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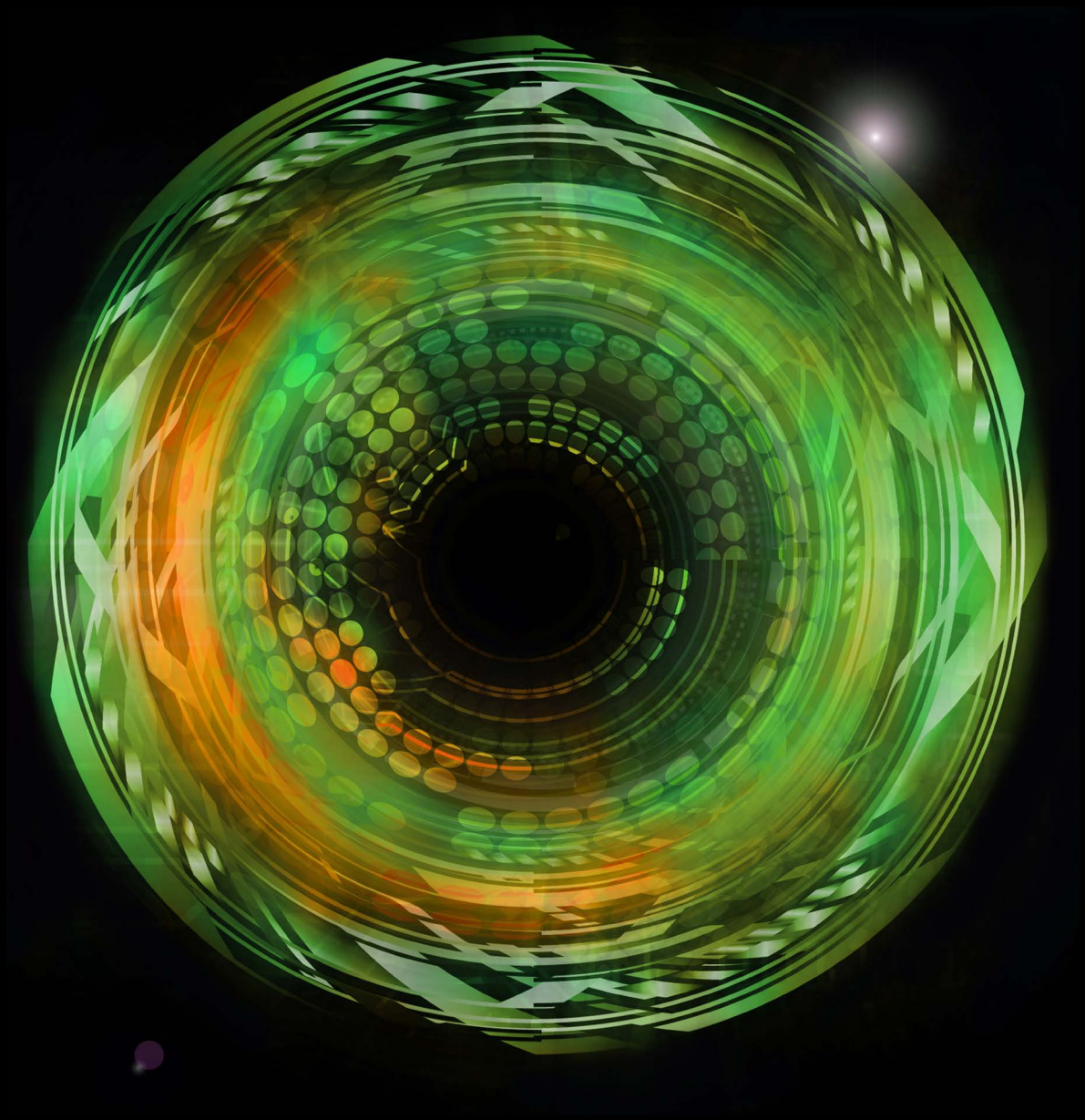

2021 outlook for the US technology industry

Deloitte Center *for*
Technology, Media &
Telecommunications

Interview with Paul H. Silverglate

Barring something like a global pandemic, entering 2020, we had anticipated another year of strong, predictable growth within the technology sector. The first widespread 5G rollouts in the United States were planned, adoption of artificial intelligence (AI) technologies was growing, and tech companies were driving the transformation of other industries.

But, as everyone knows, 2020 was anything but normal. In March 2020, one writer described the COVID-19 pandemic as a "time machine to the future."[1] I believe this analogy especially applies to the technology sector. In many ways, the last year saw faster adoption of technology by enterprises and consumers than at any other time in contemporary history. As a result, technology companies largely fared well during 2020, providing the crucial backbone that, for example, enabled employees to work from home and educators to teach at a distance. Today, we've been transported tens of years ahead of where we started in 2020.

