



E-Guide

The integrated routing & loading playbook

In this guide

How connected planning improves efficiency, service, and sustainability for manufacturers and distributors.

Why **integrated planning** matters now

Executive perspective

Manufacturers, CPG producers, and distributors face a simple but difficult mandate: deliver more reliably, at lower cost, with a smaller environmental footprint. All while navigating ongoing volatility.

Transportation is where many of these pressures become visible. Rising costs, constrained capacity, and higher customer expectations expose inefficiencies that were once tolerated. Empty miles, underutilized pallets, last minute replanning, and disconnected systems are no longer just operational issues; they directly impact profitability, service levels, and sustainability commitments.

Leading organizations are starting to approach this differently. Rather than treating routing and loading as isolated planning steps, these critical operations are interconnected decisions that work together to produce plans that hold up in execution.

This playbook outlines how manufacturers, consumer packaged goods producers, and distributors are approaching integrated routing and loading as a practical, scalable way to improve transportation performance without disrupting core systems or teams.

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Transportation performance is shaped long before the truck leaves the dock.

Executive insight
Integrated routing and loading is no longer an operational detail. It directly influences cost, service, and sustainability outcomes at the enterprise level.

From sequential planning to connected decisions

In many organizations, routing and loading are still planned sequentially. Orders are created, loads are built, and routes are planned. Each step may be optimized on its own, yet the result is often less-than-optimal once the full picture comes together.

Integrated routing and loading changes that dynamic.

Rather than optimizing each decision in isolation, integration aligns them around a shared objective: maximizing utilization, meeting service commitments, and reducing costs and emissions across the transportation network.

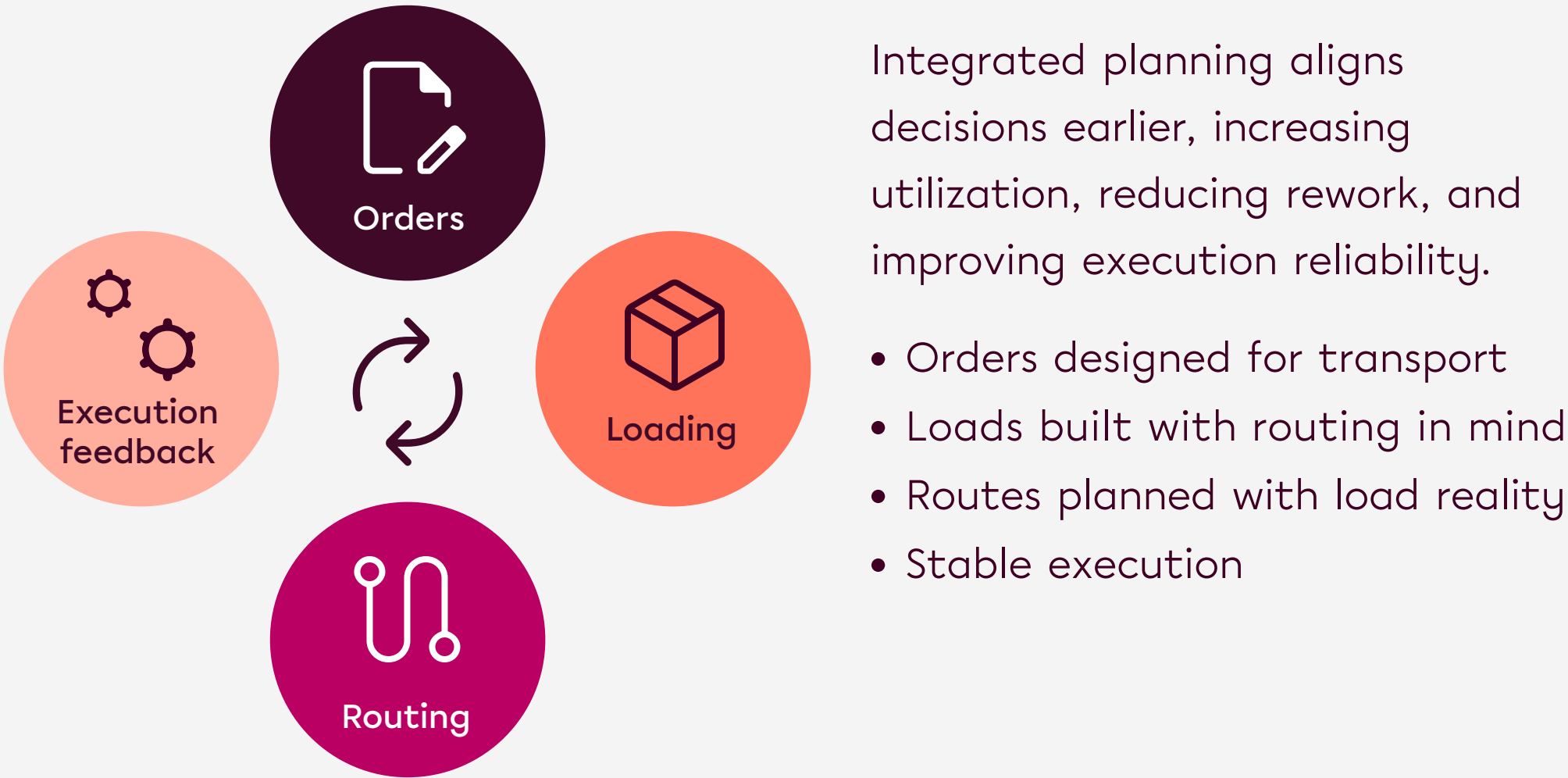
This does not mean creating overly complex plans or replacing existing systems. In practice, integration means making smarter trade-offs earlier in the planning process, using better data and advanced optimization to support decision-making.

