

28TH ANNUAL RETAIL TECHNOLOGY STUDY

WAKE UP CALL FOR DIGITAL TRANSFORMATION

Big opportunities and strong headwinds accelerate the pace of unified commerce and digital transformation

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Shots Across the Bow

THE BIG LESSON learned from looking backward at the tumult of 2017 is that retailing is bifurcating into a hardened landscape of booming leaders and struggling laggards. The rising tide of the overall industry, which recorded the strongest growth since 2014, did not lift all ships. In fact, retail bankruptcies and store closings were at record levels.

Nearly three out of 10 retailers (28%) either lost revenue last year or closed their books with no increase, according to the “2018 RIS/Gartner Retail Technology Study.” While this may also be interpreted as seven out of 10 retailers (72%) increased revenue last year, this storyline is undercut by a deeper look at the economics.

Retail revenue grew 4.2% in 2017, according to the U.S. Department of Commerce, which sounds like good news, but only 23% of respondents in the study met or surpassed this level of growth. This means that 77% of retailers did not achieve the average gain recorded for the overall industry. They either went backwards, stayed the same (which is essentially going backwards in retailing today), or registered a sub-par increase (which indicates they were unable to capitalize when shoppers were spending record amounts of money).

For this group a warning shot was fired across the bow. This dramatic wake up call demonstrates the retail landscape is splitting into just a few leaders and many laggards. It also signals the time to act is now, i.e. time to fix long broken processes, legacy technologies, and choke points that stifle opportunities. It is time to invest in advanced capabilities, test new concepts and explore emerging innovations.

Retail leaders in 2017 demonstrated they can make rapid, cost-effective shifts that anticipate fast-moving changes and quickly adapt to trends before the moment passes.

Lagging retailers, the vast majority that did not match the average nationwide growth, are incapable of delivering the kinds of shopping experiences that customers want and, unfortunately, many have been struggling with sub-par performance for years. For this group, time is running out to catch up with category leaders and secure their futures as customer-focused businesses and strong revenue generators.

Delaying projects, half steps, work-arounds, following in safe footsteps — those days are over. Instead, smart retailers must manage their IT budgets to get closer to customers to drive sales, improve productivity to drive profits, and invest in projects that deliver ROI.



A handwritten signature in black ink that reads "Joe Skorupa". The signature is fluid and cursive, written over a light grey background.

Joe Skorupa
Editorial Director
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ALEC GEFRIDES

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Reshaping Retail with Mobility

Q Retailers continue to invest in technology to personalize the path to purchase both in-store and out. Which technologies will have the greatest impact over the next 12 to 18 months?

Retail will change more in the next few years than it has in the last one hundred. Some of the technologies that will become more prevalent by 2025 are:

- **Biometrics:** Retailers are no longer content in identifying the identity of the customer through a loyalty card swiped at the POS, they want identify the customer as they enter the store. Using this technology, retailers know what products the customer wants to buy, and what the average spending is. We'll be seeing biometrics as a source of customer recognition and AI as a key factor of influence and customer service in the future, continuing to evolve personalized in-store experiences

- **Robot Assistance:** Built in scanners use image recognition to identify items and help the customer navigate the store. Robots are not only related to customer interaction, but also to supply chain. Robots can check stock, find pricing errors, and identify misplaced items. Data gathered is compiled and analyzed and used to provide improvement recommendations.

- **Smart Displays/Mirrors:** Artificial Intelligence, virtual reality and gesture recognition makes the mirror a virtual dressing room, improving the in store customer experience. These displays allows the customer to request different sizes and colors of products, while allowing the sales associate to recommend items that others have bought with the specific item. This technology allows the ease of on-line shopping into the physical world of retail.

- **Auto checkout:** In the future, customers will walk out of a store without having to stop and pay for items. Items will be automatically scanned and as the customer leaves the store their accounts will be automatically be deducted. This technology is already in stores, Amazon Go and Alibaba already offer this type of technology. The customer enters the store, items are automatically charged so there is no need to scan items and stand in line which makes for hassle free shopping for the customer.

Q Thanks to an ever-increasing number of consumer touchpoints retailers have more information on shoppers than ever before. How can retailer's best leverage this data to gain actionable insight?

- Today In-store analytics are being applied to every phase of the retail process by determining retail trends, predicting where the demand will be for products, optimizing pricing for a competitive edge, identifying consumer purchasing patterns & behaviors and other insights for immediate decisions. Thus providing the ability to work faster – and stay agile – giving retailers a competitive edge they didn't have before.

- One such example are Sensors which enhance instore experience while bridging the consumer's physical and on-line experiences. The signals are picked up by mobile devices, which then sends signals to a cloud server. The cloud server then can push targeted content back to the device. If the customer opts in, retailers will be able to gather data, track buying habits and movements pushing content to your device, alerting the buyer to sales unique to their buying habits. Retailers feel that data collection is more important than sales.

Who Responded

The RIS/Gartner Retail Technology Study

Study polled senior-level retail executives who work for national and large regional chains in the month of January and early February. The study aggregates detailed responses from 90 retailers. Of these, nearly half are at the vice-president level or higher. More than a third have a C-level title. Clearly, this respondent pool represents the highest level of decision makers in retail.