A couple of months into the pandemic, we highlighted three key priorities for the technology sector. These included the importance of upgrading supply chains for greater transparency and resiliency; accelerating digital transformation, especially with cloud, everything-as-a-service (XaaS), and edge intelligence; and considering strategic acquisitions to bolster tech and talent capabilities. These trends will continue to be important in 2021.

Today's supply networks are more complex than ever before, and many have struggled with visibility, greatly hindering their agility. In 2021, it will be critical for companies to find ways to address these vulnerabilities while also reducing their environmental impact and remaining flexible enough to manage a challenging geopolitical environment.

If they haven't done so already, tech companies should reevaluate their business models in terms of digital transformation, including cloud-driven capabilities such as subscription-based services and virtualized operations. As part (and as a result) of this effort, companies should also tackle various regulatory and ethical hurdles related to data privacy and security. As organizations continue to increase their familiarity with AI, companies should transition from using it primarily to achieve efficiency to harnessing AI to transform processes, drive innovation, and create entirely new markets.

Over the last six months, we have also seen significant activity around mergers, acquisitions, and divestitures. Many technology companies have capital to invest, and some are looking to augment their technology stack or acquire critical talent. In 2021, we believe there's much more to come, based on early indications of how companies are talking about potential transactions.

To capitalize fully on these three priorities, it's imperative that tech companies attract and develop talent with skills in critical areas, such as AI, robotic process automation (RPA), and cybersecurity. This includes the need for people who can weave these technologies into specific business objectives.

For many players in the technology sector, 2020 also offered a chance to reexamine the role they can play in society, particularly around social responsibility issues such as climate change, social justice, equity and inclusion, and employee well-being. We will likely continue to see companies taking definitive actions in these areas in the coming year as they seek to create a stronger, better world.

Paul H. Silverglate
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Key takeaways
In 2021, technology organizations should consider three key strategic opportunities both to recover from the COVID-19 crisis and boldly position themselves to thrive in the future:

- **Redoubling digital transformation efforts,** with an emphasis on improving cloud infrastructure, data and analytics capabilities, cybersecurity, and business model transformation
- **Reorienting and reskilling the workforce** to optimize remote work capabilities and take full advantage of advanced technologies such as AI
- **Reexamining where and how manufacturing happens,** with a focus on improving transparency, flexibility, and resiliency

About the series
Deloitte's *2021 outlook for the US technology industry* seeks to identify the strategic issues that technology companies should consider in the coming year, including their impacts, key actions to take, and critical questions to ask. The goal is to equip US technology companies with the information needed to position themselves for a strong, resilient future.

Three critical issues for the technology industry to consider in 2021

1. **Redoubling digital transformation efforts**
   Facing new pressures and constraints, companies are working to improve their agility and flexibility, increase automation, and move to more real-time operations. Accelerating digital transformation efforts will likely take a rededication to improving cloud infrastructure, data and analytics capabilities, and cybersecurity. It will also likely require a renewed focus on business model transformation and ecosystem development.

2. **Reorienting and reskilling the workforce**
   Workforces have been beset with multiple recent shifts and challenges, redefining how people interact and how work gets done. Tech companies have been increasingly leveraging remote work capabilities and enabling other companies to do the same. In the name of improving efficiency, more and more companies are also harnessing AI technologies and RPA, both to streamline tasks and augment capabilities. The implication for workers is that they will likely need more support and development opportunities.

3. **Reexamining where and how manufacturing happens**
   The disruption caused by the COVID-19 pandemic has laid bare vulnerabilities in many technology companies' supply networks. Some have had difficulty meeting increased demand due to an inability to secure critical components, while others have struggled to gain visibility into their networks, preventing them from becoming more agile. Tech companies should continue to explore potentially relocating and diversifying their production facilities. They should also look to improve transparency, flexibility, and resiliency while reducing environmental impact.

1. Redoubling digital transformation efforts

Rising competitive pressures in the tech industry are placing a premium on speed, agility, and flexibility, with an emphasis on boosting automation, enabling real-time operations, and reimagining business models. This can be accomplished through digital transformation, which begins with a move to the cloud while also embracing critical capabilities in the areas of data and analytics, artificial intelligence, and edge computing.

Interestingly, digital transformation and the cloud are synergistic: The cloud enables digital transformation, and digital transformation fuels the importance of moving to the cloud.[2]

Because many companies have already significantly progressed in their efforts to digitize their operations, first-mover advantage has passed. The key for those that aren't as advanced is to get started now by using digital capabilities to make processes more effective and efficient. Once this phase is completed, companies can shift their focus to harnessing more advanced digital capabilities like AI to boost innovation and their competitive advantage.

