accenture

Military readiness through supply chain resilience

Transforming defense supply chains with digital twins

There is no other supply chain like yours. It's mission driven—an engine of military readiness.

The next natural step—and imperative— in reinventing the defense supply chain for today's environment is embedding digital twins in the digital core of the organization. Our research reveals exciting opportunities to do this for a more resilient defense supply chain. But only if the defense community can navigate the complexity of digital twins.

This report explores how to reset perceptions, overcome barriers and embed digital twins into ways of working to reinvent the defense supply chain for decision advantage. Getting it right involves the entire organization in a deliberate and continuous strategy that aims to set a new performance frontier. Centered around a strong digital core, a TOTAL REINVENTION of the supply chain can help optimize it and deliver a powerful trifecta: mission readiness, organizational resilience and operational effectiveness.

To explore the best ways for the defense enterprise to increase supply chain resilience, we conducted 21 in-depth interviews with senior supply chain and technology experts from defense organizations, aerospace and defense companies and technology-related think tanks around the world in Australia, Canada, Finland, Singapore, Sweden, the United Kingdom and the United States.[1]

We learned that defense organizations can manage supply chain risk, accelerate reinvention and build resiliency by combining human ingenuity with technologies that fuel end-to-end visibility and AI-powered scenario modeling. This is exactly what digital twins do.

Volatility... and more volatility

Disruption has hit defense supply chains hard like it has supply chains everywhere. The pandemic, war in Ukraine, economic uncertainty and natural disasters have caused shortages and delays of everything from fighter jets[2] to uniforms.[3] As a vice president of information technology in a US aerospace and defense company told us, "The challenges that came with COVID-19 impacted our ability to deliver on time and on budget. There was a lot of risk in the supply chain that went unnoticed, and the impacts became clear when the supply chain tightened, and we were unable to get particular parts or people."[4]

With volatility expected to continue,[5] a future of global geopolitical uncertainty requires more military readiness. And more military readiness requires resilient, battlefield ready supply chains across the defense enterprise. This enterprise extends beyond the boundaries of individual departments and ministries of defense to include all the alliance structures that work in close cooperation to accomplish their missions. It's end-to-end capability for protecting the security and prosperity of nations and their partners.

"There's real opportunity here. In a changed world with vulnerabilities in supply chains, the cost of getting it wrong—the existential threat for nations, alliances and national prosperity—means we have an imperative to transform."

Air Vice-Marshal Richard Hill CBE, Director Support Transformation, United Kingdom Strategic Command

Digital twins today: Superpowered by emerging technologies

A digital twin is a virtual model of a physical object, process or system informed by real-time data that can be used to predict how these elements will respond to different variables.

In supply chains, digital twins can provide full end-to-end visibility of the complete supply chain network. This includes visibility into higher-tier suppliers that have previously been invisible due to a lack of available data or inadequate tools.

While digital twins have been part of the technology landscape for years, they are exponentially more impactful today because they are superpowered by advanced technologies. Sensors are smaller and more affordable. Artificial intelligence (AI) provides predictive capabilities. Edge computing and widespread internet connectivity/5G enable greater computing power and better data sharing. And the cloud delivers a new level of security. With this tech superpower, digital twins generate "what if" scenarios in a virtual environment.

# Imagine the possibilities of incorporating digital twin technologies:

Force readiness

Anticipating supply chain choke points in planning, sustainment and force employment—with scenario-based modeling to mitigate friction before forces are deployed in support of mission outcomes.

Situational awareness

Using real-time, data-driven insights to understand the capability impact of an emerging supply chain disruption—"when," "where" and "how significant"—to enhance strategic and tactical logistics decision making.
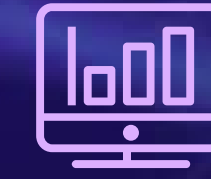
Fleet management

Monitoring and quantifying a capability's end-to-end supply chain risks and simulating the cost/benefit of alternate supply chain management strategies.

