

eBook

No Margin For Error:

How Adaptive Micro-Fulfillment
Changes the Game For Retail



From ‘Megahype’ to ‘Megatrend’, Micro-Fulfillment Is Going Huge

Hyped as retail’s “next big thing” in 2022^[1], micro-fulfillment has touched down, gaining traction and momentum as a visible e-commerce trend projected “to reach \$88.3 billion by 2031^[2] and growing at a CAGR of 44.8% from 2022 to 2031.

For early adopters in fast-moving consumer goods (FMCG) like grocery, the pandemic was a flashpoint of colliding factors forcing a total rethink of supply chain and fulfillment operations.

With advanced robotics and fulfillment tech innovations reaching new milestones, hardline, softline and big-box retailers locked out of the pandemic micro-fulfillment boom have a chance to catch the next wave.

In This eBook

For hardline, softline and big-box retailers yet to fully adopt omni-channel micro-fulfillment, the math hasn’t yet added up. In more recent years, however, conflicting pressures of last-mile costs vs. customer expectation are forcing a recalculation.

On one hand, the “ship to home or store” last-mile promise of micro-fulfillment accounts for almost half of all supply chain costs.

On the other, last-mile delivery is also where consumer expectation now lives – and losing to uncompromising customer preference has obvious implications on brand relevance and market position.

In this eBook, we’ll cover the legacy challenges that have held other retail sectors back from following grocery’s lead into micro-fulfillment strategy.

We’ll also cover how Blue Yonder’s SaaS-native Adaptive Fulfillment and Warehousing (AFW) innovations bring a composable approach to breaking down remaining challenges one by one, paving the way for rapid, cost-effective micro-fulfillment center (MFC) rollouts.

At-a-Glance Micro-Fulfillment Explainer

Micro-Fulfillment Explained

Micro-fulfillment is a logistics strategy that helps retailers soak up intensifying customer appetite for on-demand, e-commerce experiences, while protecting margin and feasibility by reducing or containing last-mile costs.

Micro-Fulfillment Enables Retailers To Provide Service Options Such As:

- Curbside pickup
- In-store pickup (BOPIS)
- 60-minute delivery
- Same-day home delivery
- Two-days-or-less delivery

Instead of a few vast, out-of-town distribution centers, micro-fulfillment centralizes fulfillment via smaller, hyperlocal micro-fulfillment centers (MFCs).

MFCs can be purpose-built, customerless "dark stores", or back-of-store environments adapted for rapid, high-volume pick, pack, and ship operations away from in-store customer environments.

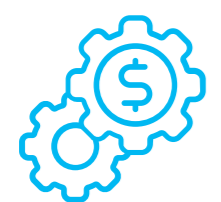


MFC Rollout Means Big Wins Besides Competing on Service



Boost Ops Efficiency

MFC's inventory is separate from the inventory of the retail floor, creating a different and more efficient process for online ordering.



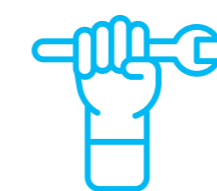
Lower Pick-and-Pack Costs

Typical cost-per-order is \$10-\$15 with store fulfillment. MFCs bring manual picking costs down to around \$3 — \$5.^[3]



Better Inventory Management

Dark stores and MFCs improve inventory and same-day replenishment efficiency, reducing risk of stock-outs while improving availability and real time visibility.



Reduce Labor Costs

No walk-in customers means reduced processing times and leaner inventory management, reducing MFC labor costs further.

Micro-Fulfillment Maturity in Grocery

Even before COVID, the disruptor, customers were sending clear signals of a shift in appetite for omni-channel retail. Some of the world's most prominent retailers noticed, making early moves.

Blue Yonder saw this as a need and built Adaptive Fulfillment and Warehousing, which focuses on scaling MFCs and the capabilities required to do so.



Pre-pandemic

The market size of the Online Grocery Sales industry in the U.S. has grown 17.4% per year on average between 2017 and 2022.^[4]



Mid-pandemic

In 2020, pandemic factors drove demand for online groceries worth 63.9% in e-commerce grocery sales that year.^[5]

By 2021, e-commerce sales reportedly accounted for as much as 10% of all grocery sales.^[6]



Post-pandemic

With the pandemic now over, the grocery e-commerce boom shows no letup. At the current pace of rollout, there's set to be one micro-fulfillment center (MFC) for every 4,000 grocery stores in the U.S.^[7]

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2009–

UK supermarket giant, Tesco opens its first two customerless "dark stores" in Croydon and Aylesford, UK,^[8] with capacity for handling somewhere in the ballpark of 8,000 orders per week, with a 500-strong workforce and around 200 active at any given time.

