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Critical Capabilities for Warehouse Management Systems

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Choose the right WMS for your operations by using the nine highlighted critical capabilities across five different use cases to appropriately align with your levels of operational complexity and sophistication. Supply chain technology leaders can use this research to compare specific WMS products.

Overview

Key Findings

- WMS support for the opposite extremes of the simplest Level 1 and the most complex and automated Level 5 use cases contrasts vendors and solutions dramatically.
- Innovation continues to distinguish warehouse management system (WMS) offerings. Newer capabilities are gaining importance, such as robotics integration, advanced analytics and machine learning (ML), and employee engagement. Other capabilities are maturing, such as usability, adaptability, composability, implementation and integration tools, and material handling automation support.
- WMS technical architecture has become a more important consideration for new buyers who seek flexibility, adaptability, composability, usability, ease of upgrades and affordability.

Recommendations

Supply chain technology leaders responsible for selection of warehouse management solutions for supply chain operations should:

- Determine the people, process, organizational, data and technology needs of each warehouse operation and focus WMS evaluations on the appropriate use cases by applying Gartner's warehouse stratification model (complexity Levels 1 through 5).

- Target the solutions best suited to your distinctive WMS use cases by developing a right-fit shortlist of vendors and solutions, using this research as a guide in combination with the companion WMS Magic Quadrant.

- Reconcile the competing interests of functionality versus less tangible characteristics, such as usability, adaptability, implementation support and simplicity, by assessing all relevant capabilities that are assessed in this research.

Strategic Planning Assumptions

Through 2026, companies will struggle to find packaged solutions that realistically support Level 1 warehouse operations.

By 2026, at least one new WMS provider will consistently challenge the six currently dominant WMS providers.

Through 2026, technical architecture will equal functionality in importance for new WMS buyers seeking flexibility, adaptability, composability, usability and affordability.

By 2026, support for intralogistics smart robotics solutions will be a primary consideration for WMS buyers.

What You Need to Know

Supply chain and IT leaders should use this Critical Capabilities research as part of an evaluation of warehouse management system products. Our assessment is based on nine key differentiating product capabilities evaluated across five major use cases of warehouse and distribution center operational needs based on warehouse complexity. The companion Magic Quadrant for Warehouse Management Systems assesses the vendors that offer the products and services evaluated here, which will allow you to make choices that balance the importance of both product capabilities and business and commercial criteria.

Our analysis synthesizes product information provided by 18 vendors across 21 total WMS products, gathered from November 2022 through March 2023. Information came from interactions with the WMS vendors over the past 12 months in the form of formal briefings, vendor and product RFI surveys, and detailed presentations and demonstrations of product capabilities. This information was supplemented, where possible, with client interactions to provide user feedback.

This research focuses exclusively on a vendor's commercially available functionality for the WMS products considered during the assessment period. It does not include future functionality, even capabilities anticipated in a relatively short period of time. It also does not rate partner solutions, such as labor or parcel management applications, as being part of the available solution. However, for the WMS Magic Quadrant, consideration is given to how partner solutions might round out the vendor's offering.

Despite similarities across assorted strata of warehouse operations, notable differences exist when considering various levels of complexity and sophistication. These differences demand specific scrutiny when evaluating new WMS investments. For this research, we identify nine critical capabilities. We then use Gartner's warehouse stratification model to highlight five different use cases — from very simple Level 1 warehouse operations to highly automated and complex Level 5 facilities. (See Apply an Architectural Framework to Stratifying Warehouse Management Systems, Use Gartner's Model to Understand the 10 Dimensions of Warehouse Complexity Before Evaluating WMS Solutions and Tool: Stratify Your Warehouse Operations to Determine the Right-Fit WMS and Improvement Strategy.) Each offering is scored against each of the nine critical capabilities. Then, each solution is evaluated considering the weighting of critical capabilities by use case, and depending on the specific offering, positions will change due to fit considerations.

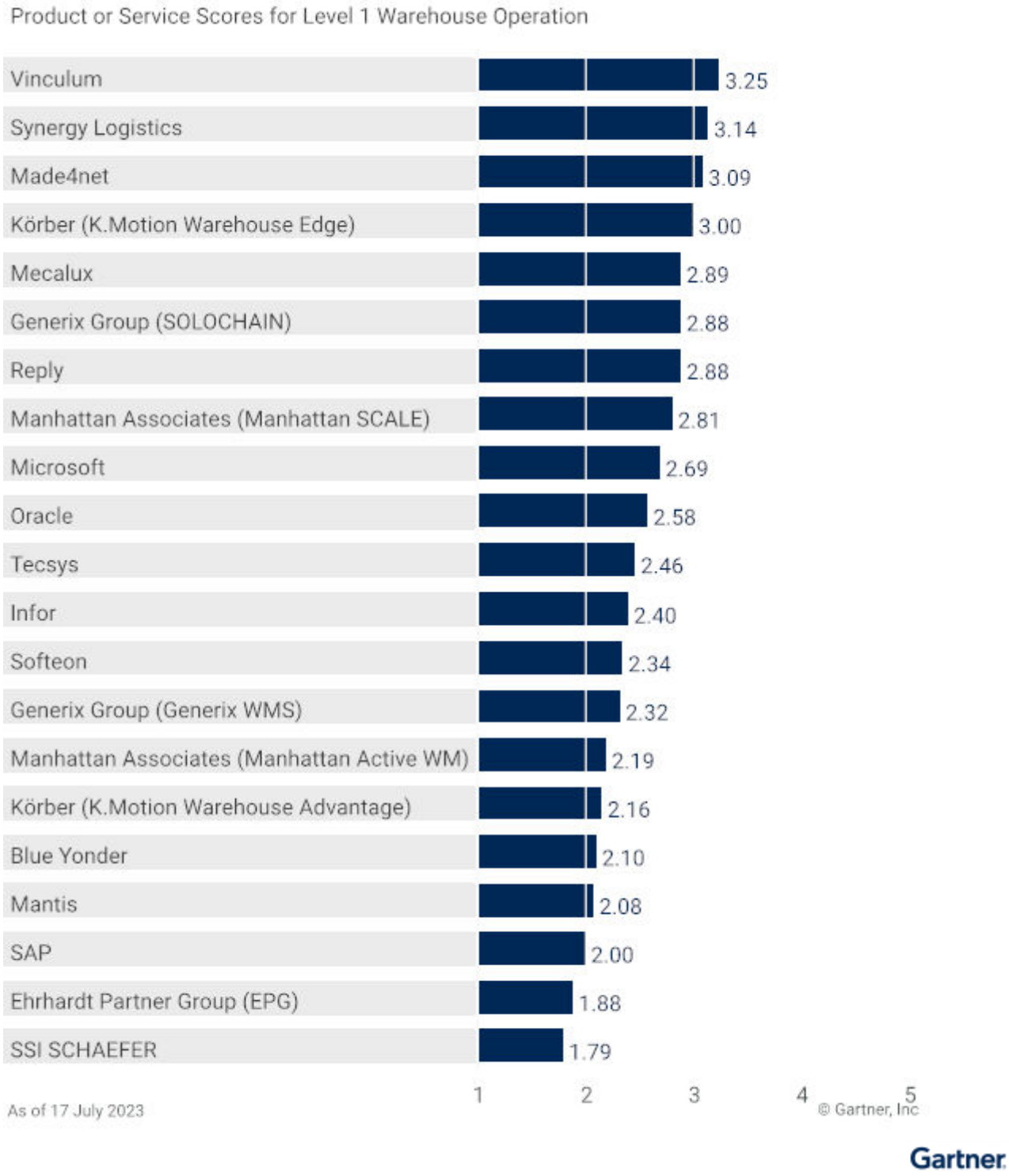
While the WMS market is mature, customer demand for specific functionality and capabilities is driving some vendors to enhance their offerings and thus changing the positioning in this research:

- Multitenant cloud solutions built on a composable microservices architecture that provide extensibility and continuous upgrades.
- Work planning and optimization.
- Enhanced user experience through a more consumer-grade look and feel, especially for supervisory workforce.
- Labor management and planning.
- Robot integration strategy and capabilities.
- Reducing implementation burden due to constrained resources by leveraging technology within the WMS.
- Supervisory workforce engagement, gamification and support.
- Enhanced support for material handling automation integration and work orchestration across various automation classes and vendors.

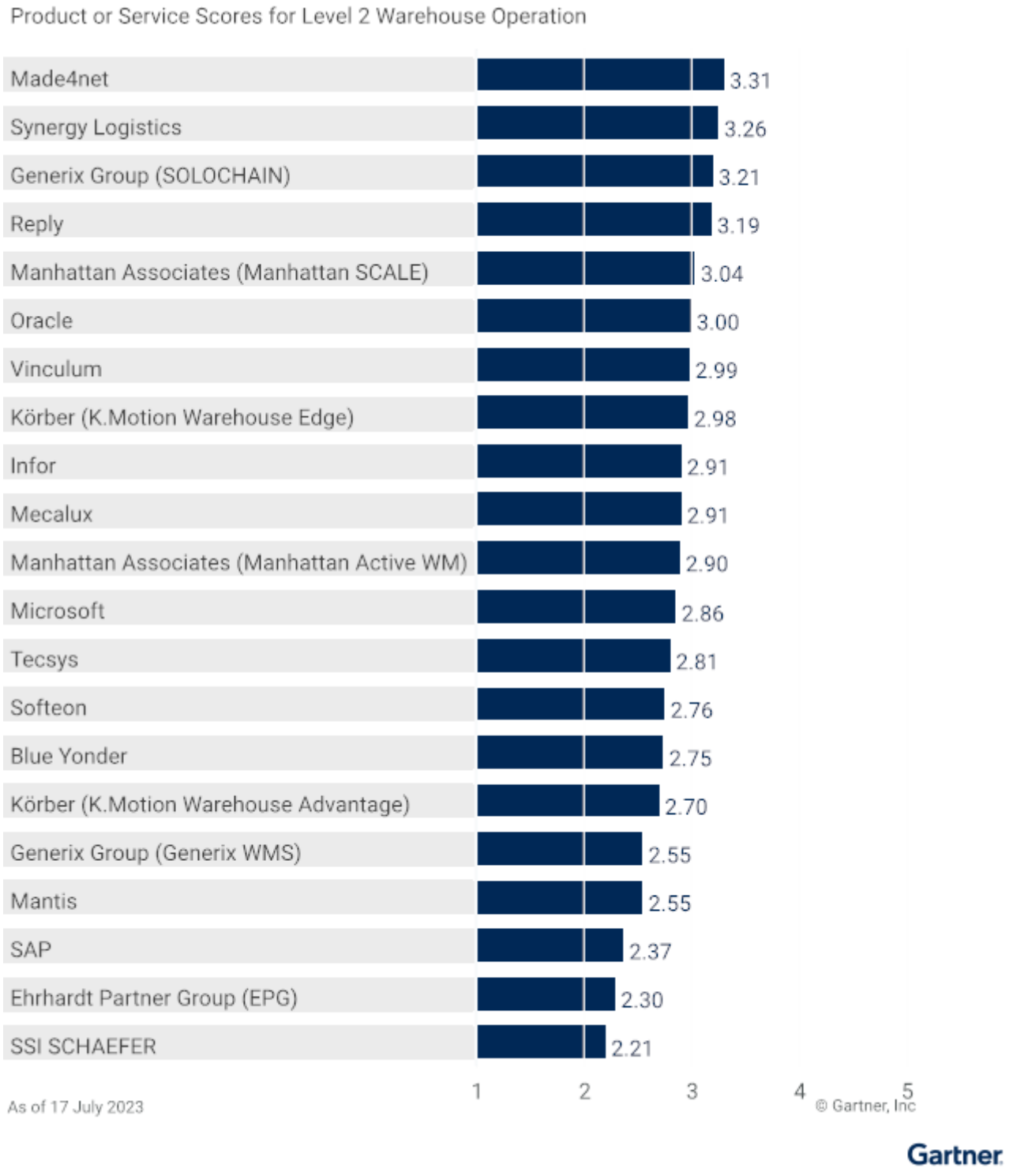
Analysis

Critical Capabilities Use-Case Graphics

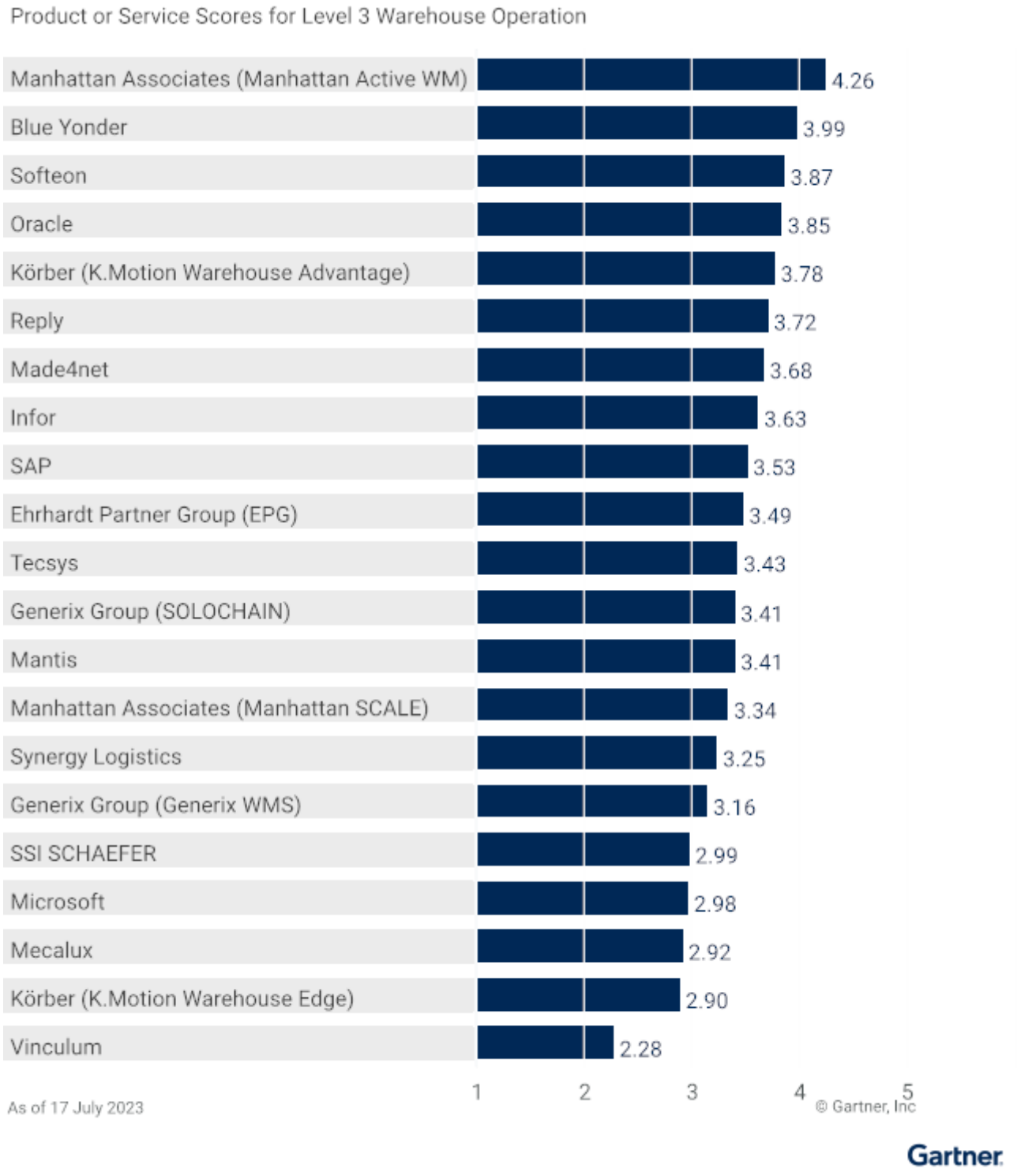
Vendors' Product Scores for Level 1 Warehouse Operation Use Case



