The Case for Modernization, and How to Navigate an Evolving Software Landscape to Deliver an Agile, Effective Technology Platform and Support Organization

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EXECUTIVE SUMMARY

The supply chain software landscape is changing. Enterprise IT leaders and vendors alike have embraced modern architectures that provide advanced capabilities, connectivity, customization, process automation, and artificial intelligence. Innovation, buoyed by data availability and enhanced processing capacity, has accelerated in recent years, and each of the major solutions providers and their partner ecosystems offer new capabilities poised to deliver enhancements to operations with tangible ROI and in many cases improved competitive positions.

That being said, the pivot from monolithic architectures to modern solutions can be challenging. Technology vendors understandably promote (and in some cases mandate) a migration path that provides them with cloud-based revenue streams, new services opportunities, and enhanced profitability with streamlined support on more recent versions. Their customers, however, are often faced with difficulty in defending the expense of the migration to their boards due to limited upside from new features - and substantial risk of business disruption from the implementation and cutover.

However, there is substantial value to be found if the appropriate steps are taken in up front planning exercises. It begins with a champion from the business who is looking to transform the way that the business operates, and/or how it consumes and leverages technology.

The journey can take different forms depending on the sponsor, which can be framed as IT Transformations, Supply Chain Transformations, or simply Application Modernization initiatives (typically of a specific business function).

MODERNIZATION VS TRANSFORMATION

The success of any of these initiatives will depend heavily on the investment made in a) understanding both the current state opportunities in the business that can see improvement and derive benefits throughout the journey, b) considering the changes in business strategy and the competitive landscape where new approaches can deliver market share and profitability growth, and c) the ecosystem of solutions and providers that can deliver those benefits.

IT Transformation focuses on building the platform and tools to leverage the advanced capabilities in a hyper-connected environment of modern SaaS solutions atop a comprehensive data ecosystem and platform tools capable of process automation and generating insights. Mapping the modernization of applications to fit amongst the platform goals requires an assessment of applications, their architectures, and often drives

evaluation of the market to ensure the vendor roadmap is aligned to corporate IT objectives.

Supply chain transformation starts with a focus on how products are sourced, produced, and distributed, often coupling new markets and channels or customer engagement approaches. Alongside new processes or facilities, systems requirements will undoubtedly evolve, demanding new software capabilities or selections and converging with traditional application modernization processes.

Application Modernization is, unfortunately, the most common of these. Navigating the migration from a legacy solution to a cloud based or SaaS native architecture seldom delivers near term returns on the required investment and too often drives standardization and removes earlier customizations that drive efficiency or speed to the business.

THE CASE FOR TRANSFORMATION

When faced with a need to modernize any application, the process of evaluating newcomer capabilities for simplification or optimization can deliver a lower cost, higher value architecture and roadmap for your organization capable of delivering unprecedented value and performance. Across the supply chain, modernization also offers an opportunity to embrace the cultural shifts that SaaS offers – pivoting from cyclical investment patterns that result in gradual degradation of capabilities while preventing investment in the best practices. A major gap that differentiates modernization from IT transformation is a steady state center of excellence approach – whether internal or delivered by a partner, the care and feeding of a solution in a 'stay current' environment can pay huge dividends.

The recent evolutions of software packages and the provider landscape offer a unique opportunity to reimagine how your business operates –outsourcing partners, software providers, services and support ecosystems, and innovation approaches can all be considered when developing a vision and roadmap to modernize or transform your supply chain.

Considering modernization more broadly and plotting a migration to a best-fit operating model leveraging modern IT platform tools and processes requires thoughtfulness on objectives, consensus in strategy, and collaboration in planning and execution – but the benefits of a formal process can ensure the investment required of modernization is leveraged to return optimal value back to the business.

NAVIGATING THE SUPPLY CHAIN LANDSCAPE

The impact of modern technology platforms on the supply chain technology landscape has been considerable. Leading providers having some place some cases been displaced by

disruptive newcomers and in other cases continued consolidation processes to amass more holistic suites that are now converting or collectively modernizing using modern platform tools. A few of the ways the impacts of manifested include:

- Supply chain planning ecosystems have become increasingly connected, collaborative, and responsive. The availability of insights and application of them to drive or even automate decision making is having a material impact on early adopters, improving fill rates, reducing inventories, and driving customer satisfaction higher.
- Transportation ecosystems are also more connected, both from a pricing and tendering perspective as well as in real time awareness of shipment status. Probably in great markets have resulted in substantial investment in visibility as well as transportation planning optimization. Customer service processes, now tightly coupled with real time shipment status awareness, are becoming hyper-responsive to disruptions – protecting revenue and improving customer service. Further, process automation has both eliminated tendering overhead with impacts to labor costs and improved tracking while AI is streamlining freight audits and rightsizing freight spend.
- Warehousing ecosystems are perhaps the most in flux, with a mission critical slant historically impeding change, the migration to SaaS and release of control over these environments can be a daunting ask for stakeholders who must meet daily commitments to achieve revenue goals and meet customer expectations. The introduction of automation is off-setting a growing labor crisis with hard ROI, and the future state warehousing solutions must orchestrate manual and automated processes simultaneously while simultaneously streamlining order fulfillment priorities and optimizing operational efficiency through task generation and distribution.

Looking more closely at each of the areas, a common theme is that each of the traditional best of breed or best of suite providers are being challenged by newcomers with native modern platform architectures, standard tools and processes that reduce complexity (easing the path to improvements and innovation), streamlined implementation tools, improved supportability, and ultimately, a lower total cost of ownership. These newcomers may not meet requirements for larger organizations with specialized requirements or advanced optimization needs to manage operating costs, but they should be considered for their ability to reduce complexity in the core business process, as any shortcomings may also be addressed through partners or plug-ins that bring advanced optimization capabilities.

Alongside the plethora of newcomers that can address the core business problems, adjacent solutions have also emerged, benefitting from similar technology platform attributes such as API driven platform development to extend traditional solutions for advanced optimization or to fill gaps in data availability that prevented a holistic solve. Whether embedded within a best of breed solution or enhancing a particular capability in a tier 2 solution, finding the right mix can deliver strong benefits…and clearly the table is set for partnerships and consolidation across these providers that will deliver some interesting competition in the coming years.

TRANSFORMATION PLANNING

Beyond the software providers, it is always worthwhile to consider whether the less impactful areas of your business could be better managed by a third party with less investment or risk. With industry standard templates for onboarding and management, and thin margins, these organizations can offer lower costs with acceptable performance if that is good enough for your organization's needs. They can also serve as a proving ground and learning opportunities for companies in growth mode that lack the appropriate competencies for excellence but require a bridge.

A detailed assessment comparing current state capabilities, considering pain points, and injecting opportunities to adopt new approaches will define the scope. Evaluating the supply chain technology (and in many cases, business process outsourcing) ecosystem thoroughly can vet the promise of provider solutions and inform the development of a modernization or transformational roadmap complete with estimated timelines, high level budgets, and organizational impacts, building consensus on objectives and a shared purpose across the organization.

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The disruption created by modern technology stacks and the promise of SaaS solutions have reached a crescendo in the industry. On the positive side, customers embracing modern platform concepts have accelerated their ability to identify insights to better manage their businesses and deliver profitably to their customers. Unfortunately, adoption rates of these platform concepts are highly variable, and leading software providers, anxious to capture new revenue streams and migrate their customers to a more 'sticky' deployment in their SaaS environment, are driving complex and risky migrations to the latest deployment platforms. In some cases, the roadmap leads to re-implementation while in others, vendors are limiting access to the latest functionality and security standards. Regardless, expect to see punitive maintenance cost increases to entice the pivot to subscription pricing.

