CAMUNDA

Process orchestration strategy in the age of machine colleagues

Navigating automation, AI workflows, and AI agents

Contents

Introduction

AI has become the default answer to nearly every business question. Leaders are eager to apply it wherever possible, hoping to capture new efficiencies or customer insights. But the more strategic question isn't, "Where can we use AI?" it's, "Where should we use it?"

Not every process benefits from AI. And not every AI deployment needs to involve agents with decision-making autonomy. But every business process—whether it's automated, intelligent, or adaptive—requires process orchestration to scale effectively.

AI agents, in particular, offer new value when business processes are complex, loosely defined, or prone to frequent change. In these cases, their ability to adapt and reason in real time can be transformative. But this flexibility often comes at a cost. AI agents consume more compute power, introduce variability, and require robust guardrails to ensure business outcomes remain valid and consistent. For many high-throughput, low-variance processes, simpler forms of automation are still the best fit.

As organizations race to adopt AI, these trade-offs are becoming more urgent to understand. According to McKinsey, **78%** of organizations now use AI in at least one business function. That's up from 55% just a year prior. Investment is surging too: the AI agents market is projected to grow from $5.1 billion in 2024 to over **$47 billion** by 2030.

Yet real-world execution hasn't caught up with the hype. According to the 2025 State of Process Orchestration and Automation report, **85%** of IT leaders say they struggle to scale and operationalize AI effectively. Gartner predicts that over **40%** of agentic AI projects will be scrapped by 2027—often due to complexity, poor integration, or lack of oversight.

Some of the confusion stems from inconsistent definitions. What's the difference between automation, an AI workflow, and an AI agent? When do you use each one? And how can you ensure they all work together in a compliant, scalable way?

Let's begin by clearing up these distinctions—and making the case for why process orchestration is the strategic layer that unifies them.

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Source: McKinsey

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Source: 2025 State of Process Orchestration and Automation report

Understanding the spectrum of machine work

There is no one-size-fits-all approach to automation. The modern enterprise uses a mix of deterministic and intelligent systems, each suited to different levels of complexity, risk tolerance, and business value. Think of machine work as a spectrum—from defined task automation and execution to AI-driven autonomy.
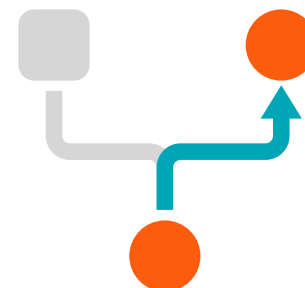
Deterministic automation: Precision at scale

At one end of the spectrum is deterministic automation. These systems follow explicit rules to execute known tasks. They assume a predictable environment, where exceptions are rare or can be safely routed to humans. This is the foundation of efficiency and compliance in most organizations.

For example, consider a telecom service delivery process. It spans multiple departments and third-party vendors, but follows a clear, orchestrated path. Because each step is well understood, deterministic orchestration ensures reliability at scale.

AI workflows: Intelligence within guardrails

In the middle of the spectrum lie AI-enhanced workflows. These are predefined processes that include specific touchpoints where AI tools make bounded decisions. The process remains orchestrated and predictable, but includes AI-powered moments—like scanning documents, flagging anomalies, or classifying content.