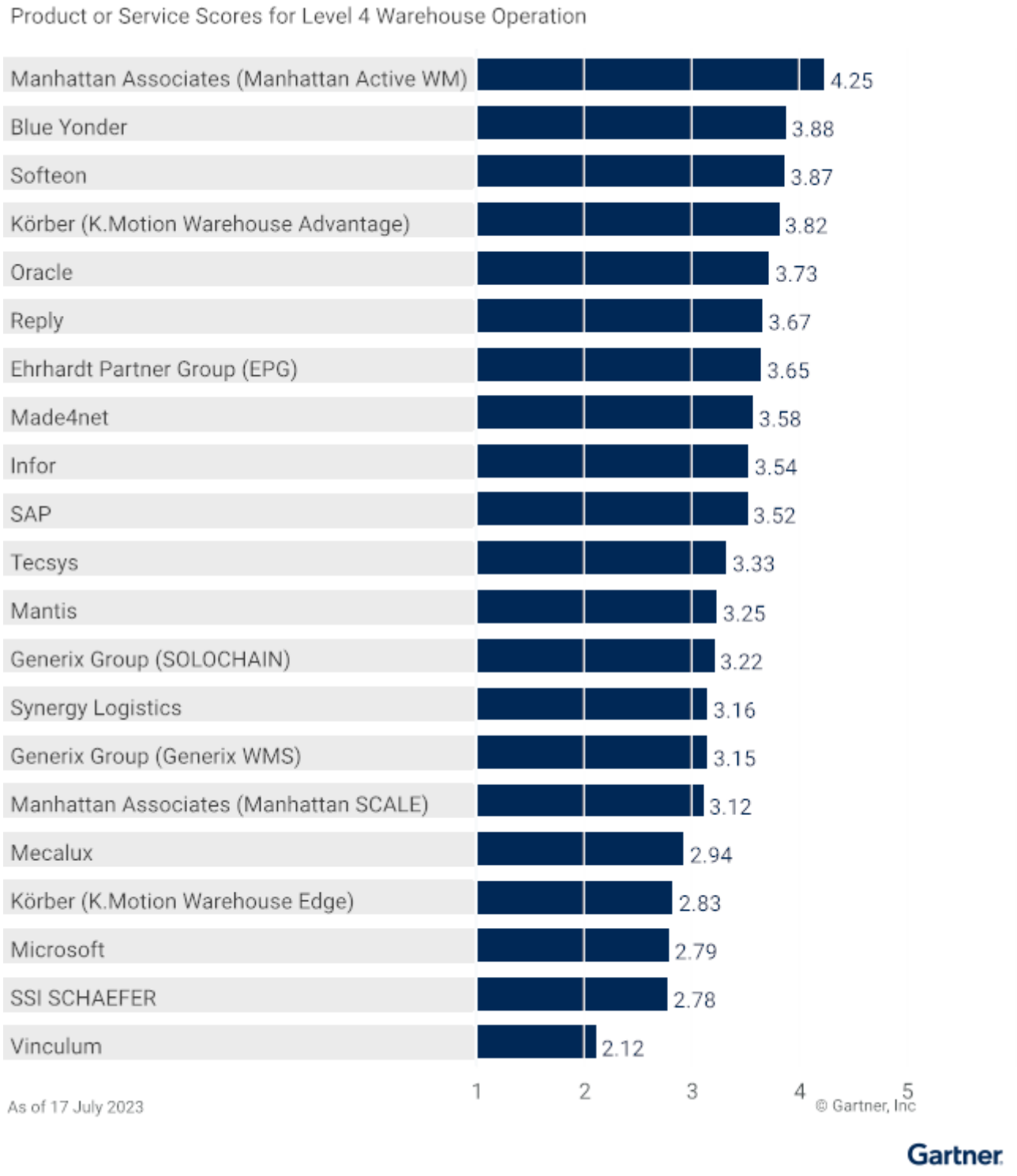
Vendors' Product Scores for Level 2 Warehouse Operation Use Case



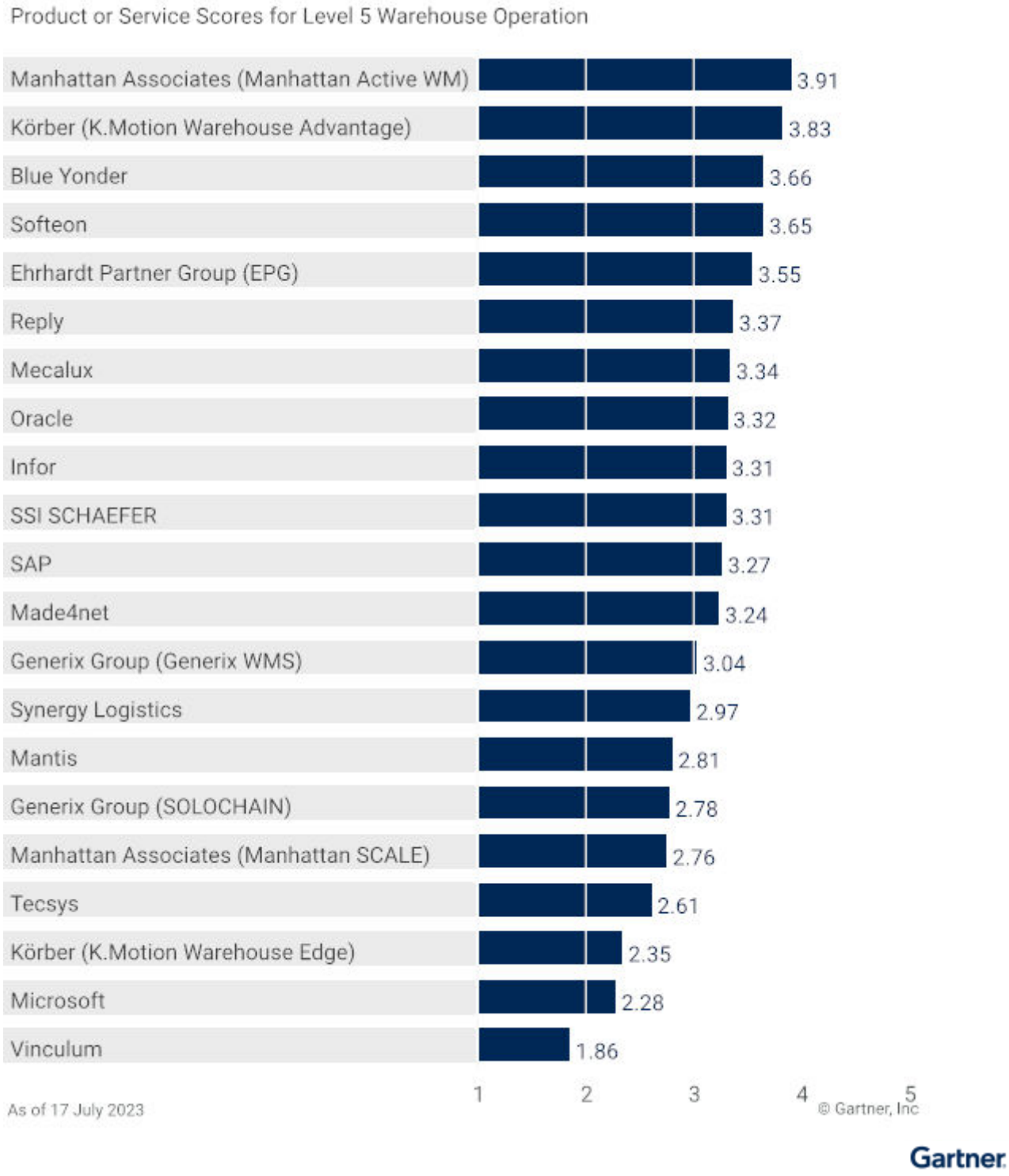
Vendors' Product Scores for Level 3 Warehouse Operation Use Case



Vendors' Product Scores for Level 4 Warehouse Operation Use Case



Vendors' Product Scores for Level 5 Warehouse Operation Use Case



Vendors

Blue Yonder

Blue Yonder offers a portfolio of supply chain management (SCM) solutions that include warehouse management, warehouse execution, workforce/labor management, transportation management, order management, supply chain planning, merchandising and retail planning. It has close to 1,000 WMS customers (one-third on its legacy Dispatcher product). Its customers span 19 industries with strengths in 3PL, food and beverage, consumer products, retail, manufacturing and pharmaceuticals.

Blue Yonder's Warehouse Management (WM) is most often used in Levels 3 and 4 warehouse operations, where the functional robustness of the WMS is valued by sophisticated and complex customers. However, it can scale from high Level 2 to Level 5 operations, where it has a large number of highly automated customers. Blue Yonder is moving from an on-premises deployment model to cloud/SaaS, with 90% of new bookings and about 80 customers on SaaS today. Blue Yonder recently expanded its WMS offerings for lower-complexity environments with a separate product named Adaptive Fulfillment and Warehousing (AFW), which it is testing with a few customers. However, this research only focuses on Blue Yonder WM.

Blue Yonder is in the lower quarter of solutions for Level 1 warehouse operations, driven by its low simplicity score. It is not a good fit for stand-alone Level 1 warehouses because it was designed for more complex facilities. Blue Yonder customers keen to use Blue Yonder solutions in Level 1 operations should likely investigate the alternative AFW offering.

The vendor's WMS is in the lower half of solutions for Level 2 operations due to its low simplicity score. However, this is offset by very strong core WMS capabilities (such as advanced configurable receiving and QC workflows to support perishable goods), strong usability and adaptability (notably, its visual assist in training and on-boarding, photo display and capture features). The vendor also offers a templatized approach to facilitate multisite warehouse rollouts and has an Environment Management Toolkit (EMT) to migrate configurations from one environment to another, which facilitates version upgrades in less-complicated warehouse environments.

Blue Yonder is among the top-placed solutions for Level 3 warehouse operations. This is due to its very strong core WMS capabilities (such as advanced cross-docking, replenishment, serialization and advanced inventory management capabilities) and notably strong extended capabilities, analytics, implementation and integration tools, usability and adaptability. Its supporting technologies are also relatively strong.

Blue Yonder is a leading solution in complex, people-driven Level 4 warehouse operations, driven by the breadth and depth of its core and extended WMS capabilities. It has notable strength in labor and workforce management functionalities, such as continuous improvement and multimetric performance, and in advanced labor forecasting and scheduling. However, Blue Yonder relies on partner solutions for some extended functionalities, such as advanced slotting and parcel management. It supports strong templatizations with capabilities such as its workflow and integration accelerators, with more than 3,000 public APIs to extend the solution with minimum modifications. It continues to enhance its automated testing capabilities through its partnership with Cycle Labs and offering Automated Solutions Testing as a Service to SaaS customers. To facilitate migration and upgrades from on-premises to cloud, Blue Yonder has recently introduced a system integration tool to help identify customizations that can be eliminated with standard functionalities and mapped against public APIs. It has strong analytics (including new mobile reporting and exception monitoring in tandem with IBM Cognos Analytics), and scored relatively strong for supporting technologies.

Blue Yonder has numerous customers with highly automated facilities, helping to place it in the upper quarter of solutions for Level 5 warehouse operations. Its material handling integration score is stronger than many vendors, but undifferentiated from the other leaders. The vendor does not have its own warehouse control system (WCS) but can integrate with third-party WCSs. It also provides features and live alerts for equipment-charging requirements, utilization rates and machine speed tracking. Blue Yonder has been developing a multirobot integration and coordination solution to support fully and semiautomated warehouses, and supports some warehouse execution system (WES)-like capabilities, exploiting its AI expertise. It is beginning to bundle its Blue Yonder Robotics Hub and Luminate Warehouse Tasking capabilities under what it calls its Luminate Warehouse Execution System (LWES). The vendor reports that its composable services strategy — with WMS, TMS, OMS services — helps manage customers' evolutions into fully automated and highly complex warehouses.

Ehrhardt Partner Group (EPG)

EPG is a WMS/logistics solution provider and has 832 WMS customers and 1,550 total supply chain execution (SCE) customers. In addition to its WMS — EPG LFS — it has multiple SCE applications and a native WCS, as well as consulting, cloud and hosting services in multiple regions. EPG provides its own voice solution, Lydia Voice, that it sells with, and independent from, the WMS. EPG's largest customer industry segments are 3PL, retail/e-commerce, industrial and construction machinery, automotive/parts and consumer products. It offers industry-specific functions for many of these, and for food/beverage, pharma/healthcare and textiles.

EPG's WMS is most often used in Level 4 and Level 5 warehouse operations, but it can scale from high Level 3 through Level 5 operations. Most of EPG's customers (80%) have deployed or migrated to a dedicated cloud environment using EPG's private cloud services, but customers do have the option to deploy on-premises. EPG has extensive experience in highly complex and automated (Level 5) warehouses with integrated WCS and 3D graphical simulation, emulation and visualization capabilities.

EPG is in the lower section of solutions for Level 1 warehouse operations, primarily driven by its low simplicity score. This is partially offset by its strong core WMS and relatively strong but undifferentiated usability. EPG's WMS is not a good stand-alone fit for Level 1 warehouses (it is designed for higher-complexity and automated environments). It does offer Lydia Enterprise Solution (LES) as an alternative to WMS for some low-complexity environments (which can work in collaboration with external WMSs). LES can also be modularly extended to a more comprehensive WMS as the customer's logistics needs grow.

EPG places in a similar position for Level 2 — in the lower cluster of evaluated solutions. However, it improves its score for this use case due to the increased importance of core WMS capabilities, usability and analytics — areas where it is relatively strong. EPG also offers tools to ease use of master data when implementing multiple sites.

EPG's score substantially improves for Level 3, placing it in the top half of offerings. Contributing factors include its strong core WMS (including features such as ideal pallet selection for outbound orders, recently enhanced cartonization/palletization capabilities and its native carrier selection engine) and strong extended WMS capabilities, such as its dynamic workload/workforce scheduling capabilities. Other notable capabilities include analytics (including LWS, its warning system for proactive alerts management and an SQL-based custom query manager), usability (with enhanced navigation, user-defined menus and built-in configuration support) and supporting technologies — all relatively strong.

