



Executive  
Perspectives

04

# Unlocking the Value Potential of AI and GenAI Transformation

## Supply Chains

*October 2024*

## Introduction

**AI holds massive value creation potential for supply chain management (SCM).** But many companies still struggle to draw value from it. In this Executive Perspective, we discuss how **GenAI can turbocharge** the value generated by AI and can by itself bring significant **new opportunities for SCM**, making supply chains future-proof.

We address key GenAI-related questions for supply chains, including:

- What tangible value can GenAI deliver in SCM?
- Where and how can GenAI be applied in SCM today and in the mid term? Where to start?
- What is the longer-term, full-potential vision of GenAI in SCM?
- How can organizations align people, processes, tech, & data to effectively enable GenAI?
- What are the limitations and risks of using GenAI in supply chains?

**This document guides CEOs and supply chain leaders in navigating through GenAI's role, identifying real value opportunities, and preparing for the future. It outlines a holistic approach to transform your supply chain with GenAI.**

### Key takeaways:

- GenAI unlocks value in supply chains by simplifying access to & step-changing adoption of AI
- It bolsters SCM digital transformations by enhancing data backbone & augmenting analytics
- It unlocks new grounds for intelligent process automation through advanced GenAI agents
- Successful GenAI implementations in SCM come with specific requirements for the people, tech, and data enablers

**In this BCG Executive Perspective, we articulate the vision and value of the future of supply chains with AI and GenAI**



# Executive summary | Supercharge your supply chain and your competitive edge with AI

AI has significant potential for SC, but execution often falls short

- **Predictive and prescriptive** AI such as forecasting, optimization, disruption detection, and scenario simulation can **generate major impacts** on revenue (+2-5pp), ops cost (-10-20pp), as well as cash (-15-30% inventory), and can enhance the agility and resilience of supply chains
- But companies across sectors **often fail to deliver on their goals and business cases** despite large amounts invested, mainly because of poor adoption rates, misaligned processes, lack of trusted data and connectivity between SC systems

GenAI can turbocharge digital & AI-driven SC transformation

- GenAI will **enhance organizations' data backbones** (e.g., improving master data, capturing market data, detecting early warning signals, augmenting supplier knowledge base) and **bolster AI analytics** (e.g., leveraging unstructured data in forecasts, embedding human knowledge in algorithms)
- GenAI will also **ease and accelerate adoption** of advanced supply chain solutions by enabling users to interface with them in natural language (e.g., explain outputs of AI models, simply define and automatically run simulations, improve user experience)

GenAI itself will also bring new opportunities through intelligent process automation

- GenAI has the potential to profoundly automate end-to-end processes with large language model-based **agents (think: smart bots) autonomously engaging within an ecosystem of tools and stakeholders** to achieve activities in a given field (e.g., sourcing planning)
- Outsized impact will come from advanced implementation where a **coalition of such autonomous agents will collaborate** across processes, taking care of several steps in the value chain, increasing efficiency and speed of execution
- This implementation will enable seamless **GenAI integration with existing systems to improve user experience** by managing the internal flow of information. GenAI enables a hub model, acting as a window that **redirects work to other AI models**
- GenAI-driven automation will bolster **cross-functional collaboration** of the supply chain **with other teams** (e.g., sales, customer care, innovation) as well as **external partners** (e.g., joint business planning/automatic synchronization with suppliers and customers)

GenAI SC implementation comes with specific requirements

- **The operating model and ways of working** must be profoundly reimagined (e.g., implementing digital-native, automated processes; enabling more centralized SC oversight and decision making; organization reskilling to foster adoption; establishing the right controls with human oversight on the most important decisions)
- **The data fabric** must be strengthened to handle bigger volumes of higher-frequency signals, including external inputs from the market and ecosystem partners, and curated content for **consumption by agent-based systems**
- **Organizations' tech platforms** must include a **robust GenAI tech stack** (e.g., orchestration, evaluation, guardrails, scalability), well integrated with/sitting on top of core systems, with appropriate controls in place

# AI/GenAI will help unlock massive value creation potential for supply chains

## Set of critical benefits...

### Less manual work

- Less data hunting
- Less Excel
- Less application switching
- Dashboards enhanced with prompts
- No data reconciliation

### Full automation of simple decisions

#### Everything that can be automated is fully automated

- E.g., forecasting for >80% of SKUs
- E.g., inventory target settings
- Admin tasks, e.g., reporting, recurring analyses

### Augmented human abilities for complex decisions

#### Faster decision making across silos, bringing resilience and flexibility

- Enhanced integration of data from suppliers to customers
- Easy what-if scenarios, e.g., capacity setting, commercial levers
- Prediction/optimization recommendations

