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CPG operations: How to win in a rapidly changing environment

This compendium summarizes current trends in the consumer-goods sector, its implications for supply chains, and how leaders are adapting to the challenging environment, both from the end-to-end perspective and within each of the relevant functions.

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CPG operations: How to win in a rapidly changing environment

Executives must develop and implement strategies that enable their organization to function in fundamentally different ways.

by Ignacio Felix, Shruti Lal, Daniel Rexhausen, and Frank Sänger

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In response to the pandemic, consumer-goods companies were forced to pull off a miraculous transformation. Meticulously designed global supply chains geared to run at maximum efficiency were upended overnight. Spikes in demand, shifting consumer preferences, and successive waves of public safety restrictions caused an exponential increase in complexity. E-commerce exploded: in some markets, online sales volumes recorded a larger jump in a matter of months than they had in the previous decade.

No segment of the supply chain was spared. Production was ramped down overnight only to ramp up just as quickly weeks or months later. Warehouses and distribution centers had to accommodate demand spikes. Supply chains innovated, adding microfulfillment centers and automation to increase flexibility. The upside: companies flexed muscles they didn't know they had, rolled with the punches, and emerged more capable than ever to take on emerging challenges.

However, the hangover from the pandemic is still taxing supply chains, indicating the crisis is far from abating. Consumer-goods companies have accepted the near future will be defined by continued upheaval. Indeed, the consumer trends that defined the pandemic are here to stay and may become even more pronounced. Meanwhile, the technologies that often served as a lifeline to companies will only accelerate the pace of change while ratcheting up the pressure for rapid adoption across operations.

The winners in this environment will exhibit the prescience and boldness to pursue new opportunities and invest in distinctive capabilities. Digital will be the catalyst, flexibility and resiliency will be the payoff, and innovation in talent, organization, and operations will be the engine to make it all happen.

Five trends shaping consumer-goods

The end-to-end consumer-goods value chain spans source, make, plan, deliver, and general and administrative (G&A). Since these segments are interconnected—developments in one segment can have a knock-on effect on the others—executives must devise comprehensive strategies to improve performance. They must also factor in a handful of trends that are reshaping supply in the short term and will have far-reaching implications in the coming years.

Rapid and highly efficient omnichannel as an operating philosophy

Consumers are throwing several simultaneous curveballs at consumer-goods companies that have dramatically increased supply-chain complexity. They expect a seamless purchasing experience across multiple channels and shortened delivery times—all at no or minimal increased cost. This dynamic presents new challenges: while consumers are demanding faster service, for example, they are largely unwilling to pay for it. McKinsey research found just one in five US consumers will accept a marginal increase in shipping fees for faster delivery compared with standard free options.[1]

To meet these enhanced expectations, consumer-goods companies are being forced to expedite lead times to retailers, reduce operational expenses to offset high logistics costs, and engage with both customers and consumers across multiple interfaces. Given the high and rising costs of omnichannel order fulfillment—roughly 10 to 20 percent of sales—companies are faced with tough decisions as they work to improve delivery speeds profitably.

The pandemic also accelerated activity in online channels. A higher proportion of consumers are discovering and engaging with brands via digital platforms. Digital adoption in Europe jumped to 95 percent, from 81 percent, as a result of the COVID-19 crisis—growth that would have taken two to three years in most industries at prepandemic growth rates. And more than 70 percent of respondents said they expected to continue using digital services with the same or greater frequency compared with current habits.

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1 Tim Ecker, Malte Hans, Florian Neuhaus, and Julia Spielvogel, "Same-day delivery: Ready for takeoff," January 31, 2020, McKinsey.com.

Serving online consumers effectively can supercharge growth. Companies that successfully catered to this segment saw e-commerce climb to almost 50 percent of their overall revenue.[2] This level of activity is expected to persist or increase as consumers continue to demand greater buying flexibility.

Better for you: A focus on health and sustainability

Whether because of the focus on public health, additional time at home to dig into product details, or the rising awareness of climate change and environmental issues, consumers are drawing on their values when making purchases. For example, in Europe the growth rate for sustainable consumer-goods is nearly four times higher than the market average. And this trend will accelerate further: 38 percent of respondents said sustainable products will be even more important after the crisis than they are today.[3]

This emphasis goes beyond the goods to the packaging: marine litter is top of mind in Europe and Japan, while pollution is more of a concern in other Asian countries and the Americas.[4] A vast majority of consumers around the world have expressed a willingness to pay more for products with sustainable packaging.

Polarized and customer-centric, personalized demand

Over the past 18 months, consumers have shown a greater proclivity to change their buying habits. McKinsey consumer surveys revealed nearly 40 percent of US consumers have tried new products or brands since the onset of COVID-19. And in a January 2021 survey, more than 90 percent of US consumers indicated they will buy the same amount of or more private brands after the pandemic, a sign of this segment's staying power. Meanwhile,

consumers who were hit directly by the economic effects of the crisis have clearly tended to shift toward value. Indeed, 19 percent of European grocery consumers say they have downtraded over the past year.[5]

Consumers also increasingly expect options tailored to their preferences. Companies are aware of the importance of personalization—100 percent of top-quartile retailers cited omnichannel personalization as a top five priority—but just 15 percent have fully implemented it across all channels.[6]

In addition, the "homebody economy" that took hold during the height of the pandemic continues to linger. While the initial spike in consumption focused on categories such as consumer electronics, fitness equipment, and home improvement, consumers have yet to revert to their prepandemic spending habits. Consumer-goods companies must closely monitor changing customer behaviors and preferences to ensure their offerings are aligned.

Rising inflation

Countries around the world have endured a steady increase in inflation over the past year. In October, the inflation rate reached 4.1 percent in the EU[7] and 6.2 percent in the United States.[8] Difficulty in securing a steady supply of commodities has fueled rising prices across a range of categories. For example, prices for farm, wholesale, and retail food products have spiked in 2021, significantly outpacing retail prices. The current volatility could have two possible outcomes: a super cycle, in which price spikes endure for five to ten years, or a return to business as usual over the next several years.

These higher costs across the value chain are putting added pressure on consumer-goods companies to explore the full range of remedies: expand sourcing options, negotiate prices or

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[2] Karel Dörner, Dianne Esber, Jason Shangkuan, Bernardo Sichel, and Amy Tong, "Five traps to avoid: The long game of DTC and e-commerce," September 2, 2021, McKinsey.com.

[3] Sebastian Gatzer and Daniel Roos, "The path forward for sustainability in European grocery retail," June 14, 2021, McKinsey.com.

[4] Daniel Eriksson, David Feber, Anna Granskog, Oskar Lingqvist, and Daniel Nordigården, "Sustainability in packaging: Inside the minds of global consumers," December 16, 2020, McKinsey.com.

[5] Richard Herbert, Jean-Albert Nyssens, Rickard Vallöf, and Tobias Wachinger, "A year like no other for European grocery retailers: The state of the industry post 2020," May 20, 2021, McKinsey.com.

[6] "Retail speaks: Seven imperatives for the retail industry," Retail Industry Leaders Association and McKinsey & Company, McKinsey.com.

[7] "Inflation in the euro area," Eurostat Statistics Explained, updated November 30, 2021, ec.europa.eu.

[8] Laura Reiley, Rachel Siegel, and Andrew Van Dam, "Prices climbed 6.2 percent in October compared with last year, largest rise in 3 decades, as inflation strains economy," *Washington Post*, November 10, 2021, washingtonpost.com.

substitutions with suppliers, pass on added expenses to customers, and increase operational efficiency, among others. The severity and duration of continued inflation may necessitate an "all of the above" approach.

Uncertainty and volatility

Global interdependencies have increased the complexity of supply chains and made them more susceptible to disruption from local and regional events, such as natural catastrophes or socioeconomic patterns. Companies must now focus on managing volatility in supply chains that have been assiduously designed to be as lean as possible. As a result, supply-chain leaders are looking to adapt their operating model to be more flexible and responsive, granular and segmented, enabled by new technology, seamlessly integrated, and cost and resource efficient.

The severe labor shortages are making such efforts more challenging and costly. Compared with the two-year period preceding the pandemic, labor costs in transport and warehousing have more than quadrupled, making it the most affected sector. With no relief in the foreseeable future, companies will have to find new paths to address supply-chain volatility.

Three overarching themes in consumer-goods operations

Executives have not been sitting still amid these trends. The pandemic required every organization to build new capabilities and accelerate decision making. However, executives must now seek to develop and implement strategies that enable their organization to function in fundamentally different ways. We have observed three themes that will be critical to elevating performance in the coming years.

1. Supply-chain flexibility and resiliency

The supply chain must be at the top of the C-suite agenda for every consumer-goods company. Gone are the days when an ultra-lean supply chain was the ideal. Coming out of the pandemic, supply

chains must have built-in flexibility and resiliency to control costs—a tall order. Consumer-goods executives should concentrate on several areas. Portfolios aligned with and optimized for specific consumer segments can help companies generate more value and remain competitive. A focus on indirect procurement, an often-overlooked area, using a coordinated, technology-enabled approach can help companies identify and capture untapped value.

In addition, virtually all consumer-goods companies will need to identify their strengths, most critical supply-chain objectives, and opportunities along the entire value chain to build a more resilient operating model. This exercise requires a cross-functional approach to problem solving. In addition, consumer demand will likely remain unpredictable. Leading organizations that effectively mitigated supply-demand uncertainty during the pandemic will be able to draw on these new capabilities to respond to future shocks.

2. Digital

One of the greatest potential antidotes to rising complexity in consumer-goods operations is the promise of digital technologies. The size of the global warehouse automation market increased 10.3 percent a year from 2015 to 2019—more than double the growth rate of the previous five years. In addition, a majority of retail, manufacturing, and logistics professionals (55 percent) reported they are investigating warehouse automation.[9]

Astute consumer-goods companies recognize that the growing complexity in operations requires new tools. The challenge: determining how to deploy these tools for maximum impact. Executives must consider several factors in charting a path forward. Digital tools are ubiquitous, so choosing and integrating the right solutions will be paramount. Companies must also develop the ability to maintain and incorporate the latest tech solutions in more cost-effective ways.

In addition, digital technologies are not a stationary target. New applications for automation, artificial

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[9] Kenza Haddioui and Tim Lange, "Automation in European grocers' supply chains has reached its tipping point," McKinsey, June 1, 2021.

intelligence, and analytics seem to emerge on a daily basis, and many are evolving so rapidly that they have yet to prove themselves at scale. This dynamic means companies must view investments in digital technologies as an ongoing journey. As business leaders seek to integrate these solutions into their operations, they must be prepared to take an iterative approach.

As with any technology, selecting a solution is just one step in the process. Getting the most from investments in digital technologies will require organizations to reassess and redesign their processes, structure, talent, and culture in tandem.

3. Organization, talent, and operating models

Consumer-goods companies need to reassess their current organizational-structure and talent efforts to build capabilities that will enable the supply chain of the future. The G&A function will provide critical support, but many organizations may need to reimagine its role. G&A could transition from a cost center to a key enabler, helping the business manage complex risks, seize emerging opportunities, and make smarter strategic and operational decisions. Equally important is to evolve the operating model and integrate new capabilities such as digital and analytics into the organization and operating model.

This new role could be accelerated by some of the adjustments consumer-goods companies were forced to make in response to the pandemic. For example, the shift to remote work can present opportunities to reallocate resources, invest further in digital technologies, and promote different strategies for collaboration, coordination, and support. The widespread shift in the nature of work requires organizations to focus much more on capability building and reskilling.

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This compendium explores these three themes in depth across all five segments of the consumer-goods value chain. The following articles offer insights that consumer-goods executives can draw on to improve their own operations.

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Ensuring high service levels to meet high consumer-demand volatility

The pandemic continues to shift consumer demand as CPG companies scramble to adjust. Six best practices can enhance the supply chain now while positioning companies for long-term success.

This article is a collaborative effort by Aditi Brodie, Alan Davies, Shruti Lal, Fernando Perez, and Daniel Rexhausen, representing views from McKinsey's Consumer Packaged Goods Practice.

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Since the onset of the pandemic, US consumer-packaged-goods (CPG) companies have endured whiplash when it comes to consumer demand. Sweeping reductions in SKUs produced and supplied, prolonged decreases in product variety on the shelf, and the dramatic shift to e-commerce channels are calling into question whether consumer demand patterns will ever return to prepandemic levels. Even companies that had built resilient supply chains have experienced stockouts and bottlenecks; complex product portfolios have exacerbated these challenges. Meanwhile, overtaxed supply-chain teams have been waging a valiant battle to manage manufacturing capacity and logistics amid persistent labor uncertainty. The coming months appear set to bring more of the same.

So how can CPG companies adapt to predict demand and respond more effectively? Leading organizations have implemented six best practices to mitigate supply-demand uncertainty during the pandemic, keep operations humming, and meet customer demand: manage employee safety, embrace machine learning in demand forecasting,

adopt proactive customer management, optimize SKU portfolio complexity, expand supply options to mitigate risk, and increase productivity in manufacturing and distribution. Each individual best practice can make an impact. But since a supply chain's many variables affect overall performance, companies that implement all six will see the greatest improvement.

Shifting consumer behaviors

Fluctuations in consumer demand have been an ever-present result of the pandemic and continue to reinforce challenges that CPG companies face. The first wave and resulting lockdown in the United States were accompanied by huge demand spikes for certain goods. Subsequent waves and the variation in mitigation strategies and vaccination rates mean the demand for specific product categories can differ by region, pandemic-induced timing, and buyer behavior. Our research suggests volatility will continue with uncertainty on timing and buyer demand, competitiveness, and shopping behavior.

Even companies that had built resilient supply chains have experienced stockouts and bottlenecks; complex product portfolios have exacerbated these challenges.

In addition, data show that online demand accelerated as a result of the pandemic.[1] Online is the new normal, and consumers' shopping habits have turned to omnichannel. Consumers have indicated that they expect to make a larger share of their purchases through online channels after the pandemic (Exhibit 1). While every retailer category has seen an increase in e-commerce penetration compared with prepandemic levels, some goods have experienced a substantial jump. For example, online purchases of pet supplies and cosmetics from before the pandemic through Q4 2021 are predicted to have grown by nine and 16 percentage points, respectively. The pandemic will have the largest impact on categories such as groceries and drugs, which shoppers have not traditionally bought through e-commerce channels. These purchasing behaviors are likely to endure as COVID-19 becomes endemic, with consumers planning to shift a large portion of their purchases online.

As in many industries, the pandemic has forced CPG companies to acknowledge the shortcomings of their traditional planning and processes in the face of such rapid change. Our research illustrates the enormous complexity organizations face. Ensuring that supply chains have the flexibility to anticipate and respond to fluctuations on a micro level will require organizations to embrace new approaches.

Exhibit 1

Online penetration is likely to remain stable, as consumers have increasingly shopped omnichannel since the onset of COVID-19.

E-commerce share of total retail sales with Q4 forecast,[1,2] %

E-commerce penetration

| | 0 | 10 | 20 | 30 | 40 | 50+ |

	Pre-COVID-19 (Feb)	E-commerce acceleration (Apr–May)	Early 2021 (Jan–Feb)	(Aug)	Forecast Q4[4]
Total e-commerce penetration by retailer category	19	27	27	25	25
Essentials Discount stores	1	0	1	1	1
Mass merchandise	6	12	13	12	13
Wholesale clubs	8	11	11	10	11
Grocery stores[3]	5	7	8	8	9
Drug stores and pharmacies[3]	15	21	21	22	23
Discretionary Software and electronics[3]	68	89	79	73	74
Home[3]	30	36	38	35	37
Pet supplies[3]	55	67	63	63	64
Sporting apparel[3]	38	66	50	44	44
Restaurants	4	10	11	9	11
Cosmetics[3]	53	90	70	68	69
Retail apparel[3]	33	67	45	36	38

[1] Year-over-year growth for Mar–Sep 2021 relative to estimate of Mar–Sep 2020 had COVID-19 not occurred. Re-forecasted Mar–Sep 2020 spend calculated by growing Feb–Sep 2020 spend by the same 1-month growth rate observed for Feb–Sep 2019.
[2] Excludes sales in automotive, beauty, grocery, home improvement, home and furniture, pet supplies, apparel and accessories, electronics, and sports and outdoors, as these categories are embedded into subsequent rows.
[3] Includes Amazon sales.
[4] Estimates are based on an analysis of historical credit- or debit-card spending data at the category level and expert analysis of current trends. Q3 uses August 2021 data for September 2021.
Source: Affinity credit card spend data for 2/2019–9/2021; Stackline Amazon spend data for 2/2019–9/2021

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[1] "How e-commerce share of retail soared across the globe: A look at eight countries," March 5, 2021, McKinsey.com.

Six best practices in supply-chain response

Leading CPG organizations have been able to adapt and enhance their supply-chain capabilities and strategies across six areas. Since the pandemic has essentially changed nice-to-have capabilities into table stakes, all of these best practices embrace a two-speed approach: they can help companies manage short-term fluctuations while laying the foundation for more effective supply-chain operations in the long term.

Continue to ensure employee safety while maintaining staffing levels

Coming out of the lockdowns, CPG companies should continue to ensure basic safety protocols are in place. Measures include implementing physical barriers and signaling to prevent transmission of COVID-19, instituting pod structures, banning nonessential gatherings (for example, in common areas), securing a sufficient supply of personal protective equipment, and purchasing antigen-testing kits that provide results in 15 minutes. Companies could also continue to monitor CDC updates for new variants and local guidelines for safety measures.

Recently, the industry has experienced the impact of structural shifts in the labor market caused by the lockdown, such as employee burnout and childcare issues. More than four million workers who left the workforce in the United States during the pandemic haven't returned for multiple reasons.[2] Leading consumer-goods companies are taking several actions to secure a reliable pipeline of candidates. To manage labor risk, they are understanding their labor exposure in each market across the entire supply chain. They are also evaluating structural levers such as the level of automation in their own operations and that of suppliers. Regarding compensation, consumer-goods companies are benchmarking their compensation versus the market and articulating their holistic value proposition to employees. In addition, they are mitigating the impact of labor shortages by revamping core HR processes, from recruiting and onboarding to training and retention. And by installing a labor sales-and-operations-planning (S&OP) process, they are proactively managing labor demand and supply.

Amid high turnover and labor shortages, companies are struggling to maintain staffing levels throughout the supply chain, from truck drivers to manufacturing labor. Organizations that have faced workforce shortages have called back retirees and even trained managers to run lines. Some have also responded by increasing wages as well as offering college tuition and other compensation benefits to cater to employees in a tight labor market.

Measures that have proved effective to date in increasing employee retention include establishing new channels to escalate matters to leadership, offering support programs for employees who are experiencing hardship (for example, single parents), hiring HR staff to keep up with high hiring demands, and providing on-site health and mental counseling. Leading CPG companies have proactively counseled employees in an effort to protect against burnout and improve retention.

Embrace machine learning in demand forecasting

The pace at which consumer demand has evolved during the pandemic has highlighted the limitations of existing supply-chain strategies. CPG companies have explored ways to become more accurate in their forecasting, which has allowed them to assume a more proactive posture.

To gauge consumer demand more accurately, organizations can adopt demand-sensing and machine-learning forecasting. Leaders have used new external data sets such as point-of-sale data, retailer stockouts, weather projections, and cell phone location data to predict true demand by customer and channel. Since the start of the pandemic, companies that have implemented machine learning to handle demand forecasting have achieved 90 percent accuracy with a three-month lag compared with around 60 percent accuracy for manual forecasting methods.

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[2] Sarah Chaney Cambon, Josh Mitchell, and Lauren Weber, "4.3 million workers are missing. Where did they go?" *Wall Street Journal*, October 14, 2021, wsj.com.

Machine-learning models recognize these patterns much faster than humans can. With the resurgence of cases and new lockdowns, these models are gathering critical data points weekly that can be used to predict the future. By contrast, companies that are lagging behind are ignoring forecast-accuracy metrics and insights from peak COVID-19 months—a huge, missed opportunity to advance their demand-planning skill sets. The uncertainty about when the pandemic will abate and the potential for other pandemics or extended disruptions to surface make these skill sets a priority.

To augment demand-forecasting insights, companies should establish and maintain direct communication with customer-category managers. These conversations can identify patterns, such as which customers are still using automated reordering and which are bypassing this channel. With this information, CPG companies can allocate production volume more effectively. Leaders have developed allocation logic by channel, customer, and location to balance the true needs of customers while taking into account calculated risk (for example, if any specific retailer is threatening to delist) at the SKU level by location on a weekly basis. These projections also consider logistics parameters such as ensuring full truck loads.

Adopt proactive customer management
Companies have taken a larger role in shaping demand through more proactive customer management. For example, they have tightened the planning cycle from monthly to weekly intervals and involved senior leadership for faster decision making on product allocation and substitutions. To supplement standard operating procedures, organizations might consider establishing a supply-chain control tower to enable better visibility and decision making.

With this more rapid, hands-on approach, companies can engage commercial teams to steer customers toward available products with more capacity prior to finalizing orders. The added transparency can also support demand analysis at the SKU level and for individual customers rather than in aggregate. They can also proactively balance the bullwhip effect of surging consumer demand with enhanced point-of-sale visibility—for example,

keeping a close eye on shelves through technology or third-party vendors. While this visibility was always an important element in meeting demand, it has taken on added importance during the pandemic.

In addition, leaders have adapted their ordering policies to meet overall sales, rationalized SKUs, limited case and layer picks, instituted minimum-order quantities, and offered customer incentives to ensure full-truckload shipping, pallet-picking, and, where possible, direct-from-plant shipments. For any orders that do not meet the new criteria, companies have also negotiated differentiated commercial—lead time agreements. By identifying bottlenecks and underutilized manufacturing capacity, leaders have been able to rebalance lines as product mix and demand levels change.

Optimize SKU portfolio complexity
Developing and implementing the right solutions to deal with uncertain demand requires a cross-functional perspective to ensure supply-chain priorities are aligned with commercial concerns. The benefits of such collaboration are best demonstrated in product-portfolio simplification. Leaders have beaten the market by making bold portfolio decisions, such as reducing SKU complexity by 80 to 90 percent by, for example, eliminating small pack sizes or limiting flavor or color variations. In addition to commercial considerations, portfolio-optimization decisions have taken into account changeover reduction, availability of raw materials, potential to repurpose other lines toward priority SKUs, contract-manufacturing and packing capacity, and logistics efficiencies. Some CPG companies have developed alternative formulations for material-constrained products in an effort to meet demand. More recently, organizations have been reintroducing items to their portfolio, but the overall complexity of portfolios is still well below prepandemic levels.

Companies have seen anywhere from five to ten percentage points of improvement in overall equipment effectiveness as a result and were able to meet the demand surge successfully. Organizations can then collaborate intensively with customers and internal stakeholders if or when the curtailed SKUs are added back to the product portfolio.

Expand supply options to mitigate risks

Even with the best practices in place, CPG companies are expected to face higher demand volatility for the foreseeable future. Relying on forecasting improvements alone is not sufficient; the supply side of the house must become much more agile. Steps to manage risk could include implementing supplier operational health tracking (segmented by span of alternatives and infection risk at country of origin) and use these insights to inform decisions on safety stock targets. Suppliers with exposure to hard-hit sectors should be identified to mitigate risk. To eliminate single sourcing, companies can monitor and mitigate tier-two and -three supply risk assessments.

To secure additional capacity, CPG companies can increase their share of contract manufacturing capacity and expand their base, including extending their search to nontraditional contract manufacturers (such as industrial laundry producers for the hospitality industry). Companies can increase their flexibility by expediting the approval process for onboarding contract manufacturers and critical raw-material providers. When standard raw and pack is unavailable, companies can expand their supplier base to include alternative parts or formulations approved and ready to manufacture, targeted dual sourcing from different regions, investments in alternative capacity, and increasing safety stocks on critical raw materials with long lead times.

Proactively assessing risk across multiple tiers of the supply chain can guide these mitigating actions and target opportunities for improvement in supplier management. The shifting landscape will require more active and collaborative supplier management over the longer term. Leaders should drill down for additional information, such as supplier inventory levels for critical ingredients, and implement real-time visibility for critical supplies. To verify the ability of suppliers to withstand the pandemic, companies can implement supplier-liquidity risk assessments and streamline the process for approving payment-term exceptions. Some companies have shifted their procurement infrastructure from category experts to procurement "athletes"—that is, assigning the very best minds to work on problem areas.

Increase productivity in manufacturing and distribution

CPG companies can take action to safeguard their available capacity and avoid decisions that could limit production. To maximize manufacturing output, they can postpone nonessential projects and line trials that interfere with routine production runs and also outsource slow production processes. They can also maximize production of top-selling SKUs by repurposing manufacturing sites and stopping any nonurgent innovation, line trials, and R&D projects that take up manufacturing capacity.

Another strategy is to invest in small capital projects that can increase manufacturing output. These investments can be more surgical in nature while still having an outsize impact on production. Companies can identify bottlenecks in their manufacturing lines and make upgrades to increase output. For example, if a filling line can manage 100 units a minute but the packaging line can only do half that amount, a solution that enhances packaging can effectively double output. Similarly, completing long-overdue maintenance work can also increase the productivity of existing lines. Companies that have made these targeted investments improved overall equipment effectiveness by five to ten percentage points as a result.

Executives must also ensure their distribution networks are ready to efficiently handle the new demand profile. Actions such as expanding warehouse capacity where available, setting up new temporary nodes (for example, using vacant retail sites as distribution centers), and lining up new carriers have helped secure the necessary capacity. Warehouse automation is also being accelerated to limit the reliance on concentrated labor pools and provide increased physical distancing in warehouses.

An interim report card

Consumer demand has remained unexpectedly high, leaving companies scrambling to ensure the availability of their products. In response, companies planned a variety of actions to increase both service levels and supply-chain resilience in the short and long term (Exhibit 2). They secured supply by increasing inventory of critical raw

Exhibit 2

Companies originally planned to increase nearshoring of suppliers to boost supply-chain resilience—but wound up increasing inventory.

Planned and implemented actions, % of respondents

■ Actions related to nearshoring　■ Actions related to inventory　■ Other

	Planned in May 2020	Implemented in the past 12 months
Increasing inventory of critical products	47	61
Dual sourcing of raw materials	53	55
Increasing inventory along the supply chain	27	42
Regionalizing the supply chain	38	25
Expanding backup production sites	27	23
Nearshoring and increasing supplier base	40	15
Reducing SKUs in product portfolio	30	15
Nearshoring production	15	11

Source: McKinsey survey of global supply-chain leaders (May 4– June 16, 2021, n = 71)

materials and dual sourcing. To absorb demand variability, they expanded inventory across the supply chain. However, they lagged in implementing actions to boost production, optimize SKU portfolio, and nearshore suppliers and their production base, which require longer times to achieve. So while companies have implemented short-term actions to accommodate rapidly changing demand, they still need to follow through on long-term actions to unlock the full potential of forward-looking demand scenarios.

With new COVID-19 variants continuing to emerge, demand volatility will likely continue to cause disruptions. Further, long-term pricing implications could also have an impact on demand. Rising e-commerce fulfillment costs can also create persistent upstream cost pressure, challenging consumer companies to accelerate the implementation of long-term supply-chain solutions. For example, warehousing vacancies have dropped to the lowest levels on record, leading to higher costs per square foot. At the same time, wages are

the highest they have been since the onset of the pandemic.

Companies are going full throttle on planned actions to ensure quick implementation. However, they should also carefully monitor demand signals and supply pressures while balancing immediate and long-term actions. To ensure high service levels and profitability, organizations will need to adopt an end-to-end approach to demand planning.

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Demand variability during the pandemic has forced US consumer-goods companies to consistently monitor trends and seek to adjust their supply chains quickly. Leaders have implemented a range of actions that gave them greater flexibility and increased output. Since demand and supply volatility are likely for an extended period of time, all consumer-goods companies could benefit by embracing these six best practices.

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Risk and resilience in consumer-goods supply chains

Consumer-goods makers' supply chains are weathering enormous strain. Here's a quick look at how to strengthen them for the future.

by Ignacio Felix, Carolina Mazuera, Julian Salguero, and Frank Sänger

COVID-19 has brought major shifts in how products are consumed, forcing consumer-goods companies to adapt in absorbing the variations in demand that resulted. Yet even though the pandemic's specific dislocations were unprecedented, disruption is becoming all too familiar. Our colleagues' research estimates that disruptions lasting a month or longer now occur every 3.7 years, on average, with a cumulative cost to consumer-goods companies of one-third a year's earnings every decade.

While many companies found they could handle short surges in demand for a specific product, on the whole, consumer-goods supply chains have proved vulnerable to shocks. Several factors have contributed to their vulnerability during the pandemic.

Geographically concentrated production in some consumer subsectors has enabled companies to enjoy economies of scale and hone their expertise— but it has also led to bottlenecks when shocks occur. Health emergencies, natural disasters, and localized conflicts can cause shortages that snarl an entire production network. When COVID-19 struck, many consumer-goods companies came to the abrupt realization that some of their critical inputs were single-sourced, further amplifying risk.

COVID-19 has also increased costs for consumer-goods companies. From guaranteeing the safety of their operations and employees to reacting to increased pressure from retailers on service levels, the pandemic has necessitated often costly adjustments.

Although supply chains for consumer-related sectors tend to be more regionalized than those in other industries, the dynamics of commodities relied on by some industry segments, such as cosmetics, and global value chains, such as apparel, can expose them to a wide range of shocks (exhibit). Even sectors such as food and beverage, with more-localized value chains, have faced their own challenges. The relatively short shelf life of certain products means that even minor delays can cause spoilage.

Consumer behaviors have also shifted, with many changes likely to last well beyond the pandemic. For example, our colleagues' research has shown that economic insecurity has led to increased price sensitivity. This has led to new shopping habits, including increased deal seeking, trading down to cheaper brands or private labels, and increasing use of value retailers.

We've also seen a rise in attention to wellness, leading to long-lasting changes in product selection and consumption. Healthy eating and investments in home exercise have endured through the pandemic, while heightened awareness of health risks has boosted the importance of hygiene in consumers' daily lives.

Meanwhile, physical distancing has also led to increased consumption of online media and accelerated the evolution of e-commerce. Recent research shows how this has played out in the fashion industry, with companies vaulting five years forward in consumer and business adoption of digital since the onset of the pandemic in March 2020.[1]

Five imperatives for ramping up resilience

In this environment, what actions can consumer-goods companies take to build resilience in their supply chains? In our experience, five steps stand out: creating end-to-end transparency, investing in digitization, improving communication and collaboration, embracing e-commerce, and building talent.

1. *Creating end-to-end transparency:* Enabling a comprehensive view of the supply chain through detailed subtier mapping is critical to identifying relationships that invite vulnerability. Without full transparency, companies may not recognize their reliance on suppliers in shock-prone regions.

2. *Investing in digitization:* Companies that invest in digitizing their supply chains can realize significant benefits in transparency, traceability, and agility.

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[1] "State of Fashion 2022: An uneven recovery and new frontiers," December 1, 2021, McKinsey.com.

Exhibit

The consumer-goods industry differs from other sectors in the factors driving supply-chain vulnerability.

Which of the following conditions currently make your company most vulnerable to value-chain disruptions due to any cause, including COVID-19?

Respondents choosing this condition, %

	All respondents (n=651)	Automotive and assembly (n=200)	Chemicals (n=84)	Consumer goods (n=86)	Pharma and medical products (n=152)
Demand variability and difficulty forecasting	32	42	42	24	22
Sole-sourcing or using non-substitutable inputs	28	22	15	24	49
Long lead times	27	22	33	25	23
Low inventory or just-in-time production	26	29	25	25	19
Lack of visibility of supplier risks	23	21	22	19	25
Concentrated production	19	18	19	26	23
Risk-prone logistics	13	10	15	18	14
Aging physical plant and equipment	9	9	24	6	5
Products with a short shelf life	7	2	0	29	5
Other	10	11	13	3	7
N/A/Don't know	10	10	8	13	12

Source: McKinsey survey of business executives, May 2020; McKinsey Global Institute analysis

The up-front costs can prove worthwhile by increasing margins over the longer term.

3. *Improving communication and collaboration:* Strong communication and collaboration with both suppliers and customers have helped many businesses weather the storm. With retailers under increased pressure to keep shelves stocked and meet their customers' demands, consistent, two-way communication has been critical for maintaining strong relationships and quelling any tensions early on.

4. *Embracing e-commerce:* For consumer-goods companies accustomed to working with a relatively small number of customers and distributors, the rapid shift to e-commerce has posed a challenge. The need to ship single units and introduce more-shippable product design has increased economic risk and reduced margins. Fully embracing e-commerce and thinking creatively about how to adapt product-design and distribution approaches are key to thriving in this context.

5. *Building talent:* The talent base within the consumer-goods supply chain is not designed to operate in this new environment. Whether creating teams of data scientists and engineers or leveraging skills internally, building new capabilities is an urgent imperative.

The essential ingredients for success

Over the past several months, some companies have successfully overcome the challenges posed by COVID-19 and built critical supply-chain resilience for the future. There are several drivers of success that have differentiated these companies from their peers.

They have *focused on safety* first, not only protecting their workforce from the spread of COVID-19 but also providing support to employees facing increased responsibilities at home. In times of crisis, a bit of empathy and flexibility can go a long way. Leaders who have been conscious of the challenges their teams face and accommodating of their personal needs have been able to maintain cohesion and high performance during a turbulent time.

They have *cut portfolio complexity.* Before the pandemic, consumer-goods companies were rapidly expanding their portfolios to capture shelf space and niche markets. This complexity has now become a vulnerability, demanding a return to basics. Some companies have worked closely with their customers and suppliers to simplify their portfolios and increase availability of high-volume items.

They *introduced flexibility into their supply chains* to allow them to cope with different demand and supply scenarios. For example, some food and beverage companies are developing alternative recipes should key ingredients become unavailable.

Finally, companies that have thrived during this challenging time have *seized new opportunities caused by shifts in consumer behavior.* They have reacted quickly and nimbly to changes in preferences and are continuing to look ahead to identify future trends.

The pandemic has tested many companies to the limit. And while COVID-19 has commanded the world's attention, supply-chain shocks are becoming increasingly common. By investing in supply-chain resilience now, organizations have an opportunity to build critical agility into their supply chains, which will help them withstand not only the current crisis but also those to come.

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How to prepare for a sustainable future along the value chain

Consumer-goods companies are setting ambitious sustainability targets for themselves. To reach those targets, however, changes are required along the entire value chain—with a concrete road map.

This article is a collaborative effort by Jordan Bar Am, Nina Engels, Sebastian Gatzer, Jacqueline Lang, and Frank Sänger, representing views from McKinsey's Consumer Packaged Goods Practice.

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80%

Share of consumer emissions that reside in supply chains. To meet the pathway to net zero, CPG companies need to work with their suppliers to secure green raw materials and supply

Our lives have changed radically as a result of the pandemic. But as dramatic as the impact of COVID-19 has been, it has by no means eclipsed another topical issue: the need to shape a more sustainable economy. In fact, this task has attracted heightened public attention following extreme weather events such as the devastating flooding all over Europe last summer. Last fall, decision makers from around the world met in Glasgow, Scotland, for the 26th United Nations Climate Change Conference to discuss the challenges ahead.[1] Although the debate primarily focused on major emitters, such as the energy, steel, and construction industries, the consumer-goods sector is equally called upon to take action.

But what exactly do we mean by "sustainability"? In its broadest sense, the term covers three areas: environmental, social, and governance—or ESG for short. Specifically, ESG encompasses the degree of responsibility that companies assume—irrespective of what they are legally required to do—for sustainable development in the three areas mentioned.

For many, sustainability is primarily about our use of natural resources and the climate impact of our actions. This is also highly relevant for consumer-goods manufacturers. As a rule, it is not enough to look only at one's own value creation. After all, a typical consumer-goods company's supply chain generates far greater environmental costs than in-house operations: for instance, it is responsible for more than 80 percent of greenhouse-gas emissions and more than 90 percent of the impact on air, land, water, biodiversity, and geological resources.[2]

The Supply Chain Act recently passed by Germany is yet another reminder of the associated obligation (also with regard to the social aspects of sustainable business).

The consumer-goods industry is facing a huge environmental challenge: if it intends to meet the current EU climate targets, it will have to more than halve its greenhouse-gas emissions by 2030. Given that prosperity and consumption will continue to grow in the coming years, a fundamental change

in thinking is required; new business models—especially those relating to the circular economy—will have to gain an increasingly firm footing.

Growing pressure and rising opportunities

Even beyond the climate targets that have been set, regulatory requirements for the economy are becoming more stringent—for example, through levies such as the "plastics tax." The European Union's Green Deal provides for all packaging in the EU area to be reused or recycled by 2030. The Circular Economy Action Plan also provides for products to have long life cycles and be repairable ("right to repair").

But it's not just from the regulatory side that pressure is growing. Other stakeholders are also demanding more sustainability from companies or setting their own new standards for sustainable business practices.

Consumers. Today's consumers are another pressure point since they no longer see sustainable products as simply an alternative.

They are partly basing their purchasing decisions on the sustainability of products and companies. Granted, what some refer to as an "attitude–behavior gap" remains. In other words, consumers don't always make purchasing decisions that are consistent with their sustainability preferences as expressed in surveys. That said, two-thirds of consumers now say they are changing their consumption habits in favor of a lower environmental impact[3]—and are staying true to their word: brands, such as oat-drink maker Oatly, that promote the ecological benefits of their products are recording above-average growth rates.

Employees. Sustainability is already a top criterion in choosing an employer for two-thirds of those under the age of 34. Across all age groups, three out of four employees would like their company to place a greater emphasis on environmental and social issues.[4]

[1] Harry Bowcott, Daniel Pacthod, and Dickon Pinner, "COP26 made net zero a core principle for business. Here's how leaders can act," November 12, 2021, McKinsey.com.
[2] Anne-Titia Bové and Steven Swartz, "Starting at the source: Sustainability in supply chains," November 11, 2016, McKinsey.com.
[3] "A natural rise in sustainability around the world," NielsenIQ, January 10, 2019.
[4] *Sustainable working environment index 2021*, Epson, June 2020, epson.co.uk.

How to prepare for a sustainable future along the value chain

Patagonia, a manufacturer of outdoor clothing, is one of the pioneers of the circular economy. By 2025, it aims to make its entire business, including its supply chain, carbon neutral.

© Patagonia/Thomas Bohne-Grieskogel

57%

of all start-ups in the consumer-goods sector are 'green' start-ups

Investors. The financial sector is, to some extent, already ahead of the real economy when it comes to sustainability. A survey of decision makers from more than 40 investment firms (including BlackRock, Vanguard, and State Street) shows that an ESG-oriented mindset is already an integral element of investment decisions.[5]

Increasing demands for sustainability stem partly from investors' risk management and partly from the increasing incidence of loans linked to sustainability criteria. Furthermore, sustainability-oriented funds are more resilient, as studies show: on average, 77 percent of ESG funds established ten years ago continue to exist today. Compare that to only 46 percent of traditional funds that have survived over the same period.[6]

New market entrants. "Green" start-ups are increasingly gaining market share in consumer-goods segments—be it in the footwear market, where the Californian–New Zealand start-up Allbirds has made a successful entry, or in the food segment, where products made from plant proteins (among others) are increasingly gaining popularity. According to the Green Startup Monitor 2021, three-quarters of all newly founded companies in Germany view their environmental and social impact

as relevant to their strategy. In the consumer-goods sector, for example, 57 percent of all newly founded companies are now green start-ups.[7] Take, for instance, the marketplace Cirplus, which has set itself the goal of simplifying the currently complex and confusing global trade in recyclates and plastic waste.

In view of the growing pressure from all sides, for established consumer-goods companies, it is no longer a question of whether or not they need to operate sustainably—and most are also clear about what they need to do; however, there is still great uncertainty when it comes to how. What is needed is a sustainability strategy and, above all, a road map to implement the strategy in the context of a transformation.

Moving toward action

Where do companies currently stand in their efforts to make their operations more sustainable? Rating agencies such as S&P try to answer this question systematically by referencing an array of sustainability criteria. As the ESG score of leading consumer-goods suppliers shows, the industry performs well on average (Exhibit 1). In the social dimension in particular, the consumer-goods sector

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[5] "The investor revolution," *Harvard Business Review*, May 1, 2019.
[6] Siobhan Riding, "Majority of ESG funds outperform wider market over 10 years," *Financial Times,* June 13, 2020, ft.com.
[7] Klaus Fichter and Yasmin Olteanu, *Green startup monitor 2021*, Borderstep Institute for Innovation and Sustainability, 2020, deutschestartups.org.

Exhibit 1

Europe's consumer-goods sector has average scores for implementing sustainability; it scores best in the social dimension.

ESG score of top companies in each consumer-goods category,[1] 2019

Legend: A+ · A · A- · B+ · B · B- · C+ · C · C- · D+ · D · D-

	Average	Alcoholic beverages	Apparel and footwear	Beauty and personal care	Consumer health	Home care	Packaged food	Personal accessories	Pet care	Soft drinks
ESG score										
Environment										
Resource use										
Emissions										
Innovation										
Social										
Workforce										
Human rights										
Community										
Product responsibility										
Governance										
Management										
Shareholders										
Corporate social responsibility strategy										

[1] Per category, 3 to 5 of the largest listed consumer-goods companies by market share in Europe, the Middle East, and Africa.

Source: Refinitiv Workspace ESG Score Report 2019; Refinitiv ESG Score Methodology

almost universally earns high scores (As and Bs). This means good to excellent ESG performance and an above-average level of transparency in the disclosure of ESG data. The analysis shows that 30 percent achieve a score of A or A+ in at least seven out of ten ESG dimensions, and 52 percent achieve the same in at least five out of ten. There are also champions in individual disciplines: the consumer-goods companies listed below demonstrate strengths in certain sustainability dimensions—typically in areas that are particularly important for their business.

Nestlé has launched the Creating Shared Value program, which assures 30 million farmers and people in rural areas stable agricultural incomes through 2030, as well as the creation of fair and inclusive jobs.

By 2030, Danone wants to use solely renewable energy and lower its water consumption by one-quarter. The company was already a pioneer in discontinuing the use of genetically modified feed and supporting farmers worldwide.

Unilever aims to reduce the environmental impact of water, waste, and greenhouse gases per consumer use of product by 50 percent by 2030. The group has long been an advocate of sustainable palm oil.

Henkel aims to triple the value of its business in relation to its environmental footprint by 2030 and, among other things, is relying for certain brands entirely on "social plastic"—that is, old plastic packaging collected from people living in poverty for a fee. In addition, Henkel plans to make all product packaging recyclable, reusable, or compostable by

2025 and to make its operations climate-positive by 2040.

Adidas is already a global leader in sourcing more sustainable cotton ("better cotton"). In doing so, it maintains production levels with minimal environmental impact and supports the livelihood of local producers. In addition, Adidas plans to use only recycled polyester across its entire product range by 2024.

Patagonia is a pioneer when it comes to the circular economy and good working conditions. For many years now, the manufacturer of outdoor clothing has offered to repair older articles and return them to consumers. By 2025, it aims to make its entire business carbon-neutral—including the supply chain, which is responsible for 95 percent of Patagonia's emissions.

Beyond Meat and Impossible Foods offer product portfolios that are based on sustainable alternatives and have created significant growth in the plant-based protein industry.

The Honest Company was founded by Jessica Alba for the purpose of promoting cleaner and more sustainable products in the baby space.

The initiatives show how seriously consumer-goods companies are now addressing sustainability. Almost all of them have set ambitious targets in a range of areas, from emissions mitigation and recycling to sustainable procurement and water use (Exhibit 2).

Explanation of Exhibit 2

Exhibit 2 shows which sustainability targets ten leading consumer-goods companies aim to achieve by what year. The target year is indicated by the color code (with the palest shade being 2050), the percentage of companies making commitments is shown within the rings, and the magnitude of the planned change is indicated outside the rings. "Committed" means that these companies have committed to making reductions but have not explicitly specified a percentage.

An example of how to read the "Sustainable procurement" chart is as follows: 20 percent of companies want to make their procurement 100 percent sustainable by 2025.

Exhibit 2

Major consumer-goods companies are setting sustainability targets that go beyond simply optimizing their carbon footprint.

Sustainability targets of 10 leading European consumer-goods companies, shares in %

Legend: ■ by 2020 ■ by 2025 ■ by 2030 ☐ by 2050

Reduction of carbon emissions, %

100% net zero
10
90

Sustainable land use, %

Sustainable procurement
50%
10
100%
20
60 Committed[2]
10
70%

100% electricity from renewables

30
40
30

Scope 1 and 2 emissions[1]

−30% −30%
10 10
Committed[2]
10
−50% 40 20
10 −70%
−60%

Sustainably procured[3] palm oil

Committed[2]
100%
20 10
20
50
100% 100%

FSC-certified[4] paper

100%
60% 10
10
100% 10
70
Committed[2]

Circular use of resources, %

Share of recycled resources
25%[5]
20
Committed[2]
30
30%[5] 20
10
10 10
50%[6] 50% PET[7]
70%

Regenerative water environment, %

Reduction of water consumption[9], percent
−25%
−35% 10
10
Committed[9]
20
−25% 20
10 −60%
10
10 10 −50%
−35% −30%

Recyclable packaging[8]

100% plastics
100% 10
10 −50%
75% 10
60
10
100% plastics

Reduction of waste[9]

−50%[10]
−30% 10
Committed[2]
10
−50% 10
40
10
−50% 10 10
−50%[11] −100%[11]

Products without microplastics

100%
10
100% 40 50
Committed[2]

Biodegradable products

100%
100% 10
10
80
Committed[2]

[1] Direct and indirect emissions. [2] Committed = commitment without specifying targets. [3] Sustainably sourced or certified. [4] Forest Stewardship Council (certification system for sustainable forestry). [5] Plastics in packaging. [6] Postconsumer recycling materials (PCR) in packaging. [7] PET = recyclable polyethylene terephthalate. [8] Reusable, refillable, recyclable, or compostable. [9] Production-related. [10] Food wastage. [11] Landfill waste.
Source: McKinsey analysis of publicly available information as of September/October 2021

Since 2015, Adidas has worked with the environmental organization Parley for the Oceans, which organizes the collection of plastic from beaches. Adidas uses Parley Ocean Plastic as an eco-innovative substitute for virgin plastics.

© adidas group

Implementing sustainability goals effectively

Effectively implementing the envisaged sustainability goals is an all-encompassing organizational challenge and often means change for both the product portfolio and the organization, including its culture. Given the scope involved, it is not enough to launch individual initiatives sporadically and hope for success. Instead, sustainability must be seen for what it is: a transformation of company operations spanning the entire supply chain. Four elements are crucial here:

Set the right target level. The first step begins with a realistic outside-in assessment: What are regulatory expectations? Where are competitors raising the bar? What are the expectations of customers and other stakeholders, including investors? It is usually strategically advisable to take the lead in a small number of relevant dimensions and determine what the future minimum requirements will be in all other dimensions. The level of the targets and the speed of their achievement should be based on realistic assumptions and plans. Knowledge of the levers and the technical possibilities to arrive at a realistic ambition is of particular importance.

Plan the transformation and set the framework. Once the target level has been set, senior management should make the transformation a visible priority for everyone and plan it in detail.

To this end, measures need to be developed and incorporated into an overall road map. Governance is also crucial for successful implementation at this point; thus, instituting a sustainability officer at the senior-management level is an important framework condition. This does not necessarily have to be the chief sustainability officer, as long as the organization ensures that the central team works effectively with the operational units and can not only create initiatives but also enforce them.

Secure and track implementation. For the implementation process, it is worth setting up a transformation office that regularly measures the degree of target achievement. This enables the prompt adoption or reprioritization of countermeasures. It is also imperative that adequate resources be made available. To change ways of thinking and behavior within the company, it also makes sense to recruit employees as change agents. In this context, the communication and anchoring of sustainability goals in the organization—for example, through incentive systems—should also be addressed.

Create transparency. Last, investments should be made in data and transparency because retailers, consumers, regulators, and investors are increasingly demanding it. In particular, traceability across supply chains poses a challenge. This makes it all the more important for companies to deal with the sustainability data of their own products right from the start and to develop the corresponding analytical skills.

No function is left untouched when changes of this magnitude are needed: everyone is involved and responsible for bringing sustainability to life in their area—from purchasing to production and logistics to marketing and sales (Exhibit 3). For successful implementation, the key actors in the individual divisions need to develop both function-specific and overarching measures.

In purchasing, for example, the focus may be placed on biologically derived ingredients, recycled plastic for packaging, biodegradable and certified materials, and regenerative agriculture.

To do this, it is first necessary to assess the volume of emissions caused by each purchasing category and what reductions are possible in each area. The procurement team is also responsible for ensuring suppliers adhere to social standards.

Exhibit 3

Sustainability can be implemented along the entire value chain in all dimensions.

	Sourcing	Logistics	Manufacturing and product design	Marketing sales
Environment	Bio-based ingredients, circular resources, traceable and biodegradable materials, regenerative agriculture, and certified materials	Reduction of last mile emission and optimized delivery routes, alternative propulsion (eg, e-mobility, H_2 trucks), sustainable warehousing incl renewable energy and sustainable cooling technology	Energy efficiency, sustainable packaging, waste reduction (incl food waste), and water stewardship	Product transparency, product ecodesign with ecoscores and labels, environmental certification, product life cycle assessment
	CO_2 reporting and Scope 1, 2, and 3 split; GHG emissions reduction; maximized water circularity by recovering, reusing, and recycling wastewater; renewable energy usage; reduction of food waste			
Social	Farmer training and financial empowerment; responsible sourcing	Upskilling and safety trainings, incentives for low fuel consumption	Health and safety management system at production sites	Promotion of responsible consumption
	Human rights policy; child labor policy; gender score; gender pay gap regulation and publication; management of gender balance; diversity and inclusion practices; donations to social causes (women empowerment, violence victim support, etc); modern-slavery transparency statement			
Governance	Compliance programs and communication; data protection regulations; conflict of interest policies; anti-corruption, anti-trust and bribery regulations; traceability system integration; risk mitigation plans			

Source: McKinsey analysis

In logistics, it is key that companies consider alternative propulsion systems for their vehicle fleets or the use of more sustainable transport options. In the field of warehousing, organizations should review cooling technologies and use renewable sources to ensure energy supplies, employing their own solar panels if necessary.

Production should first optimize its energy efficiency. In addition, consideration needs to be given to the use of renewable and sustainable energy sources for electricity and heat at production sites. It is also necessary to investigate how water and other resources can be used more efficiently and how waste can be reduced.

Meanwhile, R&D teams can work on more sustainable designs and formulations (design to sustainability). This can involve sustainable packaging or formulas for new products that lead to greater sustainability in use—such as laundry detergents that clean textiles thoroughly even at low water temperatures. L'Oreal, for example, has developed the Sustainable Product Optimization Tool (SPOT), an evaluation tool focusing on ecological design on two levels. First, it simulates different design options, evaluates their impact on the environment and society, and identifies improvement measures. Second, SPOT quantifies the effects of sustainability on various product attributes, such as packaging; the environmental footprint of product compositions and chemical processes; and social implications.

————————

The initiatives described above for illustration purposes show that sustainability is not an issue that can be left to a central unit; rather, it reaches deep into all functions of consumer-goods companies. Citizens, policy makers, investors, and new competitors are increasing the pressure to act. Above all, however, it is the companies' own sustainability ambition that requires a structured and holistic approach if the goals set are to be achieved.

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Digital supply-chain transformation with a human face

Why building a digitally enabled supply chain is hard, and what to do about it.

by Scott McArthur, Ali Sankur, Maximilian Schlichter, and Ketan Shah
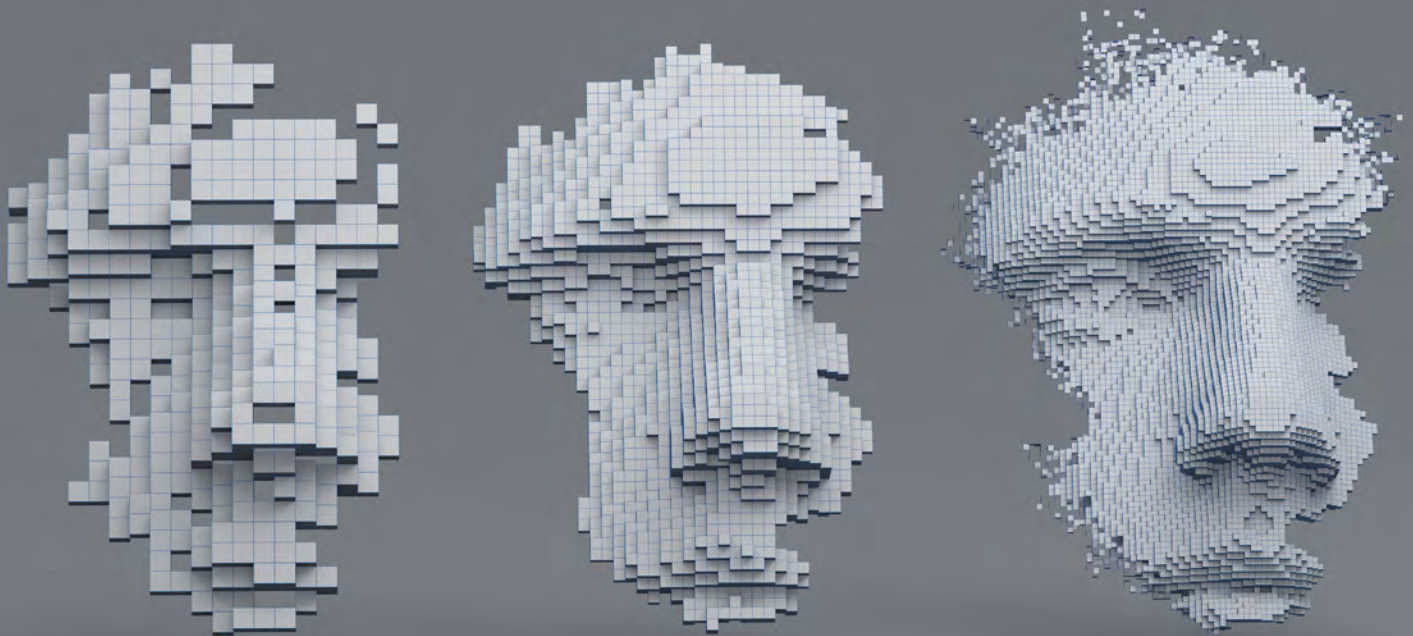
In an earlier article,[1] we looked at an inconvenient truth of supply-chain technology: the modern supply chain is still a fundamentally human endeavor. Smart algorithms may be able to generate faster, more accurate demand forecasts, for example, but executing against those forecasts requires the combined effort and alignment of hundreds of individuals across the organization, each with their own preconceptions, incentives, biases, motivations, and limitations.

In that article, we argued that understanding the importance of the human factor presents an opportunity for companies pursuing technology-enabled supply-chain improvements. Digital approaches that work with people, rather than around or against them, tend to achieve more impact while proving easier to implement and more sustainable over time. Such approaches work by improving access to information, streamlining decision making, and facilitating cross-functional collaboration and trust.

This thought provides a novel lens through which to assess supply-chain technology investment and design digital supply-chain transformations, as opposed to the stereotypical approach of automating ruthlessly.

From linear to iterative transformation

Even companies that recognize the need to take a holistic approach to supply-chain technology face another major hurdle: getting from here to there. Transformation in any part of a business has always been difficult. It requires organizations to juggle multiple moving parts, including people, processes, and management infrastructure. And it requires them to overcome all the usual technical, organizational, and cultural obstacles to change.

Digitally enabled transformations add two extra challenges into the mix. First, there is the extra technology component, which must be handled alongside changes to processes, management infrastructure, and mindsets and behaviors.

The second, and more significant, challenge for companies introducing digital technologies into

their supply chains today is the lack of a single, clear destination. When organizations embarked on transformations in the past, they could begin by defining the desired end state. Introducing a lean production system is a very difficult enterprise, for example, but companies starting out on a lean journey at least understand how they ultimately want things to work. That vision of a goal makes it much easier to take the right steps in the right sequence, and to measure the progress of the overall transformation.

Right now, digitally enabled supply-chain transformations don't have the same luxury. Digital technologies are evolving so rapidly that there hasn't been time for many of them to prove themselves at scale. There is no Toyota of the digital supply chain, providing a template for other organizations to copy. Indeed, supply chains are so specific to each company's product range, operating footprint, and customer needs that such universal archetypes may never emerge, even after years of experimenting.

All that extra complexity and uncertainty means that companies can no longer follow the traditional linear transformation path: they need an iterative approach. New digital technologies must integrate with people, processes, and management infrastructure—but those technologies will also influence how each of the other elements should be redesigned. If an organization introduces real-time, closed-loop planning technology, for example, does it still need a traditional monthly sales-and-operations-planning (S&OP) process? It might be better off with a new, more flexible collaboration structure, designed to manage exceptions and issues on the fly as they arise.

In the same scenario, does it still make sense to have separate supply-planning and inventory-management roles? In short, if companies introduce new technologies without also making changes to their operating systems, mindsets, and management infrastructure, they risk "digitizing the current firefighting" rather than fundamentally transforming their supply-chain performance.

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[1] Matt LaBombard, Scott McArthur, Ali Sankur, and Ketan Shah, "The human side of digital supply chain," August 20, 2019, McKinsey.com.

Why today's approaches fail

Designing and delivering a supply-chain transformation is a formidable task. So formidable, indeed, that some companies have so far avoided the challenge altogether, waiting on the sidelines for a standard template to emerge. Others have tried but failed, often falling into one of three common traps (exhibit).

The first of these traps is to focus only on process. Companies sometimes spend lots of time and effort in developing highly detailed plans that describe exactly how their supply chain processes should work. Others even try to outsource thinking on this, copying their plans from generic "best practice" templates.

When the time comes to implement the new way of working, however, this approach often leads to "organ rejection." Process is necessary, but not sufficient for a transformation. There are certainly common-sense best-practice principles:

for example, in most cases supply chains should be cross-functional, not siloed. In our experience, however, the details of process must be co-created by the engagement of key stakeholders across all levels of the organization, and co-driven by hands-on capability building and change management.

The second trap is the adoption of a technology-first perspective: the digital hammer looking for an analog nail. Here, companies find an impressive digital approach, then hunt for places to apply it across their supply chains. Working this way, companies end up digitizing their current, suboptimal processes. That limits the value of digital approaches and may even make it more difficult to capture larger improvements over the longer term.

The third common trap is the problem of pilot purgatory. The company understands the need to address every component of the transformation—but tries to make the problem more manageable by addressing only a small part of the organization in

Exhibit

Three common failures block supply-chain transformation.

	Operating system	Management infrastructure
	Technology	Capabilities, mindsets, and behaviors

Legacy approach
Fixing a single process (eg, forecasting) or a single metric, with focus on process design

System rollout
IT-driven attempts to digitize supply chain, or to redesign processes to conform to systems

End-to-end approach in a narrow segment of business
Implement system, process, and organization changes in only a contained slice of the supply chain

Paper excellence …
… but failure to take off and transform

Firefighting digitized …
… but failure to deliver impact

Nice pilot …
… but failure to scale up

Source: McKinsey digiTS

a targeted pilot project. These efforts often deliver rapid and impressive results.

The problem comes when it is time to scale up. Processes, systems, and technologies that work well with a small group of motivated people may not be robust enough to stand up to the demands and complexities of the entire business. There may be too many distinct segments of the business, with supply-chain requirements that differ fundamentally from those of the pilot unit, to allow for a simple copy-and-paste approach.

The shortfalls of the chosen systems and technologies, which are often easy to overlook or manually correct in a risk-free pilot, become a headache when they need to operate in a touch-free, at-scale environment. The focus and energy the organization builds during the pilots usually evaporates quickly, and other parts of the business may not be receptive to a new approach developed somewhere else. Finally, organizations may rely on external help to get the initial pilots up and running, but a lack of capability building can leave them with insufficient skills to repeat the process on their own.

Learning from the leaders

Steering a digital supply-chain transformation so that it avoids these pitfalls is no trivial exercise. Nor is there is a magic formula or one-size-fits-all approach that guarantees success. When we look at companies with high-performing digital supply chains today, we see a number of archetypes (not one model) with some common threads across them. Critically, while all these organizations make extensive use of advanced digital technologies in their supply chains, those technologies were only one component of a far more holistic effort, which always has the human element at its heart. Let's look at three examples.

Aligning on a single, clear objective in high tech

Operating in a particularly fast-moving, volatile part of the IT industry, one component manufacturer already had an efficient and high-performing supply chain. Over time, however, customers began to demand even faster delivery and the ability to

change their order mix at the last minute. With lead times of more than 30 days to fulfil orders placed by customers in the West for products manufactured in China, the company found itself in an uncompetitive position.

Over a multi-year period, the organization embarked on a comprehensive supply-chain transformation, built around a single business objective: reduce lead times to the minimum possible while keeping cost under control. Having a single, clearly understood business goal helped everyone in the company to support and align behind the multiple changes that were required across the supply chain.

Some of those changes, like lights-out factories in China or real-time integrated planning and scheduling, involved new digital technologies. Others were around processes. The company segmented its product lines and customer base, for example, and developed tailored supply-chain processes for specific segments. It introduced postponement into its manufacturing processes, assembling finished goods on demand from components stocked close to its customers. Ultimately, the transformation effort allowed it to reduce overall lead times by more than 80 percent, with most orders fulfilled in less than five days.

Hands-on capability building in complex manufacturing

A multinational industrial-goods manufacturer was drowning in supply-chain complexity. Its product range was large and diverse in a make-to-order environment, and manufacturing relied on thousands of components from hundreds of suppliers. A single missing component could bring production to a halt, so supply-chain planners responded by flooding the system with inventory. That only led to high costs and poor productivity.

The organization had been operating advanced supply-chain-management software for more than ten years, but its use of the system had not gone beyond basic dashboards for visibility. Planners didn't know how to apply the system to support day-to-day decision making, and its advanced-analytics capabilities were untapped.

Solving the problem required a very human-centered approach. Supply-chain specialists sat down with planners and operational staff to discuss the issues they faced every day. Then, building on the existing digital infrastructure, the company created decision-support tools and problem-solving workbenches that gave easy access to relevant, actionable information. Finally, the company rolled out the new tools and processes with an intensive program of on-the-job training and support.

The capability-building approach included problem solving, root-cause analysis, and—because executing a solution often required the involvement of multiple stakeholders— influencing and communications skills as well. This last step was critical, since it not only gave frontline staff the technical ability to use the new systems, it also helped change their mind-sets, giving them the tools they needed to solve problems and the confidence to implement the best solutions. The project unlocked almost $100 million in stranded inventory in less than two months.

Getting results fast with agile in consumer-goods

When a major consumer-goods manufacturer looked to shift its supply-chain performance from good to great, managers assumed that technology would provide the answer. After early initiatives delivered lackluster results, however, the company knew it would need a different approach.

The company realized that the problem lay in how its digital projects were planned and executed. With little collaboration between business functions and IT, the organization relied on a traditional waterfall approach, in which the business defined its technology requirements and the IT function proposed a solution. Working that way was slow and meant that the company was merely digitizing its existing processes, rather than exploring opportunities to run its supply chain more effectively.

To break the cycle, the organization took a radically different approach. Rather than using its existing processes as the kickoff point for its digital efforts, it started with a clean sheet. Using the agile methodology, it brought together a cross-functional team of supply-chain, business, and technology specialists to work on a new process—together with new roles, new performance indicators, and a new management system. Working in a series of sprints, the team created an entirely new supply-chain planning system that combined 80 distinct data sources to enable data-driven decision-making and execution.

By changing its approach from "all-in" to "minimum viable product", the company was able to put the new operating model into action after only 16 weeks. The new system reduced the time required to re-plan and react to demand changes from seven days to less than three hours. That led to a two-percentage-point service-level improvement and a 10 percent reduction in inventory.

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Digital supply-chain transformation is about much more than technology. For the latest wave of supply-chain innovation to deliver its full potential, companies must be willing to adapt their processes, capabilities, and management systems. They need the willingness and flexibility to learn, adapt and change as they go. And above all, they need to ensure that their people are with them on the journey.

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Achieving supply-chain resiliency in consumer goods amid disruption

Dirk Holbach, chief supply-chain officer for Henkel's Laundry & Home Care business unit, shares lessons from his seven-year journey in the role and what leaders should be prepared for in the future.

by Frank Sänger

While current headlines about product shortages and empty shelves have highlighted the importance of the supply chain, that process began in early 2020. Companies that had labored to create a lean global supply chain needed to scramble to adjust to the effects of the pandemic. Beyond that, sustainability has also become a top priority on the CEO agenda, making the supply chain an integral part of managing an organization's carbon footprint. Consider, finally, the imperative to incorporate digital technologies, and one could argue that managing the supply chain in the current landscape is one of the most complex roles in an organization.

Henkel's Dirk Holbach has an ideal vantage point to weigh in on all of these issues and more. As the chief supply-chain officer for the Laundry & Home Care business unit at Henkel, a global consumer-goods company based in Germany, he manages an operation that spans 125 countries. In his two decades with Henkel, Holbach has helped to guide the business unit's supply-chain function through both expansion and disruption. McKinsey senior partner Frank Sänger sat down with Holbach to talk about how the organization responded to the challenges presented by the pandemic, how to build resilience into the supply chain in a shifting environment, and how Holbach has taken the lead on sustainability and diversity.

Frank Sänger: In your two-decade career at Henkel, how have you seen the company's operations evolve? What factors have shaped Henkel's supply chain the most over this period?

Dirk Holbach: During the past 20 years, the supply chain has gone from being regarded as a must-have cost center to a more purpose-led, agile, sustainable function. It has become more intelligent, digital, and resilient. We have invested in setting up the right organization, rebuilt our footprint, implemented digital, and developed sustainability capabilities. We are increasingly becoming a mission-critical growth driver and engine for our business.

A key part of this effort was to empower our teams. Over the past several years, we have invested

heavily in talent and the tools to support them in their roles. Without the right investment in people development, you can have the greatest system, the greatest footprint, or even the greatest digital technology—but at the end of the day, it will not yield the expected benefits over time.

Frank Sänger: COVID-19 has led to major reforms in supply chains all over the world but has also brought disruption along the way. What strategies have you implemented in the past two years that helped the company to stay ahead of the competition in such difficult times?

Dirk Holbach: We have taken a systematic approach to managing resilience in the supply chain. During the crisis, it was a steep ramp-up of measures. In many countries, we were fortunate to have not only well-prepared and well-organized teams but also robust processes and systems in place.

Being able to adjust our capabilities and processes is ingrained in the organization, and this was a muscle that helped us a lot during the pandemic. For instance, in April of last year, when the first demand shocks hit our system, we introduced a new element in our S&OP [sales and operations planning] process in just a few days—basically a daily management of capacity and demand by country supported by some digital capabilities using our existing analytics platform.

Certain elements proved more effective in the short term to manage the crisis. Since then, we have assessed our organization and strategy and identified gaps where we had not been prepared well enough. We then embedded these findings into our latest resilience framework, which we are institutionalizing now.

We have now dedicated resources in the central team to look at all the different components of that framework and are making sure the organization is pulling the right levers at the right locations in order to strengthen our supply-chain capability.

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Dr. Dirk Holbach

Career highlights
CSCO Laundry & Home Care
(2014–present)
Corporate Senior Vice President,
Managing Director HGSC B.V.

Education
Graduated with an MS in mechanical and industrial engineering from University of Kaiserslautern and earned a PHD in business information systems from University of Duisburg-Essen

Continuing education
Harvard Business School
Leadership Forum • Executive Education

HEC School of Management/HEC Paris
Leading strategies for outstanding performance

INSEAD
Strategics for Senior Management

IESE Business School
Advanced Management Practices

Frank Sänger: How has the pandemic changed the way your organization views supply-chain risk and resilience?

Dirk Holbach: Our framework isn't super complicated. From the system and process angle, we look at three different enablers: people and visibility, redundancy, and flexibility. And here we really have defined systematically the areas in which we are purposefully investing.

For people, it's about the mindset and ability of everyone to quickly sense and react, learn and adjust, and encourage and empower the teams to do so despite being a multinational company. Many things are, of course, defined, regulated, and standardized in processes. In certain situations, you need to think beyond. This mental approach is extremely important. We enable that thinking by aiming to have all relevant data available on the spot, ideally—and if relevant—in real time to support effective decision making.

When it comes to redundancy, for instance, one principle is that we manufacture a certain product technology in two locations so that we have a backup. If one location goes down, at least I can manage the supply for a couple of weeks. We cannot replicate capacity ad infinitum, but that is one very simple principle.

The other strategic lever is flexibility. Talking about product platforms, exchangeability and formula flexibility are important. We are continuously working on that lever because materials are pretty short at the moment. We focused on building the ability to react and adjust formulations in a way that we can fulfill our consumer and customer requirements but still continue to manufacture.

At the end of the day, it's always about trade-offs. Of course, you can build redundancy in your system, but that is not for free. It costs money. This is a kind of insurance premium: you are either willing to pay or not.

Frank Sänger: We have spoken about the challenges created by the pandemic. Do you also see opportunities that have been created?

Dirk Holbach: I always like to say that in every catastrophe you will find at least one opportunity—and usually more. We learned quite a lot during the past two years. And we leveraged capabilities in a much faster and different way than we ever had expected.

People tend to see the issues and the problems. But I think it's very important that you turn quickly to a forward-looking mode and ask yourself, "What are we doing now, and how can we do even better afterward?"

For instance, we used digital technologies to run remote installations of new filling lines site tests, even without the OEMs or vendors on site. We used HoloLens and other tools. We took these steps because, due to safety measures and travel restrictions, we had no other choice. That's why new capabilities and mindsets are so important: what is possible now, compared with two years ago, is very different.

You must be able to keep up with the competition. When you have moving targets and a relevant standard of performance, that makes it difficult to measure and follow. But it continuously gives you new opportunities to perform in a dynamic marketplace.

For the next few years, we have to take a different approach to these just-in-time global supply chains. We have to be smarter. You may run into a cost and benefit discussion on the business side, but I perceive a readiness to invest in resilience.

Frank Sänger: Do you have any specific advice to other organizations to minimize their exposure to supply-chain disruptions, which have become increasingly frequent and severe?

Dirk Holbach: I would mention several things. First, invest in visibility. Visibility means understanding at any point in time what's going on in your extended supply chain. That is definitely a must, because without it you won't know what to do.

The second element is people. Again, continuing to set up the business to be more centrally standardized and organized, adding to strong regional and local teams empowered to make fast decisions within a given framework. We might never get back to a prepandemic level of supply-chain stability, so it's critical to take everyone along and to help teams to be mentally ready—things we are constantly working on. In my point of view, it is crucial to find ways of operating in such an environment, to learn from mistakes, and to do better the next time.

Last would be to review your product sourcing. This item is a bit linked to the two other buckets. I discussed the redundancy piece and also the flexibility. But let's say that you then look at the components. Do you have dual, multiple sources and setups at that end?

In general, people, industries, and players tend to forget relatively quickly, especially in the FMCG [fast-moving consumer-goods] context. That, for me, is a big "watch out" so that we don't fall too quickly back into normal. Even after COVID-19, we will have other things that affect and disrupt our supply chains.

Frank Sänger: Let's transition to the topic of digital. Henkel has been at the forefront of digital innovation in the industry, establishing industry-leading lighthouses and covering those at the World Economic Forum. How do you prioritize Industry 4.0 technologies for Henkel?

Dirk Holbach: We started that journey eight years ago. We wanted to do something good for the environment and measure the energy consumption of our factories in a global and standardized way.

Over time, we learned that a couple of elements help us to drive that effort. I elevated the role responsible for digital transformation onto my leadership team and committed the necessary resources. We started to systematically review technology areas that we believe could benefit our organization and settled on four areas: automation, robotics, analytics, and visualization, as well as the connectivity between these areas and the application and use cases.

We defined a dynamic road map, a funnel with a portfolio of application cases, and different maturity stages. It's important for companies to clearly define focus areas and build a road map. Try not to do everything at the same time. We manage fewer than 25 different application cases in different maturity stages at a time, excluding the ones that are running and implemented.

Usually, we try to learn and try out applications relatively fast and then scale up quickly. If we see that a certain application use case delivers value for us, we use it wherever it makes sense on the global scale. That approach—to avoid focusing on big, complex business and benefit cases—helps to secure the funding for these initiatives because initially you will usually look at a pretty specific and well-defined area of benefits and activities. It's easier to determine what you need to invest and what you get out of it. Then, you secure funding and build your success stories internally over time to be able to scale up the solutions.

A strong connection between the global and local team is also very important. We use a top-down, bottom-up approach to identify ideas that fit into our framework and strategic focus areas. Last, you cannot undertake this effort without a decent underlying IT infrastructure. You need to have not only a strong central IT department but also focused IT-related capabilities within the supply-chain operations. The ability to define requirements and demands through an operations lens and translate that to IT solutions is critical. Having this deep business understanding paired with Industry 4.0–related knowledge within my team accelerates progress significantly.

Frank Sänger: You mentioned the digital journey started with the focus on sustainability. Henkel has been included in the list of the world's 100 most sustainable companies presented at the World Economic Forum. What can industry do to become more sustainable, especially in supply-chain logistics?

Dirk Holbach: Sustainability is part of Henkel's DNA; it goes back even to the company's founder. We have been tracking our sustainable performance for more than 30 years and reporting on it. On Scope 1 and Scope 2 emissions, we have decreased our CO_2 footprint in our Laundry & Home Care business by 65 percent over the past 15 years. The rest we will manage over the years to come. It's well under control and manageable.

COP26 in Glasgow illustrated the size of the challenge: despite all the great things we have done in the past, we must be much faster. In German, we say, "It's five before noon." We clearly have to accelerate.

When you take a deep dive in the supply-chain area, looking into the area of logistics, this is the first bigger challenge. Like many others in the industry, we partner with other companies to operate our own logistics fleet. So we have to engage with our partners in the right way, and we need to be clear on our expectations. It starts with how we contract those services and what we specify as relevant performance. It's not only operational performance but also costs and CO_2 emissions.

On the other hand, if we take the laundry and home-care industry, just 2 percent of the upstream CO_2 footprint comes from our own production facilities. The remaining 98 percent is outside the total life cycle. The majority comes from packaging and

raw-material creation, as well as from the use and reuse of the materials. It's super important that we partner with our suppliers of these raw materials in the right way to drive progress. A few weeks back, we invited all of our key raw-material suppliers to a virtual session and shared our vision for how we want to drive the transformation of our material sourcing over the next years. The conversation covered what we have done, what we expect, and what we can do by working together.

On the downstream side, we have seen a decrease in the amount of materials used for washing. Twenty years ago, we were at 150 grams of laundry detergent per wash load. Now, our most compact version uses 15 to 17 grams—a factor of ten. In our dishwashing detergent, we are using smart chemistry to clean products in a way that doesn't require heating the water to 50 degrees or 60 degrees Celsius. However, we still need to further educate consumers when it comes to washing, water usage, and temperature. We need to continuously develop and create smarter products, addressing exactly these critical fields.

Frank Sänger: And how is digitizing the supply chain helping you to achieve your sustainability goals?

Dirk Holbach: In 2013, we started our digital journey precisely to measure energy consumption at our factories on a real-time basis. Creating that transparency along the way helped us to significantly use technology for a purpose—to drive sustainability performance and reduce our footprint. We are going beyond that. We are using machine-learning algorithms to optimize some of our energy-intensive processes, such as laundry-powder production.

Across the upstream and downstream value chain, digital capabilities will further increase the visibility and traceability of products—for instance, raw materials. Our consumers and customers are more and more interested in sustainability—and for good reasons. When I buy a product, I ask myself where it is coming from and where it has been produced. We are building capabilities that will help us answer those questions in a much better way.

Frank Sänger: Before we close, let's discuss diversity, which I know is a focus area for both Henkel and you personally. Henkel was recently listed by *Forbes* as one of the best companies to work for in terms of diversity. Is the level of diversity in the supply-chain function where you want it to be, and what are you doing to improve it?

Dirk Holbach: I'm a great believer in diversity across many dimensions—not just gender but also personal and cultural background. Especially in times of uncertainty, a diverse team will bring you a higher likelihood of different and maybe disruptive ideas and ways to handle a crisis.

At Henkel, diversity and inclusion is a very prominent topic. We have made great progress in our supply chain over the past ten years. Although Henkel is based in Germany, we employ people from more than 125 nations. More than 85 percent of our people work outside of Germany.

I have personally been driving this topic since 2011. For instance, when it comes to gender, we more than doubled our percentage of women in management positions in the supply chain during this period. But we are not where I personally want us to be.

We have been building up the bench, and we have made great progress in the supply chain already, but we need to further drive this transformation.

Frank Sänger: Any other advice that you have for other supply-chain leaders?

Dirk Holbach: Don't believe what brought you here today will help you achieve targets in the future. Past experiences and legacy practices are great; don't throw them away. Build them into your future strategies. But do not expect that they will work as a plug-and-play model in the future, because circumstances will be changing continuously. So be ready and learn. Be open. Try to integrate new findings into your experiences. Be prepared to develop at a different speed than you did in the past.

With the supply chain, you're talking about big organizations and operations. But supply chain is a people business. Despite all the technology, processes, and standards, it's super critical that we have the right people at the right spot. We take care of them because they are our most precious resource.

Over the past two years, supply-chain terminology has gained a completely different prominence in mainstream media and companies—really moving from this perception as a cost center to a solution provider and growth engine for many businesses. And hopefully that will attract more talent to supply chain and operations. It's a cool place to work if you like challenges.

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Building resilience through procurement analytics

New tools can help companies crisis-proof their supply chains. To implement the technology at scale, companies can focus on four key priorities.

This article is a collaborative effort by Patricia Bivol, Kathrin Bormann, Jörg Dittrich, Raman Julka, and Björn-Uwe Mercker, representing views from McKinsey's Consumer Packaged Goods Practice.
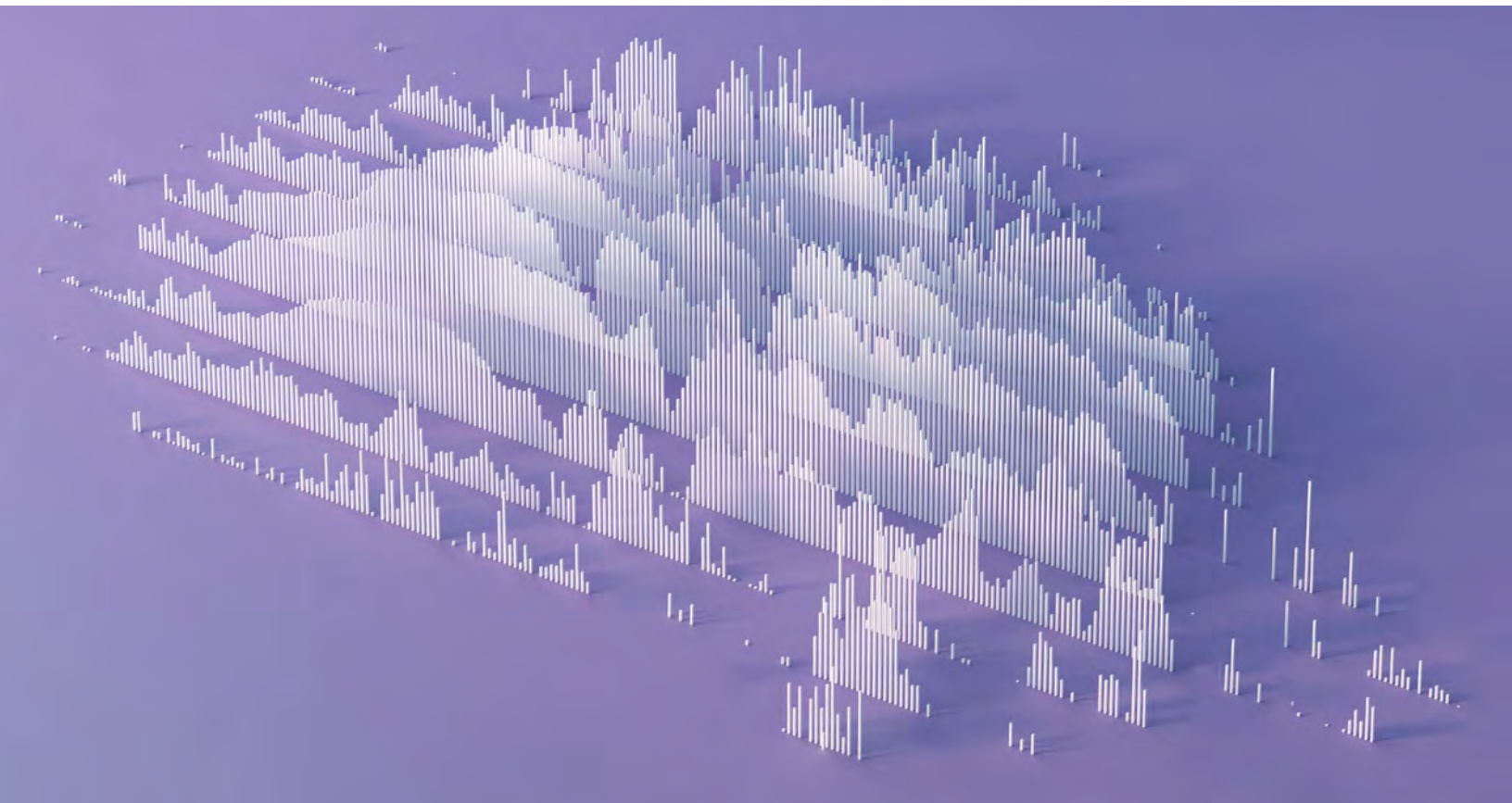
Managing supply chains can be tough for many organizations, whether because of too much organizational complexity, too little spending transparency, or too heavy a reliance on gut instinct—usually resulting from siloed data and manual processes. In early 2021, we listed critical activities that the procurement function should work on to boost efforts for recovery, now and into the future.[1] These five themes are devising zero-basing value-creation strategies, developing supplier partnerships and co-innovation, developing a future-ready operating model, reinvigorating core and new procurement capabilities, and accelerating the adoption of digital and analytics. This article will focus on the latter theme, which is the most crosscutting of all.

The promise: by better using a company's own data, analytics can help organizations spend more intelligently and efficiently, improving their liquidity and cost position. It can increase transparency and speed, giving decision makers crucial insights for determining when, where, and how to act. And in so doing, it can help organizations become more resilient.

Vulnerable supply chains, difficult solutions

In a recent webinar poll we conducted, procurement organizations reported seeing some improvement in their ability to react to disruptive events. When comparing COVID-19 to the global financial crisis of 2008−09, about half of organizations say they improved their spend visibility and were equipped to respond more effectively. Yet more than one-third saw only a slight improvement, and 16 percent, or nearly one in six companies, saw no improvement at all (Exhibit 1).

In an increasingly volatile business environment, that limited progress is not sufficient. Quite simply, too many of today's procurement and supply-chain functions are unnecessarily vulnerable. Yet companies can take substantial steps to improve their ability to respond to internal and external obstacles—especially by staying more up to date with economic and technological developments that help create a stronger, more resilient organization.

Analytics, for example, is not a secret. But companies face challenges in trying to implement it at scale, primarily because procurement data can be inherently messy and fragmented. A given product's purchase order could be stored in the company's procure-to-pay system, while the invoice is stored in the financial system and the referring contract is stored in the customer-relationship management (CRM) system. When data are stranded in silos such as these, companies cannot create a single source of truth.

Exhibit 1

Only about 50 percent of procurement professionals say their organizations performed better in 2020 than in 2008−09.

Not at all
16%
We were again taken by surprise

We have taken initial steps
35%
We made investments in analytics and capabilities, but there are gaps

Our response was better
41%
We improved spend visibility and now understand levers to react

Our response was significantly better
8%
We were able to anticipate challenges and react at speed

[1]N=165 procurement professionals; survey conducted in July–December 2020

[1] Tarandeep Singh Ahuja, Sharat Chikatmarla, Levix Liang, Yen Ngai, and Ling Zhao, "Five themes can help procurement shape recovery in the next normal," January 22, 2021, McKinsey.com.

Deep, category-level content knowledge and experience are also notoriously difficult for many companies to develop, retain, and share consistently. They have few benchmarks to work from, which means they cannot access potentially powerful demand and commercial levers to drive better terms. When teams do run analyses on specific product categories, that process is often manual and thus not scalable, leaving much of procurement's volume unmanaged. In this environment, automation is essential to manage large volumes of data and execute rote processes faster and with greater accuracy. But most procurement functions haven't applied automation at scale—yet.

Four actions for analytics in procurement

To make faster progress in using analytics to optimize procurement—and thus become more resilient in a time of immense disruptions and technological change—four actions are particularly important.

Look beyond spend data

For understandable reasons, procurement functions often focus almost exclusively on spend data. But those data give only a partial picture of what's happening. To generate true, actionable insights, it is crucial to develop a single source of truth that incorporates all sources of relevant data, along the entire supply chain, and from all relevant functions—including sales, finance, product development, R&D, and operations (Exhibit 2). When these sources are not linked to each other, executives are hard-pressed to form an accurate understanding of the entire data situation.

A dairy company used this approach to consolidate procurement's enterprise-resource-planning (ERP) data along with general-ledger and cost-item data. The goal was to differentiate operational and capital expenditure and set a baseline for external spend. By consolidating procurement and financial data and creating a common taxonomy of procurement categories, the company identified spending reductions of between 9 and 12 percent—all while maintaining strict regulatory standards across its operations.

Exhibit 2

Spend analytics harvests all relevant sources of data.

External environment
Types of data

Internal functions
Sources of data

Suppliers, service providers
Current and potential suppliers

Supply chain
Planning, manufacturing, warehousing, sales

Regulatory
Legal, financial, auditing, environmental, governance

Engineering and technology
R&D, product development

Spend analytics

Market and finance
Supplier finance, currencies, commodities

Support functions
Legal, finance, HR, compliance

Design and technical standards
Reflecting latest changes

Business strategy
Strategic planning, merger and acquisition teams

Creating a full picture of risk, however, will mean bringing together even more data sources and integrating them even more deeply, reflecting more perspectives across the enterprise. Consider a chemical company that needs specific raw materials for its production processes. The company faces potential risks in the supply chain: export barriers in the material's source markets, environmental policies, geopolitical events, and other external shocks. The procurement function analyzes this problem through a very specific lens, typically boiling down to a three-part question: What is my risk exposure for this raw material, are the materials coming from a single source, and can I line up an alternate source?

But finance looks at the problem from a different view: What is the revenue at risk if the company can't access that material? Similarly, the production department looks at it through yet a different perspective: Is there an alternative material that we can use?

By connecting finance, product development, and procurement data, companies can gain the transparency they need to understand their true risk exposure, and thus take the steps needed to increase operational and financial resilience.

A household product company implemented a control tower during COVID-19 to highlight the revenue at stake given supply disruptions. Procurement heavily supported the company's overall decision-making process by combining supplier locations, whether the material was single or dual sourced (information supplied by procurement), budgeted demand and plant capacity volumes (supplied by supply chain), and the revenue at stake if the purchased raw materials are not delivered on time (supplied by finance). In this way, the function was at the forefront in managing COVID-19 risk for the organization.

Adopt an end-to-end view
It isn't just the data that need to reflect as many sources as possible. All too often, individual departments make decisions in a vacuum, based on their own budgets, KPIs, and department-specific criteria, leading to inconsistency at best and strategic errors at worst. Ideally, the

decision-making process in procurement should also incorporate multiple perspectives, so that the company understands the full implications across the entire value chain.

For a simple example, think of time periods in payment terms. Companies often impose one standard time period for the payments they make to their suppliers, and another—typically much shorter—for the payments they receive from their customers. That difference has financial and long-term relationship implications for executives to identify, quantify, and think through. By adopting an end-to-end view, companies can better understand both the buyer and supplier side, and potentially negotiate payment terms that better reflect the full value at stake.

Similarly, if the procurement department identifies a cost-savings opportunity, top-performing companies ensure that the entire organization is able to track progress and course-correct if needed. The objective is to ensure not only that the promised improvements actually occur, but also that they don't trigger negative ramifications elsewhere in the organization.

Change the organizational mindset about benchmark data
In some organizations, employees have concerns about using data to improve procurement spending, worrying that applying benchmarks and quantifying performance will expose individuals to unfair consequences. That sort of resistance can undermine analytics initiatives right out of the gate.

To overcome these concerns, leaders can launch strong change-management practices that help shift mindsets, fostering a culture in which data are seen as a powerful tool for helping people achieve better results, rather than for "naming and shaming" exercises. Well-designed communications reinforce that the company wants to generate objective information and benchmarks, shining a light on top performers so that their best practices can be codified and shared. The people who use these insights to make the most dramatic improvements in performance can become change agents whose stories help inspire the rest of the organization.

Add automation capabilities

Finally, procurement organizations have major opportunities to automate processes and analyses. The need to automate is growing in line with the volume and complexity of procurement data, which are increasingly difficult to analyze manually in a way that leads to specific, actionable insights.

Because automation comes in different types, ranging from full analytics suites to digital assistants, companies will want to test options and tailor the right set of solutions for their needs. The critical common factor underlying most automation tools, however, is their ability to free employees from repetitive, routine tasks and processes. The most effective solutions can identify relevant data patterns and deviations from the expected, explain results and their impact, and even suggest measures to take in response. The very best can also assist in data visualization, synthesizing immense amounts of data and delivering insights to decision makers in a clear, intuitive format.

One apparel company used spend-analytics automation to understand small-value orders. Most companies have a value threshold below which employees do not need to go through formal procurement channels and can instead place orders directly. But that pragmatic practice can encourage workarounds that undermine the policy's intent, such as large orders broken into smaller ones that are all below the threshold—the $25,000 purchase that is broken into five $5,000 purchases, each one well below the $10,000 threshold. Digital assistants can handle small orders and spot such patterns and discrepancies, and flag them for a human employee to address. In this way, they improve compliance and generate savings by bundling those orders and (re-) negotiating with suppliers.

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Procurement functions are growing more complex, and the business environment is becoming more volatile. As a result, procurement analytics can deliver real value by taming complexity, increasing transparency, and giving managers the insights they need to make better decisions. Through these measures, the procurement function—and the entire enterprise—can become much more resilient.

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Mastering complexity with the consumer-first product portfolio

In managing a product portfolio, the balance between efficiency and value is a constant challenge. Taking a consumer-first approach to reduce complexity can increase portfolio performance.

by Christina Adams, Moira Borens, Ella Burroughes, and Ignacio Marcos

Consistently combining cost efficiency with consumer value is a challenge many companies spend years trying to get right. Some take an active stance that too often becomes undisciplined: without a clear governing structure, a siloed approach to innovation and product management results in constant reinvention and multiplying initiatives. At the other extreme are those businesses that do too little with their portfolios, perhaps unsure of the right steps and ending up with a growing tail of low- (or even negative-) margin products—or simply tiptoeing around important design choices in heritage brands. Both approaches typically generate too much complexity in a product portfolio for too little in return.

Portfolio optimization was a focus even before pandemic-driven uncertainties took hold, as rapid changes in consumer preferences—along with a transformed retail and competitor landscape—triggered an increasing need for simplification. Forward-looking companies that seek to keep pace with consumer expectations are becoming more intentional in identifying points of differentiation, even while meeting stronger productivity imperatives and increased cost pressures. Portfolios that are aligned with (and optimized for) consumer value drivers can help companies get a head start in the recovery period and remain competitive.

When complexity is good, it is targeted, manageable, and linked directly to value creation. When complexity is bad, it creates unwarranted cost, fragmentation, and consumer confusion. The balance lies in understanding how to design the right kind of complexity into a product portfolio while eliminating the wrong kind.

In doing so, brands have an opportunity to give consumers exactly what they want at the right price—with bottom- and top-line impact. At a major beauty company, a portfolio-performance program improved margins and reduced costs by more than 10 percent across about half of the company's cost base. A beverage company achieved similar cost reductions and increased its speed to market. And a food company successfully expanded margins in

a highly competitive subsector while reducing inventory and increasing manufacturing capacity.

Linking marketing and operations priorities for fast impact

At its core, managing portfolio complexity is matter of finding the most cost-efficient way of meeting consumers' expectations in generating the greatest possible value. Simple to say, but not so simple to achieve, as illustrated by companies' long struggles to tame complexity.

It's especially difficult to achieve when companies think of portfolio management as merely a synonym for assortment (or SKU) rationalization—reviewing all of the different products they sell and culling the low-performing ones. While SKU rationalization is a powerful tool to optimize portfolios, it isn't sufficient on its own to capture the full potential of simplification. As part of the foundation for portfolio performance, companies can also look at how to optimize their portfolio for both consumer and operational value and simplify for scale.

A promising methodology has emerged by adapting "consumer architecture," a concept that typically is considered in relation to innovation. By expanding consumer architecture's reach to incorporate considerations of cost and supply, companies can achieve a better balance in their product portfolios.

In practice, the structure adds three complexity-reduction levers, placing the consumer firmly at the center (Exhibit 1). The three levers all require the company to examine the portfolio as whole rather than product-by-product, understanding implications both horizontally, across categories, and vertically, by value tiers within categories: low-cost to luxury.

Simplification looks beyond "which products to cut," to find opportunities to standardize elements of how products are designed and made—retaining points of distinction that consumers value and are willing to pay for, while

Exhibit 1

Consumer architecture adds three new complexity-reduction levers centering on the consumer to deliver portfolio performance.

▼ New

Simplification
Reduce unnecessary complexity
Implement common platforms across products, channels, and markets

Design-to-value product design
Take out costs for features that consumers don't value
Enhance consumer and customer value with additional or new features

Process
Systems and governance to ensure refreshed accounting for brand positioning and market dynamics
Updated fact base that tracks consumer and customer insights, competitive dynamics, and cost structure

Assortment rationalization
Operationalize portfolio platform strategies
Fill relevant gaps in assortment
Take out non-value adding SKUs

eliminating needless variability that adds cost without increasing revenues. *Design-to-value product design* applies a similar sensibility to the details of how products are conceived and made, with a particular rigor to considering the cost and value implications of adding new features. Finally, an integrated *process* seeks to build this methodology into the company's way of working so that its impact endures.

The impact companies see from a portfolio performance translates not only on the bottom line, but also to a wide range of factors including accelerated speed to market, higher return on investment for capital expenses, and faster reallocation of resources to focus on value drivers (Exhibit 2).

Six steps to reduce cost and complexity

Bringing together consumer value drivers and cost efficiency integrates procurement, R&D, and marketing insights into a six-step journey that starts with target definition and finishes with implementation of new design briefs (Exhibit 3). Along the way, a transformational state of mind helps break through siloed ways of working: marketing, procurement, and R&D actively work together in small teams, and leadership fully endorses the outcome of their work (Exhibit 4).

Set margin ambition by defining cost targets
The six-step approach shifts the product- and portfolio-design orientation, anchoring them first
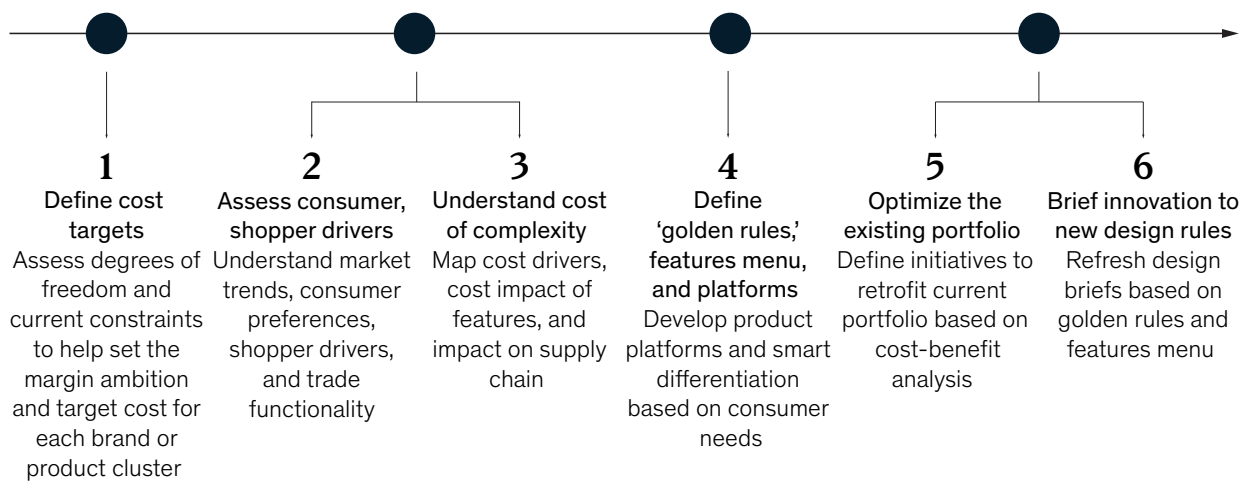
Exhibit 2

A sharper portfolio yields impact at the bottom line and across the organization.

Bottom-line impact	Marketing and innovation	Operations
2–6% margin improvement	Improved top-line sell-through	25%+ component reduction
10–20% cost reduction	Aligned consumer propositions	Improved manufacturing efficiency
Increased return on investment for capital expenses	Increased speed to market	Optimized inventory
	Focus on breakthrough innovation	

Exhibit 3

A six-step approach optimizes portfolio complexity based on consumer value.

1 Define cost targets
Assess degrees of freedom and current constraints to help set the margin ambition and target cost for each brand or product cluster

2 Assess consumer, shopper drivers
Understand market trends, consumer preferences, shopper drivers, and trade functionality

3 Understand cost of complexity
Map cost drivers, cost impact of features, and impact on supply chain

4 Define 'golden rules,' features menu, and platforms
Develop product platforms and smart differentiation based on consumer needs

5 Optimize the existing portfolio
Define initiatives to retrofit current portfolio based on cost-benefit analysis

6 Brief innovation to new design rules
Refresh design briefs based on golden rules and features menu

on consumer architecture and then on cost. It's an intense effort that takes place over a few weeks and it affects every element of portfolio management, from innovation to ongoing value-driving initiatives. Motivation will matter: accordingly, the first step is to set bold, top-down margin ambitions and cost targets, which can help create the proverbial burning platform that engages the full organization.

At the beauty company, for example, the problem was a fragmented portfolio of products that required constant refreshing and yet produced inconsistent financial results. Senior leaders, recognizing complexity as the underlying issue, charged managers with an ambitious margin-improvement target that applied even to mass-market segments under extreme competitive pressure due to disruption of traditional retail channels.

The first step for the management team was therefore to map the portfolio across and within segments to help identify inconsistencies, such as when a product's cost of goods sold (COGS) was too high for its current segment or positioning. The team

then set new targets that better matched product costs with what segments and brands could truly afford. These more-detailed targets were flexible by segment: some were based on margin improvement, others on COGS reduction, still others on lower procured spend as a percent of net revenue. In some cases, the targets even set a maximum cost for certain purchasing categories.

Assess consumer demand and drivers
The next step relies on consumer insights, which enable companies to understand how features, characteristics, and assortment correlate with differentiation, value perception, and brand recognition.

By segment, consumer insights help uncover which factors are most important in purchase decisions and customer satisfaction, which can translate to brand loyalty. Creating this fact base—and consistently highlighting the importance of specific product features—can uncover which factors matter most, while deprioritizing less-significant attributes. The beverage company confirmed that for certain categories, the thickness and material of a bottle

Exhibit 4

Leaders can overcome several typical challenges in portfolio-performance transformation.

Typical challenges include:
• lack of clear direction from senior leadership
• confusion about what "portfolio performance" means—often limited to SKU rationalization
• overly complex process
• siloed support, with one function driving the effort in relative isolation
• excess caution about potential consumer perception

Successful companies embrace a set of success factors:
• The company's leaders communicate throughout the organization that portfolio performance is a top priority.
• The organization sets bold targets for ambition, scope, and timeline.
• Actively engaged, cross-functional teams from R&D, marketing, procurement, and value engineering jointly lead the transformation.
• Leaders role model decision making based on a robust fact base of consumer needs, identifying and eliminating lower-value features.

served as an important cue that a product was premium. But the size of the mouth wasn't an important detail to consumers, so standardizing its dimensions for easier filling across different product lines carried comparatively little risk of diminishing the premium product's perceived value. In similar fashion, the food company took a hard look at certain high-cost ingredients, which it discovered consumers valued less than managers had thought.

Shopper insights can define additional focus areas, such as package design. Whereas lower-tiered consumer products rely on high color contrast on simple shapes to generate product recognition, premium segments tend to emphasize elaborate, differentiated shapes and materials. The risk, however, is that the differentiation can cost more than the product can feasibly recover. For the beauty company, shopper insights revealed that several complex features long used in the company's lines had little effect on shoppers' value perception and brand recognition. This realization provided managers the opportunity to maintain price points while substituting simpler elements.

Understand the cost of complexity

Where do complexity's costs lie? Fundamentally in the materials and components purchased, the manufacturing process, and distribution and storage requirements. A thorough understanding of these costs, the factors driving them, and their responsiveness to design choices is therefore a central tenet of the approach. The more detailed and quantified this understanding, the easier it will be to link design choices with cost impact.

The first step is to map each cost driver, along with each design choice's impact on cost, assessing the different feature options and their variations in quantity, quality, and sequence. In thinking through a liquor brand's premium gift box, for example, determining the cost of color is not just a matter of deciding whether to apply a color (and which one), but where and when to apply it, which ink type and printing method to use, the ideal number of passes, and the alternative application

methods that may be feasible.

Understanding the manufacturing process, both at the supplier and at a company's own plants, will help define the effect that standardization can have at different stages. For example, glass-production efficiency is sensitive to minimum order quantity, product deformation, and thickness. Especially in lower-premium segments, where the need to maximize efficiencies is especially high, best practices favor standardized bottle shapes and dimensions; differentiation can come from other design elements that customers are more likely to notice and can be achieved at low impact to production efficiency.

Define 'golden rules,' features menu, and platforms

At this stage, companies should have the required information—target cost levels, consumer-success drivers, and product-cost drivers—to define the complexity-value equilibrium they want to achieve in shaping a portfolio. The cross-functional team representing procurement, R&D, and marketing then plays a vital role in integrating these disparate sources into an effective final vision that paves the way for efficient implementation.

First, they map features by cost and perceived differentiation (Exhibit 5). This simple matrix then evolves into two tools: a features menu, and platforming guidelines.
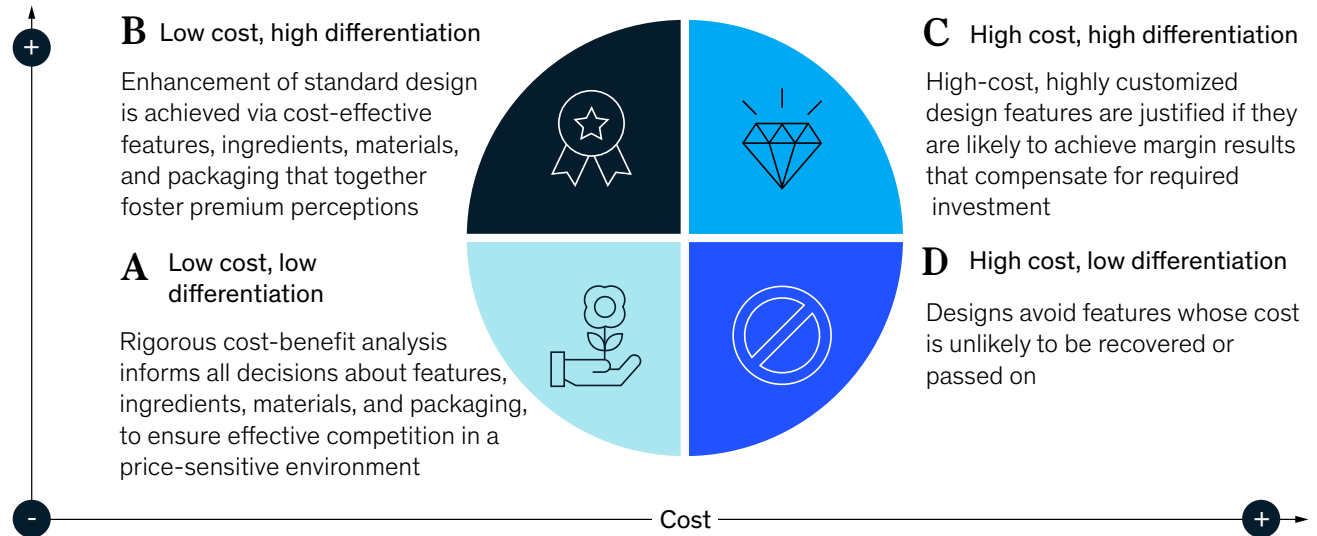
The features menu guides differentiation, allocating features and characteristics by portfolio segment with options to apply across premium levels. For both the beauty and the beverage companies, packaging was a major consideration: guidelines helped teams determine which features were justified at each tier. Ensuring that premium products incorporated only a minimum of high-impact differentiators to standard designs allowed these products to recover margins that had been lost to excessive design variation.

Accordingly, decisions such as these created a clear escalation path in line with each

Exhibit 5

A simple matrix can help organizations map features by cost and perceived differentiation.

Perceived differentiation

B Low cost, high differentiation

Enhancement of standard design is achieved via cost-effective features, ingredients, materials, and packaging that together foster premium perceptions

C High cost, high differentiation

High-cost, highly customized design features are justified if they are likely to achieve margin results that compensate for required investment

A Low cost, low differentiation

Rigorous cost-benefit analysis informs all decisions about features, ingredients, materials, and packaging, to ensure effective competition in a price-sensitive environment

D High cost, low differentiation

Designs avoid features whose cost is unlikely to be recovered or passed on

Cost

brand's positioning. It enabled luxury segments to differentiate through advanced features while less-premium segments focused on feature-choice efficiency, meeting the targeted costs across all the portfolio.

"Platforming" describes a common template that underlies multiple different products. Automakers have used them for decades to reduce cost and complexity, so that a single drivetrain design could support everything from a performance coupe to a minivan. It applies equally well in consumer products. While it is a common belief that platforming leads to generic products fail to support distinctions among brands in a portfolio, when well managed they offer companies a variety of scenarios to appeal across many consumer segments.

Platforming guidelines therefore inform what can be platformed, where, and how. Based on functionalities, consumer and segment insights, companies can use platforming across several levels of the portfolio.

— *Brands, subbrand lines, or flankers.* A beauty

company successfully redeployed elements of one if its most successful brands for a smaller, niche brand to minimize investments requirements on a riskier and smaller volume.

— *Formats.* A beverage company platformed all of its smaller formats into a single core design that it could tailor in modest, but effective ways to differentiate each brand's appeal.

— *Formulas.* The food company created a common platform to support similar flavors for certain of its products.

— *Tail end.* For a company managing a long tail of smaller brands, platforming can even support common branding approaches—with certain pillars, or essential brand elements, in common. Fragrances, for example, are an area where this approach can work.

Optimize the existing portfolio and design brief rules for innovation

Companies can now implement through innovation, existing business, or both. The menus and platforms

can be especially useful in guiding innovation and supporting the creative process before costs ever enter the system. The food company now includes the menus and platforms in its initial design-brief templates, so that new products take advantage of a revised list of less-expensive ingredients and common flavor platforms. Additional decision gates include go–no go criteria based on the alignment of the proposed product to the menus and platforms.

Companies can also use menus and platforms to assess their current portfolios and find opportunities to retrofit for faster value generation—perhaps accelerating existing packaging- or branding-review cycles to keep momentum going. Sustainability reviews offer

further options for reinforcing the portfolio performance tool kit: the beverage company has used its menus and platforms to inform decisions about material substitutions in light of consumers' rapidly evolving expectations on reducing environmental impact.

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Portfolio optimization means striking the right balance between efficiency and consumer value drivers. Both practical and tangible, a consumer-backed approach to portfolio performance is more relevant than ever and can be done relatively quickly with cross-functional resources. Now is the time to capture both short-term savings on existing business and structurally innovate for the future.

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Revolutionizing indirect procurement for the 2020s

There's a new vision for indirect procurement, enabled not just by new technologies but also by a radical new understanding of the value indirect procurement can generate.

This article is a collaborative effort by Pierre de la Boulaye, Mauro Erriquez, Manuel Gener Bago, Patricio Ibáñez, Raul Santos, and Alfredo Vaghi, representing views from McKinsey's Consumer Packaged Goods and Operations Practices.

Since 2011, indirect spend has been growing by an estimated 7 percent per year globally. Even so, many organizations fail to give indirect categories the attention they deserve.

Common challenges are apparent across industries. Spending is often fragmented among multiple locations, business units, and categories, making it hard to identify and capture enterprise-wide savings opportunities. Leaders of indirect-procurement functions typically lack sufficient clout within the organization to obtain the technology and talent they need. And most companies do not have mechanisms to monitor indirect categories and reflect their performance on financial statements.

To overcome the challenges, companies need a new vision for indirect procurement that combines cutting-edge tools and practices, as well as traditional approaches to category management, to address fundamental issues relating to processes, capabilities, and data. Using this coordinated, technology-enabled approach, global companies are already achieving marked improvements that allow them to capture the untapped value of indirect procurement.

Simply put, evolution is not enough. To succeed in the 2020s, companies need a revolution in indirect procurement.

The distinctive elements of the new vision

What makes the new vision for indirect procurement so powerful? Certainly, digital technologies and best-in-class practices provide the foundation. But these are just the starting point. To unlock the full potential, these elements must be applied comprehensively (exhibit). In the Appendix, we set out the differentiating features of each element of the approach. Here, we describe the most advanced solutions relating to each element.

Intelligent spend engines. These digital tools, blended with machine-learning technologies, use automated engines to classify and categorize

spending. Full transparency into analytical opportunities and validation status is enabled by automated data extraction from enterprise resource-planning (ERP) systems and databases, along with automated harmonization and classification. By integrating data pools and analytics functions, the tools can recognize cross-category synergies. Machine-learning features improve the tools and perform data cleansing, categorization, and enrichment activities. Visualization software translates the results into reports and drillable dashboards. Taxonomy booklets provide up to five levels of granularity on the basis of global best practices.
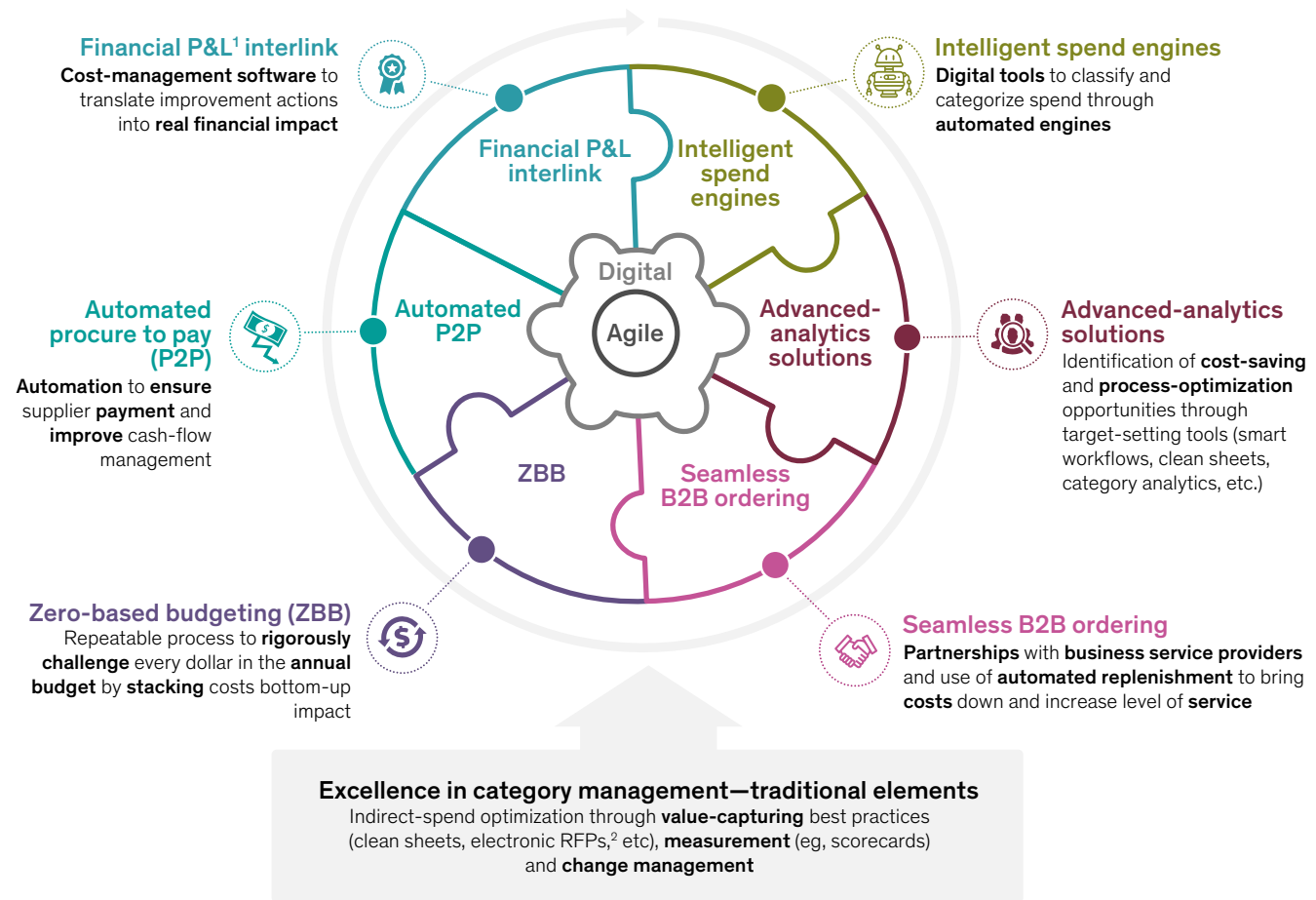
The enhanced transparency and standardization can drive significant bottom-line savings. For instance, merged companies face the challenge of integrating multiple ERP systems, fragmented taxonomies, and limited visibility on actual spend across the organizations. Intelligent spend engines can, for example, identify similar maintenance parts used by both companies and consolidate vendors. In our work supporting post-merger integration programs, we have seen these tools enable savings of 10 to 12 percent.

Advanced analytics solutions. Companies can use advanced analytics enhanced with target-setting tools to identify cost-saving and process-optimization opportunities. Several types of target-setting tools are available:

— *Category-specific.* Automated solutions—hard-coded into analytics—identify, apply, and monitor standard and advanced levers unique to a category.

— *Smart workflows.* These platforms review the forecast spending per category and activity and provide a guide to integrated best-practice actions for selected categories. Buyers use the insights to develop negotiation strategies for each category.

— *Functional advanced analytics tools.* To improve category functionality, buyers can apply a

Exhibit

The indirect-procurement function revolves around six new elements.

Financial P&L[1] interlink
Cost-management software to translate improvement actions into real financial impact

Intelligent spend engines
Digital tools to classify and categorize spend through automated engines

Automated procure to pay (P2P)
Automation to ensure supplier payment and improve cash-flow management

Advanced-analytics solutions
Identification of cost-saving and process-optimization opportunities through target-setting tools (smart workflows, clean sheets, category analytics, etc.)

Zero-based budgeting (ZBB)
Repeatable process to rigorously challenge every dollar in the annual budget by stacking costs bottom-up impact

Seamless B2B ordering
Partnerships with business service providers and use of automated replenishment to bring costs down and increase level of service

Financial P&L interlink
Intelligent spend engines
Digital
Agile
Automated P2P
Advanced-analytics solutions
ZBB
Seamless B2B ordering

Excellence in category management—traditional elements
Indirect-spend optimization through value-capturing best practices (clean sheets, electronic RFPs,[2] etc), measurement (eg, scorecards) and change management

[1] Profit and loss.
[2] Requests for proposals.

variety of tools, including: network optimization tools; automated, real-time key-performance-indicator (KPI) dashboards and executive scorecards; parametric clean-sheets, and eSourcing tools powered by artificial intelligence and advanced analytics.

Product and service costs can be reduced by 10 to 25 percent, while the manual effort for supplier governance can decrease by 30 to 50 percent.

Seamless B2B ordering. Partnerships with business service providers, along with automated replenishment, can be leveraged to reduce costs and increase service levels. Various tools and platforms have been developed. Leading companies have created a B2B offering catalog that lists all online marketplaces, additional services, and supplier offerings. Online B2B platforms—such as Alibaba, Amazon Business, and ThomasNet—are

Companies deploying automated P2P have achieved 15 to 25 percent savings in most transactions and reduced processing times from days to minutes.

e-marketplaces that are used for supplier evaluation and selection, cross-category orders, and financial traceability. Internet of Things replenishment tools are intelligent storage equipment that can automatically reorder based on stock levels. E-commerce integrator software powers an internal order-coordination platform that manages replenishment data and automatically places orders to B2B platforms.

Price reductions enable savings of 6 to 15 percent, while access to an expanded assortment eliminates a company's dependency on single suppliers.

Zero-based budgeting. To rigorously challenge every dollar in the annual budget, many companies use a repeatable process that stacks costs starting from zero. The foundation of the process is a budget-creation tool powered by software that applies zero-basing policies. The tool has capabilities for spend visualization, forecasting, and systems integration. It includes zero-basing "bluebooks" that cover the analyses and processes, efficiency levers, and organizational structure required to fully unlock the potential. The zero-basing process is supported by standard procedures to build and negotiate budgets, including knowledge, guidance, and practices that equip the organization to negotiate at scale.

Industries ranging from energy and transportation to banking and telecommunications are seeing early successes with zero-basing, following examples from consumer industries. Selling, general, and administrative (SG&A) savings of 10 to 20 percent can be identified in less than six months, and unproductive costs can be redirected to the most productive areas. Joint responsibility for the process by category owners and budget owners improves accountability.

Automated procure to pay (P2P). Companies can use automation to ensure supplier payment and improve cash-flow management. Robotic-process-automation (RPA) solutions automate routine tasks through existing user interfaces and motorized machinery. Machine-learning software uses supervised and unsupervised learning (for example, decision algorithms) to identify patterns in data, thereby automating the assessment of improvement potential. Cognitive agents and natural-language processing tools comprise a virtual workforce that can support employees and customers through the parsing and analysis of task descriptions.[1]

Companies deploying automated P2P have achieved 15 to 25 percent savings in most transactions and reduced processing times from days to minutes. These tools also promote the transition from spot checking to total quality control. Over a 12-month period, one company succeeded in reducing value leakage by approximately 3 percent and captured savings by gaining better control over spending.

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[1] For more, see Samir Khushalani and Edward Woodcock, "A next-generation operating model for source-to-pay," December 2018, McKinsey.com.

Financial P&L interlink. A procurement-finance interlink tool is powered by cost-management software that translates improvement actions into real financial impact. The solution tracks the status of initiative implementation and projected revenue. Forecasting is automated through algorithms that disaggregate volume, mix, and market effects from indirect performance. The software is paired with financial department systems, so that initiatives' financial impact can be automatically uploaded to the department's database. Auditing features check data accuracy and compare data with supplier reports and cross-functional data. The tool is supported by a basic finance boot camp. This online financial-knowledge academy teaches buyers how to improve their negotiation skills, initiatives definition, and impact tracking.

The company gains the benefits of improved forecasting and budget planning and clear visibility into how procurement influences the P&L. These benefits, in turn, allow the company to more accurately identify the level of funds available to reinvest in growth and strategic projects. Moreover, the interlink increases the engagement of top management in indirect-procurement initiatives.

Agile organization. In an agile organization, category-specific managers are replaced by a working group of managers that perform negotiations for different categories, depending on variables such as the timing of the negotiation and the required expertise. The working group is a pool of multidisciplinary professionals drawn from all categories. The agile operating model includes defined processes with clear ownership, involvement of internal and external stakeholders, and standard but flexible activities. Cross-functional collaboration is powered by visualization and communication tools that allow managers to share information and monitor and make inter-departmental decisions instantaneously.

Benefits include a 20 to 30 percent reduction of time-to-market, improved services to internal business partners, and enhanced cross-functional collaboration.

Staying focused on the basics

While adopting the new approaches, companies should also stay focused on traditional approaches to achieving excellence in category management:

Value capture. Best practices for capturing value include requiring frequent and more detailed RFPs. Clean sheets—bottom-up estimates of a supplier's costs for specific parts and services— are especially valuable analyses. Periodically searching for new vendors is important to avoid the high costs that result from being "locked in" with a particular vendor. A company can enlist support from industry experts to negotiate lower prices from vendors. Additionally, using off-the-shelf e-procurement technology is a low-cost way to support value capture.

Measurement. Procurement's performance can be measured using scorecards linked to annual run-rate cost savings. Scorecards, as well as a tracking system, can also be used to measure suppliers' performance.

Change management. The procurement function can lead efforts to change procurement practices throughout the organization. Members of business units and other functions can learn how to improve procurement approaches by "shadowing" experienced procurement analysts. It is important to link processes to contract expiration and develop a calendar that sets timetables and deadlines for actions. The company should use historical performance as a benchmark for setting aspirations. By establishing joint targets with functional peers, procurement experts can ensure that these peers have skin in the game when it comes to achieving excellence in category management.

Establishing enablers beyond the tools

A program to transform indirect procurement begins with setting clear goals and focusing on categories and subcategories. A company can then analyze the potential value of categories and subcategories by using benchmarks and spend visibility tools, such as spend cubes. To unlock the opportunities and execute rapidly, it must apply category levers,

validate the baseline, and identify the global and local champions who will lead the program and drive change. To monitor and sustain performance, the company must plan resources, track revenues, and refine the process for continuous improvement. A cloud-based platform enables all functional departments to share information in real time, while a "control tower" can monitor impact.

To successfully deploy the new approach, a company must create the right culture and bring new digital and analytics skills to the procurement team. This requires taking tactical actions that instill the necessary mindsets and behaviors, as well as building the hard and soft capabilities required for the organization to reach and sustain the full potential. Support from top management is essential to maximize the impact—as examples, CEO sponsorship is needed for zero-basing and

the CFO must support efforts to establish the P&L interlink.

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The comprehensive suite of digital solutions that we have discussed has enabled cost savings of 15 to 20 percent. A company can gain competitive advantage by applying the bottom-line savings to fuel growth and innovation. These new techniques have matured beyond the experimental phase and are now fully tested and ready to be deployed at scale. Even so, they have not yet been widely adopted, making them a source of competitive differentiation for companies that adopt them today. Leading companies have already positioned themselves for success in the 2020s by implementing the new vision for indirect procurement. The time has come for all companies to join the revolution.

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The digital future of manufacturing consumer packaged goods

Nearly two years of tumult have accelerated disruption, with lasting effects on society and business. To thrive in the consumer-packaged-goods industry, digital and analytics are now essential.

This article is a collaborative effort by Mike Doheny, Yves Giraud, Sven Houthuys, Roberto Migliorini, and Frank Sänger, representing views from McKinsey's Consumer Packaged Goods and Retail Practices.

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Last year, in collaboration with the World Economic Forum, we identified four durable shifts emerging from the unprecedented disruptions sweeping the world, with deep implications in manufacturing and supply chain.

Agility and customer centricity. Volatility in markets requires the ability to respond quickly. To meet the demand volatility in a cost-efficient way, companies are boosting network agility through stronger connectivity and supply-chain digitization.

Speed and productivity. Given the financial impact of these global disruptions on ordinary life, customers are focused more on value than ever. Delivering this value requires next-generation network productivity, which hinges on shifting to digital production systems.

Eco-efficiency. Consumers increasingly favor companies that commit to environmental responsibility, including sustainable sourcing of materials. Sustainability is now an operational advantage: increasingly, good ecological stewardship makes good business sense.

Supply-chain resilience. All the eggs cannot be in one basket, or even just a few. To survive critical disruptions, companies need the resilience of differentiated omnichannel solutions, which depend on customer connectivity through digitization and automation.

Digital and analytics (DnA) transformation isn't merely a benchmark for achieving frontrunner status; indeed, it is nothing less than a matter of survival in a competitive industrial market. If companies want to survive—let alone thrive—digital transformation is no longer optional. It is vital. In this article, we outline the steps consumer-packaged-goods companies should follow for a successful DnA transformation.

The challenge of CPG transformations

Manufacturing companies from different industries can have very different DnA-transformation journeys. Among the most significant factors affecting the challenge of a company-wide

DnA transformation is the degree to which the production network is fragmented. The greater the number of sites, the more fragmented the production schema will typically be. Moreover, consumer-packaged-goods (CPG) products often tend to have a low value density. This combination of widely fragmented production networks consisting of many smaller sites, each producing relatively low-value-density products (think, for example, toilet paper, dishwasher detergent, or toasters), often makes it difficult to achieve great return on investment (ROI) from digital transformation at any given site.

To illustrate this, consider two imaginary global companies. The first manufactures high-margin specialty chemicals at only four massive sites, each of which accounts for a quarter of overall production. The second is a CPG household-cleaning-products firm operating 100 sites on four continents. Both companies have weathered similar disruptions and recognize the need to drive significant productivity to support growth. However, whereas the chemical company has achieved surprising growth, the CPG firm has seen comparatively low ROI when it comes to its DnA-transformation efforts.

Because the specialty-chemical company enjoys both the higher value density intrinsic to the high per-unit value of its relatively expensive products and a comparatively consolidated production network with only four sites, an improvement at any single site is likely to generate substantial ROI for the entire organization. A 10 percent productivity gain at one of these value-dense sites will likely resonate throughout the company. By contrast, the CPG firm has a wide network of small sites. As such, the same productivity gain of 10 percent at any one of its 100 sites producing household cleaning products will naturally yield only marginal company-wide ROI.

This example highlights the challenges faced by CPG manufacturers, whose wide, fragmented production networks make multisite DnA transformation necessary in order to generate meaningful ROI. Such multisite transformation

Driving synergies across a broadly distributed production network is challenging, but new tools and technologies make it possible to do so more effectively than ever before.

is considerably more complex and demands highly effective planning and coordination on a network-wide level. Moreover, in this context, careful prioritization of potential use cases becomes particularly crucial. With hundreds of potential use cases, attaining the hoped-for ROI can depend on astute forecasts and informed assumptions. If a company misses the mark when prioritizing use cases and allocates substantial financial resources to the wrong ones, there could be little to no gain.

Frontrunners are emerging

CPG firms have been moving fast on the consumer side in areas such as marketing and sales and consumer engagement. But, for the most part, CPG has long lagged behind other industries in the DnA maturity of its operations. Now, there is great pressure on CPG companies to respond to these disruptions through changes associated with the four durable shifts, which together call for transformation in operations DnA.

The combination of productivity pressure and growth opportunity has triggered a significant acceleration in these areas among leading CPG firms, widening the gap between a few frontrunners and the rest. Considering that on the whole, productivity growth in manufacturing has slowed substantially in recent years, this acceleration is particularly notable. While growth opportunities can still be found by focusing on manufacturing excellence and traditional lean principles, it is becoming increasingly difficult to extract meaningful impact through these methods alone. A new approach is needed for these very different times.

Learning from CPG 'lighthouses'

Some CPG companies are seeing impressive results and genuine ROI in their DnA transformations. This includes several in the Global Lighthouse Network, a collaboration between the World Economic Forum and McKinsey, which recognizes manufacturing sites across the globe that are achieving truly transformative innovation at scale. The Global Lighthouse Network has grown steadily since its inception in 2018, and now comprises 69 lighthouse sites. A look at how CPG firms have figured in this network is telling.

Early on, the scarcity of CPG lighthouses hinted at the unique challenges the industry has faced in pursuing transformative innovation at scale. However, the number of CPG applications recognized by the World Economic Forum has risen sharply this year. In fact, it has nearly doubled since 2020, from six to ten. Moreover, the CPG applications represent varied subsectors, ranging from food and beverage to household products. What are we seeing among these frontrunner CPG organizations?

Large CPG sites are seeing substantial ROI

Reviewing the experiences of CPG companies in the Global Lighthouse Network proves it is possible for at least a few single CPG sites to undergo the kind of transformation that produces notable ROI. These sites have marked substantial improvement across a range of KPIs, including productivity, sustainability, agility, speed to market, and customization (exhibit). Nevertheless, challenges remain even among these leaders. In light of the myriad factories that comprise the fragmented production networks characteristic of CPG, only a select few sites—

typically large ones—have managed to yield notable ROI that resonates across their companies.

Again, this is due to a simple but essential reality of CPG: compared with other industries, the production network is vast and often composed of small to medium-size sites, so transformation ROI from any one site tends to be low. Furthermore, from a product perspective, it can take hundreds or thousands of boxes of a CPG product like household cleaner to equal the value of a single heavy-machinery product, such as a wind-turbine engine or specialized construction vehicle.

The downs and ups of fragmented production
A fragmented production network should not be misconstrued as a disadvantage. Indeed, CPG companies with broadly distributed production networks have generally built them intentionally in order to enjoy the advantages of proximity to consumers, a portfolio tailored to local consumer preferences, and intrinsic redundancy. However, the same distributed design that affords these advantages makes it difficult to implement broad-scale changes across the organization.

Clearly, some leading players in the CPG industry are getting it right. Again, consider that the number

Exhibit

Consumer-packaged-goods lighthouses use digital to become more productive—and more agile, customer focused, and sustainable.

KPI improvements

Impact range observed, %
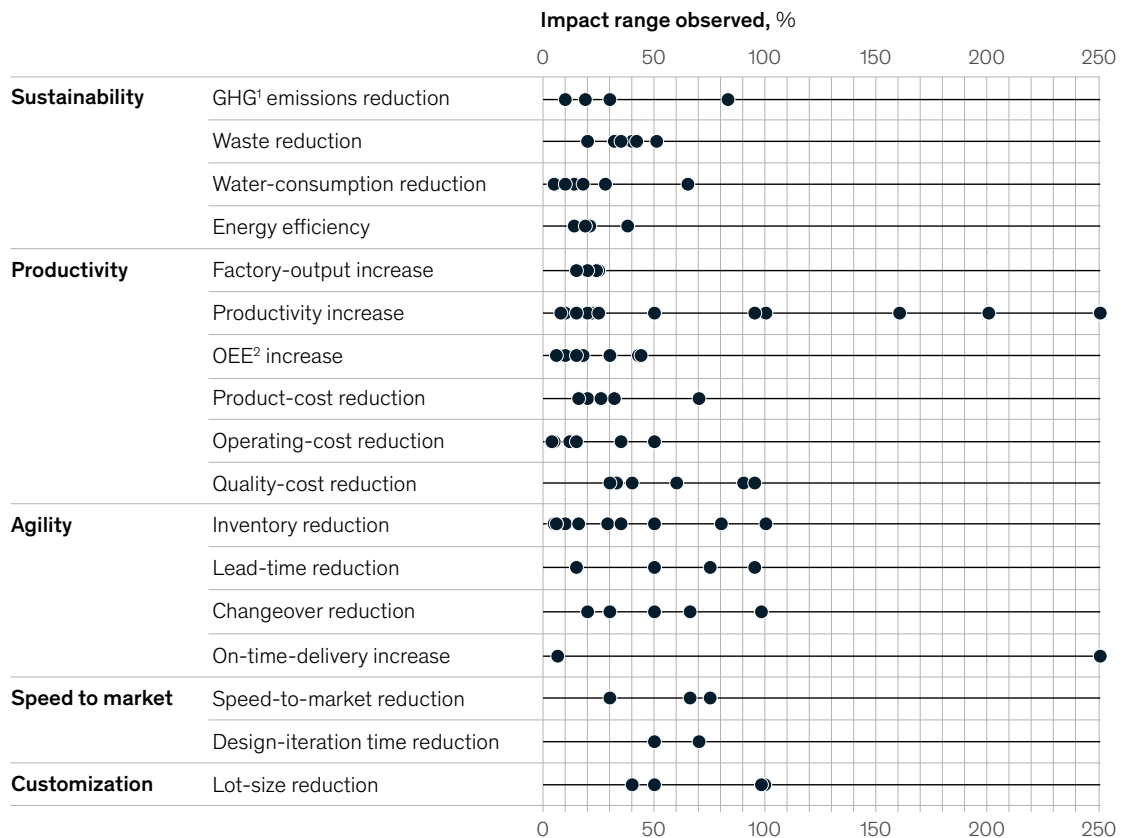
[1]Greenhouse gas.
[2]Overall equipment effectiveness.

of CPG sites recognized by the World Economic Forum as frontrunner global lighthouses has nearly doubled since 2020. We believe the key to unlocking value for these companies—indeed, their next step change—lies in leveraging DnA to increase performance across the network.

The digital way forward

What can companies do, then, when their production network is fragmented, whether by necessity or by design? How can these CPG companies with large, low-value density networks transform? How can they realize the same sort of positive changes so crucial to maintaining strong performance in light of the four durable shifts taking place in the wake of powerful disruptions?

Driving synergies across a broadly distributed production network is challenging, but new tools and technologies make it possible to do so more effectively than ever before. With the right approach that takes full advantage of the power of DnA, companies can unlock trapped value in ways that traditional lean manufacturing, for example, simply couldn't access by itself. This can allow a further penetration of new working modes, even at small manufacturing sites.

This value unlock is within reach, but it takes commitment because the requirements for transforming wide networks are even tougher than for single-site transformations. Companies aiming to transform across fragmented networks should implement the following initiatives:

— a more rigorous change-management and project-management-office (PMO) approach

— even stronger cross-site coordination

— more robust Internet of Things (IoT) planning

— a more explicit talent agenda

While it may seem obvious, it is important to keep a big-picture focus at the forefront, right from the beginning. This might mean sacrificing microlevel potentialities in favor of the macro—in other words, even if an exceptional initiative could highly benefit a single site, it shouldn't take priority if it won't be broadly applicable across the network in the scale-up stage.

Five steps to transform CPG production networks

We propose a five-step process for CPG firms that want to achieve network transformation by leveraging the power of DnA.

Develop the network strategy and road map. With a fragmented manufacturing network, it's important to begin by scanning the organization to garner a clear understanding of the terrain. The operating questions should be, "Where and how can a prioritized portfolio of digital use cases bring real business value?" and "What enablers need to be put in place for success?" This first phase should produce the following results:

— a top-notch DnA road map for the next two to three years

— a clearly articulated business case for the program and designed enablers (such as the information technology/operating technology, or IT/OT, stack, and other resources)

— a structured compilation of use cases with selected locations for piloting and rolling out

Companies that have already achieved a level of digital maturity can simultaneously launch the scaling of basic, no-regret use cases that have already been proven across different sites or, for example, the World Economic Forum's Lighthouse Network. These might include digital performance management, root-cause problem solving, or real-time overall-equipment-effectiveness (OEE) tracking.

Design the scale-up vehicle and engine. The next step is to design the scale-up vehicle and engine, making sure to keep the big picture—that is, the eventual network-wide implementation—at the forefront of the design. The scale-up vehicle

includes top use cases for implementation at the pilot locations. Ideally, these would be the company's largest, most mature sites.

The scale-up engine plan then determines scaling governance, including success control, staffing, change-management, and communication plans; technology stack and platforms; and the use of codified use cases for scaling. This phase produces a designed set of solutions, use cases, and a future-state data IT/OT stack ready to be implemented—all while readying the use cases for scaling across the network.

Build at pilot sites. With the scale-up vehicle and engine designed, it's time to build. This includes implementing top use cases at the pilot sites, while building capabilities and enablers to facilitate rapid scale-up. This phase generates an agile working mode that can be replicated at other sites, together with a governance structure to support replicability.

More specifically, the plan usually encompasses implementation of top minimum-viable-product (MVP) use cases and the Industrial Internet of Things (IIoT) platform on the factory floor, as well as training for teams on design thinking, IoT, big data, advanced analytics, and digital transformations. Implementation follows a rapid scaling approach (including governance) at subsequent sites, with the scale-up plan refined further based on lessons learned from the pilot use cases.

Scale digital use cases fast across the network. In the fourth phase, the benefits of the broad-network view become apparent. As the company scales digital-manufacturing use cases across the production network, early choices to prioritize broad applicability and explicit ownership of important use case–driven initiatives start to pay off in the form of accelerated traction. Lessons learned from agile development in the pilot site(s) add fuel, minimizing friction as the new ways of working take hold.

Develop and deploy a DnA academy. Having deployed digital use cases across a broad, fragmented manufacturing network, the ongoing challenge is to build capabilities by upskilling. In keeping with the network-wide mentality, this can include the development and deployment of a DnA academy that upskills the entire organization—not just the change team or personnel at selected sites.

The four durable shifts continue to drive a great reset as we near the conclusion of the first quarter of the 21st century and look ahead to the second. Recent global disruptions have presented a yet-untapped growth opportunity for the CPG industry. As these disruptions apply cost pressures, companies are upping the competitive ante at an accelerating rate.

Clearly, some companies are meeting the next S-curve of growth opportunities presented by the four durable shifts. For others, the time to react, anticipate, and grow is now. By understanding the unique challenges facing broadly distributed, low-value-density, highly fragmented production schema, CPG organizations can implement strategies that achieve the kind of company-wide transformation needed to thrive.

4IR capability building: Opportunities and solutions for lasting impact

Amid ongoing digital transformation, workforce capability building is vital at every level of the organization, from shop-floor workers to senior leadership. Our multiyear collaboration with the World Economic Forum found leaders can use a smart, four-tiered approach to develop tailored learning journeys and achieve lasting impact across the company.

This article is a collaborative effort by Wim Gysegom, Sven Houthuys, Sid Khanna, Roberto Migliorini, Dado Misljencevic, and Mikael Robertson, representing views from McKinsey's Operations Practice.

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In virtually every industry, the Fourth Industrial Revolution (4IR) has spurred a transformative journey that is redefining the very nature of work. While technology has played an essential and often defining role, people have nonetheless remained at the core of these revolutionary transformations.

4IR drives new skills needs

While the type of work varies across different industries and functions, 4IR transformation shifts the workforce away from highly manual tasks to a much more data-driven and automated future. Repetitive, manual factory-floor duties have been replaced with higher-level tasks that involve making data-driven decisions in collaboration with automated technology, including robotics and cobotics (or collaborative robotics).

Building those new skills is the greatest business challenge for 80 percent of CEOs, according to data from the *Harvard Business Review*.[1] Employees are seeing changes in the tools they use, their roles in utilizing them, and what they need to know about how they are functioning. Likewise, new leadership approaches are essential to help individuals and systems achieve maximum impact amid ongoing change, which is no small challenge.

The Fourth Industrial Revolution has ushered in a new world of work, forcing companies to respond with an enthusiastic and strategic approach to workforce capability building. People need knowledge and understanding of new digital tools. And as these revolutionary technologies transform the very nature of the work itself, it's equally important that everyone from shop floor workers to senior leaders be willing to redefine what they do—and how they do it—together.

The power of transformative learning

Capability building takes many forms, from hiring new people with new skill sets to outsourcing and entering new partnerships. Here, we are focused principally on upskilling—that is, helping the existing workforce build new capabilities and understand how best to apply them. The experiences of companies that have excelled at capability building point to four compelling reasons for companies to prioritize upskilling when it comes to capability building:

1. Hiring or relying on the gig economy usually cannot fill the whole need.

2. The business case for reskilling can be roughly one and a half to three times better than for hiring.

3. Reskilling enhances company culture and saves time.

4. Reskilling is more likely to secure employee buy-in.

This transformative-learning journey involves the entire enterprise at every level. Shop-floor workers master new skills, and senior leaders are called to lead the digital transformation, including the development of new organizational-management approaches that realize people's full potential. Moreover, leaders model a growth mindset with a visible commitment to their own continual learning.

It is worth reflecting on the nature of teaching and learning. The Latin roots of the English verb "to educate," *ex ducere*, mean "to lead out." Education is predicated on transformative potential. It seeks to lead people out of old ways of thinking, being, and doing and into a new landscape of abundant opportunity. Genuine learning is transformative by nature.

Forging ahead is leading to success

The Global Lighthouse Network, established in 2018 by the World Economic Forum in collaboration with McKinsey, now includes 90 leading sites that have succeeded in 4IR transformation at scale. They have taken the plunge, making bold decisions to engage new technology while keeping their people at the core of change, with many focusing sharply on capability building.

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[1] Josh Bersin and Marc Zao-Sanders, "Making learning a part of everyday work," *Harvard Business Review*, February 19, 2019, hbr.org.

For the four reasons cited earlier, these leading organizations have made it clear that upskilling the current workforce lies at the heart of the most efficient gains. When doing this, the benefits expand across the network, with increasing business impact and ROI. Moreover, this kind of network-wide transformation is not merely a technology upgrade—rather, it's a transformation of the very nature of work itself.

Compelling questions: Innovative answers

How do companies tackle the challenge of capability building across their enterprise? How are leading organizations maximizing the potential of their people and keeping the 4IR transformation journey inclusive of each worker? And how are they doing so across the broad range of roles, responsibilities, skill sets, and experience levels that comprise a 21st-century company? Read on to explore these compelling questions—and discover an innovative, four-tiered approach to achieve lasting impact.

A capability-building case study

First, let's take a look at a real case study that illustrates capability building at the core of transformative change. A large transmission system operator (TSO) in Europe faced the challenge of

doubling its annual fieldwork output to meet rising demand from new infrastructure associated with the green-energy transition, as well as increased maintenance and equipment-replacement needs. The bottleneck lay with the technical workforce, whose capability deficits were leading to delays in the capacity-building plan and an increasing work backlog.
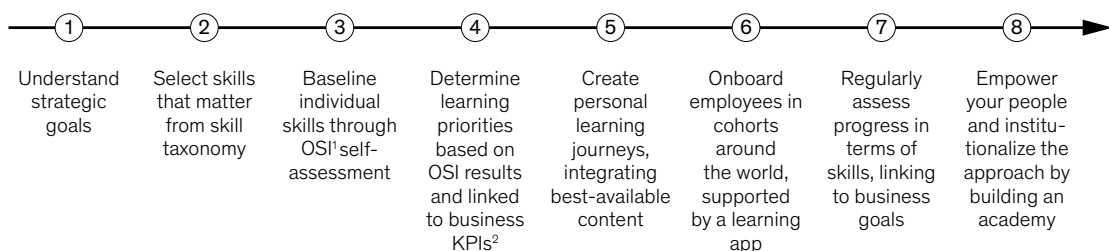
The company needed to begin with a clear willingness to transform and couple that with a commitment to capability building. That required recognizing that transforming an enterprise involves both people and technology. Moreover, part of this commitment included sustainment. Once the capability-building mechanisms were implemented, the company needed rigorous governance and clear key performance indicators (KPIs) that could work together to ensure ongoing training quality, adherence to what had been learned, and continued assessment to measure the maturity of learning and transformation.

Assessment is at the core of an effective capability-building program. A company must identify business needs, assess skills among its people, identify gaps in those skills, and then strategically link the gaps to the relevant business needs (Exhibit 1). This process ensures that the academy is fact based and directly linked to business-improvement goals.

Exhibit 1

Effective learning journeys include new and existing fit-for-purpose roles across all geographical areas and the use of an organizational skills index.

Capability-led transformation journey, illustrative

1	2	3	4	5	6	7	8
Understand strategic goals	Select skills that matter from skill taxonomy	Baseline individual skills through OSI[1] self-assessment	Determine learning priorities based on OSI results and linked to business KPIs[2]	Create personal learning journeys, integrating best-available content	Onboard employees in cohorts around the world, supported by a learning app	Regularly assess progress in terms of skills, linking to business goals	Empower your people and institutionalize the approach by building an academy

[1]Organizational skills index.
[2]Key performance indicators.

The large TSO developed an effective learning journey for both existing and new fit-for-purpose roles across all geographical areas. This journey began with a clear understanding of business goals that would support the target capacity increase—reducing unnecessary workloads, improving training speed, changing mindsets and behaviors, boosting delivery workflow efficiency for maintenance and projects, and introducing field performance management. Key to this strategic approach was the use of an organizational skills index (OSI), which enabled meaningful assessment of employees' current skill levels across functional, leadership, and transformation skills.

The TSO was able to boost its capacity within a year by 35 percent through two key changes. First, it directly increased the effectiveness of its people; second, it was able to accelerate the onboarding of new employees from three years to one and a half years. By utilizing the OSI results to inform the approach, the company was able to tailor each team's learning journey for maximum effectiveness.

Challenges of workforce transformation

As companies seek to undergo the digital shift at the core of 4IR transformation, they face challenges. Transformational change is inherently difficult—it asks people to upend traditional, often "proven" ways of doing things and to step outside of comfortable, familiar routines. Let's look at four central challenges.

Boosting technical and leadership capability

For manufacturing companies, transformation across the board is a complex task because it requires change on two broad levels that, while related, are quite distinct. First, there are hands-on technical skills. Everyone from shop-floor operators and technicians to middle managers to senior leaders is confronted with compelling new digital tools ranging from new apps and software to IoT devices. Mastering them requires new content knowledge (knowing what to do and how to do it) and developing understanding (when to do it and why).

But beyond boosting technical capability lies another category of essential learning: new leadership skills. Leaders at every level, from the shop floor to the C-suite, face the challenge of learning how to organize, communicate, delegate, facilitate, and manage a workplace and a workforce undergoing technical transformation. Amid any substantial change come the human elements of stress, uncertainty, and, often, even fear. Leaders are tasked with stewarding their people through what can be demanding and disruptive adaptations.

Different cohorts have different needs

Even within a single company, there exists a broad range of diverse roles. While some areas of the organization may require considerable focus on practical, hands-on skills, others will need more emphasis on leadership and management techniques. Moreover, even within these broader categories lie multiple cohorts whose jobs look quite different.

The range and diversity of roles present a challenge in understanding skills gaps and where best to focus capability-building efforts. This underscores the need for smart, dynamic diagnostic tools that can provide meaningful insights throughout the organization, applicable and equally effective across distinct categories, systems, and functions.

Sizing the capability-building program

While tailored learning is important, a piecemeal approach is insufficient. Typically, the more effective solution involves every level of the organization, from associates to senior global leaders. So how can leaders rightsize the program without overwhelming the company? How can leaders make sure that the right people receive the right training without extraneous or excessive content that will detract from what matters most for their jobs?

If the approach is too small, the capability building could fall short. Pockets of the company—those with the most obvious skills gaps—might receive sufficient attention and resources. But what about other areas where the relevant upskilling needs are less apparent? Rightsizing the program is

To drive capability-building efforts, leaders begin by sharing an unambiguous value proposition.
If people know what they're building toward, the process has momentum from the start.

essential. It must be comprehensive enough to involve all levels of the enterprise, but the approach must be strategic so that resources can be allocated intelligently for lasting impact.

Reconciling cost with ROI
Speaking of allocation, companies must consider the resources available to invest in capability building. These will likely be lower in typically small or midsize sites across an extensive network. Leaders face the challenge of ascertaining the right investment in capability building weighed against anticipated ROI.

Additionally, the broader the network, the more likely it is that culture and language differences will factor into the complexity and cost of capability-building efforts. Workers in one part of the world may approach learning in very different ways from workers in another. Across an extensive network, training efforts require broader deployment in more varied forms.

Capability-building solutions
We've explored some of the challenges that companies face as they undertake capability building, especially across extensive networks. So, what works? How can companies approach this essential part of their 4IR transformation, keeping people at the core? Here we present an effective four-tiered process.

1. Put an ROI on capability building
It's vital to articulate a direct rationale for capability building. If people don't clearly understand *why* they need to master new skills, the challenge is compounded. To build quick momentum that drives capability-building efforts, leaders begin by sharing an unambiguous value proposition. If people know what they're building toward, the process has momentum from the start.

Of course, to do this smartly, it is essential to assess where to direct capability-building efforts to most effectively yield ROI for the company. Leaders employ a strategic approach that inventories current skills and effectively identifies gaps linked to impact. This involves quantifying aspects of a company's capability and maturity and identifying specific gaps that can be linked to business objectives. In the case-study reference, the company leveraged an in-depth diagnostic to achieve this kind of detailed view. The resulting insights supported tailored learning journeys with a clear link to value creation.

2. Map out tailored learning journeys
The learning journey won't be the same across the board. Because of the diversity of roles and responsibilities within an organization, the road map will look different for different functions. Accordingly, a challenge for senior leadership is to develop the mindset needed to lead during the digital transformation. Midlevel leaders are tasked with understanding new processes and ways of

working, and task-specific experts need to hone new digital skills such as analytics.

Leaders then consider various business objectives and KPIs, then make informed decisions using data from their skills-gap diagnostic to plot effective paths forward for different parts of the organization. This can include smart sequencing of content directly tied to specific business objectives, which ensure not only skill-building but also the types of behavior change essential to utilize and sustain those skills.

3. Engage innovative adult-learning methods

Organizations need proven learning methods that engage adult-learning principles and emphasize practicality—leaving workers no questions about the relevance of what they're learning. Likewise, successful learning approaches incorporate an experiential focus, with hands-on methods that directly utilize the associated skills and knowledge. Gamification can be valuable, as it can combine effective mechanisms with an enticing, fun approach that builds camaraderie.

A variety of techniques can enhance the experience, including e-learning to in-person and virtual workshops, experiential learning, and fieldwork

(Exhibit 2). Moreover, ongoing coaching can help refine, sustain, and deepen the process while building rapport among workers.

4. Apply rigorous governance

To truly be transformative, change must be sustained through rigorous governance. Leaders who wish for their organizations to avoid slipping back to the status quo must be sure to set standards and benchmarks and be sure they are articulated clearly and tied to measurables. Moreover, leaders need to be attentive to the progress of the learning journey past the initial phase. This should include some degree of "homework" that can be monitored to measure adherence to the training against specific criteria.

Indeed, one of the challenges of sustaining a major organizational change lies within the fact that over time, enthusiasm can wane as novelty fades. This can be mitigated, of course, by having done the essential work up front to make the ROI case clear—but even if the value proposition is well understood, sustaining transformative change remains challenging. Rigorous governance helps leaders keep a finger on the pulse to ensure that people remain energized about that value proposition.

Exhibit 2

A variety of adult-learning approaches can be used to support the capability-building journey.

Learning approaches, nonexhaustive

E-learning
Self-paced, digital learning courses, featuring bite-sized learning modules to convey key concepts and foundational knowledge

In-person or virtual workshops
Interactive learning, which combines lectures with hands-on exercises focused on operations situations

Experiential learning
Focused on Industry 4.0 in model companies or brought to location with "Model Factory in a Box"

Fieldwork
Application of concepts to the audience's environment through value-adding fieldwork, based on an actual use case identified up front on the learning journey

Ongoing coaching
Structured apprenticeship on real-life use-case assignments to apply concepts taught in forums to engagements

Lead forth

The shifts occurring amid the 4IR across sectors and industries are not slowing down—rather, they are accelerating. Just as people are at the core of these shifts, they are likewise at the core of responding to them. Many of the leading companies among the Global Lighthouse Network have prioritized people, putting a premium on capability building.

By taking the time to assess strengths and areas for growth, identify specific skill gaps connected to business goals, and then courageously invest in effective learning methods tailored to their people, leaders can empower their companies by empowering their workers with the 4IR skills at the heart of 21st-century capability. Building the workforce of the future means embarking on a transformative-learning journey out of the old ways of thinking and doing and into the landscape of the future.

After all, to educate is to lead out—and lead forth.

Supply chain steps up: An interview with Kimberly-Clark's Shane Azzi

What is it like to steer one of the world's largest consumer supply chains through a pandemic?

by Daniel Swan

MAKE

The COVID-19 crisis put every organization under pressure. But when your products are used every day by a quarter of the world's population, your supply chain needs to keep running regardless.

In a recent interview, McKinsey senior partner Daniel Swan talked to Shane Azzi, senior vice president and chief supply chain officer at Kimberly-Clark, about the challenges of the pandemic, his organization's response, and what it all means for the future of the supply chain.

Daniel Swan: You have an interesting background, having spent time in the military before your corporate career. Has that experience informed your approach to leading supply-chain organizations or to leadership overall?

Shane Azzi: In the military, you learn the importance of articulating your objectives and stating clearly what it is you are about to do. Having that really clear point of view about what needs to be done has been especially important during the pandemic.

Another key lesson is about listening to the front line. While giving clear direction, you also need to be well in tune with your operation and its capabilities.

It's been a challenging period. Running a supply chain during this global health crisis has certainly felt a bit like a military operation at times. But all supply chains need a level of structure and discipline to work well, so that part of my background has definitely helped me over the years.

Daniel Swan: The past 18 months have been just about the scariest environment imaginable for every supply-chain executive. Can you tell us what you and your team are most proud of having accomplished during the crisis?

Shane Azzi: It's certainly been an unprecedented time, and I'm not sure any of us want to experience anything similar in a hurry. First and foremost, the thing I'm most proud of with our team has been our ability to put safety at the forefront. We prioritized the safety of everyone, from the front line of our operations to our partners, our customers, and the suppliers we work with. This enabled us to continue

Shane Azzi

Career highlights
Kimberly-Clark
(2015–present)
Senior Vice President,
Chief Supply Chain Officer

Mars Petcare
(2012–2015)
Vice President, Global Supply Chain

Education
Graduate degree in integrated logistics management, Royal Melbourne Institute of Technology

Undergraduate degree in management, Military College in Duntroon, Australia

producing the essential products that our customers and consumers depend on every day.

These were uncharted waters at the beginning, so another thing I'm proud of is our ability to move fast. We had to do things at a speed and with a level of ambiguity we'd never experienced before. Ultimately, I'm happy that we were able to support our customers at a time when they really needed us. Every day was a different challenge, but we rose to the occasion. I could not be prouder of the way our teams worked together: keeping people safe, keeping our supply chains operational, and doing our best to deliver our essential products to our customers and consumers in trying times.

Daniel Swan: The crisis has shifted the supply chain from being a niche topic to being the subject of conversations everywhere—from the dinner table to the boardroom. Do you think that change is here to stay as companies recognize the role the supply chain plays in their overall performance?

Shane Azzi: The supply chain has certainly moved from being a back-office function to having a seat at the table. And there is an opportunity within that—as difficult as it is—when you are under duress. Supply chains have been forced to navigate severe disruption, and this feels like it will be with us for some time. There's no easy path to get global shipping back to normal, for example. Things take time to rebalance. Then there's disruption on the demand side, plus inflationary pressures.

Altogether, you have some pretty significant dynamics, and as businesses, we need to work through the risks and implications. There is a real opportunity now for supply-chain leaders to step up and take a more proactive role in identifying these risks, addressing them, and helping to build strategies that are more resilient. A big part of building a more resilient business starts by thinking about how our supply chains operate. Roughly 18 months ago, I barely used the term "resilient" when talking about supply chains, and now it's becoming one of my favorite words.

Daniel Swan: Can we dig into that a little? We all know that a lot of supply chains have historically focused on productivity. Has this crisis changed your view—or the organization's view—on the risk that you're willing to take and how you think about the resilience that you need to build into the supply chain?

Shane Azzi: You must be able to identify the risk before you can do anything about it, so the first step toward resilience is understanding your exposure. I think what we learned—and continue to learn through the ongoing disruption—is that you've got to have visibility to what you are trying to manage.

Then it's about making the choices to insulate yourself from the disruption. We can't do everything, so it's about being clear about where the risk sits

and being really targeted in our actions. That's probably an area where we've had to work hard because, like many companies, we don't always have the full picture.

That's why digital becomes such an important part of the solution—because you've got to have that end-to-end picture. We must be able to see emerging risks further upstream and downstream than ever before.

Daniel Swan: Could you give us some examples of the actions you are taking in the digital arena to drive transparency, improve resilience, or increase productivity?

Shane Azzi: We've been on this journey for some time, and we're really starting to lean into digital: what it does, what its implications are, and so on. The need for digital solutions is very clear, given the amount of information we need to first absorb, then process in near real time. Digital strategies support the resilience we require—it's a mindset that revolves around action, reaction, and counterreaction.

We've been working in the area of digital manufacturing, where we have a pretty well-defined program. Right now, we are working through the whole area of logistics—and planning in particular. We are making our planning systems capable of taking information from much further upstream in our supplier base.

We've already done some good work over a number of years around demand sensing. Now the focus is on connecting this more so we can reprocess some of our planning decisions almost instantaneously. That ability to replan the business becomes incredibly important when you want to respond to changes at a faster rate.

The pandemic has really shown us that it's one thing to have your arms around your own operations but another when you have to deal with industry-wide issues. Digital facilitates our ability to see the level of information we need to operate effectively and efficiently across the chain.

Daniel Swan: This idea of an end-to-end approach to the supply chain is a powerful one, especially when you accept that end to end involves a lot of elements that are outside your organization's direct remit. Can you comment on the progress that you have made in that area?

Shane Azzi: This is definitely a hard one to crack because it requires a level of collaboration that is probably deeper than we've gone and more instantaneous than we've been in the past. We've had to get much more real time in understanding the material flows of our suppliers—for example, particularly where we have extended-lead-time supply chains. Given the current state of ocean freight around the globe, we need a really clear understanding of our suppliers' production schedules and logistics plans and when they will actually be able to get containers on the water.

We are already using digital platforms to monitor in-transit shipments within our own network, and this is about extending that approach to long-lead-time supply chains and ocean freight. It is taking the control-tower concept that we already have, which gives us great visibility inside our own operations, and extending it further upstream and faster than we ever thought we would. We want that upstream visibility because it gives us the opportunity to make different decisions early enough in the cycle to impact the outcome that we're looking for.

Daniel Swan: One of the big changes in consumer behavior during the pandemic has been a dramatic acceleration of the shift to e-commerce. Is that something you are experiencing at Kimberly-Clark?

Shane Azzi: Yes, it's real. In certain categories, we are seeing much more volume moving through e-commerce channels. So we need to be able to meet the expectations of the consumer for short lead times.

And that creates challenges. Lead times are increasing on the upstream side, while consumers want shorter lead times. That calls for a focus on fulfillment strategy. It's about being able to position inventories in our network closer to the point of demand and then get the throughput required from our distribution networks.

All CPG companies came through the school of full pallets, full truck loads, and at-scale operations. While there is an element of our operations for which that will always hold true, we also need the ability to flex down to the individual case or the individual product and be able to ship that to the consumer.

That poses some interesting challenges around the flexibility you need in the fulfillment center. You need to rethink your packaging architecture to make sure you have a suitable product that you can put through the network. You need multirole facilities or, in some cases, dedicated and focused facilities.

Those challenges will actually help to reinvent our supply chains. Automation is also going to play a role because once we get into high-volume manual tasks, we need to look at how we incorporate automation to increase velocity. This part of our business is continuing to grow and evolve, and I don't see it moving back.

Daniel Swan: All this ongoing change in the supply chain is having a big impact on the capabilities you need within the supply-chain team. How is Kimberly-Clark responding to that challenge?

Shane Azzi: There's a real shift happening now between the art and science of the supply chain, and it's definitely rebalancing more toward the science. That's clear just from the volume of data we are required to assess and base decisions upon on a pretty frequent basis. And because of the dynamic nature of the environment, optimizing the supply chain today looks a lot a different from 20, ten, or even five years ago. By necessity, we need to become more systems driven—no human can process the sheer amount of data in the time available.

What we are learning in this situation is that we can make decisions much faster when we become more data driven. That's an area we're continuing to focus on—getting the right data, then moving quickly to draw insights from that data. There's a whole subset of activities that you need to let the system drive. Our ability to accelerate and improve the quality of our decision making relies on the ability to systematize the work and then apply the right understanding to draw insights from the data.

We're continuing to put the focus on developing our people in that space. It's a lot of learning by doing, and we've had the perfect laboratory over the past 18 months to do just that. By necessity, we've really brought some of these solutions through sooner than we would have expected. I'm really pleased with our team's ability to respond to what has been a pretty significant digital transformation on a large scale.

Daniel Swan: Another thing that has become a big topic of conversation recently is worker shortages and the problems associated with finding the right talent, whether that's in distribution centers, manufacturing, or transportation. How do you ensure that Kimberly-Clark keeps winning the talent battle?

Shane Azzi: It has certainly been an unprecedented time in terms of the labor challenges we're facing across numerous industries. That has forced me to think about the real core of our work. We need to be clear about the core value pieces of our operation and then work out how we maintain a workforce that's capable and ready.

Ultimately, you need a little bit more depth in your organization. Again, I'll come back to the word "resilience." It's challenging in our operations right now because it's not the smoothest road every day. We need to create the right value proposition so that people want to come into our operations. They've got to see the value they can create in these roles—the significance of providing essential products to one-quarter of the world's population on a daily basis.

Our supply-chain teams played an incredible role through the pandemic, and supply chain came to the front a little bit more. That hasn't always been our style, because supply-chain teams tend to fly a bit below the radar. But this is forcing us to be more visible. It's an exciting place to work, and we must make people see the opportunity they have to impact business performance and deliver on our purpose.

That said, we also need to focus on how we define various roles. We need to use automation smartly and put people in the roles where they are going to add the most value and be the most engaged. There's still a lot of routine work in the supply chain that has the potential to be handled in different ways. With fewer workers available, we need to find the optimal mix of technology, automation, and the ability of our people to make the ultimate decisions and operate the system.

Daniel Swan: Sustainability is another one of the most important topics of the day. Can you tell us a little about your historical approach to environmental sustainability and how that may have changed as we've gone through the pandemic?

Shane Azzi: Maybe some people think that supply-chain practitioners have forgotten about sustainability because we've been consumed by the pandemic. In fact, it's absolutely at the forefront for us because every day is about operating with the smallest environmental footprint possible. There's real value in that, and our people believe in it passionately and want to move even faster. Keeping people safe while also safeguarding our natural resources is paramount for us.

There's an opportunity as we come out of the pandemic to increase the focus on digital and sustainability. Those are the two biggest things that are going to influence the supply chain as we move beyond the current situation.

You can see how digital and sustainability complement each other by looking at energy. That's an area where we've done a lot of work, exploring alternative energy sources and also making our energy consumption more transparent to our operators through our manufacturing-execution system. That really helps to bring to life the whole energy equation in our decision making and identify opportunities to reduce our footprint even further.

We've made steady progress over the last number of years, but now we really feel the urgency to move forward with a different level of intensity. We announced some ambitious sustainability goals for 2030, which include cutting our environmental footprint in half in the areas where we can make the biggest difference: plastics, climate, water, and forests. This is part of our global ambition to improve the lives of one billion people in underserved communities around the world by 2030 with the smallest environmental footprint, and our teams are committed to making the right decisions to get us there.

Daniel Swan: Last question: Where do you think the supply chain is going? Are today's issues here to stay, or will you be thinking about different challenges in two or three years?

Shane Azzi: For the supply chain, there has been an awakening. We have a bigger role to play than perhaps we once thought. That role involves the ability to plan and define which scenarios will meet the challenges of the day. Adjusting on the fly isn't going to be easy when you have big operations and significant infrastructure. It's going to be about how we respond when we see a signal or a pattern that's not normal. How do we adjust? It's paramount that we get deep into the data to understand supply-chain performance and the factors that affect it.

There's also going to be a lot of work around physical automation. With ongoing labor shortages, using more automation to do the routine work is a given. But at the end of the day, we can all have similar kinds of systems, similar robotics, and similar engineering infrastructure. The biggest differentiator in supply-chain performance is going to be the ability to see the situation, anticipate, and respond. Our people will make the difference.

I've been really impressed with all of our operational teams across Kimberly-Clark. We've demonstrated our ability to meet the moment and work through the ambiguity that sometimes comes in the world of operations. Now, I'm excited to capture that learning, enhance that mindset, and bring it into how we design and operate going forward to deliver on our purpose of better care for a better world.

Daniel Swan is a senior partner in McKinsey's Stamford office and the global co-leader of the Operations Practice.

Consumer-goods companies must transform their planning end to end

Rising complexity isn't tenable. Now is the time to take drastic action—in the form of tech-driven end-to-end planning transformation.

This article is a collaborative effort by Jérémie Ghandour, Christoph Kuntze, Tim Lange, Andreas Seyfert, and Alessandro Turco, representing views from McKinsey's Consumer Packaged Goods & Retail Practices.

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The consumer-goods industry has been fending off an array of challenges, such as shifts in consumer expectations and purchasing habits, low GDP growth in some large economies, and a global pandemic that created seismic upheaval. In 2020, the most resilient players were the ones that had already begun rethinking their planning practices.

Those successes are cause for optimism, but existing planning capabilities won't be sufficient for organizations to keep pace over the next decade. The accumulation of challenges will only make things more difficult for managers of global supply chains and the companies that rely on them. In the current context, supply chains will be called to contribute much more to performance—and that will require a complete reimagining of planning operations, capabilities, company performance, and processes.

The answer: an end-to-end transformation of planning. Technologies such as analytics and machine learning will play a major role, but to be effective they must be supported by new processes, talent, and governance. Companies should start their journey by focusing on five discrete priorities that could generate significant value. The benefits will be well worth the effort.

Pinpointing growth and margin opportunities

A high-performing planning function can provide consumer companies with the ability to capture value across both the top and bottom lines.

Top line: Growth and revenue

In recent years, e-commerce has accounted for 65 percent of growth in the consumer industry. The COVID-19 crisis reshaped the e-commerce landscape by forcing customers to change the way they buy. This trend led to the creation of a number of new "microchannels," several of which look set to endure beyond the pandemic (Exhibit 1). For instance, the adoption of apps such as DoorDash and Instacart and models such as "buy online, pick up in store" has spiked.

Despite the rapid growth of e-commerce, traditional channels still represent the largest share of sales in the consumer market. Consumer companies have made significant investments in technology, but service levels haven't improved. They face a number of persistent challenges in this space: increasing customization, greater complexity in the product portfolio, stockouts and missed revenues, and excess inventory. These issues all contribute to a negative customer experience.

Recent events have also placed resilience under the magnifying glass. Over the past 20 years, value chains have become more global, prompting leading companies to develop business-continuity plans. In the second quarter of 2020, we surveyed 60 senior supply-chain executives from across industries and geographies and discovered that a staggering 93 percent of respondents want to increase resilience in their supply chains.[1] The COVID-19 pandemic highlighted the need for more transparent supply chains across industries such as retail, pharmaceuticals, and consumer packaged goods. The few players that had the skills, capabilities, and technology to precisely track SKUs across the supply chain have not only weathered the crisis but have also gained an edge on less-advanced competitors.
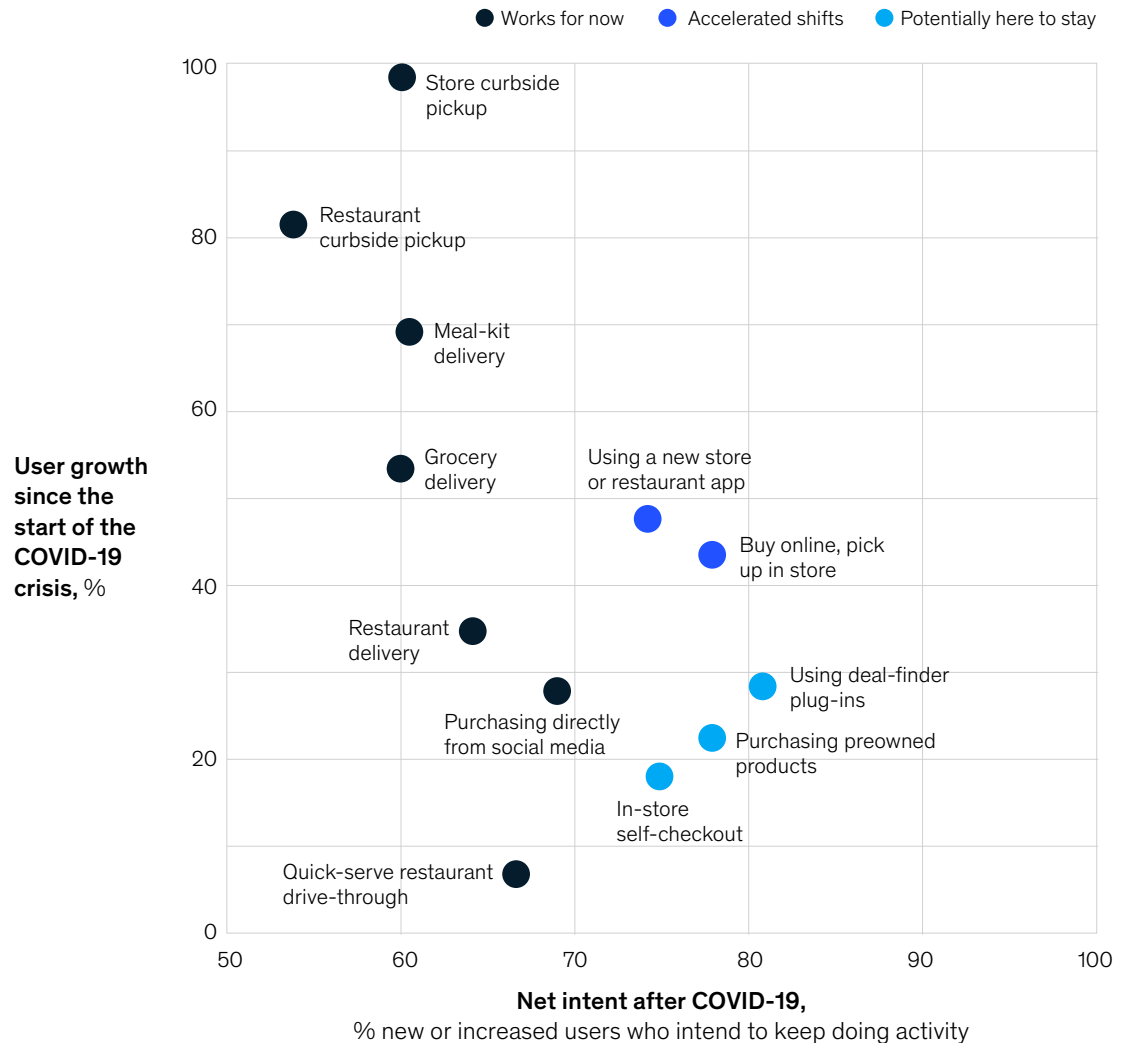
Bottom line: Margin and cost

Companies are scrambling to hold down costs and protect margins across several fronts. First, they are facing higher production and logistics costs thanks to the proliferation of SKU portfolios; rising demand for sustainable, organic products and locally sourced fresh goods; and the robust growth of smaller brands, which have expanded three to four times faster than large brands. As a result, costs have risen from lower purchase volumes, manufacturing time has increased from longer changeovers, and less-predictable demand has caused more waste and markdowns.

In addition, the increasingly scattered product portfolio is making end-to-end planning even more critical for organizations seeking to maximize growth and profitability across all planning horizons.

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[1] Knut Alicke, Richa Gupta, and Vera Trautwein, "Resetting supply chains for the next normal," July 21, 2020, McKinsey.com.

Exhibit 1

Many consumers intend to continue newly acquired habits even after the COVID-19 crisis is over.

● Works for now   ● Accelerated shifts   ● Potentially here to stay

User growth since the start of the COVID-19 crisis, %

- Store curbside pickup
- Restaurant curbside pickup
- Meal-kit delivery
- Grocery delivery
- Using a new store or restaurant app
- Buy online, pick up in store
- Restaurant delivery
- Using deal-finder plug-ins
- Purchasing directly from social media
- Purchasing preowned products
- In-store self-checkout
- Quick-serve restaurant drive-through

Net intent after COVID-19,
% new or increased users who intend to keep doing activity

Source: McKinsey analysis

Organizations cannot make optimal decisions without cutting-edge algorithms that can process vast amounts of live data and give planners the insights to react quickly to any change in demand. Finally, most consumer organizations have undertaken ambitious IT transformations that have improved data consistency and accessibility but that have failed to significantly increase planning accuracy or agility. Indeed, many are struggling to generate insights that could deliver superior business value or reduce manual planning efforts.

Establishing a 'North Star' for end-to-end planning

Many companies have been making investments in their planning tools and capabilities. Some have made progress in one or even a few areas, but only recently have companies started to tackle planning with the end-to-end perspective needed to significantly elevate performance and address the complex suite of issues. The best-in-class end-to-end planning of the future is built on the following principles:

Cross-functional integration. Companies must manage different planning activities (for example, demand, net requirements, production, and scheduling) in a comprehensive, coordinated way to produce the best decisions for the entire value chain.

Short planning cycles. Traditional monthly planning cycles accelerate to weekly cycles or even continuous-planning processes to enable the agility required in consumer industries.

Advanced-analytics enablement. Advanced analytics helps improve planning quality by, for example, enabling better demand forecasts, production planning, scheduling, and workforce planning.

A high degree of automation. Systems and algorithms support the automation of standard tasks and trigger interventions based on "basic" deviations, allowing planners to focus on exception management and decision making. Tools for automated root-cause identification and the fast, efficient evaluation of alternative actions support planners in their core tasks.

Full supply-chain visibility. Real-time data and performance transparency along the entire supply chain (for example, with inventories and orders) help organizations identify risks and exceptions early on and develop potential countermeasures. In addition, automated scenario-planning capabilities help companies understand the financial implications of potential actions and provide the basis for fact-based, profit-maximizing decisions.

This future state represents a "North Star" for consumer companies. While the end-to-end transformation is aspirational, the required technologies already exist, and companies are making progress across these elements.

Charting a path to value

To unleash maximum value from planning operations, many companies will need to embark on a comprehensive transformation. This effort encompasses several main priorities and embeds the right mix of technology, processes, capabilities, and operating-model changes required to make the journey successful (Exhibit 2).
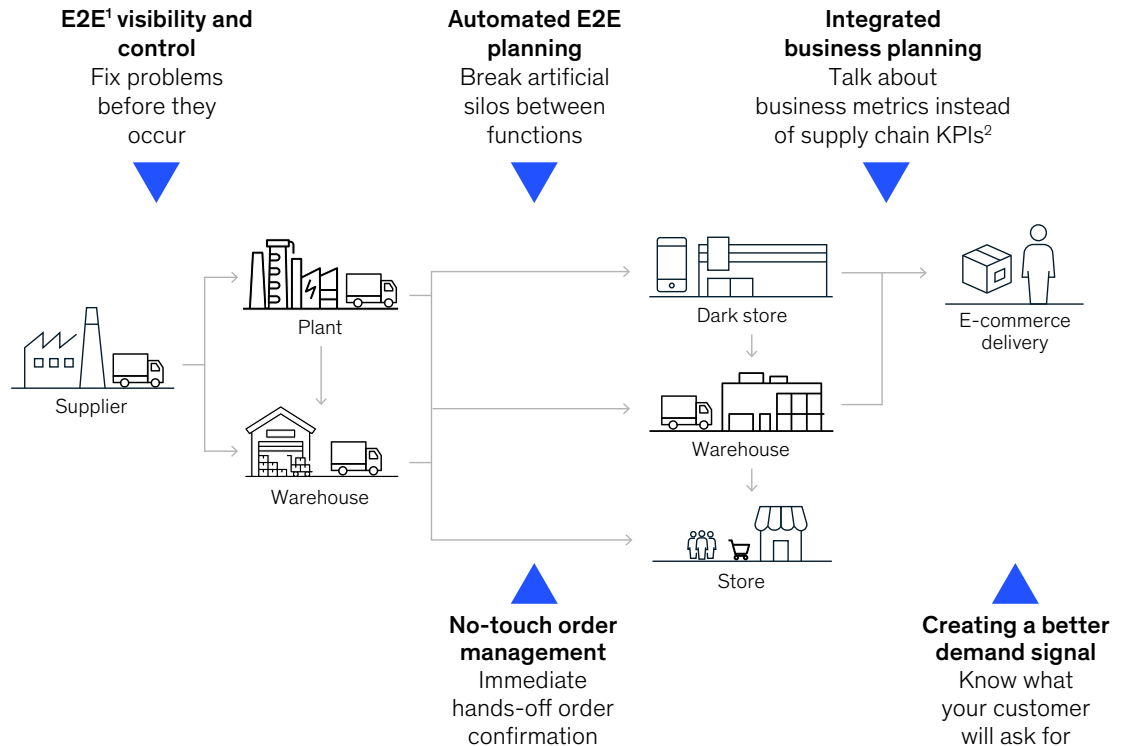
Focus on business metrics instead of supply-chain key performance indicators: Integrated business planning

Integrated business planning (IBP) builds on real-time financial scenarios that increase the quality of planning decisions as well as the agility of the planning process. Key enablers of efficient IBP are supply-chain and financial planning, system capabilities for real-time scenario creation and evaluation, and machine learning supported by exception identification. IBP is increasingly important for all consumer players, but it is crucial for omnichannel businesses that rely on cross-channel decision making (for example, prioritization decisions in case of bottlenecks). By enabling a coordinated category and product range strategy, companies can make complex trade-offs among pricing, promotions, and availability, a task that is extremely hard to achieve with classic planning systems and capabilities.

An international packaged-food company that was already holding less than 30 days of inventory with service levels above 95 percent embraced this challenge. The company started by cleaning its data to improve availability and transparency and introduced new cross-functional processes to enable data-driven decision making. Through these efforts, it decreased finished-goods inventory by 20 percentage points, improved forecast accuracy

Exhibit 2

An end-to-end planning transformation in consumer packaged goods encompasses five main areas.

E2E[1] visibility and control
Fix problems before they occur

Automated E2E planning
Break artificial silos between functions

Integrated business planning
Talk about business metrics instead of supply chain KPIs[2]

Plant

Dark store

E-commerce delivery

Supplier

Warehouse

Warehouse

Store

No-touch order management
Immediate hands-off order confirmation

Creating a better demand signal
Know what your customer will ask for

[1] End-to-end.
[2] Key performance indicators.

by six percentage points, and achieved a threefold increase in response time.

Know what your customer will ask for: Creating a better demand signal

Machine-learning forecasting algorithms use internal and external data sources, as well as their ability to "learn" from historic demand patterns, to continually improve forecast accuracy and minimize manual planning. Leaders harness the capabilities of advanced analytics forecasting tools to strengthen their fact base and close the gap between demand forecasts and commercial targets. Machine-learning algorithms can also simulate the expected impact of sales activities (such as promotions) on demand and help optimize activity management. These tools contribute to an improved customer experience by increasing the

availability of the newest offerings. A beverage company built the capabilities to simulate the impact of commercial activities on demand and integrate machine-learning forecasting into its demand-planning processes. The result: an improvement of 13 percentage points in forecast accuracy.

Immediate hands-off order confirmation: No-touch order management

The growth of omnichannel business elevates the importance of automated order-management processes, which give planners the ability to immediately confirm orders—for example, available to promise across planning levels—for optimal stocking based on customer requirements and product availability. Yet side-order management must handle an increased volume of smaller orders. Automation is required to ensure efficient, rapid

order processing and allow planners to focus on critical exceptions. As planning becomes more automated and moves toward a touchless operation, it frees up employees to gain new skills so they can focus on more value-adding tasks.

For example, a large consumer-goods distributor developed a stand-alone digital use case to pinpoint inventory position along its supply chain and accurately confirm expected delivery dates and transportation lead times. As a result, client satisfaction rose 30 percentage points.

Break artificial silos between different functions: Automated end-to-end planning

Integrated and highly automated planning processes and systems seamlessly optimize the planning process from demand to production scheduling to deployment. These tools give companies the ability to react in real time to changes in demand or supply exceptions and determine ideal trade-offs among functions. To achieve the greatest impact from advanced demand-sensing solutions, leading consumer-goods players establish automated, end-to-end planning systems to support supply- and inventory-planning agility. That capability allows companies to react to changes in short-term forecasts, manage costs and inventories more effectively, and improve service levels. One leading food company invested in advanced planning capabilities and reduced its inventory by 30 percent while raising customer service levels by three percentage points.

Fix problems before they occur: End-to-end visibility and control

Key elements of a resilient, responsive supply chain include real-time visibility and the early identification and rapid resolution of exceptions (ideally before they have an impact on customers or finances). Service and inventory control towers can help to create transparency, enable fast reactions, and continually address root causes. This visibility is essential to get the right product to the right place at the right time and through the right channel to fulfill customer demand and maximize growth. The COVID-19 pandemic clearly demonstrated the need for transparency across the supply chain, including customers and suppliers. Companies with real-time visibility have been able to react to the disruption much more quickly, make fact-based decisions, and minimize the negative impact on their supply chains—or even gain a competitive advantage.

One home and personal-care company improved customer-service levels by 25 percent through a rapid turnaround of its supply-chain performance. It achieved greater supply-chain visibility by implementing a governance structure (a control tower) that enabled faster response times when identifying exceptions in the supply chain.

Companies with real-time visibility have been able to react to the disruption much more quickly, make fact-based decisions, and minimize the negative impact on their supply chains—or even gain a competitive advantage.

Key success factors in advanced planning transformations

In our experience, a planning transformation is particularly complex. Successful companies must simultaneously manage a large stakeholder base and technological enablement while implementing new ways of working throughout the organization. Executive leadership is a vital component; without the engagement of the top team, any transformation is destined to fail. Business leaders should focus on five actions to accelerate their planning transformation:

1. **Engage stakeholders beyond the supply chain and the organization***.* Since the supply chain touches so many different parts of the organization, a successful transformation requires engagement from the CEO and COO. Their presence will lend credence to the transformation and ensure decisions are made in a cross-functional way. A transformation also presents companies with the opportunity to use external data (for example, from retailers, contract manufacturing organizations, copackers, trade partners, and proprietary databases) to generate value for itself and its ecosystem—such as through better visibility on capacity or supply. One company that had a digitally mature procurement function developed an algorithm to predict supply safety, thus improving supply-chain efficiency.

2. **Develop a plan starting with high-value areas.** End-to-end planning transformations run the risk of remaining too conceptual—and therefore difficult to implement. To make efforts more tangible, organizations should select one of the top five use cases and identify its relevance at the granularities of product family, geography, and customer segment (called cells). This exercise enables the development of a portfolio of applications that can be deployed over 12 to 24 months, focusing first on high-impact cells and those with sufficient data. In addition to starting small, organizations should be sure to scale up. One solution is to start with a cell that holds significant business value. Once a sizable

flagship has been established and is generating results, the case for scaling can be much easier to make.

3. **Select the right ecosystem of tech partners.** Several tech partners offer advanced integrated solutions, and many start-ups have developed specialized supply-chain offerings—for example, for a specific planning process or industry. While some organizations have specific planning challenges that require customized solutions, executives should start by considering more than one major tech partner. A wider set of candidates can help companies concentrate first on the expected business outcome and then on the technology required to address it.

4. **Reinvent the organization to ensure end-to-end optimization and more agile decision making at interfaces.** While advanced planning transformations focus mostly on digital and technology enablement, organizations achieve the greatest planning improvements and efficiency gains through an organization and process redesign. This approach ensures end-to-end decision making in a fit-for-purpose way depending on geography, product segment, channel, and customer type. Indeed, advanced algorithms can solve the most complex issues and identify an optimal solution for the company as a whole. However, this solution can include implications that aren't beneficial to some individual functions, so organizational setup has to ensure that the resulting actions are executed by all functions to achieve the best outcome.

   Organizational changes can take different forms. Radical changes include the creation of a central product organization representing all functions to make optimized trade-offs for a given brand and geography. A less-radical approach is to develop an official network of colleagues in charge of a product or brand while maintaining functional structure. A good way to start is to establish a cross-functional board and ensure it makes decisions based on

the recommendations of advanced algorithms. Still, additional elements are required for planning to unlock optimized trade-offs, such as implementing properly aligned incentives for objectives and target functions (for example, by product and channel). In starting such a journey, it is critical to involve key stakeholders in addition to operations, such as sales, marketing, and finance.

5. **Engage in a massive reskilling program with HR.** Planning teams typically still handle a lot of work manually, including consolidating, checking, and reviewing data. As the transformation proceeds, the role of a planning team must evolve to focus more on strategic decision making, trade-offs, and stakeholder engagement. Given the size of the team and the scarcity of those resources in the job market, companies must invest in upskilling as a critical pillar of the planning transformation. In our experience, successful efforts harness techniques such as learning by doing. For example, each individual planner should contribute to the solution design—from business-case creation to delivery—and understand the potential of algorithms to support planning.

How to get started

Companies that want to explore the potential of advanced planning should start by identifying and aligning on a core list of strategic business priorities across their operations and set clear improvement targets for each one. They should then understand how true end-to-end planning across the five priority areas discussed can achieve each of those targets and set a path for the transformation. Finally, they need to devise a clear deployment plan that embeds key success factors across organizational structures, skills, processes, and technologies to make sure that all typical pitfalls are addressed from the start.

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Planning activities have traditionally been a supply-chain topic. However, digital and advanced analytics are now unlocking the ability to make complex trade-offs among functions such as sales, production, and the supply chain that will become more critical in the coming years. This dynamic challenges the way companies think about their planning operations and organization. Given the value at stake and the threat posed by digital natives, an advanced planning transformation should be at the top of the agenda for consumer-goods CEOs, and it should focus on five main priorities: integrated business planning, creating a better demand signal, no-touch order management, automated end-to-end planning, and end-to-end visibility and control.

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Launching the journey to autonomous supply-chain planning

For many companies, the COVID-19 pandemic has provided the impetus— and a uniquely apt moment—for transitioning toward autonomous planning.

This article is a collaborative effort by Ignacio Felix, Christoph Kuntze, Shruti Lal, Karl Seibert, Andreas Seyfert, and Ketan Shah, representing views from McKinsey's Consumer Packaged Goods and Operations Practices.

Over the past few months, people everywhere have been worrying about the supply chain. Items have been out of stock at stores for weeks; shortages in crucial categories such as packaged food, cleaning supplies, and, more critically, medical safety equipment have been all over the news. At the same time, with stores closed and most people staying home, demand for other types of products has fallen precipitously. How will companies handle continued uncertainty and fluctuations in consumer demand as cities, states, and countries start to reopen?

The COVID-19 crisis poses many new challenges to supply chain planning. In forecasting, for instance, the pandemic has rendered traditional techniques ineffective, since those techniques rely heavily on a company's historical sales data rather than on forward-looking external data. Some manufacturers, therefore, couldn't react fast enough when consumers shifted most of their spending away from brick-and-mortar stores toward e-commerce; others couldn't ramp up production to meet soaring demand from pantry-loading consumers. Yet some companies will be (and, indeed, have been) consistently able to meet demand in the near term—thanks in large part to their advanced supply chain capabilities.

For many companies, the COVID-19 crisis has provided not just the "burning platform" for transforming supply chain planning but also a set of circumstances conducive to such a transformation. For one, because of mandatory closures of factories and stores in various regions, manufacturers are dealing with fewer suppliers and customers in fewer geographic markets. Also, some manufacturers are temporarily reducing the number of SKUs they make, devoting their factories and warehouses to only the highest-demand products—thus allowing for greater visibility into the supply chain and targeted interventions. Furthermore, the crisis has forced marketing and sales teams and supply chain planners to collaborate more closely with each other, creating opportunities for end-to-end redesign of planning processes.

In the early days of the crisis, many companies rushed to assemble a supply-chain control tower—a cross-functional team reviewing real-time data to make decisions quickly. Done right, the control-tower approach can be an effective one, whether in a crisis or not. It's also a potentially big step toward what we believe should be an aspiration for every consumer company: autonomous planning. The vision for autonomous planning is one in which big data and advanced analytics are used in every step of the supply-chain planning process, enabling faster and better decision making with minimal manual intervention.

In this article, we describe the elements of a successful control tower to help companies make data-driven decisions during the COVID-19 crisis and in the immediate aftermath. We also discuss how companies can use a control tower as a springboard toward autonomous planning. The goal, ultimately, is for companies to be better prepared to provide the products that consumers want and need, at the best cost and in the most environmentally sustainable way—even in times of crisis.
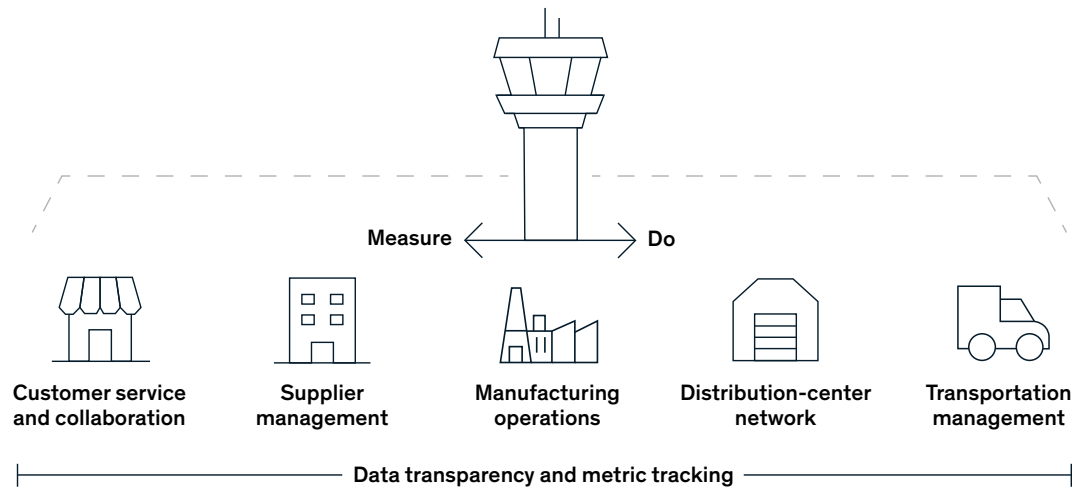
Do now: Strengthen the control tower

Some companies mistakenly believe that an effective control tower is simply a team doing round-the-clock work in a war-room setting during a crisis. In the best-run companies, however, a control tower is part of the normal way of doing business, not an ad hoc initiative hastily dusted off in crisis periods and then dismantled afterward. Successful control towers have the following elements in common:

— *The authority to make critical decisions.* The control tower can't fulfill its purpose if it's made up of junior planners and midlevel personnel tasked with generating reports for their higher-ups. Rather, the individual leading the control tower must be an executive who has the trust and respect of the CEO and COO; the rest of the team members should be high-performing supply chain planners, plus managers from customer

Exhibit 1

A control tower is cross-functional, has access to real-time data and metrics, and is empowered to make critical decisions fast.

Measure ← → Do

Customer service and collaboration   Supplier management   Manufacturing operations   Distribution-center network   Transportation management

——— Data transparency and metric tracking ———

service, supplier management, manufacturing operations, warehousing, and transportation (Exhibit 1). This cross-functional team must be empowered to make important business decisions quickly, with reasonable limits.

— *Data-enabled decision-making processes.* Gathering accurate data from internal and external sources—and integrating all the data into a "single source of truth"—is important but not sufficient. The data must then be delivered to decision makers in digestible, user-friendly formats. Control-tower team members won't be able to make decisions in a timely manner if they first have to wade through and pressure-test hundreds of spreadsheets and documents that yield limited insights for their work. That said, a company shouldn't wait to establish a control tower until it has the perfect data or the perfect tool. It can start with the available data sets and build on them over time.

— *Scenario-planning capabilities.* The most effective control towers are equipped with the tools, talent, and processes to conduct scenario planning regularly and rapidly. In minutes or hours instead of days or weeks, they can develop

a range of scenarios, model the implications and trade-offs (financial and otherwise) in each of the scenarios, and generate recommendations for action. Discussions and debates about the right path forward are data driven, instead of being dominated by the loudest and most insistent voices.

A control tower's impact will be felt in every part of the supply chain. At a consumer-health company, for example, the control tower mobilized fast in the early days of the COVID-19 pandemic to distribute personal protective equipment to factory workers, track the evolving situation at its facilities around the world, reduce its SKU portfolio by 50 to 70 percent (depending on the brand), and develop an allocation process that it swiftly communicated to retailers. Even with unprecedented spikes in demand for its products, the company has been able to maintain a higher case-fill rate than its competitors.

Shape the next normal: Move toward autonomous planning
A control tower's accelerated planning cadence and rapid decision making can serve as the foundation for building more sophisticated autonomous-

planning capabilities. Practically speaking, autonomous planning enables ongoing, machine-supported decision making in every part of the planning value chain, with planners intervening only to manage exceptions (Exhibit 2). In other words, the machines do what they do best—crunching data and applying advanced analytics—thus freeing up planners' time for higher-value activities.

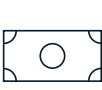### A case example: Autonomous planning in packaged food

About a year before the COVID-19 outbreak, a multinational packaged-food manufacturer sought to improve its supply chain planning processes. The company had historically adhered to a monthly planning cadence, but by the end of each month, supply conditions and demand profiles had changed, rendering monthly optimization a useless exercise.

In addition, the company was routinely taking longer than three days to respond to demand-change requests, partly because of highly manual processes and a complex data ecosystem that made it difficult for planners to access and review data inputs. The company wanted to be able to react faster to changes in either supply or demand—and to do so in the most profitable way.

Company leaders assembled an agile, cross-functional team to lead the supply chain organization toward autonomous planning. In just four months (versus the typical timeline of six to eight months), the team developed a minimum viable product (MVP) that included a tool to integrate and cleanse data from more than 100 data tables. The effort was a success: the company sped up its tactical-planning cadence from monthly to weekly

Exhibit 2

Autonomous planning differs from traditional supply-chain planning in several ways.

Features of autonomous planning	Efficient	Powered by advanced analytics	Fast	Hardwired into business	Self-transforming
From	Many manual steps and interventions	ERP[1] and standard software functionality; software potential largely unrealized	Monthly, weekly, and daily cadence (eg, for S&OP[2] planning, S&OP execution, IBP[3]); lots of data review and discussion of resolutions	Owned by supply chain/operations; not integrated with company-wide functions	One-and-done projects replacing one black box with another
To	Automation of inputs to demand and supply planning; streamlined order management; exceptions elevated	Advanced analytics with artificial intelligence and machine learning in forecasting; multiechelon, continuous supply-planning optimization	S&OP cadence replaced by short, tactical, cross-functional touchpoints relying on real-time information	KPIs[4] fully aligned across functions; planning fully integrated with all business processes	New talent (eg, data scientists) embedded in teams to pilot new use cases continually

[1] Enterprise resource planning.
[2] Sales-and-operations.
[3] Integrated business planning.
[4] Key performance indicators.

A control tower's accelerated planning cadence and rapid decision making can serve as the foundation for building more sophisticated autonomous-planning capabilities.

and achieved a 24- to 48-hour response time to demand-change requests.

When COVID-19 hit, the autonomous-planning system detected unusual patterns in point-of-sale data and other demand signals (such as retail traffic, mobility data, and social-media "buzz" analytics) in certain markets. Using automated forecasting models powered by machine learning, the system could rapidly evaluate millions of data points to uncover the drivers of shifts in demand. The system then sent automatically triggered alerts to the company's planners. It also generated a set of scenarios, as well as recommendations for maximizing both revenue and profit in each scenario. For example, in a scenario in which one of the company's manufacturing plants runs out of certain materials or ingredients, should it shut down that production line entirely? Or should it manufacture a different product on that line instead—and, if so, which product? Planners then collaborated with the marketing and sales teams to agree on the best path forward.

As a result, when demand for the manufacturer's products more than tripled in several categories and regions, it could react speedily. It was able to optimize inventory levels by two to three days across categories, even at the peak of the crisis. The company is now even more committed to building its autonomous-planning capabilities further.

Getting started on autonomous planning
The packaged-food manufacturer in our case

example is using a phased process to move toward autonomous planning. The following principles are helping ensure the transformation effort's success:

— *Focus on use cases that drive the most value.* Instead of taking the traditional, protracted "waterfall" approach and launching every single module of the new tool—thereby overwhelming the supply chain function with too many new goals and targets—the company first zeroed in on specific pain points and desired outcomes, translating them into use cases and embedding machine learning into those use cases. For example, it identified supply issues (measured in service levels) as the biggest problem to solve, given the potential market opportunity. It piloted the MVP in a handful of manufacturing plants, using it to optimize production plans. Planners found that the new system enabled them to create better plans—and to do it five times faster than they did before.

— *Challenge the operating model.* The company didn't just launch a tool and declare victory. Instead, it jettisoned its traditional planning cycles, redesigned its planning processes, and built employee capabilities (for example, in data engineering and advanced analytics) through intensive training. It reconfigured planners' workspaces to facilitate closer collaboration, immediately transitioning to remote collaboration when planners started working from home. Agile methodologies, such as sprints and kanban boards, have become the

norm in day-to-day operations for the 20-plus planners that form the core of the company's new autonomous-planning capabilities.

— Use data as the backbone. The company spent many hours unifying the data into a cloud-based ecosystem that can be frequently and automatically refreshed and that can potentially draw from dozens of data sources. Various stakeholders across functions collaboratively made decisions about the technology stack, focusing on the areas of highest importance. With a solid data infrastructure as the backbone of supply-chain planning, the company can seamlessly advance from the initial steps of autonomous supply planning to other areas,

such as inventory optimization, material-requirements planning, and, eventually, production scheduling.

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The COVID-19 pandemic has severely tested supply chains around the world, exposing weaknesses in companies' planning processes and operating models. Manufacturers must take the lessons of this crisis to heart and act quickly to address them. By embedding a control-tower approach into standard ways of working, then using it to jump-start a decisive transition to autonomous planning, companies can strengthen their businesses to thrive in the recovery and beyond.

Into the fast lane: How to master the omnichannel supply chain

Consumer-product and retail companies looking to jump into the fast lane of modern shopping will need to overhaul their operations to master the seven building blocks of an effective omnichannel supply chain.

By Tim Lange, Colin Regnier, and Andreas Seyfert
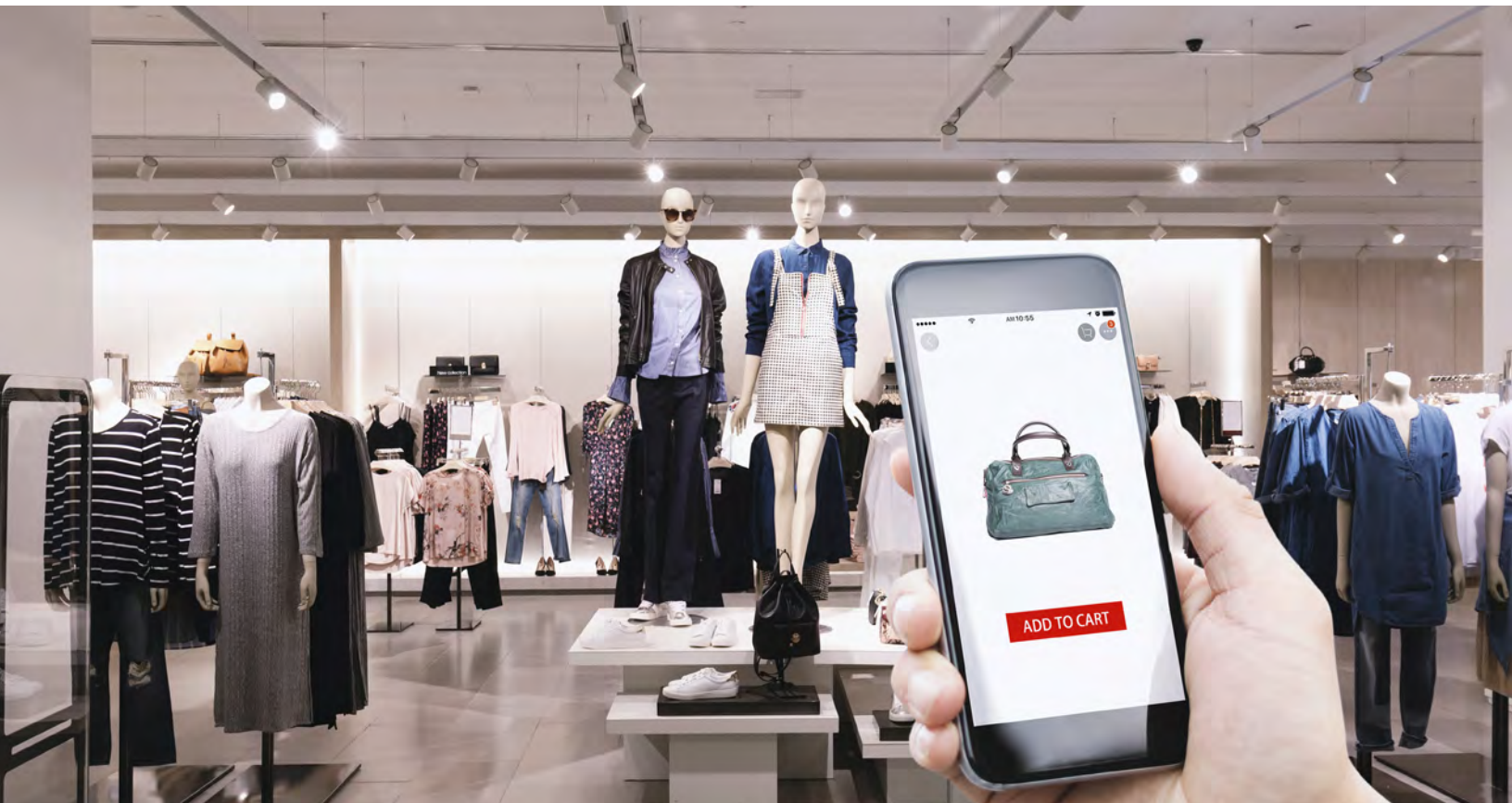
Omnichannel shopping has become the new normal for almost all consumer products and is likely to remain so for the foreseeable future. Through omnichannel shopping, consumers can shop across multiple sales channels—online using their laptop or phone, in physical brick-and-mortar stores, or at wholesale stores—while benefiting from a seamless, holistic consumer experience. This new normal has important implications for consumer-product companies, including direct-to-consumer businesses such as retail, grocery, and consumer-packaged-goods companies. To survive, these companies must accept the challenge of delivering a great consumer experience across sales channels and shape their supply chains accordingly. Most companies' supply chains predate omnichannel, however, and layering the newly required capabilities on top of legacy systems can be difficult. Organizations need to undertake broader and deeper transformations to meet rising consumer expectations in consumer experience, individualization, and delivery speed, while keeping delivery costs under control.

Our experience in working with consumer-product and retail companies across categories, including grocery, suggests that organizations looking to master omnichannel supply chain excellence should focus on seven key building blocks. These building blocks—which cover strategy, information flow, the physical flow of products, process automation, and last-mile delivery—are the principal subject of this article.

The challenge is significant, but consumer-product companies that respond effectively to the changing market environment have an opportunity to gain an advantage over their peers. Players that fail to make this shift will struggle to remain competitive.

The importance of omnichannel: E-commerce is booming, but physical stores remain important

E-commerce was booming even before the pandemic, and the COVID-19 crisis has increased the pace of growth (Exhibit 1). This shift does not necessarily spell the end of brick-and-mortar stores, however. Forward-thinking consumer-product companies have been using their stores to educate consumers on product offerings, reinforce their brands' positioning, and support e-commerce sales. Despite the pandemic, for example, Nike opened a 26,000-square-foot flagship store in

Exhibit 1

Retail sales online or via mail order grew quickly in 2020.

Index of first month for each quarter in 2020 for five European countries,
2015 = 100, retail sales via mail order or the internet

■ January 2020 ■ April 2020 ■ July 2020 ■ October 2020
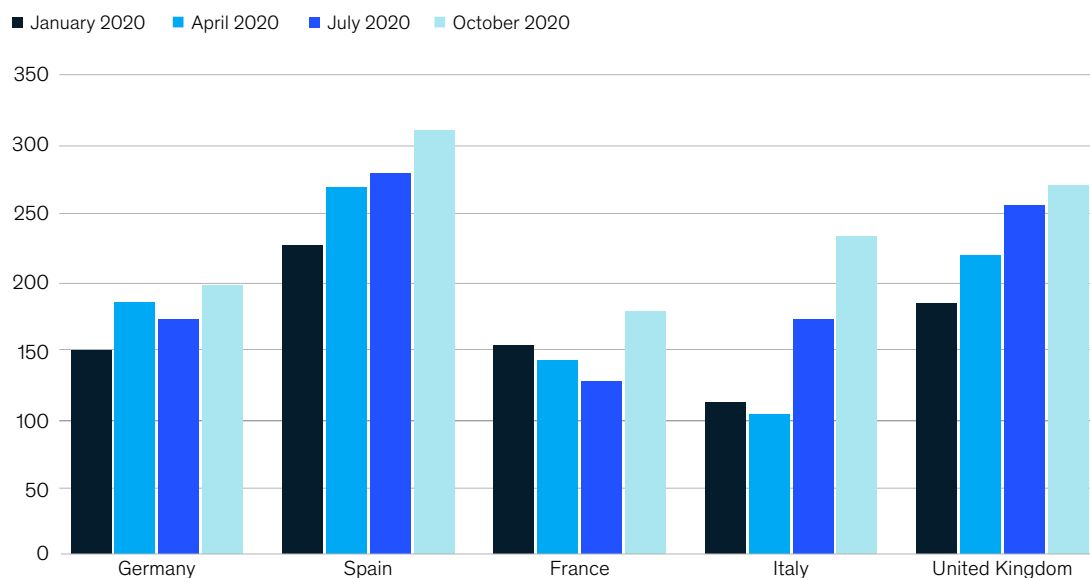
Paris that features a "digitally empowered" end-to-end consumer experience.[1] Prepandemic research found that opening a new location increases traffic to a retailer's website by 37 percent in the following quarter.[2] This complementarity is why it is vital for consumer-product companies to invest in—and master—omnichannel supply chains that can deliver a great consumer experience across multiple channels.

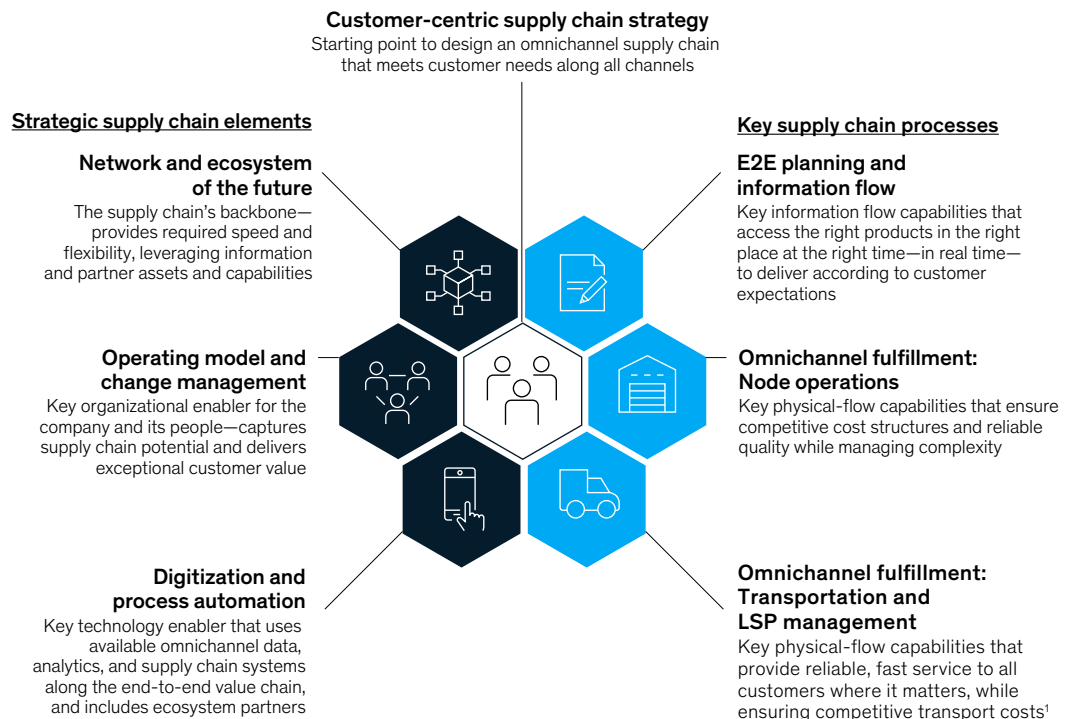## The seven building blocks of omnichannel supply chain excellence

Most companies will need to fundamentally transform their supply chains to deliver omnichannel excellence, but the effort will be worthwhile. The remainder of this article lays out the seven essential building blocks for the omnichannel supply chain of the future (Exhibit 2).[3]

The first and most important building block is a customer-centric supply chain strategy. This building block is followed by three strategic supply chain elements—the network and ecosystem of the future, operating model, and digitization and process automation—and also three key supply chain processes—end-to-end planning and information flow, omnichannel fulfillment through node[4] operations, and omnichannel fulfillment through transportation. Consumer-product companies looking to master omnichannel excellence should ask themselves some key

Exhibit 2

The seven key building blocks of future omnichannel supply chains combine best practices with digital innovation.

Customer-centric supply chain strategy
Starting point to design an omnichannel supply chain that meets customer needs along all channels

Strategic supply chain elements

Network and ecosystem of the future
The supply chain's backbone—provides required speed and flexibility, leveraging information and partner assets and capabilities

Operating model and change management
Key organizational enabler for the company and its people—captures supply chain potential and delivers exceptional customer value

Digitization and process automation
Key technology enabler that uses available omnichannel data, analytics, and supply chain systems along the end-to-end value chain, and includes ecosystem partners

Key supply chain processes

E2E planning and information flow
Key information flow capabilities that access the right products in the right place at the right time—in real time—to deliver according to customer expectations

Omnichannel fulfillment: Node operations
Key physical-flow capabilities that ensure competitive cost structures and reliable quality while managing complexity

Omnichannel fulfillment: Transportation and LSP management
Key physical-flow capabilities that provide reliable, fast service to all customers where it matters, while ensuring competitive transport costs[1]

[1]Logistics service provider.

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[1] Sheena Butler-Young, "Why Nike opened a sprawling Paris flagship in the middle of a pandemic," *Footwear News*, July 29, 2020, footwearnews.com.
[2] Edmund Mander, "Physical stores key to retail success, study finds," International Council of Shopping Centers, October 15, 2018, icsc.com.
[3] While the focus of this article is on supply chains, a complete omnichannel operational overhaul would also include an examination of the upstream value chain (sourcing, product development, and production), particularly if e-commerce is a large share of the business.
[4] A node is any location that can store and ship products. This could be a shop, a warehouse, or even a pop-up venue.

Essential questions for each of the building blocks of omnichannel excellence

Consumer-centric supply chain strategy

— How many supply chain segments are required to deliver the supply chain mission, and what is the objective of each?

— What is the customer offering across different segments, and how can we differentiate ourselves from competitors?

— How can we tailor the assortment to a retailer or to a channel?

— What are the key supply chain risks, and how can we best prepare for disruptions?

Network and supply-chain ecosystem of the future

— What is the physical flow of goods through the network? What is the impact of different product supply speed models?

— How are suppliers managed and integrated to support an agile upstream supply chain that responds quickly to changes?

— Is the distribution network designed for each channel individually, or would an omnichannel network be beneficial? What is the right composition of distribution centers (DCs), new node types, and partner locations?

— How can inventory be shared across channels? Does each channel have its own inventory?

— What are key areas for customer collaboration that could improve information exchange and product flow along the value chain?

End-to-end planning and information flow

— What are the different demand signals in the omnichannel environment, and

how can they be captured to predict demand potential through advanced analytics? How can we combine them into an end-to-end (E2E) marketplace perspective?

— What is the optimal inventory level at each stage of the value chain? How can we actively manage inventory to increase availability and keep cash requirements under control?

— How can we best synchronize the product supply with customer demand in stores, in DCs, and with partners?

— How can we align the different organizational entities and plans at key milestones? How can we manage trade-offs and locate and prioritize customers, channels, and orders?

— How can we ensure real-time visibility and accessibility of inventory across all channels and locations?

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questions (see sidebar, "Essential questions for each of the building blocks of omnichannel excellence").

Consumer-centric supply-chain strategy
Being truly consumer centric—meeting customer needs across all channels and grounding all decisions in deep understanding of the consumer—is a widely held objective, but it is difficult to achieve. Common pitfalls include a failure to listen to consumers and a one-size-fits-all supply chain, which leads to a lack of differentiation of services and, consequently, higher costs.

First, companies need to be absolutely clear about which consumer segments they aim to serve. Most companies understandably want to deliver a great service to all potential consumers, but resources are

limited; companies need to decide which consumer segments matter most so that they can focus their resources on the most important targets.

After they have identified their target segments (ideally through cross-functional decision making), omnichannel players need to figure out what to deliver to each of these segments. This decision will, in turn, determine how many supply chain segments they need.

For example, a leading global sportswear player has implemented a state-of-the-art supply-chain strategy, clearly differentiating among individual segments and defining distinct supply chains for each segment. The company's most prestigious segment is premium consumers in cities such as London, Berlin, or Paris. These consumers are

Essential questions for each of the building blocks of omnichannel excellence (continued)

Omnichannel fulfillment: Node operations

— How can we achieve warehouse excellence in a more complex environment?

— How can we manage returns in an efficient and effective way?

— How can we enable the whole downstream supply chain for omnichannel and optimize in-store layout and processes to enable local fulfillment while providing a great customer experience?

Omnichannel fulfillment: Transportation and logistics-service-providers management

— What do we need to manage transport operations efficiently in an increasingly demanding world? How do we keep transport cost under control and create end-to-end transparency of product flows?

— What are the right logistics partners for the different supply chain segments? How do we get competitive rates and services?

Operating model and change management

— How do we design supply chain processes to support omnichannel optimization? How can digital innovation be integrated in the process design?

— How can we adjust the organizational structure to capture cross-channel benefits and make change happen?

— Which additional skills are needed to enable the future organization? How can we best address the cultural change toward omnichannel behavior?

— How should performance of the E2E supply chain be measured? How can we incorporate the omnichannel dimension,

measuring the joint performance rather than individual channels?

Digitization and process automation

— What software and other tools are needed to enable the omnichannel supply chain?

— How can we capture data and use them along the value chain? How are legacy systems integrated? How do we integrate into an ecosystem with our partners?

— How can we contextualize data to conduct relevant analyses? Are operational data consolidated and accessible to the right decision makers?

— How can we employ advanced digital tools such as robotic-process automation, blockchain, and the Internet of Things to enable omnichannel optimization?

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offered a premium service, which includes a two-hour delivery window on special items, and early access to newly launched products. The supply chain for this segment is therefore focused on fast delivery and reliability. Consumers living in rural areas cannot access the same benefits; the supply chain of this segment has a much stronger focus on efficiency, and standard delivery times are two or three days.

Network and supply-chain ecosystem of the future

The shift to omnichannel is forcing consumer-product companies to rethink the supply chain ecosystem they are operating in. As described in a previous article,[5] players need to choose the right combination of distribution centers (DCs), new node types, and partners to deliver their consumer-service aspirations within each channel.

The supply-chain ecosystem should be an end-to-end collaboration involving all stakeholders, from suppliers to consumers. Companies are only able to deliver on ever-changing consumer requirements if information is shared along the entire value chain, and if all network assets and capabilities are fully leveraged. One example of the importance of collaboration is the growing demand for late customization[6]; suppliers produce a "blank sample,"

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[5] Manik Aryapadi, Ashutosh Dekhne, Wolfgang Fleischer, Claudia Graf, and Tim Lange, "Supply chain of the future: Key principles in building an omnichannel distribution network," January 15, 2020, McKinsey.com.

[6] Late customization refers to customer requests for customization as part of an online order; for example, by requesting a specific color or inscription.

which is stored as inventory and customized shortly before delivery.

Collaboration is also a great driver of innovation. For example, consumer expectations have forced consumer-product companies to move from simply shipping products from a warehouse or distribution center to more innovative fulfillment options, such as shipping directly from production facilities or dark stores.[7]

Another example of retail partner–driven innovation is "inventory sharing," as pioneered by Adidas and Zalando, a European e-commerce platform.[8] The two companies have adopted a partnership model that involves a shared pool of products; if a specific Adidas product is unavailable at Zalando, the consumer is automatically redirected to the Adidas website. Alternatively, Zalando may deliver products ordered on the Adidas website in order to decrease lead times.

End-to-end planning and information flow

The shift to omnichannel involves an increase in operational complexity; omnichannel operations involve multiple sales channels, multiple network nodes, and a decentralized inventory. Meanwhile, customers expect to be able to access the right products in the right places and in real time. Therefore, omnichannel operations require thoughtful end-to-end planning, which requires significant changes to three key elements:

— Forecasting should be done by market and product group and then disaggregated to channel level. The overall forecast, for example, would predict the total volume of sports shoes to be sold in London. This total number would then be disaggregated into those sports shoes the company expects to sell in stores, through e-commerce, and through other channels. Finally, the forecast needs to take into account omnichannel effects such as cross-channel cannibalization; for example, customers who

have a great e-commerce experience may stop purchasing items in stores.

— Inventory should not be dedicated to one channel; companies should have cross-channel inventory pools. Algorithms—which should take into account factors such as forecast demand, the accuracy of past forecasts, lead times, and lead-time reliability—should define optimum inventory levels at each node in the supply chain, including in DCs and stores and with partners. Inventory levels should then be actively managed to maximize cross-channel availability and optimize cash flow. Consumers should have real-time visibility into inventory, and orders should be fulfilled efficiently through continuously reoptimized allocation across all channels and locations.

— Information flow should be seamless among functions, channels, and systems. Players aiming for a truly omnichannel supply chain need to fully digitize cross-channel planning processes and tools, but they can choose whether to start this on one channel or to digitize and move to an omnichannel supply chain simultaneously.

Omnichannel fulfillment: Node operations

The shift in volume from in-store purchases to e-commerce forces consumer-product companies to reevaluate their fulfillment networks,[9] which are integral to their supply chains. Omnichannel players need to build key capabilities regarding the flow of products to make sure they achieve competitive costs and reliable quality while managing the complexity of omnichannel operations.

Companies looking to add e-commerce offerings to their offline business often add the operations of the new channel to the existing supply chain without sufficient consideration of the new channel's distinct requirements. The physical flow of e-commerce products, for example, is very different from the flow of products within a distribution

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[7] Dark stores are large retail facilities that resemble conventional stores but are not open to the public. They are used to hold stock and to fulfill online orders via delivery or click and collect.
[8] "Multi-channel pilot in Paris: Zalando delivers same-day for adidas.fr," Zalando, August 19, 2019, zalando.com.
[9] "Supply chain of the future," January 15, 2020.

center. E-commerce buyers generally expect very short lead times, while cost is more important than speed in the shipping of seasonal stock to the DC of a wholesaler. Stores, DCs, and e-commerce also have different units of measurement; DCs typically think in terms of full truckloads or pallets, while e-commerce is primarily concerned with individual units.

A supply chain that is purpose-built for omnichannel will take into account the varying channel requirements. Warehouse automation is a good option and can improve speed, quality, and efficiency.[10]

Cross-channel operations should be organized to maximize the value-capturing potential of each channel, including traditional brick-and-mortar stores. In an ideal omnichannel consumer experience, different points of sale are fully connected and integrated. Today's consumers expect a seamless shopping experience across channels, such as click-and-collect services that allow them to order online and pick up in a store. This expectation means that consumer-product companies also need to reassess in-store processes and layouts to ensure a great consumer experience if both online and offline consumers are served in the same store.

Omnichannel fulfillment: Transportation and LSP management

Transportation and the management of logistics-service providers (LSP) are also significantly more complex for companies with multiple channels to serve, due to the different requirements of each channel. The orders of brick-and-mortar consumer-product companies can generally be booked in advance and delivered by truck. E-commerce services, on the other hand, must process a high number of individual orders at short notice using transportation modes such as couriers or postal services. Omnichannel players need to ensure that they can provide reliable, fast service to all customers

while ensuring competitive transport costs.

Success requires organizations to identify the right logistics partners for each segment of the supply chain. Omnichannel players need partners who can deliver small shipments quickly, reliably, and relatively inexpensively, but they likely also need partners that can deliver specialized services, such as "try at home" or electronics installation. Organizations need to carefully source and manage these numerous partners to keep costs down and ensure a consistently high quality of service.

Last mile is generally the most costly transportation segment. Success in this segment requires efficient IT systems, local fulfillment networks, and carefully chosen third-party logistics partnerships. Players need to find solutions that meet consumer expectations on service and lead time, while also offering full transparency about, and control over, costs. These solutions may include leveraging preexisting brick-and-mortar stores or using nontraditional approaches such as bicycle deliveries or local couriers.

To facilitate the supply-chain transformation detailed above, and to ensure that each stage runs smoothly, companies also need to invest in two additional supply-chain setup elements. These are the focus of the final two sections of this article.

Operating model and change management

To realize the full benefits of omnichannel, companies must undertake a full transformation of their operating models,[11] including a redesign of processes, structures, mindsets, capabilities, and performance management. This building block is key to ensuring that the company—and its people—can capture the full potential of the supply chain and deliver exceptional customer value.

As a first step, players need a cross-channel omnichannel team; without such a team, it is very difficult to break down siloed thinking and operations.

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[10]Ashutosh Dekhne, Greg Hastings, John Murnane, and Florian Neuhaus, "Automation in logistics: Big opportunity, bigger uncertainty," April 24, 2019, McKinsey.com.
[11]Ibid.

Consider inventory management when demand exceeds supply or capacity, for example. To ensure good consumer service and enable profit-optimizing inventory allocation, players need one person or team to take ownership of all inventory across channels. The full team also needs to be trained—and given incentives—to optimize for the company as a whole, rather than for any individual channel.

In addition, companies need to be structured in a way that enables intense collaboration with value-chain partners. Assigning clear end-to-end responsibility—from supplier to consumer to the omnichannel team—is an effective way to do this. A leading apparel and footwear player, for example, has set up "city teams" that are responsible for everything from supply management to cross-channel inventory management.

Many companies assume that a full transformation of their operating model will be highly complex, so they tend to apply incremental improvements rather than launching a full overhaul. Ultimately, this approach will not be sufficient to deliver on the opportunity of omnichannel. Instead, companies can simplify their operating-model transformation by taking an agile approach, which breaks the process down into manageable chunks. This process involves built-in test phases and many opportunities to learn and improve.

Digitization and process automation

As this article has demonstrated, technology and effective data-and-analytics strategies that incorporate the right partners are key enablers of an omnichannel supply chain. Players need to ensure that they have the software and tools to capture the requisite data and, crucially, to leverage it.

Rising consumer expectations are pushing consumer-product companies to digitize and automate. The demand for same- or next-day delivery is increasing, for example, at the same time that orders are increasing in both volume and complexity. To meet these expectations, organizations need order-management processes with a high degree of automation and digitization across order capture and sourcing. Digitization and automation are also needed to enable the required instant updates on order status.

Seamless integration of systems and planning tools across channels is also crucial, both to meet consumer expectations and to facilitate management and decision making. For consumers, cross-channel system integration is essential to provide real-time information on product availability and delivery times. For companies, effective cross-

Rising consumer expectations are pushing consumer-product companies and retail players to digitize and automate.

channel decision making requires the integration of planning tools with real-time simulation capabilities, especially in situations of scarcity.

The implementation of digitization and automation strategies must be holistic. Separately managed initiatives often add up to less than the sum of their parts and are not sufficient to deliver the required step change in consumer service. But it is equally vital to remember that simply adding smart analytics and automation will not be enough—a fully redesigned operating model is necessary to drive these changes through and deliver omnichannel excellence.

Starting the omnichannel journey

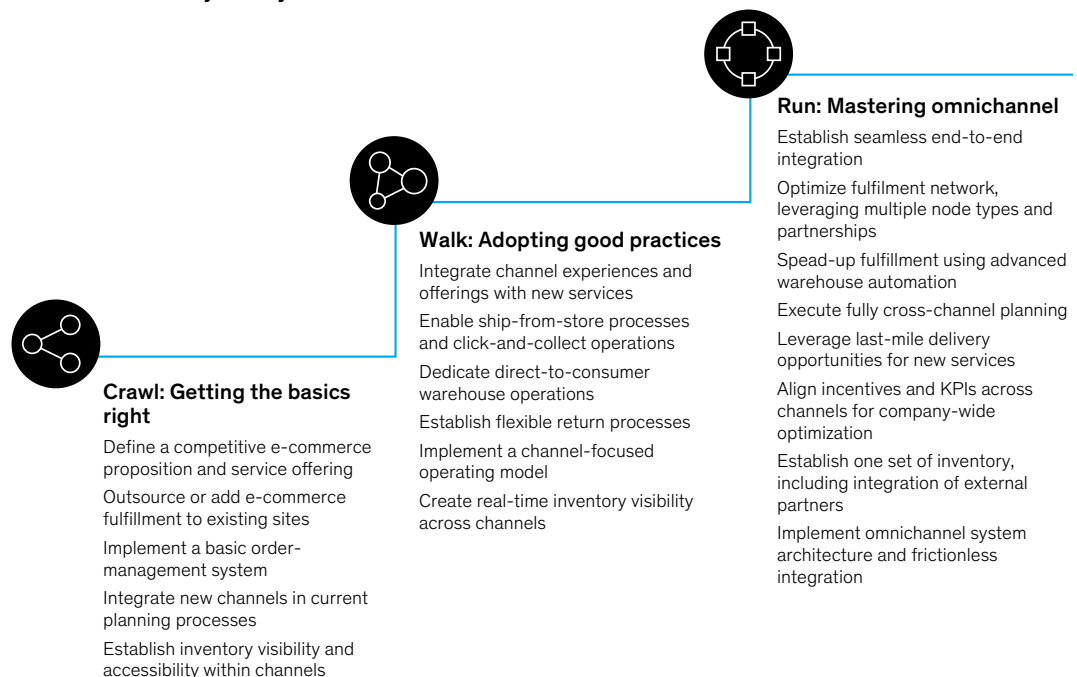Mastering omnichannel to become a best-in-class player is clearly a significant undertaking, and there is no one-size-fits-all approach to prioritizing. However, a "crawl, walk, run" approach can be an effective way to undertake, and then complete, the omnichannel journey (Exhibit 3).

The aim of aspiring omnichannel players—those at the "crawl" stage of the journey—should be to get the basics right. Above all, it is crucial to define a competitive service proposition regarding the omnichannel journey; companies need to be clear on key issues such as which services to offer and their key differentiating factors. Once players have mastered the basics, they should shift focus to adopting omnichannel best practices and then—finally—to developing distinctive omnichannel offerings. At the end of this process, the operating model will work seamlessly to align incentives and key performance indicators (KPIs) to avoid competition for limited resources. This

Exhibit 3

Companies can benefit by using a 'crawl, walk, run' strategy.

The omnichannel journey

Run: Mastering omnichannel

Establish seamless end-to-end integration

Optimize fulfilment network, leveraging multiple node types and partnerships

Spead-up fulfillment using advanced warehouse automation

Execute fully cross-channel planning

Leverage last-mile delivery opportunities for new services

Align incentives and KPIs across channels for company-wide optimization

Establish one set of inventory, including integration of external partners

Implement omnichannel system architecture and frictionless integration

Walk: Adopting good practices

Integrate channel experiences and offerings with new services

Enable ship-from-store processes and click-and-collect operations

Dedicate direct-to-consumer warehouse operations

Establish flexible return processes

Implement a channel-focused operating model

Create real-time inventory visibility across channels

Crawl: Getting the basics right

Define a competitive e-commerce proposition and service offering

Outsource or add e-commerce fulfillment to existing sites

Implement a basic order-management system

Integrate new channels in current planning processes

Establish inventory visibility and accessibility within channels

approach ensures that the various channels are complementary, which is the driving principle of omnichannel.

Consumer-product companies looking to define a starting point for their omnichannel transformation will need a structured maturity assessment on each of the seven building blocks. This assessment will also be instrumental in defining a road map and developing initiatives that address the areas with the potential to add the highest value. The final step before implementing the road map is to develop an effective governance model and powerful change story.

Companies that want to deliver a great consumer experience across multiple sales channels will need to comprehensively rethink many of their traditional supply-chain approaches, especially in these times of economic uncertainty. The challenge is considerable, but so is the opportunity—companies that get the seven building blocks of omnichannel right will grow their consumer base and build a compelling, long-term competitive advantage.

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Automation has reached its tipping point for omnichannel warehouses

Automation offers a range of benefits for warehouses, from increasing productivity to reducing risk related to labor. To harness its full potential, retailers must develop an end-to-end strategy.

This article is a collaborative effort by John Barbee, Alan Davies, Raoul Dubeauclard, Tim Lange, and Christoph Lennartz, representing views from McKinsey's Consumer & Retail Practice.

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Never before has the competition for warehouse and fulfillment labor been so fierce, strongly driven by sustained growth in B2C channels. In the United States, for example, employment levels across distribution centers are at all-time highs and wages have risen to well above $18 an hour, yet attracting and retaining warehouse employees remains elusive. In the short term, strategies such as bonuses, accelerated pay raises, and tuition reimbursement are helping. But the long-term implications of a high reliance on labor are clear: automation in warehousing is no longer just nice to have but an imperative for sustainable growth.

Fueled by venture capital over the past five years, the automation industry has seen increased availability of new warehouse-automation innovations, supply chain as a service (SCaaS) models, and technology that integrates multiple solutions to help retailers address some of these challenges.

For instance, the adoption of autonomous mobile robots (AMRs), technology that eliminates significant nonproductive walking time in warehouses, has progressed from early-stage pilots about four years ago to multiple at-scale deployments today. For example, DHL rolled out 1,000 Locus Robotics AMRs and will deploy up to 2,000 robots by 2022.[1] These technologies aren't just for larger companies. German toy retailer Rofu Kinderland built a new warehouse that includes 57 robots retrieving 3,500 different products from more than 28,000 bins, increasing efficiency and delivery speeds.[2] Innovators are gaining momentum as well. For example, Alert Innovation developed a microfulfillment-center technology platform for Walmart to handle the demands of grocery e-commerce. The proof-of-concept pilot system is now in full operation.

Automation capabilities will play an influential role in the future size and scale of omnichannel networks.

To successfully navigate the many choices for automation, retailers must have an informed perspective on where automation can create value, reduce risk, and improve reliability across an increasingly complex network of fulfillment nodes. Retailers should then use a three-step process—strategy, design, and implementation—to translate their vision into an optimal automated warehouse.

The changing face of the warehouse-automation industry

Investments from retailers in automation are poised to fuel significant industry growth: the warehouse-automation market is forecast to reach $51 billion by 2030, a CAGR of 23 percent.[3] The wave of innovation in warehousing has been fueled disproportionately by venture-capital funding for new start-ups, whose solutions increasingly influence the future of the omnichannel warehouse. In addition, private equity has provided a significant tailwind for key companies. For example, SoftBank invested $2.8 billion in AutoStore, an automation provider geared to the e-commerce and grocery industries.[4] Many of these technologies—for example, automated guided vehicles (AGVs) or the next level of automation AMRs as unmanned transport next to warehouse employees—have proved their effectiveness at scale in addressing the challenges of traditional e-commerce warehouses, such as labor shortages, SKU-complexity growth, and increasing service expectations.

Increased M&A and investment
Marketplaces and platform players have long recognized the importance of automation and have been rapidly acquiring robotics companies. Several at-scale investments have grabbed headlines. In 2019, the online marketplace Shopify spent $450 million to acquire automation provider 6 River Systems, with the goal of extending its AI-enabled fulfillment network.[5] Amazon is developing proprietary automation solutions via Amazon

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[1] Steven Crowe, "Locus Robotics scaling AMR deployments with DHL supply chain," *The Robot Report*, June 2, 2021, therobotreport.com.
[2] Melanie Wack, "E-Commerce: AutoStore für Spiel-, Schreibwaren und Dekorationsartikel," *Logistik Heute*, November 12, 2020, logistik-heute.de.
[3] David Edwards, "Revenues from robotics in warehouses to exceed $51 billion by 2030," *Robotics and Automation News*, August 19, 2021, roboticsandautomationnews.com.
[4] Sam Shead, "SoftBank invests $2.8 billion in Norwegian robotics firm AutoStore," CNBC, April 6, 2021, cnbc.com.

Robotics to improve warehouse productivity and lessen the labor burden. Zalando has partnered with multiple automation partners to accelerate consumer-delivery times and improve operating efficiencies.

Several retailers have publicly committed significant capital toward their automation strategies. For instance, Walmart plans to allocate nearly $14 billion for warehouse automation and other business areas,[6] and ASOS announced $100 million in spending to expand the capacity and productivity of its warehouses.[7] These moves are indicative of an industry-wide focus on automation, now even further accelerated as a response to changing market conditions brought about by the COVID-19 pandemic.[8]

Larger players in the warehouse-automation industry have sought to create distinctive and integrated capabilities through acquisition. For instance, Toyota Material Handling has acquired integrators including Vanderlande and Bastian Solutions, Kion Group has acquired Dematic and software company Digital Applications International, and Honeywell has acquired Intelligrated and Transnorm. Acquirers are seeking to develop more end-to-end solution sets rather than point technologies as they seek to unlock greater value through integrated solutions. The automation market remains concentrated, with the top five automation and material-handling players still accounting for more than 50 percent of current market share.[9] Beyond the top ten in each region, players mostly are specialty and niche automation providers.

Automation in action

Leading retailers are aiming to make warehouses responsive, resilient, and reliable to accommodate the ever-growing e-commerce market and incorporate lessons from the global pandemic. Along with improving existing warehouse capabilities and enabling new nodes of fulfillment (such as urban fulfillment centers), they view warehouse automation as an important part of the solution. In a recent McKinsey survey of 50 retailers across apparel, grocery, and other key sectors, more than 80 percent of respondents indicated they intend to increase automation investments over the next two to three years.[10]

And it's worth it: some retailers have cracked the code and have begun rolling out ambitious upgrades. As part of a €500 million initiative, Edeka invested €93 million to expand its existing warehouse in Berbersdorf, increasing the total number of SKUs from 2,900 to 12,700 while adding a 300,000-square-foot, partially automated picking-and-storage area.[11]

Leading retailers are aiming to make warehouses responsive, resilient, and reliable to accommodate the ever-growing e-commerce market.

[5] Emil Protalinski, "Shopify acquires 6 River Systems for $450 million to expand its AI-powered fulfillment network," VentureBeat, September 9, 2019, venturebeat.com.
[6] Tonya Garcia, "Walmart to invest nearly $14 billion in automation and other business areas in fiscal 2022," MarketWatch, February 22, 2021, marketwatch.com.
[7] "Retailer ASOS to spend $100M to automate Georgia warehouse," U.S. News, July 12, 2021, usnews.com.
[8] "Warehouse automation investment up due to COVID-19," Material Handling and Logistics, July 13, 2020, mhlnews.com; Mark Dunaway, "Why are so many companies investing in warehouse automation?," Modern Materials Handling, January 10, 2020, mmh.com.
[9] "Warehouse automation market," LogisticsIQ, 2021, thelogisticsiq.com.
[10] For more, see "Retail speaks: Seven imperatives for the retail industry" on McKinsey.com.
[11] Stefanie Schmitt, "EDEKA Nordbayern-Sachsen-Thüringen erweitert Logistikzentrum in Berbersdorf für rund 93 Mio. €," EDEKA, March 12, 2021, verbund.edeka.

Navigating automation choices

Multiple technological advancements have pushed the boundaries of what is possible in warehouse automation. As part of an overarching automation strategy, retailers that develop an end-to-end vision for the warehouse of the future have to identify the specific use cases and unlock value (Exhibit 1). Navigating the choices has become more complex, with new providers entering the market and larger conglomerates and venture-capital funds pursuing consolidation in an effort to build an integrated portfolio of solutions for clients. Acquisitions within the automation-provider landscape will continue, significantly increasing the pressure on automation companies to offer warehouses end-to-end solutions.

We envision three warehouse archetypes that will inform the design of automation systems: dedicated, shared, and integrated omnichannel (Exhibit 2). These archetypes can help retailers narrow down the set of use cases and solution sets and better understand the complex choices among automation providers, integrators, and start-ups.

Dedicated warehouses

This archetype consists of warehouses specifically designed for a given channel (such as e-commerce), product flow (for example, consolidation), or product type (apparel versus hard goods). Generally, dedicated warehouses solve for scale and cost efficiency in the network. Distribution formats can range from large-scale facilities that cover national distribution needs (more than one million square feet) to smaller, urban-based fulfillment centers (less than 20,000 square feet) that balance same-day and next-day speed with cost efficiency.

Given the specific focus of these distribution formats, integrated and specialized end-to-end automation concepts generally work best. These warehouses benefit from improved space efficiency, greater labor productivity, faster four-wall cycle time,[12] and downstream efficiencies (such as store-friendly pallets). Examples of dedicated warehouses

include retail fulfillment (Amazon Go stores), national e-commerce fulfillment (Zara), store replenishment (such as Albertsons and Carrefour), delivery centers for small parcels (Post), and category-specific facilities (such as Reckitt Benckiser and Zalando).

Shared warehouses

Warehouses serving multiple channels or product segments, which may include wholesale and direct-to-consumer (DTC) channels or ambient and perishable-product segments, make up this archetype. While these warehouses exist under the same roof, the operations and inventories are independently managed by channel. This archetype offers greater flexibility than a dedicated warehouse in that multiple channels and categories may be served under one roof or in a campus setting. The multipurpose structure has several benefits: more efficient use of distribution space, cost savings from consolidated labor and overhead, and external advantages such as inbound consolidation. The systems technology and automation may need to support specific flows, handling requirements, and order profiles of each channel. As a result, individual warehouses still operate mostly independently. Automation solutions can still be integrated, but they may combine various fit-for-purpose technologies to address unique channel needs—for example, a retail-store warehouse could be on the side of the building (with automated pallet and case storage where store replenishment orders are prepared), while the e-commerce warehouse could be on mezzanines where individual units are picked with a multishuttle or autostore.

Integrated omnichannel warehouses

Omnichannel warehouses seamlessly serve all channels in the network and generally have the technology and systems to handle inventory across a mostly common stock pool (for example, the same picking locations or an automated storage system). These facilities offer the greatest flexibility in the network and reduce systemwide inventory-carrying costs, but retailers may have to make trade-offs on cycle time, dedicated capacity, and

[12] Cycle time from entering until exiting the warehouse.

Exhibit 1

The end-state vision is lights-out warehousing that operates autonomously.
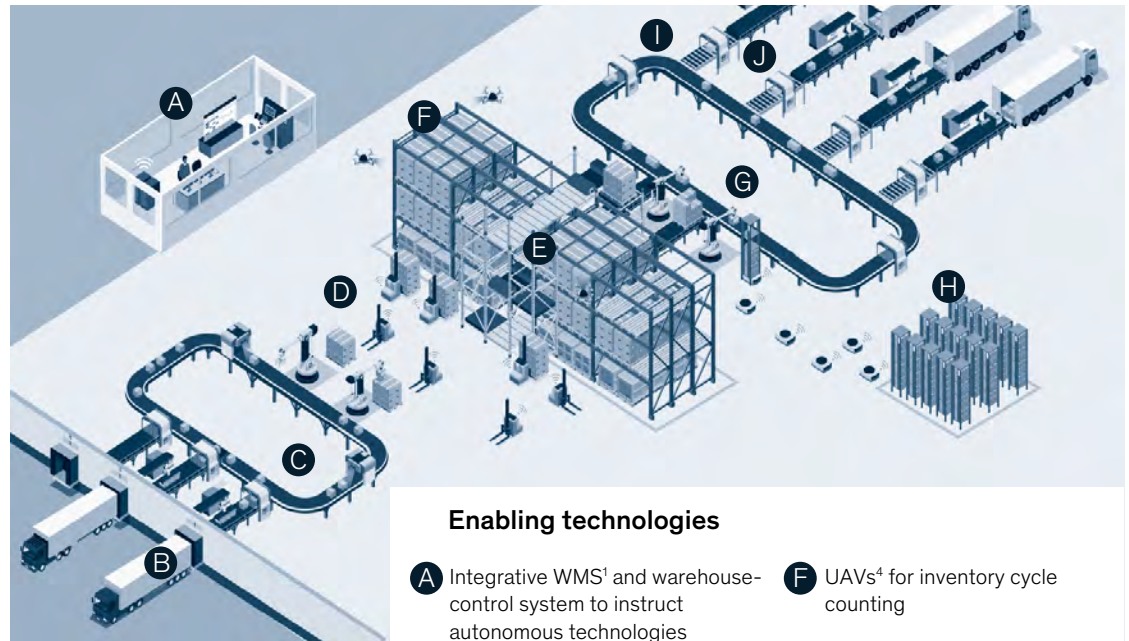
Enabling technologies

A Integrative WMS[1] and warehouse-control system to instruct autonomous technologies

B Automatic unloaders to remove cases and pallets from inbound trucks

C Product-identification scanners to document inbound receipt and determine storage bin

D Palletizers and AGVs[2] to facilitate put-away from dock to bin

E ASRS[3] system for case storage; full pallet slots for bulk storage

F UAVs[4] for inventory cycle counting

G Item-picking robots for full-case picks and loose-unit picks from storage shelves

H AGVs[2] to transport loose unit shelves for picking and replenishment

I Sortation scanner to determine loading-dock destination for each product

J Scanners and loading robots to confirm outbound delivery

[1] Warehouse-management system.
[2] Automated guided vehicle.
[3] Automated storage and retrieval system.
[4] Unmanned aerial vehicle.

Exhibit 2

Retailers can choose from three warehouse archetypes to help inform the design of automation systems.

1 Dedicated

Store   E-commerce

Consolidate

2 Shared

Network warehouse

Integrate

3 Integrated omnichannel

Network warehouse
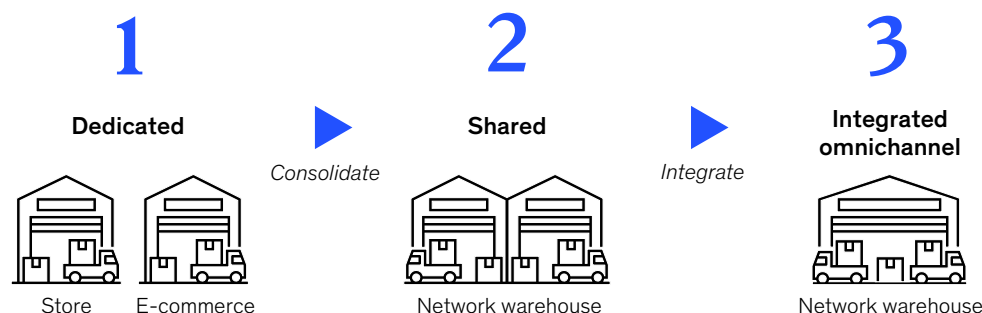
productivity. The set of automation solutions, which may be a hybrid of the capability or shared archetypes, could allow convergence in upstream warehouse processes such as inbound and storage. Distribution operations may have different requirements for fulfillment-execution processes to meet the needs of individual order profiles and channels. For example, online consumers might order small quantities and request a lead time of less than 24 hours, while stores might accept 48-hour or longer lead times with larger volumes being picked and shipped. Hence, the requirements in warehouse operations need to be matched along the steps across channels, balancing the trade-offs of solution benefits.

This archetype, which is best suited for stores that order in eaches[13] (an approach many apparel and electronics retailers take), can support a shared picking location between stores and online. It provides two benefits: First, it allows inventory pooling and the more efficient use of space. Second, it enables increased scale for automation and the better use of system capacity, with the ability to handle stores and online channels with different seasonality and peaks.

Because each type has its own advantages, identifying and implementing the optimal solution requires an informed decision-making process.

Selecting the right automation solutions

In response to a rapidly changing marketplace, many retailers are moving away from a single solution or turnkey provider and building a portfolio of solutions to fit their network. Traditionally, partnering with a turnkey provider offered advantages, such as integration across multiple solutions and pricing transparency. While this still holds true, the pace of innovation in solutions continues to accelerate, and innovations in technology and operating models provide compelling reasons to explore a multipartner strategy.

For instance, along with technological innovation, many new robotics and automation providers have innovated as-a-service models (XaaS), such as robotics as a service (RaaS) and fulfillment as a service (FaaS). These solutions alleviate the traditional hurdles of up-front capital risk (RaaS helps retailers overcome ROI hurdles such as a payback of two to three years) and offer retailers a variable cost structure better aligned to testing and learning across new technologies and concepts. Because of lower investment levels, retailers are now able to test and learn with selected partners, building up their automation capabilities. Companies can excel in innovation by replacing their tried-and-true approaches to warehouse automation with in-house capabilities to

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[13] A unit of measure where each individual piece is tracked by the computer system.

explore earlier-stage implementation. For example, companies can conduct a pilot with AMRs that assist picking operations alongside employees on site. The benefits of this experimentation can be significant—for example, progressing from proof of concept to large-scale implementations.

The range of design and implementation choices varies considerably depending on strategy. An AMR project may require six to eight weeks to pilot, whereas case multishuttles can take 12 months or more to accommodate infrastructure procurement and build-out. In our experience, a three-step process can help retailers determine the right approach to warehouse automation:

Strategy
Traditionally, retailers might take a site-by-site view of their automation strategy. This exercise includes both establishing criteria for prioritizing automation opportunities and defining business cases to evaluate fit-for-purpose use cases and potential partners for a new or existing operation. We find the more innovative retailers are taking an end-to-end view of their network, developing scenarios for both productivity and short- and longer-term labor risks. A balanced approach to use cases may open up a variety of solutions, while the site-to-site approach focuses solely on payback for individual locations.

Design
In this step—segmented into preconceptual, conceptual, and detailed design—retailers conduct a financial evaluation, create optimized warehouse designs, and select providers by stress testing simulations. The design workshops include retailers, joined by their chosen automation suppliers; beyond them, an objective, informed, third-party perspective—for example, via consultancy—is

essential to reach the optimal design. The design process goes beyond the selection of automation to encompass warehouse analytics, strategic network effects, and much more.

Implementation
Where necessary, retailers can identify and select a warehouse-automation system integrator or can orchestrate across a set of partners to build the case-specific automated warehouse. Some companies may also select a logistics service provider to operate the new warehouses and orchestrate the warehouse launch, based on a case-by-case evaluation.

This process has repeatedly captured substantial value because even small decisions (for example, initial product-segment growth assumptions that, in the end, significantly influence automation-picking capacities) have a major impact on projects of this scale. By following this holistic approach, retailers can create a compelling business case for automation and gain buy-in for investments.

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The rise of e-commerce in omnichannel has elevated the demand for warehouse automation across industries. Retailers that innovate in this space can keep pace with high consumer expectations for service and personalization. A structured approach helps to pinpoint their current status, identify available and suitable options, and implement warehouse automation and utilization—including harnessing analytics enabled by warehouse automation. With these insights, companies can select the optimal automation for their warehouses.

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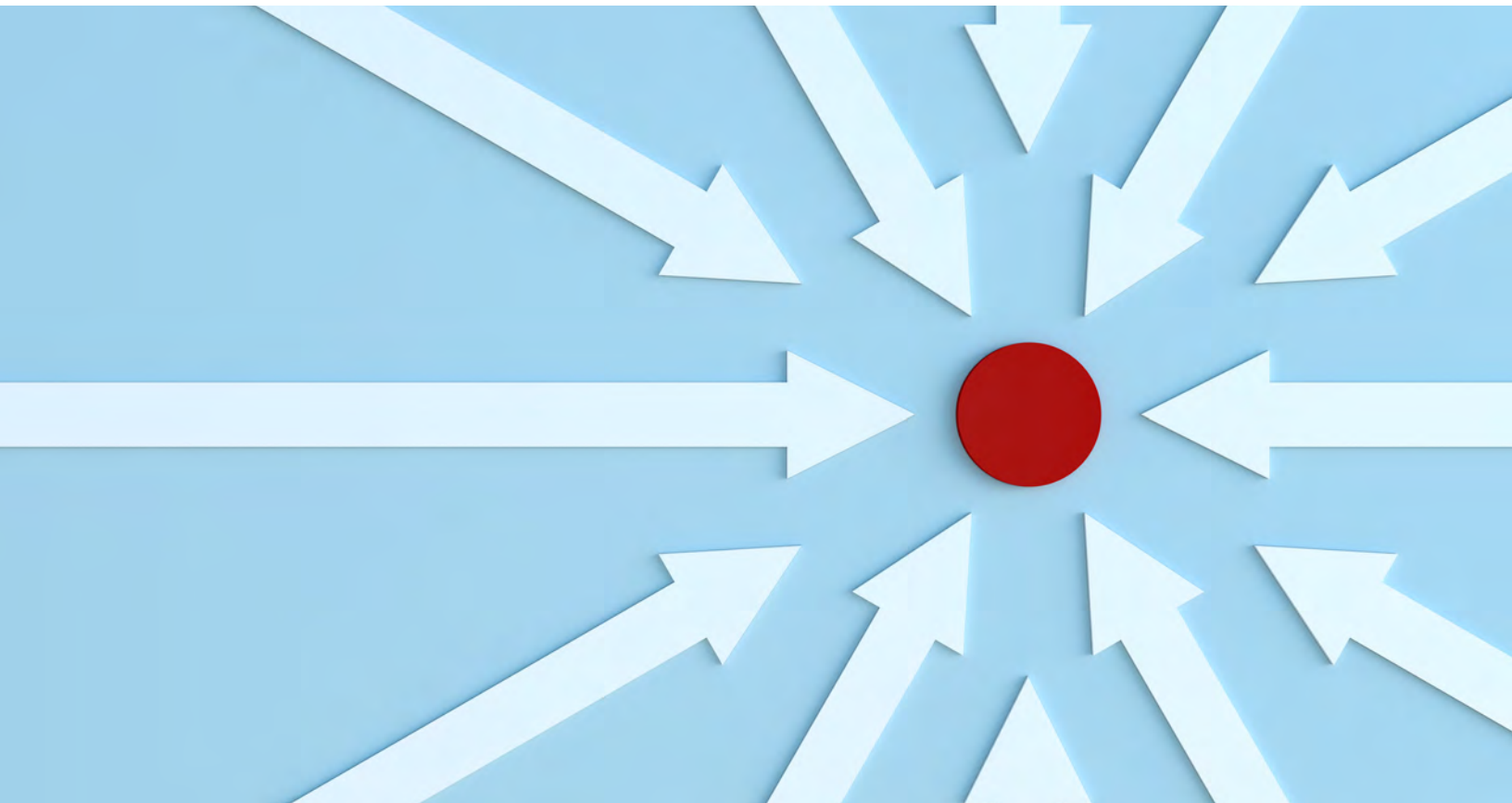
The future of G&A: Revitalizing the heart of the organization

General and administrative functions are under pressure to become more digital, more agile, and better aligned to the needs of the wider business. A more strategic model could hold the key.

by Heiko Heimes, Matt Jochim, Abhishek Shirali, and Edward Woodcock

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In 2020, businesses faced unprecedented disruption, driven both by the direct impact of the COVID-19 pandemic and the acceleration of preexisting trends in the business, political, and social environment. In response, companies have been forced to rapidly evolve, both in their management processes and their business models.

In this fast-moving and uncertain environment, the pace of change in general and administrative (G&A) functions such as HR, IT, and finance can lag behind the wider organization. These functions have spent years focused on cost reduction and efficiency improvement. Now they are struggling to respond effectively to new demands, while poor coordination between functions slows decision-making and hampers the mobilization of resources to the most pressing issues facing the business.

That's a significant source of frustration for business leaders. Reconfiguring supply chains, implementing mass-scale remote working, or responding to dramatic shifts in customer needs are tough enough tasks on their own. They are even harder if critical internal business functions are unable to provide essential support.

The challenge goes beyond the immediate impact of the crisis and its aftermath. Over the coming decade, multiple interconnected trends will pressure G&A leaders to change both the work that they do and the way that they do it. External forces, such as increasing volatility and the need to balance financial performance and stringent environmental, social, and governance requirements will make G&A work more complex and more variable. Within the business, meanwhile, G&A functions will need adapt their tools, processes, and skills to make use of advanced digital technologies and support a globally dispersed workforce (Exhibit 1).

Exhibit 1

Five emerging trends are shaping the future of G&A.
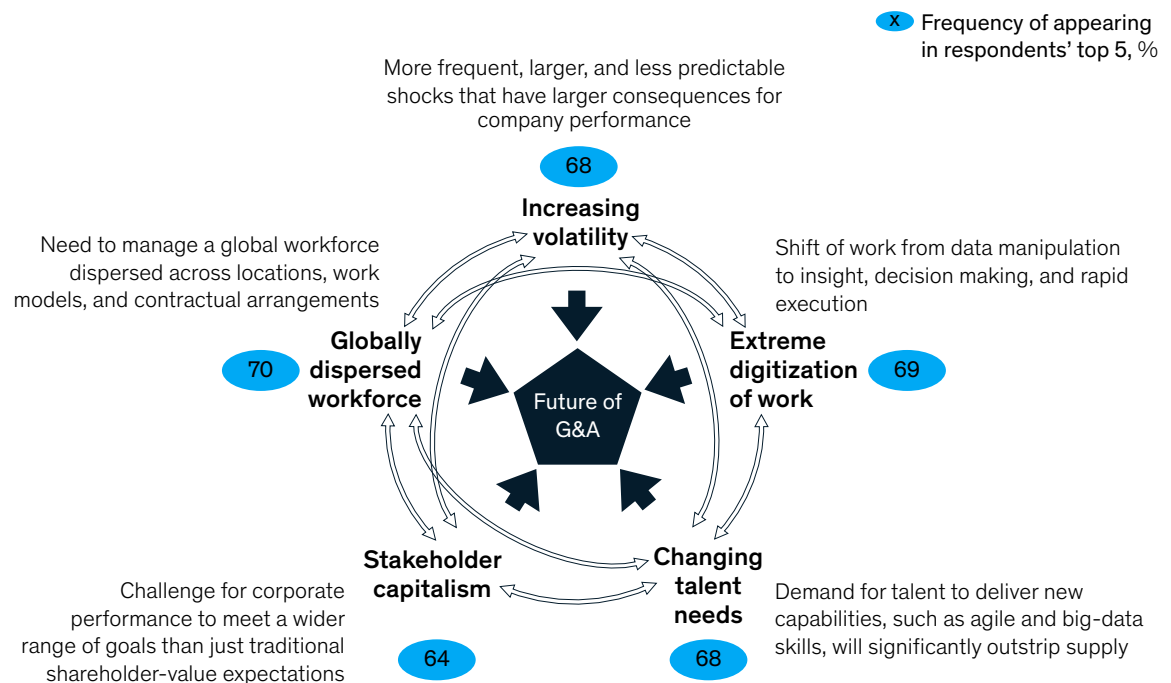
Source: McKinsey analysis

In our recent global survey of more than 200 senior executives, two-thirds of respondents told us that these trends will have a significant impact on the way G&A functions operate in the coming years. An effective response will be challenging for G&A leaders, but we believe that it also presents a chance to rethink the role of general and administrative functions in the modern organization. G&A could reposition itself from a cost of doing business to a key enabler, helping the business manage complex risks, seize emerging opportunities, and make smarter strategic and operational decisions.

A model for the future of G&A

In this article, we propose a new model for G&A functions that is nimbler, even more productive, and more adaptable. It is designed to benefit from advances in digital and analytics, and can provide more commercially and operationally relevant insights.

Our vision for a future G&A model is based on four principles.

— Simplify the administration of the business by eliminating traditional G&A functional silos. Instead, work should be planned and executed along the end-to-end journeys taken by business stakeholders, such as a manager who needs to fill a vacancy, or a product-management team looking for help developing a sales forecast.

— Embed an outward-looking, commercially focused orientation in G&A staff, so they can help the business anticipate and respond to a rapidly evolving environment.

— Use digital and analytics technologies to generate relevant insights for the business, backed by strong automation, workflow, and data-management practices to drive efficiency.

— Separate G&A activities into two distinct types. Tasks that are needed to run the business should be delivered using highly predictable, digitally enabled processes. Elsewhere, companies will use flexible, project-based resources that can quickly be redeployed between initiatives to deliver new capabilities and support changing business priorities.

These principles are realized through a new structure for G&A that reimagines roles across four pillars (Exhibit 2).

The digital G&A backbone
The digital backbone provides the services that the rest of the business relies upon for its day-to-day operations. These services will be organized from the perspective of "customer journeys" taken by their users, who include staff across the wider business along with external stakeholders such as suppliers or job candidates.

In most cases, the delivery of these services will require less direct work by G&A staff. Stakeholders will get what they need through user-friendly self-service interfaces, such as employee and vendor portals or management-reporting dashboards. Back-office tasks will be highly automated.

This shift of resources is already underway. Companies have significantly reduced the cost of day-to-day G&A support by using automation and self-service techniques. Across industries, finance costs fell by 25 percent in the decade to 2019, for example. Previous McKinsey research suggests that 64 percent of today's data-collection tasks and 69 percent of data-processing tasks could be automated using existing technologies.

To take full advantage of the potential for automation in transactional tasks, companies will need to move beyond simply stitching together fragmented or inefficient processes with digital connections. Tomorrow's G&A processes can be built from the ground up for the digital environment, allowing them to take full advantage of next-generation enterprise software.

As they design these processes, companies will also want to take the human factor fully into account. A poorly defined or rigid process will inevitably throw up issues and exceptions requiring human intervention to resolve. Leading organizations are

Exhibit 2

The future G&A model reduces silos, quickly reallocates staff to new priorities, and maximizes time on value-added work.

Cross-functional teams assigned to priority
business projects
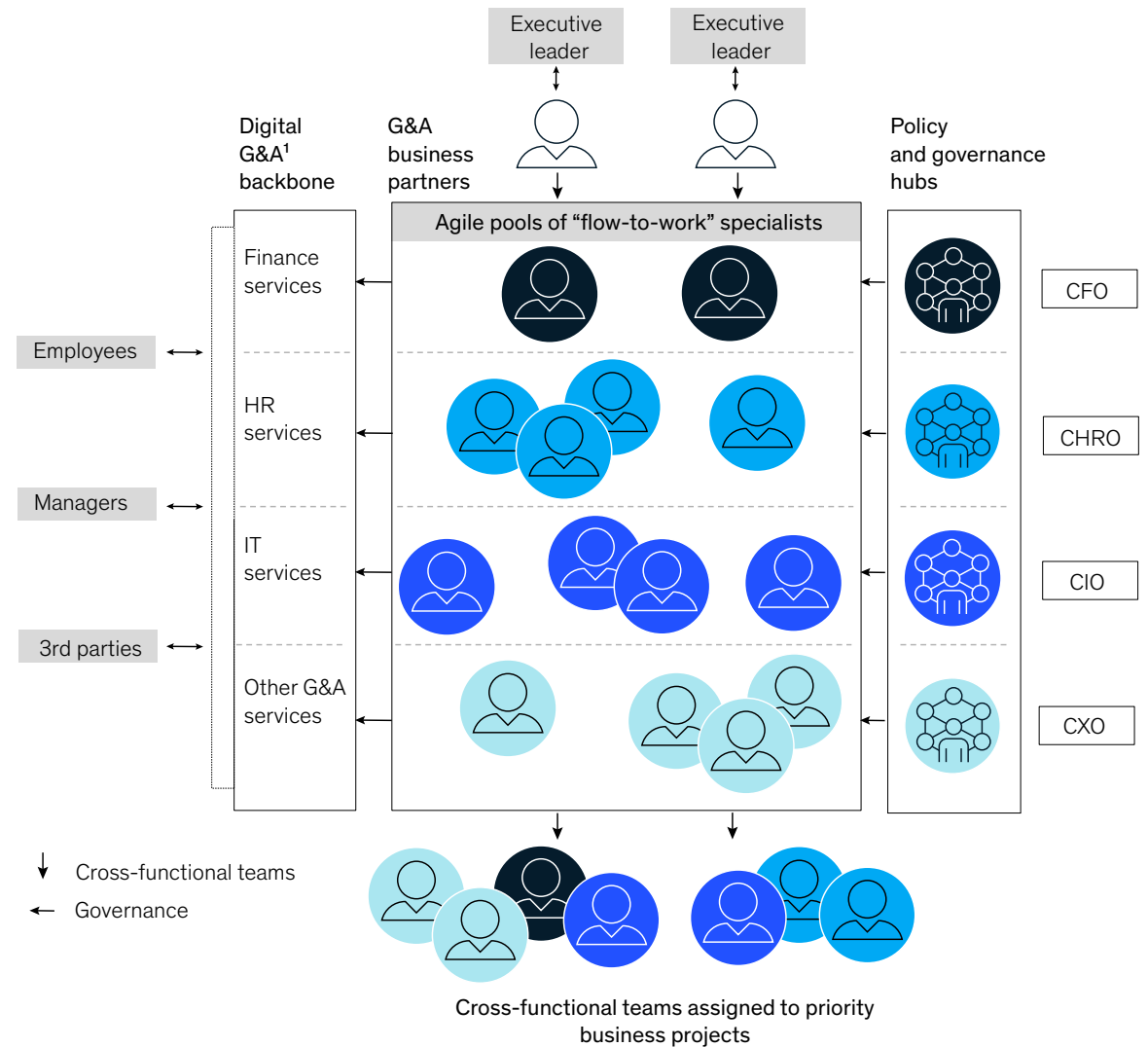
[1]General and administrative.

minimizing these exceptions by designing flexible processes around the specific journeys that different users follow.

One European organization with billions of dollars in annual external spend used design thinking and a customer-journey approach to reconfigure

its procurement process for different roles (such as third-party vendors, production managers, lab technicians, and category managers). It provided each role with a streamlined, digitally enabled experience requiring minimal intervention, which channeled spend to preferred suppliers and delivered transparent outcomes.

The agile pool

A common issue with traditional G&A functions is that resource allocation tends to be sticky. Staff are aligned to a particular role and part of the business and remain there for months or years at a time. As a result, workload may expand to fill the capacity of current roles as defined, while high-priority and strategically important projects may struggle to get the resources they need.

To overcome this challenge, organizations have started to experiment with more agile ways of working, including flow-to-work models in which colleagues are assigned to initiatives across different areas of the business on a project-by-project basis. By setting up these pools of G&A staff with different sets of capabilities, businesses can dynamically provide burst capacity to support priority initiatives in the parts of the business when they are needed, then ramp down and reallocate staff to other areas when they are not. These pools can also serve as skill-building opportunities that expose colleagues to a wider range of experiences.

One North American telecommunications provider, for example, used a simple work-intake tool and triage process to improve workflow in a 70-person financial-reporting and analytics group. Short, daily alignment meetings, backed by new standard operating procedures, helped prioritize requests and make assignments. This ensured staffers were constantly aligned to the most important business priorities, while balancing workload within the group.

Supplementing this closer matching of internal G&A staff to ever-changing organizational priorities, external labor markets are creating new opportunities to more dynamically manage the supply of talent through a wider variety of contractual arrangements beyond full-time staff, traditional contractor roles, or multiyear business-process outsourcing arrangements. Although regulations are in flux, the evolution of gig and part-time working arrangements lets organizations flex G&A staff capacity to fluctuating needs, so they can better manage resources in a zero-based manner from one budgeting period to the next.

In addition, changes in the wider labor market—driven by technology and evolving social preferences—are encouraging organizations to accommodate staff who work remotely part or most of the time. These trends will enable G&A functions to access new sources of talent, but they will also require different working practices and norms to ensure effective integration between employees performing both synchronous and asynchronous work, and potentially operating in different time zones.

Policy and governance hubs

This part of the operating model will be responsible for developing the policies and governance practices needed to comply with internal standards and external stakeholder requirements. Policy and governance hubs will house groups of deep subject-matter experts on particular topics, such as tax planning, compensation, spend-category management, or cybersecurity. While similar to the "centers of excellence" (CoEs) common in today's G&A functions, one major differentiator will be the emphasis on developing an external focus and making extensive use of business analytics to drive insights. For example, a forecasting CoE would work with digital resources to incorporate the most relevant external market trends and macroeconomic data into their models.

Volatile and uncertain environments will continually deliver new challenges, requiring organizations to anticipate, identify, and quickly react to rapid changes. The policy and governance hub can help the wider business with sophisticated modeling and decision-support capabilities, drawing on a wider range of internal and external data sources and advanced analytical skills.

In procurement, for example, a few companies are already using artificial-intelligence technologies to identify potential suppliers from publicly available databases covering millions of firms. In one successful approach, a machine-learning tool compares a natural-language description of the required supplier characteristics with suppliers' descriptions of their own capabilities. Beyond identifying specific high-potential suppliers, the

tool can also create conceptual maps of suppliers sharing similar characteristics. That feature has helped buyers identify opportunities to source from sectors beyond their traditional supply base.

G&A business partners

The need to rapidly deliver complex initiatives will require increased coordination between functions. Last year's mass transition to home working, for example, required IT teams to provide infrastructure and equipment, HR teams to develop new policies, and other functions to adapt their processes to suit the new model.

To better support such initiatives, G&A organizations will want to break down traditional functional silos and develop the capability to rapidly develop complex new services. Doing that requires effective coordination between G&A functions and their customers in the wider business.

This coordinating role would be the responsibility of a group of G&A business partners. These senior managers would work with business leaders to understand their requirements, then convene functional specialists from the agile pool—and experts from the policy and governance hubs—to deliver against those requirements.

This G&A business-partner role is uncommon today, but it has parallels elsewhere in the modern organization. In software and hardware development, for example, companies often appoint product owners or product managers, who act as the voice of the customer within the organization, coordinate work across functions, and are accountable for the financial performance of a product or project.

Getting started toward future G&A

The transition to a next-generation operation model in G&A will not happen overnight, but organizations can chart a journey that builds upon work already under way.

First, companies can ramp up their automation and digitization efforts to build the *digital G&A backbone*. This would involve targeted investment in new technologies, along with a systematic effort to define end-to-end user journeys, followed by streamlining and reconfiguring processes to match. This effort will help G&A functions to provide better service to their customers across the business, while simultaneously releasing capacity to support other parts of the transformation.

The second step involves building the capabilities of existing functional centers of excellence, turning them into *policy and governance hubs*. Subject-matter experts from different G&A functions can be integrated into these hubs, which also become the place where new analytical tools and capabilities are developed. Performance metrics and management systems are adapted to ensure that subject-matter staff spend more of their time focused on business priorities.

Third, companies can define, pilot, and gradually grow *agile pools* of project-focused staff. This can be done incrementally, with the organization first designing the career path, organizational structure, staffing and assignment models, and project-definition and approvals process for this group. The new model can be piloted and refined using small pools of staff and a low volume of projects. Over time, the agile pools can grow as automation and digitization efforts release more capacity.

The fourth step introduces greater cross-functional coordination of responses to business issues. Initially this could be as simple as elevating the level of participation by senior G&A functional staff in business-focused meetings. A logical next step would be to establish a *G&A business partner* role, with a mandate to collaborate with business leaders to prioritize operational issues, convene function-specific subject-matter experts to identify solutions, and mobilize teams of appropriately skilled G&A specialists to define, develop, and deliver the responses needed to address them.

Alongside these changes, organizations should also take a systematic approach to capability building. They will need to retrain G&A colleagues for more complex, project-driven (instead of process-driven) roles, and provide them with tools needed to minimize time spent on low-value-added tasks. They will also need to foster a greater appreciation of the commercial and operational context of the business.

Interventions may include providing "low code" automation platforms that allow G&A staff to take responsibility for automating the more repeatable parts of their own workload; training staff in techniques such as structured problem solving, influencing, and collaboration skills; or providing on-the-job skill building opportunities via structured short-term assignments and redeployment programs. And to further improve the flexibility of G&A functions, companies will need sustainable models for new ways of working, including the management of remote staff and the use of alternative contractual arrangements.

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Sometimes seen mainly as a cost to be minimized, recent volatility has shown that general and administrative functions play a critical role in an organization's ability to manage risks and respond to emerging opportunities. G&A functions are already changing, for example by embracing new digital technologies at an accelerating rate. We believe that G&A leaders can go further, rethinking their operating models to build functions that can collaborate more effectively, move more quickly, and offer greater support to users across the organization.