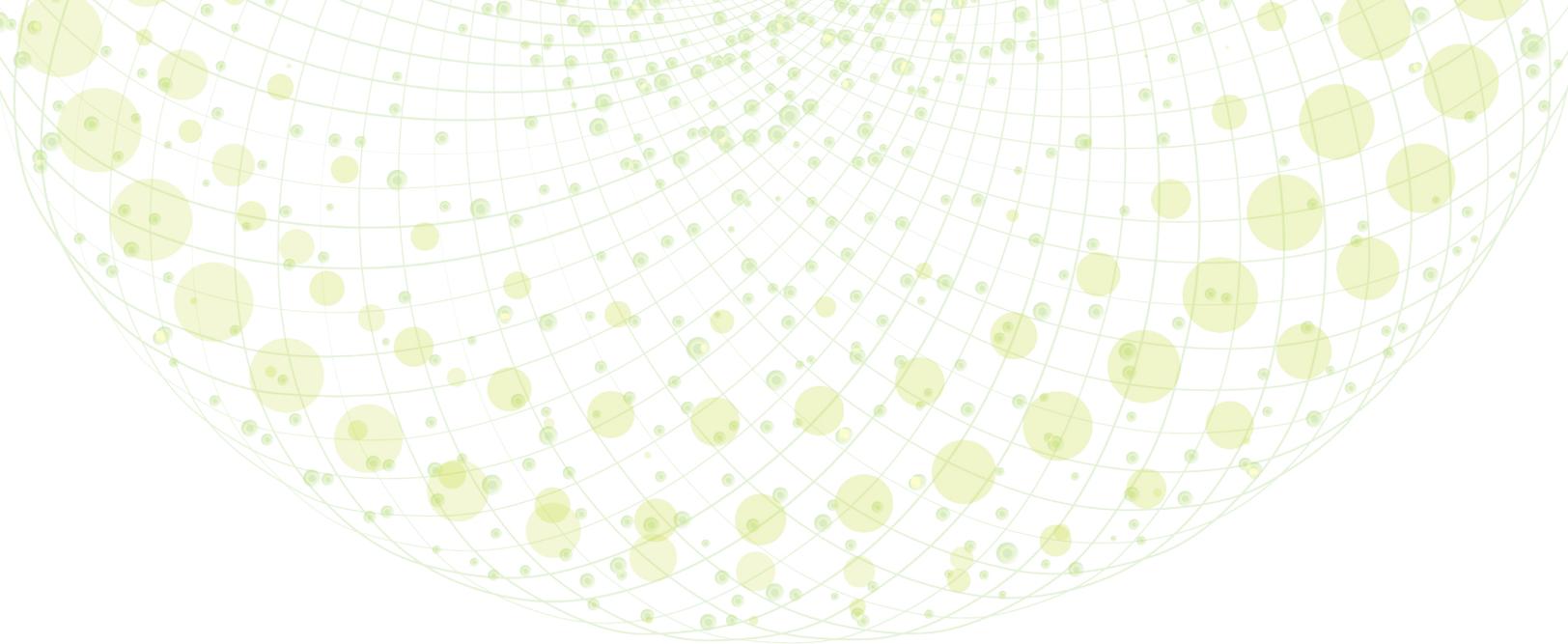


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## **What retail technology has in store**

Shaping the physical  
retail experience



**Retailers have replaced the upheavals of the COVID-19 pandemic—social distancing, rapid shifts in shopping behaviors, and supply chain fluctuations—with new worries in 2023: Supply chain challenges refuse to abate, and customers are increasingly value conscious as inflationary pressures impact wallets.** In this environment, leading retailers are evaluating the future of their physical retail stores and the retail technology investments that can help them stay competitive. Conditioned to interact with retailers in multiple channels, customers now expect product pricing, availability, and detailed information at a glance, and—notwithstanding supply chain backups—orders readily available for pickup or delivery. However, customers are not avoiding the store entirely as many did during the height of the pandemic; contrary to some predictions, consumers are far from ready to do all their shopping on retail apps and websites. As in-person shopping and consumers’ appetites for immediacy increases, retailers are responding by simultaneously enhancing existing physical retail stores and opening new ones with increased in-store and curbside offerings as quickly as the tight labor market allows.