EPG LFS places in the top third of solutions for people-driven Level 4 warehouse operations. This is driven by its improved extended WMS capabilities (where it has enhanced dock scheduling, contract and billing [CnB], workforce management, checklist and inspection capabilities, and has acquired vehicle routing and scheduling [greenplan] — now also offered as standalone solutions). Its score is also driven by its very strong support for materials handling integration and supporting technologies. EPG has relatively strong but undifferentiated usability and analytics capabilities (although less differentiated within the WMS, it also offers TIMESQUARE Cloud Analytics with integrated BI, planning and predictive capabilities through EPG cloud). However, it has lower adaptability and implementation scores than leading solutions for this use case.

EPG has numerous customers with highly automated facilities and extensive experience in this area, helping it place in the upper quarter of solutions for Level 5 warehouse operations. Its scoring for conventional material handling integration is very strong through its Automation Management Platform, and partly due to its integrated WCS and 3D graphical simulation, emulation, predictive maintenance and visualization capabilities. This is enhanced with EPG SUBURBIA, facilitating the orchestration of movements between automated guided vehicles (AGVs), forklifts and material handling automation. EPG scores strong for supporting technologies, with support for add-ons such as AR/VR, IoT and RFID. EPG also has its own voice application (Lydia Voice), which can be deployed with or without its wearable hardware that leverages AI and ML for voice simulation. EPG is not optimized for any hyperscaler but offers its own private cloud infrastructure — EPX cloud services with limited multitenant cloud options.

Generix Group (Generix WMS)

Generix Group provides a portfolio of SCM solutions with two WMSs, as well as transportation and yard management, logistics order and replenishment management, e-invoicing and electronic data interchange (EDI). Generix offers two distinct WMS solutions: Generix WMS and SOLOCHAIN, which was initially developed by its North American business unit. Generix has 464 WMS customers deployed across its two solutions. Of its WMS revenue, 78% is from consumer products manufacturers, retail (including e-commerce) and 3PL, with 3PLs representing its largest customer segment and retail a close second.

Generix WMS — the solution addressed in this section — is the stronger of the two in Europe and has the deeper functionality. It is deployed across approximately 375 customers and 1,960 warehouses.

Generix's warehouse management systems are most often used in Level 2 through 4 warehouse operations, but Generix WMS in particular scales to Level 4 and some Level 5 environments. Generix lacks its own WCS for highly automated Level 5 warehouse operations, but does offer standard connectors to some automation systems. Its preferred deployment method for new customers is now dedicated cloud using a recurring SaaS subscription pricing model. More than 90% of its new contracts are SaaS, with 47% of its customers now deployed on the dedicated cloud.

Generix WMS places in the bottom half of solutions for Level 1 warehouse operations mainly due to its relatively low simplicity and adaptability scores (which lag behind other WMSs and Generix's other solution). However, it has relatively strong core WMS and strong but undifferentiated usability. Strategically, Generix WMS is not aimed at lower complexity (L1/L2) operations, so it has no differentiation in this space. However, it may be worth consideration for companies that have both large and small operations. Its SOLOCHAIN offering may also be considered as an alternative.

Generix WMS also places in the lower group of solutions for Level 2 because simplicity is still a highly weighted factor for this use case. While it can fit a Level 2 environment, it is undifferentiated from a number of other solutions in this research. It gained some ground with strong core WMS, relatively strong usability (with new enhancements for mobile screens and multimodal voice) and solid implementation tools, including 3PL and visibility portals to accelerate go-live before EDI links are set up.

For Level 3, Generix WMS is in the lower section of WMS solutions. However, its relatively strong core (including enhancements to cross-docking for express 3PLs and QR code management for traceability), extended WMS (such as new connections to last-mile platforms) and solid implementation tools (including an enhanced API catalog and a new digital learning platform) helped improve its overall rating. Supporting technology is a more important criterion at Level 3 and Generix has enhanced its cloud support, notably its security, such that the majority of new customers are now SaaS/cloud.

Generix WMS somewhat improves its ranking for Level 4 environments. Its relatively strong extended WMS (including recent enhancements to task interleaving and workload calculations and traceability for value-added services (VAS)/kitting activities) and usability played a part, as did its strong core WMS (recent versions have enhanced functions such as receiving, allocations, wave management and support for temperature control). Solid support for materials handling integration also contributed to its Level 4 position. Notably, later in 2023, Generix WMS will be rolling out new resource management and labor management capabilities.

Generix WMS further improved its position for Level 5 warehouses, entering the midcluster of solutions. This is partly based on Generix's experience with multiple materials handling equipment (MHE) vendors in this area. About one-third of its customers deploy MHE automation, but it has limited partnerships in this area and lacks its own WCS and in-built WES capabilities. Its position is also driven by its material handling integration capabilities, an API designer to improve the speed of

connections to robotic APIs, solid implementation tools, and solid but undifferentiated analytics and supporting technologies (where there have been recent improvements to its support for voice). Further factors that contributed to its position for Level 5 warehouse operations include its relatively strong extended WMS, core WMS and usability.

Generix Group (SOLOCHAIN)

Generix Group's SOLOCHAIN is a contemporary WMS and manufacturing execution system (MES) solution. Of the vendor's two overlapping warehouse management systems (the other being Generix WMS), SOLOCHAIN is stronger in North America and has the more differentiated architecture. SOLOCHAIN has 90 customers in Canada, the U.S. and Mexico, and a small presence in South Korea and Australia. SOLOCHAIN is used most often in Level 2 and Level 3 warehouse operations, but it has a growing presence in low Level 4 operations.

SOLOCHAIN places in the top third of solutions for Level 1 warehouse operations. Its position is driven by a relatively solid score for simplicity, relatively strong core WMS, strong usability, and very strong adaptability and implementation tools.

SOLOCHAIN places among the leading solutions for a Level 2 environment. Its strong usability (supported by tools like its mobile workflow designer for WMS and MES, and graphical role-based access control) and very strong adaptability play an impactful role in this type of warehouse. Also playing a role are its strong implementation tools (notably, its process designer, label designer and report designer, driving visual workflows, an integrated implementation platform that incorporates project tracking, management and support, and its warehouse mapper). SOLOCHAIN's solid but undifferentiated core WMS also plays a part.

SOLOCHAIN places in the lower half of solutions for Level 3 warehouse operations despite having an overall score similar to its score for Level 2 environments. This is because a large number of solutions provide strong capabilities suitable for Level 3 warehouse operations. Its solid but undifferentiated core WMS had an impact on its ranking for this use case. Recent improvements to its core include bulk replenishment to forward picking, complementing advances in cross-docking and put/pick to wall strategies. A number of other solutions exceeded its capacity on core, despite SOLOCHAIN's high adaptability, usability and relatively strong analytics helping its ranking.

SOLOCHAIN places in a similar (although slightly lower) position for a Level 4 environment. This is due to its undifferentiated core, lack of some extended WMS capabilities and its lower rating for material handling integration. Notable among its extended capabilities are its support for manufacturing environments, with an integrated MES and its improved task interleaving capabilities. It also has developed some new inbound load tracking capabilities via yard and dock, and improved scrap and kitting production replenishment logic. SOLOCHAIN will also deploy the new resource planning/management system later in 2023. SOLOCHAIN has high ratings in many of the other capabilities that contribute to the needs of this complex environment. These include very strong adaptability and strong analytics, including heatmaps and new customizable work progression

dashboards rolling out later in 2023. Notably, it has embedded its own voice capabilities into its workflow process designer, avoiding the need for system interfaces or separate licenses.

SOLOCHAIN places in the lower third of solutions for Level 5 warehouse operations, principally because of its relatively low score in material handling integration and because it has a very small presence in these environments, although it has a few new use cases. Yet it has solid, relatively strong or strong scores in other factors weighted for a Level 5 environment.

Infor

Infor is a business applications megavendor. In addition to WMS, its portfolio includes a number of SCM applications embedded in, or integrated with, several of its ERP solutions. Infor's SCM products range from planning applications to warehousing, labor management, 3PL billing and transportation. We estimate the vendor has around 1,500 WMS customers, with about 150 of these now multitenant cloud. Approximately 80% of new customers are cloud. Most of Infor's overall WMS customers are on legacy Infor WMSs. Its strongest markets are 3PL, retail/grocery, wholesale distribution, automotive and industrial. Infor prefers a multitenant cloud deployment with a subscription-based WMS pricing model, but offers a range of deployment options, including on-premises.

Infor WMS is most often used in Level 3 operations, but it is making inroads toward more complex Level 4 and 5 environments, with a growing presence in Level 4.

For Level 1 warehouse operations, Infor WMS places almost in the middle of evaluated solutions. Infor does, however, offer Factory Track (not rated in this research), bundled with Infor's various ERP offerings (and sometimes with Infor WMS). It provides simplified Level 1 and low Level 2 warehouse capabilities for customers that do not need the depth of capabilities in Infor WMS.

Infor WMS ranks in the top half of solutions for Level 2 warehouse operations. Its position is driven by slightly improved simplicity and relatively strong core WMS, including its visual warehouse capabilities. The solution maintains one of the higher usability scores given its contemporary, consumer-grade UI and recent introduction of a smart help portal and user configurable themes. It also maintained a strong score for its analytics and business intelligence (BI).

Infor WMS occupies a similar position while improving its overall score for Level 3 warehouse operations, driven primarily by its relatively strong core and extended WMS, which it continues to enhance. Capabilities added include newly introduced flash picking for e-commerce operations, cherry pick replenishments, over and short pick capabilities, and features like cloud-based remote printing with NiceLabel, put to store support for flowthrough, and structured logical views of items and attributes for the end user. It also has strong adaptability (including new additions of extendable business objects), strong implementation tools (increasing support for upgrades), very strong usability (including mobile personalization tools and enhanced search features) and strong analytics/BI (benefiting from capabilities like Birst for analytics and Coleman for AI).

For Level 4 warehouse operations, Infor WMS places in the top half of solutions with relatively strong scores in several extended WMS areas, including Visual Yard and labor management. However, certain capabilities, such as slotting, are add-ons to the core solution and lack some elements like task optimization provided by other solutions. The vendor continues to show fairly sophisticated integration with manufacturing process flows across its various ERP offerings, as well as enhancements to support API-based functionalities like picking, cycle counting and time-clock integration. It also has strong adaptability with its unique approach to extensibility, leveraging the object modeling tool Mongoose. This allows end users to make “no-code” enhancements and provides a “full-code” option for technical people to make more advanced application changes. Infor WMS can demonstrate relatively strong supporting technologies (especially voice and its approach to cloud). It also demonstrated relatively strong core WMS (including capabilities like rainbow pallet build direction, waving support for production orders, and RPA-based capabilities like automatic inbound packlist scanning and discrepancy search.

Infor WMS is in the top half of solutions for Level 5 warehouse operations. It received a solid score for material handling integration, maintaining last year’s improvements due to continual development of its Automation Agent. Additionally, with its Infor OS integration layer, expanded REST APIs and library of previously installed integrations, Infor WMS provides integration capability for both traditional MHE and robotics systems. Its position for this use case is also enhanced by strong scores in adaptability, supporting technologies and analytics, relatively strong core WMS, very strong usability and a relatively strong extended WMS.

Körber (K.Motion Warehouse Advantage)

Körber’s supply chain software business is part of the broader technology group Körber. Over the last five years, Körber has executed a “buy and build” strategy which has integrated 13 supply chain technology providers (nine in software and consulting, and four in automation), in order to service customers globally under the common Körber brand.

Körber goes to market with four independent WMSs, two of which are evaluated in this research: K.Motion Warehouse Edge and K.Motion Warehouse Advantage. Körber has adopted a cloud-first model for new business, but cloud adoption varies by WMS. Körber’s WMSs are 100% dedicated cloud today, but the vendor is executing its vision to move toward a multitenant, microservices architecture over several years with significant progress expected to be made by the end of 2023.

This section focuses on K.Motion Warehouse Advantage, which primarily fits Levels 3 and 4, with some presence in Level 5 warehouse operations. We estimate Körber has 1,600 customers for its four WMSs, with no explicit or differentiated industry focus for Warehouse Advantage.

Warehouse Advantage is in the bottom third of solutions for Level 1 warehouse operations, driven by its low simplicity scoring compared with other solutions. While its core WMS, usability and adaptability drive it up the rankings, it is not a good stand-alone solution for Level 1.

For Level 2, Warehouse Advantage places in the lower third of solutions, but slightly improves its overall score. Again, its very strong core WMS, very strong adaptability and strong analytics help its position.

Warehouse Advantage is in the top quarter of solutions for Level 3 due to its very strong core and strong extended WMS, strong analytics, relatively solid implementation and integration tools, relatively strong usability, and very strong adaptability.

Warehouse Advantage is also in the top quarter of solutions for Level 4 due to its strong analytics, very strong core WMS, strong supporting technologies and relatively strong usability. Its strong and improving extended WMS includes good capabilities for most traditional WMS functions, such as two enhanced options for labor management, gamification, relatively advanced slotting capabilities and some native parcel management capabilities. Körber is also deploying AIOps technologies to continuously monitor data points, proactively identifying, prioritizing and resolving application issues (Moogsoft). Körber has labor capabilities with features to account for learning curves, fatigue management and KPI reporting, and is venturing into gamification through its K.Sight Engage offering.

Warehouse Advantage scored highly for adaptability due to features such as the vendor's rule engine, Advantage Architect, which allows trained users to modify existing business processes and create new and unique ones. It continues to enhance its flexibility with offerings such as K.Sight Pulse Designer, providing low-code and high-code development capabilities, plus a guided tool and version control for managing the modifications. It also provides an API designer integration tool that supports different industry protocols. Also, users can leverage SQL syntax to create calculations, look-ups and actions without breaking the base application. Gartner finds improved capabilities and use cases for supporting technologies, such as voice and intralogistics smart robotics. Körber is also leading the way in offering visualization, modeling and simulation capabilities with its CLASS offering.

Warehouse Advantage is among the leaders for Level 5 and a number of customers deploy it in highly automated facilities. It has a strong and improved scoring for material handling integration, which is significantly higher than many other solutions evaluated. Körber also offers Körber K.Motion WCS, its own warehouse control system, which it has improved further. It has increased its support for the majority of classes of intralogistics smart robotics, although we have not yet seen significant progress in WES capabilities. Körber is in the initial stages of aligning these robotic and conventional MHE automation capabilities with its new unified control system (UCS), although to date the offering is only beginning to be deployed in a few distribution centers. The intention is to develop this further to coordinate and prioritize tasks across multiple warehouse technologies including conventional automation, various classes of robotics, voice and put walls.

Körber (K.Motion Warehouse Edge)

Körber's supply chain software business is part of the broader technology group Körber. Over the last five years, Körber has executed a "buy and build" strategy which has integrated 13 supply chain technology providers (nine in software and consulting, and four in automation) to service customers under the common Körber brand.

Körber goes to market with four independent WMSs, two of which are evaluated in this research: K.Motion Warehouse Edge and K.Motion Warehouse Advantage. Not covered in this research are K.Motion Enterprise 3PL, which focuses on 3PLs, and K.Motion WMS X, which primarily serves complex operations, primarily in the DACH region, France and Spain. We estimate Körber has 1,600 customers for its four WMSs, with no explicit or differentiated industry focus for its Körber K.Motion Warehouse Edge offering — the subject of this section — which is marketed more to industry size because it is designed for SMBs.

