

A woman with dark curly hair, wearing glasses and a white lab coat, is focused on working on a circuit board. She is using a soldering iron. The scene is set in a laboratory or workshop with various tools and equipment visible. The background is slightly blurred, showing other people and equipment. The overall lighting is bright and professional.

Agility and connectivity for semiconductor supply chains

KINAXIS®

In the era of the "Fourth Industrial Revolution," demand for semiconductors is surging, with the industry expected to become a \$1 trillion market by 2030.

From AI and electric vehicles to smart medical and personal devices, semiconductors power the innovations shaping our world. However, meeting this skyrocketing demand with a complex, fragmented supply chain poses an urgent challenge.

The semiconductor supply chain has always been intricate, but today's landscape is even more daunting. Geopolitical tensions, supply shortages, and rapid innovation cycles that render products outdated before they leave the factory make staying ahead of the competition harder than ever. To protect margins and avoid costly obsolescence, getting the right products to market at breakneck speed is essential.

Traditional supply chain management methods are no longer effective. Nearshoring and friendshoring are reshaping global production, lead times remain long, and capacity constraints are forcing hard choices about how to allocate supply to meet demand.

For semiconductor businesses, reimagining supply chains is crucial for survival and growth. With the right tools and strategies, businesses can confidently navigate these challenges and unlock new opportunities for lasting success.



Obstacles to growth at a pivotal moment

The semiconductor industry's supply chain is at a critical juncture. The complexity of semiconductor products, combined with the industry's rapid pace of innovation, makes supply chain transformation imperative. Emerging trends, affecting both the broader market and unique challenges of semiconductor businesses, require a fundamental shift in supply chain management to outpace competitors and ensure sustainable growth.

Geopolitical shifts and supplier fragmentation

With rising geopolitical tensions and protectionism, more companies are nearshoring and friendshoring production. While this reduces dependence on foreign manufacturing, it introduces major financial and operational challenges. Building new plants can cost over \$10 billion and take years—time you don't have with demand and competition moving fast. Diversifying your supplier network adds complexity and reduces your ability to collaborate efficiently.

To stay ahead and avoid delays, supply chain orchestration tools are essential for aligning local capacity investments with immediate demands. A unified platform fosters collaboration, breaks down silos, and accelerates every stage of the value chain.





Long lead times for new materials

The hard constraint of materials in the semiconductor industry isn't going away. Geopolitical tensions, like U.S. sanctions on Chinese silicon suppliers, have worsened shortages and sent costs soaring. Wafers must be ordered years in advance and meet minimum order quantities (MOQs). Any missteps can severely limit fab capacity and profits.

By treating wafer availability as a critical constraint in supply chain planning, companies can immediately optimize material usage and accelerate work-in-progress inventory (WIP) through the system. This ensures that even during severe shortages more orders can be fulfilled, preventing costly and missed opportunities.

Constrained capacity

It's crucial to keep factories running at full capacity. One way to do this is producing chips ahead of demand and storing inventory rather than letting factories sit idle. But any disruption to this process can create costly delays and WIP bubbles. Hot lots—urgent orders that bypass normal production—cause delays, break processes, and leave companies vulnerable in an already competitive market.

Companies must align production resources with demand spikes. The right orchestration platform can help balance priorities, manage WIP build-ups, and keep other orders on track. It can also spot bottlenecks to relieve pressure at critical points, preventing costly delays.

Profitably allocating supply to demand

Chips need to be allocated to the best use by grade. Demand often fluctuates unpredictably, making it essential to allocate chips quickly and efficiently. Failure to adjust grade at the same pace as demand shifts can result in missed opportunities, excess inventory, and reduced profitability.

To solve for this, you need the ability to optimize chip allocation to the most profitable use—fast. With real-time data, you can immediately adjust supply in response to shifting demand and production yields.

Managing inventory and safety stock

Short product lifecycles and unpredictable demand make it impossible to manage inventory. Navigating the delicate balance between stockouts, minimizing waste, and preparing for future market opportunities requires planning at every stage. Raw materials have a shelf life of 18 months before they become waste. Semi-finished products become obsolete overnight.

To address the dual threats of overstocking and being unprepared for market shifts, companies must use advanced analytics and real-time data for accurate demand forecasting. This allows them to set optimal safety and stock levels at each stage, from raw materials to semi-finished and finished goods.