The imperative to digitally transform is driven by the large numbers of companies that have already gotten started. For example, global public cloud service revenue is forecasted to reach $308.5 billion in 2021 and $354.6 billion by 2022.[3]

Demand for cloud-driven as-a-service offerings is growing rapidly, as well: One recent forecast estimates that global as-a-service revenue will reach $345 billion over the next few years,[4] with further growth powered by emerging business models such as content-as-a-service, artificial intelligence-as-a-service, and Internet of Things-as-a-service.[5]

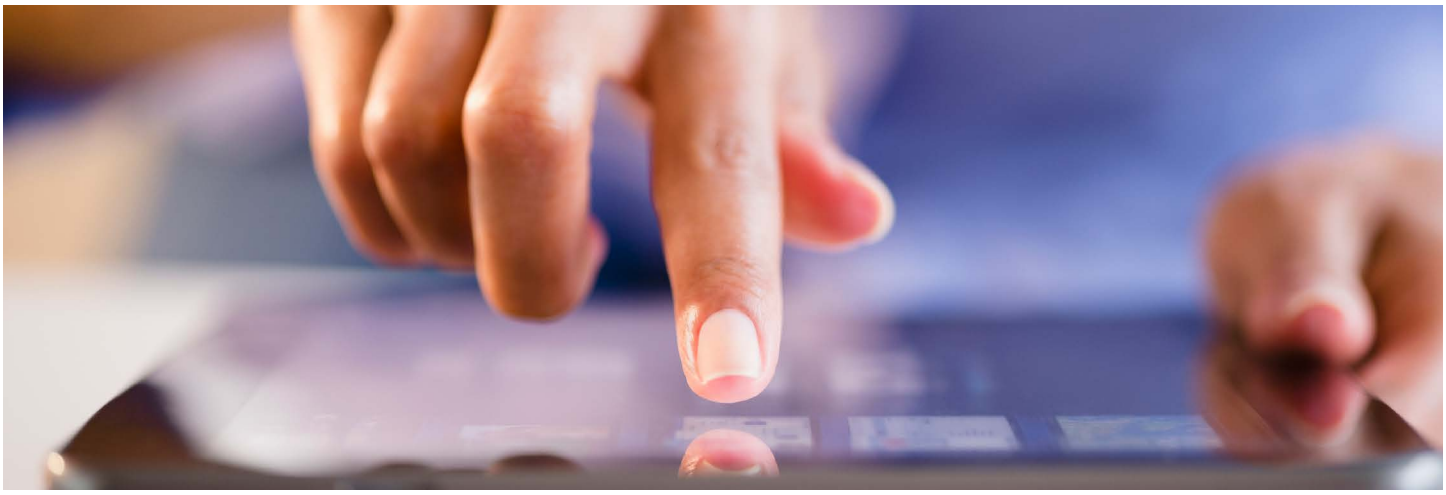
Key opportunities for growth

Growth opportunities abound for tech companies that execute on all forms of digital transformation, particularly in the areas of cloud, XaaS, analytics, RPA, AI, cybersecurity, and edge computing. For many companies, the impetus to move to the cloud is the promise of enhanced flexibility, process optimization, and cost reduction. For example, XaaS solutions can help businesses improve their expense model, enhance scalability of new applications and infrastructure, streamline operations, and free up resources for more value-centric tasks.[6]

Increasingly, however, leading adopters view XaaS as a critical tool for increasing business agility and providing easier access to innovative technologies such as AI. As a result, cloud investments are expected to double as a percentage of IT budgets over the next three years as industries seek platforms for advanced innovation, including analytics, cloud, and blockchain.[7] In addition, a 2019 Deloitte survey revealed that security and data protection (58%) and data modernization (55%) are the top drivers for cloud migration.[8]

As enterprises increasingly adopt cloud-based solutions, tech companies can capitalize by:

- Maximizing value from subscriptions by offering flexible consumption services based on customers' actual usage levels and needs[9]
- Working with their channel partners to provide vertical and regional solutions on top of their XaaS offerings[10]
- Helping clients leverage the full breadth of cloud offerings, with success tied to specific customer outcomes[11]



Although the pandemic has softened some global AI software market predictions, AI-based revenues are still expected to reach $100 billion by 2025, driven by machine learning, deep learning, and conversational AI applications. Health care, remote work, and education usage scenarios could experience some of the heaviest adoption of AI.[12]

