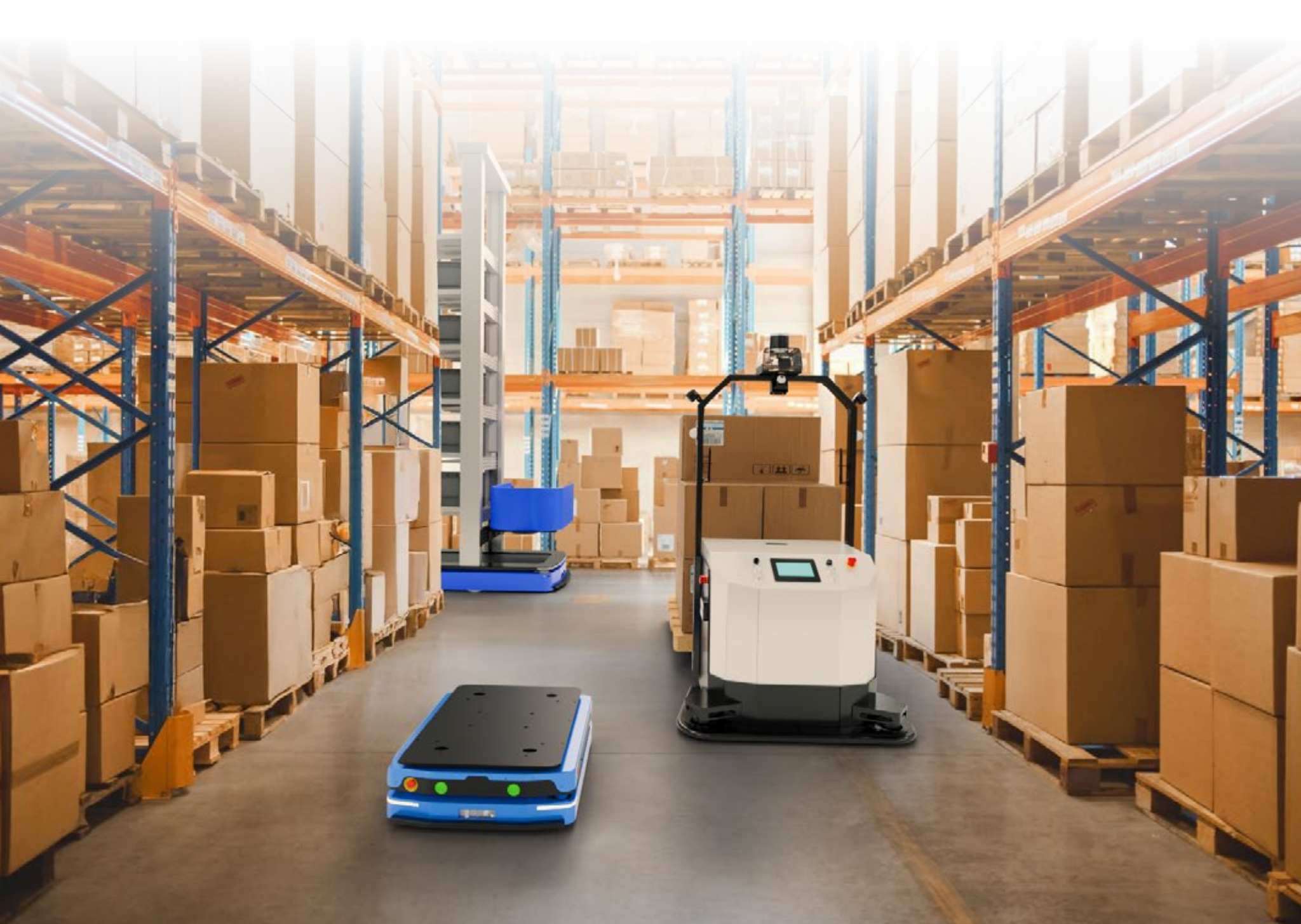
GreyOrange

Be Automation Ready

THE COMPLETE EDITION

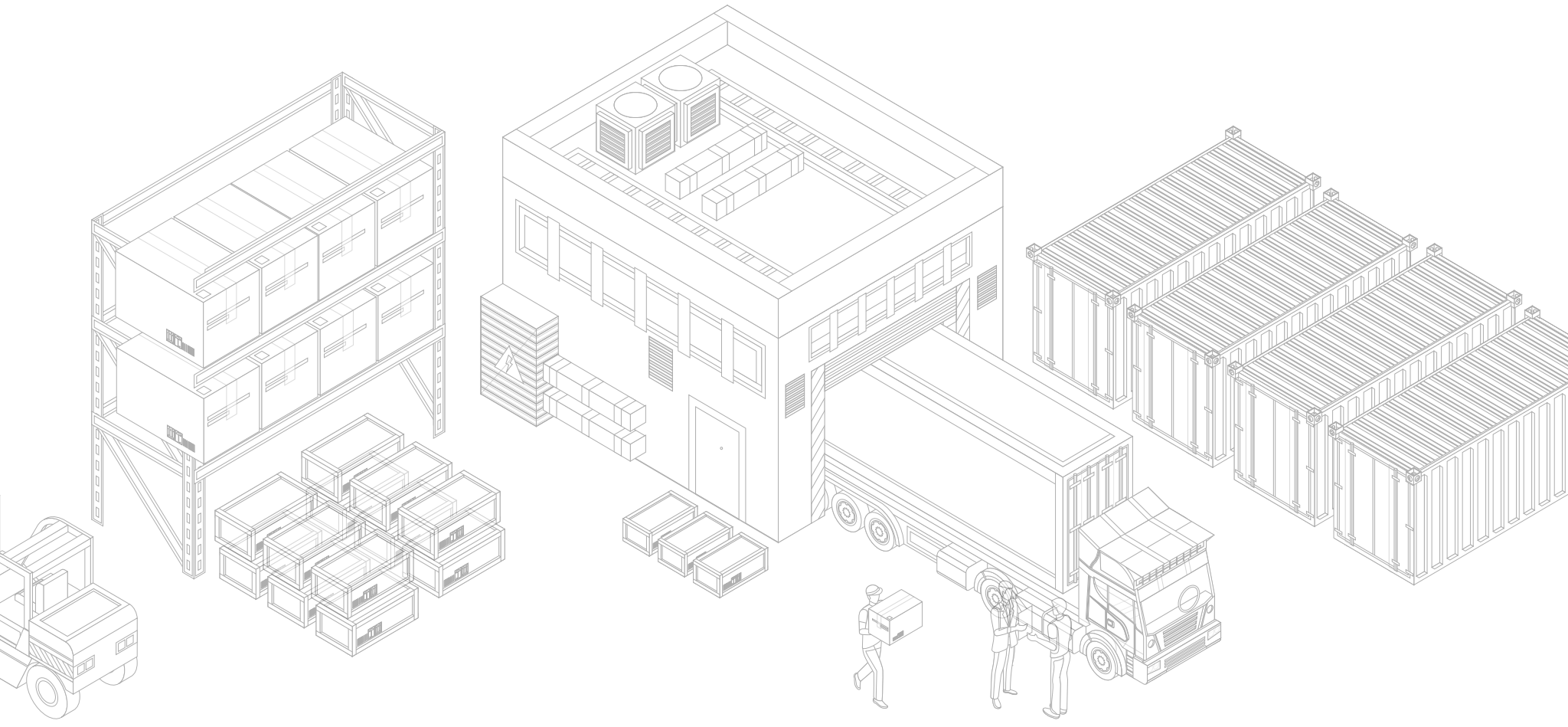


PHASE 1

EVALUATING MANUAL OPERATIONS

THE BAR IS OPEN:
WHERE AUTOMATION GETS SERVED

This BAR (Be Automation Ready) series introduces a multi-phase framework for achieving warehouse automation and breaks down the transformation into digestible steps, focusing on practical solutions at each stage of automation. We begin with the fundamentals: understanding where you are today and building a strong foundation for change.



Before diving into new technology, it's essential to know where you stand. Phase 1 focuses on assessing manual operations to identify inefficiencies and opportunities for improvement. Key areas like picking, packing and order accuracy often reveal bottlenecks that hinder productivity and customer satisfaction. While 55% of fulfillment center spend is generally tied to order picking, every organization has a different profile. Focusing on the areas with the greatest potential ROI will create self-funding initiatives down the line.

THE IMPORTANCE OF AN HONEST ASSESSMENT

Inefficient workflows

Workers spend excessive time on repetitive or low-value tasks.

Order inaccuracies

Manual picking and packing leaves room for human error, which can lead to costly returns and lost customer trust.

Low productivity

