NUCLEUS RESEARCH

WMS TECHNOLOGY VALUE MATRIX 2023

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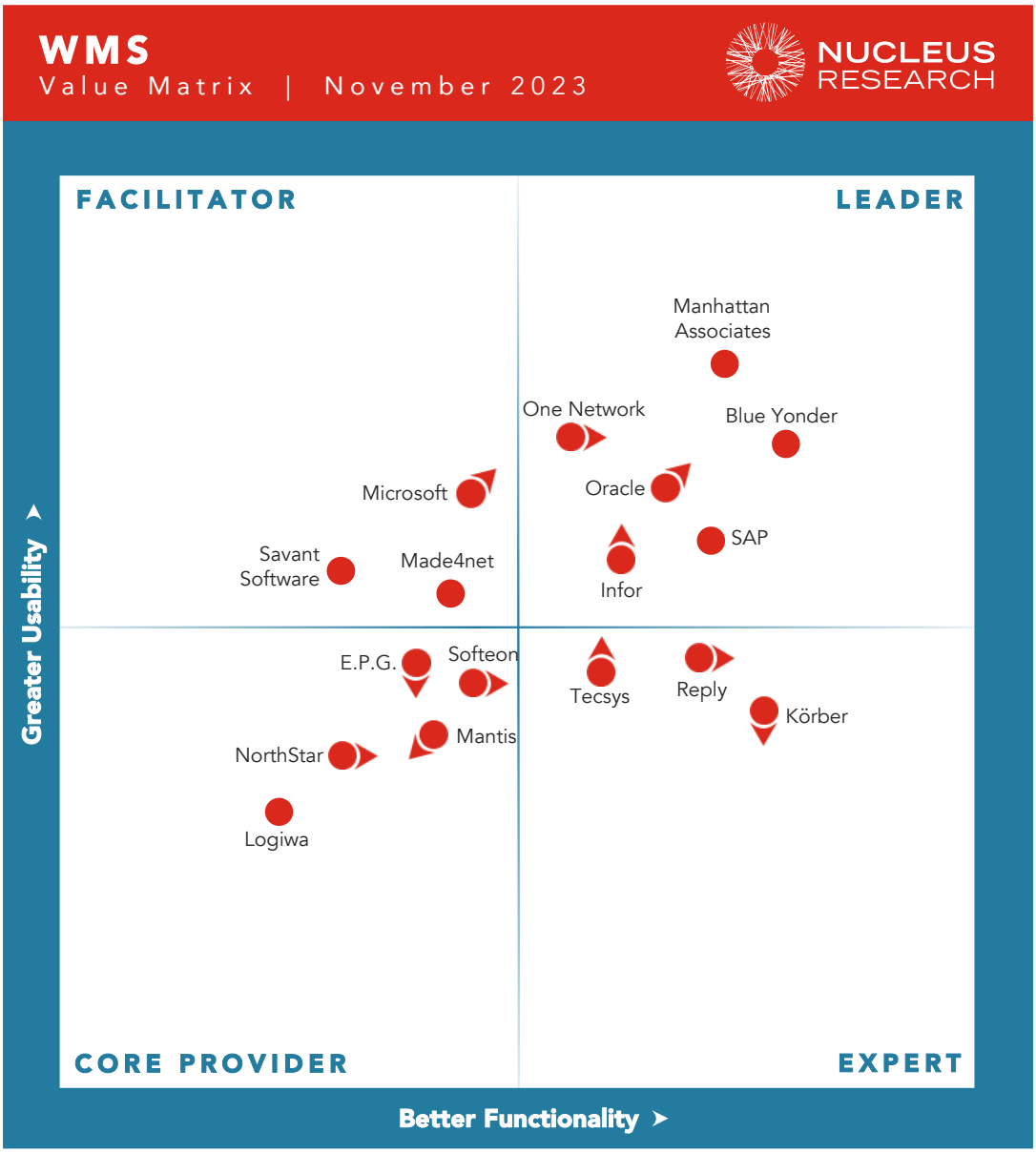
THE BOTTOM LINE

As the market responds to the increasing intricacies of modern fulfillment standards and labor shortages, Warehouse Management Systems (WMS) have emerged as essential tools for organizations seeking to enhance warehouse efficiency, reduce operational costs, and elevate customer service. With advanced order fulfillment capabilities, real-time inventory visibility, and data analytics, leading WMS solutions are tailoring development towards warehouse optimization, empowering companies to handle direct-to-consumer e-commerce, omnichannel models, and global logistics requirements.



OVERVIEW

WMS platforms are software systems designed to manage and optimize warehouse operations efficiently. These solutions encompass capabilities tailored to inventory tracking, order processing, order picking and packing, warehouse layout design, workforce management, and performance analytics. WMS platforms streamline and enhance

warehouse processes, from inventory storage and order fulfillment to goods receiving and shipping. Modern WMS vendors enable companies to consolidate their warehouse management tasks, offering a unified platform for planning, inventory control, execution, and administrative processes. This integration enhances transparency and facilitates informed decision-making within the warehouse, allowing organizations to select the most cost-effective and efficient strategies for inventory handling, order fulfillment, and shipping.

As the demand for warehouse management solutions surges, the mid-market segment is poised for significant expansion. This growth is driven by the accessibility of cost-effective warehouse automation technologies. Businesses increasingly recognize the importance of leveraging automation to improve order fulfillment speed, reduce labor costs, increase scalability, and remain competitive in a rapidly evolving market. Additionally, the growth of the e-commerce sector, driven by the demand for seamless omnichannel experiences, has placed significant pressure on warehouses to elevate operational efficiency, order accuracy, and processing speeds. WMS platforms track lot, batch, and serial numbers through features like barcode scanning and RFID to ensure compliance with regulatory demands and reduce the risk of stockouts, overstocking, and misplaced items.

Nucleus has noticed three specific trends surfacing from the warehouse management space. As costs rise and third-party logistics providers (3PLs) and distributors face margin pressures, they transition from simple 'box movers' to taking over ownership functions, such as planning and inventory management. This strategic service shift enhances customer relationships, making these organizations more integral to their clients' operations. Another notable development is the increased focus on optimizing and orchestrating warehouse robotics and automation, including pick and pack robots, palletizing robots, and automated guided vehicles (AGVs). These technologies are now tightly integrated with WMS, facilitating faster and more accurate order fulfillment while reducing labor costs. Additionally, Warehouse Execution Systems (WES) are gaining prominence as an essential trend within WMS technology. These systems allow organizations to test, trial, and change process automation at a more suitable pace for its operation without the risk of long integration exercises.

Legacy WMS platforms present challenges like manual data entry and tracking, leading to inaccuracies, higher costs, and regulatory compliance issues in tracking product details. Inventory inaccuracy remains problematic, resulting in overstocking, stockouts, and inefficient space utilization. Manual order processing and picking cause delays, customer dissatisfaction, and lost sales. The lack of real-time inventory visibility makes it difficult to adapt to changing demands quickly. Regulatory requirements for traceability and inventory management become complex without a WMS, risking penalties. Inefficient storage space utilization increases holding costs, while suboptimal routing and picking create unnecessary labor costs. Limited analytics and reporting hinder organizations from identifying problems and improvements. Modern WMS solutions address these limitations through real-time

inventory visibility, warehouse automation, optimized inventory and pace utilization, faster fulfillment, and enhanced throughput and workflows. Automated processes elevate order accuracy and customer satisfaction while optimizing warehouse operations for faster fulfillment, cost reduction, and heightened labor productivity. Efficient receiving and put-away processes strategically place inventory, maximizing storage capacity and negating the necessity for additional facilities. Real-time tracking ensures immediate insights into inventory and order status, enabling swift responses to dynamic demands.

The Nucleus Research Warehouse Management Systems Technology Value Matrix assesses the market based on how vendors deliver value to customers through the usability and functionality of their solutions (Nucleus Research v67 – Understanding the Value Matrix, April 2021). The research is intended to deliver a relevant snapshot of the Warehouse Management technology market rather than serve as an empirical ranking of the vendors. The arrows indicate each vendor's perceived momentum and are informed through conversations with end users, recently released capabilities, features, and other investment areas.

LEADERS

The inaugural WMS Technology Value Matrix leaders include Blue Yonder, Manhattan Associates, Oracle, SAP, Infor, and One Network.

BLUE YONDER

Blue Yonder is a leader in the 2023 WMS Technology Value Matrix. Blue Yonder WMS supports organizations within the Automotive, Food and Beverage, High-Tech, Consumer Goods, Life Sciences, Logistics Service Providers, E-commerce, and Retail hardline and softline verticals. Blue Yonder WMS sits on top of the Luminate Platform and leverages machine learning technology to manage core processes, including inbound and outbound workflows, yard management, inventory tracking, labor management, and coordinating activities across personnel, robotics, and third-party logistics.

