

Agentic AI layered on APS transformations

Across supply chain planning

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Preface

Supply chain planning organizations have spent the last decade investing in APS platforms such as Blue Yonder, o9, Kinaxis, SAP IBP, and Oracle to improve forecasting, inventory positioning, supply planning, and cross-functional alignment. Those systems have materially improved mathematical planning quality, but they still leave large amounts of work to planners: interpreting exceptions, coordinating trade-offs, explaining recommendations, collecting context from fragmented systems, and converting approved plans into downstream execution.

This report examines the next layer on top of APS: agentic AI. In this context, agentic AI refers to LLM-based systems and specialized AI agents that can interpret APS outputs, plan multi-step workflows, retrieve enterprise context, coordinate actions across teams and systems, and in bounded cases execute approved decisions. The report is written for enterprise transformation leaders, planning center-of-excellence heads, digital supply chain leaders, and technology decision-makers evaluating how APS transformations should evolve into AI-enabled planning operating models.

01 Executive summary

Agentic AI is best understood as a decision-and-orchestration layer that sits above APS rather than as a replacement for APS optimization engines and it is the fastest-moving segment of the supply chain software market. Gartner forecasts that SCM software with agentic AI capabilities will grow from under \$2 billion in 2025 to \$53 billion in spend by 2030, with the share of enterprises using agentic features in their SCM software rising from 5% to 60% over the same period. Against a total SCM software market of approximately \$33.4 billion in 2024, that implies the agentic layer becomes the dominant axis of competition in planning software within five years.

APS platforms remain the system of record for planning logic, constraints, and scenario math, while agentic systems add the ability to interpret outputs in natural language, synthesize external and internal context, coordinate stakeholders, and trigger actions across ERP, WMS, TMS, procurement, and collaboration tools.

Four strategic conclusions stand out.

1. **APS alone is insufficient.** Much of the real planning workload sits outside the optimizer: exception triage, root-cause diagnosis, decision communication, and cross-functional coordination. Gartner's assessment is that most agentic capability shipping today improves query interpretation, recommendation, and conversational support rather than changing decision quality, which is precisely the white space APS leaves open.
2. **Value is concentrated in exception-heavy domains.** The highest-value early use cases are concentrated in exception-heavy domains such as inventory, MRP, logistics management, and demand review workflows. This aligns with what Gartner describes as the current agentic sweet spot: well-defined, high-volume planning activities where impact is measurable and the cost of error is low.

3. **Embedded agents are everywhere.** Blue Yonder has publicly launched multiple named AI agents; Kinaxis has moved from packaged Maestro Agents to a no-code Agent Studio; Oracle has released SCM AI agents including a named Planning Cycle Agent, bundled at no additional cost; and SAP launched Autonomous Supply Chain Management in May 2026 with six Joule Assistants and more than 60 purpose-built agents. Agent availability is no longer a differentiator. Gartner reports that AI assistant features have become a mandatory requirement in SCM software selection and AI agent is a common one.
4. **The binding constraint is organizational, not technical.** Only 17% of organizations have deployed AI agents at all, while more than 60% expect to within two years and Gartner expects over 40% of agentic AI projects to be cancelled by the end of 2027 on escalating cost, unclear business value, or inadequate risk controls. The differentiating capability is therefore not agent access but the data, governance, and decision-rights foundations that allow agents to be trusted with real decisions.

The winning operating model will be hybrid: deterministic APS for optimization, agentic AI for explanation, escalation, workflow, and controlled autonomous action. Notably, every major vendor has converged on this position. All vendors frame agents as governed and human-in-the-loop with staged autonomy which is stronger validation of the hybrid thesis than any individual vendor narrative provides.

Moves that transformation leaders should consider over the next 24 to 36 months are practical rather than speculative. Prioritize a small set of high-frequency, high-value exception workflows; build the retrieval and policy layer before broad autonomy; define which decisions remain human-approved versus bounded-autonomous; and measure success through service, inventory, planner productivity, cycle time, and explainability metrics rather than chatbot adoption alone. Gartner links materially higher returns by 2030 to right-sized change management investment, which this report treats as a funded workstream rather than as a communications activity.

02 Market context and adoption trajectory

The agentic AI opportunity in planning is not a speculative future state; it is an active and rapidly capitalizing software market. Gartner sizes SCM software with agentic AI capabilities at under \$2 billion in 2025, growing to \$53 billion in spend by 2030, a step change against a total SCM software market of roughly \$33.4 billion in 2024, itself growing 12.4% year on year. Gartner further reports that AI assistant features have become a mandatory requirement in SCM software selection, and AI agents a common one, which means the buying criteria for APS platforms have already shifted regardless of any individual organization's AI strategy.

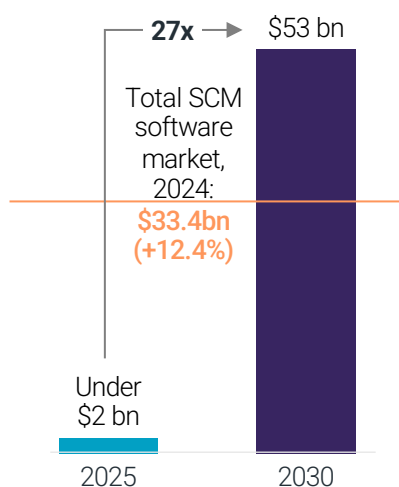
Adoption, however, lags availability by a wide margin, and that gap is the central planning consideration for transformation leaders. Only 17% of organizations have deployed AI agents to date, against more than 60% expecting to within two years. Gartner attributes the lag not to software maturity but to adjacent layers of the operating model: supply chain data management, operations management, workforce AI-readiness, and network-centricity which is consistent with the long-standing finding that change management, not technology, is the binding constraint in planning transformations.