2018–

The Kroger Company signs an exclusive deal with robotics innovator, Ocado, also buying a 5% stake worth \$183 million. In 2018, the pair would launch three next-gen micro-fulfillment warehouses in 2018 kitted with Ocado's automated fulfillment robotics, and a total of 20 new MFCs over the next three years.^[9]

2020–

Ahold Delhaize builds MFC infrastructure with fulfillment capacity of 15,000 orders per week in Philadelphia. Their online sales increased by 67.4%. Global News Wire reports that "the hive robotic technology for the new MFC includes the AutoStore storage and retrieval system, empowered by Swisslog's SynQ software and pick stations, as well as Peapod Digital Labs' proprietary manual picking capabilities."^[10]

2020–

Instacart partners with Fabric and Alert Innovation and raises \$265m to support expansion of micro-fulfillment automation, with plans for 50 MFCs throughout the US. Combining tech from both Fabric and Instacart, fulfillment teams would be able to navigate spaces custom-optimized to pick, pack and rapid-deliver groceries to doorstep or even curbside.^[11]

How Much Do MFCs Cost To Roll Out?

According to Marc Wulfraat, President of MWPVL International, a 12,000 sq. ft. MFC costs around \$5m.

How MFC Rollouts Mitigate Last-Mile Costs

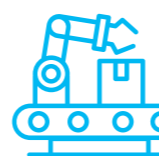
Notoriously, last-mile costs have historically made up the bulk of total supply chain costs.^[11] But the MFC model is proving its worth in rebalancing the scales.



Utilizing unused space: Some retailers are even opting to open MFCs in small spaces such as basements, garages, or parking lots, allowing for more product volume per square foot.



Localized data: MFCs help retailers gather laser-focused insight into customer preferences and expected orders, allowing significant optimization of SKU lines, inventory management and order orchestration.



Robotics and automation: Whether partially staffed or fully automated, MFCs speed up picking and packing for more agile fulfillment, order orchestration, and customer satisfaction.



Closer to demand hubs: MFCs are moving to densely populated hubs and/or urban areas, reducing last-mile costs and fulfillment time (curbside, BOPIS, home ship).



Smaller facility size: MFC footprint is typically between 10,000 and 20,000 square feet owing to space constraints in urban areas. This means lower fixed costs such as rent payments, utilities, and insurance.

The Lockdown Pivot to Fast Groceries Cemented New Customer Attitudes

By now, it's no secret that lockdown-stricken consumers the world over "clicked" rather than "collected" couriered takeout and home-delivered groceries.



The pre-internet generation leveled up and became tech-savvy, taking to online to satisfy needs and also wants. Temporary logistics workarounds for fulfilling them are becoming permanent omni-channel expectations.

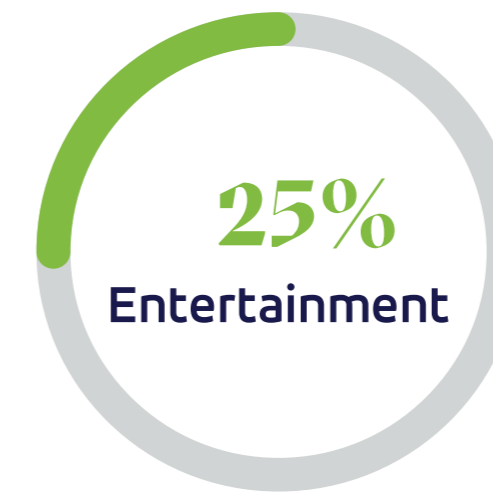
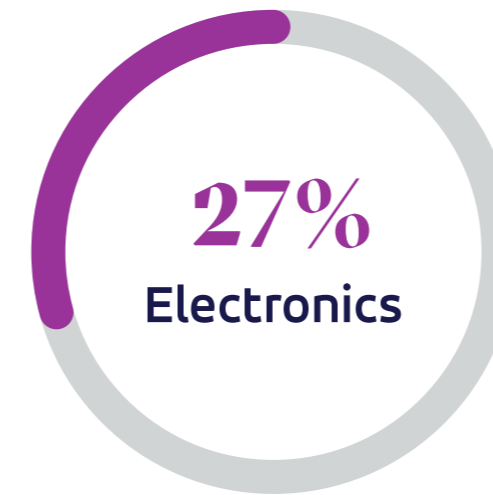
To put the post-pandemic shift in consumer habits in context: Baby Boomers (who are expected to control over 70% of the spending

power in the U.S. over the next few years^[13]) were the fastest growing e-commerce demographic back in 2021.^[12]

This trend hasn't reversed. Today, a quarter of Baby Boomers still prefer to buy all kinds of goods online, besides just groceries, according to a 2023 study by Klarna.^[14]

Besides Groceries, What Else Are Boomers Buying Online Post-Pandemic?

According to a study from e-commerce credit giant Klarna, a quarter of Baby Boomers are choosing online channels for making purchases of items ranging from electronics and entertainment, to fashion and apparel.



Consumers Are Paying For Speed, but Retail Hasn't Kept Pace

Same-day:

41%

of consumer are willing to pay extra for same-day delivery^[16]

1 – 2 hours:

24%

say they'll pay more for delivery within one or two hours of chosen slots^[15]



COVID Boomed and Busted Micro-Fulfillment

Paradoxically, the same event that lit up omni-channel demand also triggered critical challenges to scaling micro-fulfillment capabilities. Despite the boom in demand, MFC rollout and operations were slowed by restrictions and supply chain disruptions.