Körber has adopted a cloud-first model for new business, but cloud adoption varies by WMS from 5% for WMS X to 80% for Enterprise 3PL. Körber's WMSs are 100% dedicated cloud today, but the vendor has a vision to move toward a multitenant, microservices architecture over several years.

K.Motion Warehouse Edge is best suited to Level 2 and low Level 3 warehouse operations. It is in the top quarter of solutions in Level 1 warehouse operations, driven primarily by its solid score for simplicity and its relatively strong usability. Although it was relatively strong but undifferentiated in core WMS, the functionality was judged as more than adequate for Level 1 warehouse operations.

Warehouse Edge is in the top half of solutions for Level 2 warehouse operations. This is primarily due to its solid score for simplicity, relatively strong usability, solid core WMS (with e-commerce-specific features like order prioritization and smart waving, along with robust picking methods [voice capability] and standard integrations), and solid but undifferentiated adaptability, analytics and implementation tools.

Warehouse Edge moves to the lower section of solutions for Level 3 warehouse operations, where its solid but undifferentiated core and extended WMS capabilities impact its position due to the importance clients place on these at this level. Its undifferentiated analytics and implementation support tools are also a significant factor in its Level 3 scoring, despite its relatively strong usability. Despite its relatively low placement for Level 3, Warehouse Edge can be a viable solution for these warehouse operations, depending on a customer's requirements and priorities. It provides features such as stand-alone integrations to multiple ERP systems, parcel and "less than truckload" (LTL) shipping applications, and configurable deployment options. It supports the needs of mid- to upper-Level 3 environments with voice, where other solutions move ahead.

Warehouse Edge also places in the lower section of solutions for Level 4 warehouse operations. Körber does not aim Warehouse Edge at customers with these types of operations, where robust and varied capabilities are required to effectively manage greater levels of operational complexity. The relatively low position is primarily due to solid but undifferentiated core WMS and relatively low

scoring for extended WMS. However, there have been some recent enhancements, such as support for catch weight and smart waving, and smart cart picking.

Furthermore, due to its focus on less complex users, Warehouse Edge rightfully scores in the lower section for Level 5 warehouse operations. This is driven by relatively low scoring in materials handling integration and a lack of differentiation for other capabilities critical to highly automated MHE operations. But clients may benefit from the broader Körber expertise if looking to drive some automation into their Edge operations.

Made4net

Made4net was founded in 2005 and is a vendor of WMS and related SCE solutions. In 2021, private equity firm Thompson Street Capital Partners completed a majority investment in Made4net. In June 2022, Made4net acquired U.S.-based WMS vendor Zethcon, including its midmarket 3PL and cold-chain-focused Synapse WMS. In May 2023, Made4net was acquired by Ingka Investments, the investment arm of Ingka Group (the largest owner and operator of IKEA stores in 31 countries), to improve its order fulfillment landscape. Made4net will continue to operate as an independent subsidiary.

Made4net's SCExpert Suite includes WMS, transportation, delivery management, yard and labor management, all running on a single common technical platform. Following the Zethcon acquisition, it has 154 employees focused on warehouse management and over 800 customers globally (111 of whom are Synapse WMS customers). This research focuses on Made4net's WarehouseExpert solution, not Synapse. Its three key industries are 3PL, retail and wholesale distribution, with significant numbers of customers in consumer products, e-commerce, food service and apparel.

Made4net's WMS was most often used, and the majority of its customers were, in Levels 2 and 3 environments (currently 66%), but it is increasing penetration into Level 4 environments (22%), and has customers in Level 5 and Level 1 environments. Made4net supports all deployment methods, but about half of its installed base remains on-premises and the vast majority of its cloud deployments are dedicated cloud.

Made4net ranks in the top cluster of solutions in our Level 1 use case, mainly driven by its strong usability (including tools like warehouse viewer and continued UI enhancements with features like pull-down menus and built-in tool tips), strong adaptability, and solid and improving simplicity. Its relatively strong implementation tools (including industry templates, configuration test simulation and guided workflow-based tools) also contributed to this ranking.

Made4net occupies a leading position for our Level 2 use case, with strong core WMS (enhanced by features such as its advanced QC, cross-docking and audit capabilities). Its solid simplicity, strong usability and adaptability, support for e-commerce platforms and relatively strong analytics also play a part.

Made4net places in the top third of solutions for Level 3 warehouse operations. Its position was helped by strong or solid scores for the majority of capabilities required in a Level 3 environment. These include task interleaving and enhanced picking and put-away rules for e-commerce operations. It exhibited strong adaptability because its system provides a platform that supports user-personalized deployment, with features like screen generators, interface configurators and operational workflows.

Made4net places in the top half of solutions for a Level 4 warehouse environment. The vendor has reasonable scores for extended capabilities (in areas such as appointment scheduling, labor and parcel management, 3PL billing and VAS, and has integrated receiving with yard management). It also has relatively strong scores in a number of other areas important for a Level 4 environment, but not all are differentiated from other solutions. Recent enhancements include 3PL billing capabilities, a 3PL customer portal, and enhanced integrations with downstream technology partners in warehouse functions like pick by vision, voice, RFID and robotics.

Made4net places just in the lower half of solutions for a Level 5 warehouse environment, but has improved its score for this use case since last year. Although it is not widespread in highly automated facilities (but is growing), it does have its own WCS capabilities embedded in the WMS and available separately. A proportion of Made4net's customers are now in automated warehouses and use its integration plug-ins (AutomationExpert) to connect with specific MHE vendors' material flow control (MFC) systems or other WCSs if Made4net's is not used. The vendor is developing partnerships with MHE automation and robotics companies. It also addresses supporting technologies, such as voice, pick to light and put walls, with some experience implementing its WMS with multiple classes of intralogistics smart robotics. But we have yet to see advanced WES capabilities similar to some other vendors in this research. Made4net has an active partnership with an augmented reality (AR) vendor and provides support for optical character recognition (OCR).

Manhattan Associates (Manhattan Active WM)

Manhattan Associates offers a broad portfolio of SCM solutions covering warehousing, transportation, omnichannel commerce, supply chain planning and supplier enablement solutions. Manhattan offers three distinct WMSs: Manhattan SCALE; Manhattan Warehouse Management for IBM i (WMi); and Manhattan Active Warehouse Management (WM), its cloud-native microservices multitenant cloud WMS. This research evaluates two of these, Manhattan SCALE and Manhattan Active WM (which replaces Manhattan Warehouse Management for Open Systems [WMOS]).

Manhattan Active WM, the focus of this section,offers a unified WMS and WES on a common platform that share a common component library supporting high-volume and high-velocity automated operations. Manhattan's strongest industries are general retail, e-commerce, omnichannel retail, grocery, footwear/apparel, 3PL and wholesale distribution. It has customers in a variety of industries. Gartner estimates Manhattan Associates to have a total of 1,685 total customers and, as of YE22, the company disclosed it had 83 Manhattan Active WM customers.

Manhattan Active WM caters to sophisticated, complex and often highly automated warehouse environments and is most often used in Levels 4 and 5 warehouse operations, but it can scale from Level 2 through Level 5. It scored in the lower cluster for Level 1 warehouses because its strengths at the high end of the market become liabilities at the low end, impacting areas like simplicity that are important at Level 1.

The solution is also not well suited for stand-alone Level 2 environments and occupies a midpoint. Its position is helped by relatively strong scores for most capabilities and very strong core WMS.

Manhattan Active WM is in a leading position for Level 3 warehouses due to its very strong core (with recently enhanced cross-docking and license plate number [LPN] capabilities) and extended WMS capabilities. It also received high scores in all other factors important in a high Level 3 environment such as usability, analytics and implementation tools. Manhattan continues to improve ease of implementation (incorporating a common components library of most frequently requested integrations, reports and extensions to accelerate implementation timelines) and adaptability with its Manhattan ProActive tool. This has been available to customers since last year, but is not widely adopted by them. It also has capabilities to aid compliance with Drug Supply Chain Security Act (DSCSA) requirements.

Manhattan Active WM's usability (for which it scored high) continues to be enhanced, especially for supervisory workers, with its responsive UI. The solution also has strong, but so far undifferentiated, performance management capabilities. It scored well for adaptability, leveraging its microservices architecture to permit customers to build extensions that do not affect the core WMS nucleus, thus allowing continuous upgrades. Its architecture offers the capability to compose unique flows, and with Manhattan's TMS and DOM now on the same platform, this offers the potential to build unique flows cross-functionally, which some customers have begun to implement.

The solution is most differentiated and strongest in Level 4 and Level 5 warehouse operations,occupying the leading positions for both use cases. It has very strong core WMS capabilities, plus some of the broadest and deepest extended WMS capabilities. These include advanced slotting, labor management, labor planning, wave and waveless planning, work optimization and resource planning, value-added services and native parcel management. Its yard management is also beginning to evolve, where it is exploring machine vision opportunities. Manhattan also continues to enhance the solution's voice capabilities and has collaborated with Honeywell, co-developing a new application, Honeywell Voice for Manhattan Active (HVMA).

Manhattan scores well for Level 5 highly automated facilities, because it has an embedded vendor-/equipment-agnostic WES, but it lacks a true WCS. Manhattan was one of the first vendors to embed ML and AI capabilities in its WMS with its Order Streaming capability, which optimizes the release and orchestration of warehouse work based on real-time demand priorities. Manhattan continues on the path to blending the orchestration of people-driven and automated equipment

activities within its WES capabilities across manual, automated and hybrid operations. It has also developed support for integration across multiple classes of intralogistics smart robotics.

Manhattan Associates (Manhattan SCALE)

Manhattan Associates offers a broad portfolio of SCM solutions covering warehousing, transportation, omnichannel commerce, supply chain planning and supplier enablement solutions. Manhattan has three distinct WMSs: Manhattan SCALE; Manhattan Warehouse Management for IMBi (WMi); and Manhattan Active Warehouse Management (WM), its cloud-native microservices multitenant cloud WMS. This research evaluates two of these, Manhattan SCALE and Manhattan Active WM.

Manhattan SCALE, the solution assessed in this section, is based on a Microsoft technical platform. It caters primarily to the SMB and 3PL WMS markets with independent Level 2 and Level 3 warehouse environments. Manhattan SCALE can be deployed in either a dedicated or multitenant cloud environment hosted on Microsoft Azure. Although its multitenant cloud version is sometimes referred to as Manhattan Active SCALE, it should be noted that this is a distinct application and architecture from Manhattan Active Warehouse Management. Unlike Manhattan Active WM, Manhattan SCALE also has the option to be deployed on-premises.

Manhattan SCALE scores better than average compared with other offerings for Level 1 operations. This places it in the top half of solutions due to its strong coverage of core WMS and a reasonable simplicity score. Other contributing factors are its strong usability and implementation tools, such as the Manhattan SCALE extensibility framework, which makes its mobile UI more flexible and end-user-oriented, together with solid adaptability — factors important to a Level 1 environment.

Manhattan SCALE places in the top quarter of solutions assessed for Level 2 operations due to usability (including improved user experience such as in Trading Partner Management and new workflows in warehouse mobile capabilities), implementation and simplicity advantages, and its availability as a SaaS multitenancy offering. It can also be deployed on-premises or as a dedicated cloud deployment, unlike Manhattan Active WM. It offers strong core WMS and relatively strong adaptability and analytics. It has also introduced enhanced monitoring for SaaS environment performance.

While Manhattan SCALE has reasonable overall scores for a Level 3 environment, it places in the lower half of solutions. This is because a number of other solutions (including Manhattan's other product, Manhattan Active WM) scored higher in a variety of different combinations for the seven factors important in a Level 3 warehouse. Also, simplicity plays less of a part in relatively complex Level 3 environments. Its support for Level 3 operations is bolstered by its strong core WMS capabilities, its solid extended WMS capabilities, strong implementation tools (recently enhanced with tools to enhance synchronized multisite deployments) and relatively strong adaptability. This makes it a reliable candidate for its target markets. Its latest release included more enhancements in

its mobile user capabilities and an updated user experience in its Trading Partner Management portal that enables transactions and reporting between 3PLs and their customers.

Manhattan SCALE occupies a similar, though slightly lower, ranking for Level 4 and Level 5 warehouses. However, the gap in overall scores widens because it lacks the breadth of extended capabilities for Level 4. It also lacks the depth of support for MHE integrations and optimization provided by others for Level 5.

Mantis

Mantis is a WMS suite provider, which in early 2022 was acquired by logistics software and hardware provider ecovium. Its top three customer industries are 3PL, distribution and wholesale, and multichannel retail, with Mantis WMS's 711 WMS customers spread across 14 vertical industries, including a notable presence in e-commerce and 3PLs. Ecovium's legacy WMS has 270 customers.

This research evaluates Logistics Vision Suite (LVS), Mantis' WMS, not the legacy ecovium WMS. Clients range from SMBs with single-site deployments having a few users, to large multinationals with multisite, multicountry deployments having hundreds of concurrent users. LVS is most commonly used in Levels 3 and 4 warehouse environments, but it scales from Level 2 to some Level 5 operations. Mantis' customer base is primarily deployed on-premises and on dedicated private cloud environments. The company is also gradually growing its own offering of a dedicated public cloud environment on Microsoft Azure. It offers perpetual license, subscription and SaaS pricing.

Despite strong core WMS, LVS is in the lower section of solutions for Level 1 warehouse operations due to its relatively low simplicity scoring, which is affected by its highly rated adaptability — a minor factor in Level 1 environments. However, its currently undifferentiated usability is improving with more new capabilities in this space rolling out later this year.

Mantis' LVS places in the lower third of solutions for Level 2 warehouse operations because simplicity is still a highly weighted factor at this level. But its overall score improved from Level 1, given its strengths in other areas important for Level 2 environments.

It gains ground in Level 3 environments, where its strong core and solid extended WMS are more of a factor, and its very strong adaptability, solid implementation tools and analytics are also notable. LVS places midcluster for Level 3 solutions and is a good option for organizations that wish to deploy the advantages of its advanced visual workflow (a scenario builder for codeless configurations) and 3PL billing capabilities. These self-serve capabilities are useful for 3PLs willing to train technically proficient users to adapt workflows to the niche requirements of their customers' operations. It has improved e-fulfillment capabilities in areas such as advanced order batching, nested wave picking and inbound VAS. LVS has relatively advanced traceability to support upstream and downstream tracing and support lot genealogy compliant with EU TPD (tobacco industry) and EU FMD (healthcare) requirements. It also provides nested serial support for the electronics and telecom sectors.

LVS ranks in the midcluster of solutions for Level 4 environments due to its strong core WMS and solid extended WMS (such as enhanced slotting capabilities with its Slot Master and slotting-as-a-service offerings). Other contributing factors include its solid analytics and very strong adaptability supported by its visual workflow and use of scripting tools.

