

Beyond the Storefront

Integrating Digital with Physical Retail

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Introduction

THOUGH ECOMMERCE SALES MAKE UP JUST 10% OF TOTAL US RETAIL SALES, DIGITAL INFLUENCES HALF.¹

Over 80% of shoppers consult their mobile phones for product information in-store, and a quarter of these shoppers say they've changed their minds in line after looking up product information.² Forty-two percent of US online shoppers are interested in or have already used interactive touchscreen displays while shopping in-store, and 39% are interested in or have used product visualization tools.³

To keep pace with customer expectations and close experience gaps across touchpoints, retailers are making serious investments to extend digital commerce beyond their .com storefronts into physical stores. Forty-five percent of digital retail executives are expanding, upgrading or investing in

technologies like store associate tablets and in-store personalization⁴ to deliver more contextual experiences to customers and drive revenue.

But technological and operational constraints still hinder retailers when it comes to connecting digital and physical experiences. Legacy systems and monolithic architecture makes it difficult to extend commerce to new touchpoints without significant cost, time and risk.

Business and technology leaders are looking to microservices to bridge the digital and physical divide. This paper explores the benefits and practical applications of microservices for the omnichannel retail enterprise.

1. <https://www.forrester.com/report/Digitally+Impacted+Retail+Sales+In+2018+Still+Only+Half+Of+Retail/-/E-RES12290>

2. Think With Google <https://www.thinkwithgoogle.com/marketing-resources/micro-moments/mobile-shoppers-consumer-decision-journey/>

3. <https://www.forrester.com/Consumer+Technographics+North+American+Retail+And+Travel+Benchmark+Recontact+Survey+1+Q3+2017+US/-/E-sus3712>

4. <https://www.forrester.com/report/Commerce+Technology+Investment+Trends+2017+To+2018/-/E-RES123164>

SECTION 1

Why Retail is Going “Phygital”

Digital is already entrenched in brick-and-mortar shopping. Over 80% of shoppers consult their mobile phones in-store to access product information, reviews, compare pricing and check stock availability—and what they find influences their spend.

Simply having a mobile-friendly website is not enough to support customer needs and expectations. Screens are small, menus can be hard to navigate, pages can be slow to load, and the competition is only a tap away.

To better serve customers, save sales, build loyalty and grow revenue, retailers are increasingly looking to connect digital content, offers and utilities with their physical stores through mobile apps and connected screens, kiosks and more.

SECTION 1.1

Key Focus Areas for In-Store Digital Investment

Enhanced Mobile Beyond merely scaling down the online storefront for the small screen, retailers are adding features to support mobile use in-store. To help customers bypass catalog menus and quickly access product information, native apps and HTML5 sites can be augmented with voice search, image recognition, QR-code scanning or NFC (near-field communication) with smart tags. To support endless aisle, out-of-stock products can be located in nearby stores, reserved and picked up or shipped to store without sales associate help. Interactive “store mode” features like wayfinding (in-store navigation) or personalized content and offers can be baked into native apps support the physical shopping experience.

Universal Accounts True omnichannel retail connects all customer touchpoints, including online account activity with retail POS systems and other in-store digital touchpoints. At the register, purchase history, loyalty status, reward point balances and personalized promotions can be offered in-store. Likewise, in-store engagement and purchases can be tracked by the universal account to make online merchandising more relevant.

Augmented Content While most customers can access product content through their smartphones, bringing digital content like product details and demos, customer reviews, video, social content and product recommendations to the shelf or showroom saves shoppers time and offers a value-added experience. Integrated with digital signage, kiosks, wall-mounted screens and magic mirrors, digital content can be centrally managed and deployed consistently across channels, selectively based on store location or even personalized to the individual customer.

Empowered Employees Tablet apps developed specifically for sales associates can help them answer customer questions, access and inventory across stores and online, provide personalized service and recommendations and execute “roaming checkout” (transact anywhere within the store)—all without leaving the customer’s side.