A good example is a bank's Know Your Customer (KYC) process. While the overall workflow is highly regulated and predefined, AI may be used to verify document authenticity, assess risk levels, or recommend next steps. Human oversight is often built into these types of processes to improve accuracy and reduce risk. This approach allows companies to scale AI without sacrificing control.
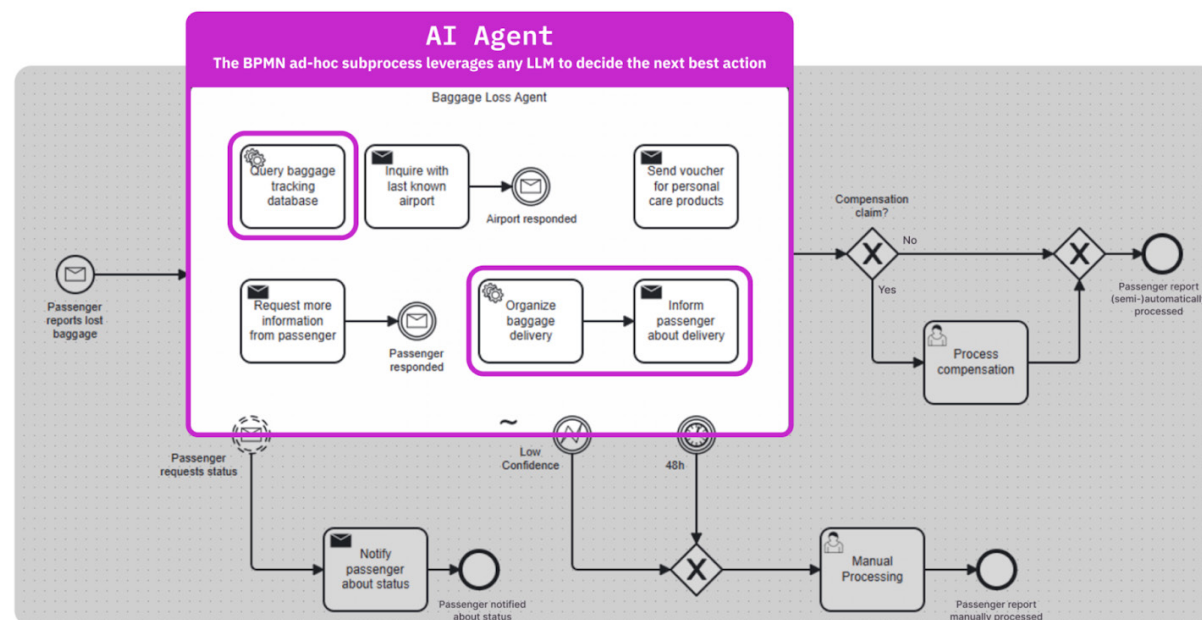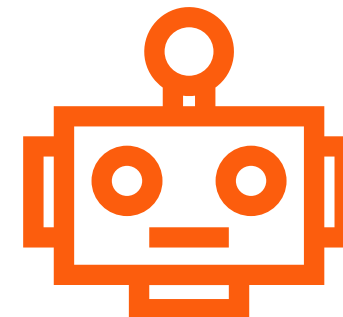
AI agents: Autonomy within constraints

At the far end are AI agents. These systems don't just complete tasks—they pursue goals. Agents can decide what needs to be done and in what order, adapting based on context, results, or shifting business priorities.

This autonomy unlocks new use cases, but also introduces risk. Because agents can act independently, their decisions must be orchestrated within a broader business context. That's where agentic process orchestration comes in.

Consider a lost luggage scenario in travel. An AI agent might initiate recovery steps, contact vendors, and update the customer. But if no resolution is found after 48 hours—or if the agent's confidence falls below a set threshold—the process automatically escalates to a human. Guardrails like this are essential to balance flexibility with accountability.

Camunda allows users to blend deterministic orchestration (via BPMN) with non-deterministic orchestration (via agents) so you can implement as much or as little AI as you want within guardrails.
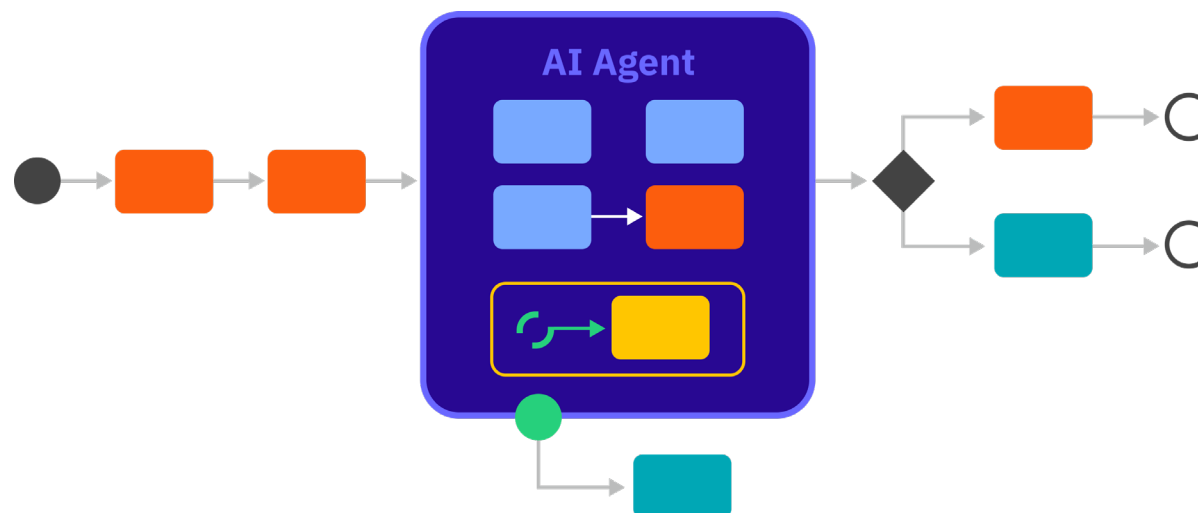
Why process orchestration is key to scaling AI

Whether you're automating a deterministic insurance claims business process or deploying an AI agent to manage exceptions, one thing holds true: machine work (and the humans in the loop) must be orchestrated.