A closer look at supply chain orchestration

Today's semiconductor supply chain challenges demand hyper-agile, modern management techniques—the end-to-end orchestration of people and physical, digital, and financial assets to meet customer expectations and industry demands.

While the concept of “orchestrating” specific parts of the supply chain isn't new, supply chain orchestration is emerging as a critical sub-segment of supply chain management, bringing together the most critical activities into a new, synchronized process.

Supply chain orchestration rises to the challenge of managing multiple parties, systems, and processes to ensure high-performance supply chains that consistently deliver on time and in full at the lowest possible cost, despite fluctuating demand and geopolitical disruptions. The result? More reliable deliveries, improved profitability, and a competitive edge.

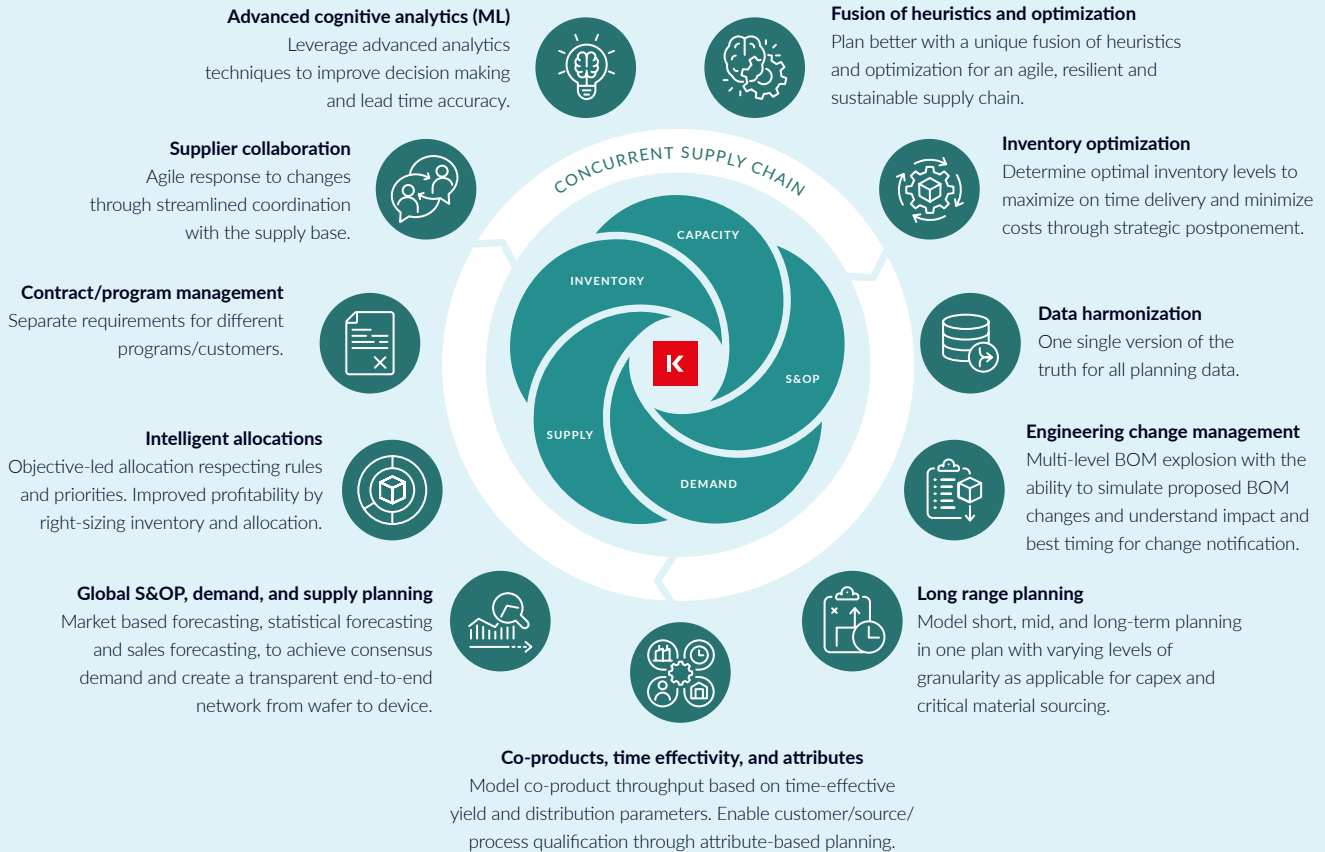


Without Maestro, I'd be spending a lot more time with hat in hand asking IT for the next report or taking a report I already had and trying to monkey around with it in Excel.