Integration works best when it helps teams create plans that are realistic, executable, and resilient.

Linear planning process



Integrated planning loop



A practical playbook for integrated routing and loading

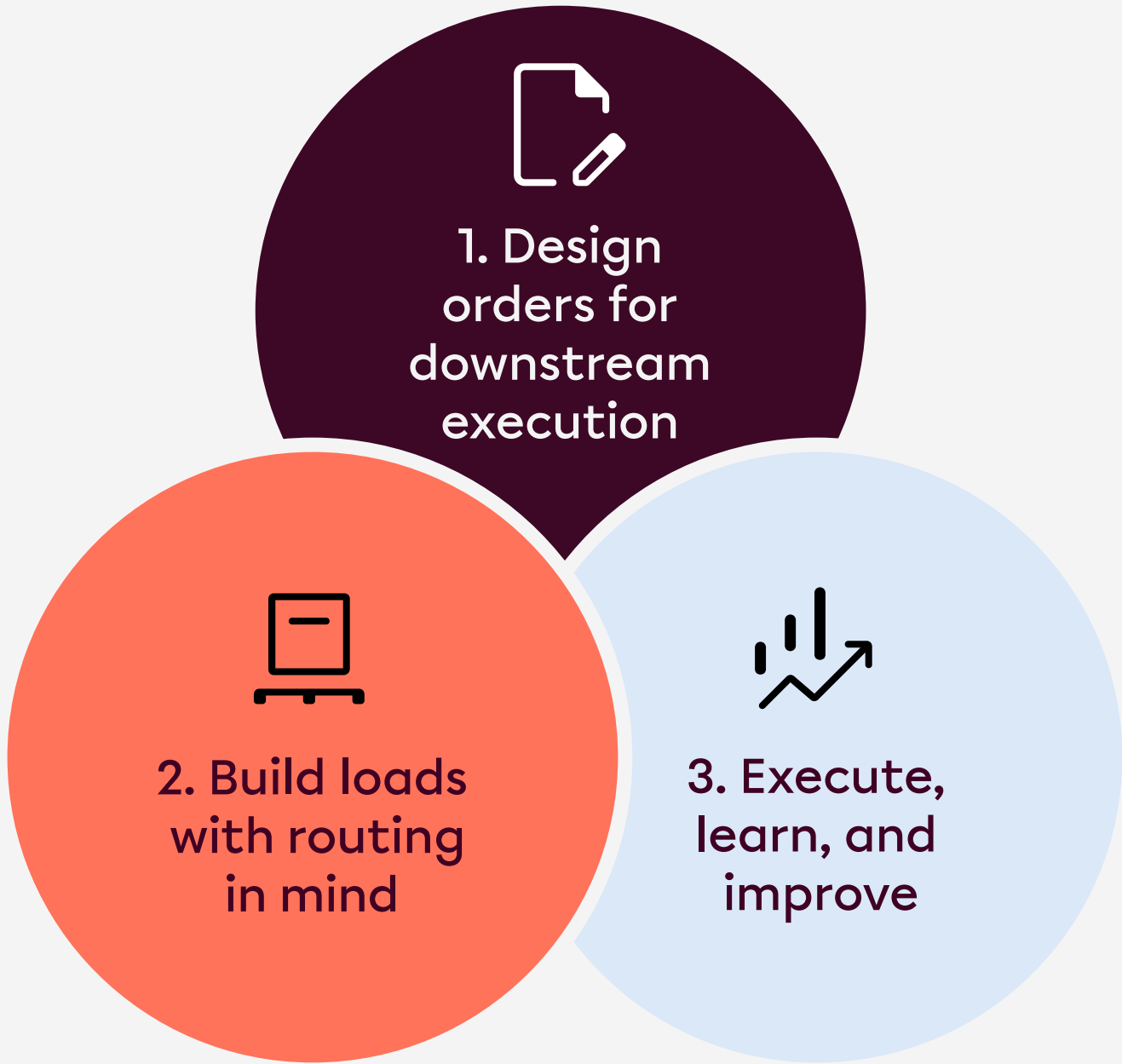
Leading supply chain organizations follow a structured, step-by-step approach to integrated routing and loading that connects decisions across the planning process instead of treating them in isolation. Rather than attempting a disruptive ‘big bang’ transformation, they progress deliberately from upstream order design, through load building and routing, and into execution and continuous improvement.