To add to complications, the pandemic pivot to e-commerce groceries wasn't without in-store friction. Grocery teams worked tirelessly around the clock, with store-based pick-and-pack operations cluttering grocery aisles, frustrating the in-store customer experience. The on-the-fly store-based fulfillment of the pandemic lacked [fulfillment tech innovations that are now available.](#)

3 minutes



From "Fulfillment Workaround" to "Micro-Fulfillment Strategy"

Now, the COVID e-commerce grocery workaround has hardened into a dedicated micro-fulfillment strategy for accelerating out of the pandemic in lockstep with new consumer preferences.

Alongside next-gen fulfillment technologies such as [Blue Yonder's Adaptive Fulfillment and Warehousing](#), MFCs are providing the centerpiece infrastructure for scaling micro-fulfillment.

The in-store pick-and-pack operations that stretched regular grocery store teams while cluttering customer aisles have moved into customerless MFCs and "dark stores". These can be standalone, or attached to back-of-store environments, away from browsing customers.

What Blue Yonder's Adaptive Fulfillment and Warehousing represents is a shift away from legacy approaches of inflexible, monolithic fulfillment architecture, to a complimentary, composable approach for dovetailing with and expanding existing capabilities without disruption.

Exposing the Unprofitability of Monolithic Fulfillment Architecture

Let's revisit the period in early 2020. What the pandemic exposed was a chronic lack of access to store inventory visibility, availability, and capacity for the omni-channel e-commerce movement of goods.

Since the pandemic, many retailers have been forced to pivot quickly to on-the-fly omni-channel fulfillment strategies in order to soak up the influx of demand for online operations, but it hasn't been easy.

The reason? It comes down to the very nature of retail's monolithic, digital infrastructures. Individual applications — whether ERP, planning, assortment, or order management systems (OMS) — were built for a single purpose, making customization near-impossible.

From "Fulfillment Workaround" to "Micro-Fulfillment Strategy"

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(Continued)

Implementing system upgrades was and still is a major challenge with traditional architecture. Retailers were forced to choose between the cost of redesigning systems from the ground up, or sacrificing innovation and relevance for preserving stability.

To make things worse, even negligible new requirements for changes to architecture meant developing completely new applications. Time, money, and effort have always been at a premium when it comes to rethinking these inflexible, complicated, and specialized applications.

Competing on Service No Longer Means Compromising on Profit

For hardline, softline, grocery, and big-box retailers weighing up their options for scaling MFC architecture rollouts, Blue Yonder's Adaptive Fulfillment and Warehousing puts an end to the era of monolithic architecture, and paves the way for rapid scaling of near-customer e-commerce.

With Blue Yonder's composable, SaaS-based architecture, micro-fulfillment is no longer about tradeoffs between profit and customer satisfaction. Now, it can be about both — competing on service while sustaining margin and profit.