LVS places in the lower third of solutions for a Level 5 environment, but with a slightly improved score since last year. This placement is principally because of its relatively low (but improving) score in materials handling integration and its undifferentiated but improving supporting technologies. These factors counter its solid analytics, very strong adaptability and reasonable scores in other capabilities weighted for a Level 5 environment. However, LVS includes proprietary technology for tight integration with technologies such as pick/put to light, voice (with enhancements for cross-docking), vision picking/smartglasses, put walls, smart carts and RFID. It also has a module to ease the integration with MHE vendors' WCSs and MFCs.

Mantis has also released its Warehouse Control Tower, providing a set of dashboards to monitor operations progress and resources performance, with more advanced capabilities due for release over the next two years.

Mecalux

Mecalux Software Solutions is part of the Mecalux Group which offers products and services for warehouses. These range from manufacturing of racking and shelving, automated MHE and associated consulting for design, to the supply of warehouse control and WMS. It has approximately 1,000 live WMS customers with strengths in retail, manufacturing, wholesale distribution and 3PL.

Mecalux's Easy WMS product is best positioned to address "medium" levels of complexity and implementation cost. It primarily services midmarket businesses with automated facilities and manual warehouse operations. Historically, it has been most often used in Levels 2 and 3 operations, but it scales to Level 5 supported by its own WCS.

Twenty-seven percent of the vendor's implemented customers are on cloud, with almost three-quarters of these on dedicated cloud and 70% of new manual customers on cloud. Standard and small implementations use multitenant solutions, and larger, more complex customers use dedicated, single-instance deployments. Mecalux uses Microsoft Azure for cloud deployments.

Mecalux previously offered its WMS in five preconfigured versions, reflecting the five levels of complexity. However, it now only offers three: Lite, primarily used for training and educational purposes; Enterprise for manual environments; and Robotics to support current and potential customers that require automation (the same features as Enterprise but incorporating Galileo, its control application).

Mecalux is in the top quarter of solutions for Level 1 warehouse operations mainly due to its relatively strong scores for simplicity, core WMS and usability, and solid implementation tools. It also offers a

very basic version of its WMS with minimum functionality, but this is now only deployed as a training/educational tool.

It places in the top half of solutions for Level 2 warehouse operations because simplicity is still a highly weighted factor at this level. Its relative strengths in usability, core WMS and solid implementation tools and analytics supported this position. Its mobile UI offers basic configuration, and more in-depth customization can be achieved through its EasyBuilder tool, which is open for customers in more technical roles. Mecalux has also broadened its 3PL offerings by adding its new directives module to the solution's 3PL portal and billing module, bringing functionalities such as shipping documentation configuration and shipping requirements modifications to 3PLs and their clients.

Mecalux occupies lower positions for Level 3 and Level 4 environments, but with further improved overall scores since last year. At Levels 3 and 4, greater strengths in a broader variety of capabilities are provided by a number of other solutions, where simplicity is of less importance. Mecalux is relatively strong in supporting technologies (although its cloud offering is not as mature as others). It has three optional modules to specifically support e-commerce requirements, parcel management (incorporating parcel manifesting and prebuilt connectors with last-mile delivery applications) and store fulfillment (supporting POS integrations and store replenishment) for emerging midmarket operations. Its extended WMS rating has improved since last year due to new yard and dock management features and 3PL enhancements. It has also improved its score for adaptability due to its workflow-based EasyBuilder tool that enables clients to create customizations, background processes, reports and labels within a low-code development environment. Easy WMS supports an extension called Manufacturing for WMS that enables the management of bill of materials (BOM) and manufacturing orders received from ERP or MES systems. This enables better sequencing to feed production lines, cross-docking and traceability, linking finished goods with the raw materials used to produce them.

Mecalux significantly improves its position for a Level 5 environment, where it places in the top third of solutions. This is primarily driven by its very strong support for materials handling integration. Mecalux has its own WCS, simulation and visualization capabilities, and provides multiple levels of setup and design support for midmarket organizations looking to implement automated MHE and e-commerce in new or existing operations. The vendor also has an automation monitoring dashboard as a complementary offering to enhance operational visibility.

Microsoft

Microsoft offers Microsoft Dynamics 365 Finance and Supply Chain Management (which includes its WMS capabilities) as an integrated cloud ERP solution. Dynamics 365 Supply Chain Management, not Business Central, is assessed in this research. The majority of its customers are midsize enterprises, but it is starting to work with some larger enterprises. We estimate Microsoft Dynamics 365 to have more than 850 warehouse management customers, and a much larger number of warehouse sites. It has customers spread across 21 industries, with its largest presence in wholesale distribution.

The vendor claims the majority of its customers use its WMS to support Level 3 warehouse operations. It is a dedicated cloud WMS, deployed on and benefiting from Microsoft's Azure scalable infrastructure and sold on a subscription basis as part of the larger Microsoft Supply Chain Platform offering.

Microsoft Dynamics 365 Supply Chain Management (WMS) is in the midcluster of solutions for Level 1 warehouse operations. While its simplicity score is undifferentiated, it is higher than more than half the solutions in this research. Its strong usability and solid core WMS also help in this environment. The newly released warehouse mobile app, with customizable user guides and views, can also ease use in different environments. Microsoft has some examples of customers using its WMS across a network with varying complexities, and aiding some pop-up environments.

While its overall score improves for Level 2, it moves to the lower half of solutions evaluated in this use case. Its solid but undifferentiated core WMS is aided by very strong usability and solid implementation tools. Its responsive UI, mobile application design, and drag and drop workflow interface also help its overall score.

While Microsoft's overall score again improves for Level 3, it places in the lower cluster of solutions for this use case. It is, however, a solid choice for mid-complexity environments. Its solid core WMS (including support for opportunistic cross-docking and a robust set of cycle counting capabilities, plus recently released guided cluster-picking capabilities) aids its position. Very strong usability and relatively strong implementation tools (including support for multisite deployments, support for more than 50 languages, and guided workflow-driven configurations) aid these environments. Microsoft also recently enhanced its hazardous materials capabilities. Additionally, customers benefit from platform integration with Microsoft's broader technology ecosystem; for example, with Microsoft Azure, Microsoft analytics capabilities, Power Platform and emerging capabilities in supporting technologies such as AI and sustainability tools (giving users the opportunity to visualize warehouse greenhouse gas emissions). The ability to easily scale users is also attractive for these environments, especially for organizations already in the Microsoft Dynamics 365 ecosystem. The offering also benefits from a mature cloud architecture and extensibility framework.

The solution places in a similar lower-cluster position for highly complex Level 4 environments, where other solutions have stronger core WMS capabilities, and greater breadth and depth of extended WMS capabilities (the most highly weighted factor in Level 4) such as advanced yard, labor management, task interleaving and 3PL capabilities. However, Microsoft's scoring is helped in this environment by its relatively strong scores in some important areas in a Level 4 environment. It has strong analytics (with embedded Power BI and intuitive dashboards) and a variety of standard reports, very strong usability, plus strong adaptability with its library of extension touchpoints, configurable workflows, wizards, and task-based guided setup. Additionally, beyond what is possible through standard configuration, it offers customer-centric customization, with in-app extensibility on various cloud platforms through Odata APIs, and extensibility through its low-code Microsoft Power

Platform. Though at early stages, Microsoft's customers can explore its differentiation in embedded process mining capabilities for operational and systemic process analysis.

Microsoft remains in the lower cluster for highly automated and complex Level 5 environments. This is due to its undifferentiated automated MHE integration capabilities and relatively low presence in these environments. While it can support automated MHE integration through its MHAX interface, it lacks a true WCS or advanced WES or orchestration capabilities compared with other vendors. However, Microsoft does offer integrations with some robotics vendors such as Invia and AutoStore.

Oracle

Oracle offers multiple WMS products, but this research focuses exclusively on Oracle Fusion Cloud Warehouse Management (i.e., Oracle Warehouse Management — previously named Oracle WMS Cloud). From inception, this solution has been a pure multitenant SaaS/cloud WMS. It is integrated with Oracle's other cloud SCM offerings: Oracle Fusion Cloud Supply Chain & Manufacturing, Oracle NetSuite, and Oracle Retail Merchandising Operations Management Cloud.

Oracle's portfolio includes Oracle Fusion Cloud Inventory Management for basic materials management, as well as other cloud solutions for order management, manufacturing, transportation and sales. Although Oracle Warehouse Management is integrated with these solutions, it is a separate product. The vendor's strategy is to maintain this solution as a separate product so it can also be integrated with non-Oracle applications. We estimate Oracle to now have 556 Oracle Warehouse Management customers, all deployed on multitenant cloud on a subscription basis.

Oracle claims its Warehouse Management customers are spread well across Levels 2 through 5 warehouse operations, with the largest amount present in Level 3 and approximately 20% of customers having a facility with some automated MHE.

The solution places just in the upper half of solutions for Level 1. Oracle has better options for simplistic operations, such as using its Oracle Fusion Cloud Inventory Management with support from mobile application development solutions in lieu of a full-blown WMS.

Oracle Warehouse Management is positioned in the upper third for Level 2 environments. This is mainly driven by its very strong core (recently enhanced for serialized items and with opportunistic cycle counting, an inbuilt label designer tool, green bill of lading and movement requests for raw materials). Its score for this use case is also driven by strong and further enhanced usability (it has deployed Oracle's Redwood innovations for an increasing number of transactions and enhanced mobile usability for receiving, put-away, cross-dock, cycle counting, picking and shipping). Further score support comes from its relatively strong adaptability and implementation tools, with its prebuilt integrations to Oracle Cloud SCM using Oracle Integration Cloud, which customers can extend as needed.

Oracle Warehouse Management shows in the top quarter of solutions for Level 3 and Level 4 warehouse operations due to its strong core and extended WMS capabilities, and its performance in

other areas such as usability, adaptability and supporting technologies. The vendor offers relatively strong but undifferentiated capabilities for adaptability and configuration within the application. However, it exposes most of its business entities via RESTful APIs, allowing customers to write their own custom code.

Oracle's WMS is in the top half of solutions in highly automated Level 5 warehouse operations, even though it lacks packaged WCS and WES capabilities. It does support configuration and setting up of rules related to MHE, but MHE integration remains principally project- and service-based. Oracle's typical approach to MHE integration maps the MHE vendor's WCS to Oracle's WMS via web services using standard integration points through Oracle WMS Automation Cloud. However, it is present in sites that use a range of MHE systems and supporting technologies, such as voice, conveyor sortation, pick/put to light, and storage and retrieval.

Oracle has very strong support and a compelling roadmap for supporting technologies. Accomplishments with cloud include near-zero downtime and enhanced security. It also has high maturity as a pure multitenant cloud/SaaS solution from inception, supported by the use of Oracle Cloud Infrastructure and Oracle Autonomous Database. It has further improved integration with other Oracle products through its prebuilt Warehouse Management integrations to Cloud SCM using its Oracle Integration Cloud (OIC) subscription offering. Customers can extend the OIC integration recipes to meet their specific requirements. Deployment is facilitated by its WMS Health Analyzer to proactively identify setup and operational issues. However, this is used by engineering support, and is not customer facing. Also, Oracle is improving AI/ML capabilities for WMS, which are becoming more accessible than other vendors' offerings due to easier access to historical data.

Reply

Reply has two WMSs: Logistics Execution Architecture (LEA Reply), a multitenant cloud WMS developed in a contemporary microservices architecture; and Click Reply, its on-premises WMS. Reply has 143 LEA Reply customers and 146 for Click Reply, and it expects LEA to surpass Click customers this year. Its WMS customers span industries: LEA Reply is strong in retail, e-commerce, food and beverage, lite manufacturing, and fashion and luxury; Click Reply is strong in automotive, industrial, service, high tech and 3PL.

It is LEA Reply, the vendor's go-forward solution, which is assessed in this Critical Capabilities research. LEA Reply generally caters to a range of warehouse-centric network environments and is most often used in Levels 2 and 3 warehouse operations. However, it can scale up to Level 4 operations and has a growing presence in Level 5 warehouses (12%), where Click Reply WMS is traditionally stronger.

LEA Reply places in the top third of solutions for a Level 1 warehouse environment. Although it received an above-average simplicity score, it trailed leaders in Level 1. Its position was also helped by its strong core WMS and usability, and very strong adaptability. LEA Reply doesn't focus on stand-

alone Level 1 warehouses; however, it is a fair alternative for customers with robust warehouses that have some satellite Level 1 facilities.

LEA Reply is in the top quarter of solutions for Level 2 environments, where strengths in usability and core WMS are weighted even more heavily. Its very strong score in adaptability and relatively strong implementation tools also helped this position. LEA Reply's microservices architecture enhances its adaptability.

It loses ground compared with other solutions for Level 3 environments, but maintains last year's position in the top third of solutions. Its strong core WMS (with recent improvements in pick path and cluster picking optimization, task orchestration, cross-docking and returns management) is a significant factor in its position. LEA Reply's extended WMS, which is a factor in Level 3, is solid but not yet a differentiator compared with that of a number of other solutions. There have been recent enhancements, such as for yard management (incorporating a 2D or GPS-based map with real-time monitoring), "control tower" and staging task capabilities. Additionally, the potential of LEA as a platform means a new generation of SCE applications can be deployed around its differentiated microservices architecture, which has contributed to its very strong score in supporting technologies. This can also significantly enhance the options for extended WMS capabilities beyond those being embedded in the core product. LEA Reply has some specific capabilities for Level 3 warehouses in industries such as food and beverage, manufacturing, distribution and e-commerce, with notable capabilities for dedicated e-commerce for supermarkets and grocery stores.

LEA Reply ranks in the top third for Level 4 warehouse environments, where extended WMS is the most heavily weighted factor. LEA Reply is evolving new capabilities in this area, such as resource forecasting and optimization, but it is not yet differentiated in extended WMS overall. LEA Reply's capabilities in other areas play significant roles in its placement. It offers very strong adaptability, strong core WMS, very strong supporting technologies (such as voice and smartglasses), strong usability, and solid implementation tools with a cohesive integrated framework. It has prebuilt connectors to multiple ERP systems, e-commerce platforms, robotics, parcel systems and web stores. It has enhanced its applications suite such as its last mile/smart planning and dropship. It also has relatively strong analytics capabilities that can support diagnostic and prescriptive analytics, leveraging real-time data streaming and processing, although some users report less ease of reporting than expected.

LEA Reply retains a similar top-third position for Level 5, although it lacks some capabilities supported by solutions initially designed for heavy automation. Its position is partly due to a growing number of customers using extensive automation and its very strong score in supporting technologies. Also, it continues to enhance its automation integration WCS component (to integrate to MHE vendors' WCSs) and LEA EDGE capabilities. Reply is collaborating with microfulfillment center vendors to extend elements of LEA Reply into these areas.

SAP

SAP has more than 30 years of experience in warehousing. This research focuses exclusively on the SAP Extended Warehouse Management (SAP EWM) solution, specifically its EWM Advanced instance as opposed to EWM Basic or other SAP alternatives. SAP has more than 2,300 EWM customers and has diversified vertical industry coverage with customers in 17 industries. It has a notable presence in retail (including e-commerce, grocery and food service), automotive and industrial/construction machinery, and consumer goods (its strongest industry).