Preparedness

Understanding how well the supply chain supports defense response options, including predicting when the supply chain will compromise operations and the cost and impact of alternate preparedness postures.

Cost efficiency

Identifying and significantly reducing supply chain expenditure across the end-to-end supply chain that doesn't contribute to increased capability or preparedness.
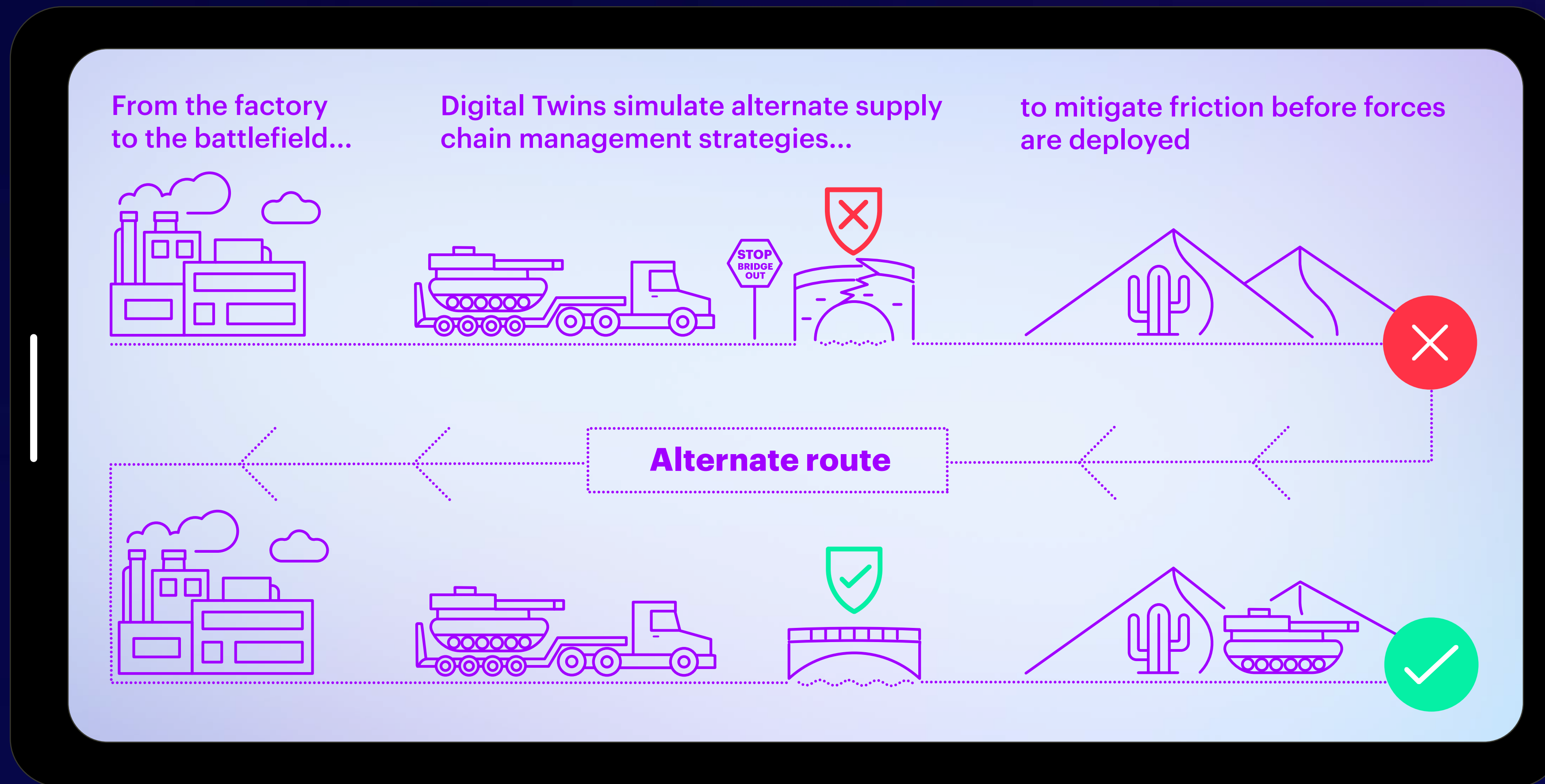
Sustainability

Leveraging a digitized end-to-end supply chain to understand, measure and drive toward more sustainable supply chains.

