The cloud as catalyst for retail

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For retailers, the cloud can do much more than reduce the cost of computing and data storage. To maximize value from cloud, retailers need to prioritize workflows that can best benefit from it. We share six opportunities for leveraging the cloud as a catalyst for accelerating delivery of business results.

Retail today is in the midst of an exciting revolution in which power has shifted from the retailer to the consumer. Consumers are influencing product trends through reviews and social media, doing extensive product research online, and expecting a seamless omnichannel experience across all touchpoints. To stay competitive, retailers face tremendous pressure to deliver new business capabilities faster. This, in turn, is shrinking retailers' already-low margins and impacting all aspects of the retail value chain.
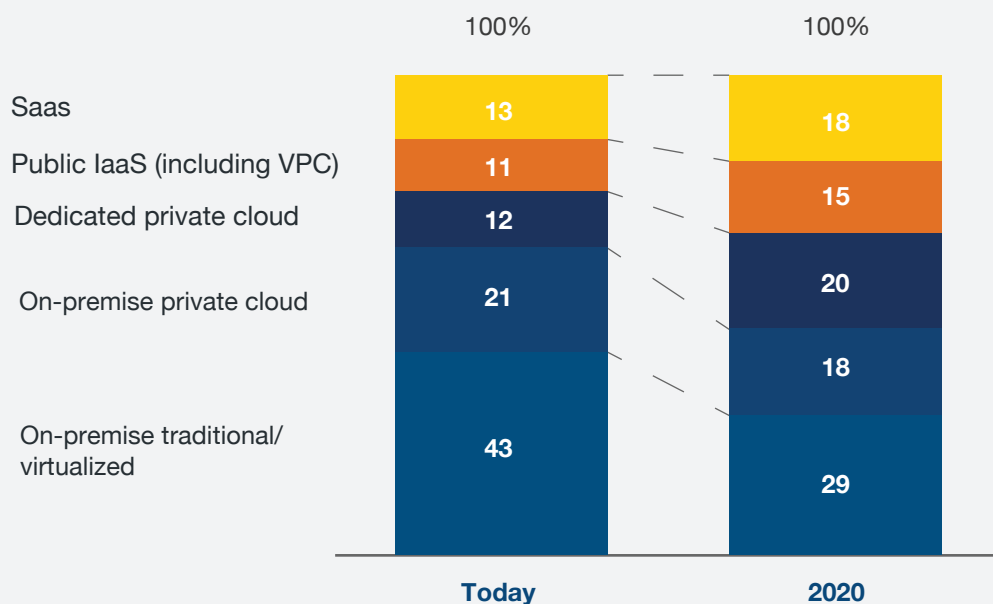
For instance, chief merchants are trying to shift rapidly from spreadsheet-based assortment and pricing to advanced-analytics-based merchandising reliant on big data as well as predictive and even prescriptive models. However, merchants are hampered by the tools at their disposal. Similarly, logistics and store operations are trying to improve consumer convenience by upgrading their operating models for picking and shipping. Businesses' demands for tech-enabled capabilities are compelling technology executives to advance/accelerate their technology-adoption schedules. An increasing number of leaders have come to recognize the critical role of the public cloud in facilitating their technological reinvention.

Cloud adoption in retail

Our interviews with more than 30 business and technology leaders, along with the findings from a global survey of 40 CIOs and IT decision makers

EXHIBIT 1   **Cloud adoption in retail varies depending on the subsector or function.**

	Today	2020
	100%	100%
Saas	13	18
Public IaaS (including VPC)	11	15
Dedicated private cloud	12	20
On-premise private cloud	21	18
On-premise traditional/virtualized	43	29

across multiple retail formats, have revealed that adoption of the cloud has not been uniform across retail subsectors or functions (Exhibit 1).

Currently, nearly one-quarter of industry workloads are in the public cloud,[1] but retailers expect that to rise to one-third in 2020. Pure-play retailers, especially the digital natives that started with a "cloud-first" approach, are taking advantage of the cloud's ability to scale as needed. But traditional retailers, burdened by their multiple, disjointed, and hard-to-abandon legacy systems, have been slower to make the transition, although most agree that migrating workloads to the cloud is both necessary and valuable. Some retailers are looking to migrate their customer-facing workloads first; others are planning to shift one function at a time.