Exhibit 1

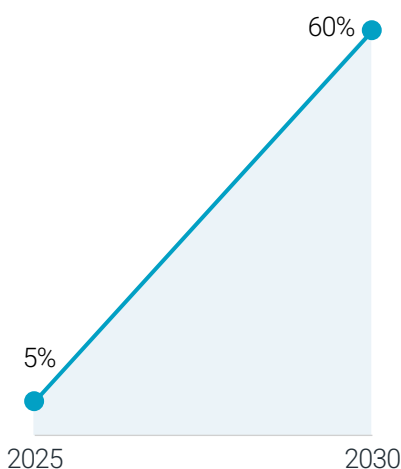
The agentic planning market at a glance

Gartner forecasts the agentic layer becomes the dominant axis of competition in planning software within five years

Spend on SCM software with agentic AI capabilities



Enterprises using agentic AI features in their SCM software



By 2028

33% of enterprise software applications embed agentic AI, from under 1% in 2024. 15% of day-to-day work decisions made autonomously, from 0% in 2024.

By 2030

50% of cross-functional SCM solutions use intelligent agents to autonomously execute decisions.

By 2031

60% of supply chain disruptions resolved without human intervention.

03 Planning landscape: what APS solves today

APS systems are built to solve structured planning problems using forecasting, optimization, heuristics, constraint-based logic, and scenario analysis. In supply chain planning, they generally cover five major domains: inventory planning, demand planning, production planning, deployment or distribution planning, and MRP or time-phased supply planning.

A useful way to frame the current state is to distinguish between computational planning and operational decisioning. APS is strong at computing the best feasible plan given available inputs and constraints, but weak at the last mile of operational decisioning, where context is incomplete, data is fragmented, and decisions require coordination among humans and systems.

This gap is not a theoretical one. McKinsey research on planning-system implementations found more than 60% of projects running late or over budget, with 35% of organizations reporting that the impact of their planning system fell short of expectations; change management was cited as the top implementation risk by 82% of respondents, ahead of poor process design at 70% and missing capabilities at 57%. These figures date from 2021 and describe classical planning transformations rather than agentic ones, but the pattern matters for the agentic question because it locates the binding constraint in the operating model rather than in the optimizer precisely where an agentic layer either helps or compounds the problem.



Exhibit 2

APS state by planning domain

Domain	How APS solves this today	Typical outputs	Common limitations
Inventory planning	Safety stock optimization, replenishment planning, service-level balancing, multi-echelon optimization	Target inventory, replenishment proposals, shortage and excess alerts, policy recommendations	Root-cause diagnosis and transfer decisions often remain manual
Demand planning	Statistical forecasting, ML demand sensing, event and promotion planning, NPI and EOL planning, consensus workflows	Baseline forecast, override proposals, accuracy metrics, consensus plan	External signal interpretation and cross-functional alignment remain challenging
Production planning	Constraint-based supply planning, finite-capacity scheduling, pegging, scenario simulation	Planned orders, overload alerts, capacity views, late-order risk, what-if scenarios	Optimizer outputs can be hard to explain and difficult to operationalize quickly
Deployment and distribution	Network flow planning, sourcing and allocation logic, transfer and deployment optimization	Deployment plans, transfer proposals, sourcing decisions, service-risk alerts	Real-time coordination with carriers, warehouses, and customers often happens outside APS
Material requirements planning	BOM explosion, net requirements, time-phased planning, lot sizing, reschedule logic	Planned orders, requisitions, expedite and de-expedite messages, shortage alerts	Exception overload and supplier-response interpretation remain heavily manual

04 Why APS alone is insufficient

Most planning organizations discover that optimizer quality is only one part of the performance equation. Even when APS produces mathematically sound plans, planners still spend substantial time explaining plan changes, reconciling conflicting KPIs, gathering unstructured evidence, coordinating stakeholders, and manually pushing approved actions into execution systems.

This is why many transformations lose momentum after initial APS deployment. The planning engine improves recommendations, but the organization does not materially compress the cycle from signal to decision to action because the exception-management layer is still human and fragmented. Agentic AI directly targets this white space by adding reasoning, workflow decomposition, retrieval, and action orchestration on top of APS outputs.

Gartner's read of the current agentic market corroborates this framing from the opposite direction: most agentic capability shipping today improves the user experience through query interpretation, recommendations, and conversational support, rather than fundamentally changing decision quality or how decisions get made. In other words the market has so far built for the explanation and coordination layer which is exactly the white space that APS leaves open and not yet for autonomous planning itself. For an organization whose bottleneck is exception handling rather than optimization quality, that is a favorable rather than a disappointing finding.

Exhibit 3

Persistent pain points after APS go-live

Pain point	Why it persists after APS	Agentic AI relevance
Alert overload	APS generates many exceptions but does not always rank them by business materiality	Agents can suppress noise, rank issues, and create role-based work queues
Weak explainability	Solver outputs are not always intuitive to planners or business stakeholders	Agents can translate recommendations into plain-language business rationale
Cross-functional friction	Demand, supply, logistics, and procurement decisions require negotiation across silos	Agents can coordinate workflows, summarize trade-offs, and route approvals
Slow execution	Recommended actions often die in dashboards and never reach ERP, WMS, or TMS	Agents can trigger downstream tasks and transactions under policy controls
Weak institutional memory	Prior decisions and planner logic are poorly captured across meetings and emails	Agent memory and retrieval can preserve decision context and reusable playbooks
Unclear investment case	55% of chief supply chain officers cannot articulate the ROI of AI investments they are already making, while 67% of supply chain digital investment is now allocated to AI	Exception-level agents produce attributable, countable outcomes; platform-level AI investment does not

05 Domain-by-domain use case analysis

The use cases below are organized by planning domain. For each domain, the analysis covers the current APS state, the agentic opportunity, and representative use cases with maturity assessments.

The selection logic follows what Gartner describes as the current agentic sweet spot: well-defined, high-volume planning activities where impact is measurable and the cost of error is low with touchless forecasting for stable SKUs and automated replenishment parameter changes are the typical examples.

5.1 Demand planning

Demand planning in APS combines historical patterns, causal signals, event data, and collaboration workflows to produce baseline and consensus forecasts. The biggest gaps are usually around external-signal interpretation and coordination with supply and finance when forecasts change.