The system automates the allocation of put-away locations and guides drivers for inbound processing based on item characteristics, storage strategy, and warehouse workload. Cross-docking workflows handle high-priority orders efficiently. With its Yard Management feature, the WMS assigns dock doors, staff, and material handling equipment to balance workloads across docks and prevent bottlenecks. It considers arrival times, vehicle contents, and destinations to optimize yard activities. Blue Yonder's inventory management functionality provides real-time visibility and control over stock. It tracks on-hand balances, inbound and

outbound flows, specific item details like serial numbers and expiration dates, and precise location data. The WMS platform excels in outbound order orchestration, optimizing batch picking, routing, cartonization, parcel, and load building. The system offers tools for workload forecasting, performance goal setting, task list generation based on location and skillset, and real-time productivity tracking for labor management processes. It integrates with payroll systems for direct incentive payments.

Blue Yonder partnership community includes organizations such as EY, Accenture, Capgemini, HP, Infosys, Zebra Technologies, Honeywell, Tyron Solution, Locus Robotics, Starware, and EC net. Organizations can also leverage Blue Yonder Robotics Hub to enhance operational efficiencies in the warehouse. Blue Yonder Robotics Hub is a cloud-based platform that helps businesses accelerate the adoption and management of robotics in their warehouses. It provides a single interface for managing multiple robotic platforms and solutions. It offers various features to help businesses optimize their robotics operations, including robot onboarding and configuration, real-time visibility and monitoring, fleet management and optimization, and data analytics and reporting.

Recent product updates and announcements include:

- In 2023, Blue Yonder deployed two cloud-native microservices accessible via the WMS platform. The first automatically produces labels for the warehouse, such as a picking or shipping label. The second produces operational reports, including packing lists, Bills of Ladings, and Import and Export documentation.
- Over the last year, Blue Yonder has deployed a cloud-native allocation engine to allocate orders with volumes, ensuring operational resilience in peak volume times.
- In 2023, Blue Yonder released a modern Yard Management tool. Companies are finding gaps in their Transportation to Warehousing handoff. Customers can solve that handoff with AI-enabled software joined into a single-yard management offering.
- Blue Yonder has deployed an enterprise-wide data lake powered by Snowflake that replicates customer data from every one of their warehouses to the data lake in near real-time. This gives customers unprecedented access to the rich transactional data available in WMS. This data includes configuration data and pre-built KPIs so that customers can watch the drift of their configuration over time and calculate with historical accuracy what changes were good or bad.
- At Blue Yonder ICON 2023 in Las Vegas, the software vendor launched its WES microservices. Blue Yonder now provides plug-and-play automation APIs, purpose-built to work with specific workflows and validated vendor by vendor, to ensure contract-driven interoperability with a growing number of automation vendors. This allows customers to test, trial, and change automation at a more suitable pace for their operations without the risk of long integration exercises.

MANHATTAN ASSOCIATES

Manhattan Associates is a leader in the 2023 WMS Technology Value Matrix, recognized for its domain expertise, platform ease of use, and ability to deploy WMS platform modules within hours. Through its cloud-based or on-premises WMS platforms, Manhattan supports SMB to global enterprise organizations within the consumer goods, food and beverage, manufacturing, pharmaceutical, retail, distribution, and third-party logistics industries.

Manhattan Active Warehouse Management (WM) is a cloud-native, 100 percent microservices warehouse management system for complex, high-volume distribution centers. It leverages machine learning to optimize fulfillment workflows and resource utilization across the distribution center. Manhattan Active WM provides real-time orchestration between workflows, robots, and workers through its integrated Warehouse Execution System. This enables seamless coordination across all resources to maximize throughput times. The system utilizes Order Streaming technology to adjust work assignments based on real-time conditions and priorities on the warehouse floor, while unified workflows simultaneously process direct-to-consumer, wholesale, and omnichannel orders using optimal fulfillment. The slotting optimization engine improves pick density by managing slotting and re-slotting activities. It provides advanced optimization capabilities, including wave management, batch picking, and optimized order routing to maximize fulfillment efficiency. The solution can manage multiple brands, distribution centers, and business units from a single platform through its multi-tenant architecture. Manhattan Active WM delivers real-time visibility and control over critical warehouse resources, including inventory, orders, labor, slotting, and material handling equipment. Integration with various types of automation, such as pick-to-light, put-to-light, and voice-directed workflows, enables optimized, technology-driven processes. Manhattan Active WM provides native functions for replenishment, yard management, optimized load building, and customizable workflows, forms, reports, and alerts to meet specific operational needs. The cloud-native platform enables high optimization, automation, and customization levels for complex distribution environments.

Manhattan SCALE delivers core warehouse management capabilities with flexible on-premises or cloud deployment for small to medium-sized businesses. It provides robust functionality for receiving, putting away, replenishing, picking, shipping, and other basic warehouse operations. Configuration is enabled through low-code tools and wizard-based setup guides tailored to each customer's warehouse environment and workflows. Manhattan SCALE can integrate with automation, ERP, and other external systems using REST APIs and web services. Embedded optimization engines help improve slotting, routing, and labor planning efficiency. It enables rapid implementation through configurable workflows, forms, alerts, and reports. Manhattan SCALE provides versatility through cloud or on-premises deployment and easy integration capabilities. Manhattan's supply chain partner ecosystem

comprises organizations such as Locus Robotics, Zebra Technologies, Honeywell, ProShip, sendflex Technologies, Everest Technologies, Arrow88, Google Cloud, and Cognizant.

Recent product updates and announcements include:

- At the annual Momentum Conference in May 2023, Manhattan Associates launched its next-generation Yard Management solution. Aimed to unify the supply chain by breaking down the silos between yard management with warehouse and transportation management on a cloud-native platform. This move marks a shift from traditional isolated systems, allowing for optimization possibilities. The solution features a graphical representation of the yard, providing real-time insights and updates to enhance risk identification and opportunity realization. This unified approach offers clear visibility into dock doors, yard positions, trailer status, contents, warehouse operations, and yard-related information, ultimately creating a more efficient and unified supply chain.

ORACLE

Oracle is a leader in the inaugural WMS Technology Value Matrix. Oracle Fusion Cloud Warehouse Management supports a diverse range of global enterprise organizations, including the Automotive, Communications, Healthcare, Oil and Gas, High Tech, Retail, E-commerce, Wholesale Distribution, Consumer Goods, Manufacturing, Logistics Service Providers, and Federal Government verticals, among others. Oracle Warehouse Management is a cloud-based warehouse management system that optimizes inventory visibility, order fulfillment, and warehouse operations within complex omnichannel supply chains. The solution provides visibility into inventory distributed across manufacturing plants, distribution centers, transportation fleets, and retail locations through real-time dashboards and comprehensive reporting. Oracle Warehouse Management includes built-in AI/ML algorithms that help predict and automate an organization's warehouse operations. The warehouse management system provides robust wave and task management functionalities, enabling efficient allocation and order picking across multiple channels and locations. Oracle Warehouse Management excels at efficiently allocating and managing critical resources, ensuring that human and machine assets are optimally utilized throughout warehouse processes. The application aims to enhance operational productivity and reduce resource waste by assigning tasks and closely monitoring resource performance. One of the standout features of Oracle Warehouse Management is its configurability, allowing businesses to tailor their warehouse layouts and settings to meet specific operational needs. This ensures that Oracle Warehouse Management aligns seamlessly with diverse business requirements, improving overall warehouse efficiency.

Oracle Warehouse Management provides picking strategies to optimize order fulfillment to reduce errors, minimize order processing times, and enhance the customer experience by

determining the most efficient and effective pick methodologies based on business rules. It manages incoming materials from suppliers and internal requisitions for inbound logistics with various methods, including receipt, sorting, quality check, value-added services, and the option of directed or suggested put away. Put-away rules can continuously leverage the AI/ML market basket analysis algorithm to recommend storing frequently ordered products close together in the warehouse. This flexibility helps adapt to different business needs, making the receipt process more efficient. For outbound logistics, Oracle Warehouse Management automates the order-picking process and utilizes features like wave picking to assign tasks to pickers based on various practices, ensuring efficient and accurate picking. The Fulfillment Dashboard highlights orders that AI/ML algorithms predict orders that may exceed target fulfillment cycle times. Oracle Warehouse Management has a built-in label designer. It can also integrate with compliance labeling systems to generate labels by customer and carrier preferences, streamlining the outbound logistics workflow and improving efficiency and customer satisfaction. Oracle Warehouse Management is designed to be highly adaptable and capable of supporting multi-client, multi-site environments, helping stakeholders oversee operations across extensive distribution networks. Oracle Warehouse Workforce Management helps supervisors manage labor productivity. Oracle Warehouse Management Automation features to streamline the process of integrating material handling equipment or robots in automated warehouses. By consolidating advanced warehouse management capabilities within a flexible cloud platform, Oracle empowers organizations to optimize omnichannel fulfillment, gain end-to-end inventory visibility, and rapidly scale operations in response to changing business needs. Oracle's system integration partners include Accenture, AccelAlpha, Infosys, PricewaterhouseCoopers, Deloitte, and Flo Consulting. Technology partners include Zebra Technologies, Honeywell, and Samsung, among others.