How retail can get value from the cloud

We suggest that retailers take a journey or workflow approach to leveraging the cloud. Rather than

migrating applications en masse or randomly, they should identify their highest-impact workflows and move them first. These workflows and their corresponding applications share two key criteria: they are ideally suited to leverage advanced cloud capabilities such as big data, artificial intelligence/machine learning (AI/ML), application-programming-interface (API) platforms, and developer tools, and they will drive maximum value for customers.

Based on these two criteria, McKinsey interviewed multiple decision makers across technology and business in the retail industry to determine the workflows most ripe for cloud migration. While every organization is likely to be different in terms of value capture, ease of change management, and customer needs, these workflows are intended to serve as thought starters to inform the cloud-migration roadmap and to enable the selection of the right technology partner to support the cloud journey.

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[1] Public IaaS (including Virtual Private Cloud) and SaaS.
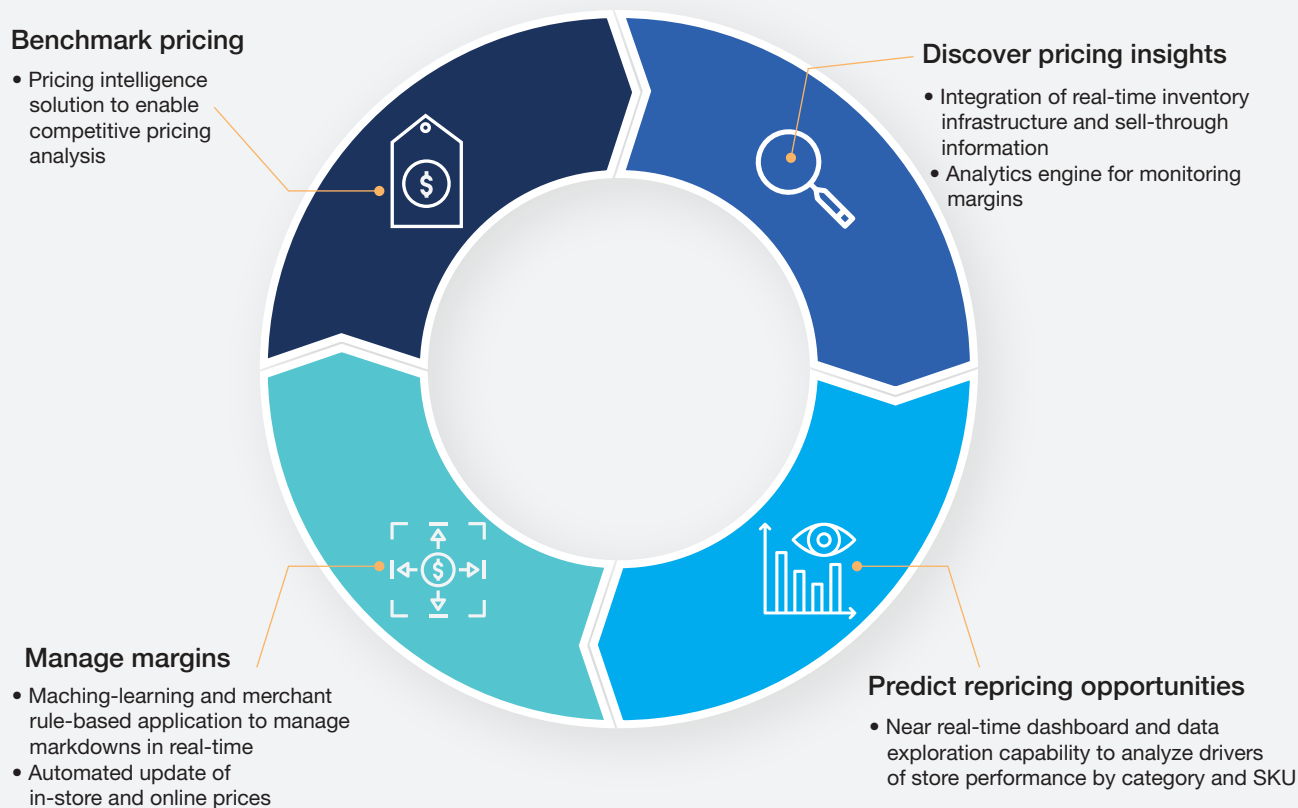
Six opportunities for impact

Our analysis of retail workflows suggests that there are six that are common across all retail subsectors and could improve performance and consumer experience if they were migrated to the cloud. Three are front-end workflows that require real-time decision making: pricing and margin management, website and recommendation-engine personalization, and loyalty-program management. The remaining three are back-end workflows: real-time inventory visibility, omnichannel order fulfillment, and inventory optimization.