### Reaping benefits of GenAI + AI combination

#### GenAI + AI capabilities leading to best-of-both-worlds applications

- GenAI enables insight extraction from unstructured data
- GenAI enables intuitive/easy interfacing with AI applications
- Increasing AI adoption—broader user base for greater impact

## ... to drive tangible business outcomes that are achievable in the short- to mid-term

### Revenue upside



**+2-5%**

Revenue uplift

### EBITDA



**+2-4pp**

Profitability

### Working capital



**15-30%**

Inventory reduction

### Service and satisfaction



**+5-15pp**

Service rate

### Throughput



**+5-10pp**

OEE uplift

### Costs



**10-20%**

Reduction in manufacturing, warehousing, and distribution costs

### CO<sub>2</sub> emissions



**20-50%**

Average near-term CO<sub>2</sub> reduction

### Resilience



**Divide by 10**

Time to understand upstream scenarios and actions needed vs. suppliers

### Flexibility

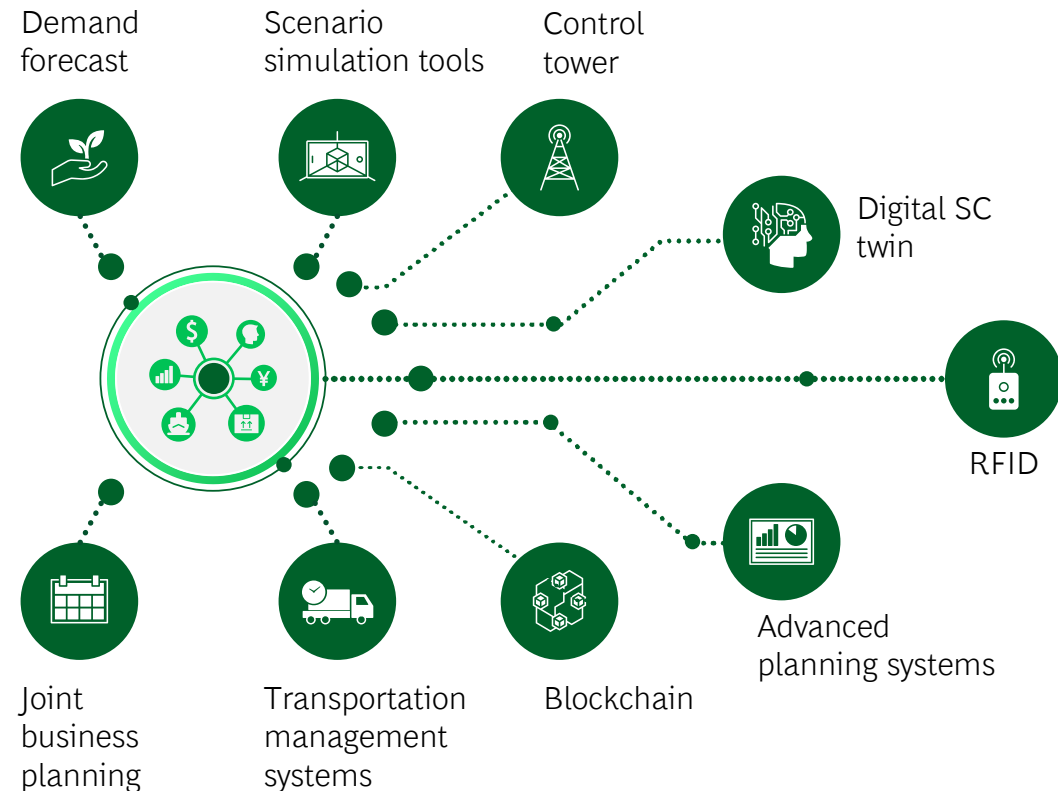


**Divide by 5**

Time needed to make plan and execute

# But many companies have yet to realize the full benefits of supply chain technologies

## Despite the range of advanced data-driven supply chain capabilities...



1. Such as ERP, WMS, CRM, SRM, MES, etc.

## ... companies have struggled to unlock value for common reasons

- Processes**
  - Insufficient redesign of processes and ways of working
  - Packaged solutions that don't fit with desired processes
- Tech and data**
  - Multiple disconnected data foundations and systems of record<sup>1</sup>
  - Lack of comprehensive data availability and usability
- Change and skills**
  - Non-intuitive tech with high skill requirements
  - Insufficient change management and lack of understanding and trust driving adoption gap
  - Ambiguity in roles, skills, and KPIs of doers and change agents