Travel time, a lack of task prioritization and outdated processes slow down fulfillment.

Limited scalability

As order volumes grow, manual processes can become bottlenecks, hampering growth.

However, these inefficiencies are opportunities in disguise. Understanding them helps build a clear case for automation and ensures that any changes align with your business goals.

STEPS TO ASSESS MANUAL OPERATIONS

While there are many frameworks for assessment, the concepts tend to remain the same.

1 GAIN CLARITY ON PAIN POINTS AND BUSINESS NEEDS

Align on the most significant pain points. Talk to your warehouse teams — they are on the front lines and can offer invaluable insights into what works and what doesn't. Look for common complaints like:

- ***Delays due to inaccurate inventory counts***
- ***Difficulties in locating products quickly***
- ***Fatigue caused by excessive manual labor***

Some key areas for goal-setting include:

- ***Enhancing storage capacity and utilization***
- ***Reducing operating costs through efficiency***
- ***Improving SLA adherence to meet client commitments***
- ***Boosting operator productivity with ergonomic solutions***

2 MAP YOUR CURRENT PROCESSES

Create a detailed flowchart of your warehouse workflows, from receiving goods to shipping orders. Focus on tasks like:

- ***Picking, packing and shipping***
- ***Inventory management and replenishment***
- ***Order prioritization and task allocation***