Digital twins in supply chain: From fleet management to force readiness

An issue en route to the battlefield will prohibit the equipment from arriving on time.

From the factory to the battlefield...

Digital Twins simulate alternate supply chain management strategies...

to mitigate friction before forces are deployed

Alternate route

Twin reactions: Recognition and reluctance

Our interviewees recognize digital twins as the new "must have" for supply chain resilience and performance. One explained that "The war and supply chain problems are now a catalyst. Instead of being like a pet project 'that would be nice… futuristic digital twin in the factory,' now it's an imperative."

Defense leaders have been interested in digital twins for years. Yet most projects are relatively niche; interviewees described initiatives in design or pilot stages. Our conversations reveal that some defense organizations use digital twins' real-time monitoring more than their more powerful predictive capabilities. Common applications include cost containment, inventory management, and maintenance and repair. Quality assessment, supplier network visibility and risk identification are less common.

Our research indicates that the defense community recognizes the applications of digital twins. With the right strategies and resourcing, we believe they can make significant strides in the near team. In some cases, in a matter of months. However, in addition to recognition, there is reluctance about digital twins fueled by common misperceptions and very real barriers.

We learned that making the most of digital twins means addressing challenges inherent in any large-scale technology transformation—gaining leadership support, aligning resources, ensuring data quality and skilling the workforce. Our research also identified four barriers specific to implementing digital twins in defense supply chains. Organizations that break these barriers can improve resilience and decision advantage—moving toward a new performance frontier. And digital supply chain transformation, according to some studies, can lead up to a 50% reduction[6] in process costs.

Digital twins are making an impact in supply chains in industries like consumer-packaged goods, retail and construction. While defense supply chains are unique, there is still a lot to learn from successes in other industries.

Digital twins in defense supply chains: Four barriers to success

Barrier 01
The knowledge deficit

The impact of skills and organization-wide awareness gaps on digital twin adoption.

Barrier 02
The data dilemma

The perception that digital twins create massive data management complexity.

Barrier 03
The security paradox

The dynamic in which concerns about data security for digital twins prevent greater security.

Barrier 04
The supplier gap

The reality that small suppliers require support to fully participate in digital twins platforms.

Barrier 01

The knowledge deficit

The impact of skills and organization-wide awareness deficits on digital twin adoption