# GenAI directly accelerates supply chain transformations by making them more agile, increasing adoption rates, and improving value capture

## GenAI impacts supply chain in four main ways

- 1 Enhances data backbone**  
E.g., cleans and augments master data such as BOM, searches supplier knowledge base
- 2 Augments supply chain analytics**  
E.g., creates features from unstructured data to enhance new product demand forecasting
- 3 Overhauls user experience**  
E.g., steers advanced planning system with natural language, explains outputs of AI models
- 4 Deeply automates processes**  
E.g., drives workflow, navigating toward outcomes, coordinates multiple capabilities/tools

## Key outcomes in successful supply chain transformations

### Agility:

GenAI accelerates the development of complex applications, interfaces, and SC solutions by **>30%**

### User adoption:

GenAI-enabled supply chain increases overall user satisfaction and use of the system by **>60%**

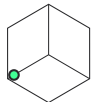
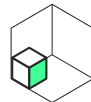
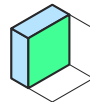

### Value focus:

GenAI-aided processes reduce administrative and data reconciliation tasks by **>50%**

### Speed:

GenAI-driven advanced analytics improve decision-making speed by **>30%**

# Disruptive potential of process automation is unlocked by GenAI in four levels


	Deploy		Reshape	
	 Level 1 <b>Task-specific point solutions</b>	 Level 2 <b>Process step enhancements</b>	 Level 3 <b>Deep process transformation</b>	 Level 4 <b>Cross-functional process automation</b>
<i>Think ...</i>	Deploy chatbot	Scan web and report alerts	Continuously verify and update master data	Automate IBP process
Description	Daily operational tasks supported by vanilla GenAI capabilities	Improved performance and usability of processes and existing tools	Profound transformation of processes powered by constrained AI agents	Orchestrated supply chain through consortia of increasingly self-organizing agents
GenAI modality employed	Core GenAI	Core GenAI	Core GenAI	Core GenAI
	GenAI plus AI and tools	GenAI plus AI and tools	GenAI plus AI and tools	GenAI plus AI and tools
	AI agents	AI agents	AI agents	AI agents
	Consortia of agents	Consortia of agents	Consortia of agents	Consortia of agents
Maturity 2024	<b>Out-of-the-box</b> Mature plug-and-play solutions entering market	<b>Proven</b> First products released, solutions in active dev	<b>Emerging</b> First announcements of solutions, few releases	<b>Visionary</b> Precursors in research, R&D stage for industry
			<i>Primary source of value in the next 3-5 years</i>	

# Current solutions are not yet addressing the disruptive potential within supply chains

Select, representative examples. Not exhaustive

	Example market offerings on GenAI point-solutions Level 1	Example market offerings on GenAI process enhancement Level 2
Supply chain specific players	 Allows users to <b>interact</b> with Specialized SC visibility platform <b>in natural language</b>	 Supports <b>risk management and optimization</b> in combination with Dynamics 360 copilot
	 Enables users to dig into supplier knowledge base thanks to <b>natural-language requests</b>	 Ensures <b>supplier coordination and mitigates shortages</b> via real-time insights, risk analysis, and action recommendations
	 <b>Explains demand forecast and planning decisions</b> using GenAI chat	 Utilizes GenAI to <b>automate routine decisions</b> including documentation and risk factor analysis
	 Conducts <b>commercial negotiations autonomously</b> using AI-powered systems	 Analyzes <b>unstructured data using Agent</b> to answer questions about orders, generate shipping quotes, etc.
Enablers	 Provides a platform unifying industrial data and giving access/ <b>insights through natural-language requests</b>	 Increases developer productivity using a GenAI-powered <b>code assistant</b>
	 Enables problem solving through <b>oral exchanges with conversational assistants</b>	 Enables users to deploy <b>LLMs in other AI applications to create AI agents</b>

## Market outlook: Trends for GenAI in SC in 2024 and beyond

- 
**Offerings emerging:** Market evolving fast with increasing number of SC-specific offerings emerging
- 
**Bundled capabilities:** SC players integrating GenAI capabilities – native bundling reduces integration overhead for organizations
- 
**Increased sophistication:** Rising level of sophistication vs 2023, but adaption or in-house development key to reaching potential, such as Level 3 automation
- 
**Enabler dualism:** SC-specific capabilities continuing to be flanked by powerful enablers such as coding co-pilots



# Example | Level 3: Recent BCG project reshaped supply chain processes with GenAI tools running complex scenarios/root-cause analysis

## Context

Leading Europe-based industrial goods company making **thousands of supply chain decisions** daily