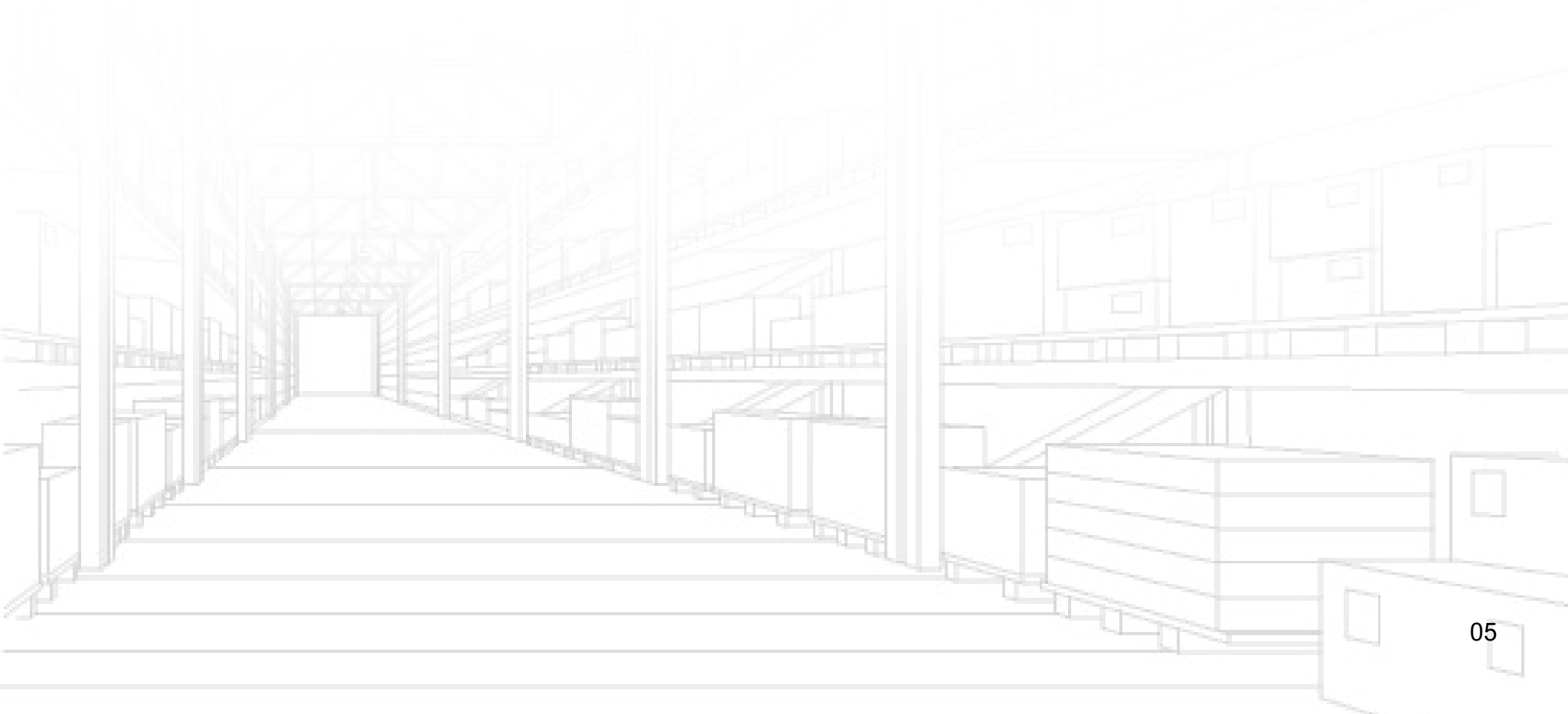
By visualizing these processes, you'll uncover inefficiencies, redundancies and dependencies.

3 GATHER PERFORMANCE DATA

Use key performance indicators (KPIs) to measure how your warehouse is currently performing:

Order accuracy rates	***What percentage of orders are fulfilled without errors?***
Picking/packing times	***How long does it take to fulfill a single order?***
Labor utilization rates	***Are tasks optimally allocated to workers?***
Throughput	***How many orders can your warehouse handle per hour or day?***

This data provides a baseline from which to measure the impact of future improvements.



4 CONDUCT TIME-AND-MOTION STUDIES

Observe workers performing key tasks like picking, packing and replenishment. Track how long it takes to complete each activity and note inefficiencies, such as:

Excessive travel time between picking locations

Poorly organized inventory that slows down access

Repetitive tasks that could benefit from optimization

5 EVALUATE YOUR TECHNOLOGY STACK

If your warehouse uses basic tools like spreadsheets or standalone systems, consider how they might limit visibility and decision-making. Look for gaps where an advanced Warehouse Execution System (WES) like GreyMatter could provide immediate improvements, such as task orchestration or inventory tracking.

PHASE 2

BRIDGING THE GAP TO AUTOMATION WITH TASKING SYSTEMS

This is the second post in our BAR (Be Automation Ready) series, which provides a simple and structured framework for achieving warehouse automation.

Phase 1 focused on evaluating manual operations to uncover inefficiencies and opportunities for improvement. Now, we delve into Phase 2: how to leverage tasking systems to enhance manual workflows and lay the groundwork for automation.

THE ROLE OF TASKING SYSTEMS IN MODERN WAREHOUSES

Maintaining operational efficiency without significant capital investment is critical in a world where customer expectations continue to rise.

While 26% of warehouses are projected to be automated by 2027, up from 14% a decade earlier and 18% at the end of 2021, many need a stepping stone to automation. Tasking systems, such as an advanced warehouse execution system (WES), can act as the bridge between traditional manual processes and full-scale automation.

The global WES market size was valued at $1.7 billion in 2023 and is projected to grow at a CAGR of over 12.3% between 2024 and 2032. A WES uses intelligent task orchestration to optimize workflows, ensuring that each resource is used effectively. Without them, manual tasking leads to inefficiencies, bottlenecks and reduced productivity in dynamic warehouse environments.

WHY START WITH TASKING SYSTEMS?