Optimization delivers the most value when it reflects how planning actually happens.

Each step builds on the last, creating better decisions earlier and more reliable outcomes downstream.

Integration works best when it helps teams create plans that are realistic, executable, and resilient.

Connected planning by design



Integrated planning is not a one-time optimization, but a continuous decision cycle



When loading and routing are planned sequentially, trade-offs appear late. Integration brings them forward.

Step One

Design orders that work downstream

Integrated planning starts earlier than many organizations expect, at the order level.

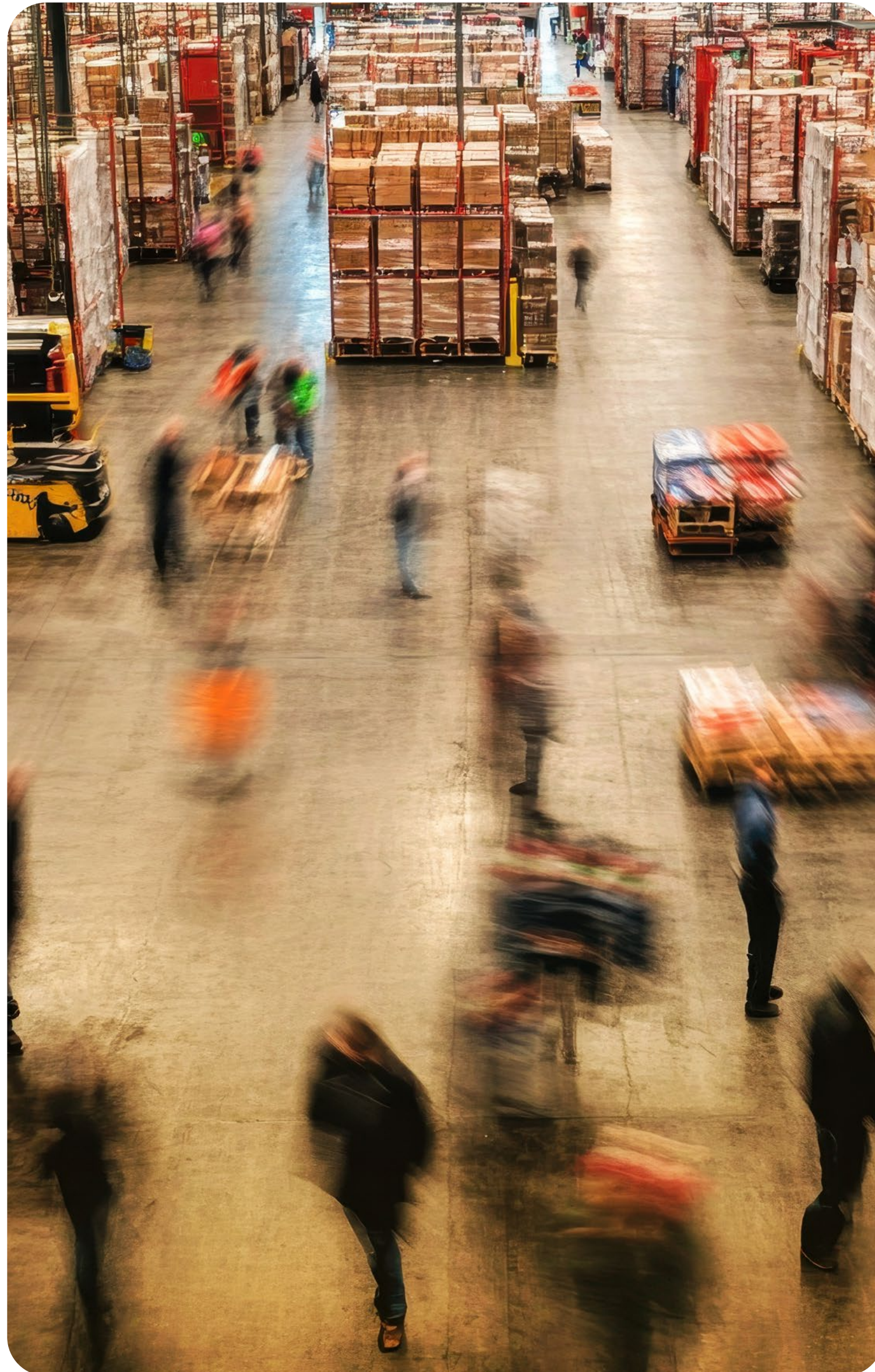
Orders may begin as commercial decisions, but they quickly become physical constraints. How items are grouped, stacked, and sequenced directly affects loading efficiency, route feasibility, and delivery performance.

