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Supply chains at
an inflection point:
The future with agentic AI

Agentic AI: from reactive supply chains to autonomous execution

The era of agentic artificial intelligence (AI) adoption is underway, and for supply chain organizations, agents constitute the next generation of tools that take AI beyond automation into systems that can sense, reason, and act on their own.

The technology is arriving at an opportune time for supply chains, given stubborn challenges that can impede efficient, agile, and cost-optimized operations:

- Organizations contend with the need to attract and retain employees with the necessary analytical and cross-functional skills.
- Increasing customer demands for more customization in end-user products strain highly interdependent networks.
- Global disruptions, such as supply and demand shifts, price volatility, and geopolitical uncertainty, require supply chain organizations to adapt to a constantly changing marketplace.
- Energy transitions, regulatory requirements, and traceability demands create new layers of complexity and trade-offs.

Amid these challenges, leaders also struggle to collaborate across functions while extracting timely insights from massive volumes of data. Status quo or incremental improvements in supply chain operations will not be sufficient to address these challenges. With the fast-improving capabilities of agentic AI, enterprises have an opportunity to not just augment but fundamentally transform how decisions are made, work is executed, and collaboration is achieved.

There is growing excitement around what agentic AI solutions can achieve today, as well as where this innovation is headed (e.g., the convergence of agents and physical AI). Yet, agentic AI also requires comprehensive changes across the enterprise, and there is growing urgency to act.

Each wave of AI innovation to this point has catalyzed investment and experimentation. With agentic AI, the potential outcomes are so significant that falling behind creates the risk of never catching up. Fortunately, the path ahead is becoming clearer, and transforming supply chains with agents is becoming a reality.



Defining agentic AI in the *supply chain*

Agentic AI is defined as an autonomous system that perceives the data and technology environment, makes decisions, and takes action with minimal or no human intervention. It enables a shift from task automation to outcome delegation. When agents are orchestrated into multiagent systems, different agents perform or validate tasks across end-to-end workflows. In more advanced applications, feedback loops from performance and accuracy assessments could allow agents to self-optimize and autonomously improve over time.

In the supply chain, agents can be grouped into three archetypes:

- **System provider agents** – Designed for an individual system or platform (e.g., enterprise resource planning [ERP]), these agents are likely offered by the platform provider.
- **Use case agents** – These bridge multiple systems to address an issue or accomplish a task that spans stages of the supply chain.
- **Decision intelligence agents** – Agents connect various systems and data sets, elevating insights and informing strategic decisions.

The business impact of these agents includes a significant reduction in decision cycle time, an increase in productivity, and a decrease in operating costs. Meanwhile, by turning over select tasks to agents, the workforce is empowered to focus on managing disruption and making strategic decisions. Agents can also enable

capabilities and speed that could not be replicated with a purely human workforce, even with unlimited resources and people.

As an example, agents can be used in spend analytics to identify opportunities to capture savings in near real time, continuously, and across large, disparate data sets. They can ingest raw, unstructured, and imperfect spend category data, structure the information, and then a series of agents scour the data to identify savings. With this, human worker roles focus less on time-consuming data analysis and more on strategic decision-making based on agent outputs.

Currently, many agentic applications are overlays on existing software platforms, and in the short term, we are likely to see agents take on routine supply chain tasks to make humans more effective. Over time, as the technology continues to mature and organizations transform to use it, more work will be shifted into agentic workloads. Offerings from third-party vendors will give organizations access to at least some agentic capabilities, and as agents are commoditized, differentiation will grow out of orchestrating the broader technology ecosystem.

For instance, connecting agents across ERP, operational technology (OT), and enterprise data could help improve predictions around supply chain disruptions. This would require external sensing data, connectivity to other systems (e.g., orders and inventory), and the ability to work across multiple vendor platforms. Organizations that can effectively architect, deploy, and scale agentic capabilities will set themselves apart. Given that organizations may have gaps in in-house competencies, a third-party service provider could be helpful in bridging capabilities needed for agent orchestration.



Agentic AI use cases in the supply chain

The most compelling use cases are those in which agents act independently to detect, analyze, and resolve issues without waiting for human prompts or requiring intervention.



Demand analysis: Agents continuously monitor demand signals, adjust forecasts, and trigger downstream planning updates (e.g., production, inventory, replenishment) without human intervention.



Dynamic inventory management: Agents track material levels in near real time and recommend (or autonomously perform) reorders or reallocations within the manufacturing network to prevent shortages.