Aim to supercharge existing supply chain simulation capability

Overarching goal to **optimize supply chain operations** and make informed decisions by:

- Identifying bottlenecks
- Testing different strategies
- Running complex scenarios

## Execution

We interconnected two powerful BCG X assets with a seamless natural language interface:

- AgentKit: **GenAI agent toolkit** (open-sourced)
- End-to-end Plan by BCG X: **E2E planning suite**

Live solution streamlines S&OP processes and enables supply planners to independently:

- Create simulation scenarios
- Analyze root causes
- Summarize KPIs
- Run sensitivity analyses
- Share key simulations outputs

## Business value capture

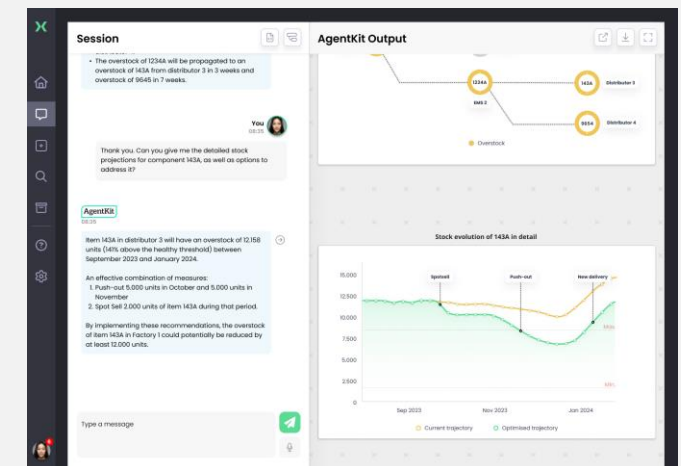
Impact from underlying AI capability

**>2pp** | EBITDA increase year 2+

Impact from GenAI agent

**25+** | Planning professionals trained

**3x** | Process cycle time reduction

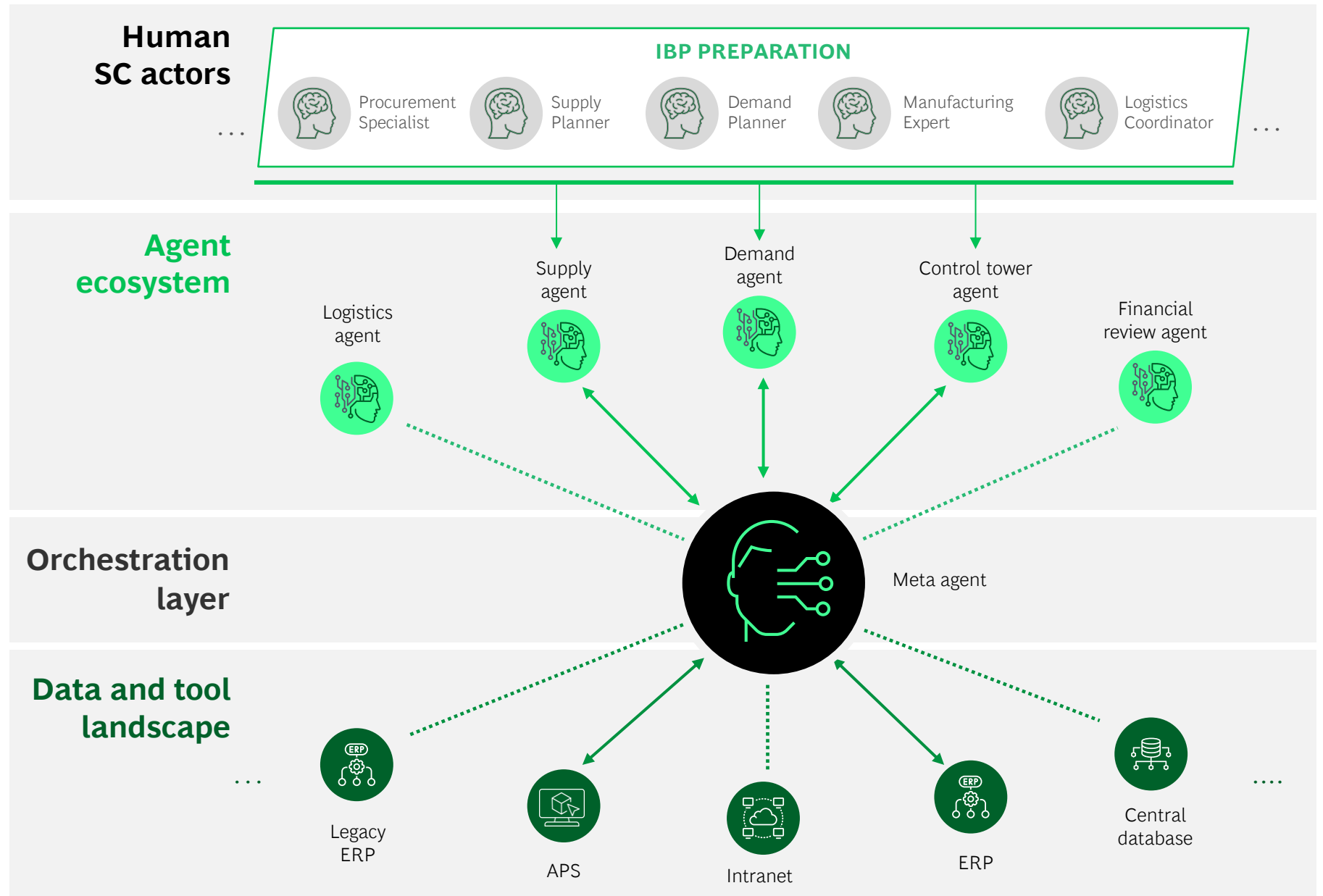


# What the future may hold | Deep Level 4 process automation via team of collaborative agents

Example

## Advanced E2E planning workflow vision

Meta-agent acts as orchestration layer planning sub-tasks and coordinating access to data sources and tools



# Whether to make or buy AI/GenAI in supply chains: follow the adopt-adapt-assemble framework

## Choose the right approach

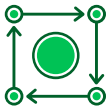
Deploy



### **ADOPT** off-the-shelf AI/GenAI products

Plug-and-play established offerings for general-purpose assistance and daily business tasks (e.g., ChatGPT for email drafts)

Reshape



### **ADAPT** existing AI/GenAI tools

Tailor existing offerings to integrate organizational data and enhance existing workflows (e.g., custom GPT instances for new-hire onboarding)

Invent



### **ASSEMBLE** bespoke in-house applications

Build fully custom solutions for truly differentiating capabilities (e.g., custom-trained LLM to accelerate product design in R&D department)