In contrast to past scenarios where vendors could impose unexpected fees without concerns for customer attrition, the market dynamics have changed – especially in the mid-market. Emerging technology providers are offering alternatives that are lighter weight, lower cost, and potentially equally effective at providing the core requirements, while others offer extensions to optimize critical functions or infuse advanced data into decision making or extended processes. Adjacent solutions and accelerators round out the market with agile solutions that are easy to implement and can combine with the tier 2 providers to solve real business challenges.

Our intent is to walk through the pain points and opportunities that can be addressed by modern platforms, and the trade-offs to be considered when evaluating next generation technology and migration programs. In this section, we'll begin by exploring the attributes of modern platforms, how enterprise IT leaders might capitalize on them, how various supply chain software providers are infusing them into their development and deployment strategies, and how we see leaders in the supply chain and IT space developing and defending roadmaps for modernization and/or IT transformation.

Platform Pain Points and Opportunities

For nearly 30 years, monolithic software products have reigned supreme across industries where their customers have hungrily consumed the capabilities to provide visibility and efficiency into supply chain operations. As big data, automation, and artificial intelligence transform the ways their companies collect and leverage data to improve performance, modern IT platforms seek to correct the challenges inherent in monolithic solutions, manifested by difficult and costly customization, integration, upgradeability, and support, establishing the fundamental capabilities that will define the operating models of the

future. The following characteristics are representative of the attributes that are critical to an empowering IT strategy poised to support organizational excellence, growth and differentiation.

a. Platform Architecture, Data Ecosystems, & AI: The promise of connected data ecosystems from visibility to analytics has seen great acceleration with the advancement of AI. Embedding third party solutions into enterprise data ecosystems and enabling interoperability across the software environment requires an understanding of the complexity of implementation and maintenance. Still, the value of data insights is fundamentally impacting business performance across industries.
b. Agility and Complexity: Traditional software leaders have developed broad capabilities to serve a wide variety of industry demands. The result Is complexity in both implementation and innovation. Application configurability and rules engines have evolved within domains. Low code - no code platforms and fresh looks at standardized best practices offer low-cost, high-quality opportunities in the next generation of technology.
c. Hyper-Connectivity and Interoperability: Highly customized integration processes can now be streamlined by AI infused mapping tools while API based connectivity, low code platforms, and third-party solutions foster a level of extensibility to fill gaps between applications that resulted in value leakage offer new opportunities to increase visibility and supply chain performance.
d. Constraint Aware Optimization: There is a false perception in the industry that siloed optimization engines effectively orchestrate labor, transportation, and inventory. The truth is that these algorithms have been developed to operate in vacuums, and the promise of modern platforms is that they offer enhanced data awareness into upstream and downstream processes in the supply chain, facilitating a more holistic solve based on extended constraints and additional considerations.
e. Responsiveness & Resiliency: The ingestion of external data and insights can facilitate improved responsiveness to supply chain disruptions and changes in customer demand at the same time as exploring alternative sourcing and delivery options to ensure artificial constraints do not disrupt the flow of goods and the optimal operation of your supply chain assets. Risk management has emerged as a standalone function and quickly become a critical competency for many organizations, especially those with extensive international operations.
f. Supportability & Upgradeability: Entrusting third parties with the management of hosted environments can be risky, but advances in environment management, monitoring and diagnostics, and cloud operations do offer benefits (although few

organizations can adequately articulate their investments). Most software organizations have condensed their upgrade cycle recommendations from six to ten years down to two to three. True SaaS facilitates continuous patching with the ability to adopt functionality following its release, but there are quality costs and risks associated with this approach. The impact is clear on paper, but the legacy of poor service and support from the leading vendors warrants a deeper understanding of the investment and the results across the customer base.

g. Cost of Ownership: Vendors increasingly are raising maintenance costs to drive to a three element subscription model (annual licensing, maintenance, and cloud/hosting fees) increasing total cost of ownership. Upgrades and re-implementations, integration migrations, and the variable costs of change management all pile on to the near-term capital requirements only to result in higher operating expense over the long term. Consumers of their technologies must explore options to defend price negotiations.

Software Providers and Product / Portfolio Modernization

Navigating the supply chain software provider landscape and their commitment to investment in modern platform architectures can be daunting. Strategies very across newcomers who have emerged largely due to their foundations on modern platforms, to best of breed providers seeking to converge suite level data models and capabilities, to vendors attempting to navigate a middle ground of embracing cloud operations to extend services reach, or simultaneously modernizing and reimagining supply chain functionality leveraging advanced data processing capacities. The most extreme are holistic re-writes of application suites atop modern platforms with canonical data models – highly costly, risk intensive, but compelling over the long term (especially for the later adopters).

Incumbent providers and modernization

Cloud Platforms & SaaS: Some examples to start thinking about modernization is with Oracle and what they've done with the Oracle cloud infrastructure; a focus on options across infrastructure as a service platform as a service, and software as a service launched the industry to begin considering how to modernize solutions to take advantage of cloud scalability, and also how to expand revenue streams to incorporate hosting and cloud services. Infor also leaned in on the SaaS concept developing industry centric ERPs and modular bolt on solution sets to be delivered in a SAAS environment. SAP brought forth HANA, which is less focused on hosting services and more focused on cloud scalability and inline memory while supporting canonical data ecosystem; a highly complementary strategy to their extended portfolio and the ability to derive insights of upstream and

downstream supply chain impacts. Each of these strategies are representative of modern platform approaches that could be followed by software companies and startups alike.

In the supply chain application landscape, best of breed providers began experimenting with hosting and cloud services several years ago, but as the promise of true SaaS deployments gained traction in other solution areas, a broader vision was brought to bear.

Perhaps Kinaxis embodies the most impactful development was bringing SaaS native and inline memory capabilities to the supply chain planning landscape offering "what if" scenario planning and real time rapid response capabilities. With an SAP partnership and complementary go to market strategy, this quickly gained momentum and set the bar for modern platforms and the associated value proposition. Shortly thereafter, OM Partners and O9 gained traction as disruptors in the planning landscape with broader visions of collaboration across a comprehensive data ecosystem and high levels of ingestive capabilities.

In the Transportation solutions landscape, Oracle's dedication to cloud-based environments and a leading transportation solution enabled the rapid migration of transportation to hosted environments while product organizations extended connectivity tools for improved customization and integration across a hyperconnected landscape. Meanwhile, several startups exploited modern technology platforms by focusing on AI based tools for rapid integration and implementation, delivering the core capabilities needed. This occurred alongside a rash of digital brokers developing tools to manage core transportation processes while focusing on AI based connectivity and data ingestion tools to recognize opportunities to profitably service the expansive transportation industry, first in spot markets, and then moving to contract carrier status with a focus on high service levels, and a goal to achieve preferred provider status.

Traditional warehousing solutions saw a variety of approaches to transform a highly monolithic and inflexible solution space into one capable of realizing the benefits of SAAS deployments from scalability to extensibility and upgradeability. With mission critical systems, providers had to make difficult choices about how tolerant their customer base would be to disruption in the upgrade path, and the risk of transitioning control to partners who, to-date, had underperformed from a supportability perspective. What evolved was a set of distributed strategies including one platform rewrite, one focused on hosted services, one hybrid approach to uplifting the monolithic code base into a SaaS native architecture, and one disruptor touting a canonical data ecosystem and consistent user experience across a broader portfolio of solutions (not SaaS but strategically similar in nature).

Ecosystem Connectivity: Building on the availability of capacity for data processing and storage, IoT data generation, AI based data insight development, and the hyper connectivity within and across organizations has rewritten what is possible and anticipating demand changes and business disruptions through the availability of information. Supply chain planning operations have greatly benefited from this development, and streamlined tools enabling the rapid access to these insights has been a major area of focus.