To date, companies across industries primarily have adopted AI to enhance efficiency. For example, AI is helping financial services companies detect fraud based on customer data and transaction validation. In health care, it performs analytics across patient data, while in HR functions, AI enables organizations to manage performance.[13] Businesses are also leveraging AI-enhanced malware protection and network monitoring to sense security issues or anomalies.[14]

However, early AI adopters are now beginning to look beyond efficiency, with the goal of leveraging AI to accelerate innovation. One survey, conducted by ESI ThoughtLab and cosponsored by Deloitte, found that companies are gaining value from their AI implementations through higher productivity, increased customer satisfaction and retention, improved employee engagement, improved profitability, and new products and services.[15]

When combined with 5G wireless technology at the "edge" of the network, AI has the potential to help drive new levels of efficiency, decision-making, and innovation. 5G networks enable computer processing (typically hosted in the cloud) closer to the network edge, where data is generated, analyzed, and acted upon. Because edge computing can process huge chunks of data in real time, less data needs to be processed in the cloud, taking pressure off the network. As such, the edge and the network are synergistic: The edge saves the network, and the network enables the edge.

5G connectivity and edge computing create a highly versatile, reusable platform that provides the connectivity and computing capabilities needed to unlock the full potential of advanced technologies like AI at scale. This has the potential to deliver value for use cases that require low latency and effective use of limited bandwidth, including:

- Autonomous vehicles – Enabling an autonomous vehicle to quickly make an evasive maneuver if an object unexpectedly stops in front of it[16]
- Offshore oil rigs – Processing data locally without requiring connectivity to a centralized data center[17]
- Security and assembly line cameras – Performing video analytics with edge chips without having to transmit data over the cloud network[18]

Key challenges to overcome

As the digital transformation imperative increases adoption of cloud and AI solutions, it's essential that companies take proactive steps to manage their risk.

Cloud security is a major concern for enterprises, ranking just ahead of "managing cloud spending" and "governance" as key challenges that should be addressed as part of digital transformation.[19] According to a recent report from Barracuda Networks, 70% of surveyed executives say that security concerns are slowing down public cloud adoption.[20] Successful digital transformation demands that companies prioritize governance of security practices and management tools.

Unfortunately, many companies have overlooked cybersecurity while plunging ahead with their digital transformation efforts: According a recent IBM report, 74% of security and IT professionals report that their organizations have ad hoc, inconsistently applied, or nonexistent security plans.[21] In addition, edge computing increases the number of potential security vulnerabilities due to multiple network entry points that can be attacked by taking advantage of authentication and encryption loopholes.

Cloud adoption also introduces new cost management challenges that befuddle many companies. According to a recent Flexera survey, 56% of organizations do not understand the cost implications of software licensing for the cloud. As a result, organizations' cloud spending exceeds their budgets by an average of 23%, with 30% of their cloud spending "wasted."[22]

The lack of interoperability among different cloud services also poses a major challenge that can slow cloud adoption. In one study, 63% of respondents named "understanding application dependencies" as their top cloud migration challenge.[23] Compounding the problem is a widespread lack of internal infrastructure-as-a-service (IaaS) skills, which can delay cloud migration by two years or more.[24]

Security and data privacy are always a challenge, and this hurdle becomes even larger when AI is thrown into the equation. According to Deloitte's *State of AI in the Enterprise, 3rd Edition survey*, although more than half of AI adopters report "major" or "extreme" concerns about various potential risks of their AI initiatives, only four in 10 rate their organization as "fully prepared" to address them.[25] While AI adopters are most concerned about cybersecurity, 57% worry that new and changing regulations could affect their AI initiatives, and 62% agree that new government regulations will hamper companies' ability to innovate in the future.[26]

The sheer complexity of AI-driven ecosystems presents yet another challenge: It's difficult to find people who possess a deep understanding of various AI-based technologies and how to weave them together to solve specific business problems. Because AI is still an emerging area of expertise, universities still aren't producing enough AI practitioners or data scientists to meet industry needs.

Actions companies should take now

- Start your digital transformation today by focusing on things you can do more effectively and efficiently. Build on this to drive improved competitiveness as advanced digital technologies, like AI, become more ubiquitous.
- Understand your data—where it is, what and whom it covers, and how it's protected and utilized—to build trust with customers and comply with regulations.
- Develop channel partners to build upon XaaS with vertical offerings.
- Attract and develop businesspeople who can act as "translators" between what the business wants and what technology can actually deliver.

Strategic questions to consider

- Which applications can we shift quickly to public clouds? Are there cloud-based services or applications we can use right away to reduce costs?
- How can we ensure that our data in the public cloud is secure? How can we ensure that we work closely with cloud providers to have best-in-class cybersecurity policies?
- What are the most important product lines to move to XaaS? Can we expand our XaaS portfolio through acquisitions and partnerships?
- Which intelligent edge use cases show the most promise in terms of effectiveness, adoption, and market size? How would these align with and affect our existing enterprise services?