Without process orchestration, even the most advanced AI can create silos, inefficiencies, or compliance risks. End-to-end process orchestration provides a common framework to coordinate tasks across process endpoints like people, systems (including AI), and devices. It uses process design specifications like Business Process Model and Notation (BPMN) and Decision Model and Notation (DMN) to put guardrails around both automated business processes and AI-driven decisions.

Take a look at the diagram to understand the difference between different execution models in BPMN:

● **Deterministic flows**
Full control of process actions to balance compliance, consistency, and flexibility with ad-hoc sub-processes.

● **Dynamic flows**
Autonomous agent determines what happens as the process runs, using AI models, internal policies, and real-time process data.

● **Escalation to humans**
Ensure agents request human intervention when their confidence level is low or more data is needed.

● **Event-driven response**
Autonomous structure for agents to respond to events, external messages or timers to guide the next AI steps.

● **Agents orchestrates subworkflow**
Tools can be single system or call an entire subprocess.

● **Multi-agent orchestration**
Agents orchestrate other agents for streamlined, scalable solutions.

Process orchestration also delivers:

- **Context Management:** Process orchestration maintains state across multi-step workflows, even when tasks are paused, retried, or routed between tools.

- **Governance:** It provides a transparent and auditable trail of decisions, ensuring compliance in regulated environments.

- **Scalability:** Process orchestration manages how different components—whether deterministic systems or adaptive agents—interact without introducing bottlenecks.

Let's look at how different orchestration models map to different levels of machine work.

Process orchestration types: From deterministic to dynamic

Deterministic orchestration

This is the most traditional approach to process automation and orchestration. Processes are modeled in advance with predefined logic, conditions, and decision models. Deterministic orchestration offers a high degree of predictability and control. It's auditable by design and works exceptionally well in environments where rules are fixed, compliance is required, and outcomes must be repeatable.

For example, orchestrating a customer onboarding process in a regulated industry benefits from deterministic orchestration. The rules are known, the steps are consistent, and any deviation could introduce unnecessary risk. What this approach lacks in flexibility, it makes up for in transparency and reliability.

Dynamic orchestration (non-deterministic)

Dynamic orchestration involves agents orchestrating a business process in a non-deterministic way. Rather than relying on a predefined sequence of steps, this approach allows AI systems—often powered by large language models (or LLMs)—to interpret context and determine which task should happen next, in real time. It supports runtime flexibility, enabling processes to evolve based on data, user behavior, or unexpected edge cases.

In dynamic orchestration, there is no deterministic business process model dictating what will happen. Instead, AI agents or services decide the next best step based on goals and current conditions. This opens up entirely new possibilities for personalization, exception handling, and knowledge work automation.

However, non-deterministic orchestration comes with major trade-offs. It's impossible to audit, more variable in its outcomes, and more resource-intensive to run. While it is super flexible, it lacks transparency and reliability, most likely leading to process inconsistencies, fragmented processes or compliance issues.

Agentic orchestration

Agentic orchestration blends the best of both worlds: the structural reliability of deterministic workflows and the adaptive decision-making of AI agents. In this model, agents operate within a structured process but retain enough autonomy to make decisions, manage subprocesses, or adapt based on real-time context.

In some cases, AI agents are embedded within a deterministic flow—performing discrete tasks like summarizing emails or drafting content. In other scenarios, they might orchestrate parts of the workflow themselves, dynamically determining task order or adjusting execution paths based on system feedback or changing objectives.

Camunda enables this hybrid model with key capabilities like asynchronous tool support, independent audit trails, and scalable process orchestration infrastructure. These features ensure that agentic systems don't lose context, miss handoffs, or override compliance expectations—even during long-running or high-volume processes.

Agentic orchestration is ideal when organizations want to increase autonomy without losing the predictability, auditability, and performance required by enterprise systems. It allows for AI augmentation in areas where deterministic systems fall short, while still maintaining control over the end-to-end business process.

Deterministic Orchestration

Predefined tasks and rules

✓ Great for compliance-heavy, repeatable processes

✗ Rigid, lacks flexibility

Agentic Orchestration

Combines structure with AI agents' flexibility. Offers the best of deterministic and dynamic orchestration.