Consumers’ expectations around how they interact with stores at which they shop—from ready product visibility and streamlined checkout in the store to a full range of curbside and delivery options beyond the four physical walls—are straining existing capabilities and challenging physical retail orthodoxies. To capitalize on these changing expectations and retain their footing, retailers need to execute for today while innovating for tomorrow—navigating the intersection of store strategy, operational excellence, effective talent management, data, and enabling store technology.

Retailers need to challenge the one-size-fits-all approach to their physical retail stores. Using a single layout or set of offerings will rarely match the needs of customers across geographies or demographics. Industry leaders are rethinking store formats and service capabilities, modifying to serve customers where and how they want to shop. Retailers need to optimize and standardize activities to drive efficiencies and maximize time allocated to create customer value while also attracting, training, and empowering their workforces to deliver “moments that matter” for their customers. And finally, the focus of this brief: They can leverage emerging technological innovation and a store technology platform to support business objectives to enable the future vision of the physical retail store and how work is done.

# A new tech platform underpinning the brick-and-mortar of today... and tomorrow

Leading retailers are taking advantage of marketplace shifts and new store technology to position themselves as shoppers' go-to, all-in-one destinations. Catering to a customer's full set of needs in a single visit has prompted retailers to reconsider their medium- to long-term strategies in three areas: customer experience, associate experience, and operational excellence. Most retailers will require investing in next-generation retail technology solutions across all three to emerge as all-in-one destinations.

## Associate experience (AX)

Drive key **AX/CX intercepts** and **develop dynamic solutions** that simultaneously **maximize the experience** for both



### "Smart" task management

Machine learning-driven decision engines to prioritize, allocate, and measure tasks



### Labor optimization

Labor forecasting decisions, with more visibility into associate productivity



### Gig workforce

Retailers are utilizing temporary third-party workers to help meet demanding staffing needs

## Operational transformation

Drive value through effective and efficient **operational execution, cost savings,** and a strong associate experience



### Real-time inventory management

Accurate and full visibility of inventory levels across channels



### Enhanced fresh for everyone

Advanced visibility into product freshness with real-time tracking



### Dynamic pricing

Electronic shelf labels display real-time price based on priority supply/demand indicators

## Customer experience (CX)

Deliver an **enhanced customer experience**, informed by observed customer behavior and associate intercepts



### Friction-free checkout

Seamless and low-touch alternate checkout through next-gen POS



### Personalized recommendations

Customer analytics and in-store tech to deliver highly personalized recommendations



### Synchronized loyalty profiles

Synchronized loyalty profiles, including preferences, offers, and transactions

However, one way to a successful evolution is avoiding getting caught in the trap of investing in a use-case-driven approach. Instead, retailers should develop a holistic view of enabling capabilities that need to be delivered through retail technology. Investments must support a necessary set of enabling technologies that power the improved experiences and operations that reinforce the overall customer journey, associate experience, and business strategy. Retailers need to fundamentally transform the speed, ease, and economics of how they deliver solutions to stores.

# The store ecosystem and core-enabling technologies

Advancements in foundational technology are enabling retailers to operate their stores in ways that were impossible 10 years ago. Rather than build one-off technology solutions for specific use cases, however, retailers should equip their stores to prepare for—and adapt to—changes that both can and cannot be anticipated today. We believe that by investing in a reliable infrastructure and distributed data platform now, retailers can reduce complexity, inertia, and costs in the long term. In turn, they'll be able to activate new real-time solutions that impact associate experience, customer experience, and the bottom line. Retailers should build a scalable and flexible ecosystem with strong foundational capabilities that support current and future experiences.



The store ecosystem of the future will use multiple enabling technologies to deliver increased value. Here we outline four that we believe will be integral: artificial intelligence, internet of things (IoT), digital integration, and edge computing/5G.

## Artificial intelligence

Artificial intelligence (AI) is the theory and development of computer systems capable of performing tasks normally requiring human intelligence. These tasks include an ability to learn and act, often autonomously, from large volumes of structured and unstructured data, utilizing various learning methods and approaches (supervised, unsupervised, and reinforcement). AI encompasses several capabilities, including computer vision and machine learning.