Enterprise Planning to Ecosystem Planning & Execution: Traditional planning processes were siloed, but the supply chain planning software industry has evolved from functionally based capabilities to leverage visibility within the enterprise, and then to enable collaboration across sales and operations. In recent years, this has further been extended through improved coordination from suppliers on the one hand, to demand sensing and customer collaboration on the other.

Execution solutions in contrast are far less forgiving of missteps in operations management. Execution products have focused more on developing quality assurance processes for cloud services and upgrade management. Therefore, a major focus has been ensuring secure, reliable, and seamless execution migrations. Connectivity, however, has also been a major area of focus as transportation managers seek to gain visibility across the expansive landscape of carriers and brokers and warehouse management providers seek to streamline the onboarding of automation providers through standardized adapters and prescriptive methods of interoperability.

Orchestration across supply chain planning and execution is nascent in its evolution. High value use cases have emerged while companies touting control towers have sought to develop a comprehensive, actionable ecosystem across applications…but the technology debt they are facing creates barriers and little has developed. The moves by SAP and Manhattan to embrace canonical data models on consistent platforms offer promise, but the reality is that customers truly committed to rapid response to shifting demand and supply chain disruptions must look internally at their own IT platforms and disruption management tools and processes for answers.

Newcomers, Disruptors, and Modern Platforms

a. The Proliferation of Parity in Standard Functionality

Each of the major areas of supply chain software capabilities have been impacted by disruptive vendors bringing functional parity on modern platforms, and in many cases, improving upon the toolkit, methodology approach, and support services as compared to the best of breed and ERP providers. We have already seen modernized platform players such as OM partners and Kinaxis disrupt the planning space, and we have certainly seen

streamlined solutions like Shipwell and then digital brokers disrupting the transportation landscape. We have also seen disruptors such as Softeon, Made4Net, and Reply having an impact in the warehouse management space by focusing on industry-centric use cases for manufacturing or order fulfillment. The expectation is the battle for the mid-market will be raged and won by these disruptive providers who bring better service and lower cost of ownership in the next 5 to 10 years, eroding the market share of the traditional leaders as they focus on portfolio strategies and struggle to uplift their platform for transformational opportunities.

b. Adjacent Technologies and Value Opportunities

In both planning and execution, the opportunity to leverage advancements being brought by innovative new entrants to the software and services landscape is also highly compelling. Many of those in the planning space have flown under the radar as the Tier 1 providers have attempted to mimic their insights, but substantial value remains through direct engagement. A specialty ecosystem of niche insights providers will continue to see growth in the coming decade. In the execution space, innovation has also marched forward to a steady rhythm, however with large organizations skeptical of the value proposition of modernizing architectures, these firms have failed to gain the traction due to them based on the value that they offer. As more organizations move to the latest platforms for their core capabilities, these adjacent solutions should be considered as part of any aspirational road map.

Planning and Defending Modernization Investment

The exercise of developing an IT platform strategy and road map can deliver tremendous value to an organization if the right approach is taken. Through facilitated workshops focused on current and future strategic differentiation, executive leadership teams have the opportunity to triangulate on the current and future competitive landscape, and how investment in and around supply chain IT can deliver the greatest value to the organization. Ideally, the facilitators will bring subject matter expertise to the table in terms of industry trends and technology impacts, challenging the leadership team's perception of how they might differentiate in the future. By defining the critical capabilities required to support an effective operating model and go to market strategy, the organization can look inward and identify build, buy, and partner strategies to uplift the current set of capabilities and hone in on key areas of investment for innovation to outpace their industry peers.

Looking forward, the urgency and complexity of implementing the future state vision will require the development and socialization of a sequential roadmap of initiatives capable of providing speed to value, targeted investment returns, and long-term strategic transformation.

Finally, developing a cadence for measuring the success of the various initiatives against the overall objectives of a transformational program and road map allows the organization to pivot where appropriate and respond to market realities while maintaining focus on and refining the long-term vision that the leaders have aspired to. This organizational consensus building then allows a more holistic approach to near and long term budgeting with a view towards positioning the organization for sustained revenue and profit growth.

Perhaps most importantly, the roadmapping exercises provide a comprehensive vision for how the transformation must develop and the long-term return on investment that it will provide. While not all initiatives will result in a positive return on investment within the preferred timeframe, the program approach offers an opportunity to transcend individual budgeting pitfalls while embracing a broader impact from investment associated with a transformational program, as well as the potential to be unleashed by developing a foundational platform to foster and expedite innovative thinking and speed to value for future investment.

The Urgency to Act

It's often said that Covid brought supply chain awareness to the board room, but the reality is that market disruptions (resulting in shifts in market share) have been initiated or accelerated over the past two decades by investment in supply chains by visionary companies recognizing the importance of customer experience. With evolutions in data availability and insights, supply chain orchestration is poised to increase its influence through its ability to address advancing customer expectations. The Amazon effect has rippled through the mentality of consumers and now has a presence in even the most static and predictable industries, and your customers and partners are not the only ones expecting improvements – impacts to revenue growth and operating profit are also expected by boards enamored with the financial returns being generated by AI.

The expectation of data availability and hyper-responsiveness to disruptions and risk is pervasive, but many companies lag in the investment to achieve this. If they cannot outcompete with product development, they will fall victim to value degradation and become a target for a competitor with a desire for acquisition and the associated synergies their innovative approach offers.

It goes without saying that the care and feeding of legacy applications and antiquated platforms will remain a disruptive cost center, creating headwinds to investment and progression of best practices and strategic customer engagement as long as they are in place. Ransomware is a material threat, and legacy code bases and deployment platforms undeniably present risk of a magnitude that could undermine business continuity and profitability. Platform security alone offers a competitive justification for modernization;

embracing the business opportunities adjacent to the modernization program only makes sense.

Modernization programs represent a large step forward in security and sustainability, but also bring the opportunity to re-establish a focus on customer experience and continuous improvement, with ongoing concentration in operational performance as a core competency. While some areas of your supply chain may not influence your operating costs or customer service capabilities, they do have a material impact on upstream and downstream processes that surely do. As investments are made across the supply chain, a modern platform will ensure that the data you need to support optimized performance and responsiveness is available.

No one would deny that competitive disruption has occurred across industries as technology has progressed. Advanced optimization capabilities, data insights, process automation, and AI have unleashed tremendous value for their investors. The ability to consume these disruptive capabilities is entering the DNA of those organizations that are positioned to capitalize on disruptions and pull away in their competitive markets. Time is running out to establish a culture focused on agility and innovation and supported by the appropriate tools and processes. Those who succeed will follow the age-old tradition of acquisition and assimilation, while those who fail will see shareholder value lost as they fall victim to those disruptive organizations at the forefront of technology investment.

1. Warehousing System Evolution

Warehousing technology has often been underappreciated and under invested in. The risk of disruption too often offsets marginal ROI opportunities for upgrades and improvements. However, with vendors driving aggressive SaaS migration policies, and automation offering opportunities for real operational impact, operators find themselves being forced to consider the longer-term implications and opportunities inherent in warehousing platforms. Critical considerations include the core WMS, software deployment platforms and the required organizational structure to support SaaS solutions, automation integration and orchestration, and a modern set of capabilities to fill gaps in the traditional offerings with adjacent solutions to automate or optimize the operational flows.