DEMAND MANAGEMENT, MASTER SCHEDULING & PRODUCTION CONTROL MANAGER,
Semiconductor Manufacturer

WHAT MAKES KINAXIS RIGHT FOR YOU?

Kinaxis offers semiconductor-specific functionality and capabilities designed to overcome your unique challenges.



Kinaxis Maestro is a much better way to work. Planners are now more productive. They're not waiting to make decisions.

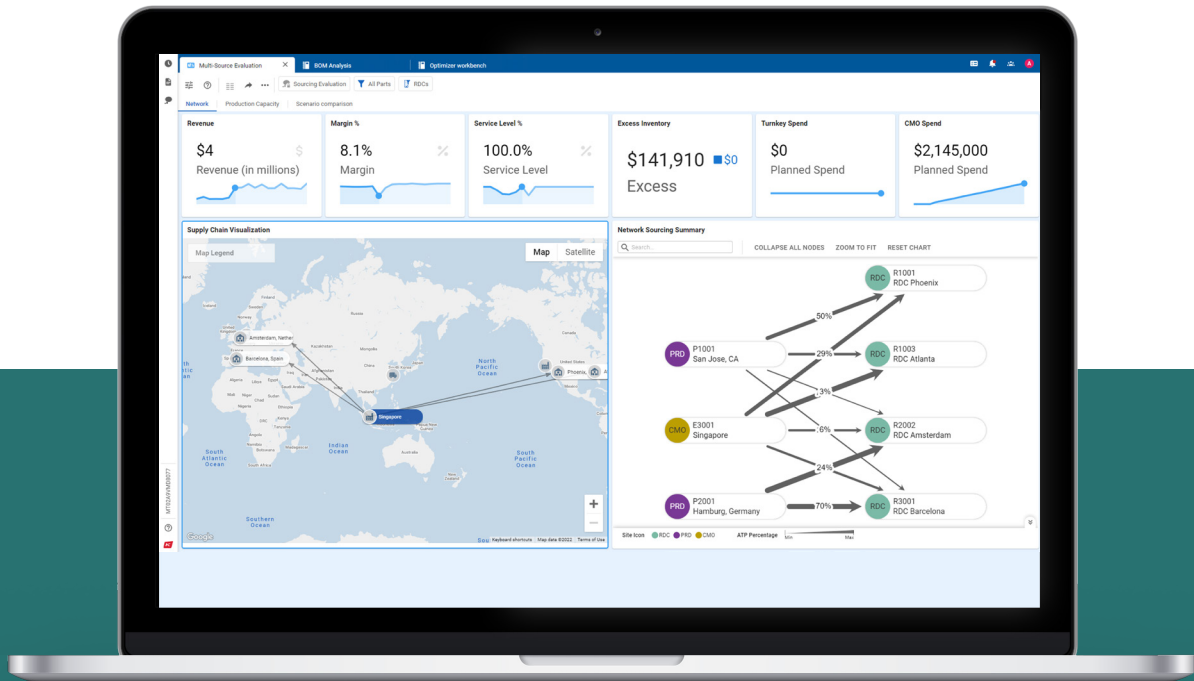
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Co-product optimization, could-be-built, and strategic supplier sourcing

Balancing supply with ever-changing demand can feel like an impossible challenge. When demand slows, you might end up with excess parts or chips. How do you manage those components, keep revenue flowing, and still meet market needs? And how do you ensure you always have the right supply to meet your customers' unique demands?

[Supply.AI](#) from Kinaxis blends the speed of heuristics with the precision of optimization to help you plan faster and smarter. Use heuristics for quick, reliable decisions and optimization for more complex scenarios that need exact solutions, like planning wafer buys. Supply.AI helps you choose the best way to meet demand, cut costs, and decide what to produce based on available supplies and uncommitted capacity. Plus, it helps you optimize your supplier mix to keep costs low while sticking to existing agreements.

All of this happens in Kinaxis Maestro™, an AI-infused, easy-to-use supply chain orchestration platform, allowing teams to collaborate smoothly and move quickly based on real-time data for a more efficient, responsive supply chain.