Recent product updates in the past 12 months:

- At Oracle CloudWorld 2023 in Las Vegas, Oracle showcased its Supply Chain Command Center. Oracle's new Command Center will provide supply chain managers with greater visibility into potential bottlenecks or issues so they can take action to keep operations running smoothly. The updates include prescriptive AI models to help predict delivery times, supplier risks, stockouts, and other supply chain disruptions.
- In September 2023, Oracle announced new generative AI capabilities to help companies improve their supply chain operations. For example, AI will generate product descriptions and suggest potential suppliers, making procurement and inventory management more efficient.
- Oracles 23C updates to its Oracle Warehouse Management application include enhancements to its inbound and outbound logistics, mobile application, inventory operations, and warehouse workforce management modules. A new predictive

slotting solution makes the AI/ML Market Basket Analysis algorithm available as a put-away strategy. Users with access to multiple facilities in WMS can now change their default facility through the User UI. This feature provides convenience, especially for users who oversee operations across different facilities. Users can now capture and display images/documents for Pallets. Users can capture and display images and documents in the WMS Progressive Web App (PWA) mobile LPN Inquiry screen. Users can now change the Unit of Measure (UOM) during inbound item receiving using a hotkey. This feature provides flexibility for handling items with different UOMs efficiently. New REST APIs have been introduced in workforce management to streamline communication with external systems for product categories and WMS activity goals. These APIs enhance the exchange of essential information between systems, improving data consistency and operational efficiency. Furthermore, users now have the option to create WMS activity and VAS goals for each month of the year through a bulk creation feature, making it easier to set performance goals for warehouse personnel. WMS has introduced a hotkey to change the UOM for cycle counting, enhancing the flexibility of the RF - Cycle Counting Location module. This change supports cycle counting in different UOMs, catering to various inventory scenarios. In response to customer feedback, a new feature allows users to capture comments during cycle count approval and rejection. This feature is designed to improve traceability and record-keeping during inventory management processes. The Container Packing Utilization Report supports sustainability initiatives by measuring the cubing logic's reduction in space in outbound shipping boxes.

- In Q2 2023, Oracle released other new product updates to Oracle Warehouse Management. WMS Common enhancements include the Configuration Export/Import tool that allows users to export and import configurations between environments or within an environment when configuring a new Facility or Company. The application can now enhance location visibility by introducing spatial coordinates (X, Y, Z) for each location, making tracking and managing items within the warehouse easier. Additionally, geographic coordinates (latitude and longitude) have been added to the Facility UI, providing precise geographic location data. Users can now access online help directly from the WMS homepage through a Help button. Users can now set up AI/ML training templates more effectively with the introduction of AI/ML Training Date Rules. These templates are crucial for Market Basket Analysis, which helps understand product associations. Users can perform inbound receipts in the Ordered Unit of Measure (UOM), simplifying the process when items are received in quantities other than their primary UOM. Additionally, users can receive an entire inbound shipment using a REST API, streamlining the process. Multiple file types, including Word documents, excel spreadsheets, and PDFs, can now be uploaded for Inbound LPNs. Users can now perform post-packing

transactions through tasking, eliminating the need to switch between RF transactions. It's also possible to update the outbound LPN status to "Picked" instead of "Packed" in specific scenarios. File uploads and viewing are now supported for Outbound LPN types and loads, including Word documents, excel spreadsheets, and PDF files. The WMS Mobile Progressive Web App (PWA) offers users an enhanced mobile experience. The PWA can be installed on Android and iOS devices and can access native capabilities. It is updated more frequently than native apps, ensuring users have the latest features and improvements. Replenishment of full LPNs in automated warehouse systems (MHE/ASRS/AGV) is now supported, increasing warehouse efficiency and material availability. Communication of replenishment info to automated systems and monitoring of pick information is facilitated through a new output interface configuration and the Replenishment Pick Info UI.

- In January 2023, Oracle released its 23A Oracle Warehouse Management enhancements. Oracle WMS introduces several improvements to enhance the user experience in this update. Reason codes are critical in certain transactions, and WMS can enable or disable reason codes to ensure accuracy. Additionally, the WMS now supports special and lowercase characters in multiple user interface screens, providing consistency and ease of integration with external applications. To boost the efficiency of an organization's inbound warehouse operations, Oracle Warehouse Management introduces AI/ML Market Basket Analysis. This feature helps identify frequently ordered items often shipped together, offering insights into product associations that can inform slotting recommendations for improved picking productivity. The Last Printed Timestamp is now displayed in the Inbound LPN UI, reducing duplication and promoting cost-saving efforts. Managing Movement Requests within WMS has been made more flexible and efficient. Users can deallocate or cancel Movement Requests, recording appropriate reason codes for these actions. Images can now be captured and displayed in Item Inventory by LPN UI, enhancing visual context for LPNs. Furthermore, Blind LPN labels can be printed directly from the RF interface, simplifying label generation. The Outbound LPN Inquiry UI now supports capturing and displaying images, promoting visual context in the event of LPN damage. The management of Full LPN Allocation has been enhanced, considering single-item LPNs with multiple lots and inventory attributes. The Outbound Audit functionality now allows skipping serial number scanning or attribute prompts when there's no discrepancy in audit counts, streamlining the audit process. Users can also apply a lock code to prevent discrepancies from being shipped. The WMS Activity and WMS Activity Detail entities are now exposed via REST API. This allows users to build additional labor management capabilities in external systems, expanding user reporting and workforce management options.

- On October 18th, 2022, Oracle enhanced its inbound logistics, inventory operations, outbound logistics, and WMS standard modules. Common WMS enhancements include the ability to display the Primary Unit of Measure (UOM), which has been expanded to additional user interface (UI) and Radio Frequency (RF) screens, offering users a clear view of the primary UOM. This improvement enhances visibility and accuracy across the system. Inbound logistics enhancements will increase flexibility in put-away and storage strategies. The WMS now allows the definition of Maximum LPN Quantity at the item facility level, preventing the co-mingling of LPNs of a Single SKU. Furthermore, inbound shipment integration has been streamlined to simplify integrations with other Oracle Cloud applications and ERPs, supporting shipment creation and updaSavtes with the same action code. Additionally, Oracle WMS provides flexibility in adjusting Inbound Shipment Details, even after the receiving process has started. A new feature allows the association of pallets to cartonized shipment details, ensuring efficient handling. For better inventory accuracy, Oracle Warehouse Management can initiate cycle count tasks for empty locations, including permanent and dynamic active and reserve locations. Users can also mass-update selected location fields with ease. Additionally, users now have the option to sort and filter data by Alternate Item Codes, enhancing search and data-sorting capabilities. In the outbound logistics domain, WMS now allows auto-printing documents like Outbound LPN Packing Slips and Task Reports as part of the wave process, simplifying document generation. Furthermore, auto-printing of documents, including the Bill of Lading (BOL) and Commercial Invoice, is triggered when the Outbound Load status changes to Loaded/Shipped. This feature streamlines transportation and border-crossing processes. The RF feature, "Assign to Load by Order," simplifies assigning orders to different loads, reducing the number of scans required. The AI/ML Predictive Fulfillment Dashboard leverages several AI/ML algorithms to highlight orders predicted to exceed the target order fulfillment cycle time.

SAP

SAP Extended Warehouse Management (EWM) is a leader in the 2023 WMS Technology Value Matrix. SAP caters to large global organizations, serving the Energy (Chemical, Mining, Oil, and Gas), Professional Services, Consumer Goods, Retail, Wholesale Distribution, Mill and Mining, Industrial Machinery and Components, Aerospace and Defense, Automotive, Technology, Manufacturing, Life Sciences, and Government industries. SAP EWM is a comprehensive warehouse management system that provides capabilities to optimize and automate warehouse operations. SAP EWM seamlessly supports various functionalities, including inbound processing, which encompasses gate appointment scheduling, yard management, put away, cross-docking, and quality inspections of incoming

inventory. EWMs' putaway functionality allows users to enable rules-based putaway strategies that optimize storage locations based on product characteristics, storage types, velocities, and capacities. EWM also facilitates the planning and execution of stock movements, including transfers, replenishments, and re-warehousing. EWM provides a range of capabilities for picking operations, including wave planning and batching to optimize workflows and support picking methods such as cart, batch, and zone picking. It integrates seamlessly with pick-by-voice systems and dynamically optimizes pick paths. EWM's packing capabilities feature packing profiles with customizable rules, verification, and license plate labeling functionalities. The system adeptly manages shipping operations with unified package building, containerization rules, shipping documentation, and customs processing. SAP EWM covers physical and cycle counting, ensuring real-time inventory updates through automation integration. Material Flow System within EWM orchestrates warehouse processes while providing extensive visibility into stock levels and locations, enabling the optimization of workflows and task assignments without the need for an additional warehouse control unit.