SAP EWM is most often used in Level 2 and Level 3 warehouse operations, but it can scale up to Level 5. The vast majority of EWM customers are deployed on-premises (we estimate 84%), with an estimated 13% on dedicated cloud (hosted) and, we estimate, only 3% on its newer multitenant, public offering (which is not equivalent to EWM Advanced).

EWM places in the lower cluster of solutions for the Level 1 use case, primarily due to a low simplicity rating and its lack of uncomplicated implementation tools and adaptability, putting it behind many other vendors. This is somewhat mitigated by EWM's very strong core WMS and improving, although undifferentiated, usability, along with SAP's strong document management capability. SAP has made efforts to create a simplified package to implement in a shorter time frame. It also offers the alternative Stock Room Management that existing users of WM may choose to revert to in place of implementing EWM.

EWM achieves a similar position for Level 2 warehouse operations. Its solid but undifferentiated usability, with a relatively confusing array of options for the client, and adaptability are factors. However, its overall score improves from Level 1 to Level 2 due to the higher weighting given to its strong core WMS. EWM may not be a strong contender for stand-alone Level 2 warehouse environments, but organizations with multiple warehouses using SAP across the business may consider EWM for Level 2. SAP has improved integration of processes, such as cross-warehouse loading and unloading with other SAP applications (for example, SAP Transportation Management and Inventory Management within SAP S/4HANA Cloud or its on-premises version, SAP S/4HANA). It has improved harmonization of product profiles between SAP's ERP system (SAP S/4HANA Cloud and S/4HANA) and EWM. It also has native integration to related processes, such as global trade, manufacturing, order management, track and trace, and transportation.

EWM significantly improves its position and score for a Level 3 environment, placing in the top half of solutions. It demonstrated strong and, in some cases, differentiated core WMS capabilities. These include its quality inspection engine and stock consolidation, strong extended WMS, and solid usability (including a new presentation option for its mobile UI), which were important factors. In terms of adaptability, it scored below most other vendors and was undifferentiated beyond configuration and implementation tools, which are both important factors in less sophisticated warehouse environments.

EWM retains a similar position in a Level 4 environment aided by its extended WMS capabilities. These include catch-weight management, rearrangement management, emerging AI capabilities to

support slotting, and various options to integrate manufacturing with warehouse execution. It has also optimized warehouse activities for plant maintenance orders, with new integration to stage and consume parts from EWM warehouses and for MES-driven staging, optimizing material flow to production. SAP also enhanced its quality management capabilities within EWM. It has developed external service stock management for items being repaired by third parties. Its relatively strong materials handling integration capabilities also start to become a factor in some Level 4 environments.

EWM places in the middle of solutions for the Level 5 use case, largely due to its own integrated WCS, which allows SAP to directly integrate with many MHE programmable logic controllers (PLCs). SAP also has a traditional warehouse control unit (WCU) interface. SAP reports that more than 350 of its customers employ various levels of MHE automation (although the number of highly automated operations is lower), with many warehouses using its Material Flow System (MFS) offering. Its position was hampered by the comparative growth in capabilities of other vendors. SAP also demonstrated new use cases for integration with smart robotics, with its latest release allowing integration with robotics vendors' own fleet management systems.

Softeon

Softeon has a noteworthy SCE convergence vision and portfolio that includes WMS, DOM, some transportation, direct store delivery and planning on a common technical platform. In March 2023, Softeon acquired GetUsROI and its AttunedLabs software development arm. This will add new capabilities through its LUCA platform, which provides low-code/no-code integration with a variety of material handling systems. The impacts on capabilities of this acquisition are not fully accounted for in this research, as they are only just beginning to become apparent with live customers related to the timeline references for this research.

Softeon has 165 customers, is particularly strong in 3PL (about 30% of its customers) and is growing in other industries such as retail, consumer goods, apparel and consumer electronics. It recently added capabilities and focus in healthcare logistics.

Softeon is most often used in Level 3 and Level 4 warehouse operations, but it can scale from Level 2 to highly automated Level 5 operations. The vendor combines WMS and WES on a common platform, supporting nonautomated and more automated operations. It offers the same software in three forms: on-premises, dedicated (single instance) cloud and multitenant cloud, and generally prefers cloud deployments with a subscription-based pricing model.

Softeon is in the lower half of solutions for Level 1 and Level 2 warehouse operations, with a relatively low score for simplicity and solid but undifferentiated usability driving these results. Some of the flexibility and capabilities that make it strong for higher-level warehouse operations add complexities that make it less suitable for less advanced stand-alone operations. Its overall rating for a Level 2 use case improves from a Level 1 due to the higher weighting attributed to its very strong core WMS and strong adaptability. Softeon may make a reasonable fit for a Level 2 environment for a large company

with strong IT and would fit a network of warehouses with varying levels of complexity. However, Softeon does include features like voice cues which can be turned on to aid training and guide new employees activities.

Softeon has some of the highest scores for Level 3 through Level 5 use cases. These are driven by its depth of strong core WMS capabilities, its breadth of strong extended WMS (plus additional SCE capabilities such as WES, DOM, returns management and direct store delivery available on a common platform) and strong ratings in supporting technologies. Softeon also scored well in adaptability and implementation tools (including a differentiated single pane integration monitoring tool). Notably, Softeon leads in applying technology to facilitate implementations and upgrades by employing intelligent wizards, which can be used by Softeon, customers and implementation partners. It has solid and developing analytics, which include an ad hoc report writer. Although the product is not yet a true-zero-modification continuous upgrade environment, the company offers tools, such as a strong rule engine, that allow for user tailoring without modification, all of which contribute to a good adaptability score. Softeon has recently enhanced its algorithms and use of AI/ML for slotting, clustering and planning. It has also enhanced its healthcare logistics capabilities, including DSCSA serialization support and controlled substance handling, gaining HITRUST certification for healthcare.

Softeon places in the top quarter of solutions for Level 5 automated warehouses with some differentiated strengths despite not typically deploying a full WCS. These include embedded WES capabilities that can also be delivered stand-alone. Its strengths include native integration to, and optimization of, technologies such as voice and manual or robotic pick to cart. It also offers some constraint-based labor and resource planning capabilities.

Softeon has expanded its support for mobile robots and put walls, supplementing its existing WES capabilities that allow integration with robotic systems in different ways. Softeon can integrate its WMS/WES with a robot provider’s fleet management software, organizing work assignment, prioritization and coordination. The acquisition of GetUsROI’s LUCA platform and the team’s expertise will help deepen technical and process integration between robots, humans and other agents. The further combination of WES and LUCA should help speed integrations and add continuous routing and balancing (an evolution toward Softeon Streaming Fulfillment) in the near future.

SSI SCHAEFER

SSI SCHAEFER IT Solutions provides its own WMS, called WAMAS, which can be offered independently of materials handling systems and to purely manual warehouse operations. The vendor offers its solutions in a variety of combinations of MHE, WCSs and WMSs, and no part is mandatory to operate another. SSI SCHAEFER also offers consulting services for SAP EWM and in March 2023, it completed its full acquisition of DS Automotion, aiding its material handling integration capabilities. SSI SCHAEFER has 418 WMS customers and approximately 93% of WAMAS deployments are in medium- to high-complexity environments, with 40% in very highly automated Level 5 environments. To date, all WAMAS deployments remain on-premises with a perpetual license

model. WAMAS in the cloud (designed for use in manual warehouses or those with only light automation) has completed internal testing and development but is not yet live with any customers.

For Level 1 environments, WAMAS' positioning is constrained by its low simplicity and relatively low usability score (it has a longer-term roadmap for improvement) and undifferentiated adaptability, although it demonstrates strong core WMS capabilities.

WAMAS occupies a similar low position for Level 2, but improves its scores with strong core WMS capabilities and relative strengths in implementation tools (supported by enhanced training document management capabilities [WAMAS Knowledge Base] and replenishment planning management). It offers its preconfigured industry template WAMAS Core (formerly WAMAS GO!) for lower-complexity environments, which helps speed implementations.

For Level 3, WAMAS' overall score and position substantially improve because strong core WMS is the most significant factor in this environment. WAMAS' relatively strong analytics and improved implementation tools, as well as solid but undifferentiated adaptability and supporting technologies, also come into play in Level 3. WAMAS can be a reasonable fit for middle-complexity to low-complexity environments for companies with strong IT capabilities, and can be a reasonable fit for a network of warehouses with varying complexity.

Despite WAMAS developments in slotting and order sequencing optimization, it is in the lower cluster of solutions for Level 4 warehouse operations. This is because other evaluated solutions have a broader range of mature extended WMS capabilities, such as yard, labor management and parcel management. SSI SCHAEFER is working to improve dock capabilities and has developed some area-specific labor forecasting (now integrated into WAMAS), but it lacks the depth of labor capabilities of other solutions. However, its strong core WMS contributes to improved performance in this environment, with very focused functionalities for manufacturing warehouse operations and receiving functionality supporting a variety of human, equipment and automation requirements. It has strong implementation and integration tools such as a new configuration management tool, recent progress in automated data migration, 2D and 3D visual workflow tools, and a self-training optimization engine with NLP-based log file analysis. WAMAS has strong analytics and solid but undifferentiated adaptability and supporting technologies, which play an important part in this use case. Additionally, in these environments, WAMAS' very strong materials handling integration and visualization capabilities come into play.

For Level 5, which is the single level with the highest number of WAMAS customers, it climbs into the top half of solutions. Its position is primarily driven by its very strong materials handling integration capabilities, with one of the highest scores of all solutions in this research. The vendor continues to improve and enhance MHE support capabilities, such as AntSim, its real-time simulation and emulation tool to perform functional and performance tests. Comparatively, its scores for supporting technologies are modest; this is primarily driven by its low maturity in cloud, which is less of a consideration for highly automated environments. It has enhanced use cases for RFID, such as

unloading and roll cage tracking, and supports voice for Vocollect and topsystem. While functionally rich for integration and optimization of many types of automation, its support for robots is primarily for AGVs and static robots, not other classes of intralogistics smart robotics. SSI SCHAEFER is also notable for its very mature and continually evolving 3D load optimization, Schaefer Pack Pattern Generator (SPPG).

Synergy Logistics

Synergy Logistics is a small software company focused exclusively on WMS and directly related products, such as mobile robots. Synergy has approximately 260 WMS customers. Its clients range from SMBs to global organizations, but its strength and differentiation are strongest in the SMB market, with almost 80% of its customers categorized as SMBs. Synergy's top three industries — representing 63% of its business — are e-commerce (40%), 3PL (12%) and wholesale distribution (11%), but it is growing in consumer products (10%) and other industries.

Synergy's WMS, SnapFulfil, is most often used in Levels 2 and 3 warehouse operations. However, it can scale down to high Level 1 and up to moderately complex Level 4 operations that don't need broad extended WMS capabilities. Synergy is one of the longer-tenured cloud WMS providers, offering a rapid deployment, SaaS, dedicated cloud solution.

Synergy has one of the highest scores for Level 1 and Level 2 warehouse operations, mostly driven by its relatively strong simplicity, accelerated implementation approach and enhanced implementation tools, remote deployment support, strong adaptability and usability, and good core WMS. SnapFulfil is built around a robust and flexible rule engine that allows high levels of noncode adaptability to support customer-specific and vertical-industry-specific requirements. This flexibility helps enable the vendor's rapid implementation methodology, which is well suited for the midmarket and Level 1 and Level 2 operations. Synergy now allows customer access to its rule engine, an SQL-based, client-centric extensibility tool. Synergy typically deploys its "starter" licensing and most basic configuration of the core WMS for Level 1 environments.

Synergy is in the bottom half of solutions in this research for Level 3 warehouse operations where there is a strong clustering of offerings for Level 3 warehouses. Its position is driven by its relatively strong but undifferentiated core and extended WMS functionality. So while Synergy's depth and breadth of functionality are undifferentiated, it has strengths in ease of implementation and adaptability, and relatively strong simplicity, which are still factors in Level 3 operations. To support peaks and troughs in demand, SnapFulfil enables bidirectional user license adoption. Additionally, Synergy leverages advanced capabilities to support specific perishable product segments like minimum (shelf) life on receipt (MLOR), temperature control monitoring and workflow-based QC checks. The vendor also has cartonization and dynamic replenishment capabilities. Most notably, Synergy continues to enhance its SnapBuddy video training and remote implementation capabilities, which overlays instructional, interactive guidance to end users of the application and offers configuration instruction and real-time feedback to superusers and administrators.

Synergy remains in the bottom half of solutions for Level 4, but it has slightly improved its score and position for more complex Level 4 warehouse operations from last year. This is attributed to its enhancements in 3PL billing capabilities and improvements to integration capabilities through a partnership with a third party. However, it still lacks the breadth and depth of advanced extended WMS capabilities compared with other vendors in this research, such as advanced yard and labor management, slotting optimization and sophisticated work optimization. Its position is helped somewhat by strong scoring for adaptability and implementation tools. Of note, the vendor leverages its implementation tools to support multisite rollouts remotely, which is meaningful to larger organizations with numerous globally dispersed warehouses.

Synergy has significantly improved its position from last year for Level 5 warehouse operations to just above the lower third of solutions due to its newly introduced SnapControl offering. This is offered both embedded within the WMS and as a stand-alone to facilitate integrations and work orchestration with robotics systems. However, Synergy has not traditionally targeted very highly automated Level 5 warehouse operations or demonstrated differentiated support for conventional automation. Synergy scores reasonably well for supporting technologies because it built SnapFulfil from the ground up using web-native technologies and deployment methodologies. However, while it is a cloud WMS, it is dedicated cloud and not multitenant SaaS.

Tecsys

Tecsys has 214 WMS clients with a strong market position in healthcare and life sciences and strengths in complex distribution across industrial products, service parts and dealer networks.

Tecsys is most often used in Level 3 and low Level 4 environments, but it can handle Level 2 with some specialized Level 1 capabilities — notably in healthcare environments. It has capabilities to integrate WMS upstream into hospitals for automatic replenishment and support for hospital pharmacies and perioperative areas. Tecsys recently launched a new WMS called Omni WMS, focused on low-complexity omnichannel environments. But it is Tecsys' Elite WMS that is assessed in this research. Historically, the majority of Tecsys' deployments were on-premises but cloud/SaaS is now preferred, with dedicated cloud penetration at 90%.

Tecsys occupies the midpoint of solutions for Level 1, partially driven by an average simplicity rating, an expedited implementation package for easier deployment, strong core WMS and strong usability.

Tecsys places close to the midpoint in Level 2 environments due to its simplicity, core WMS (including recently enhanced replenishment and prioritization logic) and adaptability. Going forward, Tecsys' new WMS, Omni WMS, may be a better fit for low-complexity environments and for some mid-complexity environments.

Tecsys places at the midpoint for Level 3, and significantly improves its overall rating from Level 2. Contributing factors include its strong extended WMS. Although Tecsys does not match the traditional extended WMS capabilities of leading vendors, it offers capabilities lacking in many

others. These include mature inventory management capabilities, compliance support for new DSCSA regulations for pharmaceutical track and trace, HIPAA compliance for patient-sensitive data, six levels of granularity for high-precision units of measure, and differentiation in managing dimensional products such as reels and cables. Tecsys has directly embedded all data and regulations into its WMS, making it more processing efficient and at lower compliance risk than alternatives. It also facilitates medical procedural pack management, tightly integrating demand planning, warehousing and delivery operations. Tecsys is developing AI capabilities to aid healthcare product descriptions and standardization of metric and imperial measurements for operations, having to manage both. Its healthcare license verification also applies to the firearms, controlled drugs and alcohol industries.