Material handling: At the intersection of agentic and physical AI, agents can be used to operate and optimize automated guided vehicle (e.g., forklifts) tasks and staging to meet delivery windows.



Fulfillment and logistics: Agents can forecast deliveries, estimate delays, dynamically reroute items already out for shipment, and replenish from another source.



Category strategy development and third-party negotiations: Agents can automate the request for proposal (RFP) process to extract efficiency, and in a mature form, agents may initiate or even manage negotiations, potentially with other agents.



Data-driven supplier evaluation: Agents can continuously assess supplier risk and performance, automatically reallocate volumes, trigger alternate sourcing events, or initiate supplier remediation workflows when thresholds are breached.



Proactive constraint management: Agents detect emerging disruptions and automatically execute mitigation actions, such as rerouting shipments, reallocating inventory, expediting orders, or switching suppliers across tiers.



Service parts availability and recovery: A multiagent system can monitor demand signals and shortages and act in recovery tasks to support fill rate and time-to-repair, transforming aftermarket service parts with improved availability and forecast accuracy.

Contending with process and *technology transformation*

Most current workflows are built around what humans can achieve and how they do so. Processes account for time dependencies and human-level responsiveness, and supply chain professionals need to exhibit not only competency but consistency. There are also areas where processes are built around human constraints, rather than machine capabilities (e.g., visual inspection with the human eye versus high-fidelity computer vision analysis).

The way humans work is not necessarily the most effective or efficient approach. What is more, particularly when leveraging a unified data platform, agents may be able to make more effective decisions than humans because they have access to more data and can process it more quickly. Therefore, in reimagining work, organizations should consider the desired outcome and leverage how agents or multiagent systems can accomplish tasks and subtasks to reach that outcome. Taking this outcome-driven perspective, organizations can begin to remove process debt and lethargy that exists because all humans have cognitive and time limitations.

In this way, agents can be a business enabler, unlocking greater flexibility, agility, and acceleration. It is a more thoughtful allocation of human and machine capabilities, and differentiation grows out of human-machine decision intelligence across supply chain systems.

With the goal of deploying dozens or even hundreds of agents, organizations will need to contend with designing a technology stack suited to agentic AI. This requires coordination between the distinct but increasingly interdependent roles in information technology (IT) and OT. IT is charged with managing an agentic platform in terms of its governance, reliability, scalability, and security. OT, meanwhile, owns the machine data and agents in the physical-world context and execution layer on the shop floor. As with agent orchestration, aligning and balancing IT and OT technologies and processes is a challenging, ongoing endeavor, and enterprises may be aided in their efforts by engaging a third-party adviser.

Thus, there are clear domains for change. There are process changes, with humans taking on different roles and responsibilities, and there are technology changes within IT and OT. Given the far-reaching impact, changing to adopt agentic AI is a C-suite-level decision that needs to be aligned with enterprise strategy, funded with the appropriate budget, and tied to specific metrics to measure progress.



Designing supply chain tech stacks for agentic AI

An agentic AI-driven supply chain architecture integrates effectively with existing systems to enable autonomous decision-making, while elevating humans to provide oversight, manage high-value exceptions, and execute strategic initiatives.

01 Interactions Layer

Allows users, processes and existing applications to collaborate with multiagent AI systems



ERP System



WMS



CRM System



Chatbot System



IT Support Portal

02 Workflow Layer

Ensure controlled flow to help agents interact with each other efficiently and in a more deterministic manner



03 Agents Layer

Create, manage, deploy and optimize role-specific AI agents

MODAL GARDEN



Commercial LLMs



Open Source LLMs

PROMPT REGISTRY



Prompt Library



Prompt Testing

AGENT FACTORY



Design Agent



Planning Agent



Sourcing Agent



Manufacturing Agent



Delivery Agent



Maintenance Agent

DATA SOURCES



Internal Data



External Data

TOOLS



Demand Planning



Predictive Maintenance

04 Agent Operations Layer

Monitor outputs and metrics to help ensure agents are functioning as expected.



Operational Metrics



Qualitative Metrics



Thought Metrics

Navigating technology *trust* and *adoption*

There are many challenges with agentic AI adoption in terms of technology orchestration. Yet, when it comes to the workforce, one of the biggest challenges may be the human emotional element. Some organizations have received reactive pushback against AI initiatives (whether agentic or otherwise) because of the misperception that humans will be replaced by machines. Fearing AI's impact can weigh on the change management needed to access agentic value.