EWM allows users to directly control warehouse automation processes, encompassing conveyors, sorters, AS/RS systems, and robots. It also extends its capabilities to include extensive integration and direct control of warehouse automation systems, including robotics solutions. This integration is facilitated through the Material Flow System (MFS) component, which allows EWM to connect with various warehouse automation devices, such as AS/RS, automated guided vehicles (AGVs), and robotic arms. EWM can assign robot-picking tasks through the MFS and specify optimal travel paths to maximize efficiency. The system maintains real-time visibility into the status and locations of robots, proactively adjusting task assignments when needed. EWM supports standard robotics integration protocols like Transmission Control Protocol/Internet Protocol (TCP/IP) and Message Queuing Telemetry Transport (MQTT) for seamless connectivity. Also, SAP EWM integrates with SAP Warehouse Robotics, which eliminates proprietary dependence on robotics solutions and can integrate multiple robots (AMR, AGV) vendors and instances across facilities directly or one or more robot fleet management systems using standard APIs.

Recent product updates and announcements include:

- On March 13th, 2023, SAP released an update for deploying machine learning for slotting, segmentation in advanced production integration, a new SAP Fiori app to load or unload freight orders, and advanced shipping and receiving processes. Machine Learning (ML) for slotting allows the system to automatically derive storage concepts for new or modified products by analyzing historical data. This reduces the effort required for initial setup. Additionally, segmentation in advanced production integration enables users to divide materials based on attributes like quality or customer segments, integrating it into various warehouse processes. A new SAP Fiori app, "Load or Unload Freight Orders," is available for on-premises and private cloud

deployments, allowing warehouse clerks to process loading activities and handle deliveries. The update also introduces a transport-driven scenario for outbound processes, enabling transportation planning before warehouse processing.

- In the latest release, SAP S/4HANA EWM 2023, released on October 11th, 2023, various new capabilities and innovations were delivered in integration, production warehousing, industry-specific features, extensibility, and usability. Some of these new capabilities included quality management enhancements, enhancements to transportation unit-based integration, enhancements to decentral advanced shipping and receiving, MES-driven repetitive manufacturing, KANBAN, and Decentral EWM integration, support for ARUN and PSST (pick separately ship together), picking of predefined serial number in RF, Pack mixed handling units in RF inbound & auto packing in outbound processes, enhancements to public APIs, new CDS views, enhancements to Warehouse Monitor, ability to reuse and customize pushbuttons on RF screens based on personas to make the end-user experience more intuitive.

INFOR

Infor is a leader in the 2023 WMS Technology Value Matrix, recognized for its strong WMS platform built on the Infor OS composition platform. The vendor serves the global Consumer Goods, Aerospace and Defense, Automotive, Technology, Third Party Logistics, Manufacturing, Energy and Natural Resources, Hospitality, Healthcare, Financial, Construction, and Distribution industries. Infor offers a comprehensive enterprise-class WMS solution in the cloud and on-premises to streamline warehouse operations. Infor's WMS platform boasts a range of capabilities, including appointment scheduling for receiving, directed putaway strategies, batch inventory tracking, serial number management, task interleaving, and flexible wave planning supported by configurable rules. It specializes in order optimization, offering features like wave planning, workflow-based wave release, order allocation rules, unit-of-measure conversion, and integrated shipping to ensure efficient order processing across diverse fulfillment channels. The system integrates built-in labor management tools for workload forecasting, staffing plan generation, and task assignments, enhancing workforce efficiency. Infor WMS also allows users with embedded analytics, powered by Infor Birst, to create dashboards and reports, providing insights into orders, inventory, equipment, and labor. Infor leverages 3D visual analysis tools to optimize warehouse operations, creating a digital representation of the warehouse environment for simulation and identifying optimization opportunities. Dashboards, KPI reporting, and drill-down analyses offer valuable insights into warehouse activities. In addition, Infor WMS seamlessly integrates with various warehouse automation systems, including pick-to-light, put walls, conveyors, sorters, and robotics, ensuring a smooth workflow between workers and equipment. The Infor OS platform is underpinned by a microservices architecture and a unified security model, making access control streamlined and integrated with identity

providers. It allows for customizable web and mobile user experiences tailored to specific user and workflow needs. Infor's open API gateway facilitates seamless integration with ERPs, WCS, automation systems, and other supply chain technologies. Infor OS enables Infor WMS to leverage embedded analytics using the Infor Data Lake and Birst BI tools. At the same time, middleware supports RPA integration and process intelligence, empowering rapid customization through low-code configuration.

Recent product updates and announcements include:

- Infor's recent product update for High-Volume e-commerce encompasses several key features designed to enhance order processing efficiency. This update introduces waveless batch picking, benefiting single-line orders sent directly to pack-out stations and multiple-line orders directed to put-to-wall areas. Additionally, Infor has incorporated flashpacking, which color codes order status (not started, in progress, complete) and offers audio notifications for success and failures, along with product images for visual reference. These improvements streamline the handling of individual and multi-item orders, ultimately optimizing the e-commerce fulfillment process.
- In 2023, Infor introduced inline updates for cloud customers. Infor ensures that cloud customers can receive updates without disruptions to warehouse operations. This feature allows for seamless, non-disruptive updates that keep the system running smoothly.
- Over the last year, Infor has integrated machine learning into its system to improve existing warehousing processes. This technology augments human intelligence, making processes smarter and more efficient. Machine learning can analyze data and make recommendations or automate certain tasks.
- Over the last 12 months, Infor launched a new feature called "Portal Adoption" that allows customers to customize the look and feel of users' screens. This customization enables users to tailor the interface to a user's specific preferences. Additionally, the update includes in-screen help, making it easier for users to navigate and understand the system.

ONE NETWORK ENTERPRISES

One Network Enterprises (ONE) is a leader in the inaugural WMS Technology Value Matrix. One Network serves large enterprises in the following industries: Aerospace and Defense, Automotive, Manufacturing, Consumer Goods, Healthcare and Pharmaceuticals, Technology, Food and Beverage, Hospitality, and Retail. One Network offers a cloud-based warehouse management system fully integrated with One Network's supply chain control tower solution suite, including TMS and YMS. This enables the orchestration of critical operations in real-time, providing complete visibility, intelligent optimization, and end-to-

end tracking. One Network's AI-powered scheduling and yard management capabilities efficiently schedule dock doors and optimize trailer movements. Real-time monitoring of load status and location optimizes flow-through, prioritizes critical in-demand shipments, and minimizes detention and demurrage charges. The inbound processing system directs putaway and manages inspections, serialization, and returns to ensure efficient receiving and inventory accuracy. The system's inventory management provides comprehensive visibility into stock levels, adjustments, expiry dates, and serial or lot numbers across the extended supply chain. Intelligent order orchestration optimizes fulfillment by batching orders, optimizing pick routing, guiding pick-pack workflows on mobile devices, and automating cartonization, parcelization, and load building for efficient shipping execution. By aggregating live operational data from warehouses, transportation, and inventory systems into a real-time network, One Network enables more effective and resilient planning and replenishment across the fulfillment network.

Recent product enhancements in the last 12 months:

- In 2023, One Network enhanced its Package and Storage Type Constraints. Customers can now set up storage unit measurements and maximum capacity for specific warehouse locations. This flexibility ensures that constraints are tailored to particular needs and should be configured at the lowest level of the location hierarchy. Moreover, depending on the storage area, the system limits putaway activities to specific package types, such as pallets, boxes, or cartons. The result is a more efficient putaway process as the system suggests optimal locations that align with these constraints.
- The new Warehouse Capacity Reporting update provides customers with valuable insights into their warehouse capacity. Warehouse capacity summary widgets are introduced to the dashboard, offering a glance at the total capacity, used capacity, and remaining capacity for various locations or storage types. Customers can delve deeper into this information through the "Warehouse Capacity by Location" report, which details location-specific capacity. This enhancement aids in better capacity planning, ensuring that resources are allocated optimally.
- One Network WMS users can now benefit from improved Inventory Unit Cost Computation and Visibility. The system allows users to view the unit cost of inventory items in financial reports, offering line-level detail. The computation employs the weighted average cost method, ensuring accurate cost representation. The system allows for manual override of the calculated unit cost through buffer updates to further empower users, making financial reporting more precise.
- One Network introduced the Print Option for Receipt and Check List in 2023. Customers can effortlessly generate and print goods received notes and checklists. This feature is equipped with customizable options to meet specific printing

requirements, offering a more streamlined and professional approach to documenting receipts and checklists.

- In 2023, One Network enhanced its WMS platform to provide Header and Line Level Dimensions for Packing Lists. Users can calculate the total volume and weight or manually input dimension information at the packing list header and line levels. This information plays a crucial role in organizing shipments efficiently. Moreover, users can propagate weight, volume, and other relevant details from the packing list to linked shipments manually or automatically, depending on established policies. This enhances shipment accuracy and efficiency.
- Over the past year, One Network improved its Holds Support feature. In the past, holds were primarily available for receipt and issuing inventory. However, with this enhancement, customers can now add manual holds and view holds generated by the system on pick lists and packing list details. This extended capability ensures better control over inventory, minimizing errors and ensuring a smoother operational workflow.