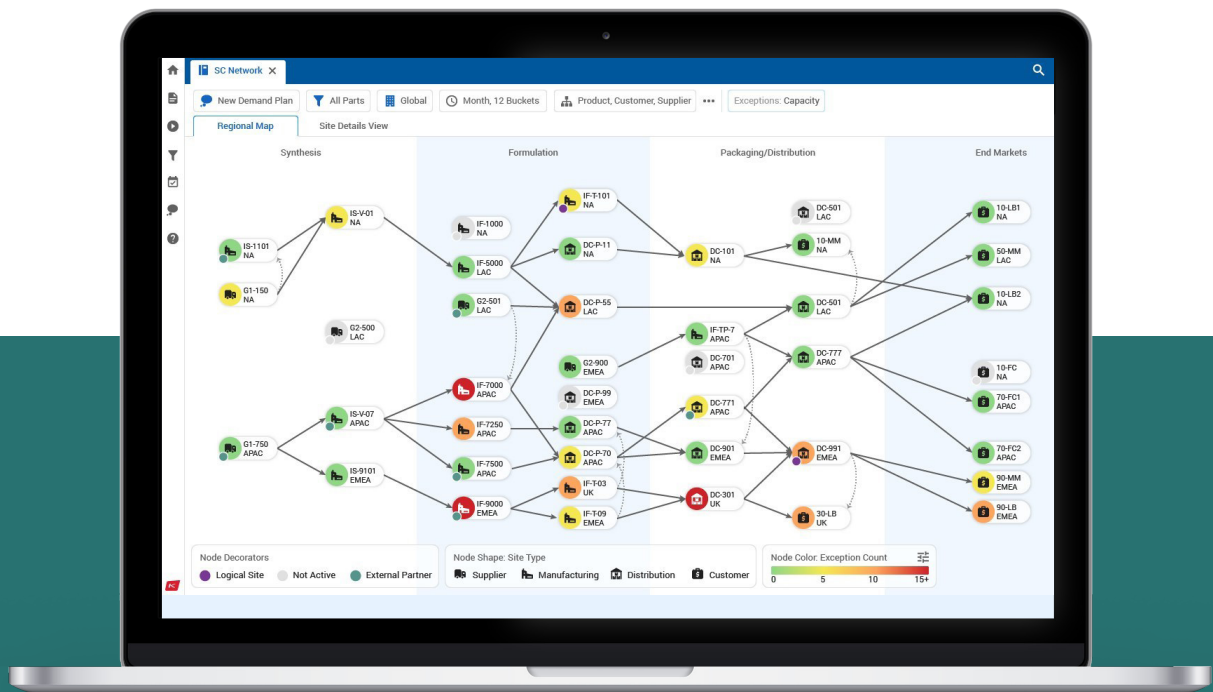


Supplier collaboration

While the supply-constrained environment of COVID may have eased, contract manufacturers and suppliers remain critical to your supply chain. Without visibility into their operations, current supply, and demand expectations, you're left vulnerable.

This is especially true in the semiconductor industry, which has always been highly complex due to its vast network of suppliers and difficult to manage supply chains. Now, it's undergoing significant decentralization due to policies like the U.S. CHIPS and Science Act, European Chips Act, and Japan's Rapidus initiative. As production shifts to multiple regions, supply chains are becoming even more fragmented, making communication and coordination more challenging. Longer supply lines mean greater risks of delays, production issues, and disruptions.

Kinaxis Maestro enables true concurrent planning by integrating data streams across your semiconductor supply chain into a single environment, providing real-time visibility into supplier commits and fab capacity. This seamless communication allows suppliers to track wafer orders, commit delivery dates, and flag production delays early, ensuring fast, coordinated decision-making. Only with this level of collaboration and transparency can you prevent supply disruptions, manage yield variability, maintain service levels, and stay agile in today's decentralized semiconductor ecosystem.