Some people think that leading technologies like digital twins only minimally rely on human intervention. Quite the contrary. The value of digital twins is in the combined power of machine learning and human ingenuity to support decision-making.
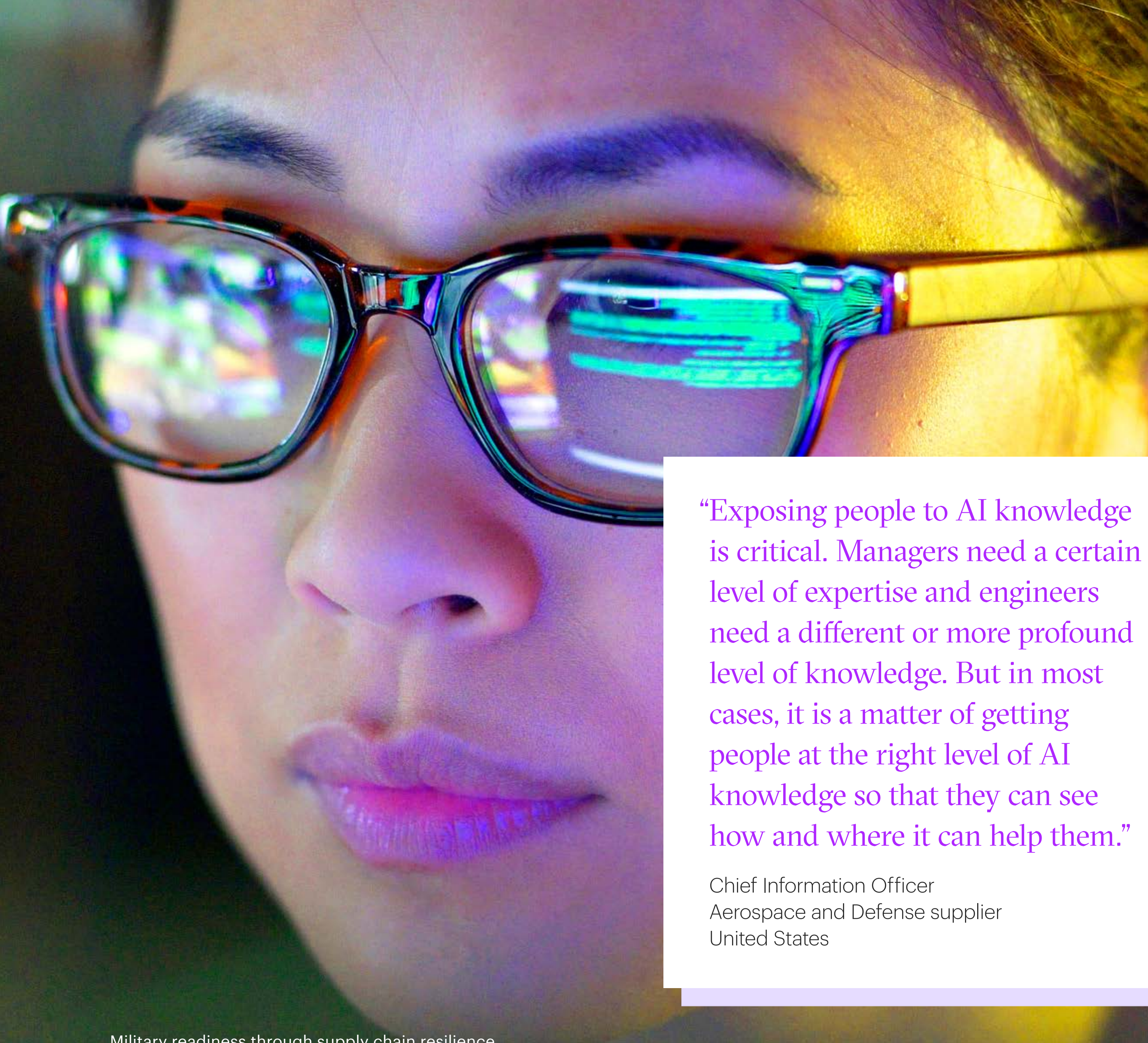
As important as the human side of this human + machine equation is, the defense community is facing awareness deficits, even at leadership levels. Our interviews reveal that decision makers are often outside the units proposing digital twin initiatives. Their lack of understanding stalls momentum and investment. And when they decide to invest, many organizations don't know how to buy digital twins.

Defense organizations should also solve for digital twin skills gaps. STEM skills shortages and the war for talent are making it difficult to recruit people with the AI and machine learning (ML) skills to run digital twin simulations. It's also hard to attract qualified supply chain experts to define scenarios and validate actions and data architects to define data correlations across processes. There are also new roles to fill as well, such as "digital librarians" to manage information for digital twins.

It's critical not to overlook the human needs of employees who work directly with digital twins. They should understand the capabilities and limitations of digital twins and how to work effectively alongside them. Clear communication is essential to diffuse misperceptions that algorithms will replace human judgment and decision-making. Employees should understand that implementing digital twins can empower them to do their jobs better, making more-informed decisions faster.