EXPERTS

Experts in the inaugural WMS Technology Value Matrix include Körber, Reply, and Tecsys.

KÖRBER

Körber is an expert in the 2023 WMS Technology Value Matrix. Körber supports North American and European SMBs to tier-one organizations within the Manufacturing, Third-Party Logistics, Retail, and Consumer Goods industries. Körber offers a scalable software solution to optimize warehouse operations and inventory management. Their platform covers various essential functionalities, including warehouse automation, labor management, analytics, and integrations, all aimed at streamlining workflows. The core WMS can handle fundamental warehouse tasks such as receiving, putaway, inventory management, order picking, shipping, and cycle counting. It employs built-in workflows to guide users through these processes, utilizing barcode scanning for accuracy while maintaining real-time inventory records. Notably, the platform is highly configurable, allowing for adaptation to diverse warehouse layouts, business workflows, and automation technologies without requiring coding. For enterprise-level customers, Körber offers an extended WMS tailored for complex warehouse environments. This includes advanced automation integration through Körber's Warehouse Control System (WCS) to orchestrate storage and retrieval systems, conveyors, sorters, and robotic technologies. The Unified Control System (UCS) integrates vendor automation for a unified workflow. The enterprise

WMS also provides yard management, labor management, and dock appointment scheduling to optimize inbound processing. Warehouse analytics are enhanced with interactive dashboards and KPI reporting. Integration capabilities extend to ERP, WCS, and other systems via Körber's integration platform.

For small and medium-sized businesses, Körber offers the core WMS with intuitive workflows and interfaces tailored for swift implementation. Built-in integrations with major ERPs like NetSuite and SAP BusinessOne facilitate data exchange. Key capabilities, including eCommerce order processing, shipping management, and SaaS delivery, empower SMBs to achieve fast order turnaround without extensive IT infrastructure. Körber also provides a specialized WMS designed for third-party logistics (3PL) warehouses that manage inventory for multiple clients. Onboarding tools expedite the configuration of workflows for new 3PL clients. A billing engine is in place to track client activities for invoicing. Workflows are customized to align with each client's service level agreements. The solution scales from basic to complex multi-client processes through a modular design and web-based interfaces that simplify training. Value-added services such as kitting and bundling can also be accommodated. Across all editions, Körber WMS focuses on boosting user productivity and inventory accuracy through features like hands-free voice technology integration, radio frequency mobile devices, barcode scanning, and workflow-directed task management.

New announcements in the last 12 months:

- On March 15, 2023, Körber extended its robotic service partnership through a Robotics-as-a-service program. This initiative gives businesses easy access to a global network of robotics service partners, enabling cost savings and faster deployment. Körber emphasizes the importance of collaboration and aims to assist companies in responding to operational challenges efficiently. The RaaS program includes autonomous mobile robots (AMR), offering diverse solutions to meet the demands of different industries.

REPLY

Reply is an expert in the inaugural WMS Technology Value Matrix, recognized for its LEA Reply and Click Reply warehouse management platforms. Reply supports global midsized to tier-one organizations within the Automotive, Retail, Fashion, Food and Beverage, Telecommunications, e-Commerce, and Third-Party Logistics industries. Its flagship supply chain platform, LEA Reply, includes warehouse management, dock management, yard management, and last-mile functionality applications. Its cloud-based WMS platform, LEA Reply WMS, is designed to optimize and automate processes within a warehouse. The solution leverages a microservices architecture to connect the warehouse's systems, machines, and workflows. This allows seamless integration with automation technologies like autonomous mobile robots, pick-to-light systems, conveyors, sorters, and robotic arms. The

system assigns and optimizes tasks to human workers with handheld RF devices or wearables. LEA Reply WMS provides capabilities like batch and serial number tracking advanced pick logic based on FEFO, expiration dates, and product dimensions for inventory management. The platform can define storage zones, slotting assignments, and replenishment strategies based on historical data and the real-time state of the warehouse. The solution has configurable wave planning, batch building, and order orchestration capabilities. Orders can be released in batches optimized for zone picking. Workflows can be scheduled based on worker availability, priority, and other rules. LEA Reply WMS also enables multi-order picking and dynamic task allocation to maximize productivity. Packing and shipping processes are validated and verified through the system. The solution automatically generates compliant shipping documentation like packing slips, labels, and bills of lading.

LEA Reply Dock Scheduling helps organizations manage and optimize the scheduling of loading and unloading appointments at warehouse docks. The system provides a portal where carriers and suppliers can view dock availability and book appointments for deliveries or pickups. The dock scheduling engine enables configurable compatibility rules, dock restrictions, and appointment time windows. Carriers and yard planners can collaborate in real-time to adjust delivery appointments based on changing needs. The solution provides visibility into dock schedules, carrier ETAs, and real-time updates on arrivals and departures. Key features include appointment calendar views, dock restriction management, ETA tracking, check-in and checkout, and analytics. LEA Reply Yard Management bridges transportation and warehouse management systems to optimize yard operations. The solution provides real-time yard visibility, including the inventory of trailers and containers and their locations within the yard. Additional capabilities include gate appointment scheduling, dock assignment, stocking/retrieval of trailers in designated zones, and trailer pool management.

Click Reply is a configurable warehouse execution suite that can be hosted on-premises or cloud-based. The system integrates with ERPs, material handling equipment, and automatic data capture technologies, including RFID and voice picking. Click Reply leverages optimization algorithms and pick logic to enhance productivity across manual and automated warehouse environments. For receiving, the system registers incoming orders and goods, capturing critical attributes and quantities. Putaway workflows intelligently direct inventory to optimized storage locations based on dimensions, turnover, expiration dates, and other parameters. Click Reply's inventory management functions provide expiry date control, batch and serial number tracking, and cycle counting for accuracy. The solution offers wave planning, batch building, zone picking, and dynamic tasking to maximize order fulfillment efficiency. Workers are guided by system-directed, paperless workflows optimized for each task type. Shipping processes are streamlined through compliant documentation, cartonization rules, loading optimization, and carrier interfaces. Real-time

dashboards give visibility into orders, inventory, throughput, utilization, and other key metrics. The solution's open architecture enables rapid integration with warehouse automation, including pick-to-light systems, conveyors, AS/RS, carousels, AGVs, and robotic arms. Reply's partner ecosystem includes Google, AWS, Oracle, SAP, Adobe, Microsoft, and Salesforce.

TECSYS

Tecsys is an expert in the inaugural WMS Technology Value Matrix, recognized for its Distribution and Healthcare-specific WMS solution built on top of the Tecsys Itopia Platform. Tecsys supports midsized to large North American and European enterprises within the Distribution, Healthcare and Pharmaceutical, Third-Party Logistics, and Retail industries. Tecsys provides warehouse management systems to optimize supply chain operations. The Elite Distribution WMS digitizes warehouse processes like receiving, putting away, order picking, packing, and shipping for maximum efficiency. Features like wave planning, dynamic slotting, and task interleaving reduce labor costs, while data analytics and business intelligence provide supply chain performance management and end-to-end visibility. Elite Healthcare WMS is unique in offering end-to-end visibility and control over healthcare provider supply chain operations in the clinical setting. It enables centralized inventory management, optimized replenishment of clinical supplies, efficient kitting of surgical carts, and integration with healthcare IT systems. The platform aims to improve clinician access, reduce costs, and minimize waste. Elite Enterprise WMS provides capabilities to optimize warehouse operations for wholesale distribution. This includes intake processing, wave planning for order fulfillment, and analytics for supply chain visibility. The solution enhances productivity, inventory accuracy, and order cycle times. The Tecsys Elite WMS platform allows organizations to leverage predictive analytics, dashboards, warehouse digital twins and heatmaps, and optimization recommendations to enhance visibility into an organization's supply chain. The Tecsys Itopia Platform is the foundation for Tecsys' supply chain applications, providing scalability and adaptability to meet various client needs surrounding warehouse, transportation, order, and labor management. It empowers distribution organizations to optimize processes and accelerate growth. All Tecsys Elite WMS platforms provide organizations with the tools to leverage predictive analytics, dashboards, warehouse digital twins, heatmaps, and optimization recommendations, enhancing visibility into their supply chain. Tecsys' partner ecosystem includes well-known organizations such as AWS, Workday, Shopify, Zebra Technologies, Locus Robotics, Episerver, KPMG, Deloitte, Sequoia, and Accenture.