## Key questions to ask

### How strategically important is this transformation?

**Consider:** Supply chain differentiation, market dynamics, competitor abilities

### What outcomes and ROI are we seeking?

**Consider:** Service differentiation/customer satisfaction, cost sensitivity, potential for automation

### How capable are our teams and our partners of undertaking this?

**Consider:** Internal data science team, partner network, understanding of architecture, core competencies required

### How customized does this solution need to be for our organization and context?

**Consider:** Existing standard processes, standardized ERP, legacy practices

# AI/GenAI-fueled transformation of supply chains will require changes in process, people, and tech



## Processes

- More seamless human/machine interaction will **supercharge daily activities**
- Increased accessibility of analytics will **unlock further value** through more widespread use
- Standardization will shift from manual spot-checks and corrections to **central orchestration**
- GenAI will facilitate and require **changes in roles, organizational structure, and operating models**
- Organizations will need to **embed AI governance** within POM<sup>1</sup> and apply iterative development and deployment



## People

- **New people structure and roles** will need to be established, and dedicated AI roles should be enabled (e.g., RAI<sup>2</sup>, CoE)
- **When sourcing talent and tech**, orgs will need to centrally orchestrate AI capabilities and workforce planning within platforms
- **Change management, upskilling, and targeted messaging** will be required to increase adoption of new tools
- Leaders will be empowered to champion **responsible AI culture** and support AI learning, experimentation, and ethics
- Teams will have additional capacity to **shift to strategic work** as AI/GenAI automates routine tasks


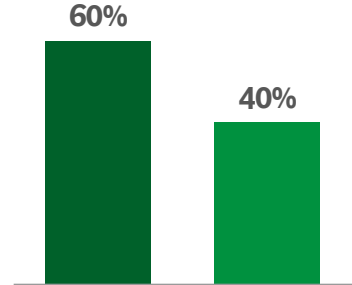

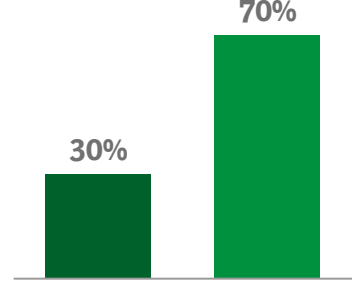


## Tech













- GenAI solutions will **bridge disconnected system entities**, integrating with existing systems
- Tech stack will evolve to propel and safeguard GenAI solutions, building beyond **AI/ML operation stacks**
- Organizational SOPs, guidelines, etc., will need to be codified to instruct and guide agents
- New building blocks required for **GenAI-powered data mgmt.**, e.g., MDM, data acquisition and curation
- **Diversify beyond one model**, including open-source options for competitive advantage