Experience-driven Innovations To breathe life into the brick-and-mortar experience, many retailers are experimenting with emerging technologies like AR/VR (augmented reality and virtual reality), virtual try-on, AI-driven shopping assistants and other forms of “retailtainment.” Others are exploring new ways to support transactions directly through IoT (Internet of Things), like Adobe’s Smart Bags,⁵ smart speakers and other interfaceless objects.

5. <https://theblog.adobe.com/no-more-lines-a-preview-of-shopping-in-the-future/>

SECTION 1.2

How Retailers are Using Digital In-Store

Lush Cosmetics

- ✓ Store associate apps
- ✓ CRM integration for personalized service
- ✓ Roaming checkout
- ✓ Multiple digital payment support
- ✓ In-store wishlist access

International omnichannel retailer Lush Cosmetics has invested in several in-store digital projects.

Armed with Androids, sales staff can digitally engage customers from hello through checkout, anywhere on the floor. Integrated with CRM information, in-store tablet apps serve personalized recommendations and integrates loyalty offers.

Till-killing “roaming checkout” spares customers from queues and supports multiple digital payment options. Lush reports the project has raised store revenue by 20%. The next iteration of roaming checkout will add wish-list access and more detailed receipts.

To help customers instantly identify “naked” products (without packaging) like bath bombs and soap bars, its mobile app uses photo recognition technology. *Lush Lens* allows customers to snap a picture of any Lush product (in-store and at home) and access product information.

The beauty brand is also tackling conversational commerce, building its own virtual assistant Lush Concierge. With future plans to roll it into its mobile app, customers will be able to ask questions about stock availability, store locations and product-related information and receive answers in a conversational format. Both *Lush Lens* and *Lush Concierge* solve the mobile friction of using mobile text search and catalog browse on a small screen, and can deliver product results (and customer satisfaction) more quickly.

6. <http://player.lush.com/channels/lush/tv/tech-break-lush-lens>.

How Retailers are Using Digital In-Store

Lowe's

- ✓ Wayfinding
- ✓ Store associate apps
- ✓ Endless aisle
- ✓ Augmented reality
- ✓ Virtual reality
- ✓ Interactive voice assistant / robots

For large stores with many departments, *wayfinding* is a popular mobile app feature, using GPS to help customers locate items in-store. Lowe's *In-Store Navigation* app takes wayfinding to the next level using Google's Tango augmented reality technology. Motion tracking, area learning and depth perception guide customers through a mixed-reality experience, with search-by-scan, shopping list and product location capabilities. Like Google Maps, the Lowe's app shows customers the fastest route to the shelf they need to find.

Lowe's also uses AR technology to power *Lowe's Vision*, a "digital power tool" for customers planning home improvement projects. Customers can measure spaces and visualize appliances and home decor within their virtual homes.

In addition to augmented reality, Lowe's *Holoroom* experience brings virtual reality to home improvement planning. Customers engage with a HoloLens specialist in the Holoroom in-store while wearing an Oculus Rift headset. Customers can preview products in their home, select from various design options like cabinets, counter tops, appliances and hardware.

LoweBot is a retail service robot that can find products in multiple languages, guide customers through the store and answer simple questions. To optimize store operations, LoweBot monitors inventory and can interact with staff.

7. <https://newsroom.lowes.com/news-releases/lowesdeliversaugmentedrealitynowavailableonaisle3/>

SECTION 2

Digital In-Store is Still Challenging for Retailers

Whether building out new, bespoke features into a mobile app or integrating digital with the physical store, extending existing legacy systems is challenging and often very costly for retailers. And the more established the retailer, the more likely to be encumbered by legacy systems that are complex, code-heavy and risky to modify.

To work around these challenges, many retailers have built stand-alone apps and digital experiences siloed from retail and digital commerce systems. These projects are typically high cost and carry high risk of failure or low return on investment. Experiences that aren't seamlessly integrated with POS or digital commerce catalogs, customer accounts and real-time inventory often disappoint customers, and don't close the loop of the customer journey. They can't share data back to core systems, require replication of content and separate maintenance.

