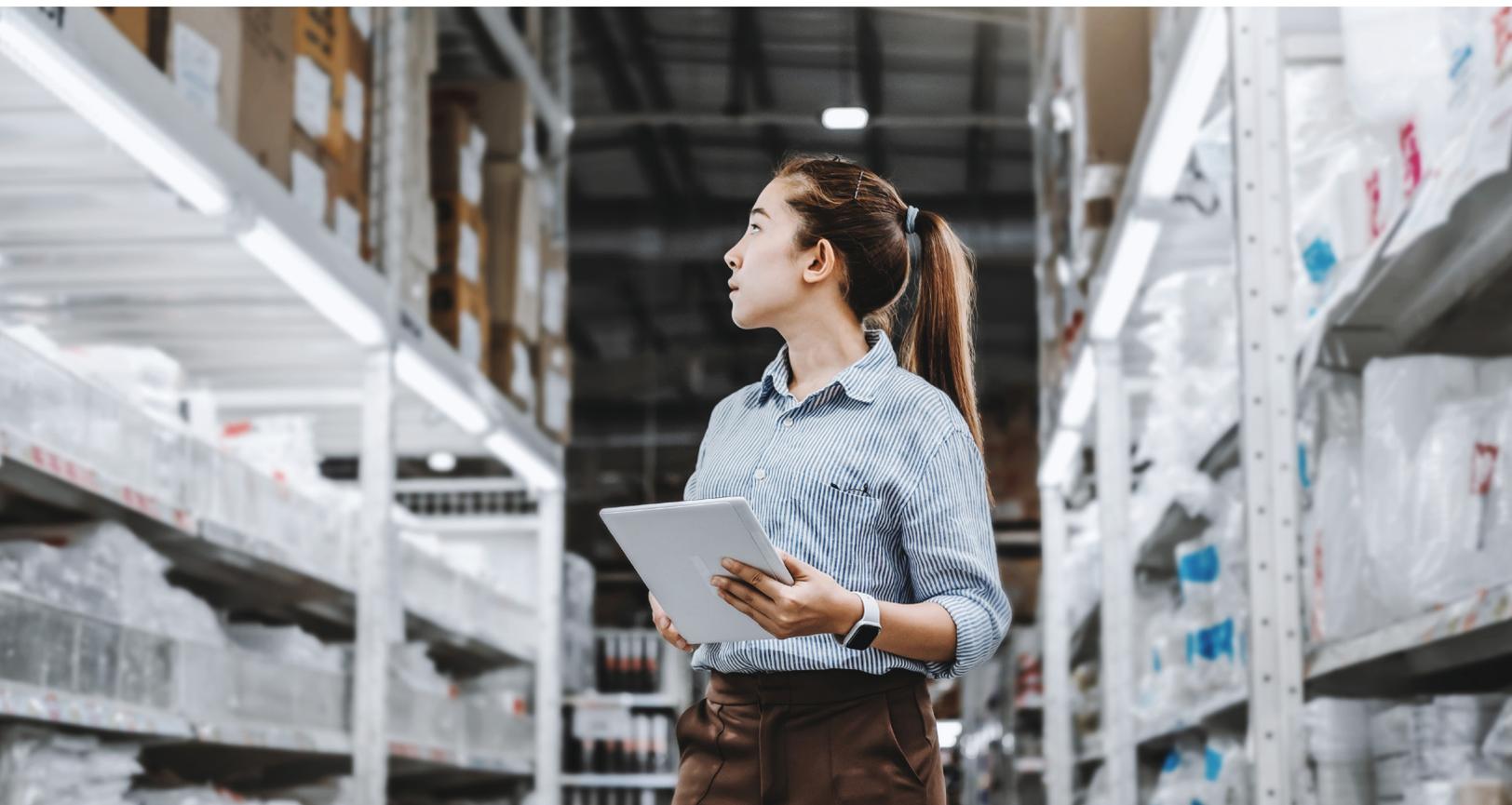


Operations Practice

Coronavirus and technology supply chains: How to restart and rebuild

As COVID-19-related restrictions begin to lift in Asia, how can organizations resolve supply-chain issues at pace?

by Didier Chenneveau, Karel Eloot, Jean-Frederic Kuentz, and Martin Lehnich



For the technology industry, the effects of the coronavirus (SARS-CoV-2), which causes COVID-19 disease, started to take hold in January when China—a critical link in the global technology chain—began reporting more cases. And while the country’s early lockdowns and quarantines are slowly beginning to lift, the pandemic’s international expansion is leading to new restrictions across the globe that are weighing on business activity. Consequently, the technology supply chain now faces a new set of challenges.