Innovators vs the Modernization of Legacy Solutions

a. Modernizing the Monoliths: BY, Infinios, Manhattan

Perhaps more than anything else, the warehousing software space has been defined by the manifestation of target markets and associated revenue sources pursued by market leaders. While industry focus (grocery, retail, CPG, industrial, 3PL) have influenced go to

market strategies, product investment and services strategies have fallen in line with what the core customer segments in those industries will support. Software licenses and support have traditionally been highly profitable, and services have been a revenue generator and offered the ability to smooth revenues in challenging economic times. With the emergence of SaaS deployments, a third element of revenue (cloud services) associated with the profitability has driven some level of restructuring across all of the major providers and brought a subscription focus (enabling a retrofit of traditional perpetual licensing to one far more profitable longer term). Thus, the migration to SaaS has become the centerpiece of the market leaders anxious to achieve aggressive revenue growth trajectories. This has become a bitter pill to swallow to customers being forced down a journey when discrepancies in support costs and service levels have become all too uncommon across providers.

While most companies are careful not to mandate a cliff event in their product roadmap, in reality, this is the approach that is being broadly taken or can be expected in the future of the major providers. Manhattan, in pursuit of a unified supply chain execution platform, have invested heavily in their Active solutions road map. With the emergence of Active, Manhattan's go-forward product strategy has all products converging to the Active platform, and in essence, ending in the discontinuation of support for their legacy products, as their previous solutions will no longer be formally supported for net new implementations or upgrades. This means that small and large customers alike are being encouraged to migrate to an evolving platform that risks gaps in capabilities, and the typical quality issues experienced with less vetted code.

Blue Yonder has also invested in SAS native capabilities but has pursued a hybrid approach to extending functionality and focusing on value-add capabilities only available through the Blue Yonder SaaS platform while also incrementally improving the technology stack for security scalability and interoperability with a broader portfolio.

Infios, (formerly Koerber) has traditionally been more customer friendly and have been slower to march down the SaaS migration path, but with new leadership and an increased focus on driving revenue streams leveraging subscription models, it is expected that the pressure will be on the sales force to migrate customers forward in the near future….the underlying challenge there is that the lack of investment in technology uplift to date means there is limited value from the cloud platform nor a cohesive strategy to migrate the legacy Infinios WMS, enVista OMS, and MercuryGate TMS.

b. Disruptive Software Solutions - Softeon, Jasci, Deposco, Made4Net

As one might suspect in the warehouse management space, the leading providers, while well proven, still bring some level of risk into migrations especially with some of these

platforms being unproven in highly specialized operations. There are alternatives that can be explored, some emerging WMS providers have focused on niche industries with highly specialized requirements, whereas others have focused on generic processes. All of these solutions can manage the basics for the typical 3PL or shipper environment.

A bit upmarket, Softeon has been recognized for years as a serious challenger to the traditional WMS leaders and have robust deployments with leading 3PL providers proving that they have the level of agility to manage across various industries. Other emerging providers such as Jasci, Deposco, and Made4Net, are reflective of companies bringing standard capabilities to modern platforms with much lower points of entry from an investment perspective, and also lower cost of ownership over time. For operations with specialized use cases, these should be considered serious contenders. For the more commodity style operations, these providers can be considered front runners as candidates to manage operations in a cost-effective manner.

c. The Evolving Landscape of Services & Solutions Providers

The implementation partner community has always been critical to the larger software solutions providers. Largely, this emanates from an extended go-to-market strategy leveraging alliance ecosystems with strategic relationships and interest in the revenue streams associated with implementation support. This was especially true in the large-scale ERP implementation that supported the early establishment of the leading best of breed providers which focused on the large consultancies. These remain important partnerships and have become even more relevant as the larger consultancies focus on transformational strategy and change management, adopting best of breed solutions as the next evolution of operational excellence.

An interesting component of this market has emerged through niche providers offering highly capable solution architect and configuration specialists. Highly effective throughout implementations and rollouts, these organizations have expanded their offerings to include support and managed services. Additionally, they have extended into solutions or even portfolios of shelf modifications and standalone applications that supplement some of the gaps and values of value leakage inherent in the software provider solutions.

The result has been the development of strategic partnerships that transcend the traditional vendor customer relationships and offer substantial value, especially in those more highly specialized or higher volume industries. With the development of modern platforms, these solutions have also evolved and can now be consumed in a more plug and play approach with limited oversight and change management risk.

d. Warehouse Execution & Automation

Warehouse Management Systems alone will only suffice for so many facilities. In the modern era of ecommerce, the rate and pace of goods needing to be picked and packed at the eaches level exponentially increases the pressure on the system and capacity, requiring adjacent technologies such as Automation which is often powered with the intelligence of a Warehouse Execution System. The combined impacts of these solutions are critical in high volume operations to increase throughput and improve inventory and shipping accuracies.

Pressure remains on manual facilities to improve speed, productivity, and accuracies as well. In order to track how efficiently they're transacting; Labor Management Systems are often employed. By using Labor Management, organizations can understand what facet of their material handling is the most time consuming for their associates, and how shifting their Units of Measure that they handle their SKUs in will impact their ability to meet customer expectations based on their existing staffing levels, or if there's a need to increase or decrease headcount significantly – particularly around peak seasons.

With an increasing trend of labor scarcity in warehousing environments, engagement and retention has become critical. Increasingly, we're seeing associates in high density labor markets moving employers for minimal wage increases, so if you can create an environment where they're engaged, and their job is straight forward, your retention will increase, therefore maintaining higher accuracy due to more skills staying in-house and mitigating constant new hire trainees.

When associates know what is expected of them, and can consistently deliver expected results, they can see their direct impact and feel accomplished which increases their job satisfaction and likelihood to stay. Observations and performance reviews, once viewed as oversight processes to correct bad behavior, are being re-tooled to focus on education and engagement of employees to ensure they are positioned to succeed.

Adding to the engagement theme and providing greater flexibility in promoting employee satisfaction, labor demand algorithms are better predicting labor needs and converting gaps to opportunities to auction shifts to offset overtime, cross-train users, or provide reprieve to employees looking for some rest and relaxation.

Flexible scheduling brings the coup de grace by allowing associates to opt in to alternative work schedules and available shifts being auctioned that fit with the demands of modern lifestyles, whether that be caused by childcare, elder care, or other commitments.

e. Complementary Solutions in the Broader Ecosystem

One needs only to walk the floor at a trade show or user conference to gain awareness of the variety of adjacent or bolt-on solutions that exist in the warehousing ecosystem.

SVT Robotics has taken a step towards eliminating overhead in connecting automation solutions to the variety of warehousing platforms (not to mention versions) that have been deployed. Taking an adapter-like approach, SVT accelerates mapping, lowers the cost of implementation, and thus promotes the expanded adoption of automation.

From a multi-enterprise perspective, electronic Bill of Lading capability was developed by the MacGregor partners - now part of Accenture. This tool is interesting both because of the value of electronic documentation and improved process flows for reducing driver return times (an imperative in many carrier organizations incapable of recruiting the necessary level of driver resources). The promise of this solution partially lies in the fact that adoption can be viral; As each shipper onboards the functionality, they can connect to all retailers and grocers capable of ingesting the inbound data for improved communication and receipt accuracy.

Autoscheduler.ai emerged as large consumer goods shippers sought to integrate improved process flows considering transportation and warehousing into their WMS environment. While some WMS providers are investing in developing tighter integration and orchestration capabilities, this tool remains a valuable candidate for complex operations with large footprints.

Longbow Advantage, as an early services provider and partner, built an analytics framework to improve operational visibility and long-term continuous improvement, and has now grown to become a portal to extend the visibility beyond the organization – which can be particularly important for 3rd party logistics providers.

In an interesting twist, Infinios has purchased DM Logic's Step Logic tool; a tool built to extend the data structure and dashboard capabilities of multiple WMS platforms. Initially heavily funded by the pharmaceutical clients seeking alternatives for managing serialization in a pedigree ready environment, this tool is now the de facto serialization solution across multiple industries with complex requirements.