Product updates in the last 12 months:

- In 2023, Tecsys announced a partnership between Workday. Tecsys's integration and certification with Workday SCM for Healthcare is a valuable development for the

healthcare industry. This integration allows seamless coordination between workforce management and supply chain operations. Healthcare organizations can efficiently manage procurement, inventory, and planning, improving patient care by ensuring timely access to critical supplies and resources. Additionally, Tecsys's new pre-built integration with Workday ERP, a certified partner, fosters seamless data exchange between supply chain management and enterprise resource planning. This integration harmonizes financial, HR, and supply chain functions. The result is a holistic view of the organization's activities, promoting informed decision-making and resource management.

- Over the last year, Tecsys launched its digital twin, 3D visualization, and heatmap functionality. Tecsys's implementation of digital twin technology, 3D visualization, and heatmaps provides operational intelligence to supply chain management. These features enable the creation of virtual replicas of warehouses and facilities, allowing real-time monitoring and optimization. Heatmaps offer a visual representation of operational data, aiding in identifying areas for improvement and enhancing decision-making in the supply chain.
- In 2023, Tecsys launched its new automation and robotics integrations. Tecsys's out-of-the-box integration with multiple automation hardware vendors facilitated through partnerships with SVT Robotics and Pendant Automation, simplifies adopting automation and robotics in supply chain operations. This streamlined integration accelerates the implementation of automation solutions, reducing complexity and deployment time.
- Tecsys's new DSCSA (Drug Supply Chain Security Act) regulatory compliance module embedded in the WMS is particularly significant for the healthcare supply chain. This module ensures that pharmaceutical supply chain operations align with regulatory standards. It manages serialization, traceability, and authentication, enhancing patient safety and compliance with industry regulations.
- Tecsys's updated Delivery Management and Receiving application is essential to supply chain management. These updates empower organizations to take control of the delivery process and streamline receiving operations. These improvements contribute to an efficient supply chain, reducing errors, enhancing order fulfillment, and elevating the overall customer experience.

FACILITATORS

Facilitators in the inaugural WMS Technology Value Matrix include Microsoft, Made4Net, and Savant Software.

MICROSOFT

Microsoft is a facilitator in the 2023 WMS Technology Value Matrix. Microsoft supports global organizations within the automotive, financial services, consumer goods, defense and intelligence, government, healthcare, manufacturing, media, retail, and telecommunications industries. Microsoft's Warehouse Management module empowers companies to optimize and oversee warehouse operations, supporting fundamental processes like receiving, putaway, replenishment, picking, packing, shipping, and inventory management. The system is highly flexible, allowing for the configuration of various workflows for inbound and outbound material handling through components like work templates, location directives, and work pools. This flexibility enables tailoring warehouse processes to facility layouts, inventory types, and specific business requirements. For instance, wave templates can be defined to release picking work in batches to process outbound orders efficiently. Location directives employ query logic to assign putaway and pick locations based on product characteristics, inventory levels, and storage restrictions. Work templates govern how different work orders move through various work processes. The Warehouse Management module integrates with other supply chain processes by linking source documents such as sales orders, purchase orders, transfers, and production orders, ensuring seamless workflow handoffs between departments. For example, when a sales order is released, delivery requirements are communicated to the warehouse for fulfillment through autogenerated picking work. Noteworthy Warehouse Management Systems capabilities encompass wave management for batch order processing, containerization of orders into pallets, integration with warehouse automation, cross-docking, and support for detailed inventory tracking utilizing batch and serial numbers. Embedded Microsoft Power BI tools give stakeholders real-time visibility into crucial warehouse Key Performance Indicators (KPIs). The Warehouse Management module uses message processor messages to enable asynchronous processing of specific workflows. For instance, when a warehouse worker closes the final container during packing, a "Run packing slip for container" message is generated to create and post the packing slip in the background. These messages are queued for processing by the Message Processor batch job on a scheduled basis. Additionally, business events can be configured to deliver alerts on failed message processing results. Message processing ensures non-blocking execution of warehouse workflows that may encounter delays when interfacing with other systems. Microsoft's partner ecosystem includes organizations such as Cognizant, Cronos Group, KPMG, Capgemini, Brennan IT, Software ONE, Accenture, and C.H. Robinson. Organizations often opt for Microsoft Dynamics 365 Warehouse Management Systems due to its seamless integration with existing Microsoft products, such as Dynamics 365 Sales, Dynamics 365 Finance, and Dynamics 365 Human Resources. This enables organizations to manage their core processes from a unified platform.

Product updates in the last 12 months:

- In September 2023, Microsoft updated its Dynamics 365 Supply Chain Warehouse Management platform to allow users to handle license plate information within the warehouse management system. This change simplifies the system's structure, making it more developer-friendly and ready for potential future features related to inventory transactions. With this update, the system consistently stores source and destination license plate information in the WHSWorkTrans table without adding or removing any columns. This feature will reorganize target license plate information for incomplete work and deduce source license plate information for pick work lines. This streamlines the system without affecting completed work records, ensuring uniformity.
- The July 2023 Microsoft Warehouse Management System (WMS) updates offer notable enhancements. First, the "Optimize location directive queries" tool has been introduced, significantly improving the speed of location directive queries. It identifies and transforms older location directive queries designed for the old data model into the new optimized querying approach. Users should test this tool in a user acceptance testing (UAT) environment before running it in the production environment to ensure it doesn't affect expected behavior. Second, the Power Automate Process Mining feature offers a warehouse material movement analysis template, helping warehouse and operations managers optimize material flow and improve warehouse performance. It's essential to ensure that your Dynamics 365 Supply Chain Management version is 10.0.35 or later and that users deploying the process have the appropriate roles. Lastly, Microsoft has introduced Dynamics 365 Supply Chain Management tools to enhance warehouse management implementation and maintenance. These tools simplify setup, configuration, and adjustment processes, improve efficiency, and offer monitoring and troubleshooting capabilities to streamline warehouse management implementation and maintenance while reducing associated time and costs.
- In the June update, Microsoft introduced the capability to run the Warehouse Management mobile app on Apple iOS devices, including iPads and iPhones. This expansion is significant for companies that utilize Apple iOS as their mobile platform or already employ iOS-powered mobile devices. With this update, Dynamics 365 Supply Chain Management extends its support for warehouse operations, making the Warehouse Management mobile app available for iOS in addition to Microsoft Windows and Google Android platforms. Warehouse workers can now perform tasks like material handling, receiving, picking, putaway, cycle counting, and production directly from the warehouse floor using this app, enhancing operational efficiency.
- The April 2023 WMS update from Microsoft focuses on custom label layouts and printing, enhancing the ability to print labels for various data types. Users can now quickly generate labels for products, locations, customers, and more within the Dynamics 365 Supply Chain Management system. With one or more custom label

layouts defined, the system automatically displays a "Print" button on relevant pages.

- The March 2023 WMS update focuses on optimizing the performance of internal movements in the warehouse, with a tiered approach designed to enhance the efficiency of processing batch and serial-tracked items. The April 2023 update introduces a feature to expedite packing shipments for businesses dealing with large items or extensive packing areas, allowing for faster and more resilient packing operations using the Warehouse Management mobile app. Additionally, the update includes a feature related to warehouse groups, enabling businesses to categorize and associate warehouses with various records in Microsoft Dynamics 365 Supply Chain Management. Warehouse groups benefit businesses operating multiple warehouses, providing a systematic way to manage them within the system.
- In February 2023, Microsoft updated the Warehouse Management mobile app by introducing auto-submit detour steps. This feature streamlines warehouse workers' tasks by allowing the app to automatically fetch relevant data from the backend, eliminating the need for manual worker input during detours. Detours enable workers to switch to other mobile devices temporarily, such as looking up a purchase order ID, and seamlessly return to their previous task. This enhancement reduces the number of steps in a workflow, enhances data accuracy, and improves worker efficiency.
- In November 2022, WMS updates introduce "Multilevel Detours" for the Warehouse Management mobile app, aimed at enhancing the efficiency of warehouse workers. This feature lets workers pause their current task and switch to another, more critical task. They can even jump to a different area within the Warehouse Management mobile app and return to the original task without losing any information or progress. It extends the existing detour functionality by allowing users to create multiple levels of detours, essentially detours within detours, providing a more flexible and efficient workflow. While the feature natively supports two levels of detours, customizations can be made to add further levels, if necessary, by creating code extensions on the WHSWorkUserSessionState table.

MADE4NET

Made4net is a facilitator in the 2023 WMS Technology Value Matrix. Made4net supports midsized to large global organizations within the Consumer Goods, E-commerce, Food and Beverage, Manufacturing, Retail, Third-Party Logistics, and Wholesale Distribution industries. The Made4net WMS offers core capabilities covering essential warehouse operations like receiving, putaway, picking, packing, and shipping. In addition, it provides advanced functions such as wave planning, task interleaving, cartonization, and labor management. Built on Microsoft technology with a rules-based architecture, it stands out for

its high configuration level, allowing easy adaptation to changing needs. All warehouse resources are efficiently managed through a unified task control engine orchestrating activities.

