Resiliency in the making

Turning adversity into advantage for engineering, supply, production and operations

Voices of Change

From insights to action, the path to extraordinary value starts here.

accenture

Executive summary

Capturing competitive advantage in pursuit of durable resilience.

Disruption has hit businesses hard in the last few years. Unforeseen fluctuations in demand at the height of the pandemic, geopolitical unrest driving up wages, material costs and energy prices, climate emergencies, and technology innovations have revealed dangerously low levels of resiliency within engineering, supply, production and operations. This vulnerability has caused businesses to miss out on a staggering $1.6 trillion in revenue growth opportunity on average each year.

Many businesses have responded with short-term fixes, quickly applying them to complex global networks designed for cost efficiency and just-in-time deliveries. Others have resorted to reactive strategies like inventory buildup, which came at a cost. Inventories used in production have reached a value of $1.9 trillion.[1]

Timeline of recent disruption

2020	**Global pandemic**
	Unforeseen rise in demand for digital products and online experiences
	Truck driver shortages lead to logistics challenges
2021	Cyber-attacks on production lines
	Semiconductor shortages peak
2022	**War in Ukraine**
	Raw materials and critical minerals shortages resulting in energy price hikes
	Key engineering talent in Ukraine and Russia displaced or conscripted to military duties
2023	**Inflation soars**
	Global talent shortages
	Extreme weather events
	Tech breakthrough: Generative AI
Today	**New geopolitical risks**
2030	**The next known unknown...**

40%

increase of product order-to-delivery lead times reported in the last 2 years.

$1.6t

potential revenue growth opportunity left on the table each year.

Only

17%

of companies say they have a multiskilled workforce today.

+3.6%

additional revenue growth that the more resilient companies were able to capture compared to their less resilient rivals.

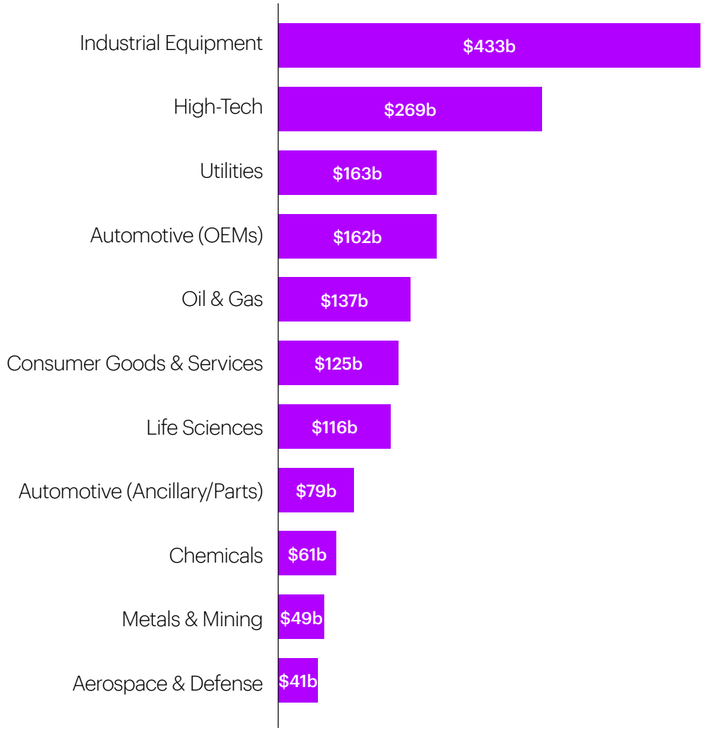
Accenture sought to better understand how businesses respond to, and manage, disruption in their engineering, supply, production and operations functions. We developed a framework of 31 capabilities that enable resiliency and then deployed a global survey to over 1,200 senior executives from 11 industries to evaluate their investment and maturity in these capabilities.

Executives told us they missed out on revenue growth opportunities of between 7.4%-11.0% due to disruption in their engineering, supply, production and operations. When we looked closer, we discovered that the more resilient companies (assessed in the top quarter of resiliency maturity) capitalized on more opportunities, in turn capturing 3.6% greater revenue than their peers in the bottom quarter of the maturity scale. Better resiliency enabled a competitive advantage that also helped them achieve an additional 1.2 percentage points in EBIT margin compared to their peers with lower resiliency.

These more resilient companies are investing in the right mix of resiliency-focused capabilities and achieving better business results because of it. This report will delve into three actions that companies can take to join them, growing their maturity in the key capabilities that enable greater resiliency in engineering, supply, production and operations, enabling them to harness the power of disruption to their advantage.

The missed growth opportunity

Figure 1: Disruptions drove $1.6 trillion in missed annual revenue growth



Resiliency

We define resiliency in the context of engineering, supply, production and operations as an organization's ability to proactively sense, absorb, adapt to, and recover from disruption so it can produce goods, deliver services, meet and increase customer demand, and respond to changes faster than its competitors.

Contents


Global/local
A first step toward resiliency

Today's challenging business environment is prompting executives to re-evaluate diversifying and localizing their sourcing and production footprint.

The turbulence of the last few years has forced many businesses to address the vulnerabilities in their highly globalized supply and production networks.

Companies taking stock of their production and supply chain footprints indicated that they will reduce their dependency on sole sourcing strategic commodities in the next three years. Today, only 42% of respondents are making use of multi-sourcing strategies compared to 72% who plan to in the future.

Regional sourcing is also bouncing back. Numbers are set to leap from 38% of respondents today mostly sourcing regionally to 65% in the next three years. Adopting the best sourcing strategy and identifying new production facility locations will be key to bolstering resiliency, sustainability and flexibility.

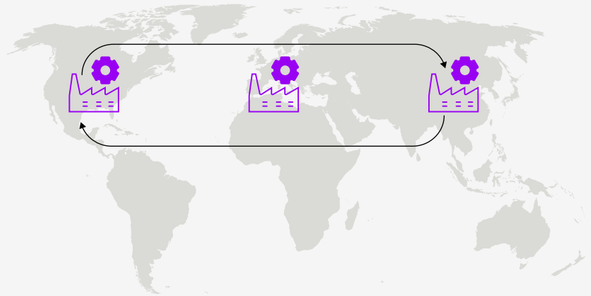
Leaders are also prioritizing proximity-based hubs that concentrate production facilities and sales within the same region to streamline logistics, improve inventory management and accelerate response to market demand. We found that the manufacturing of products across multiple plants is expected to rise from 41% today to 78% in three years' time. This rise aligns with the increasing preference for producing goods within the same selling region, which is anticipated to reach 85% in three years, up from 43%.

In addition to regional sourcing and proximity-based production, companies are actively exploring relocation and reshoring to reduce their dependency on any one specific country, region or supplier.