Order design determines what is possible downstream.

By considering factors such as item dimensions, orientation, stackability, and pallet configuration upfront, organizations can create orders that are inherently more loading and transport friendly.

The result is fewer compromises later in the process, faster loading, and more stable loads in transit.





Step Two

Build loads with routing in mind

The next step is consolidating orders into loads while accounting for routing constraints from the outset.

This includes factors such as:

- Vehicle and trailer characteristics
- Axle weight limits
- Customer time windows
- Driving times and distances
- Fleet diversity

Advanced 3-D loading optimization helps planners use available capacity more effectively while still respecting real-world constraints.

Loads that ignore routing constraints rarely survive execution.

When routing considerations are embedded into this process, the resulting plans reduce empty space, limit rework, and reduce total miles driven.

This is where organizations often see immediate gains in cost efficiency and lowered emissions.

Step Three

Execute, learn, and improve continuously

Integrated planning does not end once the plan is created.

Execution feedback is critical. What happened on the road often reveals assumptions that need to be refined. Leading organizations use this feedback to improve future plans, fine-tune constraints, and build trust among planners and operations teams.

Feedback turns planning into a learning system.

Over time, this creates a virtuous cycle. Plans become more realistic, exceptions decrease, and decision making improves across the organization.

This step also lays the foundation for AI-powered optimization, where insights from past performance help guide future planning decisions.



Integration is not about complexity. It is about aligning decisions earlier, when they matter most.

High-impact **operational use cases** to get started

Rather than attempting to optimize everything at once, successful organizations focus on a small number of high-impact use cases.

Common starting points include:

- **Improving load utilization through product design** – Small changes in product dimensions or packaging strength can significantly increase pallet density and stability, unlocking downstream transportation savings.
- **Smart order splitting** – Splitting large orders across multiple routes increases overall network efficiency when space or routing constraints would otherwise force sub-optimal plans.
- **Using fillers for fast movers** – Adding high velocity products to partially filled loads absorbs unused capacity without increasing delivery frequency.
- **Demand-based delivery optimization** – Aligning delivery timing with forecasted demand and inventory levels allows manufacturers to plan loads that support service goals while reducing unnecessary trips.

Each of these use cases can be addressed incrementally, delivering value without increasing operational risk.

Start where impact is highest and complexity is lowest.

Integrated planning can reduce complexity by helping teams make better trade-offs earlier

On the next page, we'll look at some examples of high-impact use cases that deliver value quickly because they improve decisions at the intersection of loading and routing, where small planning gaps can create larger execution problems.



Case Study

A leading global brewer built an integrated solution to manage load building, territory planning, routing, and dispatch for deliveries to its broad network of customers.

The optimization algorithms consider a range of factors, including truck design and pallet positioning and orientation, for maximized load utilization for their diverse fleet – resulting in remarkable improvements in their delivery operations.

Product design optimization

When to Use:

- Pallet or trailer utilization is consistently below expectations
- Products vary widely in size, orientation, or stability
- Packaging changes are feasible without affecting product integrity

Value Unlocked:

- Higher pallet & trailer utilization
- Fewer trips required for the same volume
- Lower transport costs & carbon emissions

Smart order splitting

When to Use:

- Large orders regularly prevent efficient route construction
- Less than truckload shipments are common
- Routing constraints limit opportunities for consolidation

Value Unlocked:

- Improved route efficiency & capacity utilization
- Reduced empty space and mileage
- Greater flexibility in delivery planning

Fillers for fast movers

When to Use:

- Certain products ship frequently & predictably
- Trailers or pallets often have unused capacity
- Service levels allow limited flexibility in order composition

Value Unlocked:

- Better use of available capacity
- Fewer partial loads & expedited shipments
- Lower cost per delivery