China itself poses several operational questions. Over the past few weeks, major progress in reducing labor constraints in China occurred (Exhibit 1). We estimate that by March 24, 2020, around 75 percent of the country’s workforce had returned to work. That is a major improvement over the situation in February 2020, when less than 20 percent of workers were back on the job. But many workers are new recruits who require training, which will likely

take several more weeks. And Wuhan—the major manufacturing center where the outbreak began—remains far behind, with just around 24 percent of labor having returned to work.

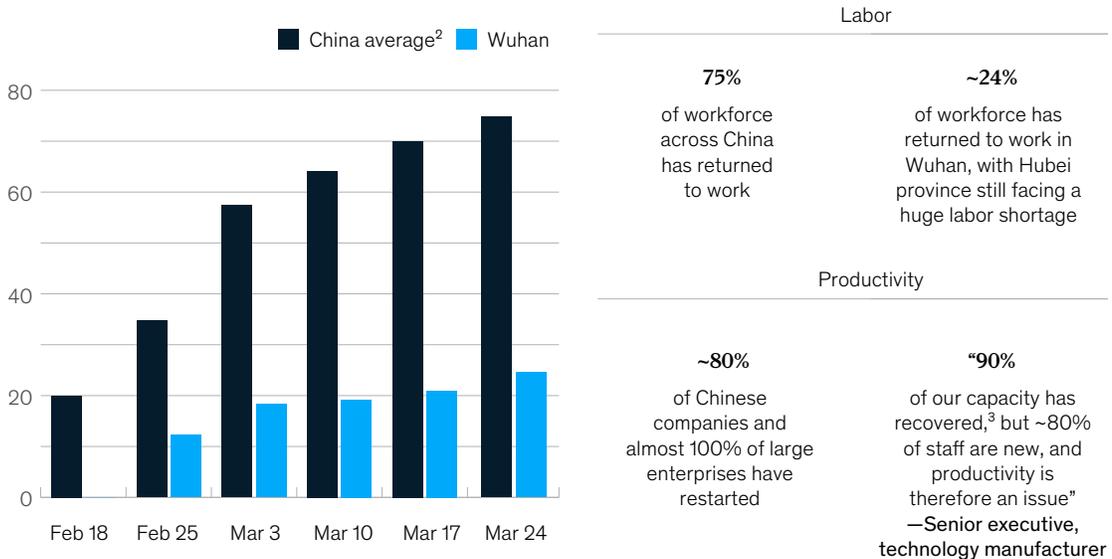
Supplies of materials and components, especially those that are highly labor intensive, are also limited, potentially creating a second wave of disruption—even assuming that labor shortages continue to abate. For global manufacturers, highly customized, low-automation components may remain out of stock if Chinese suppliers cannot recover quickly enough. And logistics challenges mean that delivering even readily available components to production lines overseas is likely to take longer and cost more than it did in the past.

Finally, liquidity challenges loom, particularly among small and medium-size enterprises (SMEs). These companies, which mainly produce labor-intensive parts, are crucial in the upstream technology supply

Exhibit 1

China as a whole is recovering, but Hubei and workforce productivity are still facing challenges.

Return-to-work index,¹ %



¹ Accumulated active populations after Jan 31 ÷ baseline active population (Dec 2019).

² Excluding Hong Kong, Macau, and Taiwan.

³ As of Chinese New Year (Jan 25, 2020).

Source: Baidu; expert interviews; McKinsey analysis

chain, but their limited access to capital makes them exceptionally vulnerable to cash squeezes.

Precedent shows that those sorts of problems are solvable with the right interventions. A Japanese technology manufacturer's experience in recovering from the 2011 Tohoku earthquake, tsunami, and nuclear disaster illustrates the critical elements. Despite the fact that virtually all of the company's productive capacity was in Japan—much of it near the earthquake's epicenter—it applied a mix of short- and mid- to long-term responses that allowed it to restore all production within a month while building flexibility and resilience against further shocks.

Short-term measures

In the short term, the priority for technology companies today is to restart and ramp up production. The question is how to do so while minimizing further disruption and keeping workers safe.

The first step is building a central nerve center to create the transparency required for agile decision making and to oversee the implementation of both strategic and tactical actions. That step enables better scenario planning. Next, the company examines demand with a skeptical eye, understanding customers' tendency to overorder and looking for opportunities to manage demand to match supply better. In parallel, specialists must assess components for criticality and risk, reaching as deep into the supply chain as possible to create a full picture. Finally, from those insights, it's possible

to optimize limited production capacity. Follow-ups will flow on a circular basis through the nerve center to continually assess parts availability and demand.

Build a nerve center

By bringing top management together in a single, flexible structure, a nerve center enables companies to navigate more efficiently through dynamic situations, guiding the whole organization to understand, react, and improve in a timely manner. For the supply chain, the nerve center will cover multiple priorities, ranging from conducting scenario-based sales and operations planning to overseeing parts availability, logistics, and supplier qualifications. Across all these activities, however, the nerve center acts as a single, authoritative information source, point of contact, and decision-making venue.

The nerve center can thereby break through logjams, particularly ones at the boundaries between functions. For example, the nerve center could bring supply-chain and procurement heads together to identify the most urgent transport contracts requiring renegotiation in order to secure alternative shipping routes. And it can resolve questions about which manufacturing sites should be reactivated first—and to what degree—bearing in mind supply constraints.

Conduct scenario analyses to identify specific actions

The information that the nerve center brings together will be crucial in conducting scenario

The nerve center can thereby break through logjams, particularly ones at the boundaries between functions.

analysis to navigate the supply chain with clear priorities. As of this writing, the most likely scenarios for the COVID-19 pandemic's further global development appear to be those in which the COVID-19 spread is eventually controlled, and catastrophic structural economic damage is avoided. But recovery may be slow or muted rather than strong, and the virus may recur. Moreover, the scenarios describe a global average, with situations varying by country and region.

In a slow-recovery scenario, China and East Asia continue their current recovery and control the virus by the second quarter of 2020, while European and US case-count growth rises rapidly through mid-April. The resulting supply-chain scenario is that China and East Asia start recovery, but supply chains remain impaired, especially by the unavailability of parts coming from Europe or the United States and by logistics bottlenecks (particularly in air freight). European and US large-scale quarantines, travel restrictions, and physical-distancing measures subsequently drive a drop-off in consumer spending and business investment in 2020 for consumer electronics.

Should the virus recur, China and East Asia face a surge of reinfection as they attempt to restart economic activity. In addition, disruption of the supply of critical components from Europe and the United States happens across the board over an extended period of time. Under a possible, more negative scenario, China and East Asia experience double-dipping slowdowns, global supply chains are almost completely disrupted, bankruptcy of smaller suppliers becomes endemic, and global sourcing alternatives and diversification become very problematic.

These broad scenarios will require refinement and adaptation for each company's unique circumstances, bearing in mind that the underlying drivers for the scenarios may have very different implications, depending on factors such as a company's primary sources of demand. Particularly if the economic impact lasts for more than a quarter or two, understanding the interdependencies will become more critical.

Understand and reshape demand to fit supply

At times of supply uncertainty, customers have every incentive to inflate demand in a bid to improve their odds of getting the amount of supply they need (or believe they need)—and to build up a buffer as well. Therefore, demand planners need to work with sales departments and data analysts to identify and correct the inflated demand (Exhibit 2).

The first—and simplest—step is to compare each customer's current order with past purchases to see just how inflated the current requests are. Additional refinement can yield further opportunities to reduce order sizes and production runs. For example, by pairing regression models with machine learning, planners can build a range of different demand curves that would apply under the current economic circumstances. Working with the sales department to review promotion plans and budgets can help spread high demand over a longer time period and reduce abnormal demand.

The last step is to work with other stakeholders, such as manufacturing, marketing, and sales functions, to evaluate demand-reshaping possibilities. That could include product substitutions to emphasize products that share similar specifications, thereby avoiding or reducing machine changeover time. For a laptop manufacturer, this may require persuading customers to accept a different model—perhaps at lower profitability—so that the manufacturer can rebuild capacity.

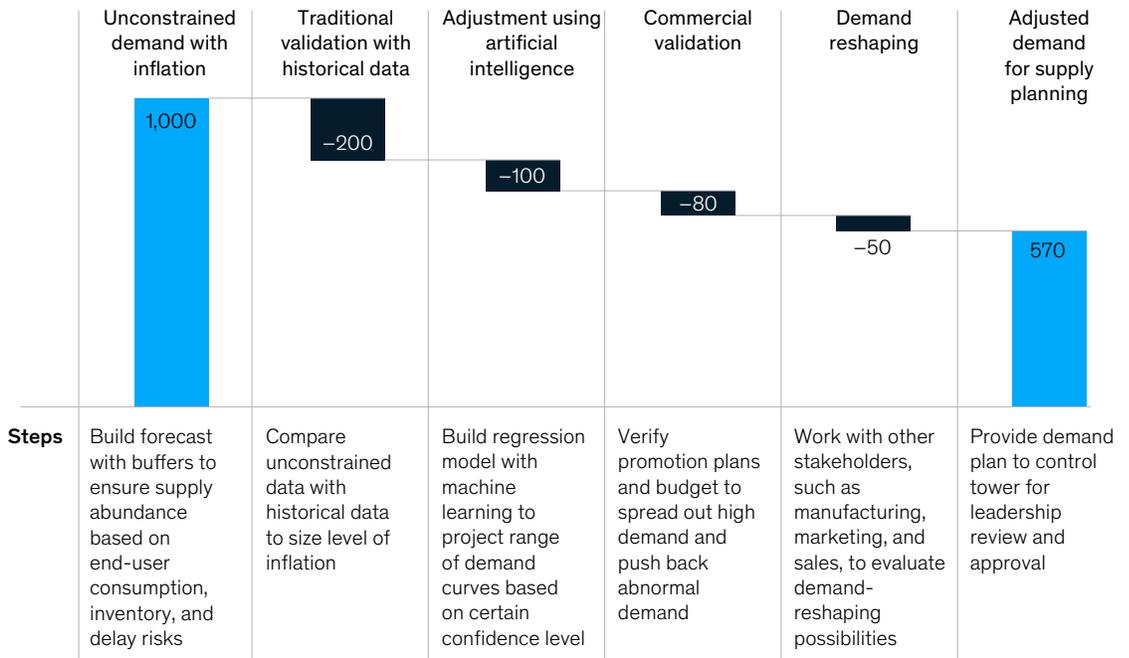
Assess components for criticality and risk at each tier

It is of critical importance that companies understand the risk exposure of components and suppliers at each tier so that they can calculate value at risk in case of a supply-chain disruption. By understanding value at risk and prioritizing the most critical components, organizations can then try to build up critical inventory, with help from distributors, brokers, or alternative sources, despite the potential cost increase.

The example in Exhibit 3 illustrates how this analysis works. A detailed tree, populated by bill-

Demand planners need to work with sales and data analysts to identify and correct inflated demand.

Critical steps in validating demand (not exhaustive), illustrative units



of-materials data, allows supply-chain staff to see each individual component down to third- and fourth-tier suppliers. For each item, the team then estimates risk along the dimensions of product technology, transport, supplier landscape, and safety relevance—for each dimension, the more specialized the product’s requirements, the higher the risk. So for example, a camera module using relatively generic technology, available locally from several suppliers, and requiring no safety testing would be of very low risk. Conversely, the latest integrated-circuit chipset, built at a single overseas fabricator site, would get a high score for risk.

Optimize limited production capacity

After obtaining the adjusted demand figures, manufacturing departments should allocate capacity based on an integrated, quantitative production-prioritization matrix. Here, it is necessary to strike a fine balance between

customer needs and production efficiency, while also considering each customer’s strategic importance, related customer-service implications, component availability, and production efficiency.

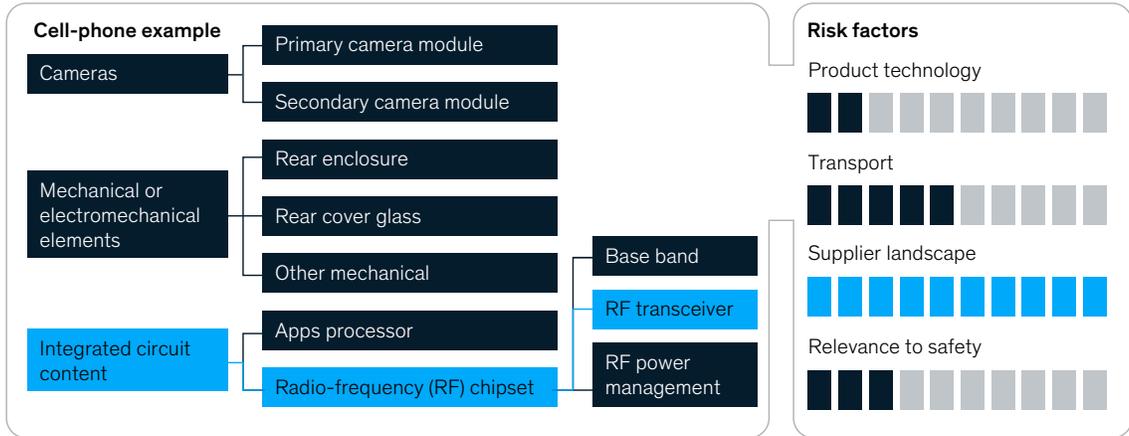
Consider a manufacturer that is facing a dozen orders, each for more than 10,000 units across three major product types. Because of supply shortages, realistic productive capacity is only about 50,000 units—less than half of the cumulative orders.

Commercial considerations matter most. One important customer is experiencing a stockout so severe that it has threatened to stop offering the product if it isn’t replenished. That order goes to the front of the queue: it’s for one of the manufacturer’s core products, and the manufacturer can’t afford to lose the relationship. Manufacturability then enters the equation. The priority order is produced, and

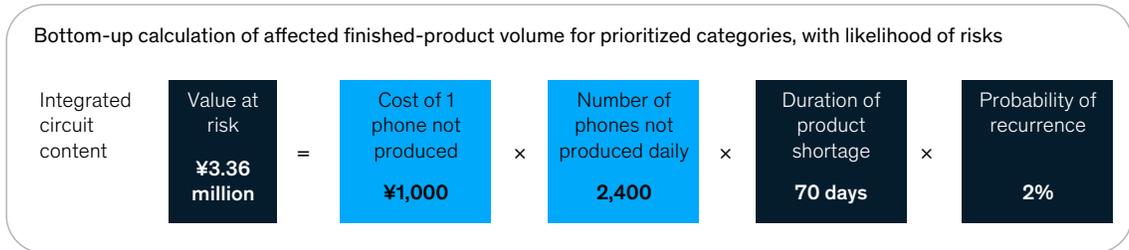
To quantify a supply chain’s vulnerability, analyze components’ risk exposure by tier.

2-step method to identify crucial parts and value at risk

1 Identify bottlenecks and risk factors in supply chain



2 Calculate risk exposure



the remaining available capacity goes to the next three orders for the same product family, making them easier to produce: one order for an overseas customer experiencing a stockout, another that was bundled with the top-priority order, and a third for a nonpriority customer whose order could be filled by the same manufacturing run.

The remaining orders above the daily capacity fall into backlog for next-day production, unless pushed again by new prioritization from customers or changes in availability of parts—illustrating an urgent need for frequent (ideally daily) sales and operations planning.

Recommended actions over the medium term

As time passes, organizations will be able to move out of the current crisis mode. In the medium term—a period of the next two to four months—a further set of actions should be taken. They should include the conversion of the nerve center into a midterm risk-management process, with business continuity tested on a regular basis.

Convert daily firefighting into reliable risk management

While companies use temporary processes to conduct short-term risk management, they must gradually streamline, over a period of two

to four months, this daily firefighting into a more formalized risk-management process. They can use the knowledge and lessons learned from their short-term actions to form the basis for building a more resilient supply chain. This should include building a risk-management team—in addition to the temporary taskforce managing catastrophic events—to assess supply-chain risk, with a clear information cascade. There should also be regular interfacing with other functions, including sales and marketing, finance, HR, R&D, and IT, to ensure and encourage a high awareness of the importance and implications of proper supply-chain risk management.

Additionally, the team should communicate frequently with other stakeholders, such as policy makers, investors, and others, to ensure that they are aware of any changes that will affect them as early as possible. The team should also identify any relevant new tax and government incentives that could support the company, either directly or indirectly through impact on others in the supply chain.

Part of building a more robust supply-chain risk-management process will also include building structural flexibility. When possible, companies should implement a multisource approach for critical components, along with local supply-chain monitoring supported by local sourcing hubs.

Support financially troubled SME suppliers

Because few SMEs have excess cash on hand—or other easily accessed forms of liquidity—the disruptions that have already occurred are likely to have a huge impact on their financial health. The early signs point to sustained pain, with some Chinese SMEs already declaring bankruptcy, while others report facing high penalties from international customers after failing to fulfill committed orders.

Manufacturers can often provide essential support at comparatively low cost and risk to themselves, first by taking simple actions, such as increasing accounts-payable periods for the suppliers most in need of cash. For those that need greater support, providing low-interest loans in exchange for supply exclusivity and stability can help both sides achieve important objectives.

Preparation for the long term

Building resilience will require tech companies to invest in two interconnected, longer-term supply-chain realignments: managing supply-chain-footprint risk while increasing supply-chain-planning agility.

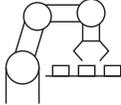
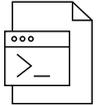
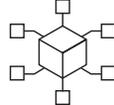
Managing supply-chain-footprint risk starts with the familiar task of optimizing production footprints to reduce cost, mitigate risk, and (when possible) capture trade benefits. For today's manufacturers operating a global supply chain, the most critical requirement is to build an agile, centralized footprint-simulation capability based on advanced modeling software. This new capability will enable leaders not only to understand and measure the risk in the current supply chain but also to simulate and run multiple scenarios to model the impact from geopolitical events, such as trade disputes, major disruptions of manufacturing assets or logistic routes, and supplier defaults. While most companies historically reviewed their footprints on a yearly basis (at best), we believe that developing a footprint-simulation capability will be key to coping better with uncertainty and being able to adapt to a fluid environment in an agile way.

Once the risks are identified, measured, and ranked, companies can consider hedging and other mitigation options, such as acquiring extra tooling or cold assets and negotiating buy options with key suppliers. Careful application of advanced analytics can also help companies identify qualified suppliers in days rather than months—and then redesign transport networks to move the supplies more quickly to factories and customers.

Increasing supply-chain-planning agility by using digital tools allows rapid replanning of the supply chain from end to end, including breaking down information silos and enabling real-time, concurrent planning of demand, manufacturing, parts, and logistics. The result is to accelerate the sales- and operation-planning drumbeat from quarterly or monthly to biweekly—or even daily. Again, new technologies play a critical role, allowing manufacturers to build robust data links among logistics, manufacturing, procurement, planning, and

Broadly speaking, agility comes from investments in four areas: new data sources, automation, new algorithms, and ubiquitous access.

How to accelerate supply-chain agility

<p>1 </p> <p>New data sources</p> <p>Integrate additional sources of data into supply-chain management to accelerate supply-chain response time</p> <ul style="list-style-type: none"> ● Actual supply-chain status (eg, demand, inventory, shipment) ● Promotional data, demand-variation data ● Social-media data 	<p>2 </p> <p>Automation</p> <p>Deploy digital solutions to automate end-to-end supply chain for better productivity and risk mitigation</p> <ul style="list-style-type: none"> ● Robotics (eg, warehouse automation, industrial robots) ● Process automation (eg, electronic data interchange, “no touch” planning) 	<p>3 </p> <p>New algorithms</p> <p>Apply new algorithms driven by in-memory computing and cloud processing power to improve accuracy and transparency</p> <ul style="list-style-type: none"> ● Interactive, real-time planning ● Improved accuracy in demand forecasts 	<p>4 </p> <p>Ubiquitous access</p> <p>Establish multiple secured data interfaces to stay connected with real-time supply-chain status remotely</p> <ul style="list-style-type: none"> ● Web and cloud applications ● Mobile applications ● Secured remote access
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sales functions, with the ambition to get real-time visibility on the end-to-end supply-chain situation and ensure faster and better decision making.

Investments in the integration of four areas—new data sources, automation, new algorithms, and ubiquitous access—can enable increased agility of supply-chain planning (Exhibit 4). New data sources can improve and accelerate decision making, automation can improve productivity and provide risk mitigation, new algorithms can enable accuracy in planning, and ubiquitous access can reduce reaction times. These four investment areas are neither interdependent nor sequentially required, but a coordinated approach is necessary to reap maximum impact at scale.

Early adopters of innovative manufacturing methodologies are making their entire value chains more resilient, integrating production and supply

into a seamless whole that responds rapidly to changes in demand and supply.

While the coronavirus pandemic is the most wide-reaching crisis to affect supply chains in recent memory, it is not the only incident that will have an impact: Brexit, international trade disputes, natural disasters, and other events are all affecting today’s complex supply chains to varying degrees.

Additionally, the COVID-19 situation is continuing to evolve on a daily basis. While recovering from this current crisis is crucial, it is more important that organizations act now to mitigate against future shocks. Companies should design and build their future supply chains with risk management firmly in mind.

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