78%

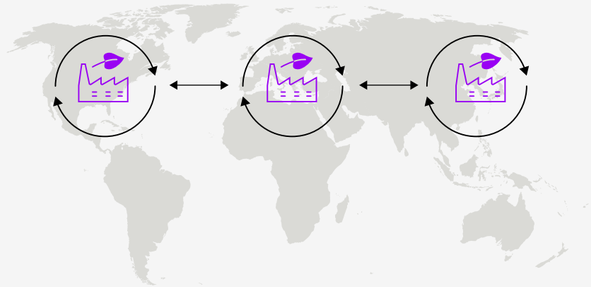
of companies will use multiple sites in 3 years' time to produce their products, up from just 41% who are already doing this today.

Companies must be mature in resiliency-focused capabilities to help mitigate against future disruption.



From globalized industrial value chains today...

- Large global footprint with free-flowing movement of goods and services that serve every customer globally
- Limited local sourcing
- Plant specialization is the order of the day (e.g. one plant in one location, mass producing one specific product)



...to localized, reconfigurable and decarbonized value chains in the future.

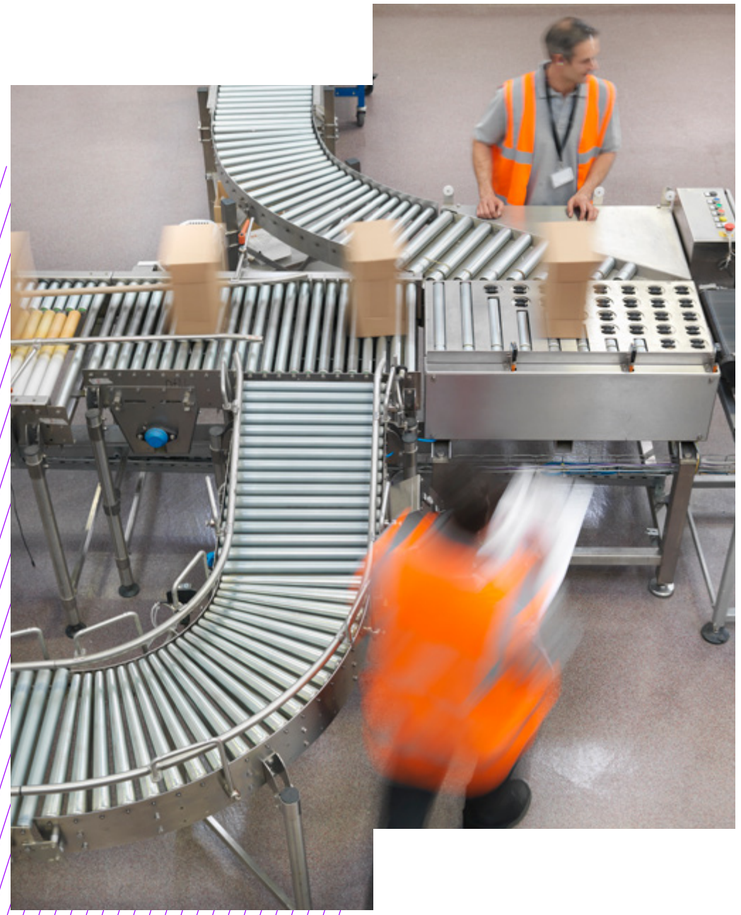
- Decentralization and localization of plants and suppliers, based on the markets or geo-locations they trade in
- Systematic double sourcing practices
- Flexible industrial models with the ability to rebalance production operations across sites
- De-risking of any over-dependence on a single supply base or location
- Relocation programs to bring production closer to consumption

Adding multiple new production and supply options provides more opportunities to be resilient in the face of change. However, as supply networks diversify, complexity grows with the addition of new suppliers, more silos appear and companies quickly find themselves having to navigate varying regulations across different regions and borders. When making major changes to de-risk networks, it is important to assess the resiliency-focused capabilities and digital maturity of the organization to better unlock value and avoid creating more problems.

Fortunately, the rapid technology innovation from the last several years provides ample opportunity for businesses of all sizes to advance their digital maturity and address disruption strategically.

Adapt / advance

Three actions to build resiliency



When it comes to building resiliency, piecemeal solutions are inadequate.

Establishing resilience requires a total rethink of the business and operating model—an enterprise-wide strategy that sets the stage for a cascade of transformative changes. In today's fast-moving consumer and tech-driven world, companies who wish to unlock new value and transform in this way need to invest in, and scale up, their maturity across 31 resiliency-focused capabilities (see figure 2).

Powered by data, digital and AI, these capabilities enable organizations to make broad changes—from the employee and customer experience to sustainability—all while increasing revenue and reducing costs.

From this list of 31 capabilities, we suggest that companies prioritize investment in the 11 emerging capabilities most aligned to better resiliency outcomes—the Resiliency 2.0 capabilities.

For example, dynamic and sustainable product development capabilities enable businesses to reach customers faster—moving from ideation to production to go-to-market at an accelerated pace—while making it easier for engineers to design more relevant, sustainable and differentiated products and experiences.

Figure 2: Our study measured maturity across 31 capabilities that enable resiliency in engineering, supply, production and operations. The highlighted capabilities represent the most important areas where companies should prioritize investment.

● Denotes emerging Resiliency 2.0 capabilities.

Dynamic and sustainable product development

The ability to design new products and processes in an eco-design and co-engineering approach, leveraging a continuous feedback loop along the life cycle.

- Collaborative approach to digital twin platforms
- Eco-design approach to embed sustainability by design (e.g. carbon footprint, circularity)
- Continuous upgrade of offerings to adapt to customer needs (e.g. product services upgrades, product features upgrades based on over-the-air)
- Agile development methodologies for non-software components (systems, mechatronics, mechanical)
- Application of resiliency-by-design approach (e.g. standardization, modular approaches, broader supply base alternatives)
- Digital feedback loop during in-service, based on analytics and IoT

Localized and reconfigurable supply chain networks

A reduced geographical spread of supply networks to achieve a more local, low-carbon supply base and transportation flow.

- Use of network simulation/optimization tool to optimize production and supply chain footprint changes
- Alert system to identify risks in the supplier base (from Tier-1 to Tier-N levels)
- Ability to increase storage or freight capacity
- Ability to simulate impact of disruptive scenarios

Autonomous production

A low-carbon industrial system capable of quickly and seamlessly reconfiguring and correcting to adapt to change.

- Hyper-flexible and automated production lines concept tailored for high customization or ability to quickly reconfigure to change
- Dynamic production scheduling capabilities
- Inventory optimization models
- Integration of sustainability parameters for CAPEX

Demand foresight

The ability to anticipate and predict changes in demand and customer needs, as well as greater societal and cultural shifts.

- Structured analytics tool to predict surge or decline in demand (in addition to customer historical forecasts)
- Proactive customer segmentation to arbitrate demand in case of shortage
- Customer trend control tower collecting data insights (market, connected products, customer journey, sentiment analysis) to design and price new offerings

Smart end-to-end control towers

Visibility solutions that more quickly anticipate and identify risks, manage disruption and analyze causation throughout the value chain.