Demand-based delivery timing

When to Use:

- Demand patterns can be reasonably forecasted
- Inventory visibility is available across locations
- Delivery timing can be adjusted within agreed service windows

Value Unlocked:

- Fewer emergency or ad-hoc deliveries
- Better inventory & transport plan alignment
- More stable routes with lower variability

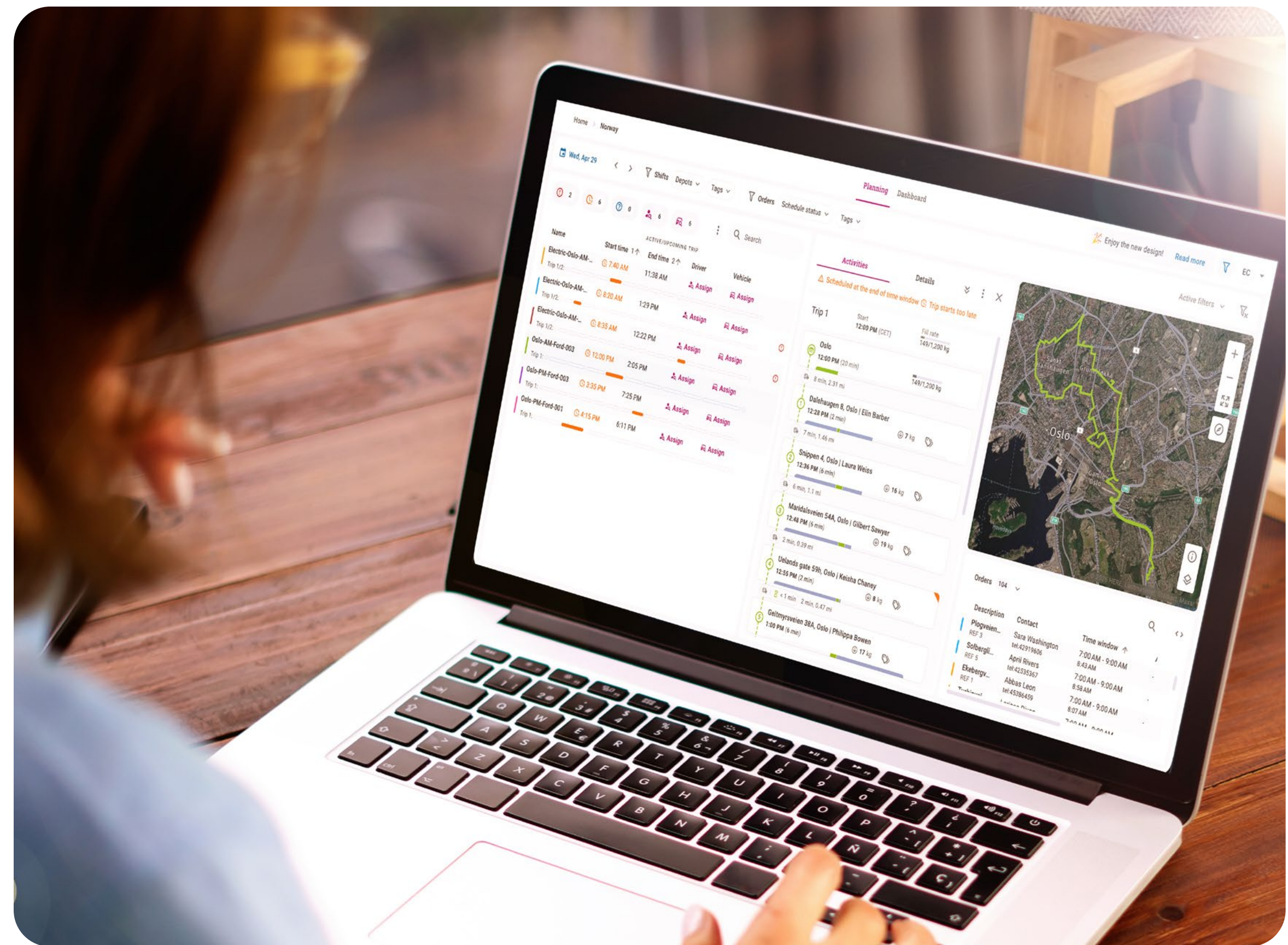
Making integration work in the real world

Technology integration is often seen as the biggest barrier to progress. In reality, it is also one of the biggest enablers when approached practically.

Most supply chain organizations rely on ERP systems, such as SAP, as the backbone of their planning and execution processes. Integrated routing and loading works best when optimization capabilities are embedded into these existing workflows.

