GreyOrange

MULTIAGENT ORCHESTRATION, EXPLAINED

WHAT IT IS, HOW IT WORKS AND WHY IT'S CHANGING WAREHOUSE AUTOMATION

Introduction

In 2024, warehouse automation is no longer a nice-to-have capability, but a necessity. As such, the industry has steadily progressed toward more efficient fulfillment technologies such as sortation, automated packers, intralogistics, etc.

While multiple players have emerged in the fulfillment automation market to meet this demand, there isn't one that addresses the entire automation process. And as companies continue to build on their automation environments, it becomes increasingly likely that they are using automation from several different vendors.

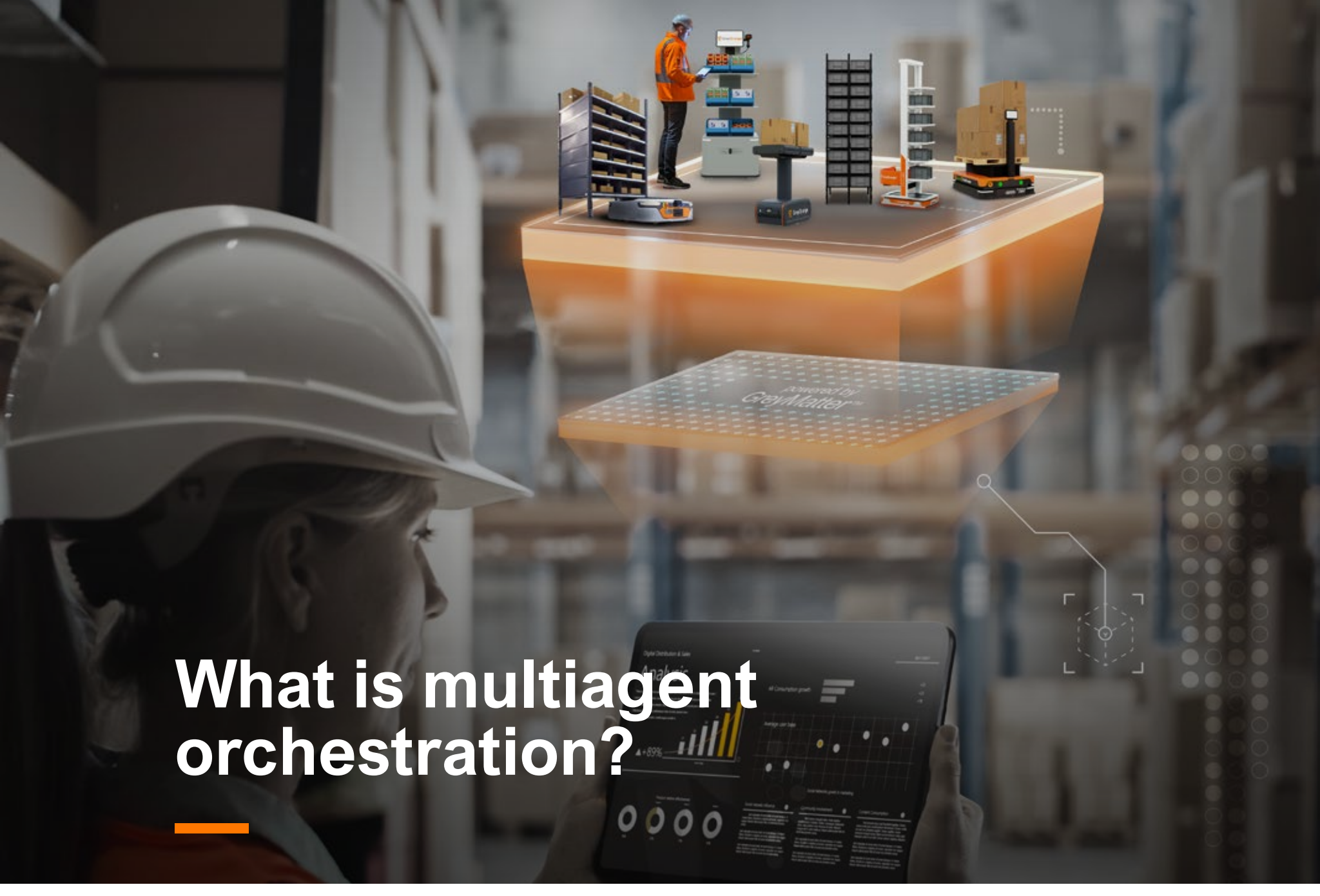
Therein lie the questions we'll address in this ebook: **How can warehouses avoid the complexities of working with numerous vendors? And, more importantly, how can they synchronize operations with multiple solutions running in their warehouses?**