Engaging employees in the reinvention was an important aspect of Accenture's supply chain resilience work with a global technology company. It was the height of the pandemic, and a lack of supply chain resilience increased risks from the microchip shortage. The team created a supply chain digital twin—a virtual replica of the global supply chain—to support more advanced, proactive risk management. Stress tests subjected the digital twin to pre-defined, disruptive scenarios to create overall resiliency scores. Accenture transferred the knowledge to the company's internal supply chain resilience team so that it could take the wheel.

The knowledge deficit

Actions for continuous reinvention

- Ensure that senior leaders are informed about the power of digital twins for supply chains and that adoption and investment is led by them, not by the IT organization.

- Consider acquiring key skills (e.g., AI, ML and cloud enablement network connectivity) through strategic partnerships with academic and research institutions and vendors.

- Do what's realistic to create an environment to attract the right skills— an environment that offers options like remote work and flexible contracts that support on-demand talent models.

"Exposing people to AI knowledge is critical. Managers need a certain level of expertise and engineers need a different or more profound level of knowledge. But in most cases, it is a matter of getting people at the right level of AI knowledge so that they can see how and where it can help them."

Chief Information Officer
Aerospace and Defense supplier
United States

Barrier 02

The data dilemma

The perception that digital twins create massive data management complexity

Real-time data is the oxygen for digital twins. Yet some interviewees worry about the quality, volume and complexity of data needed and the time and costs involved in managing it.

Defense organizations are often hesitant about data quality. Our interviewees have found that moving to a data-driven environment as part of supply chain modernization naturally spotlights data quality. Several were prompted to create a more intuitive user experience to support quality data entry and prevent errors. Making this transition can deliver powerful forecasting ability with better results and is important foundational work for using digital twins successfully.

While some digital twins require a lot of data, defense agencies can build digital twins with the data they have today and evolve models as more data becomes available. For example, defense agencies can pull existing ERP data through a data mesh using APIs and data calls. A digital twin simulation can reveal the impact of longer lead times on procurement requirements and on getting planes out of maintenance and into the air. It's next-level supply chain visibility.

Global manufacturer Mars is working toward this visibility. The company has been trialing digital twins in its manufacturing operations since 2020. This has made it possible to simulate and validate product and factory adjustments virtually before allocating resources in the physical world. For example, Mars tested a digital twin to reduce over-filling packages. It fed sensor data from manufacturing machinery into a predictive analytics model so line operators could monitor events in real-time and adjust the filling process.[7]

To get the full value of digital twins across the end-to-end supply chain, defense organizations should share data across the ecosystem. Establishing a comprehensive data network doesn't always require a widespread upfront investment in data collection nodes. However, it does require identifying and aggregating data into a centralized model for analysis.

> "Digital twins allow supply chain management to allocate transportation resources using real-time data. The data can integrate demand forecasting into the supply chain digital twin to prevent stockouts and reduce total manufacturing and warehousing expenses. In addition, and perhaps most importantly, it aids in predicting how packaging materials will perform."

Vice President
Chief Purchasing Officer
Aerospace and Defense, and Industrial Company
Sweden

Barrier 02

The data dilemma

Actions for continuous reinvention

- Create a common user platform in information services and design an intuitive user experience at the point of collection to trigger correct inputs and minimize errors.

- Evaluate the supply chain for a data aggregation approach to support digital twins, identifying areas of risk; system, sensor and third-party data gaps; and how to close them.