Orders may originate from customer demand, replenishment logic, or stock transfer requirements. Regardless of the source, the goal is the same: ensure that optimized orders and transportation plans flow seamlessly through the ERP and into execution.

The most effective integration approaches minimize disruption, reduce manual handoffs, and allow planners to work within familiar systems.



” Integrated planning scales when it is embedded, not bolted on.

What success looks like at scale

Large manufacturers, producers, and distributors that have adopted integrated routing and loading demonstrate what is possible when planning decisions are aligned.

In practice, success looks like:

- Higher utilization across diverse fleets
- Fewer last-minute delivery changes
- Better service consistency across customers
- Reduced transportation costs and emissions

By embedding routing, loading, and optimization within their core planning environment, organizations are able to scale these benefits across thousands of deliveries and complex operational constraints.



What we see in practice

Most inefficiencies occur not because optimization is missing, but because routing and loading decisions are made too late to influence each other.



AI and agentic AI: What's next for integrated routing & loading

Artificial Intelligence (AI) is changing how supply chain software is built and used. For many leaders, the challenge is separating meaningful progress from hype.

In the context of integrated routing and loading, AI does not replace optimization. Instead, it enhances how optimization is applied, accessed, and continuously improved.



AI enhances how optimization is used, making advanced planning more accessible and effective.

From optimization models to AI supported decision-making

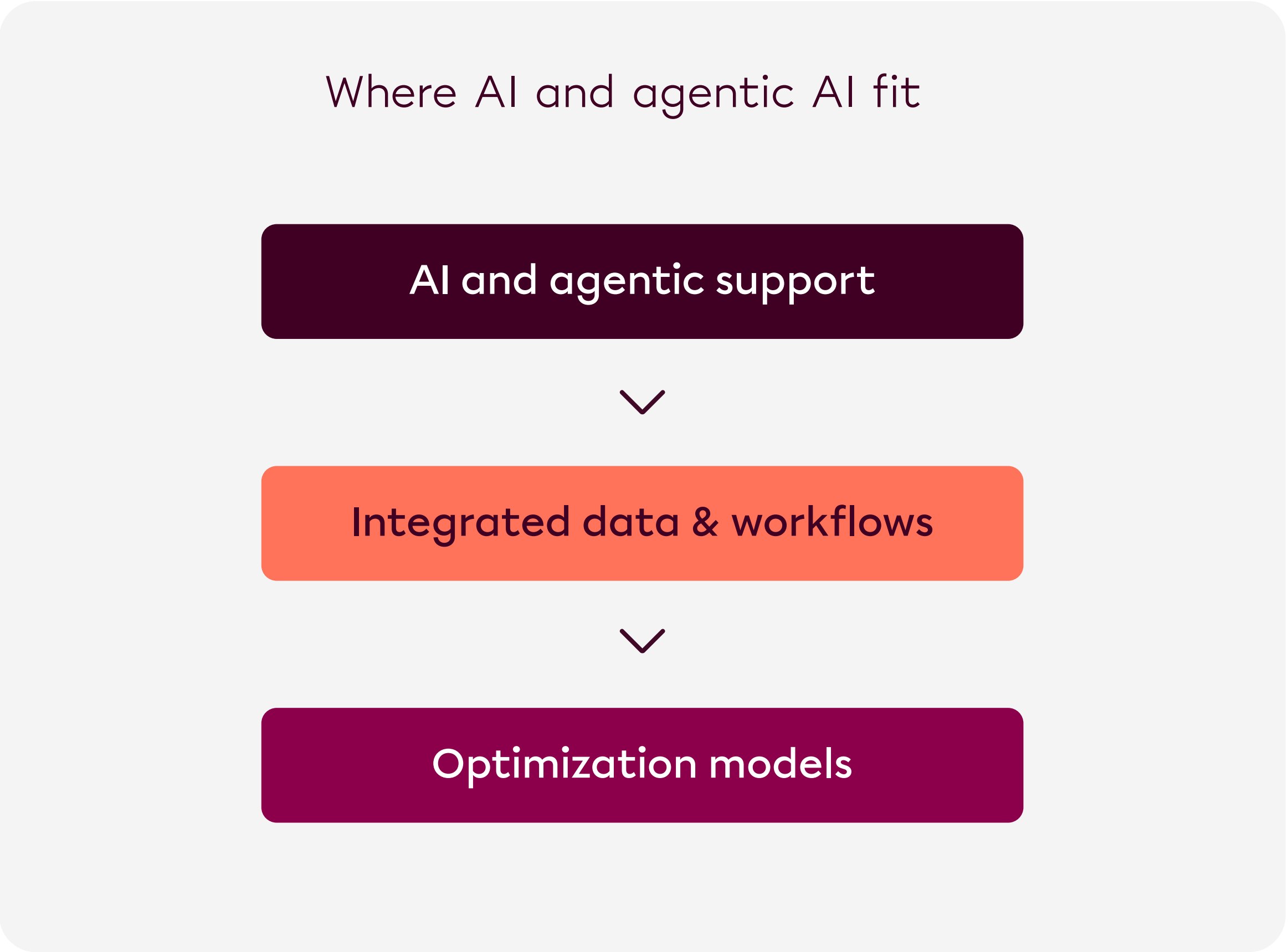
Advanced optimization has long been at the core of effective loading and routing. These models excel at evaluating complex trade-offs across thousands of constraints.