2. Reorienting and reskilling the workforce

Over the past year, the pandemic accelerated a technology-enabled trend that had been underway for several years: the move to virtual, remote work environments. With millions of employees given no choice but to work remotely 100 percent of the time, demand for certain technology products (laptops, home office products) has skyrocketed, with the potential to remain strong even after the pandemic abates. According to Deloitte's Q2 2020 CFO survey, 85% of respondents indicated that an increased percentage of their company's workforce will work remotely postpandemic.[27] In addition, by the end of 2021, up to 30% of the US workforce is expected to do remote work "frequently."[28]

While many workers may miss the ability to collaborate with colleagues in the office, many others credit the remote work environment with making them more efficient and effective. In addition, they appreciate the elimination of business travel and their daily commutes, allowing them to reduce their personal carbon footprint and spend more time with family. The virtual work environment also shrinks the "digital divide" by enabling virtual collaboration with colleagues located anywhere in the world, promoting increased diversity of thought and talent.

As companies reorient their workforces, they're also exploring ways to harness advanced technologies like AI to streamline tasks and augment capabilities. As a result, companies should focus on creating more support and development opportunities for employees, including reskilling key portions of their workforces.

Tech companies also should reimagine how they develop students for future careers in technology. Until now, companies primarily have relied upon colleges and universities to develop students, with little or no input from the companies themselves. Companies typically have recruited students by physically visiting campuses, an extremely time- and labor-sensitive process. In addition, students often lack the skills and diversity that companies seek.

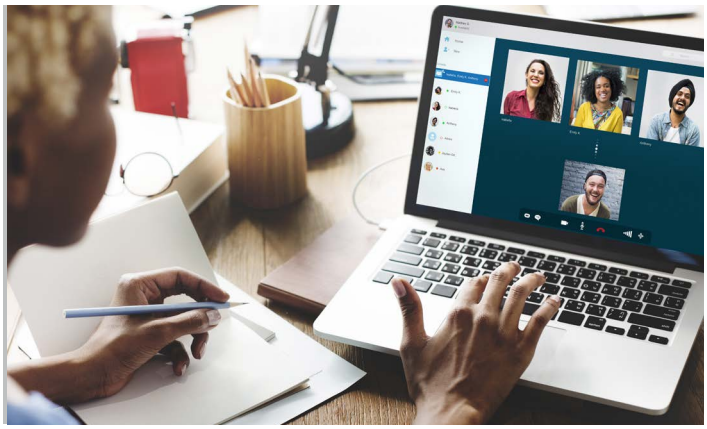
Thanks to high-speed connectivity and advanced videoconferencing capabilities, companies now have the ability to get a lot more creative about how they develop and recruit talent. For example, what if tech companies were to use videoconferencing technology to conduct classes in colleges, high schools, and even junior high schools to help students understand and develop the skills tech companies are seeking now and for the future?

Key opportunities for growth

We've already mentioned the potential for remote work to accelerate adoption of a variety of technology solutions, including collaboration and videoconferencing apps. On its October 2020 earnings call, Microsoft revealed that Microsoft Teams now has 115 million daily active users—growth of more than 50% since April 2020.[29] In addition, for its February–April 2020 quarter, Zoom reported 265,400 business customers with 10 or more employees—year-over-year growth of 354%.[30] Given the likelihood that large percentages of workers will continue to work from home in 2021, companies are expected to increase technology investments in areas such as risk and crisis management, human capital management, customer experience, and health and safety.[31]

Virtual work environments also have the potential to foster innovation and workforce diversity by enabling tech companies to tap ideas and talent from broader geographical areas.[32]

Another opportunity for tech companies is to look for ways to align and collaborate with government institutions and the general population on critical societal issues. We've already seen examples of this approach in the area of social responsibility, where some companies have committed to becoming carbon-neutral within a certain time frame. Other companies have instituted policies designed to address racial and gender-based inequality. These steps have been taken without the need for regulations; instead, companies have pursued these actions on their own because, ultimately, their employees are citizens—and because they want to take socially responsible actions that help create a better world.