Made4net's SCExpert platform enables e-commerce distribution by seamlessly integrating with voice, vision, and IoT technologies. It takes a modular approach to supply chain management, combining WCS, TMS, YMS, and proof of delivery for comprehensive end-to-end visibility. Its robust capabilities are designed to scale facilities of any size, offering flexibility and ease of use to optimize efficiency, accuracy, and visibility across omnichannel distribution operations. In addition to its core warehouse management system, Made4net presents modular solutions to enhance various aspects of fulfillment and logistics. These modules include YardExpert for yard management, AppointmentExpert for streamlined carrier appointment scheduling, WarehouseExpert, and LaborExpert for workforce optimization. RoutingExpert employs advanced algorithms to generate optimal delivery routes that minimize miles, costs, and fleet size. These modules work in synergy to optimize the end-to-end supply chain, from yard to labor to transportation. Made4net integrates these modules into a unified fulfillment platform, synchronizing data and workflows. This modular approach empowers organizations to deploy the capabilities needed to address specific pain points and facilitates scaling up over time.

Synapse 3PLExpert is a comprehensive warehouse management system designed to cater to the unique requirements of third-party logistics (3PL) providers. It excels in optimizing complex, multi-client warehouse operations with real-time task optimization across critical 3PL functions, encompassing multi-client billing, financial reporting, cross-docking, trans-loading, value-added services like kitting and packaging, returns processing and disposition, and ensuring inventory visibility across multiple facilities and clients. One of the standout features of Synapse 3PLExpert is its deep reconfigurability, allowing it to adapt swiftly to diverse and rapidly changing customer requirements, even down to the item level. It provides valuable insights through analytics and customizable dashboard reporting, offering real-time visibility into key performance indicators. Synapse WMS integrates seamlessly with financial systems, ERPs, e-commerce platforms, warehouse automation systems, and transportation management solutions, facilitating comprehensive end-to-end supply chain control.

Product updates in the last 12 months:

- Made4net introduced a new user interface with an RF (Radio Frequency) application. This update provides users with a more intuitive and user-friendly experience. The RF application simplifies operations by allowing for user-configurable workflows. This streamlines warehouse tasks such as inventory management, order picking, and data collection.

- In 2023, Made4net launched its built-in label designer directly within the application. This eliminates the need for external label design software, allowing users to create and customize labels seamlessly within the supply chain management platform. The ability to design labels in-house reduces costs, saves time, and provides greater flexibility for labeling products and shipments.
- Over the last year, Made4net introduced new appointment scheduling functionality. This feature empowers Customer Service Representatives to schedule appointments with vendors and carriers through a user-friendly calendar tool. Efficient appointment scheduling optimizes the coordination of inbound and outbound shipments, reducing wait times and improving resource allocation.
- Made4net's new portal for carriers to schedule appointments is a valuable addition. Carriers can now directly access the system to coordinate meetings, enhancing communication and collaboration between shippers and carriers. This feature improves supply chain visibility and aids in managing carrier relationships effectively.
- Made4net's incorporation of new AMR connectors signifies a move towards automation in the supply chain. These connectors facilitate integration with autonomous mobile robots, enabling automated material handling and transport. This enhancement increases operational efficiency, reduces labor costs, and enhances flexibility in warehouse management.

SAVANT SOFTWARE

Savant Software is a facilitator in the 2023 WMS Technology Value Matrix, recognized for SMB and enterprise-level WMS within the manufacturing and distribution domains. Savant's offerings lie in its scalable approach through its three core platforms: WMS Lite, Pro, and Enterprise. These platforms are designed on a single code base, database, and UI/UX design. This architecture, controlled by a verification system, allows for a "Land and Expand" approach, enabling customers to transition into additional features as operational needs evolve. Savant Lite is a subscription-based WMS platform designed for small to mid-sized warehouses. It covers fundamental WMS functions, including receiving, putaway, inventory management, picking, and shipping. The platform leverages barcode scanning and mobile technology for efficient inventory and order management, featuring user-friendly interfaces and built-in workflows that simplify operations. Savant Lite is scalable, allowing organizations to transition into a full-featured WMS as business needs evolve. Savant WMS Lite facilitates integration with ERP systems, including Acumatica and others, through Rest APIs. Savant WMS Lite is compatible with mobile devices such as Zebra, Honeywell, and Newland.

Savant Enterprise was created for enterprise-level organizations to meet the demanding requirements of large distribution and manufacturing entities. Its modular design allows organizations to leverage its functionality in alignment with its growth trajectory. Modules

like Container Tracking provide visibility and management of containers throughout the shipment journey. It captures essential details such as container and seal numbers, carrier information, and voyage data. The RMA module streamlines the return authorization process with automated approval, validation, and material tracking workflows. Box-building algorithms optimize packaging by suggesting sizes based on order items, dimensions, and fragility, ensuring the selection of suitable boxes and minimizing errors before shipping. The Shipping Manifest feature automates the final steps of order fulfillment, managing carrier selection, rate shopping, document generation, and address validation. The ASN module streamlines the process between order fulfillment and the customer's receiving process, capturing item-level details for efficient electronic data flow upon shipment. Savant's IoT hardware integrations include Honeywell, Zebra Technologies, and Newland AIDC.

CORE PROVIDERS

Core providers in the inaugural TMS Technology Value Matrix include Softeon, Erhardt Partner Group (E.P.G.), Mantis, NorthStar, and Logiwa.

SOFTEON

Softeon is a core provider in the 2023 WMS Technology Value Matrix. Softeon supports small to midsized businesses in Retail, Third-Party Logistics, Consumer Goods, Food and Beverage, Healthcare, High-Tech, and Manufacturing verticals. Softeon's WMS platform is designed to optimize and orchestrate all aspects of distribution center operations. The system manages core warehouse processes, including receiving, putaway, inventory management, wave planning, dynamic order picking, sorting, packing, and shipping. The WMS directs workers, material handling systems, and autonomous mobile robots to complete tasks in the most efficient sequence possible. Slotting optimization analytically determines optimal product placement based on velocity, affinity, dimensions, and more to minimize travel distance and increase pick density. Labor management features capture worker performance data, enable labor planning and balancing, and provide real-time feedback to drive productivity gains above industry averages. Parcel management integrates with shipping providers for instant label printing, rating, and tracking. Dynamic wave planning considers variables to sequence work for efficiency. Replenishment tuning balances velocity needs and inventory buffers. Real-time dashboards and KPIs give visibility for agility. The solution's configurable workflows and rules engines enable adaptation to unique requirements without coding.

Softeon offers an integrated Warehouse Management and Execution System (WMES) to optimize modern distribution centers. This combines the core WMS functionality with an

overlaying Warehouse Execution System (WES). The WMS efficiently executes warehouse processes like receiving, putaway, wave planning, picking, packing, and shipping. The WES acts as a supply chain 'brain' to enable the orchestration, visibility, and optimization of workflows, resources, and automation. Together, the Softeon WMES seamlessly manages core operations while intelligently balancing workloads, identifying bottlenecks, monitoring throughput, and adapting to real-time constraints. The WES optimizes the utilization of equipment and labor by continually assessing priorities, resources, and objectives.

Product updates in the last 12 months:

- On March 2nd, 2023, Softeon announced it acquired warehouse technology and implementation vendor GetUsROI LLC and its AttunedLabs software development department. This move bolsters Softeon's capabilities with fully composable tools for integrating and orchestrating materials handling systems, enhancing user interface development, analytics, and more. With GetUsROI's open LUCA supply chain execution platform, these tools empower Softeon's Warehouse Management and Warehouse Execution Systems to offer low code/no code integration with various materials handling systems, allowing customers to enhance traditional supply chain boundaries and achieve desired operational outcomes.
- On March 2nd, 2023, Softeon announced it acquired warehouse technology and implementation vendor GetUsROI LLC and its AttunedLabs software development department. This move bolsters Softeon's capabilities with fully composable tools for integrating and orchestrating materials handling systems, enhancing user interface development, analytics, and more. With GetUsROI's open LUCA supply chain execution platform, these tools empower Softeon's Warehouse Management and Warehouse Execution Systems to offer low code/no code integration with various materials handling systems, allowing customers to enhance traditional supply chain boundaries and achieve desired operational outcomes.

ERHARDT PARTNER GROUP

Erhardt Partner Group (E.P.G.) is a core provider in the inaugural WMS Technology Value Matrix. E.P.G. supports global midsized to large enterprises within the Automotive, Healthcare, Electronics, Food and Beverage, Manufacturing, Third Party Logistics, and E-Commerce industries. The Ehrhardt Partner Group's Logistics-Focused Solution (LFS) is a modular and highly configurable warehouse management system (WMS) that optimizes warehouse operations. LFS leverages advanced algorithms and smart automation tools to maximize productivity across all workflows, including receiving, put away, replenishment, order picking, packing, and shipping. LFS enables optimized retrieval through path-optimized batch picking, parallel order processing, cross-docking, and automated sorting. It supports multiple picking methods such as pick-by-voice, RFID, pick-to-light, and pick-to-

carton to allow businesses to choose the best approach for their needs. Quality checks and transparent tracking provide supply chain visibility and ensure accuracy. LFS prints shipping labels, delivery documents, and package contents lists for packing, enabling two-stage packing and consolidation to maximize efficiency. Real-time tracking and alerts allow proactive exception management. LFS from E.P.G. leverages data and analytics to generate actionable insights. A comprehensive view of warehouse statistics, cycle time analysis, product velocity, and allocation overviews allow managers to understand performance and identify improvement opportunities.