AI adds a complementary layer.

By combining optimization with AI techniques, organizations can:

- Reduce manual configuration and repetitive planning tasks
- Improve planner productivity and adoption
- Surface insights from large volumes of planning and execution data

Rather than making the models themselves ‘smarter,’ AI helps teams use powerful optimization more effectively and consistently.



Optimization remains the engine; AI improves how team interact with it

Introducing agentic AI in supply chain planning

The next evolution gaining attention is agentic AI – systems that can work across data, tools, and workflows to support decisions in context. Unlike generative AI, which primarily produces text or insights, agentic AI can assist planners as they work by taking on well-defined tasks within a planning process.

In integrated planning, early agentic AI applications may include:

- Assisting planners in setting up loading or routing scenarios
- Translating plain language intent into optimization parameters
- Diagnosing infeasible plans or data issues before execution
- Remembering prior scenarios and outcomes to guide future decisions

These capabilities reduce friction between planners and complex optimization software, making advanced tools more accessible across teams.



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Agentic workflows support planners while preserving transparency and control.

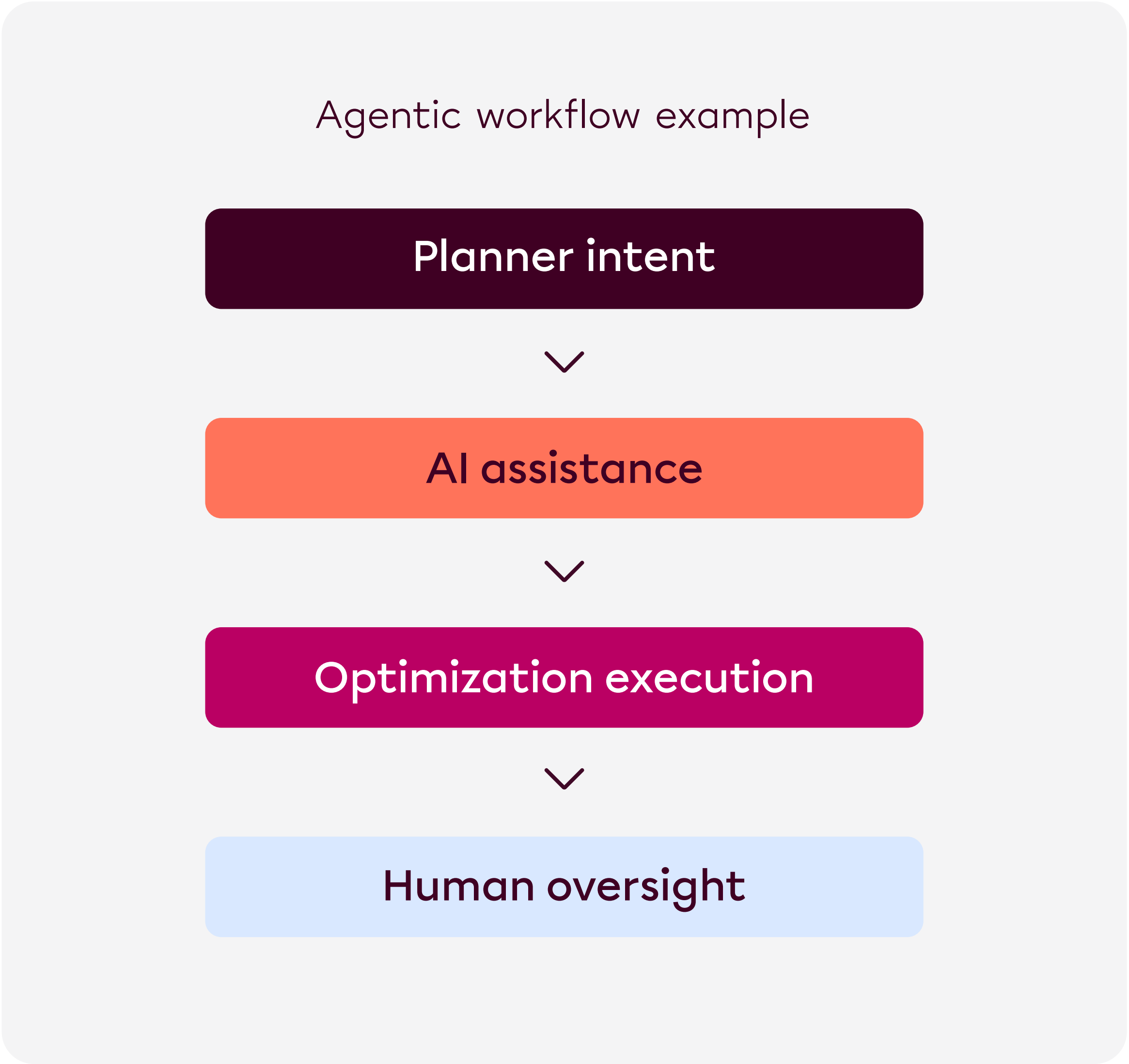
Start simple, **scale with confidence**

While fully autonomous AI agents attract attention, most organizations begin with agentic workflows. These follow predictable, governed steps and incorporate AI where it adds clear value.

This approach allows organizations to:

- Maintain control and transparency
- Build trust with planners and leadership
- Ensure data security and governance
- Deliver measurable value without added risk

Over time, as confidence and maturity grow, more advanced forms of autonomy can be explored.



AI should reduce friction, not control

A readiness check for integrated planning and AI

Before embarking on an integrated routing and loading initiative, or introducing AI into logistics planning, leaders often pause to assess whether the organization is truly ready. In practice, these are not separate questions. AI readiness is inseparable from planning readiness.

The most successful organizations start by examining how decisions are made today and how well those decisions are supported by data, systems, and governance.

Integrated routing and loading is becoming a defining capability for modern manufacturing, production, and distribution supply chains. It helps teams turn complex planning inputs into clearer, earlier decisions, so transportation plans are easier to execute with confidence.

Supported by advanced optimization and enhanced by AI, integrated planning can improve efficiency, strengthen service reliability, and support sustainability goals in a practical, scalable way.

Key questions to consider include:

- Do we clearly understand our true loading and routing constraints, or are they discovered only during execution?
- Can we assess load feasibility early, before trucks are built and routes are finalized?
- Are planners spending most of their time improving plans, or reacting to avoidable exceptions?
- Do our planning systems enable integrated decisions across loading and routing, or do they reinforce functional silos?
- Is sustainability measured and managed at the planning stage, or only evaluated after execution?
- Do we have reliable, accessible data and integration with core systems, such as ERP and TMS?
- Is there clear ownership, governance, and alignment between planners, IT, and leadership?



Answering these questions honestly helps clarify where integration will deliver the greatest impact – and where foundational gaps need to be addressed first.

A practical view of the road ahead

The future of supply chain planning is not about replacing people with AI. It is about enabling planners and leaders to work more effectively with increasingly complex systems.

Integrated routing and loading, supported by AI, moves planning closer to real-world execution. It helps organizations respond faster, plan with greater confidence, and continuously improve performance.

For organizations moving in this direction, the practical path is to focus on impact, adoption, and continuous improvement



E-guide: Integrated routing and loading

The path forward

Integrated routing and loading is becoming a defining capability for modern manufacturing, production, and distribution supply chains. It helps teams turn complex planning inputs into clearer, earlier decisions. Supported by advanced optimization and enhanced by AI, integrated planning enables these supply chain operations to improve efficiency, elevate service, and advance sustainability goals in a pragmatic, scalable way.

ORTEC partners with supply chain leaders to turn integrated planning into a practical advantage, one step at a time.

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Integrated planning is a series of better decisions, made consistently.



The goal is simple but powerful: make better decisions earlier, so fewer compromises are needed later.



E-guide: Integrated routing and loading

About ORTEC

ORTEC helps organizations improve operational performance through advanced optimization, analytics, and AI.

Working across industries including Foodservice and Beverage Distribution, Manufacturing and CPG companies, Retail and Home Delivery, and Transportation organizations, we help companies make better decisions, improve resource utilization, reduce costs, and support sustainability goals.

Trusted by some of the world’s largest and most complex supply chains, ORTEC combines operational expertise with data-driven technology to help teams simplify complex planning challenges and improve execution across their logistics and delivery operations.

Contact us to get started



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