- Dynamic and data-driven planning with “what-if” scenario capabilities
- Predictive early detection of operations issues (poor-quality, breakdowns, maintenance needs, non-conformity)
- Digital cockpit enabling real-time visibility of end-to-end operations
- Digital tool to quickly understand impact of supply shortages/ production or shipping delays on sales and costs

Agile organization

A cross-functional, platform-based organization with flat leadership structures and scaled-up digital foundations built for agility.

- Decentralized decision making close to execution, with transparency at all levels
- Remote expertise capabilities (leveraging AR, VR and such)
- Proactive risk management framework and business continuity plans
- Extensive use of company-wide shared services/resources pools for services and support functions
- Extensive use of outsourcing of non-core activities
- Fully deployed cloud IT infrastructure using advanced cybersecurity practices

Flexible workforce

A highly versatile, adaptable and diverse workforce underpinned by a culture of continuous learning.

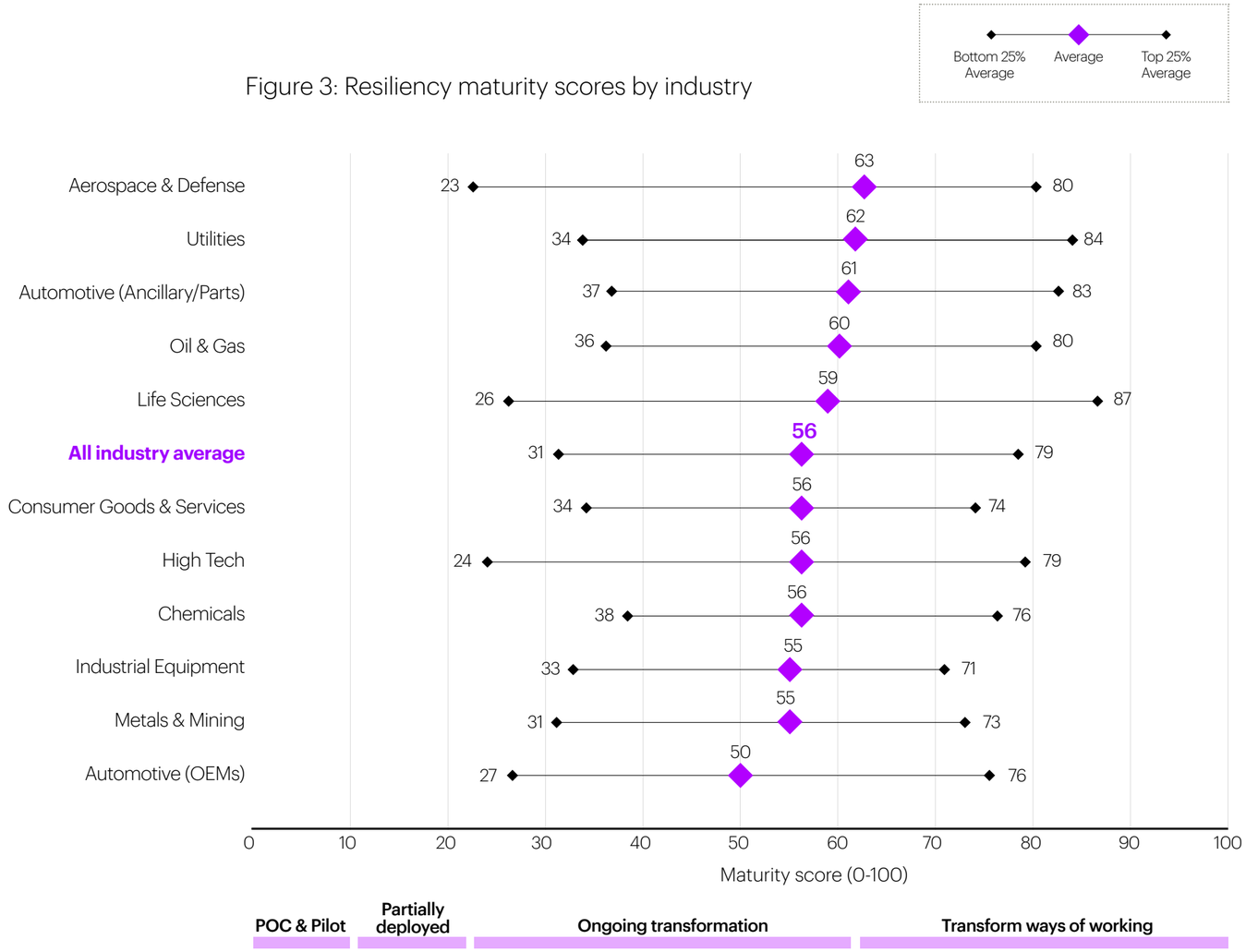
- Having a versatile/multi-skilled workforce across the supply chain, production and operations to facilitate resource reallocation
- Flexible employee contracts allowing quick adaptation of resources to activity level
- Skills demand management using analytics and skills ontology allowing quick matching of competence with needs
- Procedures and methods to ensure team safety for catastrophic events that go beyond regulatory requirements (e.g. natural disaster, violence/terrorism)

But there's work to do. While most executives anticipate advancing their resiliency-focused capabilities over the next three years, they concede that today they would rate the overall level of resiliency in their end-to-end engineering, supply, production and operations as quite low.

Our analysis shows that on average the companies we surveyed exhibit a maturity score of 56/100 (see figure 3) across all 31 capabilities for resilience (see figure 2).

While many companies are transforming, not all are realizing the benefits of transformation and new capabilities because their ways of working have not changed. These companies are taking a fractured and isolated approach to transformation, resulting in limited benefits and stalled maturity.

Figure 3: Resiliency maturity scores by industry



For companies to increase their resilience and generate more revenue, they need to focus on three important actions.

Action / 01

Invest in visibility, predictability and continuity-focused tech

Action / 02

Adopt “shift left” engineering capabilities to embed resilience in design

Action / 03

Develop a multi-skilled workforce for agility

Action / 01

Invest in visibility, predictability and continuity-focused tech

Companies need the capabilities to visualize and control their operations. This enables real-time insights and data sharing across suppliers, factories, plants, distribution centers, logistics carriers and customers. But this is far from the norm. Only 16% of companies surveyed have these capabilities, and only one in 10 have near real-time alerting. This lack of visibility hinders their ability to be made aware of, act on, and recover from shocks efficiently.

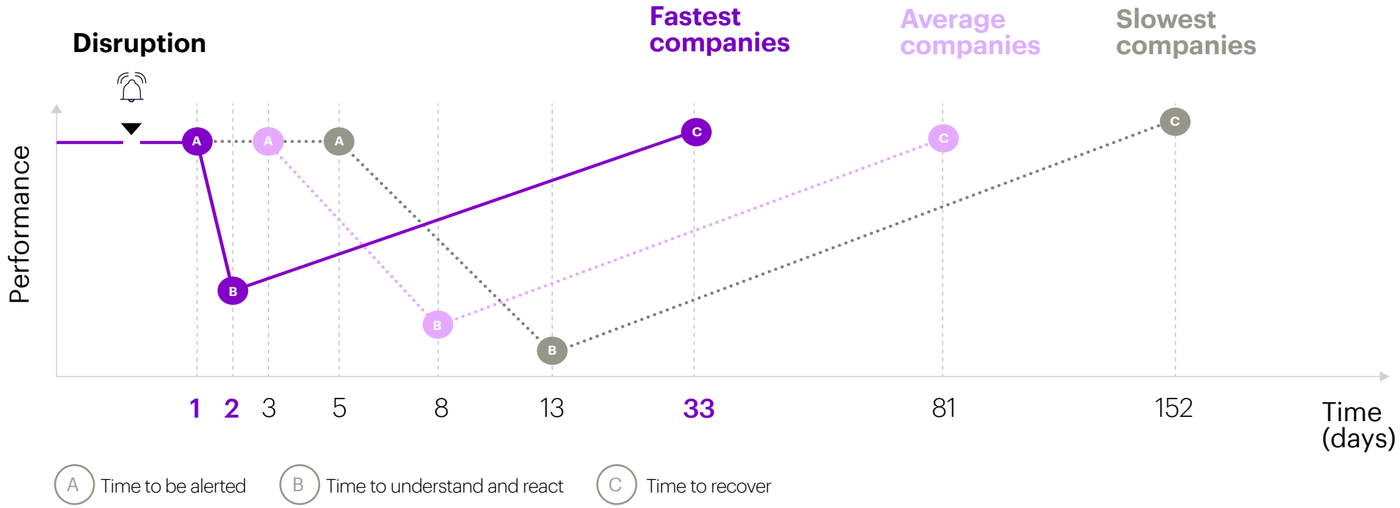
Our research reveals that the average time from being alerted to a disruption to staging a full recovery is three months, and it can even reach five months (see figure 4). For 57% of companies it takes a week or more just to be alerted to production or supply network disruptions. Even then, almost 80% of executives say it takes an additional week or more to assess the disruption's impact.

Dynamic and sustainable product development	**Localized and reconfigurable supply chain networks**	**Autonomous production**	**Demand foresight**	**Smart end-to-end control towers**	Agile organization	Flexible workforce

Resiliency 2.0 capabilities featured:

- Dynamic, data-driven planning
- Hyper-automated production lines
- Early predictive fault detection
- Proactive customer segmentation
- Demand surge/decline analytics

Figure 4: Resilient companies are alerted to disruptions faster, meaning they also understand, react to, and recover from disruptions sooner.



Disruption refers to an event that has a material impact on the client, product, plant site or sales. Recovery refers to the time needed to reconfigure the supply chain in terms of planning and sourcing or restarting a production line or plant site. Fastest companies is average performance of top quarter response performance. Slowest companies is average performance of bottom quarter response performance.

Companies that want to shorten these recovery times should adopt demand foresight and smart end-to-end control towers. They should strive towards reconfigurable supply networks and autonomous production to gain real-time visibility and control over the entire value chain, from suppliers to customers.

Demand foresight capabilities provide the structured analytics and customer trend insights to drive new offerings and help arbitrate demand in times of shortages. **Smart end-to-end control towers** provide scenario analysis and real time end-to-end visibility to provide early detection and correction of operations issues. **Reconfigurable supply chain networks** and **autonomous production** provide the flexible backbone to dynamically change operations at a site or shift from one site to another to maintain production levels when faced with ongoing volatility.

The increased visibility, reconfigurability and ability to ramp-up automated assembly processes at speed in response to a sudden shift in consumer preferences will enable companies to proactively streamline operations, optimize resource allocation and adjust productivity levels to respond to disruptions in real-time or near real-time. This does not only help with resiliency: As consumers continue to seek out hyper-personalized and customized products, companies will need to be adept in autonomous production capabilities to capture these revenue growth opportunities.

Looking ahead, generative AI can support even greater cross-organizational collaboration by creating action plans for meetings based on shared data, translating meetings in real-time for attendees in separate geographies and even automating information exchange across departments.

Case study:

Enhancing resiliency by increasing the visibility of production and operational continuity.

The challenge

A multinational company producing heavy and high-value equipment struggled to ensure operational efficiency and continuity in meeting production goals due to a lack of real-time visibility into its production processes.

The solution

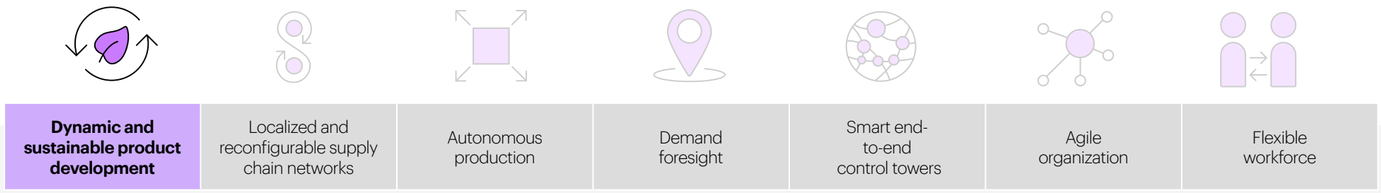
The company implemented a cloud-powered, smart, connected factory via an industrial internet of things (IIoT) technology platform. Integrated sensors and connectivity tools linked physical assets in the factory to the digital world, providing valuable real-time insights.

The outcome

Within six months efficiency soared by 25 percentage points, resulting in higher productivity and reduced waste. However, equally important was the enhancement of operational continuity. The factory floor now enjoys improved visibility and data-sharing capabilities that empower supervisors to make proactive, data-driven decisions to prevent disruptions and downtime. This comprehensive approach ensures better efficiency and minimizes potential risks, making the production process more resilient and adaptable to challenges. The success of this implementation proves that investing in visibility, predictability and continuity-focused technology can revolutionize operations, while still being scalable for future growth.

Action / 02

Adopt “shift left” engineering capabilities to embed resilience in design



Resiliency 2.0 capabilities featured:

- Collaborative approach to digital twin platforms
- Continuous product offering upgrade
- Eco-design for sustainability

Businesses are under pressure to increase resiliency while at the same time reduce costs, improve cycle times and enhance product quality. A “shift left” strategy upends the status quo to help them achieve these goals. It enables resiliency in engineering by moving activities earlier in the development process, allowing companies to get products, processes and ways of working right the first time and address potential issues before production begins.

Resiliency 2.0 capabilities centered around **dynamic and sustainable product development** can help businesses successfully implement a “shift left” strategy. These capabilities help companies see the potential impacts of disruption on the product at the time of design. They also help reduce lead times, and improve customer and revenue retention.

Digital twin solutions help build resiliency by enhancing transparency and offering real-time visualization of production activities. As digital replicas of physical production facilities—down to individual assembly lines and machines—they allow product designers and engineers to proactively identify and troubleshoot potential prototype issues or defects and iterate the design before production begins.

Digital twin solutions also democratize access to valuable product data and insights, fostering improved collaboration during research and design phases.

Our survey found that two out of three executives anticipate a shift in the next three years towards a fully embedded collaborative approach that incorporates stakeholders across all operations.

Additionally, our survey found that the number of executives planning to increase designing for resiliency will jump from 17% today to 63% over the next three years. This involves incorporating process standardization to drive cost efficiencies, modular design approaches to increase flexibility, and alternative supply base options to reduce vulnerability.

By involving suppliers and customers early with a "shift left" approach, companies can also address evolving customer needs and expectations before they lead to dissatisfaction. Companies can achieve these goals by seeking customer feedback during product development or service enhancement stages, and then use that feedback to continuously upgrade offerings. Companies can also leverage digital twin solutions to bolster this capability.

Tighter environmental regulations mean that companies must also add sustainability considerations to product design processes such as their carbon footprint, environmental impact and circularity. By using an eco-design approach that "shifts left", companies can integrate sustainability principles into product design from the outset and embed them throughout the value chain.

Case study:

Reinforcing resiliency through a “shift left” strategy in a biopharmaceutical tech transformation.

The challenge

A leading global biopharmaceutical company faced increasing pressure to expedite the delivery of its new emerging products portfolio while still ensuring safety, compliance and an exceptional customer experience. To maintain its position as one of the most valuable pharmaceutical companies globally, it sought to enhance resiliency by revolutionizing the handover of information from R&D to production in order to address potential design issues early in the development process.

The solution

The company deployed a “shift left” strategy by investing in digital twin technologies that could simulate a future state operating model with precision. It worked with a trusted partner to design a smooth and digitized handover process, promoting better collaboration between R&D and production teams.

The outcome

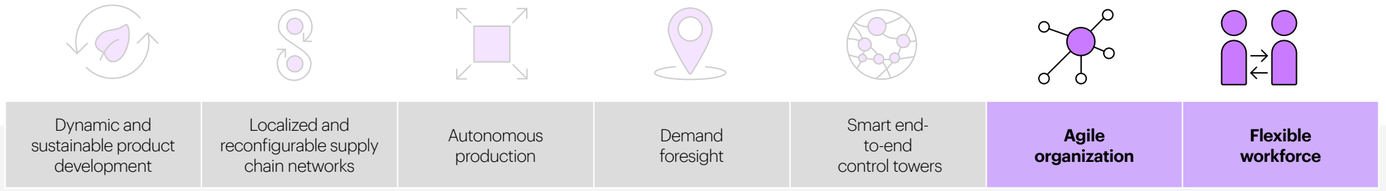
The impact of the “shift left” strategy went beyond operational efficiency. The tech transfer cycle time was significantly reduced from 12 months to just seven to eight weeks, enabling the company to bring life-saving products to market faster. This accelerated timeline improved the company’s competitive edge and strengthened its resiliency.

By identifying and addressing potential issues earlier in the development process, the company achieved a heightened ability to recover from potential setbacks. The approach ensured supply chain readiness to manage a more complex product portfolio. As a result, the organization demonstrated agility and adaptability to evolving market demands, underlining its resiliency.

The “shift left” strategy empowered the company to embrace resilience as a core value. The ability to identify, anticipate, and address potential hurdles early on enabled faster, safer, and more compliant product launches, which solidified its position as a leading global pharmaceutical company.

Action / 03

Develop a multi-skilled workforce for agility



Resiliency 2.0 capabilities featured:

- Decentralized decision making
- Remote expertise capabilities (leveraging AR, VR and such)
- Versatile/multi-skilled workforce

Resilient businesses need **decentralized decision-making** where frontline teams can quickly make decisions close to where the operations happen. These teams should have access to emerging predictive and data-driven tools that enable them to make prompt decisions and improve recovery times in the face of disruptions. But for this more agile organizational model to work, employees will need the skills to effectively leverage these advanced capabilities.

Accenture's biennial Global Skills Survey 2023 revealed that the C-suite is overestimating the skills readiness of its workforce. While 50% believe their organization is effectively preparing their workforce for the skills needed for future growth, only 28% of workers feel the same. And while 54% of C-suite leaders are certain their workers' job skills will be useful and valuable in three to five years, only 34% of workers agree.[2]

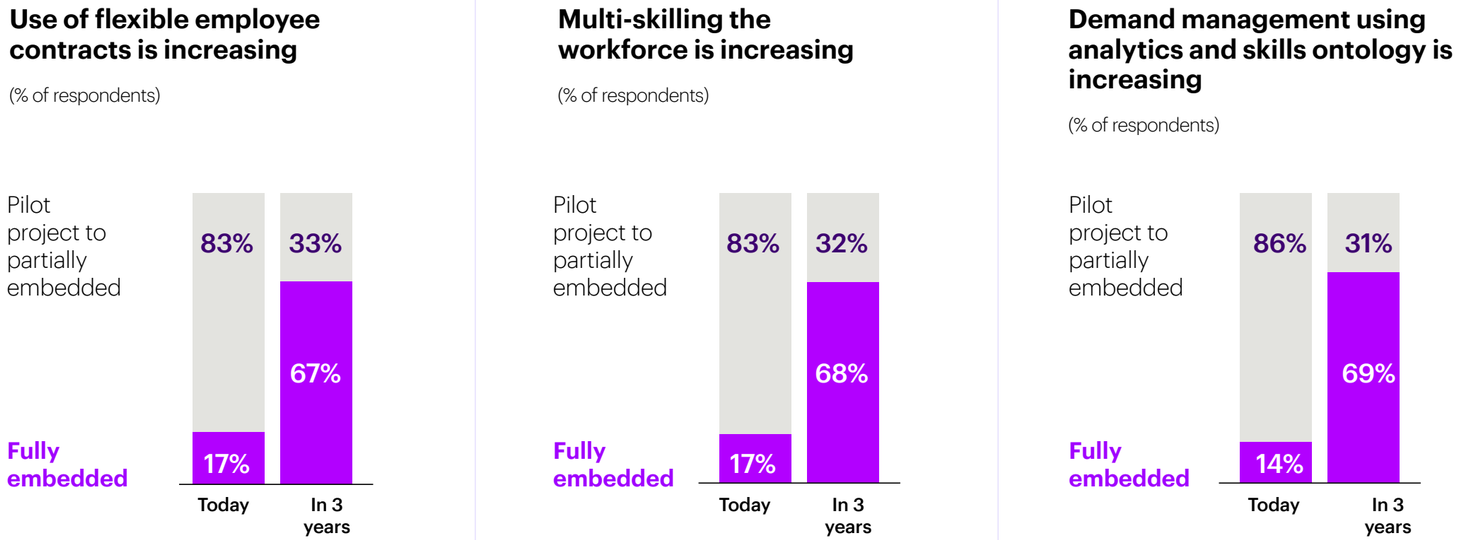
While specialized knowledge in areas like procurement, operations, production and logistics will always be important, digitally literate, multi-skilled and cross-functional thinkers who understand the big picture will also be invaluable in helping companies adapt to new complexities.

For example, workers will need to know how to use predictive and visualization tools and make data-driven decisions to navigate the complexities of modern supply chains. These complexities are not easily solved by siloed functional teams and require employees who can work across operations.

Our survey data reveals that more than 68% of companies are investing in developing a multi-skilled workforce while improving demand management using analytics and skills ontology tools, and increasing flexible contracts for employees to tap into a wider talent pool. By leveraging these data insights, companies are increasingly identifying employees in their current organization who would be good candidates to fulfill demand for emerging skills (see figure 5).

Technology is the foundation for improving agility during disruptive events that may cause critical skills shortages. For example, **companies can leverage AR/VR to empower employees** who have the necessary skills in one geography to help peers successfully complete tasks in a completely different location.

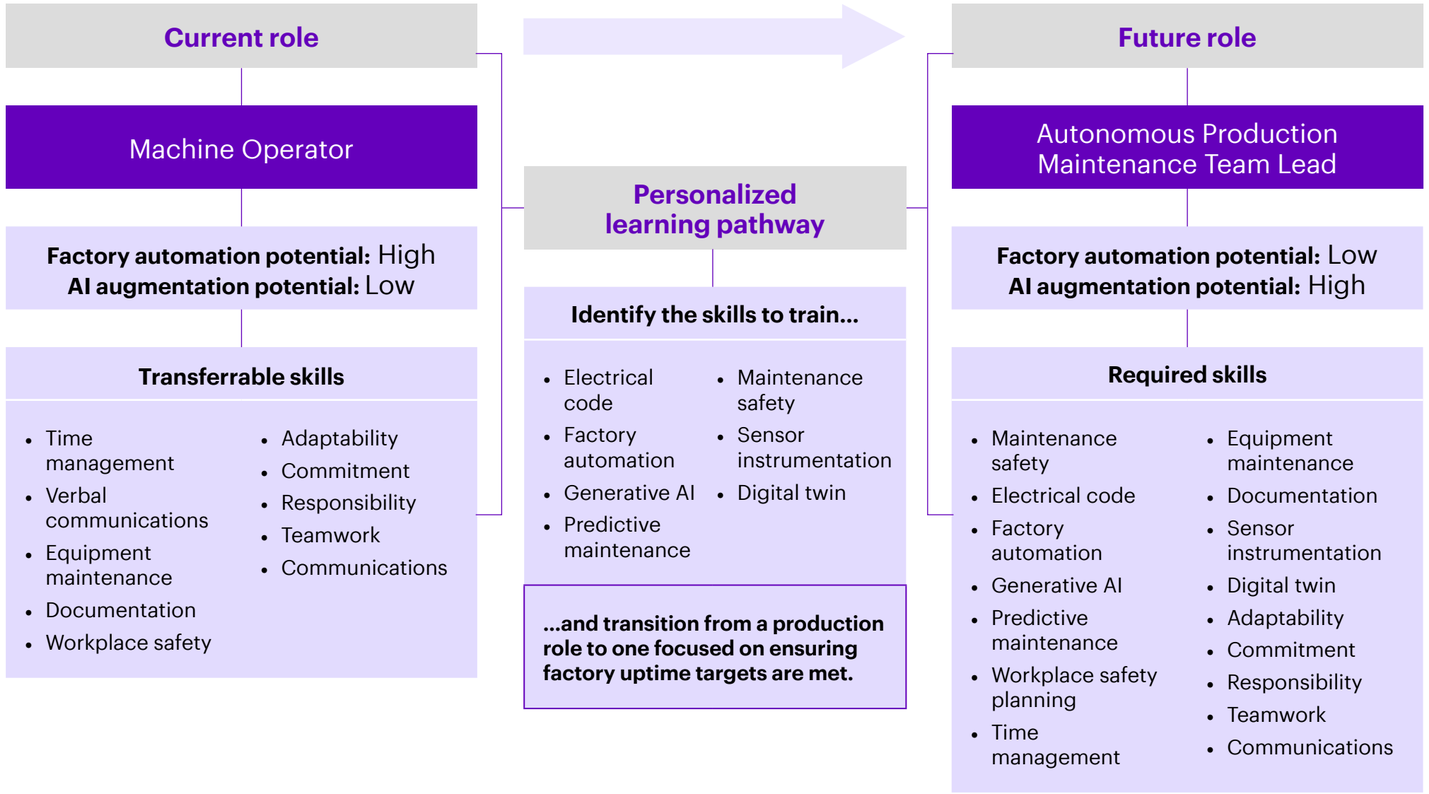
Figure 5: Overall, companies are significantly increasing the level of versatility in their workforce through flexible contracts, upskilling and skills demand management.



Fundamentally, securing durable resiliency will hinge on an upskilling and reskilling strategy that brings people and technology together. Creating tailored interventions known as personalized learning pathways (see figure 6) is a viable, scalable and cost-effective way to bridge the skills gap.

With this strategy, businesses can expect to better navigate shortages in critical skills, create a culture of agility and provide fast, flexible upskilling.

Figure 6: Reinventing roles – machine operator to autonomous production maintenance team lead



Source: Accenture Research based on analysis of World Economic Forum Consumer Industries Task Force of Future of Work Pilot, Occupational Information Network (O*NET), US Dept. of Labor; US Bureau of Labor Statistics.

Case study:

Digital reskilling strategy empowers decentralized decision making at an oil and gas company.

The challenge

A national oil and gas company with nearly 50,000 employees sought to accelerate its digital transformation journey, develop new lines of business and meet its sustainability targets faster. To achieve this, the company needed a resilient workforce capable of decentralized decision-making and using emerging predictive and data-driven tools to improve recovery times during crises. However, to enable this model and use these advanced capabilities, the employees required upskilling and reskilling.

The solution

The company's management team implemented a comprehensive upskilling and reskilling strategy. A gamified learning platform powered by AI was developed to promote baseline digital fluency across the organization. This innovative platform encouraged continuous learning and empowerment among employees at all levels, from the CEO down to teams on the ground.

Additionally, a first-of-its-kind, cloud-based solution was built to analyze 10 years of performance data, identifying workers suited for new digital roles in procurement and IT functions. This data-driven approach saved talent management time and eliminated managerial bias and allowed employees to assess and close skill gaps proactively.

The outcome

The upskilling and reskilling strategy transformed the company's ways of working and fostered a culture of agility and adaptability. As a result, the organization stands resilient in the face of uncertainties, ensuring long-term success and sustainability in the ever-evolving oil and gas industry.


Risk / reward
The time to invest is now

Many companies are still in the early stages of their resiliency transformation and plan to invest heavily, but what stands in the way of success?

The number of executives enhancing their resilience by investing (see figure 7) in facility relocations, automation and digitization is increasing in the next three years—ranging from 2.5x to 4x today's investment levels, which currently stand at 4.5% of average revenues or just over $1 billion. Companies are also balancing their investments in reshoring/relocations ($450 million) with building their digital maturity, including increased automation ($575 million) (see figure 8). However, big plans don't yet confidently translate into competitive advantage. Only a third of companies regard themselves as significantly advanced compared to their competitors.

Why? These are big, costly changes that are not undertaken frequently. As a result, any decisions must stand the test of time. And while these changes are considered, the business must also maintain shareholder value and reduce costs. Therefore, organizations will need a compelling vision and clear accountability underpinning any investment to ensure they provide both short-term value and a foundation for long-term transformation.

Figure 7: The number of companies who plan to make significant investments in reshoring/ relocation, industrial automation and digitization is increasing in the next three years.

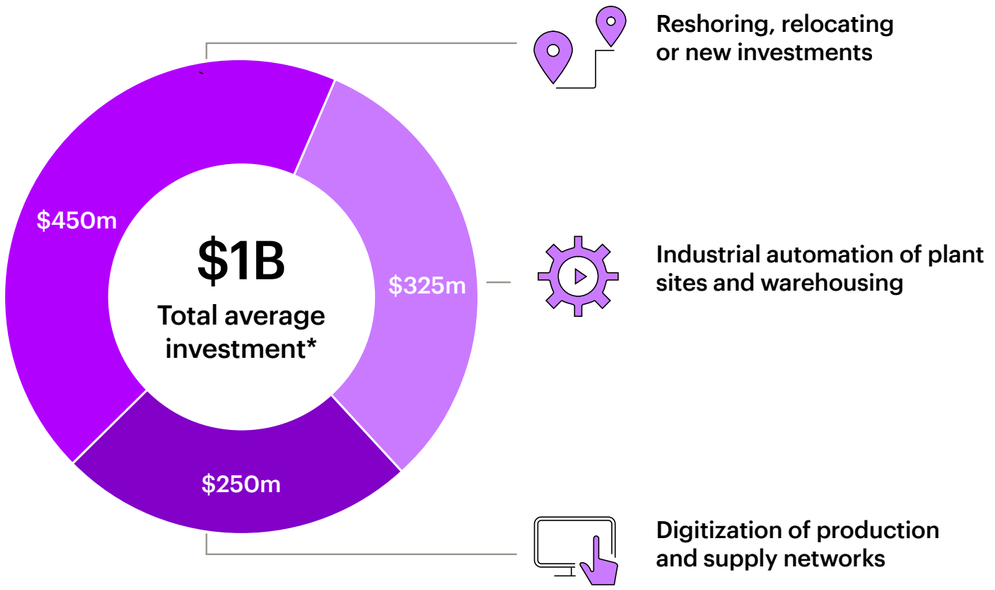
% of respondents who say they will spend....

This is ultimately a journey, not a step change. Different tactical investments in operational efficiencies must be pooled to bring increased proactive and predictive visibility and transparency. The IT and OT functional departments must be brought together to help solve a broader problem set, but with tactical first steps aligned with their operational priorities. And business should look at the combinatory impact of investments across relocation, digitization and automation—and how to balance those investments.

Without this, investments (and technology) will be fragmented, lacking a broader view of what resilient operations of the future should look like and how to untap value while getting there. Those that drag their feet in the name of cost-cutting or priority paralysis could miss the opportunity for long-term resiliency.

Figure 8: Companies are enhancing their resilience by investing in relocation, automation and digitization.

Total average investment by companies in production and supply chain resilience



*Based on $23B average size of companies we surveyed.

Assembling the pieces for resilience

The unprecedented disruptions affecting every industry sector worldwide have highlighted the critical need for resilience across all operational areas—from engineering and production to operations and supply chain. The net result is that companies must adapt and embed resilience-focused capabilities into their operations to ensure products are manufactured cost efficiently, safely, on-time and sustainably.

Our analysis has demonstrated that businesses investing in resiliency-building capabilities and improving digital maturity significantly outperform their peers. Early adopters (i.e. the most resilient companies) who have embraced these practices are already generating additional annual revenues of $830 million on average—depriving the least resilient companies from sharing in the success. With an estimated $1.6 trillion of potential revenue left on the table each year on average, it's a prize worth fighting for. To build resiliency, companies should focus on three core areas:

Visibility: Enhanced visibility across the supply chain and production processes allows for real-time tracking and collaboration, enabling quicker decision-making and responsiveness during disruptions.

Resiliency in design: Moving activities earlier in the development process allows companies to get products, processes and ways of working right the first time and address potential issues before production begins.

New ways of working: Equipping the workforce with the necessary skills and decentralized decision-making enables them to navigate through disruptions. Companies need to invest in upskilling and reskilling programs to create a resilient and agile workforce.

So, how can companies get started on the actions that build resiliency in engineering, supply, production and operations?

- Evaluate current capabilities within each of the areas in scope to identify gaps.
- Develop the "North Star Vision" for what a resilient future-state function could look like and host collaborative open-door workshops to share the vision and iterate as needed.
- Look at investment needs holistically. Are relocation, digitization and automation investments balanced to deliver results?
- Build the financial and executional governance so that IT and OT budgets and solutions can be combined to streamline and accelerate digital maturity.

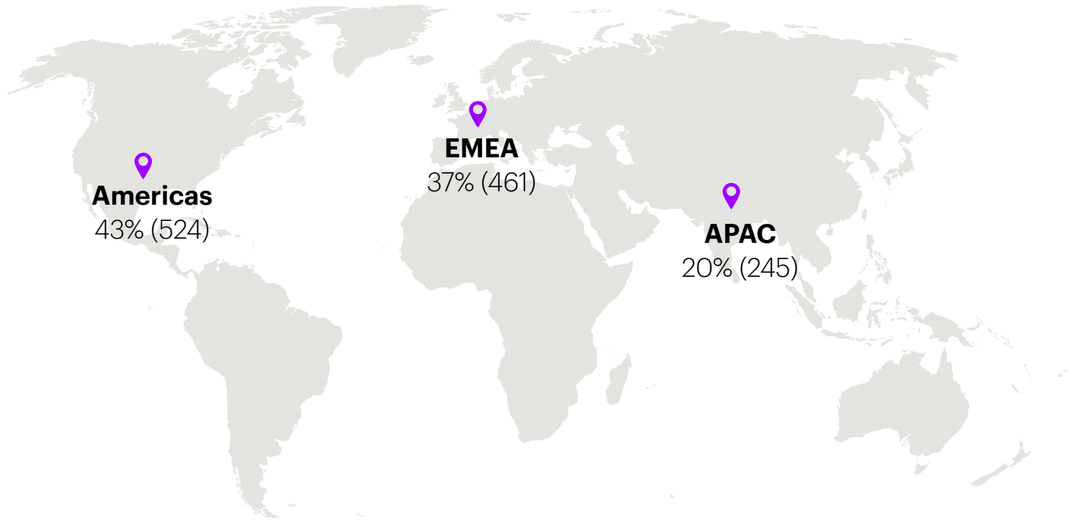
Those who invest in developing resiliency capabilities and the supporting digital foundation will capture market share from those who delay. The time to invest is now, and at an accelerated pace, before the next disruptive event comes knocking.

About the research

Surveying across our key capabilities framework

Accenture developed a framework of the 31 key capabilities that foster resiliency. We then deployed a global survey to evaluate companies' maturity in strengthening and establishing these capabilities.

We surveyed 1,230 engineering, supply, production and operations functional leaders across 11 industries and with a global reach representing 14 countries across the Americas, EMEA and APAC regions. The countries and regions we surveyed included Australia, Canada, Brazil, France, Germany, Mexico, Italy, China, Spain, India, UK, Japan, Sweden and the US. We assessed their strategies for sourcing and production, responsiveness to disruptions and steps towards resiliency against those disruptions.



# of respondents					
80 Aerospace & Defense	**112** Automotive Ancillary/Parts	**112** Automotive OEM	**112** Chemicals[1]	**112** Consumer Goods & Services	
112 High-Tech[2]	**112** Industrial Equipment	**142** Life Sciences[3]	**112** Metal & Mining	**112** Oil & Gas	**112** Utilities

[1] Including petrochemicals; [2] Consumer/enterprise technology including components; [3] Includes biotechnologies and medical technology

Maturity model construction

We developed a maturity model based on expert interview responses related to the current adoption of the 31 capabilities for resiliency. For example, we inquired about investments in relocation/reshoring, automation, digitization and inventory.

We analyzed capability maturity and its impact on business performance based on a regression framework where results are controlled by industry, company size, location, production and sourcing strategies and investments in automation and digitization. We awarded a numeric score to each of the capabilities based on a scale from "not started" to "fully deployed and ways of working have changed."

Analysis of disruption impact

We then evaluated the capabilities against business performance during a widely accepted period of prolonged disruptions. Analyses of the impact of disruptions were based on revenue impact, margin erosion, recovery times, EBIT and lead times. We also looked at the performance of supply networks and production in terms of the estimated time (in days) it took our respondents to be alerted to, understand and recover from disruption.

The capability insights underpin the actions for resiliency

By analyzing the maturity of the 31 capabilities across industries and during disruption we were able to identify three actions for resiliency:

01 / **Invest in visibility, predictability and continuity focused tech.**

02 / **Adopt "shift left" engineering capabilities to embed resilience in design.**

03 / **Develop a multi-skilled workforce for agility.**

Authors

Sef Tuma

Global Engineering & Manufacturing Lead, Industry X

Jeff Wheless

Principal Director – Industry X, Accenture Research

Max Blanchet

Global Supply Chain & Operations Lead, Accenture Strategy

Stephen Meyer

Principal Director – Supply Chain & Operations, Accenture Research

Sunita Suryanarayan

North America Supply Chain & Operations, Resiliency Lead

Contributors

Rushda Afzal

Pascal Brosset

Stephane Crosnier

Liam Friel

Inge Oosterhuis

Mike Poland

Camille Prost

Maria Rey-Marston

Aakarshuk Sarna

Nigel Stacey

Matt Thomas

Kris Timmermans

and Professor David Levi Simchi, MIT

Acknowledgments

The authors would like to acknowledge Alexa Mouta, Catalina Rodriguez, Deepak Tantry, Iys Suyambulingam, Laura Kopec, Marcin Bodzial, Pierre Hure, Somioranjan Mekap, Taurai Nyaruwata, Yeye Xiao, Ajay Sivaramakrishnan, Ruth Keane, Terence Paul and Jamie Byrne for their contributions.

Glossary

31 capabilities
The 31 technologies and tools that, if invested in, drive resilience in engineering, supply, production and operations.

Agility
The ability of organizations to adapt to changes measured by the time it takes to be alerted to, understand and recover from a disruption.

Co-engineering

A collaborative process involving internal and external stakeholders—from engineering, product R&D, design, operations, marketing, cybersecurity and sustainability teams, suppliers and customers—that enables joint decision-making when designing and manufacturing a product.

Design
A process to develop and test a product, including includes R&D and design engineering.

Digital Twins
Virtual replicas of physical systems or processes that can be used to simulate and optimize behavior in real-time.

Disruption
Events such as geopolitical shifts, extreme weather or technological breakthroughs that impact an organization's engineering, supply or production operations.

Efficiency
Processing a product with no downtime and no defects.

Lead time
The duration between product order and product delivery.

More or highly resilient companies
A company that has invested in more of and better established the 31 capabilities.

OEE
Overall Equipment Effectiveness (OEE) is a performance metric used to measure the effectiveness of equipment, production lines or facilities by calculating equipment availability, performance rate and output quality.

Operations executives

These are senior professionals in engineering, manufacturing, supply chain and operations who manage operational activities to improve efficiency, meet goals, manage budgets and work with other senior leaders to meet organizational objectives.

Production
To make or manufacture a product from components or raw materials using discrete or process manufacturing and engaging R&D, engineering or maintenance, repair and operation functions.

Quality
Production rejects or field failures such as infant mortality or latent design defects.

Resiliency
We define resiliency in the context of engineering, supply, production and operations. as an organization's ability to proactively sense, absorb, adapt to and recover from disruption so it can produce goods, deliver services, meet and increase customer demand and respond to changes faster than its competitors.

Supply
Supply chain, logistics and related operations.

References

1. Manufacturing inventory hits record $1.8tn worldwide – Nikkei Asia, June 2022
2. Becoming a skills-driven organization, Accenture Skilling Study, 2023

About Accenture

Accenture is a leading global professional services company that helps the world's leading businesses, governments and other organizations build their digital core, optimize their operations, accelerate revenue growth and enhance citizen services—creating tangible value at speed and scale. We are a talent and innovation led company with 732,000 people serving clients in more than 120 countries. Technology is at the core of change today, and we are one of the world's leaders in helping drive that change, with strong ecosystem relationships. We combine our strength in technology with unmatched industry experience, functional expertise and global delivery capability. We are uniquely able to deliver tangible outcomes because of our broad range of services, solutions and assets across Strategy & Consulting, Technology, Operations, Industry X and Accenture Song. These capabilities, together with our culture of shared success and commitment to creating 360° value, enable us to help our clients succeed and build trusted, lasting relationships. We measure our success by the 360° value we create for our clients, each other, our shareholders, partners and communities.

Visit us at **www.accenture.com**.

About Accenture Research

Accenture Research creates thought leadership about the most pressing business issues organizations face. Combining innovative research techniques, such as data science led analysis, with a deep understanding of industry and technology, our team of 300 researchers in 20 countries publish hundreds of reports, articles, and points of view every year. Our thought-provoking research developed with world leading organizations helps our clients embrace change, create value, and deliver on the power of technology and human ingenuity.

For more information, visit **www.accenture.com/research**