Retailers surveyed by RIS Research cite “too many siloed systems” as the top barrier to improving omnichannel and customer engagement strategies (64% of respondents).⁸ Seamless integration of digital and physical experiences benefit both the customer and retailer, but are difficult to achieve with existing legacy commerce systems.

8. <https://risnews.com/top-omnichannel-failures-causes-and-solutions>

SECTION 2.1

The Problem with Monolithic Commerce Platforms

Traditional enterprise commerce platforms, whether built in-house or licensed from a vendor, use *monolithic architecture*. Monolithic commerce platforms are designed to be self-contained and delivered in “one piece,” with commerce services like catalog, search, customer accounts, pricing, PIM and checkout *tightly coupled* and interconnected with each other.

As the commerce platform is continually modified and customized, code becomes even more complex. Developers may not fully understand all the interdependencies of the growing application, making it challenging to plan and execute new projects smoothly and without disruption to the system.

Slow development and risk For IT, working with millions of lines of tightly coupled code makes development slow. And with a shared code base, modifying any piece of the platform or extending it to a new touchpoint impacts the entire application. Changes may break code, compromise performance and impact customer experience and revenue.

This means any update that is made to a piece of a monolithic platform requires extensive *regression testing* to ensure updates don't break or impact performance. The larger the monolithic system, the more resources and time must go into coding, testing and rollout. And every update rolled to production requires a reboot of the entire system.

For many organizations, routine maintenance of complex and aging legacy systems consumes enough of IT's bandwidth and budget to leave little room for innovation. And because even simple changes impact the entire application, experimental projects compete with everyday development and introduce too much risk, and often never get prioritized or delivered.

Inefficiency Many in-store digital projects are unique, and don't need to use the entire commerce application. For example, pulling product descriptions, customer reviews and pricing into digital signage without need for account, loyalty or checkout. With a monolithic platform, developers can't simply use the services the touchpoint will actually use.

Technical limitations While a monolithic platform may be able to integrate with various technologies in different programming languages, its primary programming language can be limiting. For example, a platform built in PHP may not be able to easily integrate with a service written in more modern language like Node.js, or in a language that best accommodates the use cases and requirements of a new feature or experience.

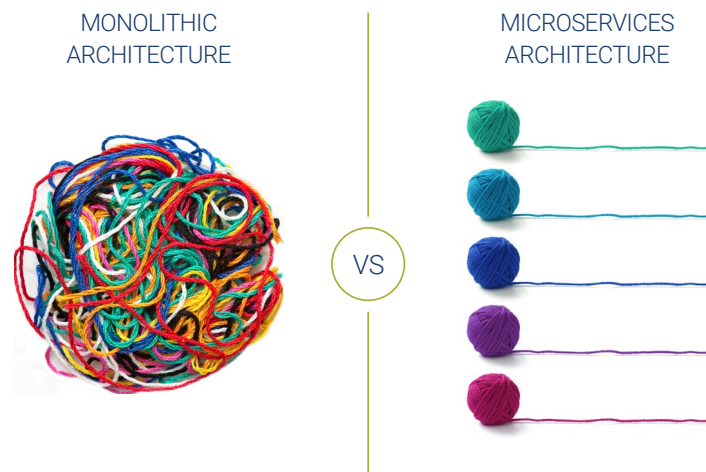
Scalability Scalability is also a problem for monoliths. Supporting mobile payments in-store, for example, may dramatically increase demand on checkout, with other systems like account and loyalty marginally impacted, and catalog and PIM hardly impacted at all. Without the ability to scale services independently, a retailer must invest in copies of the entire monolith (including more licenses and/or hardware), or slow down the entire system across touchpoints.

SECTION 2.2

The Monolith vs Microservices

The tightly coupled architecture of a monolith is akin to a ball of string. Interdependent services have intertwined code, and pulling or modifying one string impacts the entire ball.