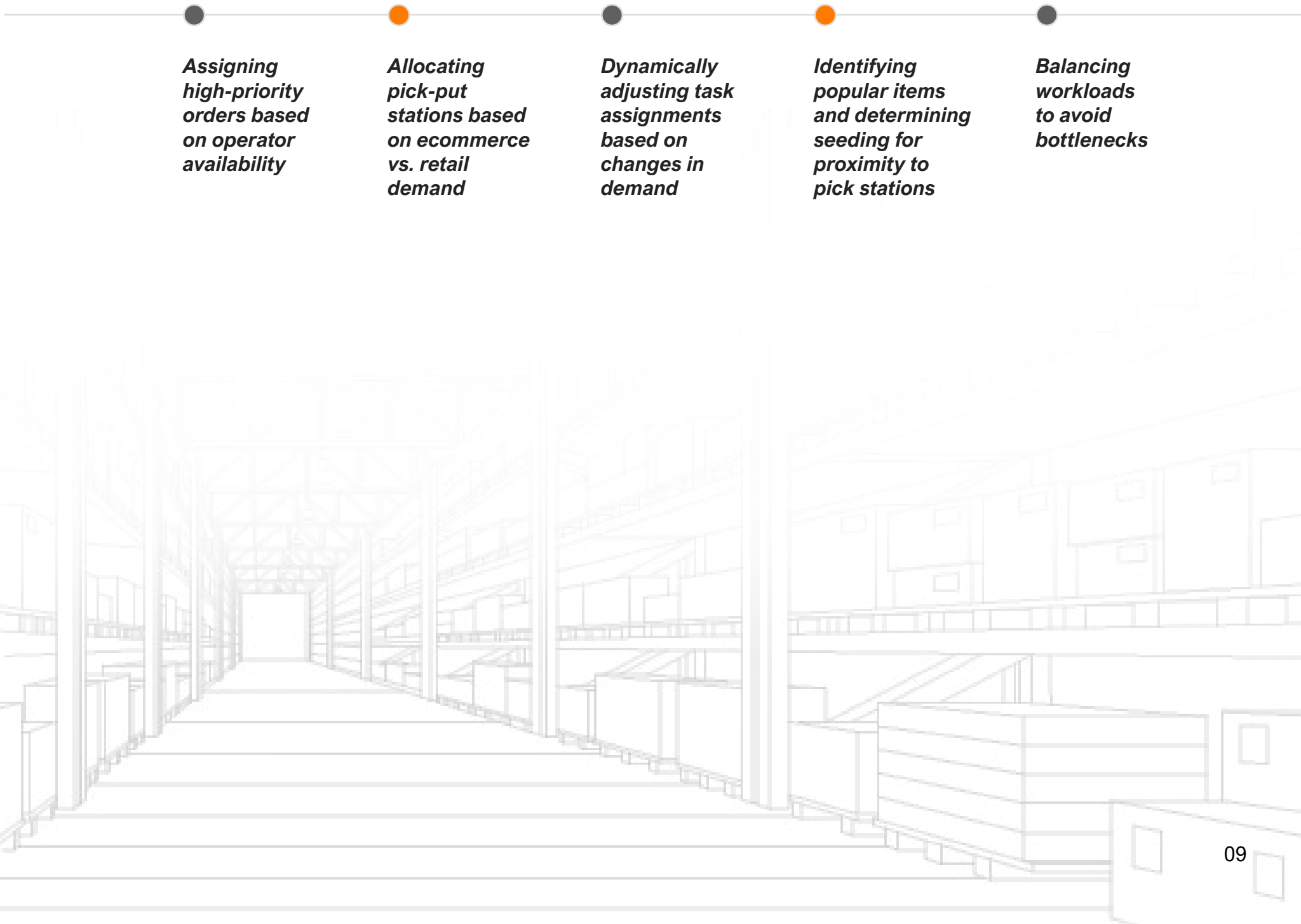
For many organizations, adopting a tasking system is the logical next step after assessing manual operations. It's a cost-effective way to address immediate inefficiencies while preparing for future automation. By prioritizing tasks, balancing workloads and integrating existing tools, tasking systems help warehouses achieve measurable improvements without upfront hardware investments.

KEY BENEFITS OF TASKING SYSTEMS

Intelligent task orchestration

Tasking systems assign and prioritize tasks based on real-time data, minimizing idle time and optimizing worker productivity. Some key functions include:

- ***Assigning high-priority orders based on operator availability***
- ***Allocating pick-put stations based on ecommerce vs. retail demand***
- ***Dynamically adjusting task assignments based on changes in demand***
- ***Identifying popular items and determining seeding for proximity to pick stations***
- ***Balancing workloads to avoid bottlenecks***



Enhanced visibility and decision-making

A robust tasking system provides a centralized view of all warehouse activities. Managers can monitor performance, identify potential issues and make data-driven decisions to improve efficiency. Features like real-time KPI dashboards and predictive analytics offer actionable insights to optimize operations.

Integration with existing tools

Tasking systems integrate seamlessly with your current technology stack, including enterprise resource planning (ERP), transportation management system (TMS) and warehouse management system (WMS) platforms. This ensures continuity while enhancing the functionality of existing systems. By centralizing task management, warehouses can streamline workflows without overhauling their infrastructure.

Incremental improvements without hardware costs

Unlike hardware-driven automation, tasking systems deliver significant benefits without major upfront investments. This makes them an ideal starting point for organizations looking to improve operations while managing costs.

STEPS TO IMPLEMENT A TASKING SYSTEM

There are four key steps to getting started with intelligent tasking.

1 DEFINE OBJECTIVES

Start by identifying the specific goals you aim to achieve with a tasking system. Whether it's improving order accuracy, reducing fulfillment times or increasing labor efficiency, clear objectives will guide your implementation strategy.

2 SELECT THE RIGHT SYSTEM

Choose a WES that aligns with your warehouse's needs and integrates with existing tools. Consider scalability and flexibility to ensure the system can evolve alongside your operations.

3 TRAIN YOUR TEAM

Ensure your warehouse staff understands how to use the tasking system effectively. Provide training and support to help them adapt to new workflows and embrace technology-driven processes.