Finally, there are a plethora of new labor management solutions hitting the market leveraging AI to identify and translate labor demand trends into forecasts and scheduling capabilities. As the labor market tightens, and a technology savvy and uberized workforce demands improved visibility and engagement tools, these are poised to have a material impact on the way that companies recruit and retain warehousing associates.

f. Understanding the core warehousing software landscape:

Functionality: Warehousing has long been a mature and stable market (aside from the influences of order management and automation), so most of the major players have comparable core functionality (at least, specific to warehousing). Where they have the opportunity to set themselves apart is in their strategic investments in capabilities to enable the workforce to make smarter, more efficient moves to evolve to the modern distribution pressures. Some examples of this are waving processes (including allocation logic, work assignment generation) which flows into task assignment (optimized for priority and proximity) and in contrast, the adaptation of waveless, or streamed orders which allows for priority ecommerce orders to live-time be prioritized ahead of recurring wholesale pallet work. Labor management capabilities, slotting and product movement policies, and freshness management are areas with material cost savings impacts. Other areas of differentiation can be around industry specific needs such as cold-chain, serialization, or traceability since those can be relatively complex needs for many pharma or cold chain distribution operations. The underlying approach to configurable processes and extensibility also drives strong differentiation for some vendors in the industries that require them.

Portfolio: The market's preference for point solutions versus portfolio players has been a pendulum over the years. Realistically, there's a lot of traction and benefit to having a portfolio play to mitigate integration risk, but it should not be the end-all be-all in your decision of who to work with. A portfolio player can show their strategic outlook as a long-term partner who is thoughtful about the needs of your organization, and its ability to break down supply chain silos through technology, but it's not the only way to get there. Considering the right partner for warehousing may require deep evaluation of order management and warehouse execution (or automation interoperability). Labor management is declining in relevance in some industries but retains relevance for highly manual operations, whereas transportation is often positioned as an adjacency but for real value, we'd recommend exploring the third-party ecosystem with solutions such as autoscheduler.ai or Loadsmart's appointment scheduling tools.

Technology: Secure, scalable, supportable and future proof (to the extent possible) – the technology expectations of a WMS vendor are fairly straightforward, but the intricacies in architecture, instrumentation, and the support organization available to ensure uptime and SLA targets are met are elusive even for many at the larger sales organizations of tier 1 providers to articulate. Security is better relied upon by the experts at leading cloud providers (who most WMS providers have partnered with to own this area). Scalability cannot be assured by computing power alone, instrumentation, alerting, and even self-healing capabilities should be understood in high volume environments – and this flows

directly from scalability to supportability in asking what the investment is in tools, processes, and personnel to ensure rapid response is available to issues encountered in the mission critical environment.

While there are no guarantees around future proofing, the product development approach to seamless upgrades has matured, enabling more frequent and less disruptive upgrades, but risk remains. Automated testing tools like Cycle Labs can drive higher levels of quality over the long term and should be built into your technology strategy, or a deep dive into quality assurance during patching processes will be warranted – big risks and costs are at stake.

g. Critical success criteria for selection of the core warehousing solution.

In summary, let's get back to the promise of SaaS and the threat of rubber stamping a vendor for an upgrade / SaaS migration without fully appreciating your organization's needs (current and future), and what the best fit of solution(s) are from the broader provider ecosystem, that will meet your needs with limited complexity and low overall cost impacts.

When selecting a core Warehouse Management offering, there's several key components to the story to gain traction both with your executives as well as to help you maneuver through the process and make a well-informed decision. Some critical success criteria you may look at for each vendor may be:

- The size and scale of their largest projects
- The number of live facilities or square feet/meters live in your industry (especially if you have a highly specialized industry like Pharma or currency)
- Number of installs in your country and/or preferred language
- The availability of partners to perform or supplement your implementation and support
- The referenceability of customers – a very telling indictment of their focus on relationships, follow through, and organizational depth and service levels.

Since Warehousing is mature, the primary value proposition is either to not fall behind on the support/upgrade path, or to get ahead of the competition with the latest functionality regarding market pressures such as order streaming or waveless fulfillment. The maturity of your organization will help you understand the climate of the value needed, but both outcomes come from upgrading or investing in newer technology.

Change management is key to any major transitions in your organization. Whether you're upgrading an existing system that many are already familiar with, or bringing in a totally new technology, managing expectations, communicating widely and frequently, and incorporating the team from the start will be extremely important to the adoption process. Organizations that fail to bring in their front-line team members into the conversation early

lose critical momentum for positive excitement and ownership from the team who will be most impacted.

h. Developing the list of vendors and partners for evaluation

Your relationship with the vendor is critically important because the lifetime of these relationships is typically no shorter than a decade. You want to feel confident that they are going to support you, listen to your needs, and be a true partner. While many of these vendors have been around for a long time, and they know a lot, make sure they listen to you and don't make general assumptions about your business – they are not invested in bettering your business, only to gain commitment to some level of services to get you to the next version / deployment (change requests are far too common in this industry). The better you build an upfront understanding, the stronger the project team's scoping and proposals will be because of their understanding of your challenges and pain points.

When narrowing the field for vendors, focus on the core offering – in this instance, WMS. Yes, the peripheral technologies such as labor, tasking, and automation, are important, but getting the core essentials right that match your business needs first is essential to amplifying the benefits of the other tools. Don't be beholden to limiting yourself to your ERP or a legacy best of breed provider, but open the educational process to include candidates and accelerators from across the landscape. There are tremendous learning opportunities to understand, compare, and contrast the value propositions and differentiation approaches across providers.

Once you've narrowed your field to the key players that most align with your business needs, the RFP pool should have 2 candidates in the sweet spot, and 1 as a challenger. Having these different perspectives will give your team context to compare pros and cons, and a basis for cost negotiations. Be careful though, there is a difference between a good deal and a poorly scoped project (and rushing to judgment will surely deliver the latter).

In addition to core competencies, the industry always has new innovators breaking ground to solve problems that have plagued the industry. While not make or break to the project as a whole, it's helpful for long-term thinking and strategy to be aware of the players who could disrupt or complement the tools you are selecting from. These innovators often address the value leakage in between applications, or other times they may just be able to handle information that can drive better performance.

Just as important as the technology is the team that supports and implements it. They knowledge of the tool, the industry, and best practices that will help you get the most value out of the tools you're investing in are key to your success and mitigating risk throughout your journey. Some implementation partners will come in with their own tools that either

adapt the core toolset or sit on top of it, which is also important to understand how you will work with them both during implementation and after go-live.

i. Anticipating Organizational Impacts

Warehousing programs have long been victimized by lack of investment. But, the traditional 'set it and forget it' approach can no longer apply if one is to offset the cost of investment to move to SaaS platforms. In this model, SaaS vendors shoulder more of the burden for the care and feeding of the application, and also offer opportunities to more quickly react to product improvements made available without disrupting the core application, but without an organizational model positioned to support operational excellence, there will be no conduit to ensure these take hold. Further complicating the situation, it should be recognized that with invariably shifting product demand and ordering patterns, there is a natural degradation of warehousing configuration effectiveness. Finally, the increasing labor market risk is driving more investment in automation which requires additional skill sets entirely.

Any warehousing modernization or transformation program offers the opportunity to address these likely gaps in organizational design. The opportunity to consider up front organization needs in the steady state, planning for operational agility, resiliency, and reliability, can deliver a staff development and training plan with hands on experience with the inner workings of the warehousing and automation configuration, and the management of the installation, acceptance testing and maintenance training will ensure awareness of the automation environment.

Warehousing implementations offer unique challenges and opportunities to upskill internal resources due to the far-reaching impacts and rigid cutover requirements. Planning for a steady state staffing model at the core of the implementation team will ensure those resources acquire the necessary skills, and allow them to grow into roles where improvement and innovation are central to the role and culture. Supplementing that core team with the right partners and experienced skill sets will foster that growth.