Positioning Offerings Closer to Customers Has Never Been More Viable

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Boost customer satisfaction

improve customer satisfaction levels and attain OTIF of 99+%



Scale MFCs rapidly

with time-to-value in weeks for pilot sites, and days for subsequent activations



Optimize fulfillment efficiency

and reduce fulfillment expenses up to 10%

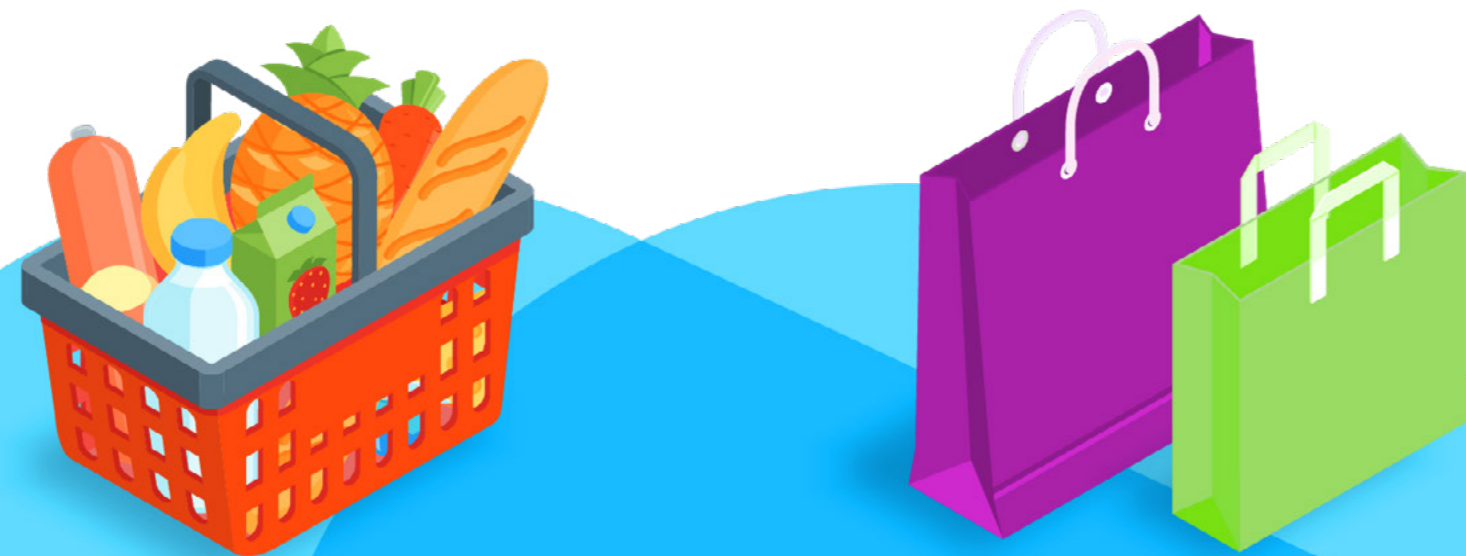


Supercharge inventory efficiency

while reducing inventory costs by up to 15%

Grocery Had To Find Workarounds, Now the Rest of Retail Doesn't Have To

Thanks to the boom in remote working and restrictions on restaurant dining, food and grocery retail's share of e-commerce volume surged during COVID, along with cleaning and household products.



Meanwhile, non-grocery brands such as “social” retailers — associated with leisure, personal care, and commuting purchases — lost out to disruptive pandemic factors.

The Stage is Set for Next-Gen E-commerce and Micro-Fulfillment

With the pandemic in the rearview mirror, the stage is set for hardline and big-box retailers intent on pursuing micro-fulfillment maturity.

The Six Stages of Micro-Fulfillment Maturity

According to Tomorrow Retail Consulting CEO Jordan Berke — also one of the forces behind Walmart's e-commerce expansion in China — there are six stages in the micro-fulfillment maturity curve.^[17]

Stage 1: In-Store Picking

 1 — 50 daily orders

Just as customers would, fulfillment teams pick orders from store aisles.

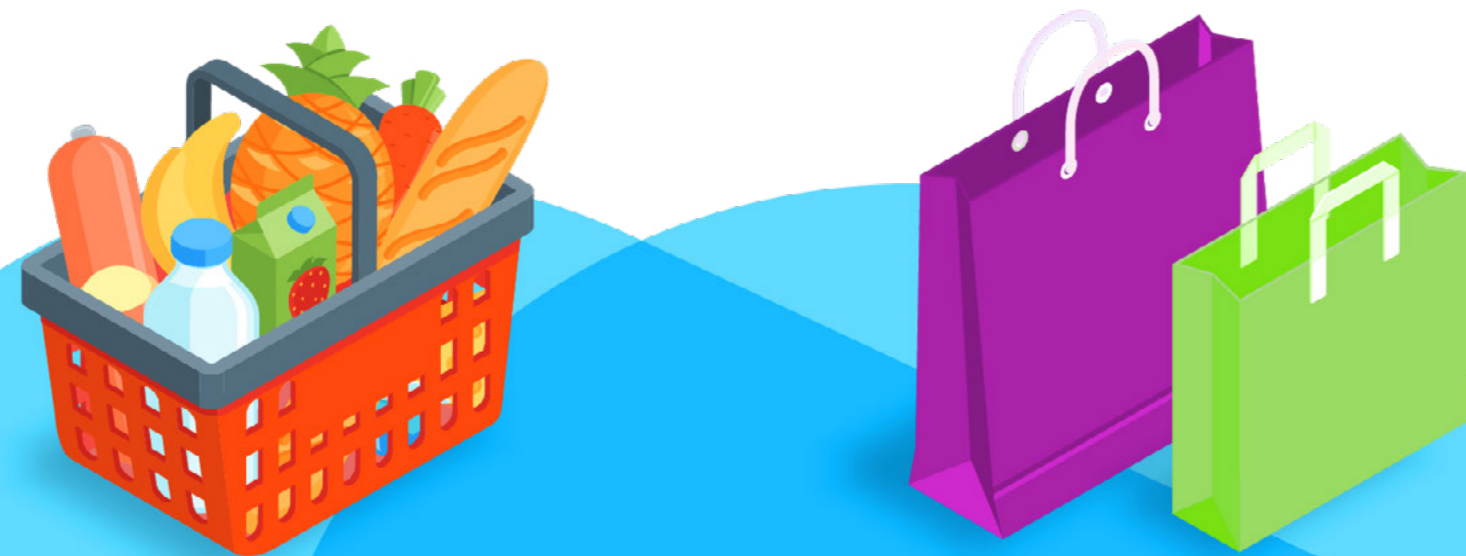
Stage 2: Enhanced In-Store Picking

  51 — 150 daily orders

Like regular in-store picking, with [added automation for inventory tracking, work orchestration and time to value.](#)

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(Continued)

Stage 3: Dedicated In-Store Manual Picking

 151 — 250 daily orders

Fulfillment of fastest-moving goods shifts into a dedicated space, away from customers.