Key challenges to overcome

With so many employees working from home due to the pandemic, the challenges of data security and privacy have become even more pronounced. After all, remote workers no longer have access to an IT department "down the hallway." Remote workers often lack security awareness and are unfamiliar with best practices concerning the physical safety of their devices, cyber threat detection, password usage, and data protection.[33] According to Deloitte research, the need to accommodate remote workers has increased the likelihood of a large-scale cyberattack due to unmonitored networks.[34]

Remote work also introduces challenges in terms of increased IT workloads, potential lost productivity, and a lack of camaraderie with colleagues. For example, support of remote workers has increased IT workloads by 37% due to VPN and videoconferencing issues, bandwidth constraints, password reset requests, and various messaging issues.[35] In addition, according to one recent survey, 35% of employers are grappling with remote-work-driven changes in employee productivity.[36] Another study cites the three biggest struggles of remote work as insufficient collaboration and communication, loneliness, and inability to fully unplug after work.[37] Some employees also worry about the negative impact remote work could have on career advancement due to a lack of mentorship and reduced interpersonal networking opportunities.[38]

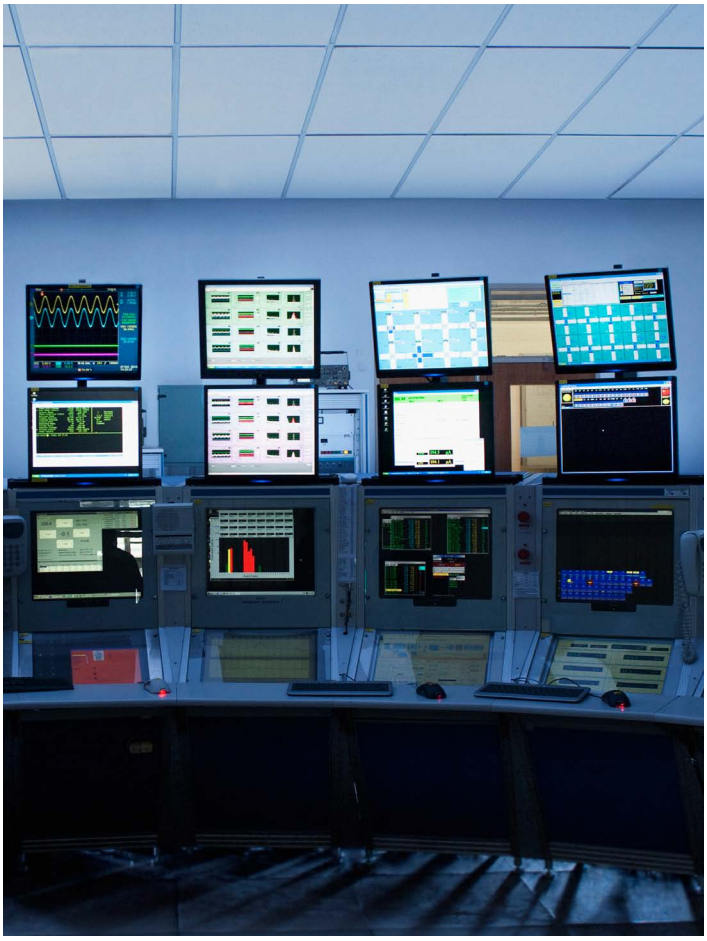
Many tech companies have understandably been "frozen in time" during the pandemic. Heading into 2021, these companies should strive to gain a better understanding of how the pandemic has affected their employees and to learn more about what they can do to energize workers and increase their overall job satisfaction.

Actions companies should take now

- Rebuild the *esprit de corps* of your talent by focusing on energy-producing activities and initiatives that attracted employees in the first place.
- Explore ways to align and collaborate with government institutions and the general population on critical societal issues.
- Take advantage of employing a remote workforce by changing recruitment practices.

Strategic questions to consider

- What is the right balance of in-person and remote work postpandemic? How will culture, office space and technology needs, and approach to travel need to change to ensure both productivity and safety (physical and cyber)?
- What can be done to enhance employee engagement and well-being in the long term?
- How can companies best engage (and develop plans of action with) their employees regarding important societal issues?



3. Reexamining where and how manufacturing happens

Because of ongoing impacts from the COVID-19 pandemic and persistent global trade issues, many technology companies (especially data center hardware, semiconductor, and PC and device makers) have been reevaluating their manufacturing capabilities. They are striving to manage pervasive uncertainty and improve the resiliency of their supply chains and manufacturing in order to curtail potential future disruptions. Some companies that have taken a more centralized approach have experienced repercussions from these issues and are beginning to make moves in response.[39] Everyone faces a precarious balancing act, looking to manage trade-offs involving cost and efficiency, resiliency, and innovation.