The reality is that the roles of supply chain planners and professionals are evolving from execution to orchestration and will likely entail advisory functions. Some roles may become unnecessary but not because one agent has replaced one human. As the nature of work changes, job functions will too, and human professionals will require different skills with new responsibilities.

Consider the role of a spare parts inventory manager. Currently, the manager tracks down data from enterprise systems, spreadsheets, and other sources to answer basic questions. Numerous systems are updated manually, and follow-ups with vendors are done by phone or email. Decisions are based on professional instinct and frequently outdated data. On many days, the manager is in "firefighting mode," reactively responding to issues while attempting to coordinate with teams across multiple disconnected channels.

With agentic AI, this can change. Agents balance trade-offs, watch key limits, and trigger replenishments in real time, coordinating procurement, fulfillment, and logistics. Agents also detect, resolve, and notify teams of delays or other issues before they become detrimental. The manager focuses on validating agentic outputs, planning scenarios, managing suppliers, and driving service performance. And they do so using a single intelligent workspace that offers visibility across inventory, parts, suppliers, and service events.

The manager is still necessary, and their expertise remains valuable. They hold an indispensable role in governance, satisfying human checkpoints engineered into human-agent interactions. What changed were the manager's tasks and responsibilities, allowing the human to focus on strategic, higher-order activities while agents accomplish in hours what previously took days. It is a new balance of human-machine collaboration.

Presenting the supply chain workforce with a value narrative that champions their participation in an agent-fueled organization helps overcome misperceptions about what agents can (and cannot) do and why they are valuable to the business. This is bolstered by training for the agentic era and helping the workforce acquire the skill sets they need to thrive in transformed roles. Organizations should begin developing training curriculums to support the workforce, as well as adjusting talent acquisition goals and hiring practices.

With agent-ready skills and an empowering narrative for the human workforce, the organization moves toward trust in the technology and the business intent. Building this trust is a priority. Supply chain professionals are required for the agentic future, even if why they are required changes.

Trust is also a factor as it relates to confidence in agent outputs. If agents are adopted in large number, leaders need to trust that they will function as desired and not negatively disrupt the organization. Comfort and trust in agents will grow out of experience, careful planning, and at least initially, quick wins on high-autonomy, low-complexity agent deployments. Data will also contribute to trust. An agent operations layer in the supply chain tech stack, for example, can monitor outputs and metrics to provide explainability, transparency, and lineage for agentic decision-making.



Contending with agentic *costs* and *acquisition*

Traditional procurement and supply chain platforms are stable and trusted, but they are also rigid and can make innovation challenging. Platform tools can force certain processes while also being difficult to augment for an organization's varying needs. Innovations built at the periphery can become technology debt that is increasingly difficult and costly to maintain.

Agentic AI reveals a different approach. Agents decouple enterprise data and insights from inflexible interfaces, allowing different parts of the supply chain organization to build agents to achieve precisely what they need. Some platform providers are building ahead of industry readiness, embedding end-to-end workflow solutions within their software. This raises the perennial question of whether to buy or build AI. New technology offerings for agent development are bringing down barriers to building in-house. As agents become commoditized, differentiation will lie in how multiagent systems are orchestrated, less so in the capabilities of a bespoke agent.

There are likely to be instances, however, where building an agent is the appropriate path. It could be there are concerns around privacy, intellectual property, and whether a third-party platform vendor could use proprietary data to develop a solution that is

then sold to a competitor. More likely, building custom agents will make sense in specific instances largely unique to the enterprise, such as an agent to leverage a proprietary algorithm or to work in a niche area.

Moving forward will require a holistic enterprise strategy, executive support, and robust governance processes. These surround and enable multiagent collaboration and help avoid the kind of fragmented AI deployments that have happened in the past. There will be significant change in workforce training, adoption, and process transformation, and these activities will bring costs. However, costs are better thought of as investments because they set the stage for much greater value to come.

As an organization begins using agents, it will steadily become conditioned for broader agentic AI deployment and use. The workforce will learn how to use agents in their evolved roles. Leaders will enjoy increasing trust in agent outputs and efficacy. Greater use and technology readiness will spur new ideas and continue the process of transforming work. And as agents are put to use in a variety of areas, the enterprise will continue to extract more business impact out of the same investment.