4 MONITOR AND REFINE

After implementation, continuously monitor the system's performance and gather feedback from your team. Use this data to refine workflows and maximize the system's impact.

In short, tasking systems are a great first step for warehouses transitioning from manual to automated operations. By improving efficiency, visibility and decision-making, these systems lay a strong foundation for the future phases of our BAR series, including assisted picking and goods-to-person automation.

PHASE 3

ASSISTED PICKING COMBINES HUMAN EXPERTISE WITH REAL-TIME GUIDANCE

This phase focuses on the integration of human expertise with real-time guidance technology to maximize accuracy and productivity.

WHAT IS ASSISTED PICKING?

Assisted picking refers to the use of technology to guide warehouse workers in completing tasks such as order picking, packing and inventory replenishment. It combines human judgment with intelligent hardware, such as case picking and intralogistics bots that are powered by warehouse orchestration software with advanced safety features. As a result, assisted picking reduces errors, shortens training time and accelerates fulfillment processes.

HOW DO YOU KNOW IF ASSISTED PICKING IS A GOOD FIT FOR YOU?

In today’s warehouse environment, efficiency and flexibility are key to staying competitive. Assisted picking offers a smart way to enhance operations without the need for full-scale automation.

Cost-effective enhancement

Assisted picking is a practical step for highly manual warehouses because it requires a smaller investment than implementing end-to-end robotic automation or other advanced systems, allowing for full integration and scale as needed.

Retention of human-driven flexibility

Unlike fully automated solutions, assisted picking retains human decision-making while leveraging technology to optimize performance. This hybrid approach is especially valuable for handling complex or non-standard orders.

Rapid implementation

Assisted picking technologies are typically easy to deploy and integrate with existing Warehouse Management Systems (WMS), enabling warehouses to see results quickly.

KEY BENEFITS OF ASSISTED PICKING

Assisted picking solutions bring immediate, measurable improvements to warehouse operations. From reducing training time for new employees to optimizing pick paths and minimizing errors, these systems enhance productivity without the complexities of full automation.

Minimal operator training requirements

Assisted picking systems simplify the learning curve for new employees. By providing clear and intuitive guidance, these tools enable faster onboarding and consistent performance across the workforce. In fact, getting associates up and running with assisted picking robots is about 80% faster than recruiting, hiring and training new pickers for manual processes.

Enhanced productivity

Real-time guidance helps workers complete tasks faster by eliminating the need for manual checks or paper-based instructions. Optimized routes and streamlined workflows further boost efficiency. Some companies report productivity increases of up to 40% with assisted order-picking systems.

More efficient workflows

Assisted picking minimizes operator time while also reducing idle time. Once a pick is completed, the handheld device instantly guides the operator to the next pick location, ensuring seamless workflow efficiency.

Scalability

Assisted picking solutions can scale alongside your operations. Whether you're managing seasonal surges or expanding your warehouse, these systems adapt to changing demand by adding new agents or more operators to achieve the desired throughput.

4 STEPS TO IMPLEMENT ASSISTED PICKING

A successful rollout requires careful planning and a strategic approach. From assessing your warehouse's specific needs to selecting the right technology and ensuring proper training, each step plays a crucial role in maximizing the benefits of assisted picking.

1 EVALUATE YOUR NEEDS

Identify the areas where assisted picking can deliver the most value. Common pain points include order accuracy, fulfillment speed and training inefficiencies.

2 CHOOSE THE RIGHT TECHNOLOGY

Select tools that align with your warehouse's requirements and integrate seamlessly with existing systems such as handheld devices.

3 PILOT AND REFINE

Begin with a pilot program to test the technology’s effectiveness in a controlled environment. Gather feedback from workers and use performance data to refine the implementation process.

4 TRAIN YOUR TEAM

Provide comprehensive training to ensure employees are comfortable using the new tools. Highlight the benefits of assisted picking to encourage adoption and engagement.

Assisted picking is a smart step for many warehouses, as it bridges the gap between tasking systems and more advanced automation phases. By empowering your workforce with real-time guidance technology, you’ll set the stage for greater efficiency and scalability in future phases, such as goods-to-person automation and waveless fulfillment.

PHASE 4

GOODS-TO-PERSON AUTOMATION FOR SMARTER INVENTORY HANDLING

Welcome back to the BAR (Be Automation Ready) series! Following **Phase 3: Assisted Picking**, we now turn our attention to Phase 4: Goods-to-Person (GTP) Automation. This phase explores the automation of inventory delivery directly to workers, significantly boosting throughput and driving efficiency.

Recent industry surveys show that nearly 60% of companies now utilize some form of warehouse robotics[1] and 92% are planning to invest in robotics[2] over the next two years, signaling continued growth and adoption across the supply chain sector.

WHAT IS GOODS-TO-PERSON (GTP) AUTOMATION?

GTP automation leverages robotic systems to transport inventory from storage areas to workstations, minimizing the need for workers to travel through the warehouse. This process reduces inefficiencies and can increase throughput by 2-4x. By delivering goods directly to workers, GTP systems enhance accuracy and safety. They minimize the need for workers to walk between locations, streamlining operations and improving workflow.

Integrating Warehouse Execution Systems (WES) into GTP automation is key. WES orchestrates the flow of goods across multiple systems — whether it's automated storage and retrieval systems (AS/RS), robotic transport systems or manual workflows. By seamlessly connecting these components, WES optimizes task prioritization, routing and resource allocation, ensuring that each order is fulfilled with maximum efficiency.

WHY IMPLEMENT GTP AUTOMATION?

