VANDERLANDE

# WHITE PAPER

# *Key Considerations When Evaluating Warehouse Automation Software Platforms*

*MOVING YOUR BUSINESS FORWARD*

# Contents

# Introduction

*In the market for robust, reliable warehouse automation software? Assess these critical areas when considering your options.*

Of all the takeaways from the COVID-19 pandemic, warehouse, and distribution center (DC) operators have learned that the key to resilience is agility. That is, the ability to quickly respond and adapt to customer demands and supply chain disruptions by making radical adjustments—like adopting new automation and technology, upgrading equipment, and redefining processes, workflows, and more—is crucial to business success.

For many operations seeking to adopt more automated solutions and equipment to help cope with a workforce shortage, increasing customer expectations, and volatile inventory availability, their current warehouse software platform inhibits their ability to adapt. In spite of needing to make a change, perceived barriers to adopting software need to be addressed, according to a recent research study conducted by Peerless Research Group for Modern Materials Handling magazine, the “2022 Materials Handling Technology Study.” It found:

> *“When adopting materials handling software, 39% of respondents say compatibility with existing systems is a major roadblock, while 38% point to integration with existing software applications. Other obstacles to implementation success include the total cost of ownership of such systems (37%); compatibility with host or legacy systems (36%); the lack of resources to implement, manage, and maintain such systems (35%); and substantiating ROI (30%).”* [1]

Compounding these impediments to new warehouse automation software adoption are concerns about the age of software and material handling systems already in place (and those planned for the future). Worries about potential incompatibility between the old and the new often inspire reluctance to adopt new software.

The Modern Materials Handling survey found that, "Of the companies that currently have a [warehouse management system] WMS in place in their warehouse or DC, 10% have had the technology for less than one year, 28% for less than five years and 31% for five to 10 years. Fourteen percent of companies have had their WMS solutions in place for 15+ years."[2] The age of these systems often becomes a liability in terms of limited functionality and challenges associated with adding new automated technologies and solutions—making an operation unable to quickly adapt to changing conditions.

Further, many operations managers are concerned about the potential of software upgrades "breaking" their existing systems and integrations, causing excessive rework and downtime (and a lot of headaches). The Modern Materials Handling research found evidence of upgrade delays and avoidance: "Twenty-eight percent say they upgraded their WMS less than one year ago, 41% say one to less than five years ago and 7% say five to less than 10 years ago. Fifteen percent of respondents have never upgraded their WMS solutions."[3]

The reluctance to implement new warehouse automation software is understandable, given the inherent limitations of many software solutions' architectures. Historically, most software suites have been programmed to be either hardware specific (programmed for a specific piece of material handling automation) or customer specific (custom programmed to deliver the operational functionality required in that warehouse or DC).

However, best-in-class modern software platforms can actually enable them to adapt to custom configurations or unique requirements more easily without complex, application-specific coding. They are easily configured to integrate with both older and newer material handling automation and software; support fast and reliable upgrades; offer inherent security features; self-correct faults and errors for robust operational reliability; are evolving to meet future messaging integration standards; and more.

This white paper offers an overview of the key warehouse automation software features and characteristics to consider—and why they are important for your operational success—when comparing the different options available on the market today.

## Evaluate The Following...

To ensure reliable, flexible, and stable operations in the face of today's demanding operational challenges, there are several key technical aspects to look for when considering warehouse automation software. The optimal software system's under-the-hood design approach will include the following characteristics.

## Modern Software Architecture

Software architecture has a significant impact on the system's flexibility, reliability, and upgradability. Be sure to review the software's architecture when evaluating different options. Generally, there are two primary types of architectures used in developing warehouse automation software: monolithic and microservice.

Monolithic architecture is driven by a single database to which all software components are tied. In this unified approach, all application behaviors are tightly coupled and integrated. This makes it impossible to update one aspect of a system without redeploying the entire application database platform—which often requires extensive retesting and modeling to ensure that changing one warehouse process will not break any others. Ultimately, monoliths are relatively inflexible, have poor agility, are difficult to integrate with third-party modules without considerable custom coding at great expense, and have slow development and release cycles—if at all.

Conversely, microservice architecture based on domain driven design creates a highly modular system with multiple, small, self-contained application sets that control individual feature capabilities—such as operation of a goods-to-person (GtP) workstations, including picking, clearing, and decanting. Each application operates independently of the others with its unique database. They are tied together with feature flagging and workflows. Feature flagging is a methodology that turns on and off feature sets, enabling a certain set of capabilities. Standard workflows can then be easily configured to enable those capabilities and communication to execute site-specific requirements.

Because microservice architecture is built on individual application sets, updates or modifications made to one do not impact the operation of the others. This means that changing one aspect of the code to enhance the functionality requires only that portion of the software application to be updated and tested. Updates can then be deployed independently of the entire system. Since only certain aspects of the software are being modified—and other functions are not impacted—the entire process can be completed more quickly and with a higher degree of overall operational reliability when applying the update to the production environment.