- Invest in analytics and business intelligence platforms that integrate data into a decision support capability, so decision makers aren't overwhelmed with insights that aren't useful.
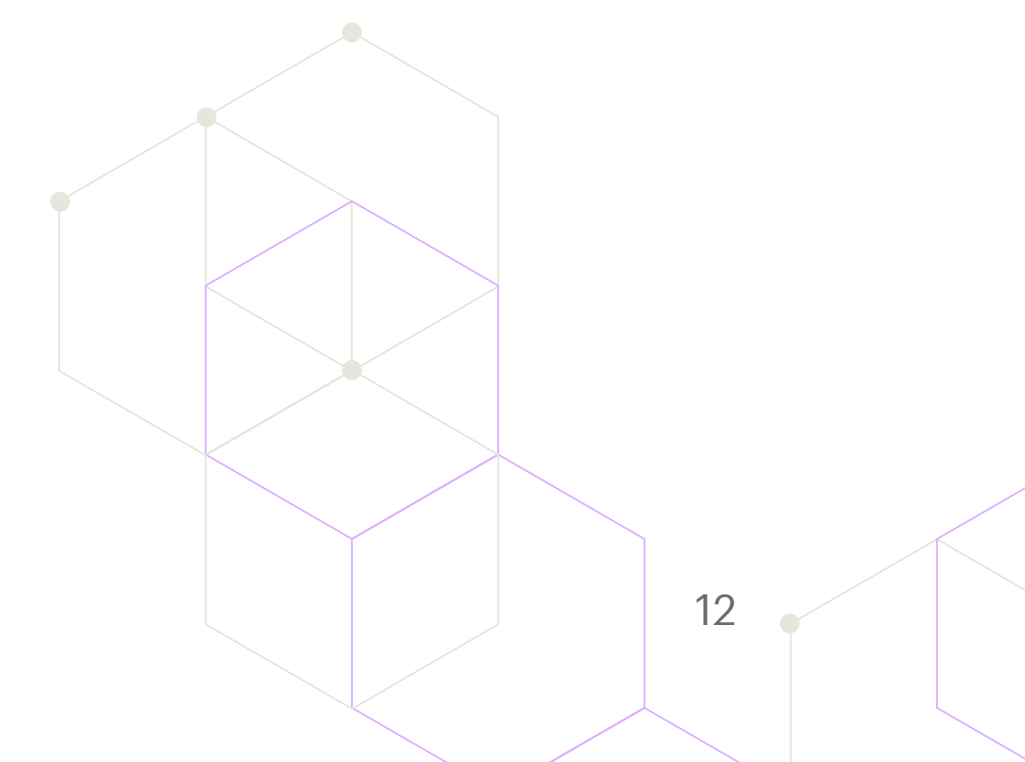
Barrier 03

The security paradox

The dynamic in which concerns about data security for digital twins prevent greater security

Digital twins deliver more value to the military ecosystem when they extend beyond a single organization and integrate with the entire supply chain. However, security concerns can make this difficult to do.

Lives depend on sharing the right data with the right person at the right moment. So, defense organizations have high data sharing security thresholds for managing the data flow within organizations and across the supplier network. Many are concerned that sharing and aggregating data increases risk, making it easier for adversaries to hack sensitive information. At the same time, it can be challenging to keep pace with how fast the tech sector brings solutions. Defense organizations can be behind in developing related security strategies for data sharing.

Given this and the nascency of digital twin applications in defense supply chains, governance is lagging. The irony? This governance gap only perpetuates fears around security and compliance; this is the security paradox.

However, some defense organizations have a more contemporary approach to data sharing that enables flexibility around controls and access. A freer flow of data is key for organizations to take full advantage of digital twins. As part of our R&D investments, Accenture has developed a supply chain digital twin for OEMs in the industrial engineering and aerospace and defense industries. It offers a digital representation of the full supplier network that can visualize the components that every supplier provides. This helps decision makers anticipate potential long-term disruption events like lack of production capacity or service level reductions.

While counterintuitive, data sharing and more flexible controls and access can improve security. Sharing data properly promotes end-to-end supply chain visibility. And the more visibility there is, the better positioned defense organizations are to predict and prevent supply chain disruptions that threaten security. It's a risk-reward tradeoff. But the downside of rigid data security far outweighs the upside.

Barrier 03

The security paradox

Actions for continuous reinvention

- Update defense policies and agreements that relate to data security and data sharing to ensure they promote data sharing across the end-to-end supply chain.

- Refine environment, application and data security accreditation standards to clarify how defense players and suppliers can prove they are compliant with sharing rules.