With microservices, individual business capabilities are encapsulated and stand alone as separate dockerized services, with their own business logic, databases and set of APIs. They can be used alone or interwoven with other services to extend to new touchpoints and experiences in a more nimble way without disrupting the entire application structure.



Microservices enable an enterprise to build, test, and deploy new commerce projects faster. Full regression testing of the entire commerce system is not required, and small, iterative updates can be regularly made without interrupting operations.

“With microservices, you can create an architecture ecosystem that allows you to change all the time”

—Accenture

Machine vision capabilities are yet another way to support product suggestions. Store associates armed with digital devices should be able to use the camera on the device to make product recommendations. Machine learning algorithms can generate suggestions for complementary items, predict future purchases, and understand customer intent. This will help store associates provide a much more valuable and personalized customer experience.

The Problem with Monolithic Commerce Platforms

The Monolith vs. Microservices

What About the Monolith's APIs?

SECTION 2.3

What About the Monolith's APIs?

Many large monolithic commerce vendors offer APIs that can tap into individual services within the monolith and expose commerce services to new touchpoints. Some even claim their API orchestration layers allow their monoliths to behave in a modular way like microservices. While APIs are technically capable of extending the monolith, underneath the orchestration layer still lies a monolith, with all the difficulties that come with tightly-coupled architecture.

SECTION 3

Why Microservices for Digital In-Store Projects

Despite the challenges with legacy architecture, it's often not ideal or even possible to simply rip and replace monolithic systems for many larger, omnichannel organizations—especially when significant investment has been made in customizing and integrating the platform with systems like ERP, CRM, POS and more.

For these organizations, microservices can run alongside the monolith, delivering the capabilities and innovations faster, with less impact on the system. New experiences built with microservices can hook back into the system, closing the gaps that siloed projects create.

SECTION 3.1

Microservice Advantages

Flexibility and choice Microservices also give development teams the flexibility to select the “best tools for the job.” This may include programming languages outside of the monolith’s stack. Individual microservices can use the technologies that best suit the project, while connecting and communicating to each other (and the monolith) through APIs. This also makes it easier to swap in new and better technologies over time, without being locked into a single stack.

Decentralized governance Monolithic code can be very complex, and typically requires a centralized team of developers with deep knowledge of the application. Microservice projects can be owned by smaller groups of developers, and require them only to understand the languages that apply to their project. This reduces labor costs and speeds delivery. What would take months or years can be delivered in days to weeks.

For innovative and experimental projects, organizations can test and “fail faster.” Microservices are quicker to deploy, but also quicker to roll back if needed.

Scalability Because microservices can scale independently, they also eliminate the need to invest in more and more copies of the digital commerce platform to keep experiences performant. In-store digital use can rapidly increase load on digital commerce systems, especially for retailers with a large physical footprint. Many in-store digital projects are first deployed and tested in a pilot store before rolling out across geographies. The ability to scale when and how much is needed over time is critical.

SECTION 3.2

Practical Applications of Microservices In-Store

Individual microservices can extend to digital in-store experiences in a variety of ways, including (but not limited to):

PIM

- Deliver product information to digital signage, kiosks, tablets and sales associate apps
- Index data as changes are made to digital catalogs, and ensure updates are published to store in real time
- Integrate catalog information with QR code or barcode scanning, photo search, or interactive voice applications
- Support multilingual content, for example luxury retailers that want to offer English, Chinese and Mandarin options
- Publish selective content to digital screens or mobile apps (such as video only)
- Access bundling, product configuration or personalization features through kiosk or connected screen

User Accounts

- Pull customer "status"/loyalty and apply loaded or qualified discount - at till POS and through mobile POS/associate apps while serving in-aisle
- View, manage or adjust rewards from store (e.g. resolve a customer complaint addressed in store)
- Allow customers to redeem points in store (e.g. point perks and deluxe samples, or redeem an \$X reward)