Exhibit 4

Demand planning use cases

Business problem	APS output involved	Agentic layer behavior	Human interaction	KPIs impacted	Value	Maturity
Demand intelligence agent						
External demand signals are fragmented and hard to interpret consistently	Forecast exceptions, demand sensing outputs, override history	Ingests market signals, planner notes, and events; drafts forecast rationale and override suggestions	Planner validates or rejects changes	Forecast accuracy, bias, service	High	Scaling
Consensus meeting copilot						
Monthly demand review is slow and manually prepared	Baseline plan, overrides, bias metrics, action logs	Prepares pre-reads, highlights unresolved assumptions, captures decisions, updates follow-ups	Human-led meeting remains central	Meeting cycle time, alignment, forecast value add	Medium-high	Scaling
Promotion risk agent						
Commercial events are not translated fast enough into supply actions	Event plans, uplift assumptions, forecast deltas	Detects promotion risk, alerts supply and inventory agents, coordinates mitigation workflow	Human review for major changes	Service, lost sales, obsolescence	High	Emerging

Touchless forecasting for stable SKUs is the clearest example of the sweet spot in this domain and is a defensible first deployment. The demand intelligence agent is more ambitious: it depends on external data quality that most organizations do not yet govern, and its outputs are harder to audit. Sequencing the two in that order is more likely to build trust than starting with the more visible capability.

5.2 Inventory planning

Inventory planning in APS typically uses service-level logic, forecast variability, lead-time assumptions, and network constraints to set safety stock and replenishment targets. The outputs are usually mathematically sound, but planners still need to decide which alerts matter, whether to rebalance inventory, and how to explain recommended changes to business teams.

Published benchmarks for the agentic layer specifically remain scarce, but the classical AI baseline gives an order of magnitude. McKinsey found that early adopters of AI-enabled supply chain management improved logistics costs by 15%, inventory levels by 35%, and service levels by 65% relative to slower-moving competitors. Two caveats matter and should travel with the figures wherever they are reused. It is best read as an upper-bound reference point for what better planning decisions are worth, not as a forecast of agentic returns.

Exhibit 5

Inventory planning use cases

Business problem	APS output involved	Agentic layer behavior	Human interaction	KPIs impacted	Value	Maturity
Inventory exception triage						
Too many shortage and excess alerts for planners to review manually	Projected inventory, service-risk alerts, replenishment proposals	Clusters alerts by root cause, impact, or custom criteria; proposes transfer or sourcing actions	Human approves material actions	Service level, inventory turns, planner productivity	Very high	Scaling
Replenishment approval copilot						
Daily order proposals take too long to review and explain	Replenishment orders, target inventory changes	Summarizes what changed, why it changed, and the implied KPI trade-off	One-click planner approval	Stockouts, working capital, cycle time	High in retail and distribution	Emerging
Multi-echelon rebalancing agent						
Inventory is trapped in the wrong node or echelon	Excess and shortage by node, transport constraints, deployment options	Orchestrates transfer scenarios and downstream execution after approval	Human approves costlier moves	Fill rate, transport cost, inventory health	High	Emerging

5.3 Production planning

Production planning APS engines are designed to create feasible supply and scheduling recommendations under capacity, material, sourcing, and sequencing constraints. The challenge is less about generating a plan and more about responding quickly when a plant, material, or labor assumption changes.

Exhibit 6

Production planning use cases

Business problem	APS output involved	Agentic layer behavior	Human interaction	KPIs impacted	Value	Maturity
Production recovery agent						
Plant disruptions or shortages require rapid replanning across functions	Constrained supply plans, overload alerts, pegging outputs	Identifies bottleneck, simulates alternatives, quantifies service and margin impact, launches approval workflow	Human approval for action	OTIF, schedule adherence, expedite cost	Very high	Emerging
Order release agent						
Feasible planned orders still require manual release effort	Planned orders, readiness status, material checks	Validates policy conditions and autonomously releases low-risk orders	Human handles borderline cases	Throughput, adherence, planner effort	Medium-high	Experimental to emerging
Planner brief generator						
Solver logic is difficult to communicate to plants and business teams	Scenario results, constraint conflicts, order impacts	Produces role-specific narratives of why the plan changed and what trade-off was chosen	Human consumes and forwards	Decision speed, explainability, adoption	Medium-high	Scaling

5.4 Material requirements planning

MRP remains foundational in many planning landscapes because it translates demand and BOM structure into time-phased material and order signals. Its biggest operational problem is not computational weakness but exception volume: too many rescheduling messages, too much supplier follow-up, and too little prioritization by business impact. This makes it the closest fit in the whole planning landscape to the high-volume, low-cost-of-error profile that current agentic capability handles well.

Exhibit 7

Material requirements planning use cases

Business problem	APS output involved	Agentic layer behavior	Human interaction	KPIs impacted	Value	Maturity
MRP exception prioritizer						
Planners are overwhelmed by low-value reschedule and shortage messages	Exception messages, pegging, planned orders	Ranks issues by revenue, customer impact, and risk; suppresses noise; creates work queues	Human executes actions	Planner productivity, shortage days, service	Very high	Scaling
Supplier communication agent						
Supplier confirmations are delayed and hard to interpret at scale	POs, due dates, shortages, confirmations	Reads supplier emails, extracts dates and quantities, proposes order changes, escalates conflicts	Human review or bounded auto-update	Confirmation cycle time, shortages, buyer productivity	Very high	Scaling
Parameter tuning advisor						
Poor master data drives unstable planning behavior	Chronic expedite patterns, lead-time variance, planning-policy signals	Diagnoses policy issues and recommends targeted parameter improvements	Human approves master-data changes	Plan stability, expedite cost, inventory	High	Experimental to emerging

5.5 Deployment and distribution planning

Deployment planning sits at the boundary between planning and execution, which makes it especially suitable for agentic intervention. APS can optimize inventory flows and sourcing rules, but actual disruptions often require fast coordination with warehouses, carriers, customers, and partner systems in real time.

This is the one domain with published quantified outcomes, and they come from the logistics execution layer rather than from planning. project44 reports a 4.1% reduction in freight spend, up to 75% reduction in sourcing cycle times, and a 70% reduction in manual coordination from its AI Freight Procurement Agent, launched in February 2026. These are vendor-published rather than independently audited figures and should be attributed as such but they are currently the only firm outcome set in this market. The absence of any equivalent published figures on the planning side is itself a finding: it suggests that near-term agentic value is being realized closer to execution than to plan generation.