- **Computer vision:** Many retailers are investing in computer vision, which is observing, capturing, and processing images and/or videos to drive insights and shape customer behavior. It can assist retailers with enhancing actionable decisions across areas such as customer/employee tracking, inventory management, and risk management.
- **Machine learning:** Retailers are also reaping the benefits of technology-driven predictions to make decisions, including those around associate experience. Whether evaluating associate productivity to determine areas of the store that will need additional attention, mining sales data to execute demand forecasting, or analyzing store traffic to optimize labor forecasting, machine learning lets stores anticipate—rather than react to—needs.

## IoT

Linked smart sensors enable store teams to gather real-time targeted data on customer traffic, inventory positions, and associate productivity, among other information. Data collected from sensors generates staff, product, and visitor metrics but offers little real-time actionability without additional infrastructure. IoT-based monitoring is the connection that enables stores to react on time: It analyzes and integrates monitoring data and turns it into real-time decision-making tools to redirect staff actions without human input—creating better outcomes for our three enabling areas: customer experience, associate experience, and operational efficiency.

- **Beacons and sensors:** IoT devices can aid employees' efforts to serve customers in real time, alerting associates to unusual high-traffic areas in the store, moving associates across departments seamlessly and without the need for manager intervention. Integrated with a connected wearable, staff members don't even have to check their handheld devices for guidance.
- **RFID and Bluetooth tags:** Tags on consumer items can provide real-time inventory data, including balance-on-hand and backroom and salesfloor locations. Retailers have equipped employees with connected (store-owned or bring-your-own) devices that can display this information quickly and easily. When integrated with the appropriate customer-facing platforms, customers can also readily see whether an item is available and where to find it.

## Digital integration and automation

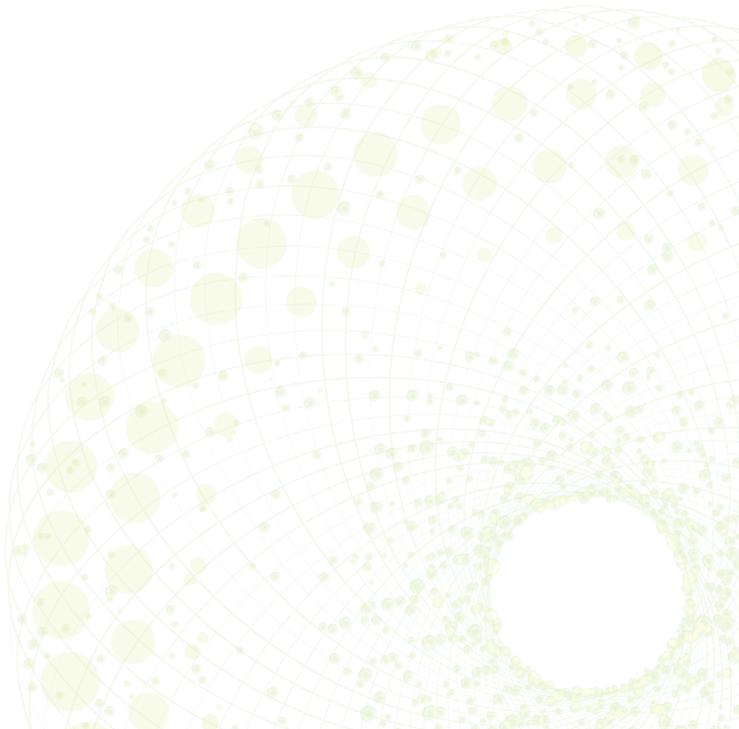
As retailers continue digital transformation efforts, new features unlock an augmented in-store experience for associates and customers. Automation can lower costs and, perhaps more importantly, free employees to focus on higher-value, customer-centric tasks.

Digital integration and automation equip stores and their associates with the ability to create a seamless customer journey, with mixed-reality features enhancing product experience—including customized recommendations and virtual demonstrations—and integrated digital/physical apps augmenting the in-store shopping journey.