Stage 4: Dedicated In-Store Picking With Automation

 251 — 500 daily orders

Now partial or full automation comes into play, with [next-gen micro-fulfillment systems](#) and robotics.

Stage 5: Dark Stores

 500 — 1000 daily orders

"Dark stores" take micro-fulfillment out of customer environments with dedicated layouts and [smart systems for maximum efficiency](#).

Stage 6: Automated Dark Stores

 1000+ daily orders

Fully-automated as either dedicated MFC facilities or attached back-of-store warehouses using [full SaaS-Native integration](#).

Blue Yonder's Adaptive Fulfillment & Warehousing

Omni-channel micro-fulfillment services you pick, choose, and scale.

For retailers intent on maturing and scaling micro-fulfillment architecture, Blue Yonder's Adaptive Fulfillment and Warehousing offers a "microservice" approach for iteratively scaling fulfillment capabilities from store, stockroom, and MFCs, solving key challenges one at a time, without replacing existing architecture.



Activate MFC Sites Faster

With time-to-value measured in weeks for a pilot site and days for subsequent activities.



Deal With Labor Uncertainty

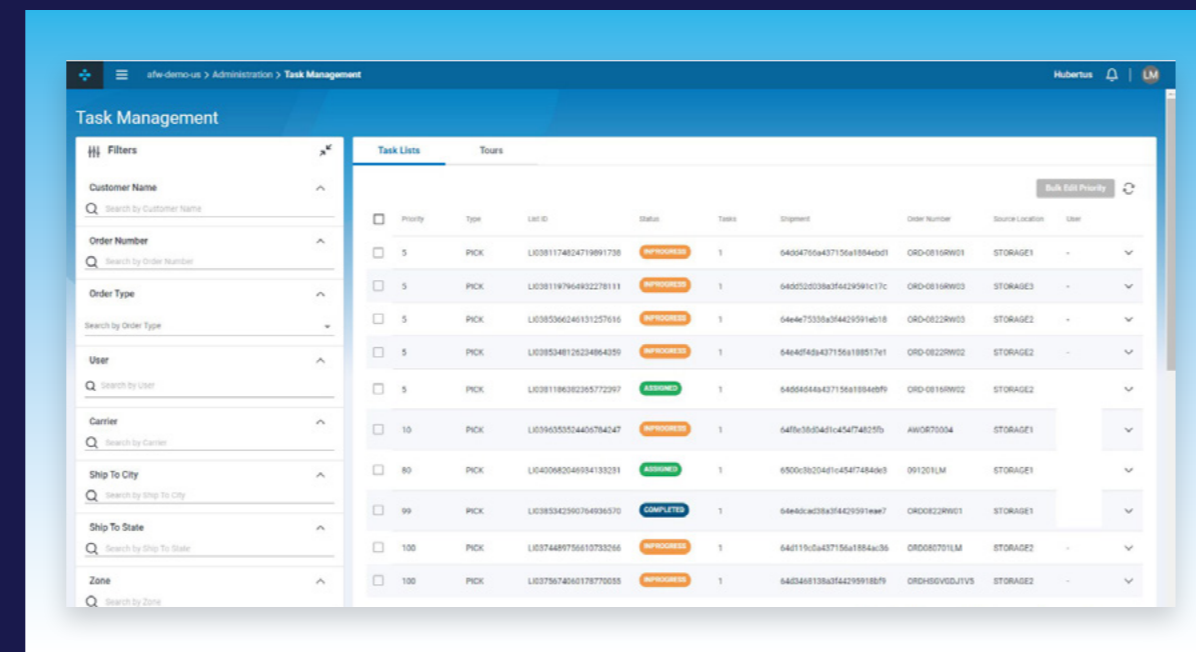
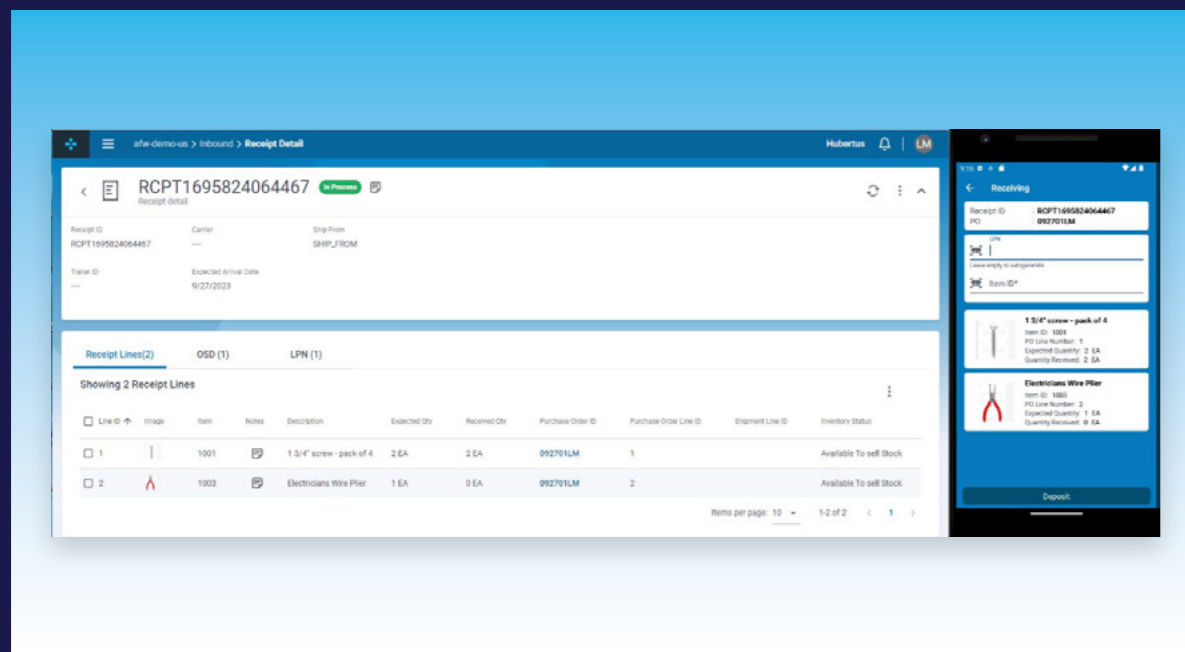
With intuitive, rapid new-staff onboarding and reduced reliance on tenured MFC staff.