Rueben Schriven, a Senior Analyst at Interact Analysis, writes that the tendency to have ‘islands of automation’ — where particular workflows or tasks are automated — creates complex communication between systems. Communicating tasks across multiple fixed automation solutions and into subsystems causes leakages and develops inefficiencies.[1]

The solution to this problem is a central orchestrator. In 2022, Garter analyst Dwight Klappich outlined the importance and impact of platforms with this capability in “Hype Cycle for Supply Chain Execution Technologies, 2022”

> *As a company’s fleet of robots grows, simple point-to-point API integration will not be enough. Companies will need an orchestration capability that can assign work to the right robots based on near-real-time information and the characteristics of the activity. This will reduce the time, effort and cost to onboard new robots and will reduce support cost, ultimately making organizations more efficient because work will be assigned to the robot best-suited for the task.*

That’s why, several years ago GreyOrange and Klappich started to research the multiagent orchestration market. During their work, Klappich and GreyOrange coined the term “multi-robot orchestration” to describe the then-emerging software niche.



What is multiagent orchestration?

Multiagent orchestration (MAO) is a software platform capable of managing heterogeneous fleets of robots and other agents in the warehouse like doors, elevators and even people. This includes the orchestration and assignment of work while monitoring and coordinating the activities of said agents. MAO continuously optimizes fulfillment performance in real-time: the right order, with the right bot and/or agent, taking the right path and action.

MAO provides

Task allocation across different systems and agents

In a multiagent environment, task allocation is key to ensuring productivity. The load balancing performed by an MAO platform ensures that all resources are used optimally and tasks are completed on time.

Traffic management

The system plans ideal paths for each agent to maintain collision-free routes and prevent congestion. The synchronized movement managed by MAO optimizes the flow of materials through the warehouse, minimizing idle time and maximizing throughput.

Real-time visibility

Continuous monitoring and tracking enables stakeholders to identify potential issues or inefficiencies as they arise. Moreover, by analyzing data on agent performance, task completion times and environmental factors, MAO provides predictive analytics to anticipate future trends and potential bottlenecks.

Data-driven decision-making across the system

MAO systems analyze historical data on task execution times, resource utilization and demand patterns to make informed decisions about task and resource allocation. By doing so, MAO platforms can help build strategies and foster continuous improvement.

Breaking down MAOs & WESs

Warehouses – though complex – run easily when systems are integrated. A Warehouse Execution Systems (WES) system is the first crucial step, following which an Multiagent Orchestration Platforms (MAO) is implemented to cement the technology into place. Most supply chain systems have a smoothly running WES over which they typically require an MAO. Some systems also require a WES as a foundational step. Fortunately, GreyMatter does both.