2. Transportation System Evolution

Digitalization has dramatically disrupted the transportation management marketplace and with it the technology landscape that support it. From software providers to digital brokers to hyper connected carrier ecosystems, we have seen functional convergence, consolidation, support deterioration, and expansive innovation. We see customers investing in (but typically failing to fully capitalize on) capabilities to drive actionable responses to real-time transportation disruptions, while their technology support requirements become ever more complicated and costly. In parallel, some of the premier software providers have seen their competitive differentiation erode while legacies of putting profits before relationships have put their install base at risk. Provider strategies have diverged in focus across use cases for a) shippers, carriers, or brokers, b) domestic vs international, c) middle mile vs last mile, and d) planning vs execution, we believe it is time for enterprises to reconsider the core capabilities required to support their transportation needs, and to develop a road map to deliver a strategic architecture and supportable transportation ecosystem to manage costs while delivering the promise of the innovations available.

a. Transportation Ecosystem Evolution

The transportation solutions provider ecosystem is at a critical juncture between the evolution of traditional software providers and the infusion of new, innovative solutions concepts and services providers. There is an opportunity for operators and their partners in IT to develop a holistic approach to developing the platform and implementing the tools, solutions, and partners that will deliver optimal value. It is a perfect time to take a step back and consider a pragmatic roadmap for transportation capabilities.

The TMS ecosystem is less monolithic than its adjacent solutions, with a steady stream of new solutions emerging, followed by consolidation of maturing solutions into broader portfolios. The result is a landscape dotted with disconnected solutions, questionable stability due to lack of controlled customization, and poor support quality that is tolerated due to well recognized challenges in upgrades and migrations. Recent transactions of MercuryGate and BlueJay offer some opportunity to correct past mistakes, but these will come with considerable cost and it's not clear if e2Open and Infios are really in a position to invest in the product as they stabilize the services ecosystem and attempt to transition their customer bases to SaaS. You can certainly expect customer retention will be more challenging than historical indicators for these companies in the coming years. Additionally, switching costs are lower relative to transportation costs than say a WMS, so software relationships are more volatile and ready for reconsideration.

The real leaders in the industry, at least for shippers, are Blue Yonder and Oracle, both of whom have seen solid progress in converting customers to SaaS environments. The challenge they'll see is more related to cost of ownership as emerging providers bring parity with core capabilities and accelerated implementation tools and timelines to minimize switching costs and provide a clear justification to migrate away.

SAP has made investments in their transportation capabilities, but lacks substantial parity relative to the leaders, and as such, are limited in scope to less mature organizations that focus on tracking versus optimization, or larger organizations that rely heavily on managed services providers. However, the cost of ownership for SAP remains high. As a result, companies such as Mastery Logistics and Rygen have emerged with advanced platforms focused on hyper-connectivity and rapid onboarding to do just that. The differentiation those tier 1 solutions bring is associated with their planning capabilities, both of which benefit from connectivity to forecasting and replenishment tools. As of now, we're not seeing the right level of focus on combining streamlined execution with more elegant planning tools. The next round of consolidations may well remedy that, with companies like Ortec or 4Flow pairing up with Mastery or Rygen to offer a best of both planning and execution suite. Formally or informally, we expect to see these relationships gain traction in the coming year.

The other disruptors here are the data aggregators and digital brokers. FourKites and Project44, and to a lesser extent, FarEye are all examples of data aggregators who were infused with tremendous capital. They did a great job of marketing, but the results to date of their value proposition. It is questionable whether they've solved the core problem they promised, and most have pivoted to solution development to address the core transportation landscape to which their data can add value (currently managed by the legacy TMS leaders we're familiar with). In this context, they represent an opportunity to refresh core transportation management solutions, but have failed to gain traction yet to be real challenger. On the other hand, digital brokerages have emerged with tech that can provide the same core transportation functions (granted they've managed these processes as brokers at scale), and they've accumulated great insight into the profitable engagement of carriers and orchestration of shipments. The tech is solid and can extend beyond the broker ecosystem for core TMS functions. As such, companies like Transfix are also poised to follow a path similar to the one mentioned for Mastery and Rygen.

b. Core Functions and Value Drivers

Transportation management solutions typically evolved by focusing first on execution (tendering, tracking, financials) and then expanding into planning (routing, pricing, and load planning (and ideally, these three as part of one engine/solve).

Perhaps the biggest question when considering the best fit TMS for your organization is the importance of robust planning capabilities which can include load and route optimization as well as routing and tendering decisions. For manufacturing organizations, much of the transportation plan will be dependent on maintaining safety stock in the distribution centers and fulfilling customer orders, so upstream interdependencies with supply chain planning and order management tools can greatly influence performance.

International and global trade requirements include highly sensitive customs processing capabilities, an increased need for visibility throughout those processes, and connectivity to trade management or taxation functionality. This may be increasingly important now as the administration considers tariffs and surcharges based on both country of origin and also destination ports.

Fleet optimization (largely addressed by core TMS from a planning perspective, but brings complexities of asset tracking, driver scheduling, truck maintenance, etc) is another considerable area of functionality needed by carriers and shippers with private fleets. Quite often fleets require specific route planning capabilities typical of dedicated routes, but there is also upside with adding dynamic stops or backhaul opportunities to the mix.

Digital tracking and insights into potential disruptions came on in force in recent years and have largely matured with large customers leaning in on the front end of investment. Now the challenge will become driving a higher level of automated actionability associated with those insights which requires additional insight into interoperability across the broader transportation platform.

Finally, there is a broad category of data aggregators that have used integrations and screen scraping technology to mine data from across the transportation landscape. In essence, these are multi enterprise hyper connected solutions that have gained recognition as digital tracking solutions, but also have seen applications in freight marketplaces, pricing insight solutions, appointments scheduling capabilities, and electronic bill of lading and ASN connectivity ecosystems.

c. Differentiation across the landscape of providers

Functionality: Digital brokers and data aggregators have reached parity for basic execution capabilities, and will be taking share from the larger providers for the more basic operations, though there is upside for tightly coupled planning and execution capabilities which if needed would require a partner solution (Kinaxis uses 4Flow for example, whereas Ortec has often attached itself to warehousing and transportation environments). A single provider approach can deliver streamlined implementation programs, but beware that at least a few of the prominent suppliers of these solutions are in essence modularly based

and lack tight coupling of the solutions, meaning there are limitations to continuous planning as the execution of those plans develop and evolve.

Portfolio: A portfolio-based approach can deliver streamlined implementation programs, but those who offer them have failed to invest and haven't captured many of the synergies available. Perhaps one exception is the planning / transportation landscape where inventory replenishment and load planning can deliver strong asset utilization. The more dynamic world of order fulfillment (a focus on order promising, sourcing, warehousing (ie order processing), and transportation) lacks a shared logic model in the industry.

Technology: SaaS adoption has progressed well in the transportation management technology space. There is, however, an aversion to multi-tenant environments and the associated risk, especially considering patching and upgrades. Validating vendor strategies for quality assurance processes should be central to vendor interviews and selection. How to embed automation and streamline connectivity across the ecosystem is a challenge we've seen some vendors try to address but more robust organizations take ownership of upgrade management and quality assurance, eliminating (with solid reasoning) some of the upside of SaaS.

Overall: To revert back to the promise of modernization and what companies should aspire to in terms of capabilities for their transportation ecosystem, it's really about focusing on the best fit for solution for each individual area and then rationalizing the vendor ecosystem for the right balance. Inserting automation capabilities and hyper connectivity as a critical requirement will round out the platform approach and ensure the investment road map will deliver the promise of modernization.

Critical Selection Criteria: There is no silver bullet for a transportation solution that will service the needs of every shipper and/or carrier. So, it is important to identify the most critical areas of your transportation landscape and to develop selection and migration strategies to support those technologies in an effort to templatize the approach and replicate it for the areas where more basic solutions or partner strategies will deliver the needed capability. That being said, capabilities in load and routing optimization as well as global trade capabilities are paramount to understanding the best fit, alongside industry and product centric requirements handling. Beyond that, revert to usability and cost of ownership as the primary value drivers.

As the basic requirements and the criticality of those requirements are understood, an appreciation for the portfolio capabilities of those vendors best positioned to deliver should be considered alongside the general experience of customers of those vendors and the strength of the relationship which may drive a streamlined portfolio strategy with economies of scale, but also may suggest diversification for risk mitigation purposes.

For basic platform technology such as process automation and integration while vendors are stretching their comfort zones to deliver additional capabilities, these come with a price that should be challenged internally from an opportunity cost perspective in terms of control and ROI. Likely there are synergies in other areas of the business that warrant investments in these areas if a strategic vendor solution for process automation and integration platforms has not been established. For specialized transportation capabilities, a substantial look at tier 2 and tier 3 providers is certainly warranted as parity in the industry has delivered a plethora of providers that can support these functions with high levels of service, less risk, and lower cost.

d. Developing the list of vendors and partners for evaluation

With a broad array of potential suppliers, RFI's may be issued across a wide spectrum of candidates. Likely those with applicable success stories and a competitive pricing strategy will lean into replies and offer compelling alternatives. For areas that may be recognized as likely later phase requirements, RFIs and interviews with the providers of international transportation and trade management are warranted to anticipate a future state architecture and the complexity of a longer-term roadmap, but we'd stop short of full architecture and design until preceding phases are past design.

Short listing a few vendors for RFP with a focus on the core functional need is also in the interest of the organization in order to streamline the education process and drive more effective consensus and decision making. It is advantageous to consider at least one portfolio play here but to urge a focus on the problem at hand and a heavy consideration to the cost benefit of the options.

e. Anticipating Organizational Impacts

While the broader ecosystem of solutions and providers is relevant, the more important element is how your organization will invest in the technology platform and skills required to consume them versus judging the pros and cons of various road map opportunities to be addressed in coming years.

Organizational disruption will be dependent on the severity of change to which you are committing at any given time. However, if your organization is committed to taking advantage of the capabilities that come with the modern platform, it is advantageous to assign a transformational lead that is deeply familiar with the transportation ecosystem in which you operate and capable of facilitating change across multiple areas of your organization including operations and IT. This individual will bear responsibility for strategic planning, budget tracking, and change management. This is also an area where a strategic advisory such as SCT can play a pivotal role.

In the IT organization, trade-offs will need to be evaluated between partner relationships and building capabilities in house. Expanding the familiarity of an enterprise architect who can orchestrate both internal and external integration resources is a key activity. Adding skills associated with process automation and integration to your Center of Excellence if they do not already exist will bear benefits both in the transportation ecosystem and beyond. Finally, identifying enthusiastic and capable leaders will smooth the change management process and deliver a higher level of success.

3. Planning & Orchestration

Supply chain planning systems are under increasing pressure to deliver more than just forecasts and allocations — they must serve as intelligent, connected, and responsive engines of enterprise orchestration. As with warehousing and transportation, this domain is experiencing accelerated disruption: the push for modernization is not just about speed or cloud adoption, but about realigning planning architectures to deliver profitability, resilience, and control in the face of volatility.

For many organizations, the legacy of siloed planning tools, overly manual processes, and disconnected workflows has limited their ability to respond to demand fluctuations, supplier constraints, or geopolitical shifts. At the same time, new entrants and evolved incumbents offer platforms with built-in intelligence, embedded collaboration, and real-time responsiveness — enabling scenario-driven decision-making and automated response to change.

As the market has evolved and matured, it has become obvious that the age-old adage that 'failure to plan is planning to fail', is as pervasive as ever, and in this instance, failing to plan to modernize your planning ecosystem is setting your long-term strategy up for failure. As your organization and executives bolster your long-term plans, it's imperative that there's a cohesive end-to-end view that incorporates a modern planning stack that allows your organization to leverage the latest technologies such as AI, Control Towers, and Integrated Business Planning in order to amplify the benefits and increase your organization's flexibility and proactive abilities.

a. Planning Ecosystem Evolution

The shift from Master Resource Planning (MRP) and standalone Sales & Operations Planning (S&OP) to enterprise-wide, AI-enabled planning and orchestration platforms has been underway for a decade. Recent shifts in data infrastructure, real-time analytics, and SaaS deployment models have catalyzed a new wave of transformation. Modern planning no longer resides within a single function. Instead, it serves as a dynamic decision engine, integrating across sourcing, fulfillment, finance, sales, and external partners.

Today, we are evolving towards **ecosystem orchestration**—platforms that interconnect supplier networks, marketplaces, retail channels, logistics nodes, and macroeconomic signals in real time. This allows planners not just to optimize within the enterprise, but to shape demand and adjust upstream and downstream across a multi-enterprise value chain. We are entering the age of the **Autonomous Planning Layer**—a landscape where inputs from sensors, partners, marketplaces, and macroeconomic signals feed directly into planning systems that generate prioritized, prescriptive actions.

Planning vendors such as Kinaxis, O9, and OM Partners have redefined the baseline—enabling what-if simulation, concurrent planning, and rapid response capabilities as core competencies. These capabilities are no longer aspirational. They are the new standard.

Are you ready to consume the data you already have?
With IoT devices, cloud data lakes, POS systems, and market intelligence sources at your disposal, the limiting factor is no longer access, but readiness, and the ability to manage the data processes. Many organizations have extensive amounts of data, but haven't known how to make heads or tails of it yet. There are endless ways to interpret data, and having an intentional approach about the specific trends or anomalies your organization cares about is an important first step to figuring out what data feeds to analyze. Clean data is also of the utmost importance. If the data isn't already in a clean format, it won't be the easiest to synthesize or connect the dots. These preliminary steps will make a world of difference in your long-term plans and strategy.

What-if Planning and Machine Learning: Modern platforms enable planners to simulate multiple outcomes (promotions, supply disruptions, pricing shifts) and quickly identify the most profitable or resilient scenario. Machine learning enhances this by learning from past events and continuously improving forecasting accuracy. By allowing planners to play out the different scenarios they have in mind with different market pressure scenarios, they can better understand the implications of various choices. When your planners can understand the cost and value trade off decisions available, they will continue to make better business decisions that will help mitigate risk both for the short and long term. These learnings will then be able to be re-incorporated into future scenarios and the system becomes smarter as your associates do too. It's a multiplied benefit of both your human resources and technology resources symbiotically learning from each other and growing the business concurrently.

Collaboration and Connectivity: Hyper-connectivity is no longer optional. Orchestration demands visibility across sourcing platforms, marketplaces, logistics providers, and retailers. Real-time APIs, digital twins, and cloud-native solutions are enabling supply chain teams to break silos and collaborate cross-functionally and cross-enterprise. This visibility will be the game changer to make smarter decisions faster to stay competitive. Without breaking down silos to understand where your inventory is, or where your demand signals are coming from, the left hand won't know what the right hand is doing, and you'll still be living in a 20th century world. By leveraging the aforementioned accelerators such as APIs and digital twins, your organization have a more wholistic view and representation of all the pressures the business is facing, and the macro impacts to decisions needing to be made for the best interest of the supply chain and customer satisfaction.