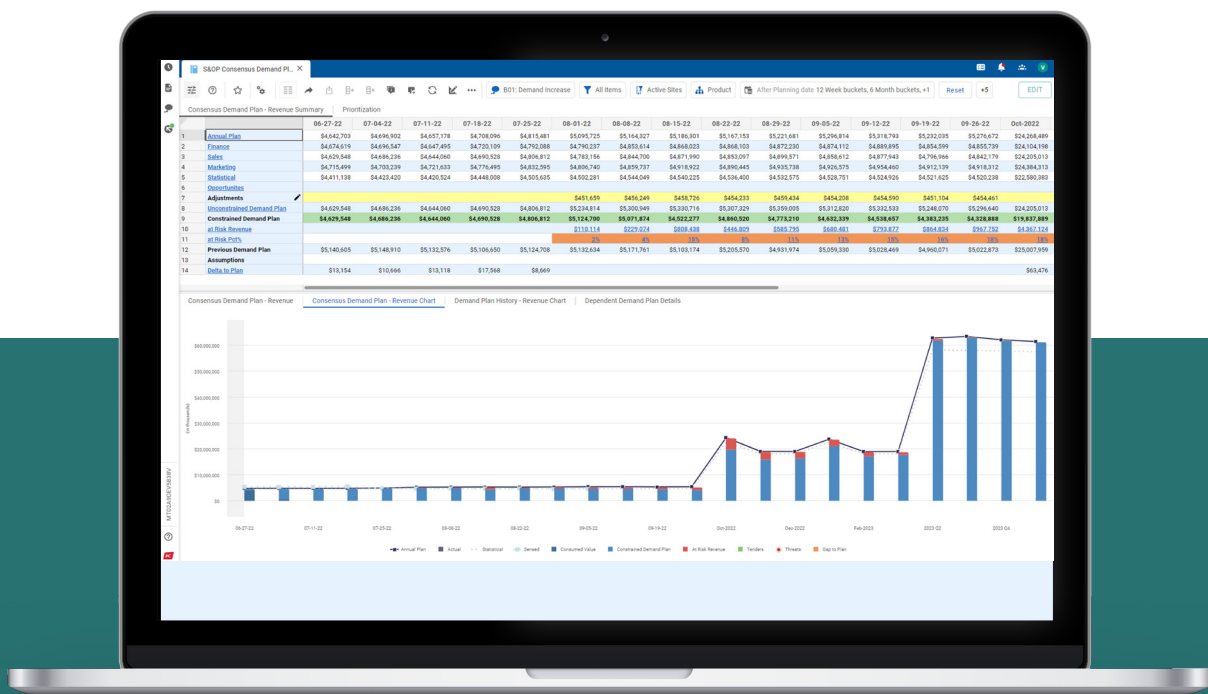


Global S&OP, demand, and supply planning

When you're known for innovation and fast-paced development, you can't afford to wait weeks or months to complete an S&OP or PSI cycle. The semiconductor industry is particularly vulnerable to this challenge. Demand for chips can be highly unpredictable—driven by fluctuating global demand for high-tech products like AI, autonomous vehicles, and personal computing. Additionally, the increasingly fragmented and complex supply chain, worsened by geopolitical tensions and protectionist policies, further complicates production planning and synchronization.

On top of these complexities, it's difficult to synchronize various functions like demand and supply planning, inventory management, capacity planning, finance, sales, and marketing to get quick, clear insights into each team's changes and their impacts.

The Kinaxis Maestro S&OP application eliminates data silos, creating a transparent, end-to-end network from components to final assembly. It helps companies quickly identify plan deviations, prioritize actions by impact, and dynamically respond to demand fluctuations. Our out-of-the-box dashboards offer instant insights, helping you manage key metrics such as ending inventory, on-time delivery, key constraint utilization, and margin percentage. By analyzing real-time data instead of relying on outdated information, you can stay agile and adaptable to the fast-moving semiconductor market.



Planning and feature BOMs

When your customer places an order, you need to know if you have the components available to manufacture the product and its unique features. Given the long lead times and constrained capacity in semiconductor supply chains, it's critical to not only understand current component availability but also to predict when you can meet that demand if parts are missing. In this fast-moving and highly competitive market, being able to provide reliable commitment dates and deliver products configured to exact specifications is a key differentiator.

That's where Kinaxis planning and feature BOM capabilities come in. Kinaxis enables you to manage complex, multi-level BOMs, crucial in semiconductor manufacturing where different product and feature configurations are common. By monitoring BOMs for potential disruptions—such as demand spikes, geopolitical-driven shortages, or long lead times on critical components—you can react quickly. Give your suppliers visibility into your BOM needs, allowing them to stay informed about component availability and lead times, so you can keep production on track and meet customer expectations.



Kinaxis makes all three of the areas I manage more efficient. I can get the data my employees need, or they can get it on their own directly out of the tool, so everybody's more productive.