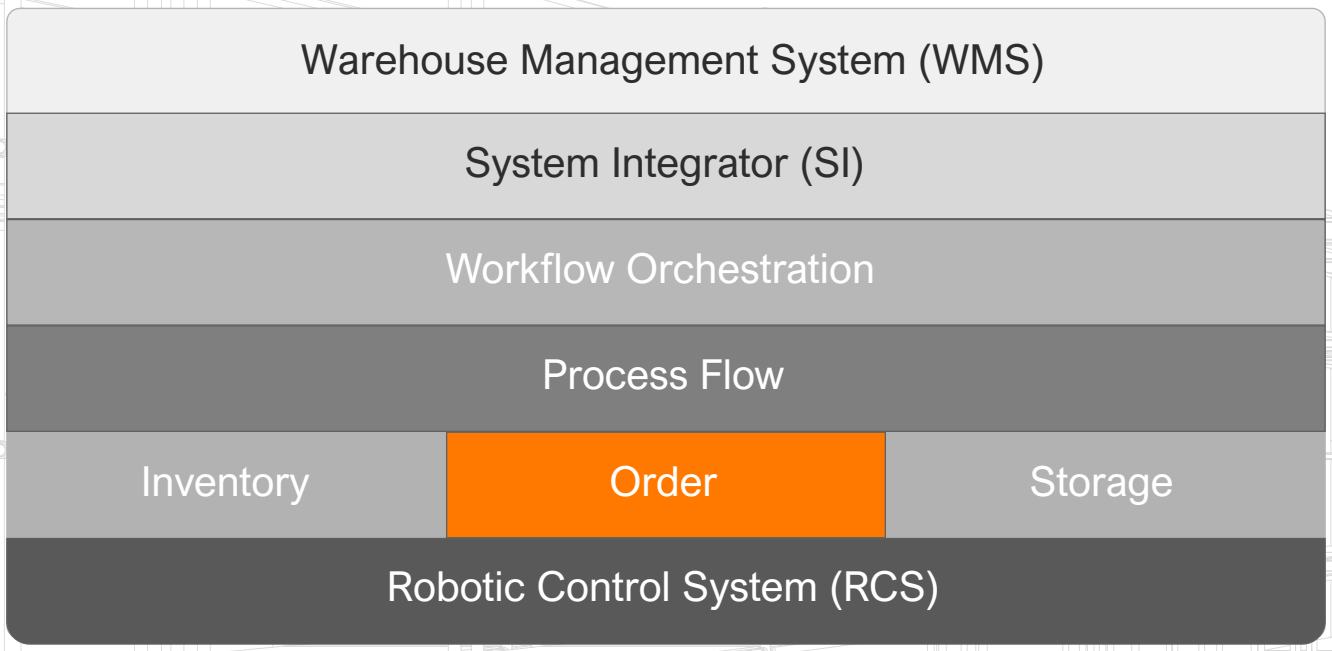
Warehouse Execution Systems

Optimize order fulfillment and improve throughput by prioritizing and executing tasks, consolidating orders, improving routing, allocating resources and performing real-time performance monitoring. A WES is like a super-powered puzzle solver who sorts the pieces (orders), figures out the best way to put them together (fulfillment) and keeps track of where everything is (monitoring).

Multiagent Orchestration Platforms

Are intelligent middleware solutions that integrate and orchestrate work between various business applications, heterogeneous fleets of operational robots, workers on the floor and other agents like automated doors or elevators.

MAO platforms monitor and coordinate the activities of diverse fleets of robots within a warehouse to achieve a common goal. Their capability to assign work in near real-time helps businesses adapt to changing conditions and labor demands in the warehouse. These solutions often include advanced data analytics and reporting capabilities, providing insights into operational performance and process improvement opportunities. MAO platforms can also integrate with a variety of business applications.



MAO Software Tech Stack

Does MAO require an open API?

Open Application Programming Interfaces (APIs) are the key to enabling multiagent and multi-vendor capabilities. They eliminate the need for complex and costly integration development and make it simple for MAO platforms to transform siloed tools into interconnected end-to-end automation ecosystems. While it's possible to achieve MAO without open APIs, it's far less effective from a time and cost perspective.

Flexibility and vendor independence

Warehouses can select the best bots for the job and connect various agents and systems regardless of their vendor.