# Process | AI/GenAI automation will transform how processes are run

Illustrative

	Target setting	Supply issue resolution	Alternative identification	Decision making	Estimated time allocation						
 <p><b>Current process example of supply planning</b></p>	<p>Targets are established based on historical information and latest plan – <b>exchanges between planning system and Excel files, plus manual plugs</b></p>	<p>Future delivery disruptions are phoned in by supplier/buyer teams – <b>disruption already occurred, but impact not yet measurable</b></p>	<p>Determine which parts and products will be impacted via BOM</p> <p>Sites are <b>informed after 3 weeks</b> of manual impact sizing</p>	<p><b>Bad news is communicated internally</b>, and an action plan is created</p> <p>Communication is prepared for customers</p>	 <table border="1"> <tr> <th>Category</th> <th>Percentage</th> </tr> <tr> <td>Administrative</td> <td>60%</td> </tr> <tr> <td>Strategic</td> <td>40%</td> </tr> </table>	Category	Percentage	Administrative	60%	Strategic	40%
Category	Percentage										
Administrative	60%										
Strategic	40%										
 <p><b>Future process With GenAI</b></p>	<p>Data and systems are examined with natural language</p> <p><b>GenAI supply plan recommendations</b> are reviewed and validated</p>	<p><b>GenAI web scanner</b> detects supplier disruptions in real-time</p> <p>Models are <b>automatically updated</b> with projected impacts</p>	<p>Alternative suppliers are <b>instantly identified</b> by GenAI database search</p> <p><b>Automatically generated action plans</b> are reviewed</p>	<p><b>AI-generated assessment</b> is shared internally</p> <p>A scenario is prioritized and a GenAI tool <b>validates the optimization plan</b></p>	 <table border="1"> <tr> <th>Category</th> <th>Percentage</th> </tr> <tr> <td>Administrative</td> <td>30%</td> </tr> <tr> <td>Strategic</td> <td>70%</td> </tr> </table>	Category	Percentage	Administrative	30%	Strategic	70%
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Administrative	30%										
Strategic	70%										

# People | AI/GenAI automation will transform roles across supply chains

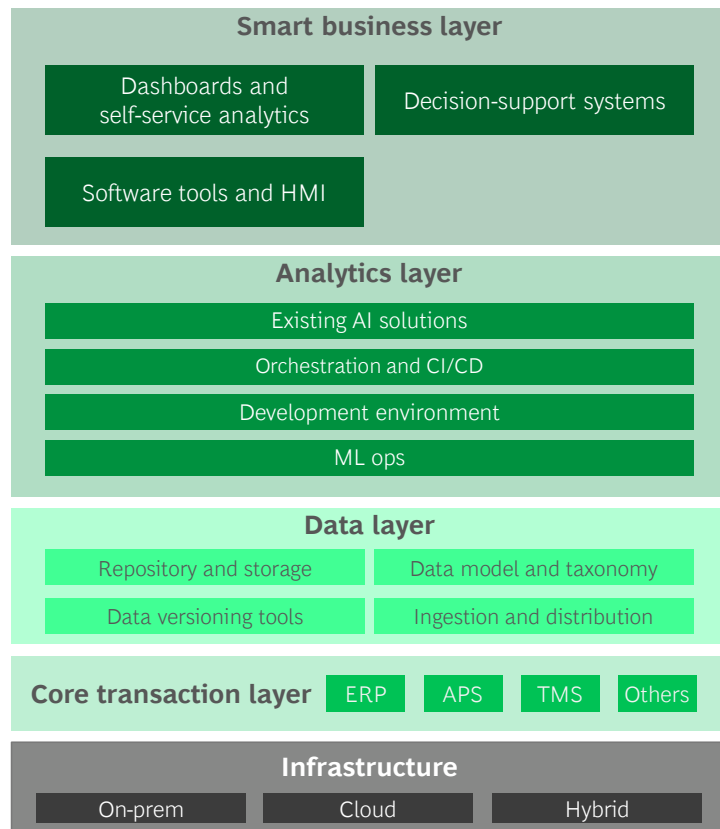
	Demand planning	Supply planning	Sourcing and procurement	Manufacturing	Transport and logistics	Customer services
Selected example personas	  <b>Demand planner</b>	  <b>Material planner</b>	  <b>Procurement specialist</b>	  <b>Manufacturing engineer</b>	  <b>Logistics manager</b>	  <b>Customer relations agent</b>
<b>IMPACT ON PERSONAS</b>	<ul style="list-style-type: none"> <li>• Less time in planning discussions</li> <li>• More focus on root-cause analysis leading to better forecasts</li> </ul>	<ul style="list-style-type: none"> <li>• Less research across silos</li> <li>• Sharper focus on critical stock issues</li> <li>• Faster request turnaround</li> </ul>	<ul style="list-style-type: none"> <li>• Boosted productivity through automation</li> <li>• Improved savings by prioritizing key suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced reconciliation across channels</li> <li>• Greater effectiveness in urgent task resolution</li> </ul>	<ul style="list-style-type: none"> <li>• Improved timing, including last-mile delivery</li> <li>• Decreased overhead via automation</li> </ul>	<ul style="list-style-type: none"> <li>• Increased efficacy in responding to key requests</li> <li>• Reduced admin workload</li> <li>• Greater customer satisfaction</li> </ul>
<b>GEN AI USE CASES</b>	<ul style="list-style-type: none"> <li>• Self-service for automatic forecast updates</li> <li>• User-friendly APS interface</li> </ul>	<ul style="list-style-type: none"> <li>• Easy access to raw material stocks and inflows</li> <li>• Decision support for shortages and disruptions</li> </ul>	<ul style="list-style-type: none"> <li>• Automated RFP and contract drafts</li> <li>• Instant access to supplier and contract data</li> </ul>	<ul style="list-style-type: none"> <li>• Standardized BOMs across sites and products</li> <li>• AI assistant for work orders and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Auto-generated route plans from alerts and disruptions</li> <li>• Automated drafting and review of logistics documents</li> </ul>	<ul style="list-style-type: none"> <li>• Direct access to customer history and company policies</li> <li>• Auto-generation of customer documents</li> </ul>

