailers to enhance demand forecasting
- Obtaining more data from key suppliers to enable longer range forecasting
- Automating ordering through to warehouse and picking and dispatching is being fully automated
- Moving raw inventory on plant pull signals with no manual interventions. Warehouse improvements and robots will be the final step but not for a couple of years
- Implementing real-time tracking on more raw inventory so we can start to look at better optimization of the supply chain
- Reducing inbound sales/customer service inquiries by proactively providing tracking data supporting logistics movements

Vendor Involvement in Autonomous Supply Chain Initiatives

Enterprises typically need assistance in implementing supply chain transformation, and eighty-four percent of enterprises will involve vendors in co-creation when implementing autonomous supply chain initiatives.

While all enterprises will need some external assistance in elements of the implementation, the majority of enterprises undertaking autonomous supply chain initiatives will involve service partners across the transformation lifecycle with vendors extensively involved in defining new autonomous supply chain process models and in delivering elements of autonomous supply chain processes as managed services.
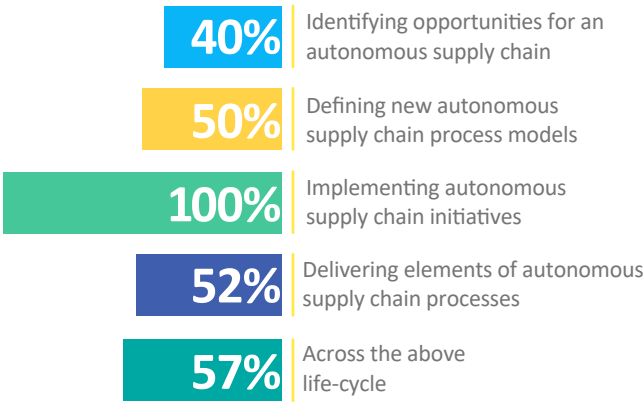
While significant proportions of enterprises will involve vendors in providing managed services around planning and forecasting, the major areas for the use of vendor managed services are expected to be around logistics administration, principally around transportation optimization and consignment tracking.

"For an FMCG company, Capgemini leveraged its demand planning framework and machine learning platforms to increase the client's forecasting accuracy and lower planning costs by over 25%."

Jörg Junghanns, Vice President Europe - Digital Supply Chain, Capgemini's Business Services

84% of enterprises will adopt co-creation involving a vendor

Stages of vendor involvement

40%	Identifying opportunities for an autonomous supply chain
50%	Defining new autonomous supply chain process models
100%	Implementing autonomous supply chain initiatives
52%	Delivering elements of autonomous supply chain processes
57%	Across the above life-cycle

Areas Where Managed Service Considered

Planning & forecasting

32%	Demand forecasting
32%	Supply forecasting
50%	Inventory planning & optimization

Logistics

74%	Transportation optimization
70%	Logistics execution
68%	Consignment tracking
44%	Materials compliance

Returns & warranty

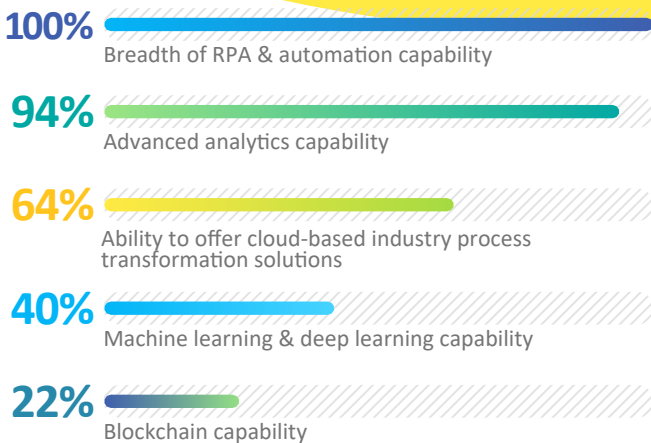|	
70%	Returns management
32%	Warranty management

What to Look For in a Services Partner

When seeking a services partner, supply chain executives seek a combination of creative and consultative expertise in assisting enterprises in reimagining their supply chain processes, underpinned by deep supply chain domain expertise to provide granular understanding and reality, and platform and automation expertise.