Product updates in the last 12 months:

- In 2023, E.P.G launched an expanded version of its LYDIA Voice Demo App, available for free on the Google Play store. This app introduces users to the 100 percent voice-controlled picking process and now includes multi-language recognition. A key feature, multilanguage recognition, enables LYDIA Voice to understand multiple languages concurrently, catering to the needs of multinational personnel.
- In 2023, E.P.G. announced that its Lydia Voice 9 solution has received formal certification from SAP for integration with SAP S/4HANA and SAP NetWeaver for Extended Warehouse Management (EWM). This certification affirms that Lydia Voice can significantly enhance warehouse performance for businesses using SAP technology. Lydia Voice can be seamlessly integrated into an existing SAP environment without requiring middleware, ensuring maximum efficiency in warehouse processes. The key highlights of Lydia Voice 9 include the ability to recognize multiple languages in real-time, support for multi-core threading, expansion of supported languages, and a smart voice grammar editor, providing users with enhanced flexibility and efficiency in voice-directed workflows.

MANTIS

Mantis is a core provider in the 2023 WMS Technology Value Matrix. Mantis supports mid-sized global organizations within the Retail, Third Party Logistics, E-Commerce, Pharmaceuticals, High Tech, Fashion, Food and Beverage, Distribution, and Manufacturing verticals. Mantis Vision's Warehouse Vision (WV) is a comprehensive Warehouse Management System (WMS) on the LSV platform that optimizes and streamlines major warehousing activities. WV facilitates the management of Purchase Orders (POs) and Advance Shipping Notices (ASNs), allowing for efficient tracking of incoming inventory. It automates receiving and put-away planning, directing users based on predefined plans, and supports various put-away scenarios, enhancing accuracy and efficiency. Mantis also excels in outbound operations, capturing Sales Orders (SO) and efficiently processing them while offering advanced features like cartonization and palletization for order fulfillment.

Additionally, Mantis WV provides quality control, inventory management, advanced task management, and inventory counting options, providing a complete warehousing solution. Users can access out-of-the-box reports for quick insights into warehouse operations and leverage the power of Crystal Reports for highly customizable reporting. For more advanced analytics and data mining, the optional Supply Chain Intelligence subsystem offers deep insights and visualization tools. WV supports custom report creation, allowing businesses to tailor reports to their unique requirements, and provides scheduled reporting for automated, timely distribution of critical information.

Mantis Warehouse Vision presents a set of modules that enhance warehousing operations. One such module supports kitting, simplifying the handling of kits within orders and eliminating the need for physical kit assembly. Additionally, the Warehouse Production module is designed to streamline light production activities, enabling the assembly of products from existing components and packaging materials with advanced specifications. Mantis offers the Touch Screen Packing Station to further optimize the packing process, where operators can efficiently handle picked goods, generate packing lists, and ensure the accuracy of the packed items. In the realm of automation, Mantis provides cost-effective and straightforward solutions. One standout feature is the direct control of various automation technologies, eliminating the complexities associated with third-party control software integration. The Light-Directed Automation uses a highly configurable platform closely integrated with the Warehouse Execution System (WES). This integration optimizes core processes like put-away, replenishment, pre-cubing, picking, and sorting, significantly enhancing warehouse efficiency.

Mantis supports Automated Material Handling Systems (AMHS), enabling more efficient material handling, particularly in Goods-to-Person picking scenarios using automated storage, conveyors, and robotics technologies. The Voice Picking and Cross-Docking software provides real-time integration with Mantis WMS, allowing concurrent access to picking locations through various technologies, collectively improving overall efficiency. Furthermore, Mantis introduces the innovative Vision-Voice-RFID (VVR) Picking solution, leveraging Smart Glasses with advanced voice recognition capabilities and wearable RFID devices. This innovative approach optimizes traditional picking processes, such as piece picking, case picking, and sorting, ultimately enhancing efficiency and accuracy within the warehouse environment.

NORTHSTAR

NorthStar is a core provider in the inaugural WMS Technology Value Matrix. NorthStar supports North American SMB organizations within Manufacturing, Third-Party Logistics, Wholesale Distribution, Food and Beverage, and E-commerce verticals. The NorthStar Automation Platform is a WMS designed to enhance warehouse operations and streamline

inventory management. It offers extensive features that enable auto allocation of inventory to both work orders and sales orders. With the option to lock down chosen inventory to specific kits or customer orders, businesses gain control over order fulfillment, ensuring complete, partial, and non-fill order management. The platform facilitates the creation of zones within the warehouse, ideal for businesses dealing with a vast range of products and delivery requirements. Users can customize the warehouse layout based on unique business rules and security levels, offering flexibility in managing tasks such as receiving, put-away, picking, packing, and shipping. The NorthStar WMS provides real-time visibility through features like SnapShot and KPI dashboards, enabling quick insights into warehouse activities. It also offers comprehensive functionalities, including repacking, unit-of-measure conversions, and lot number tracking for traceability. The system optimizes warehouse operations with load management, vendor management, wave creation, and report generation features. Moreover, its mobile module enhances barcode-based transactions, while the Pack Order module simplifies order packing and shipping. NorthStar WMS empowers users to seamlessly oversee and control every warehouse process directly from their mobile devices, ensuring operational flexibility and real-time management capabilities. NorthStar has integrated Vertical Lift Modules (VLM) within its WMS to allow organizations to automate the picking and packing process. NorthStar integration portal consists of ERP, eCommerce, shipping carriers, and data collection vendors such as Zebra Technologies, Voxware, Mobile, DHL, UPS, USPS, FedEx, amazon, eBay, Magneto, Microsoft Dynamics, Sage, and Oracle NetSuite.

LOGIWA

Logiwa is a core provider in the inaugural WMS Technology Value Matrix. Logiwa supports midsized North American organizations within the Consumer Goods, Distribution, Third Party Logistics, and E-Commerce industries. Logiwa WMS is a cloud-based warehouse management system that optimizes warehouse operations and order fulfillment processes. The system provides inventory management, order processing, warehouse task management, and analytics capabilities. Logiwa WMS maintains a central database that stores information about inventory, orders, warehouse layouts, and other operational data. Users access and update this information through the Logiwa web interface or mobile applications. The system utilizes barcode scanning technology to enable real-time inventory tracking through receiving, putaway, picking, packing, and shipping processes.

Logiwa WMS supports advanced functions like directed put away, zone-based storage, cycle counting, and cross-docking for inventory management. The system provides visibility into inventory levels across multiple warehouses and automatically routes orders to the optimal fulfillment location. Users can configure automated rules to optimize putaway locations based on product velocity and fragility, for example. Order processing in Logiwa WMS utilizes wave and batch picking to optimize fulfillment workflow. The system creates picking

waves based on logical groupings of orders, considering factors like shipping cutoff times and item availability. Pickers are guided through optimized pick paths based on item locations. For analytics, Logiwa provides real-time dashboards and historical reports on essential warehouse KPIs like inventory accuracy, order cycle times, employee productivity, and warehouse utilization. This actionable data helps managers identify issues and improve operations. The system is also customizable, allowing users to tailor the interface, define workflow rules, set up warehouse zones, and configure automation to suit their fulfillment processes. Logiwa coordinates automated cross-docking workflows to redirect incoming pallets directly to shipping areas and streamlines handling for high-velocity products. Logiwa optimizes yard moves based on proximity, vehicle availability, and priority. The system tracks dock door assignments and collects real-time updates on load status.

Notable product updates from the past year include:

- On September 14, 2023, Logiwa enhanced its Fulfillment by Amazon (FBA) integration, expanding on Logiwa's existing FBA capabilities. Fully accommodating Amazon's essential FBA functionalities, Logiwa's enhanced integration is seamlessly integrated into its interface. Users can now create FBA shipment plans, generate box labels, and execute various FBA tasks within one platform.
- In Q1 2023, Logiwa partnered with shipping solutions software vendor eHub. This partnership will integrate Logiwa’s WMS platform with eHub to simplify the complexities of the shipping processes. This collaborative feature empowers users to access eHub's extensive network of over 150 carriers, shopping carts, and marketplaces, facilitating functions such as rate shopping, package tracking, and delivery information, all integrated into Logiwa's cloud fulfillment platform.
- On December 13th, 2022, Logiwa partnered with logistics software vendor Techdinamics to enhance supply chain visibility and control over fulfillment networks. The integration will enable users to seamlessly track, manage, and optimize the entire fulfillment process, encompassing order placement to last-mile delivery, all from a single platform.