Additionally, microservice architecture supports a more modern, automated continuous integration/continuous deployment (CICD) pipeline. This makes sandbox testing of an update optional. While some operations prefer to utilize traditional change management methodologies prior to implementing an update—and a microservice architecture will support that—optimally the warehouse automation software will have a mechanism to automate the testing phase and identify potential issues. If the proposed change passes the system's own tests, it can automatically be promoted to a production environment. This advanced capability can cut development cycles by as much as four weeks, enabling new features and capabilities to be realized more frequently and more rapidly.

Ultimately, warehouse automation software built on a microservice architecture will deliver greater flexibility through the ability to seamlessly add new functionality and easily integrate with new systems and automation technologies moving forward. It also helps ensure backwards compatibility with existing host or legacy systems and integrates with existing software applications. Microservice architecture-based software reduces redundancy and inefficiency, facilitates faster operational upgrades, and helps to future-proof the software investment.

That said, some software vendors describe their product as being modular, implying that it is microservice driven when, in fact, their solution has been constructed with a monolithic architecture. To determine which architecture a software has, ask if it is possible deploy an update to a single module without simultaneously needing to re-deploy the other modules. The answer should make the distinction clear.

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# Security Approach

When vetting warehouse automation software in terms of how secure it is, key areas of consideration include what methodology the programming utilizes to prevent the application from being compromised, and how information is encrypted.

To prevent unauthorized penetration into the source code of the application, the software will ideally deploy layers of infrastructure through modern application programming interfaces (APIs). Among the most secure methods are those that create a virtualization scenario to run the application on the server's operating system.

Rather than running the application directly on the operating system, the virtualization uses Kubernetes clusters to restrict access, which enable the software to be hardened and secured more effectively. Kubernetes clusters also feature built-in firewalls, helping to further isolate traffic and movement into and out of the cluster as the application receives and sends commands.

Further, the warehouse automation software should incorporate role-based access control for users at every user interface point within the system. Ideally, it should support single sign on and can federate to multiple security domains.

Additional security measures to assess include  verifying the use of built-in encryption. A good encryption process uses algorithms and binary keys to scramble the information so that it can only be understood by authorized systems, equipment, and personnel. Ideally, encryption will be deployed automatically to protect information inside the application, both for data in transit and data at rest. This prohibits unauthorized access to the software's base code and commands.

## Software Reliability

Because no software is completely bug-free, when considering reliability, it is important to determine the extent to which a warehouse automation software system can automatically recover and restore itself from faults. The application should support both automated operational restoration and manual information technology (IT) software restoration.

The objective of these recovery capabilities is to ensure that the software has the means to recover an operational fault or error. For example, if there is a failure of message transmission between the overarching warehouse automation software and another system, the software should have the ability to automatically retransmit the message to recover. This ability to retry or self-correct without human intervention is optimal. However, the system should also support manual corrections if necessary.

The more self-correcting the warehouse automation software is, the more reliable it will be and the less impact it will have on operational activities, downtime, and—ultimately—revenue. Software that lacks the ability to self-correct when faults or errors occur will require more manual labor and extend operational delays, which negatively impact both costs and revenue.

# Systems Integrations

Currently, unlike the banking and medical industries, no messaging interface standards exist in the supply chain field. That makes it challenging to integrate warehouse automation software with other existing or overarching software systems—such as ERP (enterprise resource planning) and WMS (warehouse management system)—without extensive custom coding.

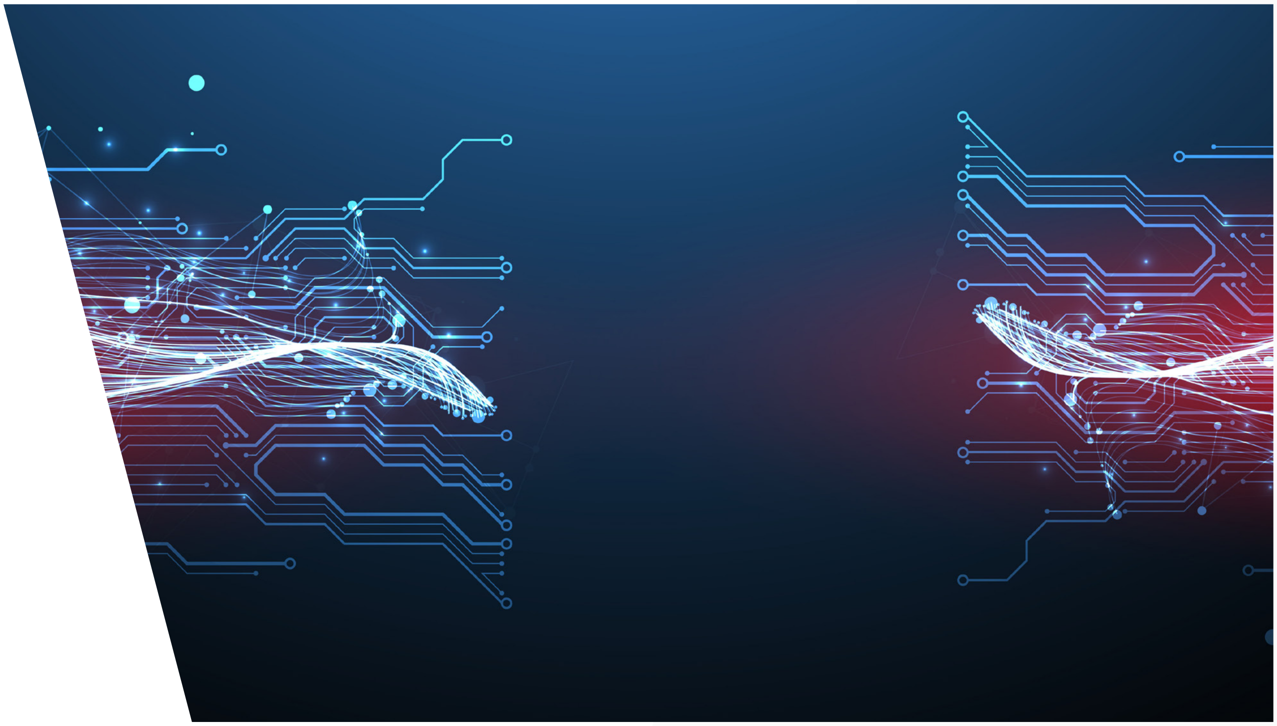
A few forward-thinking software and equipment suppliers are working to develop and adopt standardized interfaces. With the establishment of such standards, a warehouse automation software vendor can create a highly configurable host adapter that enables easy message integration between its software and other systems, no coding required. This would make such integrations simple enough to be completed in the field.