Extensibility and future-proofing

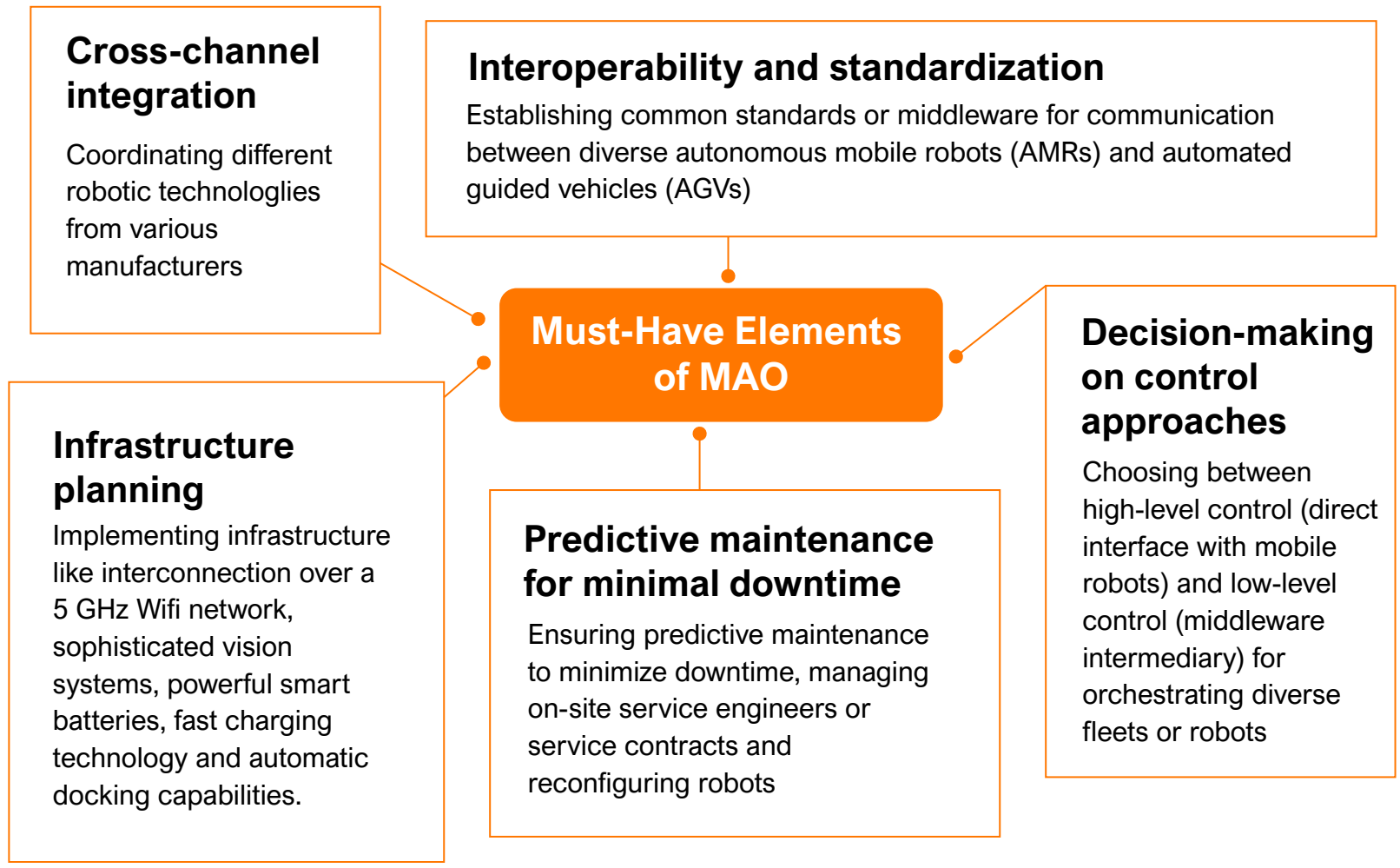
Open APIs enable integration with third-party services and tools, allowing warehouses to expand their automation capabilities at will and adapt their systems to evolving business needs.

Real-time decision-making

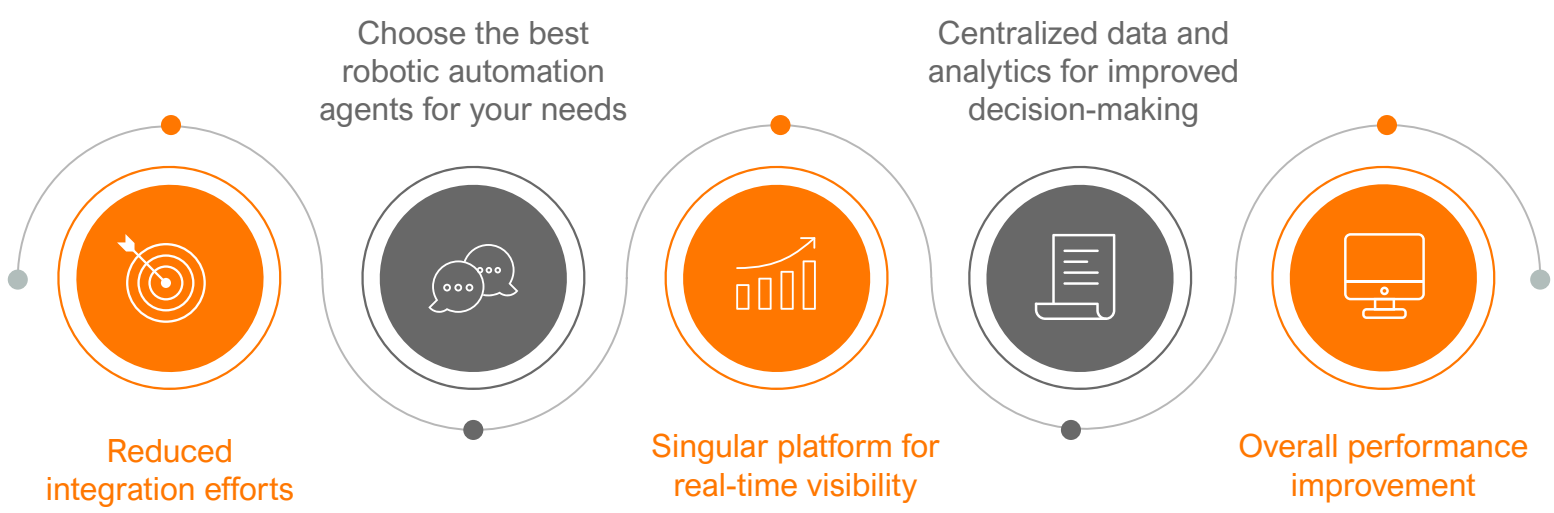
Warehouses generate a wealth of data, but without convergence, this data remains trapped wherever it's recorded. An orchestration platform with open APIs can bridge this gap. It connects millions of real-time insights and data points across numerous automation solutions, enabling them to apply these insights and make optimal decisions.