GTP automation offers a strategic advantage by streamlining operations, enhancing accuracy, maximizing space and improving worker safety — all critical factors in warehouse efficiency.

Enhanced productivity

GTP systems drastically reduce the time workers spend walking between storage locations, enabling them to focus solely on order fulfillment. This results in faster processing times and higher throughput.

Improved accuracy

By delivering the correct items directly to the workstation, GTP systems minimize human error. Integrated verification technologies, such as barcode scanning or RFID, further ensure order accuracy.

Optimal space utilization

GTP solutions make better use of vertical space, allowing storage systems to extend upwards. As a result, companies can increase storage capacity without the need for expanded square footage or additional floor space.

Ergonomic benefits

Workers no longer need to perform physically demanding tasks like walking long distances or reaching for high shelves. GTP systems bring items to an ergonomic height, improving workplace safety and reducing worker injuries.

KEY COMPONENTS OF A GTP SYSTEM

Key components of a GTP system work together to create an efficient warehouse ecosystem where inventory comes directly to workers rather than requiring workers to travel throughout the facility.

Automated Storage and Retrieval Systems (AS/RS)

These systems manage the storage and retrieval of goods within the warehouse. Examples include shuttle systems, vertical lift modules (VLMs) and robotic arms.

Workstations

At ergonomically designed stations, workers receive, process and pack items delivered by the GTP system.

Robotic transport systems

Mobile robots or conveyors transport items from storage areas to designated workstations or Pick Put Stations (PPS), drastically cutting down the time workers spend moving between storage locations.

STEPS TO IMPLEMENT GTP AUTOMATION

Implementing GTP automation requires a strategic approach with five critical steps that can streamline warehouse operations while delivering a substantial return on investment (ROI).

1

ASSESS YOUR NEEDS

Identify areas where GTP automation can deliver the most value. Consider factors such as order volume, warehouse layout and existing inefficiencies. Integrating a WES is critical in this step, as it helps identify where the orchestration of multiple systems will bring the greatest ROI.

2

CHOOSE THE RIGHT SOLUTION

Select a GTP system that aligns with your operational goals. Evaluate options based on scalability, integration capabilities and ROI.

3

PLAN THE LAYOUT

Design a layout that optimizes the flow of goods and minimizes bottlenecks. Consider how GTP systems will integrate with existing processes and technologies.

4

TRAIN YOUR TEAM

Ensure workers understand how to operate and collaborate with GTP systems. Training should focus on workstation processes, system interfaces, troubleshooting and how to interact with WES for optimal performance.

5

CONTINUOUSLY MONITOR AND REFINE

Track performance metrics, such as order processing time and accuracy rates. Use this data to fine-tune the system and maximize its benefits.

LOOKING AHEAD: WAVELESS FULFILLMENT

Phase 4: Goods-to-Person (GTP) Automation represents a significant milestone in the BAR journey. By streamlining inventory handling and boosting efficiency, GTP systems pave the way for even more advanced automation phases, such as waveless fulfillment and end-to-end robotic workflows. Companies that implement GTP systems typically realize ROI within two years, making it a cornerstone of modern warehouse strategy.

Sources:
1. https://www.supplychaindive.com/news/warehouse-robots-costs-cost-emerges-top-barrier-adoption/723447/#:~:text=Interact%20Analysis%E2%80%99%20latest%20research%20found,mobile%20automation%20in%20their%20facilities
2. https://www.gartner.com/en/newsroom/press-releases/2024-11-12-gartner-hype-cycle-reveals-rising-adoption-and-fast-growing-market-for-advanced-mobile-robots-for-supply-chains

HOW WAVELESS FULFILLMENT IS A STEPPING STONE TO MULTIAGENT ORCHESTRATION (MAO)

Implementing waveless fulfillment does more than just accelerate throughput. It lays the operational and technological groundwork for multiagent orchestration (MAO).

Real-time work allocation → multi-agent decisioning

Waveless fulfillment introduces continuous task generation. MAO builds on this by making **intelligent decisions across multiple agent types** — robots, humans, pick stations — based on shared, real-time inputs.

Task flexibility → cross-agent collaboration

As waveless fulfillment enables tasks to be reassigned and reprioritized midstream, MAO takes it one step further. It uses smart orchestration logic to ensure those tasks are routed optimally across a **heterogeneous fleet**, including Autonomous Mobile Robots (AMRs), Automated Storage and Retrieval Systems (ASRS), and manual zones.

Visibility and context → centralized control

Waveless dashboards provide operators with a live view of throughput. MAO extends this by functioning as an **intelligent control tower**, coordinating priorities across systems and ensuring seamless interaction between automation layers.

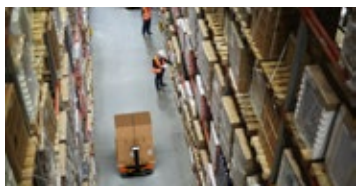
In short, if waveless fulfillment is the engine that generates dynamic tasks, MAO is the brain that **orchestrates and executes those tasks across multiple agents in real time.**

HOW WAVELESS FULFILLMENT BUILDS ON PREVIOUS BAR PHASES

Waveless fulfillment represents the natural evolution of modern warehouse execution, seamlessly integrating and enhancing the foundational technologies established in previous BAR phases while eliminating the constraints of traditional wave-based processing.

Intelligent tasking systems (Phase 2)

Phase 2 introduced rule-based task assignment. Waveless extends this to **dynamic, on-the-fly prioritization**, factoring in real-time order attributes and capacity.