When considering different warehouse automation software options, look for a vendor who is committed to developing and working within a standard messaging interface moving forward. This will enable smoother, faster integrations with existing or new systems as technologies evolve and business needs change.

# Hosting Methodology Considerations

As Cloud computing and broadband capabilities have grown more robust in the past few years, software vendors have increasingly offered a new delivery model: software as a service (SaaS). Warehouse automation software is no exception to this trend.

In the simplest terms, the software provider creates a standardized application hosted in the Cloud. Different companies pay to use the software in a multi-tenancy leasing arrangement. Data is partitioned and each company's proprietary information is kept separate and secure. Customization is challenging in this methodology, as part of the gained efficiency is predicated on all operations using the same application in the same way throughout all their warehousing processes.



The advantages of the SaaS model include a lower up-front cost and continuous access to ongoing upgrades and new feature releases. However, in addition to limiting the customization capabilities, SaaS warehouse automation software does pose a higher risk to reliability. Meaning that a failure somewhere in the system could negatively impact the operations of all companies using it. That is, if one user experiences an outage, so do all users. That can lead to extensive downtime and significant loss of revenue.

Conversely, opting to have the warehouse automation software deployed in house and on-premises on servers maintained within the facility, or by accessing it directly from the vendor via a dedicated private cloud, offers several advantages. In addition to the ability for operational customization, upgrades and new feature releases are continuously available and their implementation is controllable. Reliability risks are also lower, as the software is deployed solely for a single company's use.

Both models are viable; in addition to cost, consider reliability, risk, and customization requirements when evaluating the different deployment and hosting options.

# Conclusion

When considering which warehouse automation software platform will help warehouse and DC operators achieve the agility needed to quickly respond and adapt to customer demands and supply chain disruptions, evaluate the following factors:

- **Architecture** – Solutions with a microservice architecture offer faster, easier, and more targeted upgrades to specific portions of the software. This ensures the operation can take advantage of the latest productivity features without requiring the entire system to be redeployed. Integrations with new or existing material handling equipment and automated systems is much easier and less likely to "break" the entire operational process.
- **Security** – Software that leverages cluster-based security to control unauthorized access and built-in encryption to secure all data and transmissions is inherently less vulnerable to internal or external breaches. This significantly reduces the risk of downtime.
- **Reliability** – Also reducing the risk of downtime and ensuring higher productivity, software that can automatically self-correct and auto-restore when a fault or error is encountered—as well as supports manual intervention when self-recovery is not possible—offers greater reliability.
- **Integration** – Warehouse automation software vendors who are committed to the development of standardized messaging interfaces with systems from other suppliers are leading the way to smoother, easier integrations.
- **Hosting** – In addition to cost, consider risk, reliability, and customization capabilities when comparing SaaS and on-premises deployment options.

By choosing the right warehouse automation software, an operation can achieve enhanced visibility and control of their operations through seamless, productivity boosting adjustments and upgrades to equipment, processes, and workflows. In addition to greater flexibility and agility in the face of ongoing supply chain disruptions, workforce challenges, and shifting customer expectations, companies can attain a faster return on investment and lower total cost of ownership.

Want to talk more about your operational needs and how to select the optimal warehouse automation software for your warehousing and distribution facilities? Vanderlande's software experts are here to help. Contact us at info.us@vanderlande.com.

1. McCrea, B. (2022, July 12). Warehouse Software and Automation Survey 2022: Users cautiously embrace change. Modern Materials Handling. https://www.mmh.com/article/warehouse_software_and_automation_survey_2022_users_cautiously_embrace_chan

2. Ibid

3. Ibid

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