- **Task management:** Technology can help retail employees prioritize work, feeding people real-time information about customer and store trends and directing staff toward higher-level value creation.
- **Robotics:** Augmenting human labor with additional in-store infrastructure, such as micro-fulfillment robotics, can increase through-put, drive higher fulfillment accuracy, and create the basis for more long-term profitability with sustainable omnichannel operating cost structures.

## Enterprise 5G and edge computing

By providing a real-time, scalable, low-latency, easily accessible platform, 5G and edge computing offer the promise of enabling a whole suite of retail innovations. From monitoring and aiding operations in real time with low latency data processing to highly responsive distributed applications, edge computing can both lower the cost of data transmission and boost reliability in execution. New and powerful telecommunications have opened the door to new and differentiated capabilities to support real-time operations at scale. As we see the number of mission-critical devices grow exponentially, so too will the importance of ensuring stores are equipped with networks with lower latency, less downtime, and higher responsiveness.



## How to enable the store for the future

The technology-aided retail enterprise needs to enable the broad set of use cases and capabilities—and encompass a scalable, flexible infrastructure and ecosystem of solution partners.

### Current state

Legacy IT infrastructure cannot support advanced use cases at scale, often being slow, unreliable, and managed on an individual store basis

### Future state

Retailers are able to integrate modern technologies to quickly deploy and scale use cases requiring low latency and high reliability



Devices and sensors

- Limited devices and sensors deployed for distinct use cases, often on as pilots rather than at scale (e.g., security cameras, temperature sensors)

- Many low-power devices and sensors sharing operational data to a single platform in real time (e.g., cameras, sensors, digital signage)
- Ability to enable multiple use cases per device/sensor, increasing ROI per device/sensor



Connectivity

- In-store network infrastructure that is outdated; usually a standard “rack and stack” environment with VM Management tools
- As a result, in-store bandwidth is constrained, limiting the ability to support low-latency use cases

- Optimize in-store server architecture to reduce in-store compute and applications; retire in-store racks and stacks
- Modernize network to enable faster, more reliable connectivity (4G/5G, Zigbee, Bluetooth)



Compute

- Centralized cloud compute with many enterprise applications, which cannot support low-latency use cases

- Portability of workloads and hybrid compute models to provide optionality for deployment between edge, data center, and cloud-based on business resiliency, performance requirements, and cost of operations
- Workloads deployed at the edge that require low-latency and/or decisioning in real-time data produced at the edge (store or DC)



Decision-making

- New use cases leverage disparate platforms and infrastructure, leading to redundancy and unnecessary IT complexity
- Reactive, human-centered decision-making (e.g., manual security footage review, manual temperature sensor monitoring)

- A common platform, based on open standards, that allows for leveraging the same infrastructure to support multiple use cases, greater agility, speed to value, and data-driven decision-making (e.g., greater data produced by a variety of sensors at the edge)
- Real-time, AI/ML-enabled decision-making across stores

Integrated compute, network, security, and container management in a full IaaS functionality at the edge

## Moving forward

To continue to accelerate and enable stores for the future, we believe retail leaders should take the following actions to ensure they move forward in a cost-effective and scalable manner:

- **Set the strategy:** Create and align on long-term ambitions and vision along with tangible business goals. Develop the guiding principles for store technology, and identify the technical gaps and inhibitors most likely to hinder the company's journey.
- **Build technology foundation:** Establish a strong technological foundation to enable store architecture strategy success. Understand the integrations and dependencies of solutions/use cases, platform services, and infrastructure—both constraints and opportunities.

- **Operationalize the strategy:** Create dedicated environment(s) to test new and in-flight retail initiatives, with strong recommendation for a “real” store. Since innovation is iterative, prototype and search for enablers via rapid testing. Pilot prototypes and gather feedback, refining offerings and then scale, pivot, or exit initiatives.

As we've said many times, the future of retail will still be grounded in physical retail stores. Retailers that win amid today's ever-shifting headwinds will prioritize near-term investments in the technology platforms and capabilities that will support their future customer, associate, and operational strategies.

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Additionally, the authors would like to thank Cody Thompson and Cam Parker for their contributions to this research.

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