Expected level of impact on roles

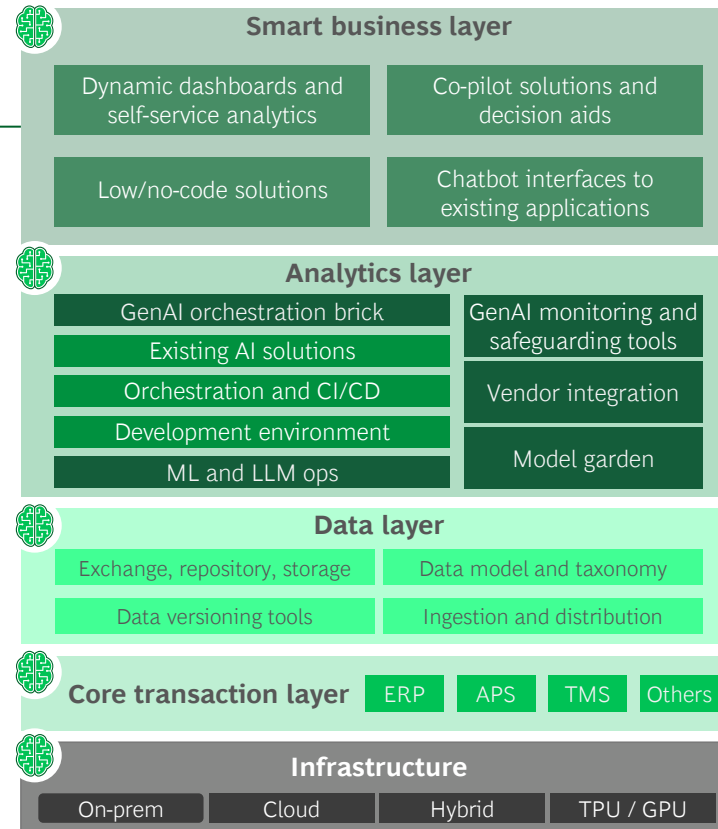
●●● Low impact    ●●●● High impact

# Tech | Tech stacks will evolve with transformative impact on analytics stack and user-facing layer

## Typical current tech stack



## AI/GenAI-enabled tech stack



Layer interfaces/capabilities upgraded and impacted by GenAI

## Key takeaways

- Co-pilots and natural-language interfaces are **transforming end-user experiences**
- **Entry barriers** to complex applications (e.g., analytics tools, advance planning systems) are reduced
- Emphasis is on **versatile analytics layer** (off-the-shelf models, hybrid AI/GenAI solutions, etc.)
- For GenAI, LLM ops for **continuous monitoring and evaluation** is paramount
- Data layer will be enriched with bigger volumes of unstructured data, including external
- GenAI tools **accelerate data consistency** and taxonomy reconciliation
- Interaction with core systems abstracted via co-pilots and/or GenAI agents (wrappers)
- GenAI tools and interfaces used as easy-access interfaces to legacy landscape
- Cloud resources should **minimize vendor dependencies** in a fast-changing market
- It's key to make cost-aware infra decisions based on information-security and cybersecurity needs