Better Competition on Service

With diverse, omni-channel options and agility to always deliver on promise.

With e-commerce sales having doubled in the past five years — and set almost to double again by 2026^[18] — retailers caught in a state of indecision risk missing the window of opportunity.



Inbound Processing

- ✓ Check In
- ✓ Truck Unloading
- ✓ Purchase Orders
- ✓ Inbound Receipt Verification
- ✓ Directed Storage
- ✓ Undirected Receiving
- ✓ LPN level ASNs
- ✓ Cross-Dock
- ✓ Rapid Receiving

[Ask an expert about this →](#)

Workforce Management

- ✓ Labor Tracking
- ✓ Role and Equipment Assignment
- ✓ Dynamic Tour Build Creation

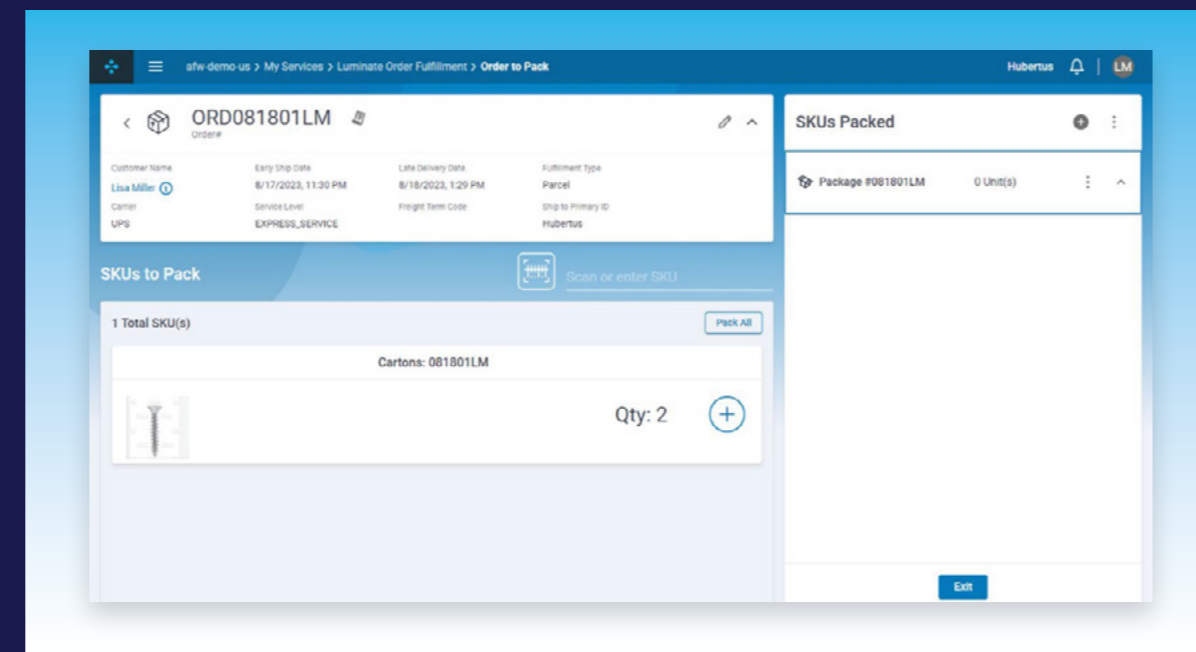
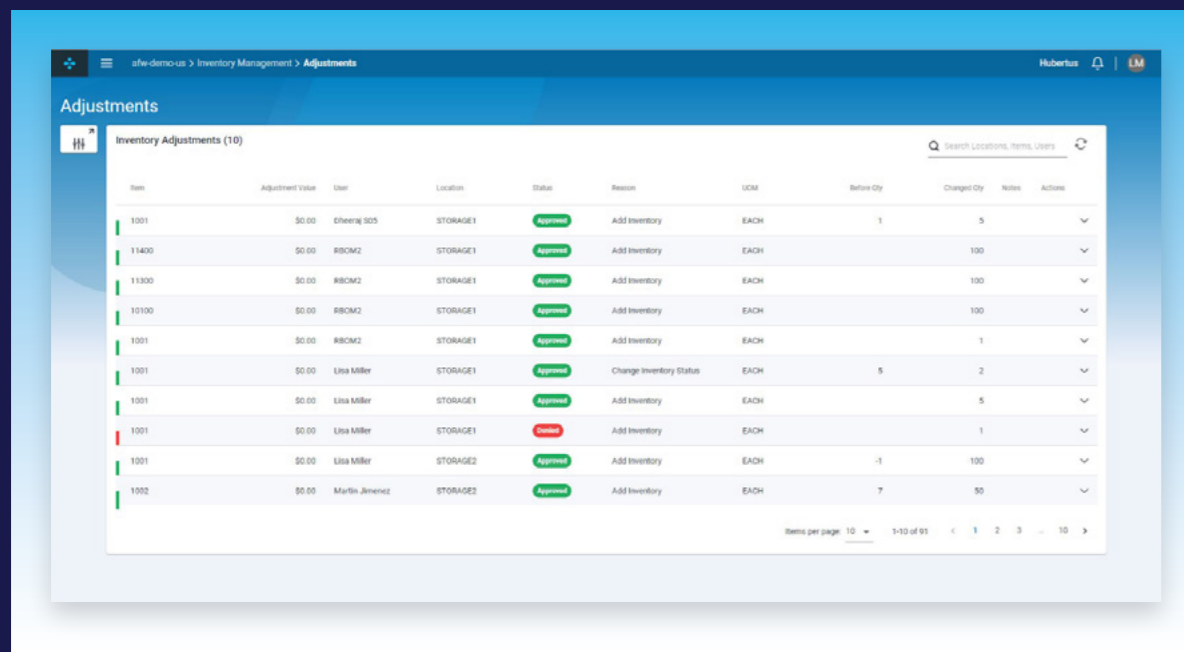
[Ask an expert about this →](#)