Exhibit 8

Deployment and distribution use cases

Business problem	APS output involved	Agentic layer behavior	Human interaction	KPIs impacted	Value	Maturity
Dynamic rerouting agent						
Real-time logistics disruptions invalidate static deployment plans	Deployment priorities, delivery commitments, transport plans	Merges visibility events with plan priorities, proposes alternate routes, updates execution systems	Human approval typically required	OTIF, logistics cost, spoilage	Very high	Scaling
Fulfilment sourcing agent						
The best source node changes as inventory and service conditions move	Allocation rules, sourcing decisions, available-to-promise logic	Re-evaluates node choice continuously and recommends or triggers reassignment	Policy-based approval	Fill rate, margin, SLA adherence	High	Emerging
Appointment coordination agent						
Revised plans require dock, labor, and carrier coordination	Revised inbound and outbound plan, shipment priorities	Coordinates slots, labor readiness, and partner communication across channels	Human oversight for exceptions	Warehouse productivity, detention cost, service	Medium-high	Emerging

5.6 Understanding the use case maturity framework

Four maturity levels provide a practical governance lens: experimental, emerging, scaling, and mature.

In the current market, most explainability, summarization, and workflow-copilot use cases are moving into scaling, while autonomous decision execution in planning remains largely emerging or experimental. This distribution is consistent with independent assessment: Gartner placed autonomous planning past the Peak of Inflated Expectations on its 2025 Hype Cycle for Supply Chain Planning Technologies the point at which early enthusiasm gives way to the harder work of proving operational value.

The pattern reflects the asymmetry of planning risk: explanation errors are recoverable, but execution errors reach service, cost, and customer commitments directly. It is also why the “Mature” category above is deliberately sparse. As of mid-2026 there is no substantial body of public, quantified evidence for fully autonomous agentic planning actions at enterprise scale, and any framework that claims otherwise is describing vendor roadmaps rather than deployed capability.

Exhibit 9

Maturity definitions

Level	Meaning in supply chain planning
Experimental	Proofs of concept with narrow scope, weak integration, and limited production trust
Emerging	Live pilots or controlled rollouts with human approval and bounded automation
Scaling	Repeatable deployment across teams or sites with measurable KPI value and operational integration
Mature	Standardized enterprise capability with strong governance, workflow integration, and clear ROI evidence. Deliberately left thinly populated: public evidence remains limited in this category for fully agentic planning actions

06 Vendor landscape

The market signal from public announcements is unambiguous: every major supply chain software vendor is embedding AI agents, copilots, and orchestration layers into planning and execution suites. Gartner reports that AI assistant features have become a mandatory requirement in SCM software selection, with AI agents now a common requirement so the presence of agents is no longer a differentiator.

That very uniformity is the analytical problem. Gartner has issued an explicit warning about “agent washing” in the supply chain planning market i.e. the relabeling of conventional automation as agentic AI and estimates that only around 130 of the thousands of vendors claiming agentic AI capability are genuine. The comparison below therefore assesses vendors on capabilities and deployment evidence.

Blue Yonder stands out because its public messaging is the most explicit about an end-to-end autonomous or agentic supply chain operating model. In 2025 the company announced five named AI agents i.e. Inventory Ops, Logistics Ops, Warehouse Ops, Shelf Ops, and Network Ops, each linked to a defined operational domain and framed around detecting, analyzing, and acting on supply chain issues. In 2026 it extended this with a Model Training Factory built on NVIDIA infrastructure to fine-tune domain-specific supply chain models.

The more important point is not the number of agents but the architecture implied. Blue Yonder describes a planning-and-execution loop in which agents collaborate across logistics, warehouse, and planning contexts, including within Microsoft Teams, to coordinate rerouting, appointment changes, and labor alignment. That is materially different from a dashboard copilot because it treats AI as an orchestration layer spanning execution systems, collaboration tools, and planning logic.