1. Pricing and margin management

Pricing is a critical consideration for consumers and one of the chief merchant's most data-heavy responsibilities. It has implications for gross margin and sell-through rate and is also likely to impact transaction time. Merchants need to stay aware of competitors' prices, analyze sales history with high granularity (often at the store level), predict repricing opportunities, analyze margin and sales implications, and translate the results of these analyses into pricing in stores and on the website. Unfortunately, for most merchants this process is mostly manual. Data are frequently distributed across multiple channels with no single source of truth, making insight generation extremely cumbersome and time consuming. Merchants are beginning to work with CIO organizations and analytics leaders inside the company but are hampered by the lack of real-time analytics solutions and by data gaps. In most instances, insights are not timely, and by the time they are converted to pricing decisions and communicated to the stores, the opportunity is lost (Exhibit 2).

EXHIBIT 2   **Pricing and margin management: How cloud could help**

Benchmark pricing
- Pricing intelligence solution to enable competitive pricing analysis

Discover pricing insights
- Integration of real-time inventory infrastructure and sell-through information
- Analytics engine for monitoring margins

Manage margins
- Maching-learning and merchant rule-based application to manage markdowns in real-time
- Automated update of in-store and online prices

Predict repricing opportunities
- Near real-time dashboard and data exploration capability to analyze drivers of store performance by category and SKU

Cloud data platforms can ingest multiple sources of data and prepare them for analysis. This can save an enormous amount of time for data specialists and free them to focus on modeling. The cloud also opens up opportunities to easily integrate data from external sources and to drive insights by leveraging machine learning and analytics. Hence it is critical for decision makers to evaluate potential cloud providers carefully by determining which one can create a data platform in the shortest amount of time as well as bring intrinsic analytics and best-in-class machine-learning capabilities.

2. Website and recommendation-engine personalization

Personalization allows CMOs to ensure that the right products are shown to the right customers. The CMOs whom we interviewed emphasized that personalization has a direct correlation to incremental revenue and increased conversion rate. However, retailers are still struggling to get a 360-degree view of the customer, as this requires data reconciliation, attribution across multiple channels, and integrating with partner data sources. Moreover, as product selections and SKUs grow, showing the right set of products becomes more

EXHIBIT 3 **Website and recommendation-engine personalization: How cloud could help**

Data aggregation / curation
- Data cleansing & manipulation tools to stitch together multiple data sources
- Data mapping management
- Solution to identify customer across channels

360-degree view of customer
- Machine learning to optimize rules based on performance, recommend new rules, and A/B test new metrics based on performance

Personalized homepage
- Third-party data cross-reference capabilities
- Algorithms for sophisticated user ID attribution
- Website analytics (e.g., what's selling, browsing history) to tailor homepage for anonymous visitors

… recommendations
- Real-time integration of data between purchase history and website analytics