Personalized Workflows

- ✓ Modify existing mobile screens with mobile builder toolkit
- ✓ Custom-create workflows built rich API foundation
- ✓ Extensions seamlessly auto-upgraded

[Ask an expert about this →](#)

With e-commerce sales having doubled in the past five years — and set almost to double again by 2026^[18] — retailers caught in a state of indecision risk missing the window of opportunity.



All network strategies lead to omni-channel fulfillment, giving rise to last-mile sites including stores. AFW is a great custom-built solution for specifically solving those last-mile needs and challenges.



” Chirag Modi

Inventory Visibility & Control

- ✔ Inventory Adjustments & Approvals
- ✔ Cycle Counting
- ✔ Serialization
- ✔ Inventory Attributes
- ✔ Directed ABC Cycle Counting
- ✔ Multi-Client Inventory

[Ask an expert about this →](#)

Pick, Pack and Ship

- ✔ End-to-End Order Execution Visibility
- ✔ Extensible Mobile Fulfillment Pack Station
- ✔ Truck Load Shipping
- ✔ Curbside Pickup
- ✔ Picking Processes
- ✔ Last-Mile Integration
- ✔ Multi-Order Picking
- ✔ Rapid Outbound

[Ask an expert about this →](#)

Micro-Fulfillment Isn't a Bolt-On, It's a Centerpiece Strategy

The micro-fulfillment evolution of e-commerce is a strategic move to remain indispensable to the customer in a fast-shifting retail paradigm. Micro-fulfillment feasibility is no longer speculative.

Retailers conscious of this shift are creating ever-deeper levels of engagement — both online and offline — following grocery retail's lead, and scoring big in the process. And they're doing it fast, with commitments into micro-fulfillment and digitally-driven commerce that represent a total step-change.

The Perfect Storm of Micro-Fulfillment Motivators

Some of the Forces Driving E-Commerce Evolution Toward Micro-Fulfillment



Urbanization

More and more rural populations are undergoing economic migration into urban areas



Warehouse Space

Vacancy rates reached historic lows in 2020^[19]



Labor Challenges

Retail fulfillment turnover rates annually are typically over 60%^[20]



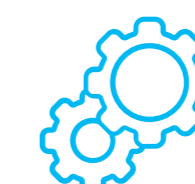
Post-Pandemic Trends

56% of consumers aged 18 — 34 expect same-day delivery^[21]



SKU Proliferation

Inventory and product lines are ever-more complex and diverse



Last-Mile

Last-mile costs make up almost half of all supply chain costs^[12]

Hardline Retail Brands Backing Micro-Fulfillment

Influential industry figures are encouraging non-grocery retail to make the move into micro-fulfillment. In one of countless Forbes publications, renowned global retail consultant, Brittain Ladd, signaled his backing for micro-fulfillment amid the pandemic in 2021.