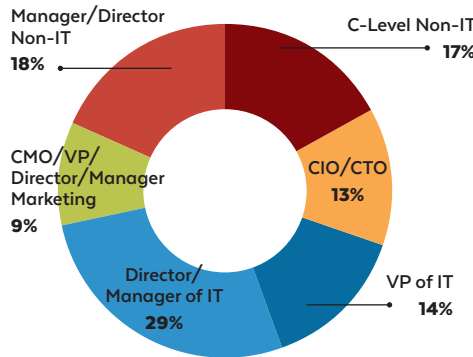
All respondents are headquarters executives, which means store managers and regional personnel are not included. Small main-street type retailers have also been excluded. The study's aim is to create a respondent pool that has significant responsibility for making contributions to enterprise IT decisions about technology strategy, implementations, and purchases in their organizations.

There is significant representation in the respondent pool in three major retail segments: apparel/footwear/accessories (23%), food/drug/convenience (31%), and specialty (31%).

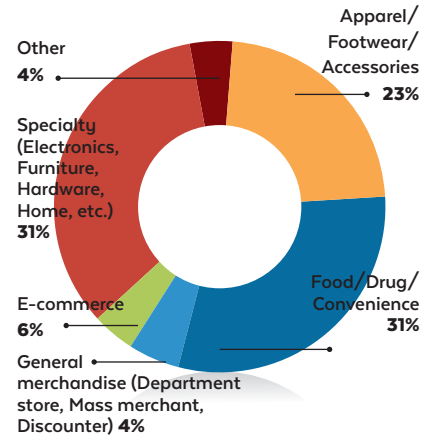
Nearly half (46%) of the retailers in the study have annual revenue greater than a billion dollars and of these 18% have revenue greater than \$5 billion. Large retailers have large IT budgets and often set trends for the rest of the retail industry to follow. The majority of respondents (60%) have annual revenue greater than \$500 million.

A partial list of participating retailers includes such major names as Macy's, Sears, Levi Strauss, Circle K, Shoprite, Home Depot, Dick's Sporting Goods, Neiman Marcus, Genesco, Rooms To Go, Jack in the Box, Vineyard Vines, Spartan-Nash, Tapestry (Coach), Etsy, Bealls, Tractor Supply, Clarks, Piggly Wiggle, Guess, Guitar Center, and Perry Ellis.

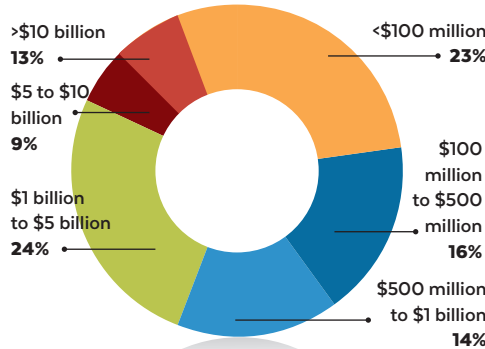
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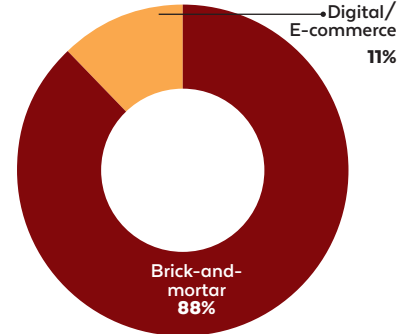
Retail Segment



Annual Sales Volume



Primary business model



About Gartner

Gartner research is a leading provider of research and analysis about the global information and technology industry. It worked with RIS News to produce this study, which was conducted during the first two months of 2017. In conjunction with the RIS editorial team, Gartner created the survey, performed the analysis of the data, and co-wrote the report. Gartner was not paid for its involvement and RIS did not involve any of the advertisers in the report during the preparation or analysis phases.

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A SINGLE VIEW FOR SHOPPER SATISFACTION



JEFF WARREN

Vice President, Retail Strategy
and Solution Management
Oracle

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Retail

Q Which technologies will retailers invest most heavily in over the next 12 to 18 months?

2018 will be the year of customer engagement empowered by technology and a single view of operations. Investments will be aligned with the expansion of the digital store, mobile and programs to drive loyalty – all of which will be powered by retail science and analytics. Retailers that proactively pivot to a data-driven approach (versus data led) to define their strategy, architect a vision, set direction and feel confident in their decisions will ultimately become closer to their customers. The data driven enterprise will also allow retailers to find efficiencies and scale their operations while adopting new innovations.

Q In the study, retailers named expanding unified commerce capabilities as a top priority. In your opinion how far along is the industry in this vital capability?

The retail industry is not there yet. We saw the face of brick and mortar continue to change and blend during the 2017 holidays but many retailers still manage their business disparately as online or brick and mortar. The pain of running two independent entities has not yet surpassed the perceived pain of unifying data, systems and processes. Consumers continue to expect a seamless experience – buy anywhere, pick up anywhere, and return anywhere. Consumers will vote with their wallets and retailers who deliver an exceptional experience will command their loyalty and drive growth. Retailers who execute these shopper experiences and journeys while preserving profitability will win. I believe this true unification will occur in the next 12-18 months.

Q While the need to modernize the tech stack is all too real for many retailers, they often struggle letting go of their legacy systems. Do you have any advice

for retailers reluctant to take the plunge?

Our advice to retailers is to prioritize projects that will positively impact your bottom line and use that gain to fund your next project. Delivering quick wins is incredibly effective in respect to winning executive-level support for omnichannel journeys and bolstering team morale. By mapping out a strategic vision that can be executed methodically retailers can modernize their business at a pace that keeps them competitive throughout the transition. The cost of transformational projects may seem out of reach but retailers need to realize that they do not need to boil the ocean. Oracle's community is active and rich with transformational success stories – connect with peers and partners to define the first step forward. Remember this is not a sprint it is a marathon.

Q What can retailers do today to keep pace with the industry's tech leaders (Amazon, Walmart, Starbucks, etc.)?