… and check out
- Algorithms that learn from customers' sessions and update models automatically
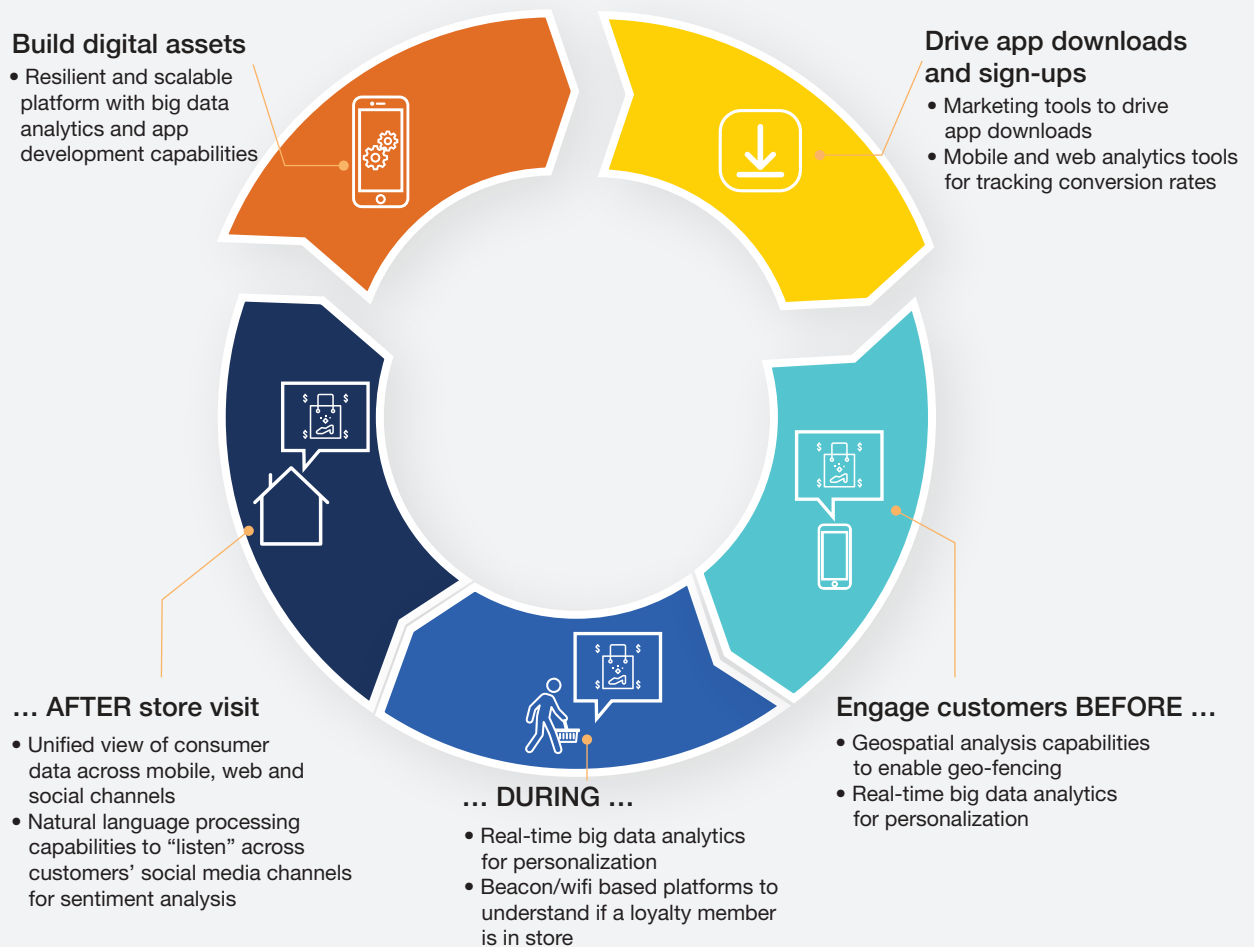- A/B testing tools to measure incremental revenue

difficult. This increases the risk of losing customers due to incorrect personalization (Exhibit 3).

Technology leaders in retail organizations are only beginning to realize the value of cloud-based data clean-up and manipulation tools that can stitch together multiple data sources. The scale of the cloud and the recommendation platforms it offers enables retailers to take action quickly, such as setting up A/B testing scenarios, validating performance, and iterating on their personalization algorithms.

3. Loyalty-program management

Company CMOs are increasingly charged not only with acquiring new customers, but with retaining loyal customers, who often make more-frequent valuable purchases and have a higher lifetime value than new customers. Loyalty programs have been a traditional tool for customer retention, but they come with challenges of their own. Customer identification across channels is difficult, and CIOs also face two significant technological hurdles: data are often siloed at the store level and are not always

EXHIBIT 4 **Loyalty program management: How cloud could help**

Build digital assets
- Resilient and scalable platform with big data analytics and app development capabilities

Drive app downloads and sign-ups
- Marketing tools to drive app downloads
- Mobile and web analytics tools for tracking conversion rates

Engage customers BEFORE …
- Geospatial analysis capabilities to enable geo-fencing
- Real-time big data analytics for personalization

… DURING …
- Real-time big data analytics for personalization
- Beacon/wifi based platforms to understand if a loyalty member is in store