Taking the *next steps* with agents in the supply chain

Leading supply chain organizations are already investing in the adoption of agent-based solutions. There are legacy systems and infrastructure that will take time to rebuild or replace, but time is of the essence. The degree of change will be significant, and simply building or acquiring agents is not enough to reach the boldest agentic vision.

It begins with a supply chain AI strategy and roadmap, which aligns a cross-functional team, defines a clear agentic AI vision, and sets governance standards. Establishing a strategy and roadmap up front helps prioritize and coordinate the activities across the areas of people, processes, and technology.

One foundational component is data readiness. Just as with any other type of AI, output accuracy reflects data quality. If data is imperfect and the quality is low, agent outputs will likely not be reliable or accurate. As a prerequisite for valuable agents, the enterprise will need:

- Clean master data, constituting the single source of truth at the core, paired with reference data;
- The ability to access transactional, reference/machine, and time-series data; and
- Application programming interface (API) connectivity for integration and orchestration.

Importantly, data readiness does not need to be perfect to get started. Agents can even be used in cleansing master data to improve readiness for bolder agentic use cases. While tech stack enablement and data cleansing are underway, prioritize the first use cases based on enterprise value and feasibility.

It can be helpful to work with an adviser to integrate multiple cloud environments, develop a cohesive AI strategy and architecture, and experiment with existing solutions, such as Deloitte's [Zora AI™](#), an agentic AI platform built on NVIDIA, and [IntelligentOps™](#), a Deloitte-branded agentic-native platform that weaves AI agents into daily operations to rapidly unlock value and empower the workforce.

Alongside these technology-specific activities, remember to engage stakeholders across the organization. Their participation in the agentic future is necessary, and a compelling value narrative helps workers buy into the vision and engage in the upskilling and continuous learning required to use agents in a transformed supply chain.

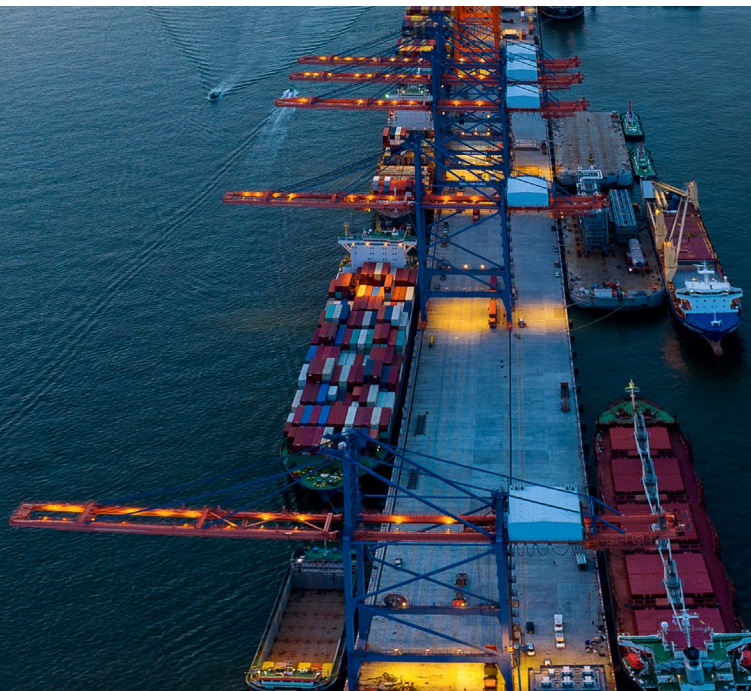
There is significant disruption ahead, perhaps even more so than the shift from paper-based records to PCs and software. But the scale of opportunity is equally vast. The time to begin the agentic journey is now.



Key questions for supply chain leaders when considering agentic AI

What is the feasibility?

- Do we have access to the necessary data in sufficient quality, volume, and timeliness?
- Are the underlying processes structured and stable enough for automation or augmentation?
- Can our existing IT and data infrastructure support implementation and integration?
- Do we have leadership support and stakeholder buy-in for change and adoption?
- Are there any regulatory, ethical, or compliance risks that would block or delay deployment?
- What is the business value?
- Does this use case directly support a core strategic priority or transformation initiative?
- What is the estimated financial impact (cost savings or revenue generation)?
- How significantly will it improve operational efficiency or reduce manual work?
- Will it enhance customer experience, personalization, or satisfaction?
- Does it create scalable or reusable capabilities that benefit multiple business areas?



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