Assisted picking (Phase 3)

Waveless relies on **precise, guided task execution**, which assisted picking technologies (e.g., voice, wearables, RF) make possible.

GTP automation (Phase 4)

GTP systems align perfectly with waveless logic: inventory is retrieved and delivered based on **live order demand**, not fixed pick waves.

KEY BENEFITS OF WAVELESS FULFILLMENT

The strategic shift to waveless fulfillment delivers advantages across operational efficiency, resource optimization, scalability and decision-making, positioning forward-thinking distribution centers to excel.

Faster fulfillment cycles

No batching means immediate execution — orders are picked, packed and shipped the moment they’re ready.

Smarter resource utilization

Labor and automation are deployed based on urgency, location, and availability. This eliminates idle hands and underused bots.

Elastic and scalable

Whether it’s peak season or a last-minute flash sale, waveless fulfillment flexes in real time to meet demand.

Data-driven decisions

Live analytics, predictive alerts and fulfillment KPIs give supervisors total visibility and rapid response capabilities.

STEPS TO IMPLEMENT WAVELESS FULFILLMENT

Transitioning to waveless fulfillment requires a strategic, phased approach that upgrades both your technology infrastructure and operational mindset, creating a seamless ecosystem where orders flow continuously from receipt to shipment without batch constraints.

1

Upgrade your tasking layer

Ensure that dynamic task generation and prioritization is supported. This is the foundation for a solid WES.

2

Integrate picking and GTP systems in real time

Assisted picking and GTP systems have to communicate with the task engine continuously.

3

Train for flow, not batches

Operators need to adapt to a new rhythm that’s driven by constant prioritization instead of planned wave releases.

4

Track KPIs relentlessly

Speed, accuracy and resource efficiency should be monitored daily to calibrate your orchestration logic.

LOOKING AHEAD

As Gartner[2] reports in “Apply an Architectural Framework to Stratify Warehouse Management Systems,” “The combination of high levels of complexity with rapid business change demands adaptable systems.” Waveless fulfillment is that system, one that powers the strategic leap from automation to orchestration.

Sources:
1. Adoption of AI-based order picking in warehouse: benefits, challenges, and critical success factors
2. Gartner

PHASE 6

END-TO-END INTEGRATED AUTOMATION

The final step in becoming automation ready

Welcome to the final phase of the BAR (Be Automation Ready) series. We've moved from foundational tasking systems to dynamic, demand-ready fulfillment. Now, we arrive at the future: **End-to-End Integrated Automation**, where robotics, orchestration and AI converge into a single, synchronized system.

As warehouses adopt more technology, the risk of fragmentation grows. Disconnected software, machines, and teams create data silos that hamper visibility and performance. In fact, 82% of enterprises report that these silos disrupt critical workflows[1], and nearly half of supply chain leaders say siloed systems prevent effective operations.

The solution? **Integration powered by orchestration**. A Warehouse Execution System (WES) acts as the brain, unifying sub-systems, vendors and workflows into a harmonious whole. The result is faster, more adaptive and error-resistant operations.

WHAT IS INTEGRATED AUTOMATION?

Integrated automation combines state-of-the-art robotics, AI-driven decision-making, and orchestration-first logic to enable real-time, autonomous operations. It's not just about adding more robots — it's about ensuring that every part of your warehouse works in harmony.

This evolution builds directly on the foundations laid in earlier BAR phases:

Phase 2: Tasking systems

now serve as orchestration engines, dynamically assigning tasks across humans, robots and subsystems.

Phase 3: Assisted picking

evolves into robot-assisted accuracy, where humans and machines coexist in optimized workflows.

Phase 4: Goods-to-Person (GTP) systems

transform into robot-managed inventory, handling replenishment and fulfillment with minimal human touch.

Phase 5: Waveless fulfillment

becomes the launchpad for fluid, adaptive, always-on orchestration powered by AI.

CORE FEATURES OF INTEGRATED AUTOMATION

Integrated automation transforms warehouses into intelligent ecosystems where robots, AI and human expertise converge to create seamless, self-optimizing operations that adapt in real time to changing demands.

End-to-end robotic workflows

Autonomous Mobile Robots (AMRs), robotic arms, conveyors and humans work as one. Robots take on tasks like picking, packing, sorting and replenishment. This reduces manual effort while boosting speed and precision.

AI-driven decision making

AI algorithms use real-time data to dynamically assign resources, predict demand shifts and continuously optimize workflows. The system learns and improves on its own.

Predictive maintenance

IoT sensors monitor equipment health, enabling predictive alerts before failures happen. This reduces unplanned downtime and keeps operations running smoothly.

Human-robot collaboration

Cobots support humans in complex or dexterous tasks, while people oversee strategy, handle exceptions and guide continuous improvement.

Modularity and scalability

Cutting-edge systems are modular, allowing operators to expand, upgrade or reconfigure workflows quickly without massive reinvestments.

HOW TO GET THERE: YOUR ROADMAP TO WAREHOUSE ORCHESTRATION

Here's how to move from fragmented operations to fully orchestrated, end-to-end automation in a warehouse that's intelligent, adaptive and built for scale.

1

Assess your readiness

Analyze your automation maturity. Where are the gaps? Which processes are still siloed? What's your current throughput vs. target?

2

Select the right partners

Choose vendors with proven orchestration platforms, flexible robotics and deep integration experience — not just hardware providers.

3

Invest in AI and robotics

Deploy intelligent, interoperable systems that deliver measurable ROI and scale with your business.

4

Upskill your workforce

Train teams to interpret data, manage exceptions and operate alongside intelligent systems. People remain key to high-performing automation.