In addition to pandemic- and trade-related stressors, the semiconductor industry is dealing with changes that have placed their manufacturing approaches under the spotlight. A flurry of recent mergers and acquisitions included ADI's proposed purchase of Maxim, NVIDIA's acquisition of Arm, and SK hynix buying Intel's NAND memory business.[40] In addition, boundaries within the industry have slowly blurred as more and more tech players design their own chips and outsource manufacturing (for example, Apple's M1 processor and Google designing chips for its phones and laptops).[41]

Many technology manufacturers also continue to suffer from an overreliance on a specific geographic region or limited set of vendors. The current pandemic is just the latest in a line of natural and human-made disasters that have brought this problem to the forefront.[42] In combination with recent trade issues, however, it is clear that this obstacle can no longer be ignored.[43] However, it takes time and patience to develop a strong diversification (regional or global) strategy. To lay the foundation for future success, it's important for manufacturers to begin identifying the necessary resources, talent, transportation infrastructure, and supportive regulatory and tax environments.

All of these factors are creating a more complex landscape that can drive the evolution of technology design, manufacturing, outsourcing, supply chain operations, and logistics in 2021 and beyond.

Key opportunities for growth

Against this uncertain backdrop, technology manufacturers should explore two major opportunities no matter how things eventually unfold: 1) improving visibility by transforming supply chains into digital supply networks, and 2) diversifying suppliers and manufacturing capabilities in order to improve adaptability and resilience.

Over the past year, the pandemic has highlighted the serious problems that can arise when companies have insufficient visibility into their supply chains. Many companies manage complex webs of suppliers that could contain hundreds of high-tech parts and components providers about whom they may have little information. When disruptions happen, companies often lack the data needed to determine where failures are occurring so that they can make swift course corrections.[44] As a result, some find themselves unable to fulfill demand due to missing components.

It doesn't have to be this way. By redesigning key business processes and using advanced decision support technologies (including AI), process automation (through sensors and robotics), and integrated communication technologies (like 5G networks) to drive real-time action, companies can bring everything together into an integrated digital supply network.[45]

Key challenges to overcome

Technology companies should manage the "four T's" (trade, tax, talent, and technology) to successfully transform their supply chains and diversify manufacturing capabilities. New changes, barriers, regulations, and directives related to global trade will likely continue to emerge across multiple countries and test technology manufacturers.[46] The pandemic will potentially exacerbate protectionist tendencies. Favorable tax policies and other financial incentives will likely still be used as a tool to attract and retain manufacturers.[47] Technology manufacturers rely on highly skilled and specialized talent; if the decision is made to geographically diversify, the right talent should be available. Finally, many companies still rely on legacy technologies that don't provide the data and analytics capabilities needed for transparent and real-time digital supply networks.

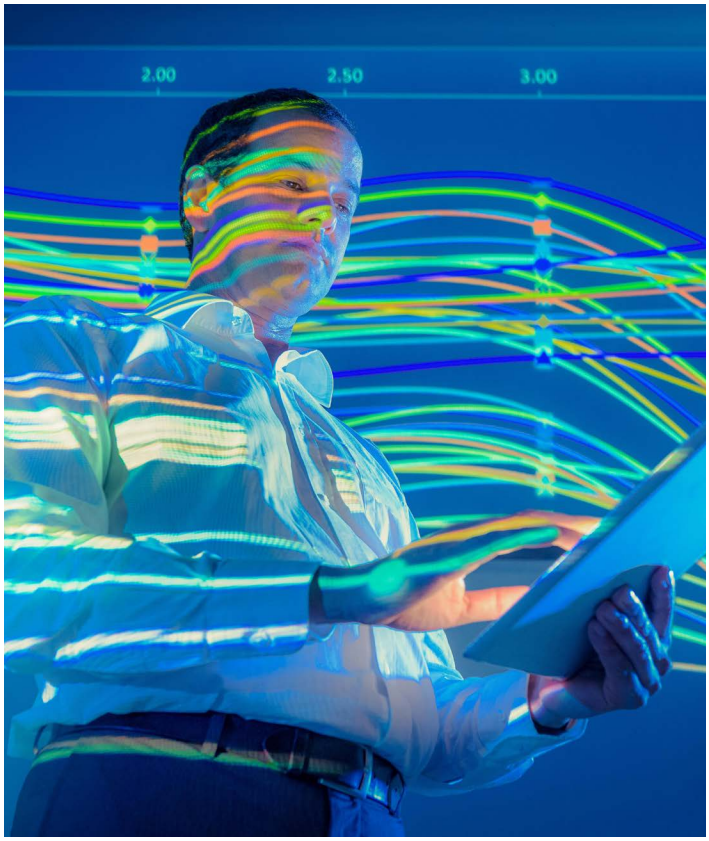
Once the pandemic subsides and its risks fade, technology companies may be tempted to fall back into old habits and delay strategic actions to bolster their manufacturing capability and supply chains. Cost will always be a primary motivator for organizations, but they should recognize that investments are needed to create resiliency and redundancy. Organizations should consider engaging their boards of directors to help manage this challenge.