Reimagined supply chain technical architectures are increasingly likely to be API and microservice-based to provide deep layers of integration with existing ERP platforms and systems of record and facilitate rapid switching systems of execution on and off as new technologies platforms emerge. Many of these technologies and platforms are likely to be cloud-based, which beyond ease of integration facilitates scaling and resiliency, and vendors are increasingly combining groups of technologies into pre-built cloud-based solutions addressing particular supply chain needs and pain points.

In terms of individual technologies, RPA and analytics are regarded as critical skillsets. Supply chain executives place less emphasis on machine learning & deep learning technologies, which may underestimate the current importance of these technologies. They are already highly relevant to supply chain transformation in assisting in digitalizing paper-based documents and incorporating process learning for ongoing minimization of exceptions handling. Process discovery and mining technologies are also beginning to play a key role in process optimization.

> *"To ensure business value, you need a consistent and holistic methodology such as Capgemini's Digital Global Enterprise Model (D-GEM)."*
>
> Dharmendra Patwardhan, Global Head of Digital Supply Chain Practice, Capgemini's Business Services

Ability to reimagine supply chain processes

88%
Use of design thinking to reimagine processes and operations

76%
Ability to rethink supply chain process boundaries

Domain expertise

98%
Strong supply chain domain and process understanding

96%
Personnel with advanced degrees in supply chain

Platform & automation capability

100%
Breadth of RPA & automation capability

94%
Advanced analytics capability

64%
Ability to offer cloud-based industry process transformation solutions

40%
Machine learning & deep learning capability

22%
Blockchain capability

NelsonHall analysis:

- It is important to choose a vendor with both the consulting and operational supply chain expertise to reimagine and deliver supply chain transformation projects
- The vendor should complement this process knowledge with depth of automation and analytics capability
- Ideally, the vendor should have developed best-practice solutions based on integrated combinations of process models, industry platforms, and automation technologies

Keys to Success

Times have changed, and many organizations are no longer prepared to commit to long-term, high investment projects. As commented by a supply chain executive, "High cost and capital projects are unpopular at the moment unless they have a near-term RoI case." It is increasingly important to establish the vision and roadmap for supply chain transformation and achieve this as a series of complementary short-term projects, each delivering demonstrable RoI in a modest timeframe.

Gaining internal executive sponsorship remains a major challenge, and maintaining that sponsorship throughout the transformation is critical. In the words of one supply chain executive, "A key success factor is getting business buy-in and executing in stages with RoI and justification at each stage to ensure the sponsors remain in place."

It is also important to pilot each stage in the journey, using pilots to deliver a working prototype and ensure that all the challenges met on a live roll-out have already been identified and understood.

Also, many supply chain transformation projects will depend not just on internal buy-in but also require commitment and resourcing within trading partners. As expressed by another supply chain executive, "you need to make sure that trading partners are on board and able to fulfill their requirements."

The quality of the delivery team comprising internal and vendor personnel is also important. This team needs to operate as a single highly integrated unit working to common goals, rather than as different entities working to their own agendas.