Dynamic Orchestration

AI decides what happens next at runtime

✓ Good for personalized, variable, or evolving tasks

✗ Hard to audit, unpredictable

Real-world examples of agentic orchestration

Several leading organizations have already put agentic orchestration into practice:

Agentic Trade Exception Management

EY recognized that many of its global financial services clients already have mature AI models and internal LLMs—but often lack the orchestration layer needed to translate those capabilities into tangible business outcomes. With Camunda, EY is helping these organizations embed existing AI assets into structured, auditable workflows that meet strict compliance and operational standards. Camunda's platform allows clients to connect their preferred AI models, whether hosted in the cloud or internally via EY labs, and apply deterministic guardrails to ensure AI is only triggered when appropriate. This lets clients avoid rebuilding AI from scratch, instead focusing on governance, visibility, and scalable deployment—areas where Camunda's orchestration brings immediate and measurable value. In one capital markets implementation, EY reduced manual effort by 86%, cut T+1 delays by 98%, and boosted analyst productivity from 6-10 to 41-64 cases per day—a 7x improvement.

Agentic AI-Assisted Quality Audit

Cognizant saw the legal and regulatory complexities involved in deploying agentic AI in the European market, where GDPR and labor laws create clear limits on data use and full automation. Cognizant has created and demonstrated workflows in Camunda that include mandatory human review steps—enabling AI to suggest actions, but requiring manual approval before those actions are executed. This balance allows organizations to benefit from AI-powered insights while also facilitating compliance with regional laws. For example, audit trails, escalation paths, and process visibility are all embedded into the BPMN model, assisting organizations in demonstrating full control over every agentic interaction. This led to significant time savings: the quality audit process was reduced from 138 minutes to just 7-10 minutes, increasing auditor productivity by 20-30%, and cutting costs by 30-50%. All activity is fully traceable via embedded audit trails and escalation paths in BPMN.

INCENTRO

Customer service agent

Incentro has embedded Camunda's agentic orchestration into customer service workflows for a more responsive experience. Replacing standard auto-responses, Incentro built an AI agent that uses a LLM to analyze queries and draft meaningful replies in real time. The agent accesses the company's full FAQ and documentation set, enabling specific answers rather than generic acknowledgments. Camunda's BPMN model structures the logic, with the agent dynamically choosing the best response path via an ad-hoc sub-process. When implementing these systems with Payter, Incentro was able to reduce handling time per inquiry from 24 to 12 minutes, with lead time cut by 58%, helping improve both customer NPS and agent satisfaction without increasing headcount.

BP3

Compliance Monitoring Agent

BP3 is integrating agentic AI into decision-heavy workflows in regulated industries like BFSI, pharma, healthcare, and utilities. Its approach uses LLMs alongside DMN tables to generate "accept, reject, or refer" outcomes. In ambiguous cases, decisions are escalated to a human, enabling the AI to learn from real-world feedback over time.

Choosing the right approach

There's no one-size-fits-all answer. Each approach has strengths and trade-offs, depending on your goals and business context. Here are some general guidelines to follow:

Use AI agents when:

- [ ] You need flexibility in how and when tasks are completed

- [ ] Processes must adapt to different environments or users

- [ ] You can tolerate non-deterministic outcomes in exchange for adaptability

Use AI endpoints when:

- [ ] You want to enhance a specific task within an otherwise deterministic process

- [ ] The process is mission-critical, but human oversight can verify outcomes

Stick with deterministic automation when:

- [ ] You need reliability, repeatability, and precision

- [ ] The process is highly sensitive to errors

- [ ] Rules are well-defined and unlikely to change

Across all three, one principle remains: hybrid systems are the new normal. The modern business process blends human decisions with automated execution and AI augmentation. Process orchestration is what makes that blend work.

Conclusion:
Designing for a machine-human future

AI is changing how work gets done. But rather than start with tools, start with questions. What is the business problem? What level of flexibility, oversight, and scale is required? And what mode of machine work fits best?

Process orchestration is the strategy layer that brings it all together. It helps you blend automation, intelligence, and autonomy into a seamless, auditable, and scalable system. As AI becomes a true colleague in our daily work, process orchestration will determine how well we all work together.

Read more about why agentic orchestration belongs in your automation strategy:

Download guide

Schedule a customized demo of Camunda's process orchestration and automation Platform:

Book now

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About Camunda

Camunda enables organizations to orchestrate and automate processes across people, systems, and devices to continuously overcome complexity, increase efficiency, and fully operationalize AI. Built for business and IT, Camunda's leading orchestration and automation platform executes any process at the required speed and scale to remain competitive without compromising security, governance, or innovation. Over 700 companies across all industries, including Atlassian, ING, and Vodafone, trust Camunda with the design, orchestration, automation, and improvement of their business-critical processes to accelerate digital transformation.

Learn more at camunda.com.