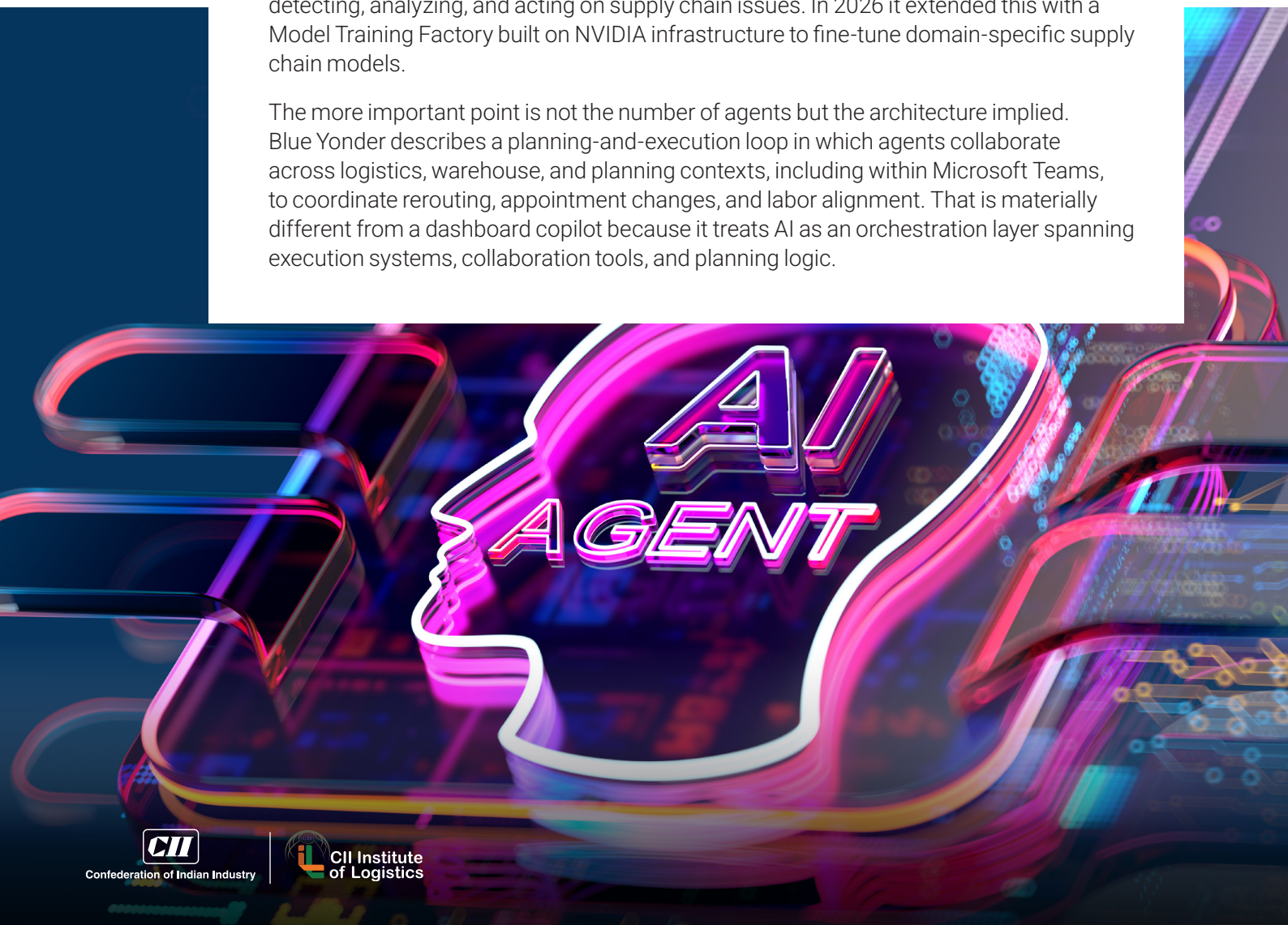


Exhibit 10

Vendor capability comparison

Vendor	Agent capability	Exception management	Deployment evidence
Blue Yonder	Multiple named agents across inventory, logistics, warehouse, shelf, and network operations; domain models fine-tuned on NVIDIA infrastructure	Strong	Announcements, demos, named customers; no quantified agentic outcomes published
Kinaxis	Maestro Agents plus Maestro Agent Studio, a no-code agent builder working with OpenAI and Gemini models	Strong for shortage and tariff analysis and rapid scenario work	Press releases, named customers
SAP IBP and SAP SCM	Autonomous Supply Chain Management: six Joule Assistants plus more than 60 purpose-built agents	Strong planning-plus-execution linkage	Product announcements; GA phased through 2026; no customer outcome metrics
Oracle	SCM AI agents including a named Planning Cycle Agent; Fusion Agentic Applications including an Inventory Planning Command Center	Strong in workflow and transaction-oriented exception handling	Announcements and documentation; bundled at no additional cost
O9 Solutions	Agentic functions on the Enterprise Knowledge Graph, including composite agents for cross-functional root-cause analysis	Strong scenario and decision-support positioning	Trade and analyst coverage; new logos disclosed without outcome data
OMP	Process-industry planning with embedded AI; agentic capability less publicly detailed	Strong in process-industry planning contexts	Analyst position rather than public agent evidence
RELEX	Agents perform investigative work during overnight planning runs so root cause and a candidate scenario await the planner	Strong; a useful counter-example to chat-first design	Product pages; limited public quantified evidence
Microsoft	Dynamics 365 SCM agents including Supplier Communication Agent, inventory rebalancing, picking route optimization	Strong for communication and workflow assistance	Release-plan evidence; latest to general availability among the majors
project44	AI agent portfolio including Freight Procurement Agent, disruption response, carrier onboarding; multi-agent orchestration and no-code workflow manager	Strong in the real-time logistics exception domain	The only vendor in this set publishing quantified outcomes
FourKites	Loft platform orchestrating digital workers; agentic ocean freight booking	Strong conceptual fit for execution exceptions	Product announcements; network scale disclosed, outcomes not disclosed
Palantir	AIP deployed for agentic orchestration of fulfilment, sourcing, allocation, MRO, and service at GE Aerospace	Evidence gap in planning	One named large-scale deployment, reported via secondary sources
Anaplan	Agentic portfolio announced under "The Agentic Enterprise"; first skills-based agents targeted from late 2026	Limited planning-specific evidence	Announcement-stage
Logility & Aptean	DemandAI+ with prebuilt demand planning agents; OpsVeda acquisition adds end-to-end agentic orchestration	Moderate	Product release and acquisition evidence
AWS	Primarily cloud and model infrastructure in this context	Not established	No direct supply chain planning agent evidence

07 Future-state architecture

Future-state architecture is easiest to understand as five layers: APS core, data and retrieval, agent and orchestration, workflow and approvals, and learning and governance.

Described in words, the architecture resembles a hub-and-spoke operating model. APS remains the analytical hub; retrieval and data services surround it; domain agents sit above it; workflow engines and enterprise applications sit beside it; and a human-governance wrapper controls which decisions are advisory, approval-based, or autonomous.

One architectural decision deserves particular attention because the market is diverging on it. Vendors are pursuing at least three distinct grounding strategies: fine-tuned domain-specific models (Blue Yonder, on synthetic training data), knowledge-graph grounding (o9), and model-agnostic orchestration over general frontier models with platform-level governance (Kinaxis Agent Studio, working with both OpenAI and Gemini models). These imply materially different lock-in profiles, and Gartner explicitly warns that inflexible upgrades and retrofitted agents can cap ROI and increase long-term lock-in. Architectural flexibility at the model layer is therefore a governance requirement, not a technical preference.