… AFTER store visit
- Unified view of consumer data across mobile, web and social channels
- Natural language processing capabilities to "listen" across customers' social media channels for sentiment analysis

processed in real time. Mobile-app-based loyalty is primarily useful in engaging the consumer during the purchase process—but CMOs want to engage the consumer before, during, and after the purchase (Exhibit 4).
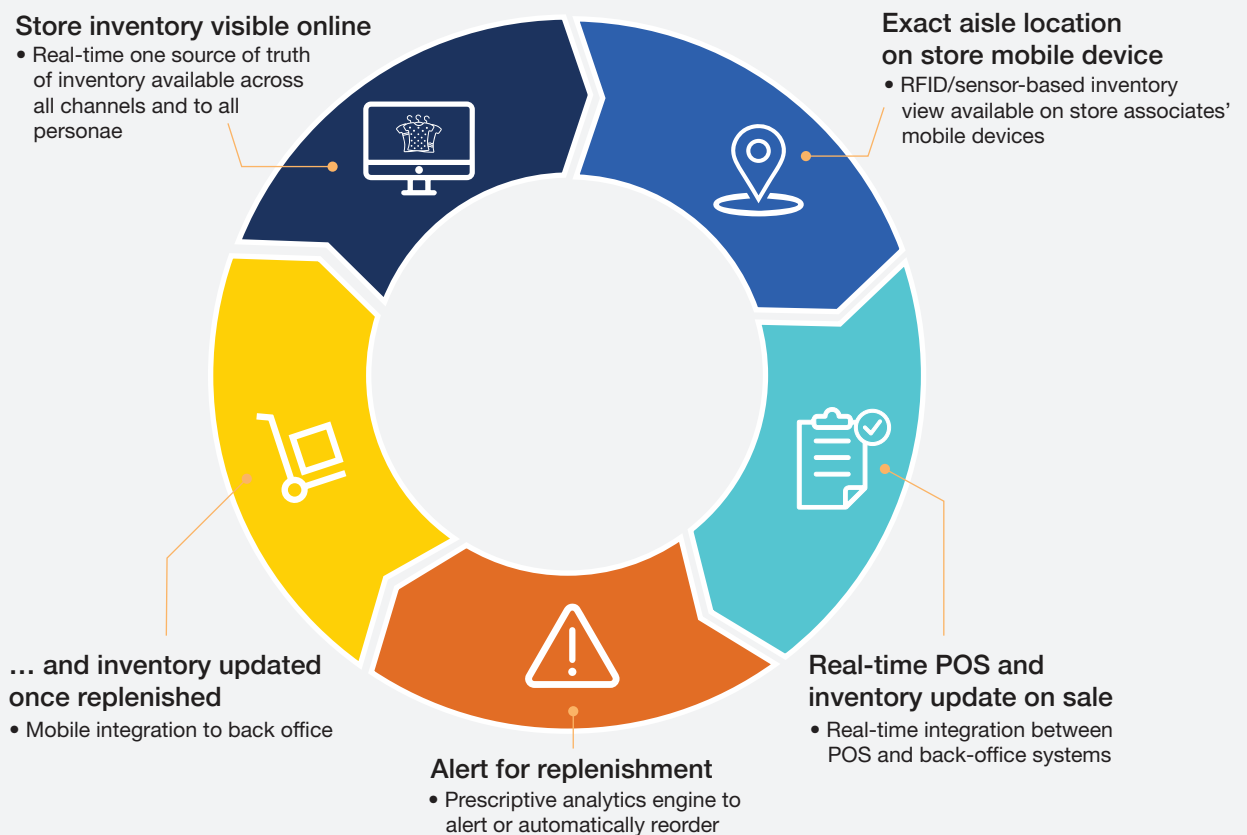
The cloud can integrate multiple data sources to enable a unified view of consumers across transactions and channels (in-store, mobile, web, and even social media). It can also power both real-time and batched data processing, thus solving both of the CIO's significant technological challenges. Furthermore, CMOs can take advantage of cloud-based capabilities to engage customers through

personalized digital promotions based on real-time big-data analytics. For example, by integrating mobile and Web analytics tools with loyalty programs, they can design the right promotions, use geospatial analysis capabilities to enable geofencing, and employ natural-language processing (NLP) for sentiment analysis. Retailers can also develop resilient and scalable loyalty apps on cloud platforms and leverage the platforms' marketing tools to drive app downloads.

4. Real-time inventory view

Real-time inventory view is one of the foundational capabilities for successful omnichannel retail.