5

Iterate and optimize

Use AI insights to refine workflows, test changes quickly and stay ahead of market and demand shifts.

THE PAYOFF: OPERATIONAL IMPROVEMENTS YOU CAN MEASURE

End-to-end integrated automation doesn’t just streamline operations — it's about delivering tangible, measurable results. Here’s what businesses can expect when orchestration becomes the norm.

Higher throughput and speed

A well-orchestrated warehouse sees up to a 15% boost in throughput and 12% more units processed per hour[2], thanks to real-time task optimization and smoother handoffs.

Lower operational costs

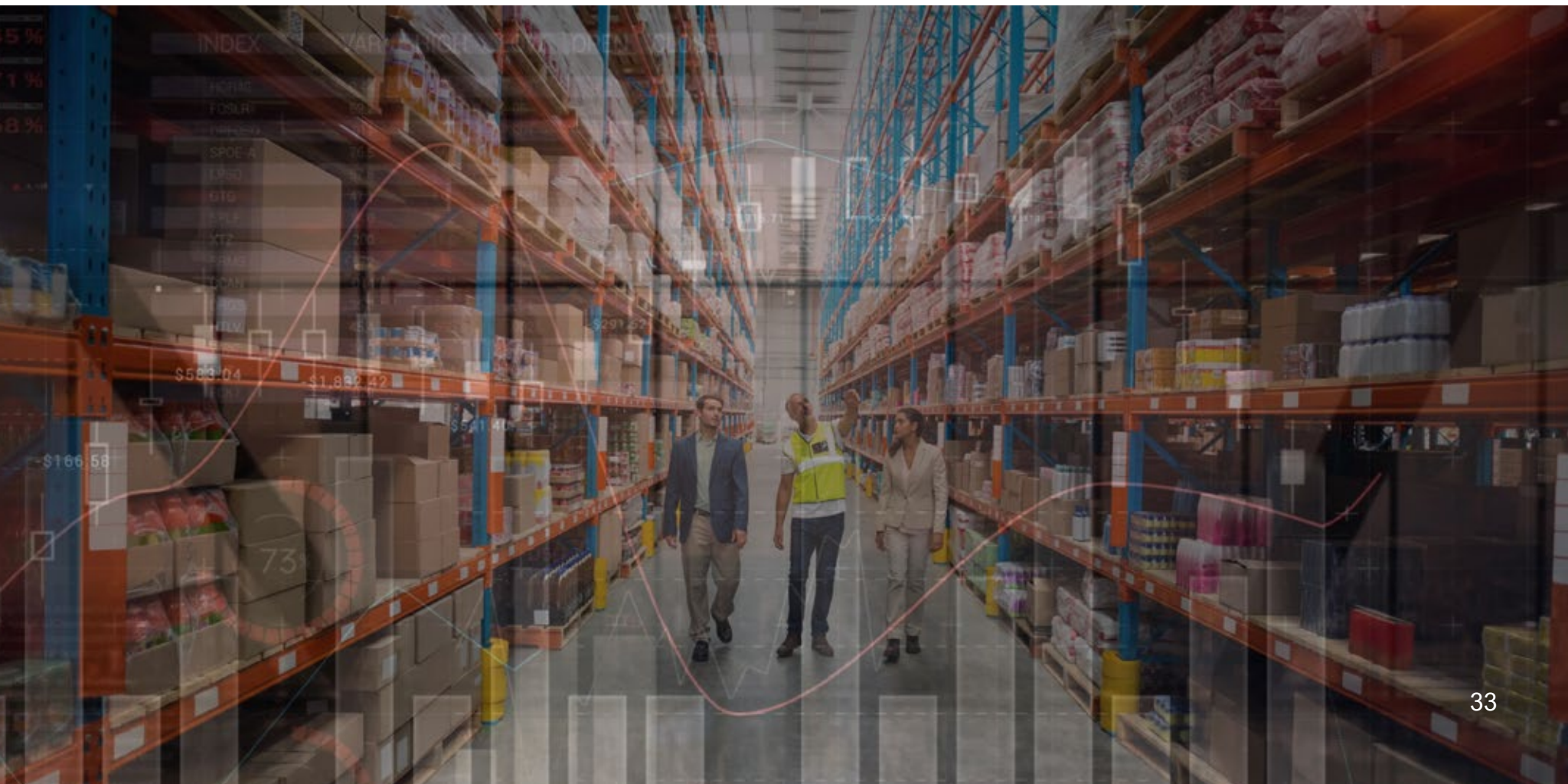
WES platforms streamline labor and equipment usage, with some businesses reporting up to an 80% reduction in administrative costs[2] and dramatic drops in travel time per order.

Productivity and accuracy gains

With automated workflows across picking, sorting and replenishment, orchestration combined with automation unlocks greater output per employee without requiring additional headcount.

Resilience and agility

Integrated systems can dynamically reassign tasks, reroute workflows and scale with demand spikes. This ensures uptime, flexibility and future-ready performance.



LOOKING AHEAD
CONTINUOUS IMPROVEMENT THROUGH ORCHESTRATION

Phase 6 is not the final step. It's where automation continuously evolves from isolated functions to a **living, breathing system** that thinks, learns and adapts. As fulfillment becomes more complex, orchestration becomes your competitive edge.

Ready for end-to-end integrated automation?

GreyOrange helps enterprises unlock the full potential of their warehouses through orchestration-first design and next-gen robotics from best-in-class vendors. Contact us today to begin building the warehouse of the future.

Sources:
1. What are data silos?
2. The Warehouse Execution System: A New Competitive Imperative