Actions companies should take now

- Dust off business continuity plans and rewrite them based on recent learnings. Consider augmenting those plans with automated information feeds than can provide real-time and actionable risk data on suppliers.
- Evaluate all supplier tiers, and determine which ones are reliable long-term strategic partners—those that have redundancies and alternate sourcing options built in, including geographic diversification.
- Engage the board to help take responsibility for managing supply chain and manufacturing risk.
- When designing new products, selecting a new supplier, or building a new factory, explore which incremental actions can be taken to diversify your manufacturing footprint, including multisourcing and nearshoring.

Strategic questions to consider

- To manage increasing complexity, how will you become more integrated and improve cross-organizational collaboration? Which new capabilities will you need?
- How will you balance cost, resiliency, and innovation throughout your manufacturing and supply chain capabilities? Which trade-offs are you willing to make?
- Which new partnerships and alliances will you need if you move into new geographic regions? How will you develop talent and capabilities in these new regions?
- What data will be needed to monitor and better assess country or regional risks?



Looking boldly to the future

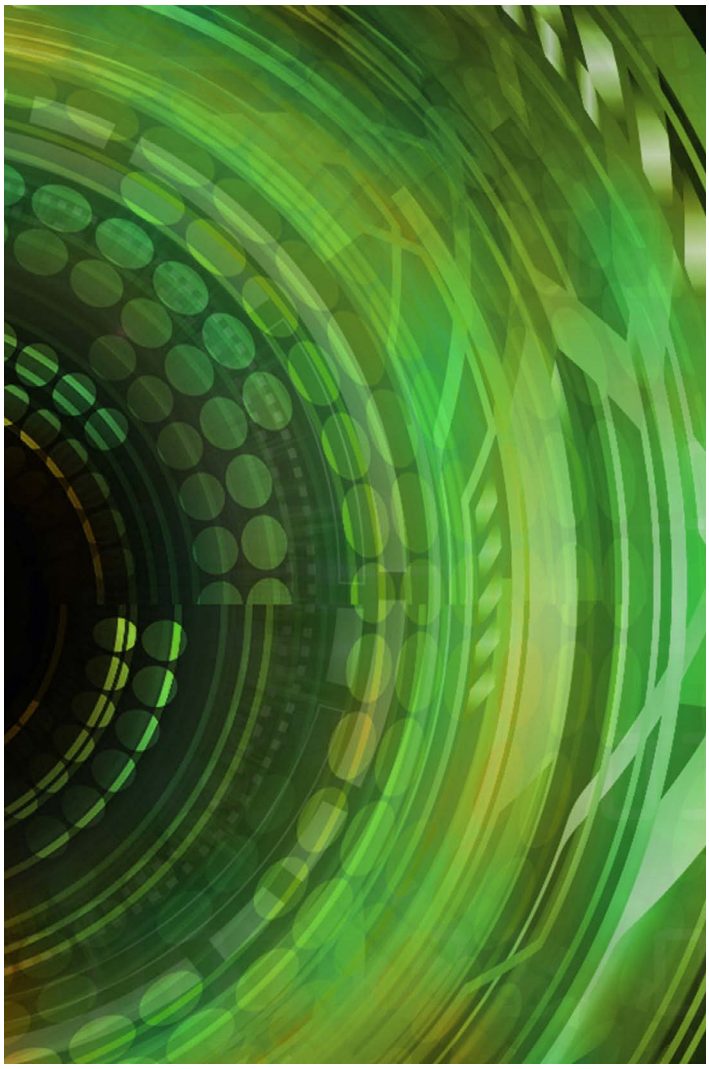
In spring 2020, a couple of months into the COVID-19 pandemic, we stated that technology companies should reassess what and how they sell, how they operate, and how they can forge stronger and more direct relationships with customers. To recover from the crisis while making a bold play for a thriving future, we suggested that tech companies focus on three areas:

- Upgrading supply chains for greater transparency, responsiveness, and resiliency
- Modernizing capabilities by accelerating adoption of cloud, XaaS, and edge computing
- Capitalizing on asset valuations with mergers and acquisitions

While these remain key priorities for tech companies in 2021, it will also be important to consider pursuing a range of other opportunities, including:

- Ensuring that employees have the ability to undertake tasks that keep them energized each day
- Attracting and developing talent who can act as "translators" between what the business wants and what technology can actually deliver
- Finding ways to align and collaborate with government institutions and the general population on critical societal issues, such as racial injustice and climate change
- Taking advantage of virtual working environments to build workforce diversity

Because technology continues to reshape how every industry operates, the actions outlined above can help all companies thrive in the coming year.



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