# Limitations and risks of AI/GenAI in supply chains should be carefully addressed



## Data privacy and cybersecurity

- **Regulations and responsible AI** focus could limit use
- **Proprietary transfers** may create vulnerabilities
- Training with proprietary data raises **IP infringement risk**



## Reliability and control challenges at scale

- **No standard practices** can fully handle hallucinations
- **Cost control challenges** are an issue when scaling



## Fragmentation and rapid tech evolution

- The ecosystem has **450+** GenAI companies and counting
- **GenAI gaps** for SC-specific players will be rapidly filled
- **Many partner choices** and models have no clear leaders



## Limited AI/GenAI talent and experience

- **Scarce talent** with hands-on GenAI/LLM expertise due to novelty
- "Mainstream" data scientists will need **growth or upskilling**
- **Internal upskilling** will require time and resources



## Data availability for training AI models

- **Limited supply chain data** for training AI models may limit scaling and hinder output quality
- This could cause **overdependence** on external LLMs

## Limitations and risks

## Example mitigating actions

(non-exhaustive)

- **Adopt advanced encryption and secure storage** to protect sensitive information

- **Deploy whiteboxing techniques** for transparency and AI decision control
- Monitor agent actions closely

- **Continuously evaluate partners and models** to ensure alignment with organizational goals

- Organize workshops, webinars, and certification programs to **upskill the team and bridge the talent gap**

- Implement policies to ensure **data source transparency** while developing internal data repositories



# Key learnings to consider within the AI/GenAI transformation of supply chain operations



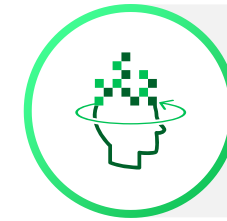
## Left brain and right brain

- **Use AI and GenAI roadmap** synergy
- **Select Hybrid AI/GenAI** use cases and staffing
- **Lower AI entry barriers** with GenAI
- **Streamline** the workflows for buy-in (e.g., chatbot)
- **Establish Integrated** value tracking and improvements



## Sequenced journey from vision to scale

- **Conduct baseline assessment** (vendor options, key partnerships)
- **Scope and prioritize** initiatives (adopt-adapt-assemble)
- **Define roadmap**, lighthouse to scale up including people/data/tech enablers
- **Build MVPs** to show value quickly and scale fast



## 10-20-70 paradigm

- GenAI value creation:
  - 10%** algorithms/models
  - 20%** tech/data
  - 70%** people/processes/organization
- **Rethink roles/responsibilities**, talent strategy, and acquisition
- **Org change** with use cases: address concerns, embed in processes, upskill users/owners

# Concrete actions | What it takes to be successful in AI/GenAI supply chain transformations

- 1 Use a people-first lens:** At every turn, consider end-users to drive adoption and generate impact
- 2 Think big:** Be bold in your supply chain aspirations by targeting high-impact transformations and ROI
- 3 Get the basics right:** Address data and tech foundations from the start
- 4 Partner effectively:** Establish early, tight collaboration between business and AI/tech/data experts
- 5 Manage change intentionally:** Bring people along as you rethink processes and ways of working



**Start by shaping a prioritized SC transformation journey to be delivered in incremental steps**

# BCG experts | Key contacts for GenAI in supply chains



**Dustin Burke**  
Managing Director  
and Senior Partner  
*Chicago*



**Olivier Bouffault**  
Managing Director  
and Senior Partner  
*Paris*



**Dan Sack**  
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and Partner  
*Stockholm*



**Tristan Mallet**  
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**Abhijeet Shetty**  
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and Partner  
*Miami*



**Paari Rajendran**  
Managing Director  
and Partner  
*San Francisco*



**Markus Weidmann**  
Managing Director  
and Partner  
*Munich*



**Kosuke Uchida**  
Managing Director  
and Senior Partner  
*Nagoya*



**Camille Engel**  
Managing Director  
and Partner  
*New Jersey*



**Stefan Gstettner**  
Partner and Director  
*Frankfurt*



**Gregor Jossé**  
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**Ashish Pathak**  
OPS Offer Director -  
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