- Allow customers to self-serve through a mobile app, kiosk, screen or digital assistant
- Support real-time adjustment of points after refund or exchange for lower value items
- Connect to online accounts to show loyalty points in real time, order details and receipts for returns, wishlist or registry, personalized offers and recommendations

Inventory

- Support endless-aisle capabilities to locate items across stores and online, reserve stock, ship to store or ship to customer
- Support wayfinding
- Allow customer to check store inventory without asking for help (when shelf is empty)
- Provide access to back order status and restock dates
- Allow customer to sign up for email or text restock notifications in-store
- Support purchase of pre-order items through promotional digital signage

Promotions

- Sync location-specific offers to store
- Deliver personalized promotions through geofencing or location-aware SMS
- Allow store associates to apply store-specific offers or price adjustments to online orders placed in-aisle

Practical Applications of Microservices In-Store

- Target promotions by store context (e.g. back-to-school sale start and end dates based on state, suppress promotions to stores that don't carry specific brands or product lines)

Recommendations

- Push product recommendations to digital signage and kiosks
- Target recommendations based on store location (e.g. based on zipcode or demographic segments or climate)
- Push product recommendations to store associate tablets
- Push personalized recommendations based on account history to customer's mobile phones, digital signage or POS

Content management

- Centrally manage, schedule and deploy content and offers to stores (ensure consistency with digital channels)
- Target content to store location
- Publish selective content to digital screens (product tours, brand showcase, interviews, demos, etc)

Registry / wishlist

- Support creation, retrieval and modification of wishlist or registry through any screen
- Support QR code or image scan to add to wishlist or registry
- Allow customers to search and locate wishlists or registries from friends and family

- Connect wishlists and registries with wayfinding, endless aisle capabilities, promotions or product recommendations

Cart and Checkout / POS

- Recognize customer loyalty status, points and offers and apply loaded or qualified discounts
- Support mobile checkout without help from associate
- Support roaming checkout (in-aisle checkout through store associate tablets)
- Connect POS and mPOS to online account, instantly update points balance across channels
- Support multiple and emerging payment options in-store (PayPal, mobile wallets)
- Allow customer to pay with loyalty points or redeem points for perks and have instantly update points balance across channels
- Allow customer to pay with store credit through any channel
- Transfer saved web cart to in-store mobile checkout or POS

OMS

- Support receiptless returns / exchanges / warranties
- Update invoices in account history with return or exchange in real time
- Support price adjustment from Web order in-store
- Text customer when online purchase or reserved item is ready for store pickup

SECTION 4

Let's Recap

Retail is going phygital, and there's no going back. Business leaders are investing in enhanced mobile apps and in-store digital experiences to better serve customers at every stage of their journey. But it's critical that mobile and in-store experiences are seamless across touchpoints, and leverage the same content, pricing, account information, merchandising and transactional capabilities.

Enterprise retailers are challenged by legacy monolithic commerce platforms. Tightly-coupled commerce services are difficult to modify and extend to mobile apps and innovative in-store digital projects without significant cost, effort and risk. Even with API orchestration tools, changes to the monolith can introduce fragility into the system, and require extensive regression testing and a reboot of the entire application after every change is made.

While a full rip-and-replace solution is not realistic for many enterprise retailers in the near term, microservices can be leveraged and integrated with legacy systems. Microservices allow the enterprise to build and deploy new experiences rapidly, at lower cost, with the flexibility to choose only the commerce services needed, and to select the technologies and programming languages that make most sense for the end product.

Unlike monolithic architecture, microservices scale independently and are easier to maintain and iterate over time. With the constant shifts in technology and customer expectations, microservices help enterprise retailers stay competitive, nimble and innovative.

About Skava

Skava is a leader in providing modern e-commerce and digital platforms. Our cloud-native, microservices based technology enables continuous innovation in a mobile first world. We help leading retailers and enterprises across the world deliver engaging omnichannel, customer-centric experiences.

Headquartered in the heart of San Francisco's Financial District, with offices in the US, Europe and Asia.



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