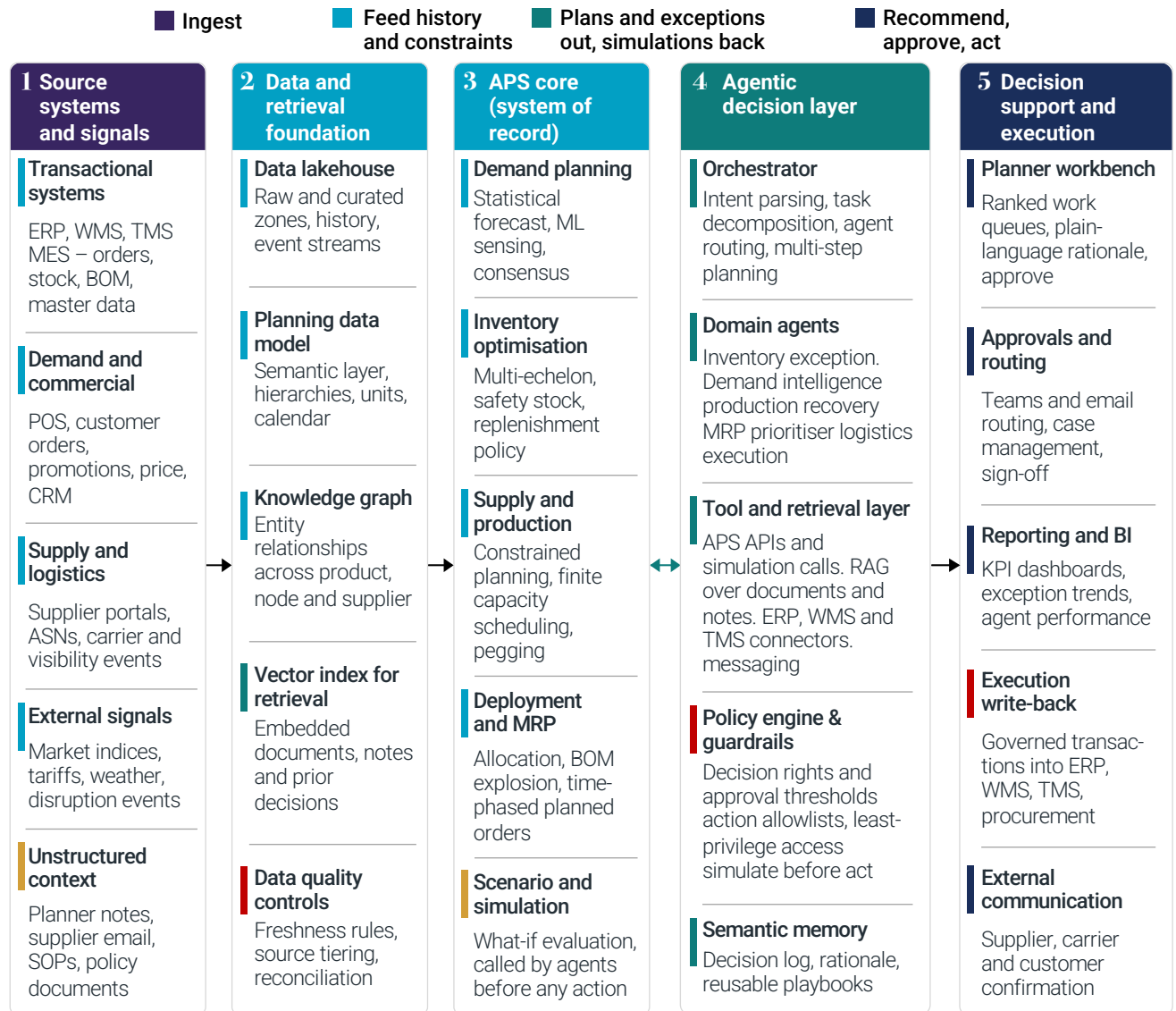
Exhibit 11

Future-state layered architecture

Layer	Core components	Design intent
APS core	o9, Blue Yonder, Kinaxis, SAP IBP, Oracle planning engines; optimization models; scenarios; planning master data	Preserve deterministic planning logic as the source of truth for feasible plans
Data and retrieval	ERP, WMS, TMS, MES, procurement, visibility feeds, market signals, policy documents, planner notes, SOPs	Ground agents in enterprise-specific planning context and live execution state
Agent and orchestration	LLM orchestrator, domain agents, tool router, policy engine, semantic memory	Interpret requests, call APS simulations, coordinate multi-step reasoning, and manage agent-to-agent collaboration
Workflow and approvals	Human approval rules, case management, Teams and email integration, ERP, WMS and TMS connectors	Convert recommendations into governed action with audit trails
Learning and governance	Decision memory, KPI feedback loop, evaluation harness, model-risk controls, prompt and policy versioning	Improve recommendations over time while preserving traceability and control

Source systems and external signals feed a data and retrieval foundation that serves the APS core and the agentic layer in parallel. Agents read curated planning data, but also the knowledge graph, planner notes, supplier correspondence and policy documents that never enter the optimizer, which is what allows them to explain a plan change rather than merely restate it. APS continues to generate the plan; the agentic layer consumes its outputs and calls the scenario engine to test any action before proposing it but never writes to the planning model itself. Only the final stage reaches transactional systems, and every write passes a policy engine that determines whether an action executes under bounded autonomy or is drafted for human approval. Planner overrides and realized outcomes return to the data foundation, the loop that makes the system improvable and auditable rather than merely operational.

→ Data and plan flow ↔ Agent calls APS simulation, receives results -→ Feedback and learning loop ■ Governance, observability and control



08 Implementation methodology

Organizations should first identify which recurring decisions are high-frequency, high-value, and sufficiently policy-bounded to benefit from agentic support. The sequence below deliberately settles decision framing and evidence design before any tooling decision and requires governance design and a measured baseline before deployment, because the published failure modes in Section 11 cluster around programs that reversed that order.

Exhibit 13

Recommended build sequence

Step	What to define	Why it matters
Decision framing	User role, decision cadence, error consequence, required response time	Prevents building generic copilots with weak business value
Evidence design	Authoritative data sources, freshness rules, retrieval policies, source tiering	Reduces hallucination and stale-context risk
Tool and workflow design	APS APIs, simulation calls, transaction connectors, approval rules	Ensures the agent can act, not just summarize
Governance design	Approval thresholds, audit requirements, model risk controls, fallback logic	Makes adoption possible for high-impact planning decisions
Baseline measurement	Current planner time, exception volumes, cycle times, and decision quality before deployment	Without a baseline, benefits cannot be attributed that is - the single most common cause of unclear ROI
Evaluation	Grounding rate, decision usefulness, cycle-time reduction, KPI impact	Moves the program from demo quality to production quality

09 Risks, failure modes and counter-evidence

Agentic AI changes the planning operating model because it compresses the distance between analytics and action. Traditional IBP and planning organizations are built around periodic reviews, planner-owned spreadsheets, and manual issue resolution, whereas an agentic layer enables continuous monitoring, exception-first workflows, and policy-governed execution. The upside is faster response, better planner leverage, more consistent decisions, and stronger institutional memory.