I believe specialty retailers, department stores, warehouse clubs, and big-box retailers can all benefit from the use of micro-fulfillment.



Brittain Ladd

Strategy Advisor, Shatranj Capital Partners

Walgreens Boots Alliance *Walgreens*

- **2021:** Walgreens buys majority stake in pharmaceutical fulfillment tech innovator, iA, to support automated micro-fulfillment in its Phoenix and Dallas MFCs^[22]
- **2023:** Walgreens operates a total of nine automated micro-fulfillment centers to fill prescriptions and ease pharmacist workloads^[23]
- **By 2025:** Walgreens anticipates 22 pharmacy micro-fulfillment centers across the U.S.^[24] for eliminating excess inventory, with plans to leverage similar facilities for micro-fulfillment of diverse retail products

Target

- According to Bloomberg, Target has committed \$100 million to developing six new package sorting centers in a push to expand next-day delivery capability. The new hubs are planned to be fully operational by 2026, Target said in a statement on February 22nd 2023^[25]
- The new sorting centers will expand Target's strategy of using stores for online-order fulfillment as it vies with Amazon and Walmart for market share
- Target's new micro-fulfillment centers will double delivery volume to more than 50 million packages in 2023, with more and more items delivered to shoppers next-day^[25]

Fewer and Fewer Reasons To Hold Back

Despite the unrelenting surge in micro-fulfillment demand post-pandemic, some retailers are holding back, nervous about cost and scalability. The reality is that both of these feasibility factors are now easily mitigated by SaaS-native approaches to moving the needle on accuracy and efficiency across all MFC operations.

“Extend”, Not “Replace”: Maturing Existing Fulfillment Architecture

For retailers nervous of ripping out valuable, established fulfillment systems, Blue Yonder’s Adaptive Fulfillment and Warehousing offers a SaaS-native, augmentative approach that extends, rather than replaces, existing architecture and systems to reduce risk and ensure faster time-to-value.



Foundational, intuitive fulfillment solution, with real-time inbound and outbound inventory visibility and mobile-based interface for rapid actions, onboarding, and results



Zero-code, seamless integrations into the Blue Yonder Platform, for easily scaling fulfillment capability up- and downstream in the supply chain



Extensible and flexible personalization of any dashboard and mobile workflows to flex micro-fulfillment capabilities as operational scenarios evolve



Rapid deployment, seamless upgrades, with composable, SaaS-native microservices, you can pick, mix and plug right into your existing architecture for faster time-to-value and reduced or eliminated IT overheads



Managing micro-fulfillment centers requires a different set up of processes and technology. The best solutions will not only provide the flexibility to meet increasing consumer requirements, but also offer retailers the ability to fulfill orders profitably in locations near the consumers. As retailers across grocery, softlines and hardlines pivot from a just-in-time to a just-in-case supply chain, micro-fulfillment locations should be a centerpiece of the network.



Shannon Wu-Lebron
Corporate VP, Global Retail Industry Strategy



Responding to continuing e-commerce demand, the number of micro-fulfillment centers will continue to expand in the next few years. With Adaptive Fulfillment and Warehousing, rapidly activating new sites and onboarding staff is simplified. The digital transformation of the facility ensures real-time inventory accuracy, improving order fulfillment accuracy and improving the customer experience.



Terence Leung
Senior Director, Product Marketing, Blue Yonder

How Blue Yonder Adaptive Fulfillment and Warehousing Is Transforming Micro-Fulfillment

Electronics

One of the largest electronics retailers in Europe was seeking a solution that would support their urban hub sites between their distribution centers and their retail stores. AFW was selected as the solution to meet the needs.

Despite an aggressive schedule as well as scope changes, the first site was implemented in 15 weeks. The next two sites averaged one week to deploy and the customer's team were trained to manage future rollouts.

Fashion & Apparel

This market-leading fashion and apparel brand was looking for a store fulfillment solution that would be easy to implement and adopt by their associates. AFW was selected to help them transition from a manual system to a modern, digital solution that provided a consistency of operation across stores and increased labor efficiency.

Industrial Distribution

One of the largest industrial distributors selected AFW for their MFCs and store operations. Thanks to the adaptive nature of AFW this distributor was able to configure AFW to support both use cases both in a large facility with simpler processes and functionally scaled down to retail store operations. AFW has been built on Blue Yonder's platform, allowing it to technically scale so customers can deploy 400+ DCs and stores without concerns about performance or volume implications.

Ready to Place Omni-Fulfillment and Experience Closer to Customers?

To get started, visit <https://blueyonder.com/solutions/adaptive-fulfillment-and-warehousing> and speak with a Blue Yonder expert.

They'll answer any questions on how best to implement Blue Yonder's Adaptive Fulfillment and Warehousing, to achieve faster MFC rollouts and time-to-value (TTV).



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