> *"The first step is to build the right level of skill and expertise within the supply chain personnel. Secondly, make elements of the supply chain touchless. Autonomy will happen as a staged approach, not as a big bang. It's a journey. Focus on high-impact areas first, enable quick wins, and start with prototyping."*
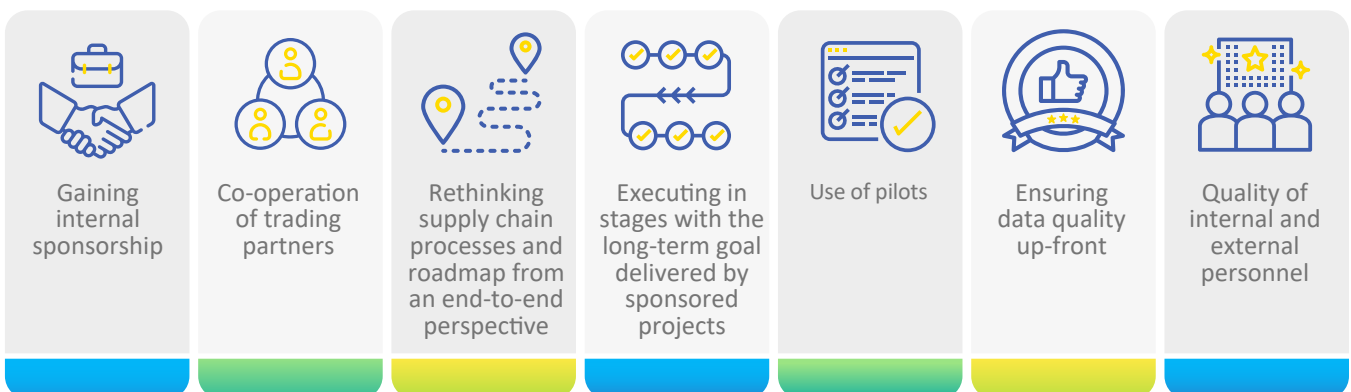
Jörg Junghanns, Vice President Europe - Digital Supply Chain, Capgemini's Business Services

This is particularly important when the inevitable teething problems are encountered. As expressed by one supply chain executive, "Quality of people and project management is vital to ensure that objectives are met and the solution isn't diluted when problems are encountered." Another commented, "Ensuring you are partnered with the right people is critical as the skill in execution is really important."

Certain foundational elements are also desirable, with robust data a frequent challenge often due to manual input into a range of diverse legacy systems.

Finally, it is important to remember that supply chain transformation is a, possibly never-ending, journey. In the words of a supply chain executive interviewed, "Training and continual improvement need to be part of a project not handed over to a BAU team who are unfamiliar with the project."

Key Success factors

| Gaining internal sponsorship | Co-operation of trading partners | Rethinking supply chain processes and roadmap from an end-to-end perspective | Executing in stages with the long-term goal delivered by sponsored projects | Use of pilots | Ensuring data quality up-front | Quality of internal and external personnel |

Ask the Expert

If you would like to organize a friendly chat to ask for advice, seek guidance or if you have any questions about moving to an autonomous supply chain model, please contact Jörg directly:

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About Capgemini's Digital Supply Chain Practice

Capgemini's Autonomous Supply Chain offering helps transform your organization into an integrated, frictionless, and customer-centric supply chain function that delivers cognitive, touchless operations and transparent data-driven decision-making.

Capgemini's approach leverages the power of intelligent automation technologies to unlock value across your business – partnering with you to transform your supply chain into a function that delivers competitive advantage and enhanced business outcomes, including:

- Improved demand forecasting accuracy
- Improved logistics planning and optimization
- Increased levels of fulfillment reliability
- Enhanced risk identification
- Reduced operational cost and working capital.

In turn, this helps you to transition to the Frictionless Enterprise.

About NelsonHall

NelsonHall is the leading global analyst firm dedicated to helping organizations understand the 'art of the possible' in digital operations transformation. With analysts in the U.S., U.K., and Continental Europe, NelsonHall provides buy-side organizations with detailed, critical information on markets and vendors (including NEAT assessments) that helps them make fast and highly informed sourcing decisions. And for vendors, NelsonHall provides deep knowledge of market dynamics and user requirements to help them hone their go-to-market strategies.

NelsonHall's research is based on rigorous, primary research and is widely respected for the quality, depth, and insight of its analysis.

For more details, contact: