GREYMATTER DEVELOPMENT PLATFORM (GMDP)
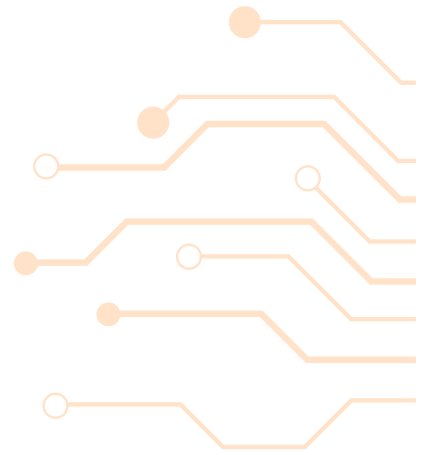## EXPLAINED

Introduction

Warehouse automation has revolutionized logistics and supply chain management by boosting operational efficiencies beyond what can be achieved through traditional methods. From the initial steps of mechanization to the integration of advanced robotics, IoT and AI-driven technologies, the field has evolved dramatically in a short period of time. This evolution has led to a growing demand for skilled partners who can seamlessly integrate diverse technologies to create responsive, efficient warehousing environments.

Modern warehouses are not simply storage spaces — they are intelligent hubs where real-time data analytics, cloud computing and autonomous systems are necessary to harmonize operations and keep costs down. As technological advancements continue, partners are essential for ensuring these complex systems work together effectively.

However, the industry is rife with challenges, such as integrating various technologies with unique protocols, staying up to date with rapid technological advancements and ensuring robust cybersecurity in an increasingly connected landscape. GreyMatter™, our transformative software solution, offers an answer. The platform minimizes customization overhead and seamlessly integrates multiple systems to create a cohesive, real-time operation tailored to each customer's needs, enhancing competitive advantage and revenue potential. Additionally, the system incorporates safety measures around the navigation of robotic agents, communication with peripherals and human-robot interaction that have been adopted by some of the largest companies in the world.
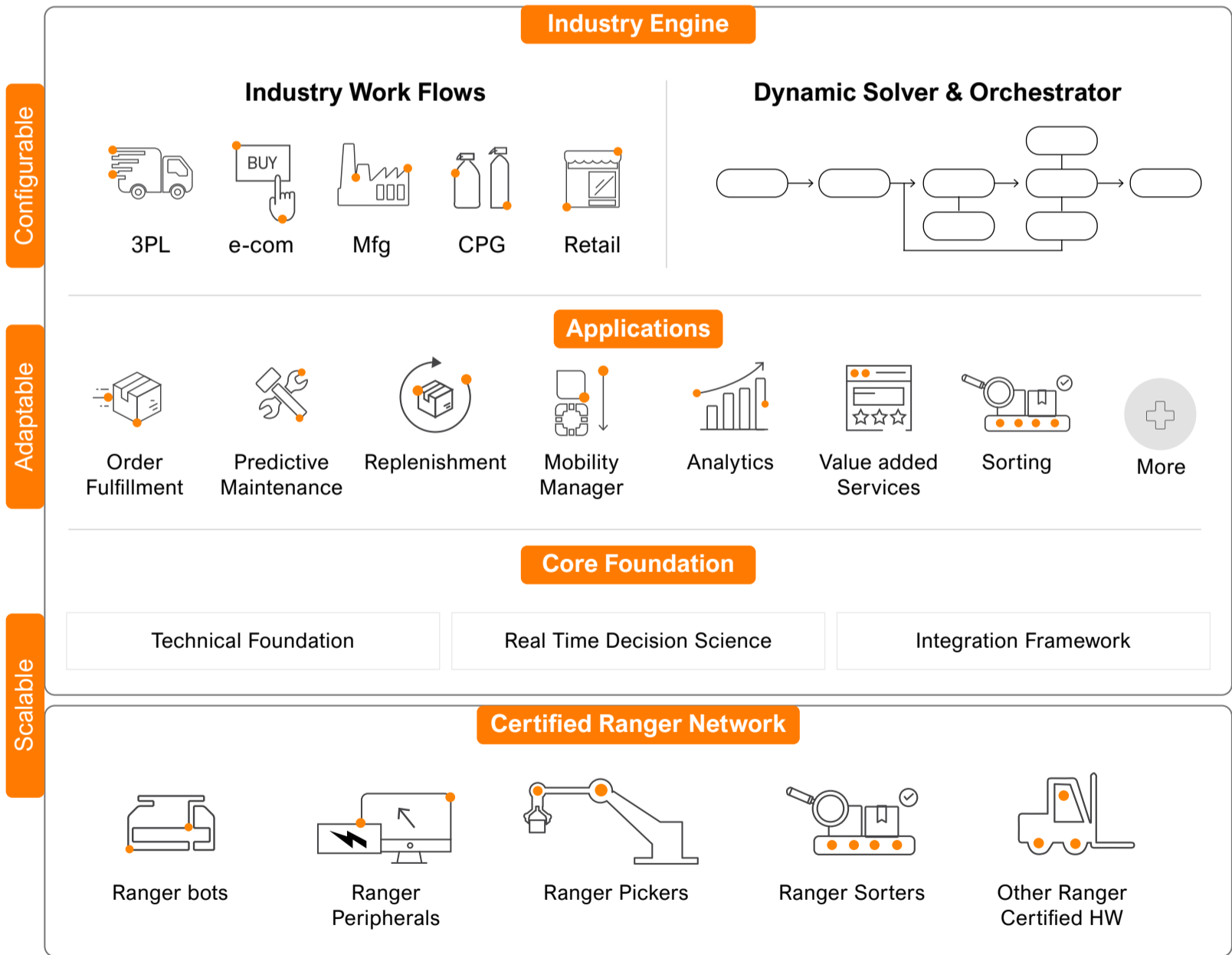
Understanding GreyMatter

GreyMatter is a fulfillment orchestration platform that enables automation using a host of modern robotics solutions across all critical warehouse processes. It is a flexible and efficient automation platform with an integrated warehouse control system (WCS) that can directly manage both robotic and human agents. It is hardware-agnostic and simplifies the integration of diverse technologies by removing the need for additional control layers.

Built on a scalable microservice architecture, GreyMatter supports real-time operations by making thousands of decisions per second to optimize outcomes. It is a proven system that manages millions of items for Fortune 500 companies every day. Unlike typical automation software, which only enables piecemeal operations, GreyMatter covers numerous process flows, including dock-to-stock, storage and retrieval, replenishment, order consolidation, sorting and more.

Industry Engine

Configurable

Industry Work Flows

3PL   e-com   Mfg   CPG   Retail

Dynamic Solver & Orchestrator

Adaptable

Applications

Order Fulfillment   Predictive Maintenance   Replenishment   Mobility Manager   Analytics   Value added Services   Sorting   More

Scalable

Core Foundation

Technical Foundation	Real Time Decision Science	Integration Framework

Certified Ranger Network

Ranger bots   Ranger Peripherals   Ranger Pickers   Ranger Sorters   Other Ranger Certified HW

How is GreyMatter Transformative for Partners?

Comprehensive Design and Simulation Suite

Data-Driven Solutions

The GreyOrange Solution Builder (GSB) facilitates data-driven and iterative process design, ensuring the right technology choices for optimal customer outcomes.

Streamlined Deployment

GSB simplifies the deployment and configuration of GreyMatter, enabling a seamless transition from design to production while reducing deployment complexity.

Comprehensive Process Coverage and Warehouse Control System

Versatile Integration

GreyMatter's hardware-agnostic platform supports a wide range of technologies, including shelf-to-person, tote-to-person, person-to-goods and material transportation solutions.