Tecsys places at the midpoint of solutions for Level 4, mainly due to its strong and unique extended WMS capabilities, strong adaptability, usability, core WMS, and relatively strong implementation support (including facilitating remote design). Its integration offering provides rich capabilities for how data is passed between Tecsys and other systems. Its adaptability rating reflects the multifaceted nature of its options, such as its rule engine and workflow management. While these capabilities are powerful and flexible, they are complex and primarily suitable for relatively sophisticated IT users, which affects simplicity and usability. Tecsys offers extensibility with its Itopia platform aimed at providing low-code development and API-based integration to support unique custom requirements. Tecsys has enhanced its support for 3PLs and given greater focus to inventory and picking accuracy through visual cues. It now directly embeds Cognos in its WMS, enhancing reporting. It has also enhanced its cross-docking and dashboard monitoring capabilities. Most other capabilities of importance for Level 4 operations were undifferentiated.

Tecsys places in the lower quarter of solutions for Level 5 but with an improved score since last year. The position is due to its lack of productized MHE integration through a WCS or similar capability, or optimization for highly automated environments. However, it offers an in-house interface layer to specific carousels/PLCs and has experience with equipment, such as weigh-in-motion scales. Tecsys is in the process of building a direct integration to Pendant Automation's WXS (a WCS). While a separate chargeable product, this will give the option to ease MHE integration in the future. Tecsys has begun to enhance its robotics integration strategy by partnering with SVT Robotics, a multiagent orchestration vendor. Enhancements that are live have slightly improved its rating. It was undifferentiated from other solutions' capabilities in supporting technologies, but has support for voice and wearables.

Vinculum

Vinculum is a provider of a suite of cloud/SaaS-based solutions aimed mainly at e-commerce and omnichannel retail, darkstore/backstore fulfillment and retail-focused 3PLs. B2C and e-commerce order fulfilment play a major part in its WMS. Vinculum has a modest presence in B2B and nonretail 3PL (10% to 15% of its business). In addition to WMS, its Vin eRetail suite covers omnichannel product information management (PIM), automated listing to marketplaces, multichannel sales order

management, returns, payment reconciliations, merchandising, omnichannel loyalty, and real-time view of inventory in stores and warehouses. Its WMS can be purchased and run as a stand-alone solution; however, buyers get both the WMS and OMS, even if they do not intend to use the OMS. Vinculum claims about 1,500 total customers across its suite, with 685 pure WMS customers, excluding “freemium” users.

Vinculum is best suited to emerging or small and midsize e-commerce and multichannel retailers and brands, or regional operations of larger organizations. Vinculum’s WMS is best suited to paper- or mobile-based manual Levels 2 and 3 warehouse operations, and it offers a web-based store inventory capability that supports Level 1 operations. In 2013, it launched its cloud/SaaS-based WMS, Vin eRetail WMS, running on Amazon Web Services, and 95% of its customers are multitenant cloud, with the remainder dedicated cloud.

Vinculum has a leading position for Level 1 warehouses, mainly due to its strong simplicity and ease of adoption. Its emphasis and strength in low-level warehouse operations is clear; more than 40% of its customers continue to use paper instead of its mobile technology for things like picking. Its usability score remains strong due to its adaptive UI (although without visualization). Its adaptability is undifferentiated. It has a strong integration framework where it leverages APIs to connect to more than 80 marketplaces, to over 200 web stores, brand distribution centers, last-mile delivery applications, and to 3PLs. Its solution includes self-onboarding guides and simple configuration tools for customers. These characteristics also make it a good solution for low Level 2 operations, where it places in the top half of solutions assessed in this research.

Vinculum scores low for the remaining use cases (Levels 3 through 5), driven mostly by its lack of the more advanced core and extended WMS capabilities provided by other vendors in this research. It does, however, provide effective tools for its client base, such as a 3PL client portal and inventory serialization to enhance order processing transparency. These features are supported with capabilities for controlled multiuser/multisite control access. Vinculum claims it is beginning to expand its reach into Level 4 and Level 5 warehouse operations via partnerships with third-party task, labor and yard management solution providers, as well as some providers of intralogistics smart robotics such as Addverb and Mowito. Vinculum’s operational analytics within a warehouse environment are low compared with those of other vendors in this research; but it offers good insight on inventory across a network.

The overall depth of Vinculum’s core WMS capabilities does not match the functional capabilities of other vendors in this research (although it has developed further in 2022 in areas like sort to box, simultaneous picking/packing and cycle counting). Its enhancements remain more focused on deeper marketplace integrations, inventory reservation and prioritization, category support for fruits and vegetables, new features for dark stores, and usability features such as QR code enhancements. Furthermore, although Vinculum provides some limited extended WMS capabilities such as value-added services (VAS) and 3PL support capabilities, it lacks the breadth of extended capabilities compared with many vendors in this research. It does, however, have some strong functionality

necessary for its typical Asia/Pacific customer base, notably support for complex taxation capabilities. The vendor has also played to its strengths over the last year with recent enhancements in integration to delivery platforms, upgrade security and performance. Vinculum has not yet demonstrated strength or competitiveness in supporting technologies beyond cloud, nor does it exhibit differentiated capabilities or experience for materials handling automation integration and support. However, Vinculum does advise that it supports voice through partnership with Vocollect,

Context

Gartner's Magic Quadrant for Warehouse Management Systems is an evaluation of the WMS market and the leading WMS vendors in that market. Although WMS product capabilities are an important consideration in a Magic Quadrant, they are not the only or singularly important one. Evaluation of other factors — such as global scope, sales and marketing track records, customer satisfaction, operations and vendor viability — contributes to a vendor's placement on the Magic Quadrant. Conversely, this Critical Capabilities research for WMSs focuses specifically and exclusively on the capabilities of the highlighted WMS products. There are two dimensions to the Critical Capabilities research:

- **Critical capabilities** — We have identified nine critical capabilities considering core and extended functionality, usability, analytics, implementation tools, adaptability, supporting technology, materials handling integration, and overall simplicity of use and operation.

- **Use cases** — Not all critical capabilities are equally important, depending on certain predefined use cases. Each critical capability is weighted by use case, and vendor offerings are scored by critical capability and use case. As a result of the different level of importance (weighting) attributed to each critical capability in each use case, a particular solution may score well for one use case and not for others. This is an evaluation of the qualifying WMS offerings across the strata of warehouse environments that span from small, simple operations to complex and highly automated facilities. As part of the evaluation, we determine how many users have committed to using the solutions in various operational environments. For three of the WMS vendors that have multiple products, we also address where their various offerings best fit the environments and how vendors decide on which product to offer.

Product/Service Class Definition

Gartner defines a warehouse management system (WMS) as "a software application that helps manage and intelligently execute the operations of a warehouse or distribution center (DC)."

WMS applications offer core capabilities such as receiving, put-away, stock locating, inventory management, cycle counting, task interleaving, wave planning, order allocation, order picking, replenishment, packing and shipping. These systems incorporate mobile devices in conjunction with bar codes and, possibly, RFID scanning/sensing to form the transactional foundation of a WMS. This enables efficiencies of directed work activity and the delivery of accurate information in near real

time. Also of importance to more complex and sophisticated warehouse environments are what Gartner refers to as “extended WMS capabilities.” These include workforce/labor management, slotting, yard management, voice picking, parcel manifesting, value-added services, light manufacturing/kitting, and third-party logistics (3PL) billing.

Gartner has intentionally chosen not to use terminology like Tier 1, Tier 2 or Tier N warehouses to delineate various strata of warehouse operation. There are several reasons for this. First, tiering is too often assumed to relate principally to the size of the organization and not the operational conditions of a warehouse. Larger Tier 1 enterprises can run simple (what Gartner might call Level 1 or Level 2) warehouses, and midsize enterprises can sometimes operate robust and sophisticated warehouse operations (what Gartner might call Level 4 or even Level 5). For example, a midsize electrical parts distributor in the $100 million to $250 million range might have quite complex Level 4 or Level 5 warehouse operations because of the customers it serves and the products it carries. Second, the typical tiering people use is not granular enough to describe all the various warehouse operational environments encountered in the marketplace. Instead, we use Gartner’s stratification model, which is more specific and relevant to the needs of warehouse operations.

For this research, the use cases are based on Gartner’s warehouse stratification model, which categorizes warehouse operational environments from very simple Level 1 environments to potentially highly complex and automated Level 5 facilities.

For further information, see:

- Apply an Architectural Framework to Stratifying Warehouse Management Systems
- Use Gartner’s Model to Understand the 10 Dimensions of Warehouse Complexity Before Evaluating WMS Solutions
- Tool: Stratify Your Warehouse Operations to Determine the Right-Fit WMS and Improvement Strategy

Critical Capabilities Definition

Core WMS

Core WMS functionality includes receiving, inspection, put-away, cross-docking, inventory management, location management, cycle counting, picking, replenishment, packing and shipping, as well as support for radio frequency (RF) technology in conjunction with bar codes.

All WMSs that qualify for this research can handle core WMS capabilities to one degree or another. Solutions are differentiated by the depth of capabilities in each of the core functions, and where there are advanced and enhanced capabilities across these functions. Solutions can also be differentiated by any unique attributes, such as configurability, that support the management of core WMS

functions. Finally, some consideration is given, where appropriate, to vertically specific core functionality that might be needed for specific industries such as product traceability.

Extended WMS

Extended WMS functionality includes functions that are adjacent to core WMS. These include task/work planning and optimization, labor management, slotting, yard management/dock scheduling, value-added services (VAS), work planning, 3PL billing/cost to serve, and parcel management.

Vendors' solutions are rated in extended WMS functionality based on how broadly they cover each of these and other extended functions, and based on the richness of the features they offer in each area. These functions become increasingly important as warehouses move from Level 3 to Level 4 warehouse operations.

See Market Guide for Yard Management and Market Guide for Multicarrier Parcel Management Solutions.

Usability

Usability, or user experience (UX), includes responsive UI design, workflow management tools, visualization capabilities and UX differentiated between operators, supervisors, back-office and managerial roles. It also considers multiple interaction modes such as mobile, voice and augmented reality.

Users are now placing greater emphasis on the usability of the WMS across different classes of employees. Issues such as personalization, user onboarding and capabilities to make the system appeal better to new and different types of users are important. Look and feel, navigation and process streamlining are also considered.

Analytics/Performance Mgmt.

Analytics considers the level of standard reporting provided, ad hoc report creation capabilities for users, activity visibility and visualization, track and traceability, basic analytics (descriptive and diagnostic), and advanced analytics (predictive and prescriptive) capabilities.

Gartner research finds that users are looking beyond basic warehouse task execution. Basic reporting and descriptive and diagnostic analytics are now "table stakes," and most vendors offer basic capabilities, while more advanced predictive or prescriptive analytics, modeling and simulation are differentiators. Users place more importance on the capabilities that a WMS can deliver to provide better transparency into what is going on in and around the warehouse, and what capabilities the WMS offers to enhance decision making. Adoption of various forms of analytics, such as predictive or prescriptive analytics, or embedding AI capabilities like machine learning, are of interest. This is in addition to basic mechanisms to access and visualize information in the WMS.

Implementation/Integration Tools

Implementation and integration tools are embedded capabilities that facilitate and accelerate WMS implementation and multisite deployments, such as standard tools like wizards and workflows to aid configurations and upgrades, as well as system integrations.

WMSs have been notoriously time-consuming and expensive to implement, deploy and support across one or more warehouses. Upgrades have also proved time-consuming, and many companies were often stuck many releases back on aging versions of the WMS. Implementation and integration tools in this context are not things used outside the system to support consulting endeavors. The focus is not on implementation methodology or service, but instead on what tools and capabilities are delivered within the system to facilitate implementation, multisite deployments, and ongoing technical and application support and enhancements. Integration capabilities — such as use of integration accelerators and experience with integrating and interfacing with multiple upstream systems (e.g., ERP and order management systems), related applications such as TMS and multicarrier parcel management systems and downstream systems (e.g., scales, labeling systems and dimensional systems) — are also considered.

For further information, see:

- Market Guide for Multicarrier Parcel Management Solutions
- Explore and Understand Gartner's Supply Chain Management Applications Stack
- Quick Answer: Best-Fit Accelerators to Optimize Your WMS Implementation

Adaptability

Adaptability features address how responsive a system is to change, considering the availability and ease of use of tools such as rule engines, configuration capabilities, workflow management, no-/low-code development and scripting languages.

WMS buyers now place more emphasis on the technical architecture and the adaptability of WMSs they are considering. Although Gartner recommends customers strive for a zero-modification WMS implementation, realistically, this is not always possible. There are different ways that vendors and WMSs can accommodate customization and personalization. This research assesses the tools provided to address the need for agility. It considers whether these tools are available to, and used by, only the vendor, or if these tools are available for customers to use on their own.

Architecture/Supporting Tech

WMSs are rated based on the number of different types of technologies supported, length of time they have been in operation, level of penetration, maturity and type of cloud offered (dedicated, multitenant). Additional focus is placed on developments in the systems' technical architecture.

Certain supporting technologies, such as RF, are now ubiquitous, but numerous emerging technologies could enhance WMSs. These can be wearables, smartglasses, new approaches to voice

such as conversational agents, and integration with certain technologies such as robots, smart carts and put walls. Solutions are also assessed for new approaches to how existing technologies like mobile devices may be handled.

For further information, see:

- Top Technology Trends Transforming Warehousing Over the Next 5 Years: Part 1, Improving Upgrades
- Top Technology Trends Transforming Warehousing Over the Next 5 Years: Part 2, Handling Volatility and Complexity
- Top Technology Trends Transforming Warehousing Over the Next 5 Years: Part 3, Labor and Resource Challenges
- Top Trends in Strategic Supply Chain Technology 2023

Material Handling Integration

Materials handling integration considers whether the vendor's WMS natively provides a WCS, its experience and tools for integrating with MHE. Also considered is whether special functionality like WES is provided, and that enhances the use of automation.

Customer interest and adoption of material handling automation is increasing. Conventional bolt-it-to-the-floor automation and emerging technologies, like various classes of intralogistics smart robotics, are growing in adoption. Primarily, this capability relates to Level 5 warehouse operations, but smaller-scale adoption is also occurring in lower-level warehouses. This is expected to intensify as mobile robots grow in use. This rating focuses on the vendor's approach to handling WMS coexistence and integration with automation, specifically "productized" capabilities, not implementation or service approaches to integration.

For further information, see:

- Select From the 8 Software Deployment Options to Support Warehouse Automation and Robotics
- Top Technology Trends Transforming Warehousing Over the Next 5 Years: Part 2, Handling Volatility and Complexity
- Market Guide for Intralogistics Smart Robotics

Simplicity

Simplicity is rated based on how easy the most basic capabilities are to learn, use, configure, implement and maintain.