Rapid Response, AI, and Real Time Orchestration: AI-powered decision engines are now capable of triggering automated responses—rerouting orders, reallocating inventory, or reprioritizing production—in response to real-time events like port delays, demand spikes, or extreme weather. This is the future of resilient planning whereby anomalies aren't an anxiety inducer, but rather there are preventative measures already anticipating them.

b. Core Functions and Critical Capabilities

A modern planning platform must address the foundational pillars of supply chain decision-making while embedding flexibility, speed, and intelligence. Capabilities can include, but aren't limited to:

- **Forecasting & Demand Sensing** – ingesting internal data and external signals
- **Supply Planning** – multi-echelon, multi-source optimization
- **Inventory Optimization** – node-based and network-wide, with dynamic safety stock
- **Production Planning & Scheduling** – finite capacity-aware planning
- **Scenario Modeling** – trade-offs across cost, service, and risk dimensions
- **Collaboration** – visibility and input across functions and partners

From Planning to Orchestration

The evolution of supply chain planning is best understood as a progression from inward-looking forecasting tools to externally connected, multi-enterprise orchestration platforms. Below you can see the evolution charted in stages, or eras if you will, marked by the technologies that enabled the planners at that point in time:

Stage	Capability Focus	Technology Foundation
MRP	Materials Planning	Batch ERP, On-Prem
S&OP	Enterprise Alignment	Integrated Modules
IBP	Cross-Function Planning	SaaS, In-Memory Models
Orchestration	Real-Time, Automated Response	AI, APIs, Cloud Native

The emerging stage is orchestration: a seamless integration of planning, execution, and decisioning logic that uses structured and unstructured data to trigger prescriptive actions in near real time. This latest era is allowing for organizations to make decisions in real-time with relevant information as it's happening. This allows for decision making that's not mired in delayed intel and anecdotal finger crossing. With technologies that are talking to each other and collaborating about what's happening in the real world, organizations can have confidence that the decisions being made are what is best for their customers both for the immediate needs and long term greater good.

c. Insights & Actionability Technologies

Modern planning must be insight-led. Leading platforms ingest and act. The planning tools of tomorrow will not simply report KPIs. They must generate them, prioritize them, and act on them.

Emerging systems are being built to ingest data such as:

- **Commercial and Channel Insights** (POS data, loyalty, marketing effectiveness)
- **Macroeconomic and Sentiment Indicators** (inflation trends, consumer behavior)
- **Geospatial & Environmental Data** (weather, shipping lanes, regional volatility)
- **Operational Signals** (machine status, lead time variability, OTIF performance)

From the data ingested, a clearer picture is created to help organizations gain insights into behavior drivers in their consumer base. These insights are then translated into actions. Automated adjustments to production schedules, dynamic reprioritization of shipments, or revised sourcing logic based on trade policy impacts or lead time risks are some of the decisions made to meet consumer demand patterns that are identified through the data feeds coming in.

The most sophisticated planning environments convert insights into action. Some key examples include but are not limited to:

Procurement Strategies

- Dynamic trade-off modeling between lead time, landed cost, and risk.
- Strategic sourcing scenarios and tariffs mitigation.

Demand Shaping

- Price optimization and elasticity-aware promotions.
- Joint business planning with key customers and distributors.

Inventory Balancing

- Multi-echelon optimization with dynamic safety stock modeling.
- Return-on-inventory investment prioritization across channels.

d. Differentiation and value proposition

The planning market has evolved with technology as well. Due to varying investment levels, the market has bifurcated into:

1. **Modern Platform Providers** – Kinaxis, O9, OM Partners offering in-memory simulation, native SaaS, and real-time response capabilities

2. **Modernized Legacy Providers** – SAP IBP, Oracle SCP, Blue Yonder offering integration with broader suites and scalable enterprise depth
3. **Insight Layer Innovators** – Tools like Prevedere, Elementum, and custom ML overlays offering next-gen ingestion, visualization, and alerting

Each tier has its place depending on organizational maturity, strategy, and risk appetite. The core question becomes: are you buying a better forecast, or a new way to run your business? It's important that each organization evaluate whether they have the appetite to make incremental changes or if they want to overhaul their abilities altogether ahead of making their selection since this will greatly impact their selection process and criteria.

e. Critical Success Criteria

Because the investment levels and variance in capabilities are so wide ranging, it's important for organizations to understand which capabilities are most important to your own success story. While each of the below functionalities is value-add, some will amplify benefits more than others when applied to specific situations or combined with specific capabilities in a 1+1 =3 type setting.

Success in planning transformation depends on:

- **Scenario Planning Proficiency** – the ability to simulate and compare outcomes
- **Data Integration Readiness** – the ingestion of internal and external signals
- **Latency and Speed** – sub-day response cycles for disruptive inputs
- **Platform Extensibility** – an ability to plug into MES, WMS, OMS, and finance
- **Execution Alignment** – a closed-loop orchestration with execution systems
- **Change Management** – upskilling planners for AI-informed decisioning

f. Designing the Journey

Planning transformation must be purposeful and phased. Key steps include:

- **Define the North Star**: Clarify your orchestration ambition—speed, resiliency, cost control, or all three.
- **Baseline Current Maturity**: Assess existing planning processes, tools, and organizational capabilities.
- **Build the Business Case**: Anchor investment to enterprise objectives—customer experience, inventory turns, margin expansion.
- **Engage the Ecosystem**: Evaluate core platforms, insight providers, and services partners for best fit.
- **Plan for Adoption**: Establish a Planning Center of Excellence to steward capability development, support rollout, and monitor value realization.

Modernization Planning

After reviewing this paper on the promise of embracing a more holistic value-based approach to modernization through transformation, we hope you have achieved a bit of an appreciation for the importance of a thoughtful planning process to ensure organizational alignment on the objectives and an educational process to explore the recent developments in supply chain best practices, software, and services providers.

Our methodology focuses on first developing consensus across organizational leaders regarding the importance of each functional area under consideration to the long-term strategy of the business, including the critical capabilities needed to achieve that strategy. By mixing stakeholder interviews and educational sessions to develop a point of view on success factors across the organization, SCT plays back key concepts for consensus building. Applying corporate IT strategy, tools, and capabilities to the functional requirements and opportunities available to improve performance within these supply chain functions while balancing value, cost, and complexity, we'll deliver a prioritization model enabling a thorough approach for exploring options and developing a business case and road map for the migration.

During this exploration, it is highly recommended to thoroughly vet any and all options on the table including:

- Incumbent strategies: many vendors have dramatically altered their product roadmaps to align to a broader platform strategy. This may include native SaaS development strategies with cloud operations implications, integration platform mandates, the re-architecting of data models, and reimagination of application logic. These uplifts may necessitate a partial or complete reimplementation of this solution.
- Alternative solutions: many newcomers to the supply chain software landscape have built upon modern platforms and quickly achieved parity for the basic capabilities required to operate supply chain solutions. With streamlined processes for implementation, less complexity and system configuration, fresher support models, and a lower cost of ownership, these solutions can easily replace legacy products that have become burdensome to manage.
- Accelerators: Many smaller but high value solutions providers have emerged leveraging unique access to develop data insights or pragmatic approaches for the extension of application logic or interoperability across solutions that are worth considering from a value creation perspective. The landscape is broad, but the

promise is considerable, and understanding how these bolt-ons might be consumed as an adjacency to the core applications and platform provides quick win opportunities.

Once your organization's future state requirements have been identified and prioritized, a combination of Requests for Information (RFIs) And Requests for Proposal (RFP's) offer opportunities for education and the delivery of a short list of contenders to engage in the selection of core Solutions or services and accelerators to round out a future state architecture design and road map planning process. The more intrusive or costly of these solutions should certainly be vetted through an intense process of demonstrations, scoping and staffing workshops, and contractual negotiation prior to commitment.

The final deliverable from our planning process should not be limited to an implementation plan, but rather focus on both longer-term road map opportunities, and also steady state staffing plans and partner arrangements to ensure the appropriate level of reliability resiliency and continued improvement warranted by the required investments.