The risk, however, is not primarily technical. Gartner expects over 40% of agentic AI projects to be cancelled by the end of 2027, attributing this to escalating costs, unclear business value, and inadequate risk controls rather than to model capability. The broader enterprise picture is consistent: MIT's 2025 study of enterprise generative AI found roughly 95% of pilots delivering no measurable P&L impact against \$30–40 billion of enterprise spend, a figure that is very widely reported but that this review could not verify against the primary study, and which should therefore be read as indicative of direction rather than as a precise rate. And in supply chain specifically, 55% of chief supply chain officers report being unclear on the return from AI investments they are already making, even as 67% of supply chain digital investment flows to AI.

Read together, these findings point to a specific failure mode rather than to general immaturity: organizations are buying capability faster than they are building the data, governance, and decision-rights foundations required to use it. The implication for sequencing is direct, and it is why the roadmap in Section 14 front-loads foundations over autonomy. Gartner projects a high return by 2030 for organizations that right-size change management investment relative to those that do not.

Exhibit 14

Key risk themes and required controls

Risk area	Why it matters in planning	Required control
Hallucination	False root-cause narratives or invented constraints can misdirect decisions	Retrieval grounding, policy checks, simulation before action
Explainability	Planners and leaders must understand why a recommendation was made	Traceable rationale, source references, scenario comparisons
Decision rights	Not every action should be automated	Tiered approval thresholds by business impact
Data leakage	Agents can touch sensitive customer, supplier, and planning data	Least-privilege access, logging, red-teaming, action allowlists
Change management	Planner roles shift from manual execution to supervisory decisioning	Role redesign, training, KPI updates, governance sponsorship
Vendor lock-in	Retrofitted agents and monolithic upgrades can cap ROI and constrain future architecture choices	Model-agnostic orchestration, contractual exit terms, avoid single-vendor agent monocultures
Workforce disruption	55% of supply chain leaders expect agentic AI to reduce entry-level hiring and 51% expect overall workforce reductions, with implications for the planner talent pipeline	Deliberate capability strategy: redesign entry-level roles rather than eliminate the training ground for senior planners

Because the base rates above are high, they are more useful as design inputs than as warnings. The exhibit below converts each into an observable early warning signal and a pre-emptive control, so that a program can be audited against them at any stage.

Exhibit 15

Failure modes, base rates and early warning signals

Failure mode	Base rate or evidence	Early warning signal	Pre-emptive control
Project cancelled before value is realized	Over 40% of agentic AI projects by end-2027 (Gartner)	No named decision owner; success defined as adoption rather than outcome	Define one countable business metric per agent before build begins
Pilot with no P&L impact	Around 95% of enterprise generative AI pilots (MIT, 2025)	Pilot runs parallel to, rather than inside, the planning workflow	Require workflow integration and a transaction hook at pilot stage
ROI cannot be articulated	55% of chief supply chain officers (Gartner, August 2026)	Benefits stated as productivity with no measured baseline	Baseline planner time and exception volumes before deployment
Buying agent washing	Around 130 of thousands of vendors assessed as genuine (Gartner)	Vendor cannot demonstrate objective re-sequencing or trade-off negotiation	Apply the three-part autonomy test from Section 6 during selection
Autonomy attempted too early	Gartner classes cross-enterprise negotiation, dynamic cost trade-offs, and ethical judgement as poor candidates before 2027	Roadmap places autonomous execution in year one	Gate autonomy on demonstrated simulation accuracy and audit coverage
Architectural lock-in	Gartner: retrofitted agents and inflexible upgrades cap ROI	Agent layer available only from the incumbent APS vendor, with no model portability	Require model-agnostic orchestration and documented exit paths
Workforce disruption mishandled	55% expect reduced entry-level hiring; 51% expect overall reductions (Gartner)	No role redesign in scope; planners not involved in agent design	Redesign the planner role and KPIs within the same program, not after it

10 Use cases driving impact

The ten use cases below are ranked on ROI potential, ease of implementation, data dependency, technical feasibility, and time to value. Rankings are directional judgements calibrated against the Gartner sweet-spot test rather than against published benchmarks, which do not exist for most of these use cases.

Exhibit 16

Prioritized use cases, ranked

Rank	Use case	ROI potential	Ease of implementation	Data dependency	Technical feasibility	Time to value
1	MRP exception prioritizer	Very high	Medium	Medium	High	Fast
2	Supplier communication agent	Very high	Medium	Medium	High	Fast
3	Inventory exception triage	Very high	Medium	Medium	High	Fast
4	Dynamic rerouting agent	Very high	Medium	High	Medium-high	Medium
5	Production recovery agent	Very high	Medium-low	High	Medium	Medium
6	Demand intelligence agent	High	Medium	High	Medium-high	Medium
7	Consensus meeting copilot	Medium-high	High	Low-medium	High	Fast
8	Replenishment approval copilot	High	Medium	Medium	Medium-high	Medium
9	Fulfilment sourcing agent	High	Medium-low	High	Medium	Medium
10	Order release agent, autonomous	Medium-high	Low	High	Medium-low	Slower

11 Roadmap recommendations

A phased roadmap is the most practical way to move from APS transformation to agentic planning transformation. The first phase should focus on low-regret use cases with obvious pain points and modest governance complexity, such as MRP prioritization, demand meeting copilots, and supplier communication support.

The phasing above is deliberately conservative on autonomy and deliberately aggressive on foundations. That asymmetry is the central practical recommendation of this report: an organization that spends Phase 1 on data, policy, and baseline measurement while a competitor spends it on agent deployment will look slower for roughly two quarters and will then be able to move considerably faster, because it will be able to demonstrate value and therefore fund the next phase.

Exhibit 17

Phased roadmap

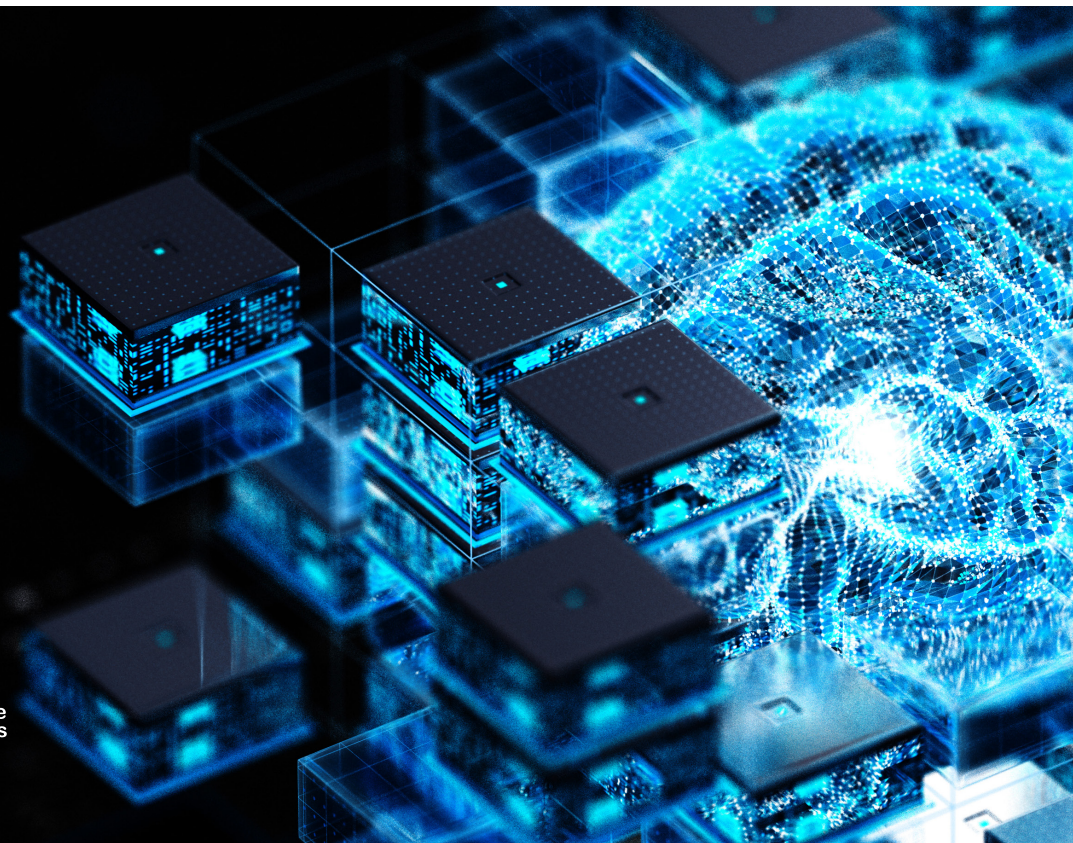
Phase	Horizon	Focus
Phase 1	0–3 months	Select two to three bounded use cases; define data quality and policy controls; establish baseline KPIs
Phase 2	3–9 months	Deploy human-in-the-loop copilots and exception agents connected to APS and collaboration tools
Phase 3	9–18 months	Introduce bounded autonomy for low-risk actions with simulation and approval guardrails
Phase 4	18+ months	Expand to multi-agent coordination across demand, supply, logistics, and procurement

12 Future outlook and key takeaways

The next stage of supply chain planning software is unlikely to be a clean replacement of APS by LLMs. Instead, the more plausible future is a hybrid stack in which deterministic engines continue to optimize, while agentic systems become the language, memory, and operating fabric that make those plans continuously explainable, collaborative, and actionable.

The direction of travel is visible in both vendor investment and analyst forecasts, but the two diverge sharply on pace. Vendors shipped a step change in 2026: SAP launched Autonomous Supply Chain Management with six Joule Assistants and more than 60 purpose-built agents; Kinaxis moved from packaged Maestro Agents to a no-code Agent Studio; Oracle bundled SCM agents including a Planning Cycle Agent into Fusion at no additional cost; and Blue Yonder began fine-tuning domain-specific supply chain models on NVIDIA infrastructure. Analyst assessment is more measured: autonomous planning has already passed the Peak of Inflated Expectations, only 17% of organizations have deployed agents at all, and over 40% of agentic projects are expected to be cancelled by end-2027.

The gap between shipped capability and deployed value is where the next three years of this market will actually be decided — and it is an operating-model gap, not a software gap. For enterprise leaders, the critical question is therefore no longer whether AI will sit on top of APS, but how quickly to build the controls, data layer, and operating model needed to capture value safely.



Key takeaways

- APS remains essential as the optimization core, but agentic AI is becoming the layer that closes the gap between planning math and operational action. Gartner sizes that layer at \$53bn of spend by 2030, from under \$2bn in 2025.
- The best early use cases are exception-heavy, policy-bounded workflows with clear economic value and strong transactional hooks MRP prioritization, inventory exception triage, and supplier communication above all.
- Agent availability is no longer a differentiator. Blue Yonder and SAP lead on narrative, Kinaxis and Oracle on analyst-assessed execution, OMP in process industries.
- The failure base rate is high and knowable: over 40% of agentic projects cancelled by end-2027, around 95% of enterprise generative AI pilots without measurable P&L impact, and 55% of chief supply chain officers unable to articulate AI returns. Treat these as design inputs, not as reasons to wait.
- Planning organizations should treat agentic AI as an operating-model redesign, not as a copilot feature deployment. That includes deliberate attention to the planner talent pipeline, given that a majority of supply chain leaders expect agentic AI to reduce entry-level hiring.



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Acknowledgments

We are pleased to release this whitepaper on agentic AI in supply chain planning and its role in APS transformations. The paper sets out where an agentic layer creates value on top of advanced planning systems, extending well beyond conventional monitoring and reporting: sensing, interpreting and acting on internal and external signals, and converting them into implications for plan feasibility, capacity and material constraints, decision rights, and operational risk. It also states the evidence base and the published failure modes plainly, so that the conclusions are usable for investment decisions rather than for advocacy.

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McKinsey & Company provided the fact-based analysis for this report. This analysis is based on a combination of primary and secondary research, including publicly available corporate disclosures (such as company websites and financial filings), industry databases, expert interviews, and market intelligence.

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