Many companies now support very simplistic warehouse operations where the functional requirements are uncomplicated, but the need for very easy to learn and to operate WMS capabilities is mandatory. Workers can often be temporary or nonlogistics people, so an intuitive, near-zero-training user experience is valuable.

Companies are pursuing increasingly distributed, hyperlocal and pop-up warehouse networks driven by consumer expectations for timely, personalized service. Networks are expanding, and the users in these small, uncomplicated environments are typically not skilled logisticians, so simplicity reigns. Simplicity, however, is not just valuable to small warehouse environments, it is also increasingly important in many environments driven by employee turnover and desires for employee satisfaction and productivity. Can end users operate the application with zero training? Does the application have a consumer-grade mobile UI? Is it intuitive and effortless to use? Can new sites be provisioned with almost no effort? Is there minimal, if any, maintenance burden for every site? Are process steps minimized and simplified (e.g., one-click operation)? Are functional options limited to reduce confusion?

Use Cases

Level 1 Warehouse Operation

Level 1 warehouses are typically rudimentary bin tracking or single storage location systems, with most, if not all, processes manual and not system-directed.

Level 1 warehouses need very basic WMS and inventory management functions (such as perpetual inventory, receiving, storage, picking and shipping/requisitioning), but the depth of these capabilities is very limited. Many users do not even call Level 1 operations true WMSs. Because of the single storage location nature of these systems, they are appropriate in places such as storage or stockrooms, service depots or retail stores. Also, they can be used in simple manufacturing environments where the common denominator is the storage location, which is predefined and typically fixed.

Most of the WMS vendors and products covered in this research do not focus specifically on Level 1 warehouse operations. Some offerings, however, have specialized capabilities as part of their larger WMS that accommodate these operations, but these remain primarily for customers using the vendor’s complete WMS in other higher-level warehouse operations. For example, a company might have several Level 3 or Level 4 warehouses, but numerous other Level 1 facilities. And it will scale back the capabilities of the WMS to the bare minimum to use in its Level 1 facilities. This is what we rate in this research, and it’s why few vendors are identified as excelling in this area. See Choose the Right Software and Services to Meet Rising Demand for Low-Complexity and Pop-Up Operations for some alternatives.

Level 2 Warehouse Operation

Level 2 systems are appropriate for undemanding facilities that need basic WMS capabilities. Level 2 is the first level at which multilocation inventory storage is introduced.

Level 2 operations are typically supported by a rudimentary stock locator capability where the system directs some work activities, such as put-away. Core WMS functions (e.g., receiving, storage, picking and shipping) are supported, but the depth of coverage is limited to a few simple options (e.g., order pick, pallet movement and put-away zones). These warehouses are often paper-based and are looking to add mobile devices with more work verifications (e.g., scan-based pick or ship verify).

Level 3 Warehouse Operation

Level 3 warehouses are more complex and require capabilities that intelligently and automatically direct work with a focus on improving physical warehouse execution processes.

This level demands more options and greater levels of inherent flexibility, such as introducing advanced rule-based locators that provide tailoring through rule definitions, workflows or scripting languages (not coding). The systems also offer work management capabilities to intelligently group and direct user activities to help the user more effectively perform tasks (e.g., wave planning or task interleaving). Depth of features/functions is also greater than at Levels 1 and 2, with more options and sophistication in processes (e.g., cross-docking, multiple pick and put-away methodologies, serial/lot control, pallet/case license plating, packing and cycle counting).

While the differences between a Level 2 and Level 3 environment are typically ones of scale of complexity, the differences in solution capabilities can sometimes be profound. For example, some products are stronger at low Level 2, whereas others can be stronger at higher Level 3. To accommodate the more comprehensive needs of Level 3 environments, more weight was placed on the depth of functionality for both core and extended warehouse capabilities, while for Level 2 environments, more emphasis was placed on simplicity and usability.

Level 4 Warehouse Operation

At Level 4, emphasis shifts to automating, improving and enhancing processes by adding value-added, “extended” decision support capabilities.

At this level, capabilities include task, labor and yard management, slotting, business intelligence, visibility, and traceability. Operations are notably more complex and sophisticated, with higher volumes of work, more items and more complicated processes such as light assembly or kitting. The goals driving new system evaluations are often to improve performance and throughput while adding more decision support capabilities that can further improve efficiency and productivity.

These operations must move beyond simply automating basic physical work processes. Agility also becomes paramount at this level, as the combination of high levels of complexity with rapid business change demands adaptable systems. First, Level 4 operations need to improve, extend and enhance warehouse processes by adding value-added decision support capabilities (e.g., task and labor

management, advanced wave or waveless planning, slotting optimization and work planning). Next, these types of operations typically need more advanced operational capabilities, such as multicarrier parcel management, yard management, advanced dock scheduling, value-added services and billing for 3PLs. Finally, because of their sophistication, these operations demand better managerial support (e.g., dashboarding, business intelligence, visibility and traceability).

To address the complexity and sophistication of Level 4 operations, the breadth and depth of extended WMS capabilities take on significantly more weight for this use case. Offerings were evaluated for capabilities they deliver directly, whether they use partner solutions, and their track record deploying extended capabilities — not just if a vendor has a customer that might qualify as Level 4 operations. Only commercially available capabilities were considered, as we did not take into account future roadmap plans.

Level 5 Warehouse Operation

The previous levels focus primarily on people-driven processes, while the emphasis at Level 5 shifts to the extensive use of materials handling automation systems.

Although Level 3 and Level 4 operations might have limited automation (e.g., pick to light, or carousel storage and retrieval), or even widespread pockets of isolated automation, Level 5 operations are the most automated. In extreme cases, entire facilities are engineered to support highly automated operations (e.g., extensive use of conveyors, sortation, automated storage retrieval and robotics). As the level of automation grows, the software emphasis shifts from people-centric WMS processes to materials handling integration (WCS) and, increasingly, optimization (WES). WCSs are the middleware that sits between the WMS and the MHE. A WCS translates business-oriented instructions into forms that are meaningful to materials handling automation. WESs combine capabilities from both WCS and WMS that enhance the operations of the warehouse. The WES builds on the WCS's near-real-time insight into what's happening in the automated warehouse, but it adds business process logic to this layer, communicating directly with the automated equipment to execute the instructions.

Virtually any WMS can be integrated to some material handling automation and might minimally fit a Level 5 operation. However, this research highlights that most WMSs are not well suited to larger-scale Level 5 warehouse operations. Approximately half of the 21 solutions fall into this category. Some vendors, such as Körber, Oracle and Reply, might also have other WMSs not covered in this research that would be well suited or even better suited to highly automated facilities.

Vendors Added and Dropped

Added

Microsoft was added this year for its Dynamics 365 Supply Chain Management solution.

Dropped

No vendors were dropped this year.

Inclusion Criteria

In this Critical Capabilities research, we include WMS products from each vendor included in the companion Magic Quadrant for Warehouse Management Systems. Most vendors have only one WMS highlighted in this research, even if they have multiple WMSs. We have chosen what we consider to be the vendor's primary, although not exclusive, go-forward product to evaluate herein. We do, however, highlight two products from three vendors — Generix Group, Körber and Manhattan Associates — where each vendor's two solutions have maturity in the market and specifically target different strata of warehouse operation. Two cases, Körber and Manhattan Associates, actually have more than two WMSs, but these overlap with the vendors' WMSs being evaluated in this research. In no case was the choice of WMS a negative value judgment about the solution not selected for inclusion in this research. In some cases, the solution not evaluated here might be the best alternative for a particular customer.

The inclusion criteria for the companion Magic Quadrant and this Critical Capabilities research were as follows:

- A vendor must have a credible WMS product that fundamentally supports core WMS capabilities and minimally supports some extended capabilities.
- The vendor must also exhibit a vision for WMS in at least moderately complex warehouse environments.
- Vendors must demonstrate a consistent and compelling market presence through new sales, WMS revenue and numbers of installed customers. The most prominent megasuite vendors also qualify due to user interest.
- Vendors must exhibit some global presence by generating at least 10% of their revenue and customer base outside of their home geography, as well as having sales and implementation resources in at least three geographic regions.
- Additionally, a vendor can qualify if it has a demonstrably differentiated and unique focus and market position in a specific vertical industry.
- For the detailed inclusion criteria, see Magic Quadrant for Warehouse Management Systems.

Not Included

We do not include stand-alone specialist component providers of yard management, slotting, labor management, parcel manifesting, RF, voice, RFID or WCSs (see Warehousing and Fulfillment Vendor Guide). This research focuses on independent WMS offerings, so a vendor must routinely sell and implement its WMS separate from other non-software-related services or products the vendor offers. Furthermore, we do not evaluate specialized WCSs that are the middleware between the WMS

business application and the MHE. However, we do consider a WMS vendor if it offers a native WCS as part of its WMS offering. In addition, because they are not relevant as stand-alone WMSs, we do not evaluate every ERP, MHE or suite vendor's WMS capabilities, even though these might address a particular customer's WMS needs.

Table 1: Weighting for Critical Capabilities in Use Cases

Critical Capabilities	*Level 1 Warehouse Operation*	*Level 2 Warehouse Operation*	*Level 3 Warehouse Operation*	*Level 4 Wareho Operati*
Core WMS	10%	15%	40%	25%
Extended WMS	0%	0%	15%	30%
Usability	10%	15%	10%	10%
Analytics/Performance Mgmt.	0%	5%	10%	10%
Implementation/Integration Tools	5%	10%	10%	0%
Adaptability	5%	10%	10%	10%
Architecture/Supporting Tech	0%	0%	5%	10%
Material Handling Integration	0%	0%	0%	5%
Simplicity	70%	45%	0%	0%

Critical Capabilities	Level 1 Warehouse Operation	Level 2 Warehouse Operation	Level 3 Warehouse Operation	Level 4 Wareho Operati
As of 17 July 2023				

Source: Gartner (July 2023)

This methodology requires analysts to identify the critical capabilities for a class of products/services. Each capability is then weighted in terms of its relative importance for specific product/service use cases.

Critical Capabilities Rating

Each of the products/services that meet our inclusion criteria has been evaluated on the critical capabilities on a scale from 1.0 to 5.0.

Table 2: Product/Service Rating on Critical Capabilities

Critical Capabilities	Blue Yonder	Ehrhardt Partner Group (EPG)	Generix Group (Generix WMS)	Generix Group (SOLOCHAIN)
Core WMS	4.3	4.0	3.5	3.0
Extended WMS	3.8	4.0	3.5	3.0
Usability	3.8	3.5	3.0	4.0
Analytics/Performance Mgmt.	3.8	3.0	2.8	3.5
Implementation/Integration Tools	3.8	2.4	3.0	4.3

Critical Capabilities	Blue Yonder	Ehrhardt Partner Group (EPG)	Generix Group (Generix WMS)	Generix Group (SOLOCHAIN)
Adaptability	3.8	2.0	2.3	4.3
Architecture/Supporting Tech	3.5	4.0	2.5	3.0
Material Handling Integration	3.5	4.0	3.3	1.8
Simplicity	1.3	1.3	2.0	2.5
As of 17 July 2023				

Source: Gartner (July 2023)

Table 3 shows the product/service scores for each use case. The scores, which are generated by multiplying the use-case weightings by the product/service ratings, summarize how well the critical capabilities are met for each use case.

Table 3: Product Score in Use Cases

Use Cases	Blue Yonder	Ehrhardt Partner Group (EPG)	Generix Group (Generix WMS)	Generix Group (SOLOCHAIN)	Infor
Level 1 Warehouse Operation	2.10	1.88	2.32	2.88	2.40

Use Cases	*Blue Yonder*	*Ehrhardt Partner Group (EPG)*	*Generix Group (Generix WMS)*	*Generix Group (SOLOCHAIN)*	*Infor*
Level 2 Warehouse Operation	2.75	2.30	2.55	3.21	2.91
Level 3 Warehouse Operation	3.99	3.49	3.16	3.41	3.63
Level 4 Warehouse Operation	3.88	3.65	3.15	3.22	3.54
Level 5 Warehouse Operation	3.66	3.55	3.04	2.78	3.31
As of 17 July 2023					

Source: Gartner (July 2023)

To determine an overall score for each product/service in the use cases, multiply the ratings in Table 2 by the weightings shown in Table 1.

Evidence

Gartner used multiple data sources to help analyze and assess each solution in this research. These sources included:

- **Vendor presentations and demonstrations to the Gartner analyst team:** Specifically, to support this research, each vendor is allotted time to present information about its company and solutions. Each vendor is allotted the same amount of time for this research, but Gartner also conducts interactions with vendors throughout the year as part of normal and ongoing relationships with user and vendor clients. In addition to the live presentations and demonstrations, each vendor

provided a prerecorded, 50- to 60-minute demonstration of its core WMS, basic configuration, implementation accelerators and extensibility tools per offering.

- **Research and data collection:** Each vendor is also asked to respond to and fill out a survey that investigates, in more detail, factual information about its company and WMS offerings. This includes current operations, solution sets, strategic directions, technology vision, and market and industry focus. Also, as part of this exercise, Gartner reviews customer references on Gartner Peer Insights submitted in the last 12 months.

- **Customer inquiry:** Throughout the year, Gartner takes approximately 1,500 client inquiries on various topics related to WMS and WMS vendors. This information supplements, not replaces, the core information collected during this research.

Critical Capabilities Methodology

This methodology requires analysts to identify the critical capabilities for a class of products or services. Each capability is then weighted in terms of its relative importance for specific product or service use cases. Next, products/services are rated in terms of how well they achieve each of the critical capabilities. A score that summarizes how well they meet the critical capabilities for each use case is then calculated for each product/service.

"Critical capabilities" are attributes that differentiate products/services in a class in terms of their quality and performance. Gartner recommends that users consider the set of critical capabilities as some of the most important criteria for acquisition decisions.

In defining the product/service category for evaluation, the analyst first identifies the leading uses for the products/services in this market. What needs are end-users looking to fulfill, when considering products/services in this market? Use cases should match common client deployment scenarios. These distinct client scenarios define the Use Cases.

The analyst then identifies the critical capabilities. These capabilities are generalized groups of features commonly required by this class of products/services. Each capability is assigned a level of importance in fulfilling that particular need; some sets of features are more important than others, depending on the use case being evaluated.

Each vendor’s product or service is evaluated in terms of how well it delivers each capability, on a five-point scale. These ratings are displayed side-by-side for all vendors, allowing easy comparisons between the different sets of features.

Ratings and summary scores range from 1.0 to 5.0:

1 = Poor or Absent: most or all defined requirements for a capability are not achieved

2 = Fair: some requirements are not achieved

3 = Good: meets requirements

4 = Excellent: meets or exceeds some requirements

5 = Outstanding: significantly exceeds requirements

To determine an overall score for each product in the use cases, the product ratings are multiplied by the weightings to come up with the product score in use cases.

The critical capabilities Gartner has selected do not represent all capabilities for any product; therefore, may not represent those most important for a specific use situation or business objective. Clients should use a critical capabilities analysis as one of several sources of input about a product before making a product/service decision.

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