Must-have elements of MAO

It’s not enough to control more than one type of robot. To be a true MAO platform, a solution must have the following capabilities:



Benefits of MAO



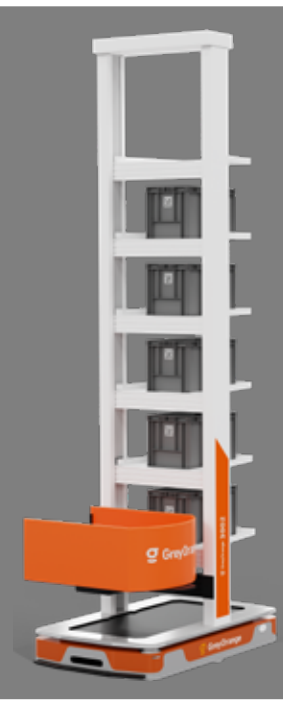
Why GreyMatter MAO?

GreyMatter is an MAO platform and a WES++ at the same time — a fulfillment orchestration platform that also supersedes a typical WES in its ability to also serve as a warehouse control system (WCS) and directly control robots without the need for an additional layer in between.

Using the GreyMatter Open API, the platform facilitates the seamless integration of various robotic solutions, providing flexibility in technology selection. GreyMatter effectively coordinates disparate robotic systems, enhancing productivity, accuracy and safety. It harmonizes the actions of robots and automation agents from different vendors and offers the ability to orchestrate complex workflows across diverse warehouse operations. Furthermore, it delivers the unique capacity to integrate manual workflows into automated processes.

RANGER RACK TO PERSON
Developed by GO/through CRN

RANGER TOTE-TO-PERSON
Developed through CRN



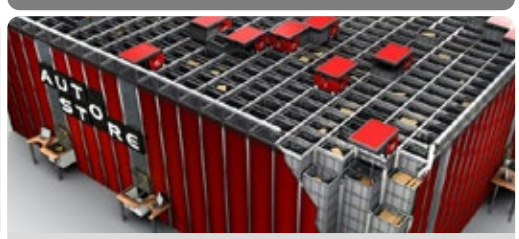
RANGER ASSIST
Developed through CRN

RANGER INTRALOGISTICS
Developed through CRN

RANGER MOVE SMART
Developed through CRN

POCKET SORTER
Third-party integration

CONVEYORS
Third-party integration



AUTOSTORE
Third-party integration

AUTOPACKER
Third-party integration

ELEVATOR
Third-party integration

HANDHELD
Third-party integration

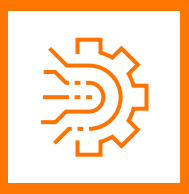
MAO in Action — Case Study

Leading retailer boosts throughput, gains efficiency with MAO

GO Solutions: Goods-to-Person; Sortation, Smart Conveying; Person-to-Goods Cobots, all powered by GreyMatter MAO

Made next-day delivery available to 97% of customers nationally

Reduced labor dependency for peak and non-peak shifts



Streamlined automated picking, packing and sorting processes, enabling:

- 2-3x productivity increase
- 60% reduction in variable cost per unit

Transformed the way 500K+ SKUs are stored within 430,000 square feet for:

- Efficient inventory management with a 21-day supply on hand
- Faster fulfillment, with orders ready for pick up in 30 minutes or less

Enabled continuous productivity improvements via automated monthly software upgrades

Previous whitepaper on GreyMatter MAO

Visit solution.greyorange.com to explore our suite of robust products and automation solutions.

Or, schedule a call with one of our automation experts for more in-depth information.

CONTACT US

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