Tailored Solutions

The platform allows partners to integrate and coordinate diverse robotic agents from a single system, making it ideal for complex process automation.

Ease of Integration

Simplified Integration

GreyMatter integrates seamlessly with any upstream system, supporting a wide range of protocols such as REST API, SOAP and FTP as well as message queues like Kafka.

Flexibility

The solution handles various file formats, including XML, JSON and CSV, centralizing changes and simplifying the integration process.

Operations Analytics

Measurement

GreyMatter has robust data collection tools to measure business, operations and robotic agent outcomes.

Integration

The system is ready-made for integrations and supports data visualization and data egress platforms.

Open Platform

GreyMatter's open platform facilitates seamless collaboration, integration and orchestration. This openness not only makes the platform robust and integration-friendly but also ensures reliability and stability. Partners can co-create solutions and leverage APIs, contributing to a more capable system that meets diverse customer needs efficiently.

The solution allows partners to use their own platform in combination with GreyOrange's modules or even rely entirely on GreyMatter. With GreyMatter, partners can integrate at three different levels:

Tasking Only

The partner controls all process flows, slotting, rack/slot selection for picking, putaway and cycle counting as well as everything to do with station management while GreyMatter selects and navigates the bots needed to complete its assigned tasks.

▶▶ GO KPI(s) - Navigation efficiency
▶▶ Partner KPI(s) - Operator Cycle Time, potential UPH (Tote/Rack presentations x Hit Rate)
▶▶ Integration would change for different types of agents (eg., shelf-to-person, tote-to-person, person-to-goods, sortation and intralogistics) (remains the same for different manufacturers of the same agent type)

Navigation, Order Processing and Slotting

The partner controls stations and related process flows while GreyMatter controls the tasking and navigation of agents as well as tote/rack selection for putaway, picking and order selection from the wave(s) passed to it.

▶▶ GO KPI(s) - Potential UPH (Tote/Rack presentations x Hit Rate)
▶▶ Partner KPI(s) - Operator Cycle Time
▶▶ Integration would remain the same for different types of applications like order picking, sortation, point-to-point material movement, etc. (remains the same for different types of agents and different manufacturers)

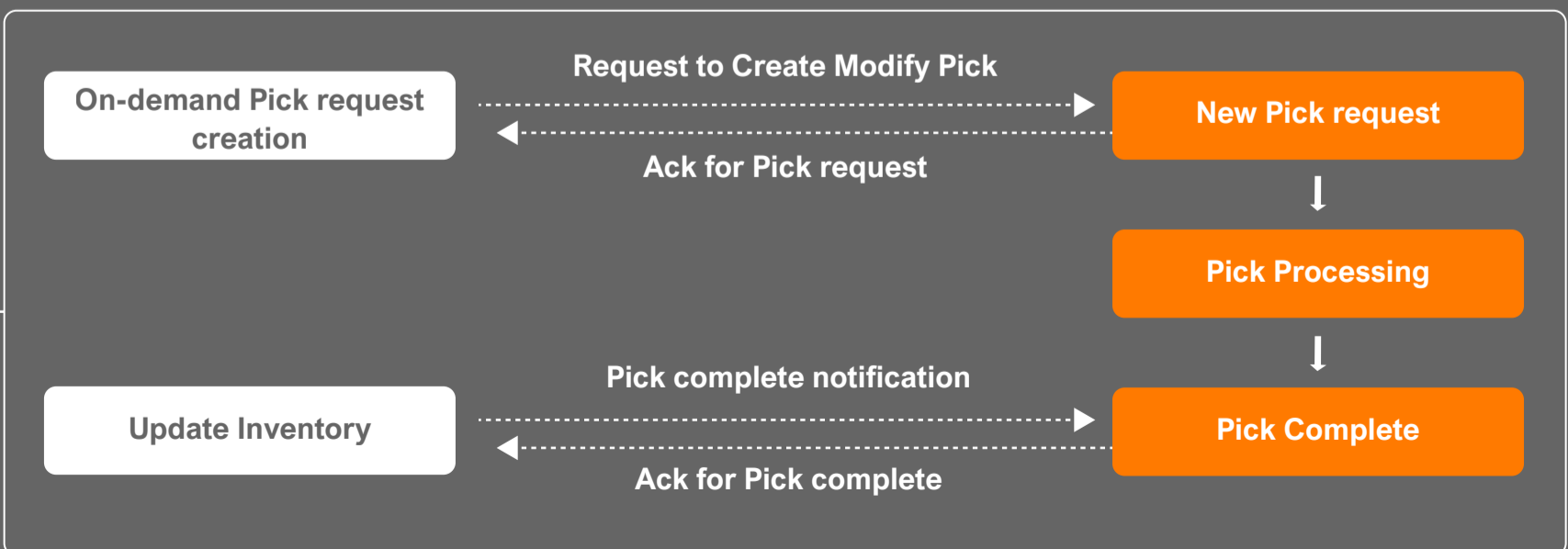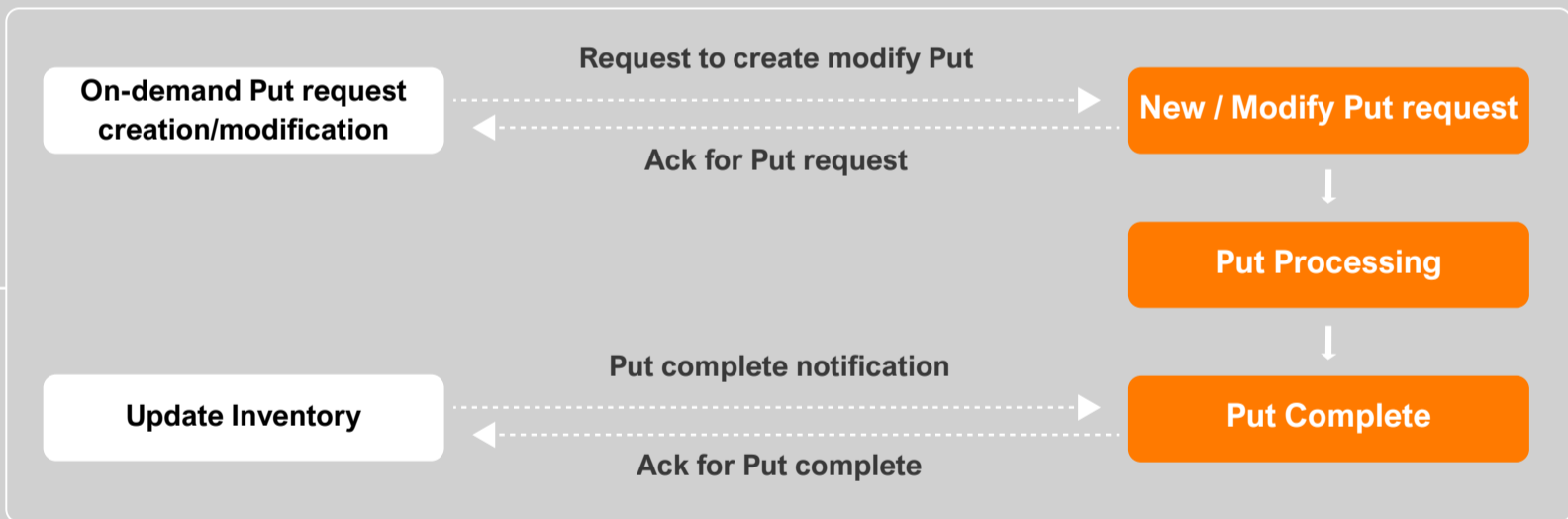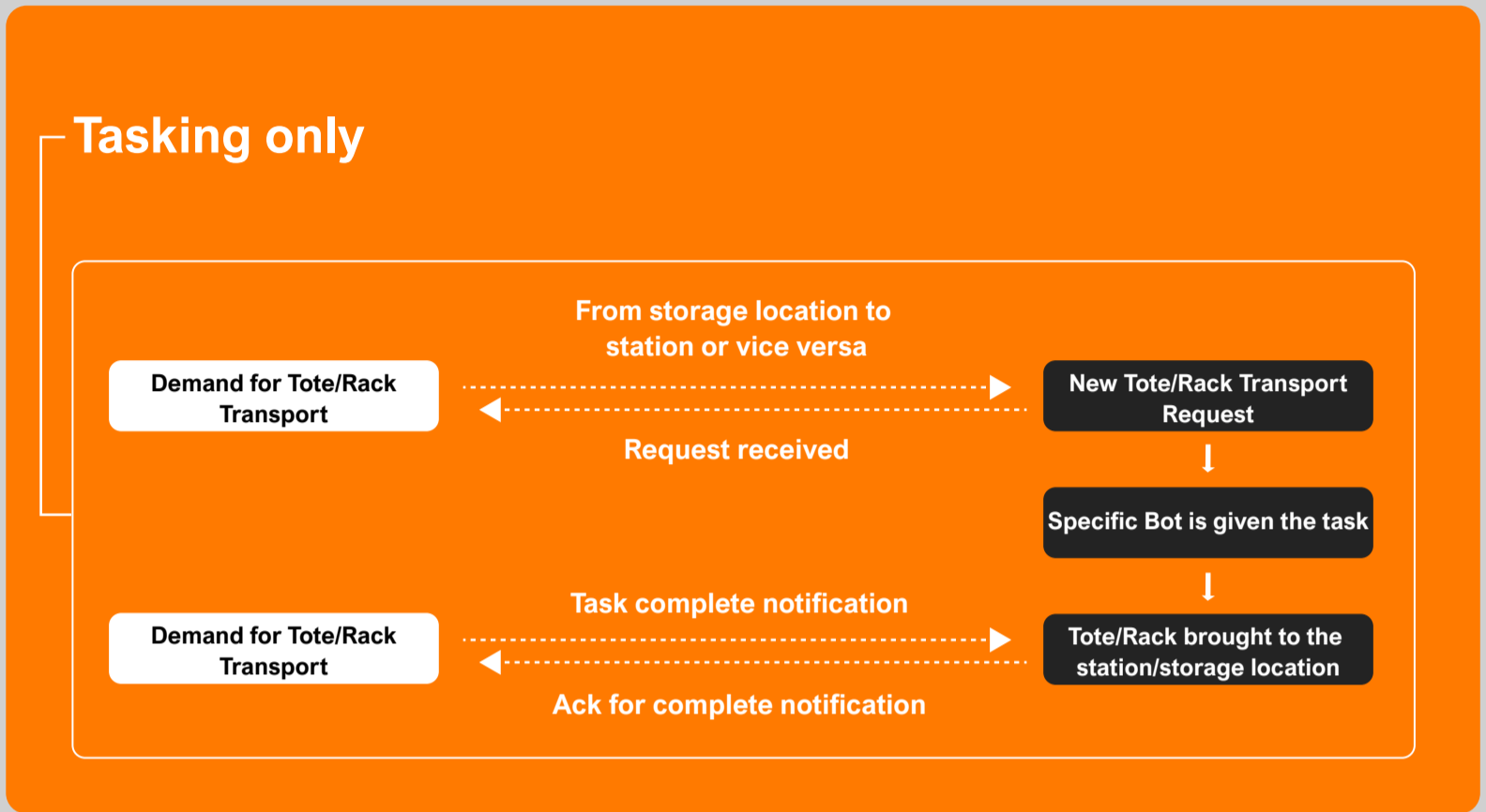## Navigation, Order Processing, Slotting and Station Management

This method allows GreyMatter to control the whole process. GreyMatter handles the tasking and navigation of agents, tote/rack selection for putaway and picking, and order selection from the wave along with process flows at stations. GreyMatter has extensive process flows that can be configured to customers' requirements on the fly, making it highly adaptable.
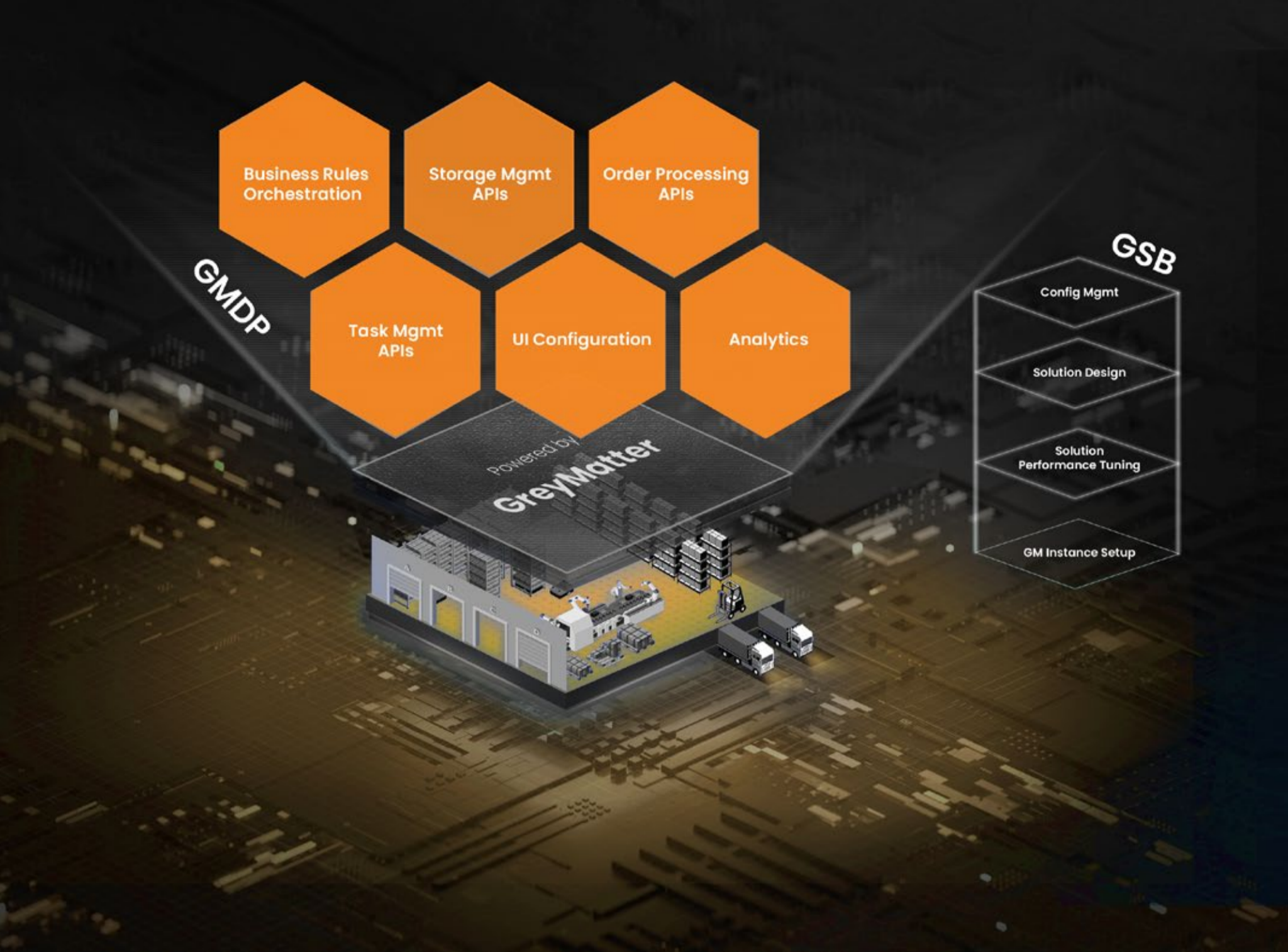
▶▶ GO KPI(s) - Potential UPH (Tote/Rack Presentations x Hit Rate), Operator Cycle Time
▶▶ Partner KPI(s) - None. GreyMatter handles the entire process
▶▶ Integration would remain the same for different types of applications like order picking, sortation, point-to-point material movement, etc. (remains the same for different types of agents and different manufacturers)

Navigation, order processing, slotting and station management

Navigation, order processing and slotting

Tasking only

Demand for Tote/Rack Transport	From storage location to station or vice versa →	New Tote/Rack Transport Request
	← Request received	
		↓
		Specific Bot is given the task
		↓
Demand for Tote/Rack Transport	Task complete notification →	Tote/Rack brought to the station/storage location
	← Ack for complete notification	

On-demand Put request creation/modification	Request to create modify Put →	New / Modify Put request
	← Ack for Put request	
		↓
		Put Processing
		↓
Update Inventory	Put complete notification →	Put Complete
	← Ack for Put complete	

On-demand Pick request creation	Request to Create Modify Pick →	New Pick request
	← Ack for Pick request	
		↓
		Pick Processing
		↓
Update Inventory	Pick complete notification →	Pick Complete
	← Ack for Pick complete	

All of the above integration approaches are a part of the GreyMatter Development Platform (GmDP) which, along with the GSB, forms the backbone of all our partnerships.

Via the Config Mgmt tool, GmDP allows partners to configure and use GreyMatter to suit their unique needs. Any solution can be customized for specific operations, and multiple solutions can be applied to the same operation, ensuring that partners can distinguish their application from any instance with or without GreyMatter. Besides the task management details described earlier, the storage management and order processing APIs allow partners the following controls around order processing and storage management:

Order Processing

- Apply any business rules to process the orders in terms of priority at an order and order line level
- Specify a specific station/bin or a set of stations/bins for orders to be processed at

Storage Management

- Specify what inventory is eligible to be stored in which rack/slot or combination of racks/slots
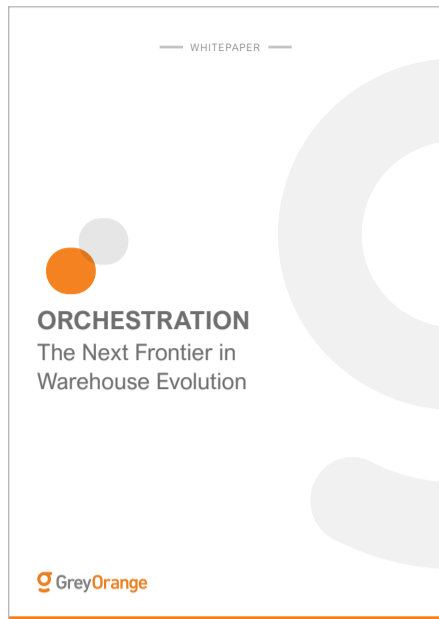- Specify which area of the map a set of SKUs can be stored in

Ultimately, the purpose of our solution is to make automation and orchestration deployments easier to design, deploy and manage. We have found that the best way to drive fulfillment towards the future is through collaboration; when we work together, there's more grey matter (if you will) between us for solving problems and overcoming difficulties. Because there is no one-size-fits-all solution for fulfillment, we have chosen to make a solution that is designed to be tailored for each end customer to maximize results.

If you'd like to discuss how GreyMatter can augment your practice or if you'd like to learn more about our capabilities, reach out to us to speak with an expert.
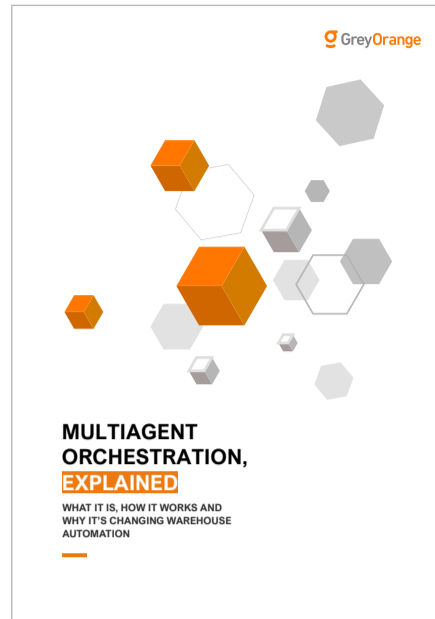
Greymatter for partners at a glance:

- GreyMatter is an open platform that can be used on its own or in combination with partner solutions to automate and orchestrate warehouse processes

- The platform is hardware-agnostic and facilitates the integration of solutions from different vendors

- GreyMatter is extremely flexible. The GreyOrange Solution Builder (GSB) and GreyMatter Development Platform (GmDP) are designed to make the system modular, scalable, and applicable to a wide variety of customer needs

- The platform covers numerous process flows, and its AI engine enables it to make real-time adjustments

- It is a proven system that is trusted by Fortune 500 companies to execute on a daily basis
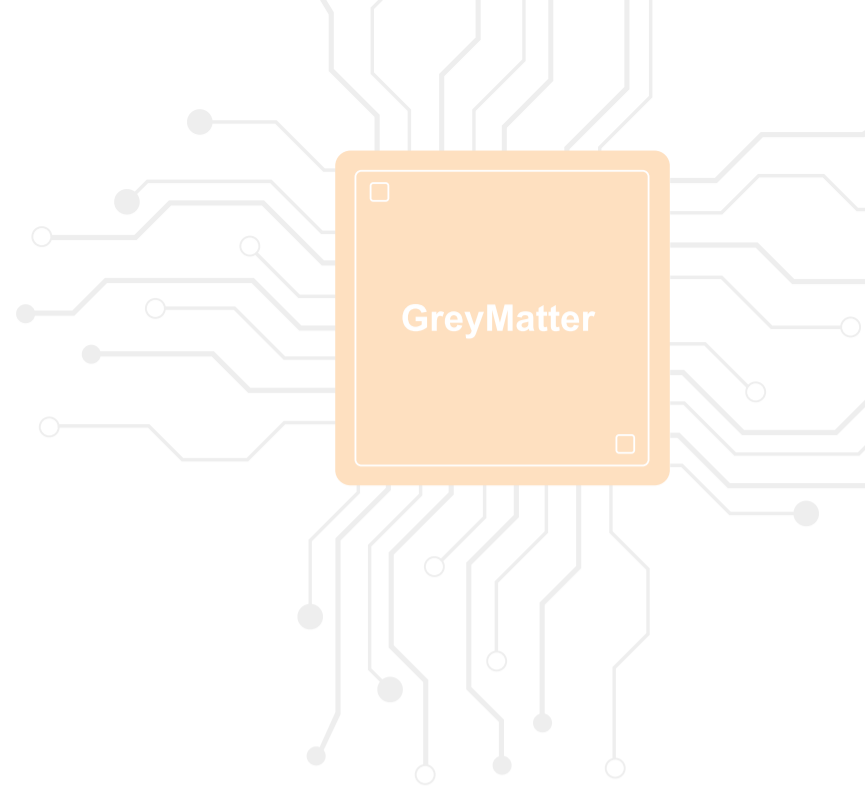
ORCHESTRATION
The Next Frontier in
Warehouse Evolution

GreyOrange

GreyOrange

MULTIAGENT ORCHESTRATION, EXPLAINED

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

Previous whitepaper on
GreyMatter MAO

Multiagent Orchestration,
Explained

GreyMatter

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more in-depth information.

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