Consumers, although less loyal than they were a decade ago, do business with brands that appeal to their motivations at the point of intent. Conventional segmentation approaches fall short today in understanding that point of intent but a data-driven enterprise can empower retailers to understand what inspires consumers to act. This understanding drives loyalty and ultimately a competitive advantage. Last year at Oracle Industry Connect we predicted that the war for talent would intensify as retailers look to leverage advanced applications in machine learning and artificial intelligence. It's not within reach for most retailers to bring a cadre of retail scientists onboard full time but that is the arms race we are in. That's why Oracle Retail has made such significant investments across its retail insights cloud portfolio – so that retailers can essentially plug and play and compete with the likes of Amazon and Walmart without the overhead.

Not an Apocalypse, But an Evolutionary Event

AN ASTEROID DID NOT STRIKE PLANET RETAIL, BUT COMPETITIVE PRESSURES AND CHANGING CONSUMER BEHAVIORS ARE CAUSING RADICAL CHANGES TO ANTIQUATED BUSINESS MODELS

BY BOB HETU

In 2017, a healthy holiday season provided great relief for weary retailers. A strong economy lifted all, proving that traditional retail is not dead. People still shop, but their buying behaviors and lifestyle choices are changing. Amazon is not the asteroid that struck planet retail. Competitive pressures from disruptive, pure-play e-commerce players and new physical retailing models are causing radical changes to antiquated business models, driving down prices and driving up costs. Retailers are rightfully concerned about how to accomplish the herculean task of transforming a traditional, multichannel retailer into a digitally enabled provider of unified retail commerce.

For the second time we asked retailers to indicate where their organization is on a scale ranging from having “no digital strategy” to “harvesting results.” Figure 3 compares the responses from this year and last and incorporates the results from Gartner’s “2018 CIO Survey,” showing that there is a fairly consistent trend, but a slow march toward scaling and ultimately harvesting results.

These continue to show that retailers are having difficulty shepherding digital transformation into digital business opportunities. The term “digital business” encompasses a broader business opportunity that is not focused primarily on an element of technology — for example, online technologies. Rather, it refers to the emerging trend of organizations creating new and innovative business designs by blurring the physical and digital worlds.

A leading-edge digital business will include connection or integration with

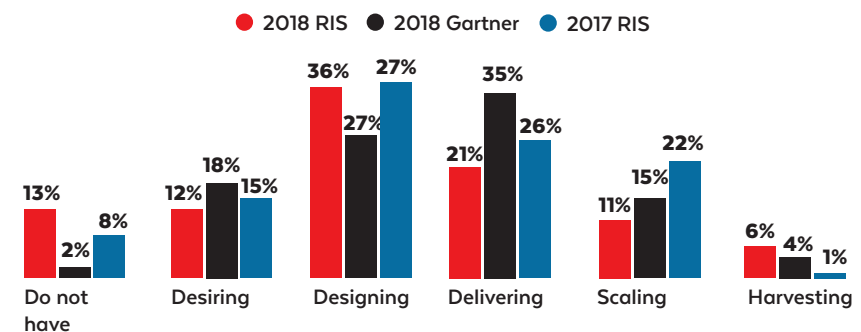
FIGURE 1 Top technology-driven strategies over the next 18 months

Expanding unified commerce (omnichannel) initiatives	54%
Leveraging social media engagement	54%
Increasing customer engagement	51%
Developing personalized marketing capabilities	47%
Advanced analytic tools and capabilities	46%
Advancing mobile commerce for consumers	46%
Improving network and IT systems security	46%
Advancing mobile store/enterprise security	36%
Digital transformation (cloud, omni-stores, etc.)	35%
Pricing optimization	29%

FIGURE 2 Top obstacles over the next 18 months

Optimizing digital commerce (online, mobile) as growth channels	52%
Consolidating channel silos (e-commerce, stores, mobile, etc.)	41%
Retiring legacy systems (i.e. digital transformation)	38%
Application integration (ongoing, new, maintaining)	37%
Customer data security	37%
Change management (resistance to change)	34%
Slow organizational response	33%
Marketplace giants (Amazon, Walmart, etc.)	33%
Consolidating databases	30%
Developing apps to enable the consumer	29%

FIGURE 3 What stage is your organization’s digital transformation?





assets (businesses, people and things) beyond the control of any one company. Digital businesses will, therefore, redefine traditional industry and market boundaries, and they will drive change toward new and unprecedented business environments — led by customers and characterized by industry fluidity. Collaboration is key — retailers must build ecosystems that include other retailers, other industries (such as consumer goods), customers, and tech vendors.

To combat market share erosion and take advantage of the opportunities offered by digital transformation, multichannel retailers need to recognize that their extensive network of stores can be part of an effective, unified commerce strategy. Expanding unified commerce initiatives takes the number one spot on our list of top technology strategies pursued over the next 18 months.

Unified commerce provides a customer-centric experience, based on how customers approach shopping, with no limitations by channel. Unified commerce also involves understanding how customers use technology in their everyday lives, then deploying technology that makes their lives simpler, better, easier and safer. Unified commerce demands that retailers of all types engage in digital business transformation built on a foundation of customer understanding.

The technologies that complete the top five (leveraging social media engagement, increasing customer engagement, developing personalized one-to-one marketing capabilities, and advanced analytic tools and capabilities) are key to building the necessary customer understanding for execution of unified commerce strategies.

There are significant obstacles faced by all retailers as they seek this transformation. Optimizing digital commerce (online, mobile, etc.) as a growth channel is the number one ob-

FIGURE 4 Top 10 Technologies for 2018

CRM/Personalization	47%
Mobile devices for associates/manager	40%
In-store pickup/return	40%
Mobile POS	38%
Promotion optimization	38%
Multi-channel frequent shopper tracking	37%
E-commerce platform	37%
POS software	36%
Real-time inventory visibility	36%
Campaign analytics and forecasting	35%

FIGURE 5 Top 10 Technologies for 2020

Multi-channel customer behavioral segmentation	42%
Location-based sensing for marketing/communication	39%
CRM/Personalization	37%
Mobile devices for associates/manager	36%
Mobile POS	36%
Multi-channel frequent shopper tracking	36%
Clienteling/Guided selling	36%
Price optimization	35%
Split tickets (omni-store)	35%
Digital devices (signage, magic mirrors, etc.)	33%

stacle. In truth, optimizing digital commerce is really an opportunity that acts as a catch-all summary for the balance of the list of the challenges.

While not minimizing these technology issues, such as retiring old legacy applications or application integration, the obstacles on this list are within our control and can be managed. The real challenge is firmly planted in

corporate cultural issues. Recent Gartner research confirms that for all industries, including retail, cultural issues are the primary reason that scaling and harvesting results from digital transformation are not progressing more quickly.

The best advice is to use your seat at the table to demonstrate knowledge of new technologies and how they can support digital business use cases. **RIS**



Bob Hetu is a Research Director with the Gartner Retail Industry Services team. His responsibilities involve tracking the technology markets and trends impacting the broad-based retail merchandising and planning areas as well as advanced analytics for retail. Hetu is an expert in the areas of brand, vendor and assortment management, merchandise planning, allocation, and replenishment. Contact him on Twitter: @bob_hetu

Feeling the Disruptive Impact of Digital Transformation

IN A YEAR CHARACTERIZED BY STRONG GROWTH AND STRONGER HEADWINDS, RETAIL LEADERS ARE RESPONDING BY FOCUSING ON DIGITAL TRANSFORMATION AND INCREASING THE SIZE OF IT BUDGETS

BY JOE SKORUPA

Strong fourth-quarter sales during the 2017 holiday season buoyed a year that had the highest retail growth rate since 2014. In fact, steady growth has been the hallmark of retailing since at least 2011 after coming out of the Great Recession.

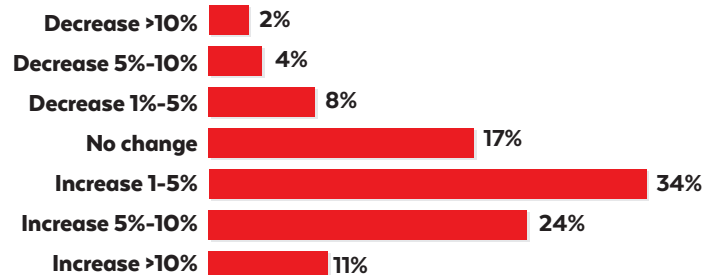
But 2017 was also characterized by a record number of bankruptcies and store closings. This led to a buzzy new term used in the mainstream media — “the retail apocalypse.”

Of course, neither a Biblical apocalypse nor a giant asteroid hit the retail industry last year. Not only did consumers continue to shop, but they spent more than ever.

At the same time, however, strong winds blew across the landscape that toppled several iconic brands, such as Toys R Us, The Limited, Payless, Rue21, Gymboree and more. In some ways, these winds are really just the new normal, describing a marketplace where competition is fierce and the speed of change is accelerating.

Digging deeper into 2017’s retail economics one can see that many retailers who declared bankruptcy or closed hundreds of stores did so as a direct result of a long period of bad decision making. They delayed

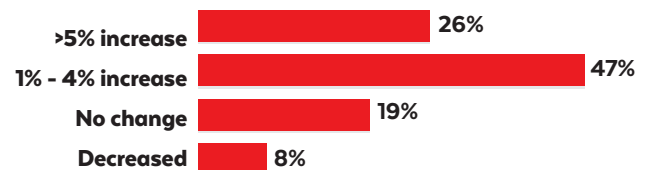
Change in 2018 IT budget



Study data finds that IT budgets are set to **climb in 2018 by an average of 4% year over year**, which is a healthy bump up from last year’s 3.5%.



Change in revenue over last 12 months





4%

Average increase in 2018 IT budget compared to last year



starting critical enhancements, killed projects already underway, relied on inefficient work-arounds, and opted to become followers instead of innovators.

Standing on weak foundations, these troubled retailers had no financial safety net or loyal customer base to count on when the strong wind caught them.

State of Retail Economics

Retail revenue grew 4.2% in 2017, according to the U.S. Department of Commerce, which is a healthy increase. However, only 23% of respondents in the study met or surpassed this level of growth. This means 77% of retailers did not achieve the average revenue gain recorded for the overall industry

Nearly three out of 10 retailers (28%) either lost revenue last year or closed their books with no increase. For a more positive spin on this number, the data can be flipped around to say seven out of 10 retail-

ers (72%) increased revenue, which is a very high number.

However, as noted, most retailers did not match or surpass the average revenue gain of 4.2% for the overall industry. This means more than three quarters either went backwards, stayed the same, or registered a sub-par increase.

Despite this lackluster performance, or maybe because of it, study data finds IT budgets are set to climb in 2018 by an average of 4% year over year, which is a healthy bump up from last year's 3.5%.

Also, nearly seven out of 10 retail-

ers (69%) are planning to increase their IT budgets in 2018, which sounds like a big number, but it is down from 88% last year.

Since large segments of retail had a challenging year in 2017 — apparel, sporting goods and mass merchants — and many retailers peg their IT budgets to revenue, it is not surprising that fewer retailers are increasing their IT budgets.

This leads to a major finding in the study, which is that although fewer retailers are increasing their IT budgets the increases are larger in 2018. This supports the notion that

Although fewer retailers are increasing their IT budgets, the increases are larger in 2018, which supports the notion that retail is bifurcating into leader and laggard groups differentiated by revenue growth and progress toward digital transformation.

FIGURE 4

184%

ANALYTICS IS A DIFFERENTIATOR:

Nearly twice (184%) as many retail leaders identify advanced analytic tools as a top priority over the next 18 months as retail laggards.





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Toshiba elevates the retail experience with solutions that empower consumers to shop the way they want. We combine the right mix of proven solutions, innovative capabilities, and expertise retailers need to transform the retail environment in a digital world.

FIGURE 5

192%

STORES ARE A CHALLENGE:

Nearly twice (192%) as many retail laggards identify optimizing stores as a growth channel as a major obstacle over the next 18 months than retail leaders.



retail is bifurcating into leader and laggard groups differentiated by revenue growth and progress toward digital transformation.

Leaders Vs. Laggards

Important lessons can be drawn by examining study data that compares retail leaders, those that increased revenue 5% or higher in 2017, and laggards, those that lost revenue or remained flat year over year.

One good example of the difference between the groups is that retail leaders are major proponents of analytic tools and strategies while laggards are not. The data shows that nearly twice as many leaders (184%) identify analytics as a key strategy over the next 18 months compared to laggards.

This is a crucial differentiator, because smart investments in analytic tools and capabilities are proven methods for achieving a better understanding of consumer behavior to drive sales and loyalty. Analytic tools can also tighten

forecasts and improve productivity in ways that reduce expenses. The small, incremental improvements analytic tools produce for national or large regional organizations can add up to big gains. Examples abound. These include discovering savings by reducing inventory levels, tightening sales forecasts, and increasing promotional effectiveness.

Another example of the difference between leaders and laggards is the ability to convert brick-and-mortar stores into growth channels. Retail winners have either solved this problem or are currently working toward a solution, according to study data that finds nearly twice as many retail laggards (192%) say optimizing stores as a growth channel is a

Retail leaders, according to study data, **have three major distinguishing characteristics compared to laggards:** By a wide margin, they are investing in advanced analytics, **optimizing stores,** and **retiring legacy systems.**

major obstacle they need to work on over the next 18 months.

How big is the brick-and-mortar problem to struggling retailers? Huge, since 88% of respondents say brick-and-mortar stores are their primary source of revenue.

Finally, although not quite as dire as optimizing stores as a growth channel, the study finds more than twice as many retail laggards (224%) identify retiring legacy systems as a major problem to resolve in the next 18 months.

The fact that this problem ranks so high is evidence that most (if not all) laggards have delayed critical technology upgrades and are using out-of-date software, hardware and network systems. This can have a crippling effect on an organization's ability to operate efficiently and add new capabilities that match or leap ahead of their competitors.

Retail leaders, according to study data, have three major distinguishing characteristics compared to laggards: By a wide margin, they are investing in advanced analytics, optimizing stores, and retiring legacy systems. **RIS**

FIGURE 6

224%

CHOKING ON LEGACY SYSTEMS:

More than twice (224%) as many retail laggards identify retiring legacy systems as a significant problem to be solved in the next 18 months than retail leaders.

Answering the Digital Transformation Wake Up Call

DIGITAL TRANSFORMATION MEANS FOCUSING ON CONTINUAL DEVELOPMENT OF NEW AND BROADER OPPORTUNITIES IN TECHNOLOGY AND BUSINESS AS THEY BECOME AVAILABLE. HERE ARE SPECIFIC WAYS RETAILERS ARE MAKING IT HAPPEN.

BY BOB HETU AND JOE SKORUPA

If it were possible to summarize an overarching conclusion about all 85 technologies tracked in this year's study, it would be that digital transformation is a fact of life in retail today and the massive process is well underway, especially for retail leaders.

Findings that lead to this conclusion have already been highlighted in the "Executive Summary" and "IT Budget" chapters and more will be uncovered in this section of the study. However, it is important to emphasize that digital transformation is not solely about technology. It is also about retail organizations changing their DNA and converting into digital businesses that blur the lines between the physical and digital worlds.

Importantly, this omni-retail or unified commerce approach does not imply a shift away from the central role played by brick-and-mortar stores. In fact, retail leaders cite optimizing stores for growth as one of their three big strategies over the next 18 months, a characteristic that distinguishes them sharply from retail laggards.

Ultimately, digital transformation means focusing on continual development of new and broader opportunities as they become available. This includes emerging channels and innovative business models such as conversational commerce, chatbots, mass marketplaces, micro-marketplaces, game consoles and more.

The final points to be made about the ongoing digital transformation in

FIGURE 1 Status of in-store technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
WiFi for customers	39%	17%	13%	8%	22%
Mobile devices for associates/manager	25%	22%	18%	18%	17%
In-store shipping	24%	13%	12%	11%	39%
In-store pickup/return of web goods	23%	22%	18%	10%	27%
Real-time store monitoring/KPIs	19%	16%	19%	13%	33%
Digital devices (signage, kiosks, magic mirrors, etc.)	17%	18%	15%	18%	33%
Shopper tracking capability	16%	10%	13%	19%	42%
Location-based sensing for marketing/communication	10%	10%	14%	25%	40%
Clienteling/guided selling	9%	10%	17%	19%	44%
Item-level RFID	9%	3%	6%	8%	74%
In-store video analytics	8%	7%	6%	16%	64%
Electronic shelf labels	2%	5%	3%	17%	73%

FIGURE 2 Status of POS checkout lane technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
EMV payment	57%	16%	8%	8%	11%
POS peripherals (signature pads, pin pads, printers, etc.)	54%	19%	8%	6%	13%
POS terminals (traditional, fixed)	53%	19%	12%	7%	9%
POS software	41%	22%	14%	12%	10%
NFC (Near Field Communication) payments	22%	16%	14%	7%	42%
Self-checkout terminals	17%	13%	7%	5%	59%
SaaS POS (software as a service or cloud-based)	17%	9%	6%	11%	57%
Mobile POS	12%	19%	19%	17%	33%
Checkout and payment on customer's own device	8%	9%	12%	24%	25%

retail is that it will amplify corporate cultural issues that have proven to be stubborn obstacles to smooth transitions. For many retail CIOs, working with disruptive technologies and ironing out the kinks of complex deployments are the easy parts of the process. The hard parts are solving the cultural issues that prevent organizations from moving ahead quickly and achieving the benefits that digital transformation can bring.

Tracking 85 Technologies

In this section of the study, datapoints are gathered and analyzed about 85 technologies that are segmented into seven groups. The groups are Store Technologies, POS/Checkout, Analytics, Merchandising Management, Supply Chain, Workforce Management and E-Commerce. And for each of the technologies, we gather five datapoints, so the total number of datapoints collected in the chapter is 425.

With so much data collected, each of the seven groups could have an entire chapter devoted to it. However, in the spirit of brevity, we have included all the datapoints in seven major charts. Since the charts are complex and loaded with detail, here is a quick guide about how best to interpret them:

- Up-to-date technology in place refers to recently installed or upgraded technology, typically within the last two or three years. So, if we see that 64% of retailers say their time-and-attendance software is up-to-date it means that major upgrade projects have been completed within the last two-to-three years. Also, because the number is so high (a clear majority of retailers at 64%) it means the technology is absolutely essential to running a modern retail enterprise and

FIGURE 3 Status of analytic technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
Product purchase history analysis (POS and transactions)	49%	15%	9%	13%	15%
Competitive analysis (benchmarking competitors, market share, etc.)	32%	15%	15%	10%	28%
Multi-channel frequent shopper or loyalty tracking	30%	15%	22%	14%	20%
Market basket analysis	29%	21%	14%	11%	25%
Inventory optimization	26%	24%	9%	13%	28%
Replenishment optimization	25%	23%	11%	14%	27%
Social media analytics	23%	22%	14%	14%	27%
Campaign analysis and forecasting	22%	18%	17%	11%	32%
Promotion optimization	20%	19%	19%	13%	28%
Price optimization (modeling for pricing elasticity, sales & margins)	19%	13%	15%	20%	33%
Markdown optimization	18%	11%	14%	16%	41%
Assortment optimization	18%	15%	18%	10%	39%
Pricing Intelligence (competitive pricing data)	18%	7%	14%	20%	41%
Space optimization	17%	20%	7%	15%	41%
Predictive analytics	17%	17%	18%	11%	36%
Data visualization	16%	15%	19%	10%	40%
Multi-channel customer behavioral segmentation	16%	16%	16%	18%	26%
In-store shopper tracking analytics	13%	11%	8%	18%	49%
Artificial intelligence	6%	9%	13%	17%	55%

it is critical to keep this technology up-to-date.

- Started but not finished a major upgrade refers to technologies that are still in the midst of deployment. If 22% say they have started but not finished a major upgrade for mobile devices for associates/managers, for example, it means the project was approved and begun last year and carries over into

this year. This indicates that real-time activity is taking place right now.

- Will start major upgrade within 12 months means that retailers have begun preparing or have finished preparing the business case for a project. It also means that a green light for the project has been given and budget approved, or that they are pending. In either case, some work on

the project, even if just internal, has already begun and the start date for the project is by the end of the year.

- Will start major upgrade within 12-24 months means that retailers have not yet done much preparation work to develop a business case for a technology project that is clearly on their multi-year priority plan. It also means that these retailers plan to begin preparation work relatively soon to get ready for a 2020 starting date. Although projects two years out are often victims of unforeseen events and postponements, technologies in this category are clearly identified as having a place on the retailer's priority list and most will rise to the top of the list within a year.

One interesting method of data analysis that is unique to this study is based on the five datapoints we gather for all 85 technologies. This method is used to create two lists that appear in the Executive Summary on page 8, the Top 10 Technologies for 2018 and Top 10 Technologies for 2020. To determine the technologies that make these lists we examine all 85 technologies and combine two of the five datapoints gathered about them.

For Top Technologies for 2018 we combine started but not finished major upgrade and will start major upgrade within 12 months. Both of these categories indicate dollars are being spent or allocated on the technology projects and active work is being done either in deployment or preparation.

For Top Technologies for 2020 we combine will start major upgrade within 12 months and will start major upgrade within 12-24 months. Both of these categories indicate these technology projects are on a pre-determined priority list and preparations for implementation, including developing a business case, are being made or will start soon.

FIGURE 4 Status of merchandise management technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
Replenishment	38%	10%	10%	18%	24%
Item master data management	36%	16%	15%	10%	23%
Merchandise financial planning	35%	10%	11%	10%	34%
Category management	34%	7%	17%	14%	28%
Allocation	33%	7%	17%	17%	26%
New product or private label development	31%	13%	13%	10%	33%
Campaign SKU/product management	30%	16%	14%	8%	32%
Price management/execution	29%	17%	15%	14%	24%
Merchandise assortment planning	28%	13%	17%	13%	28%
Product lifecycle management	25%	14%	8%	17%	36%
Core enterprise resource planning (ERP)	24%	22%	10%	9%	32%
Micro-space planning (planograms)	24%	9%	14%	9%	35%
Trade promotion management	22%	10%	10%	10%	47%
Macro-space planning (allocation of floor space, store design)	18%	15%	10%	13%	44%

Store Systems and POS

Since stores are the primary revenue source for 88% of respondents, we track 22 technologies in the related areas of Store Systems and POS/Checkout. For 2018, the top technologies getting the most attention in these areas are mobile devices for associates/managers and in-store pickup/return of web goods.

A huge 40% of retailers are either in the midst of a major upgrade of in-store mobility projects (22%) or they plan to start one within 12 months (18%). Equal figures are registered for in-store pickup/return of web goods.

These high numbers pushed these two technologies into the Top Technologies for 2018 list. Mobile devices for associates/managers also made the Top Technologies for 2020 list thanks to the 18% of retailers who said they will start a major upgrade within 12-24 months (a number that is added to the 12-month figure to achieve a combined total).

It is also worth pointing out that only 17% of retailers say they have no plans or interest level in deploying mobile devices for associates/managers. This is one of the lowest numbers for the "no plans" datapoint in the study, aside



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from critical technologies related to POS, which every retailer should have.

Both of these technologies, mobile devices for associates/managers and in-store pickup/return of web goods, are gateways for blending the brick-and-mortar and digital worlds, which means they are in the forefront of retailer efforts to achieve digital transformation.

It is also worth noting that many in-store technologies with strong adoption curves in this category rely on robust network infrastructure. The technologies that fall into this category, which also made the Top Technologies for 2018 or 2020 lists, include: mobile devices for associates/managers, mobile POS, real-time inventory visibility, location-based sensing for marketing/communication, clienteling/guided selling, and digital devices (signage, magic mirrors, etc.).

Deploying this long list of in-store applications in the next two years will undoubtedly stress store-level infrastructures currently in place.

Retailers moving forward with these projects will risk post-implementation disappointment or even outright failure unless they address the growing need for reliable WiFi coverage throughout their stores, sufficient bandwidth to handle the new applications, and necessary management control over the network to ensure high-priority bandwidth is always available for key applications.

Fortunately for retailers, network infrastructure technologies have achieved advancements that can help them ensure new in-store application deployments will achieve expected performance levels. SD-WAN is a prime example.

Analytics

Many retail processes will ultimately deploy advanced analytics and algorithms to leverage the rich data that is becoming available through the ongoing process of unified commerce and the consolidation of once separate

sales channels, department divisions, and technology silos.

Gartner describes this as algorithmic retailing; the application of big data through advanced analytics across an increasingly complex and detailed retail structure to deliver an efficient and flexible, yet unified, customer experience.

Figure 3 shows that multichannel customer behavioral segmentation, which is based on buying patterns and personal/social profile, is the number one technology for future investment. More than a quarter (26%) say they will start an upgrade within 12-24 months, which is the highest number in this timeframe for any technology in the study.

Understanding customer behavior in its entirety, across all channels is the foundation for digital businesses and it will impact every retail process. Behavior reaches past demographics to target the reasons why a customer makes decisions. This will provide the levers that retailers can use to influence future activities.

Two of the top three future investment priorities in the analytics category are product-pricing related – pricing intelligence (using real-time competitive pricing data) and price optimization (modeling for pricing elasticity, sales and margins). Effective pricing strategy is a critical building block for delivering unified commerce.

Discussions with retailers continue to support the premise that pricing strategies are fluid and/or not sufficiently defined to enable an algorithmic approach. However, a unified price, promotion and markdown optimization (UPPMO) approach combines these individual solutions. The corresponding big data foundation that UPPMO creates can drive real, long-term, strategic benefits.

Artificial intelligence (AI) rocketed

FIGURE 5 Status of supply chain technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
Warehouse management	40%	19%	8%	2%	31%
Drop-ship management	36%	14%	10%	6%	34%
Fulfillment	35%	20%	10%	9%	26%
Logistics	35%	15%	10%	8%	33%
Transportation management	35%	13%	9%	10%	33%
Distributed order management	34%	9%	14%	10%	33%
Returns management	32%	13%	18%	7%	31%
Real-time inventory visibility	31%	22%	14%	11%	23%
Sourcing	28%	11%	14%	9%	39%
Radio frequency identification (RFID) case or pallet	8%	6%	10%	13%	63%

from the bottom of this list in 2017 to number five for future investment (combining planned deployments within 12 months and planned deployments within 12-24 months). Gartner expects that by 2020 retailers will be utilizing AI during many retail processes to make better and faster decisions.

Advanced analytics and smart data discovery will lay the groundwork for AI to revolutionize the accuracy and speed of retail decision making. This will ripple through retail headquarters, transforming many existing business processes, challenging organizational structures, and stretching the skills of associates. Algorithms and artificial intelligence are converging to transform merchandising and marketing operations, and, in the future, delivering customer-centric experiences will not be possible without AI-enabled intelligent automation services (IAS).

Merchandising & Supply Chain

Digital opportunities are revolutionizing retail business models. Merchandising is the core of retailing, where multimillion dollar decisions are made on a daily basis in a diverse organizational structure. For myriad reasons, merchandising is moving headlong into a major transformation.

For multichannel retailers, this means assortments that cross channels and drill down into each individual store have to be configured to support customer preferences. The emphasis on new technologies that enable effective allocation of goods, merchandise assortment planning, replenishment, category management, and pricing execution is driven primarily by the need to become customer centric.

These new technologies create opportunities to employ advanced algorithms, incorporating many

FIGURE 6 Status of workforce management technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
Time and attendance	64%	9%	7%	9%	11%
Labor scheduling	53%	18%	9%	11%	9%
Task management	33%	16%	13%	11%	26%
Human resources and benefits	60%	13%	6%	8%	14%
Recruitment and on-boarding	48%	11%	10%	8%	23%
Education and training	44%	17%	17%	9%	13%
Mobile workforce and/or HR applications	36%	11%	10%	15%	28%
Employee engagement management/monitoring	29%	14%	15%	7%	34%
Real-time store/employee monitoring	22%	8%	10%	10%	49%

more data inputs, steps and even decision-making capabilities. Complex algorithms were once the domain of scientists and academics, but with the advent of digital technologies and smart machines, retailers are preparing to use algorithms to improve merchandising results.

Merchandising cannot be optimized by just touching the independent variables in isolation. Lowering the price of a product may require adjustments to space and replenishment to avoid stock-outs and dissatisfied customers. Retail merchandisers no longer have the luxury to assume that other dependent actions will be taken or that things will just “work out.”

Algorithmic merchandising is how advanced merchandising, i.e. customer-centric merchandising, will be achieved by simultaneously taking into account a wide range of variables to ensure success.

Item master data management is the number one current technology where investment has been going and will go in the future. When all data points in the study are combined, item

master data management reaches 77% of all respondents. This is the largest total for any technology in the merchandising category. Coming in a close second is replenishment technology, which reaches 76% of all respondents.

Supply chain management, both planning and execution, are integrally tied to a successful merchandise management capability. And since both functions are essential to achieving financial success and both are entirely under the control of the retailer, the data shows retailers have made steady investments in these systems over time.

For most of the 10 technologies tracked in the supply chain category roughly a third of retailers believe their systems are firmly up to date and do not need imminent upgrades. This includes fulfillment, which is a defining capability in a marketplace driven to compete against the standards set by the best fulfillment operation in the world – Amazon.

Returns management deserves a call out in this category because it

has the highest number for starting a major upgrade project within 12 months. As retailers increasingly sell a higher percentage of their products online versus in stores, they ultimately incur a higher percentage of returns, since products purchased online are returned at a rate that is two or three times higher than those purchased in stores. Losses from a growing rate of returns can climb into the millions of dollars, so it is not surprising to see nearly one in five retailers are planning to make imminent investments in returns management to stem the red ink.

Workforce Management

Retailers have long understood they are America's employers. Walmart alone employs 2.3 million workers. As a result, retailers have made strong and steady investments in workforce technologies for many years. However, workforce applications and systems are continually advancing and adding optimization functions, so updating and keeping them current is an ongoing process.

The data shows that workforce applications are pervasive in the industry with 91% of retailers saying they have implemented labor scheduling and 89% saying they have implemented time and attendance. High numbers are also recorded for those who say their technologies are up-to-date. This includes 65% who say they are up-to-date for time and attendance and 60% for human resources and benefits. These numbers are among the highest in the study for up-to-date technologies.

The top areas where retailers will start workforce management projects within the next two years are: education and training (26%), mobile workforce and/or HR applications (25%), and task management (24%).

FIGURE 7 Status of e-commerce technology plans

	Up-to-date technology in place	Started but not finished major upgrade	Will start upgrade within 12 months	Will start upgrade within 12-24 months	No Plans
E-mail, mobile, text marketing/messaging	46%	24%	10%	13%	8%
Product/catalog management	41%	18%	7%	15%	19%
Customer reviews/ratings	40%	20%	15%	10%	15%
E-commerce platform	37%	22%	15%	17%	9%
Product recommendations	36%	15%	14%	15%	20%
Community	29%	12%	17%	15%	27%
Remarketing	20%	11%	13%	6%	50%
CRM/Personalization	18%	25%	22%	15%	20%
Distributed content management/repository	18%	19%	16%	15%	32%
Dynamic pricing	16%	9%	14%	6%	55%
Chatbots	3%	10%	19%	11%	56%

E-Commerce

The half-life of e-commerce platforms is among the quickest to reach obsolescence of any technology in the retail industry, which is a testament to the blazing speed of change that characterizes the online world. Year after year the study finds that roughly a third of retailers believe their e-commerce platforms are up-to-date, a third are either updating them now or will start soon, and a third will begin within two years.

Of the 11 technologies tracked in the e-commerce category, CRM/personalization shows the strongest levels of retailer planning and investment. Nearly two thirds of all respondents (62%) say they will be involved in a major CRM/personalization upgrade within two years, a figure that includes a robust 25% who are currently working on an implementation and 22% that will start by the end of the year. The massive number of retailers (47%)

focusing on CRM/personalization is a datapoint that confirms the status of personalization as one of the top strategies of the year.

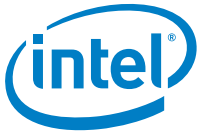
Also worth noting is the emergence of chatbots as a key technology for retailers. Currently, only 3% of retailers have chatbots in place, but 10% are currently implementing them and 20% plan to start a chatbot project within the year. Adding these numbers together we can expect to see nearly a third (32%) that will have working chatbots in place by the end of 2018.

A wake up call in retail has been issued by leaders pulling away from the pack and a culling of the weak laggards in the herd. Technology is not the answer to all of a retailer's ills, but for national and large regional chains it is a key to reducing inefficiencies and maximizing revenue opportunities, both of which are essential in a marketplace characterized by increasingly fierce competition and fast-moving consumer trends. **RIS**

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