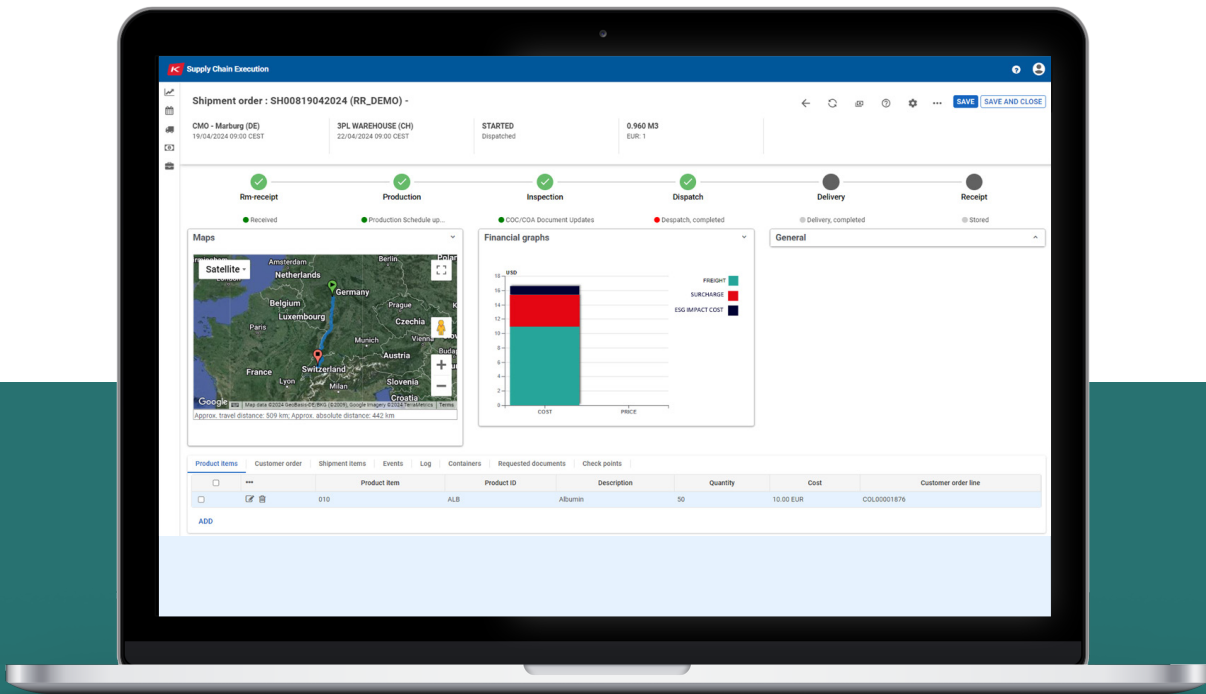
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Logistics and fulfillment

The globalization of semiconductor manufacturing has increased supply chain complexity, with chips crossing multiple countries, facing export restrictions, geopolitical tensions, and long lead times. In an industry where tight deadlines and innovation are critical, ensuring on-time, in-full delivery is a constant challenge, especially with disruptions like material shortages and capacity constraints.

Kinaxis order and transportation management capabilities help semiconductor companies automate and optimize logistics from order planning through last-mile execution. Dynamically allocate orders, choose optimal fulfillment partners, and streamline routes to maximize resources and support just-in-time deliveries. With full end-to-end visibility, Kinaxis ensures compliance and gives customers greater reliability and transparency across every transaction in multi-leg, multi-modal supply chains.

Stay ahead of disruptions with real-time alerts and automated re-planning, taking the best actions directly in the system. Execution updates sync automatically with planning to keep supply and demand in alignment.



Validation from the experts

If you'd like validation that Kinaxis is a Leader in supply chain planning solutions, look no further than the 2024 Gartner® Magic Quadrant™ for Supply Chain Planning Solutions.

We're excited for Kinaxis to be recognized as a leader in the 2024 Gartner® Magic Quadrant™ for Supply Chain Planning Solutions. We have been positioned highest on Ability to Execute, which we feel solidifies our track record of bringing innovation to life.¹

Endnotes

1 Gartner, Magic Quadrant for Supply Chain Planning Solutions, A. Salley, T. Payne, P. Orup Lund – 2021, 2022, 2023, 2024

Gartner, Magic Quadrant for Supply Chain Planning System of Record – 2014, 2016, 2018

Gartner, Magic Quadrant for Sales and Operations Planning Systems of Differentiation – 2019, 2017, 2015



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