EXHIBIT 5   **Real-time inventory view: How cloud could help**

Store inventory visible online
- Real-time one source of truth of inventory available across all channels and to all personae

Exact aisle location on store mobile device
- RFID/sensor-based inventory view available on store associates' mobile devices

Real-time POS and inventory update on sale
- Real-time integration between POS and back-office systems

Alert for replenishment
- Prescriptive analytics engine to alert or automatically reorder

… and inventory updated once replenished
- Mobile integration to back office

However, retailers are struggling to obtain this level of clarity. When a customer buys online and opts to pick up in-store, the e-commerce channel might show availability at the store, but the item might not actually be there. There are two main reasons for this: the POS and inventory systems might not have updated in real time, or the item could be in the store but not in the expected location, perhaps because in-store customers or employees have misplaced it (Exhibit 5).
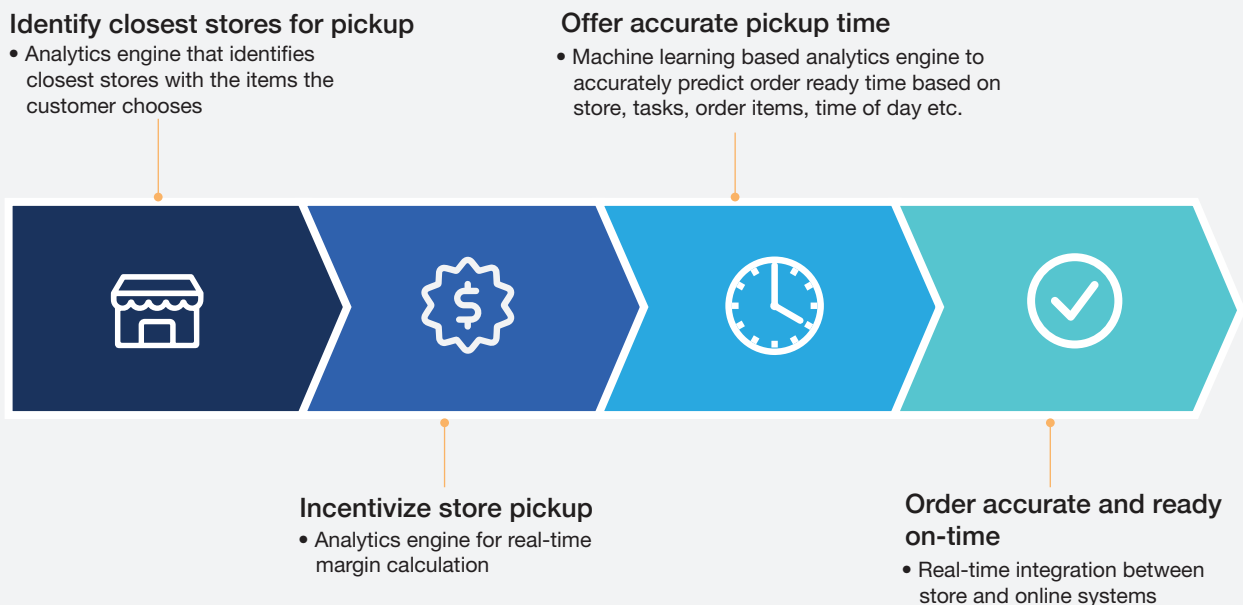
Cloud data platforms could construct a real-time single source of truth for inventory levels across all channels and all users, both customers and employees, by connecting into data pipelines and unifying all data sources with low latency and high transaction throughput. Some data platforms may even allow local-store inventory to be published to third-party e-commerce channels and search engines, thus driving additional revenue.

5. Omnichannel order fulfillment

One of the key advantages that traditional retailers enjoy over their online counterparts is their extensive store network. E-commerce leaders at traditional retailers want to leverage these store networks to fulfill customer orders faster and reduce delivery costs. But removing an item from a store to fulfill an online order could damage sales and profits for the store, especially if the item's profit margin is better at the store than in other channels. And even if customers do choose an in-store pickup,

EXHIBIT 6   **Omnichannel order fulfillment: How cloud could help**

Identify closest stores for pickup
• Analytics engine that identifies closest stores with the items the customer chooses

Offer accurate pickup time
• Machine learning based analytics engine to accurately predict order ready time based on store, tasks, order items, time of day etc.

Incentivize store pickup
• Analytics engine for real-time margin calculation

Order accurate and ready on-time
• Real-time integration between store and online systems

the online channels often can't provide accurate pickup times because they lack visibility into store operations and staffing. Retailers are trying to build analytics engines to help them make trade-offs (for example, in margin or volume) and offer customers better visibility, but they are impaired by the lack of sufficient data and talent as well as the required computing and storage capacity for making these data-heavy calculations (Exhibit 6).