- Prioritize cloud adoption to break the security paradox, putting trust in the cloud to connect data and experiences to accelerate momentum around digital twins.

Barrier 04

The supplier gap

The reality that small suppliers often require support to fully participate in digital twins platforms

Defense organizations rely on contractors as well as an extended network of small suppliers to be mission ready. Defense agencies and prime contractors choose suppliers based on their compliance with contracting requirements, skills and capabilities and operational performance.

As momentum for digital twins grows, defense organizations will need additional criteria around digitalization and data literacy, as well as modernized contracting protocols, to select right-fit suppliers.

Given the sheer volume of suppliers needed, it may be difficult to find the necessary digital maturity across the network. Defense supply chains are complex; there can be over 100 suppliers involved in the manufacturing process for just one component, and many don't have the requisite digital maturity. In this environment, there's a role for defense organizations as well as contract primes to help small suppliers along their digitalization journey so they can plug into the ecosystem and allow end-to-end visibility.

Australian shipbuilder ASC is providing this network focused assistance to suppliers. The company launched a supplier portal to improve collaboration, connectivity and visibility for all suppliers in the Collins Class submarine supply chain. It's a key step in the company's vision of creating a digital shipyard.[8]

Visibility is also highly dependent on improved data sharing agreements. The reality is that suppliers also hesitate to share data to protect their competitive position. Outdated contracting language means that ownership of datasets is often unclear. What works is when ecosystem partners agree on clear contracting terms from the start.

> "Overall, we do mostly military work, so we need suppliers that can adhere to our standards. The Supplier Development Lead keeps an eye on the overall account and supports the supplier with any information gaps so that it can perform on all parameters, based on our business requirements."

Senior Vice President
Operations and Supply Chain,
Aerospace and Defense, and Industrial Company
United States

Barrier 04

The supplier gap

Actions for continuous reinvention

- Agree on data ownership and sharing to provide armed forces with end-to-end visibility while enabling suppliers to protect intellectual property and competitive market positioning.

- Help suppliers set winning conditions for digital reinvention—keys to success are committed business leadership; clear vision, strategy and outcomes; and a comprehensive business case.

- Partner to improve data literacy through coaching, new approaches to commercially incentivizing data literacy, and as necessary, adoption of new technologies and tools.

Begin the journey to a new performance frontier... Because military readiness won't wait.

There is consensus that digital twins are the next major technology evolution for defense supply chains. The leaders we spoke to understand the promise— and the imperative. Their struggle is implementation. What's the best way to build skills? What's needed to develop the right data foundation? How is it possible to balance security concerns with data sharing? What will it take to get the supplier ecosystem ready?

With volatility now a constant state, the defense community can't wait to answer these questions. It must prepare for continuous, dynamic reinvention of the defense supply chain.

It's time to move away from managing the supply chain for the analogue battlespace. In today's world, exceptions are the norm and information has a much shorter lifespan. That's why supply chains powered by real-time data insights, human ingenuity and machine intelligence are a generational step forward. Decision makers can see threats for what they really are and act decisively. This is what military readiness looks like in the digital age. It requires a strong digital core that includes digital twins.

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About the Research

To explore the best ways for defense organizations to increase supply chain resilience, Accenture Research conducted 21 in-depth interviews with senior supply chain and technology experts from defense organizations, aerospace and defense companies (A&D) and technology-related think tanks in Australia, Canada, Finland, Singapore, Sweden, the United Kingdom and the United States. What we heard from all interviewees focused on the barriers explored in this report; there were a few nuances between groups. Defense organizations focused more on administrative barriers, especially budgeting and security restrictions. Defense organizations are also more concerned about data quality, bearing in mind it is their remit to maintain administrative, commercial and public trust. A&D interviewees commented more on supply chain alignment, highlighting the supply chain's complexity and international scope. In addition, supplier digital maturity, contract management (including policy implications), standardization challenges, and security controls and processes.

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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 738,000 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**

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