Cloud platforms could come to the aid of e-commerce leaders through ML-based analytics platforms, which reduce the need to hire best-in-class data scientists and engineers or to have substantial on-premise computing and storage capacity. Furthermore, they provide the analytical

capabilities needed to identify the stores closest to the customer that carry the items the customer has chosen, real-time margin calculation comparing store pickup with warehouse shipping, and accurate order-ready-time prediction based on store, items in basket, time of day, etc. Indeed, with e-commerce sales poised to grow at around three times the rate of store sales in 2018,[2] it is imperative that retailers leverage the cloud to improve their e-commerce margins.

6. Inventory optimization

Merchants face significant challenges in managing the numerous variables involved in inventory management. The lack of accurate forecasts, limited automated solutions for consumer-packaged-goods

EXHIBIT 7   **Inventory optimization: How cloud could help**

Forecast inventory
- Analytics based inventory forecasting engine
- Automated connection to suppliers through API

Identify product promotions
- Automated process leveraging APIs to learn of supplier promotions

Identify similar products to the brand
- Analytics based engine that identifies similar products

Predict cannibalization
- Machine learning based cannibalization engine

Update order
- Automated connection between cannibalization engine and supplier through APIs

2 "NRF Forecasts Retail Sales Will Increase Between 3.8 and 4.4 Percent in 2018," Business Wire, February 2018, businesswire.com.

(CPG) promotions, seasonality of products, and unexpected consumer trends are just some of the possible failure points that can and do jeopardize inventory management. The lack of standard attributes makes it very difficult to clearly define substitutes for a retailer's product portfolio. This can lead to unanticipated cannibalization, especially during the promotion window. This manifests in excess inventory of certain products and stockouts of other products, creating inefficiencies and additional inventory costs (Exhibit 7).

Merchants, analytics, and CIOs should work hand-in-hand to leverage cloud infrastructure and analytics platforms to build both predictive and prescriptive inventory-forecasting engines to meet the challenges of optimizing inventory management. Sophisticated engines can even factor seasonality, promotions, trends, and product substitutes and complements into their forecasts. When used in

conjunction with cloud-based APIs for supplier promotion, these engines can improve the accuracy of forecasts and increase the predictability of inventory levels.

What the cloud journey could look like

Adopting the cloud is a transformative journey, and we suggest five guidelines for success:

- *Define capabilities first.* Before embarking on a cloud journey, retailers need to think about the new capabilities they want to offer their customers. They should look hard at their workflows to identify where the cloud will create the most value, examine where new capabilities will put pressure on existing infrastructure and architecture, and prioritize the changes that can provide early wins. This will allow the retailer to quickly capture value and also learn through the experience. Over time, retailers can

EXHIBIT 8   **Retailers' priority capabilities tied to Cloud stack**

Priority capabilities across retail segments

Priority capabilities across retail segments	Cloud stack
Enable security & control of data, which are top of mind, driven by high-profile incidents and PII volume	Security/scale/control
Shift to modular architecture & ecosystem of external partners to scale omnichannel	API-driven connected platforms
Build to enable flexibility and speed via shift to Agile and Product vs. Project based dev/QA	App development & management
More focus on insights derived from both in-store behavior stream & digital clickstream	Data analytics & machine learning
Expedite changing role of IT – from back-office transactions to insights and interactions	Infrastructure, storage, network

pick workflows and capabilities that need more sophistication and scaling (Exhibit 8).

- *Collaborate closely across business and technology.* Technology leaders and business decision makers need to be involved early in selecting the priority workflows, determining the KPIs, and deciding on cloud priorities. It is usually best practice to bring business leaders into preliminary conversations with technology vendors to ensure that the partner of choice brings not only technical depth but also the retail-industry expertise and understanding of workflow nuances necessary for a successful partnership.

- *Define the security and data governance model.* Security and control of data should be a baseline expectation. Until relatively recently, this was framed as a trade-off, but modern cloud platforms enable security and control along with productivity and elasticity.

- *Design lightweight processes.* Cloud migration should be coupled with changes of mind-set and ways of working. Retailers need to make their enterprise processes lightweight in order to take full advantage of the nimbleness that the cloud offers. Additionally, business and technology teams will need to adopt a partnership mind-set and work together collaboratively.

- *Consider organization and talent.* To sustain a successful cloud journey, it will be critical to reskill existing IT talent and acquire external talent that has the requisite skills and experience with cloud platforms.

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In conclusion, the cloud can accelerate retailers' ability to offer new capabilities to their consumers and employees in a more nimble, scalable, and cost-effective manner. ◆