Risks on the Horizon

Willis Towers Watson
Technology, Media and
Telecommunications Futures Report

Executive Overview

November 2021

A selection of industry views

Global talent & skills race

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Anonymous, TMT Executive

Operational complexity & vulnerability

“Supply chains are complicated and changing them isn’t easy. You have to start with improving supply chain visibility. If you can see it, you can get your hands on it. If you get your hands on it, you can better manage it and mitigate the risks.”

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Regulation & legal risks

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Digitalization & technological advances

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Business model & strategy pressures

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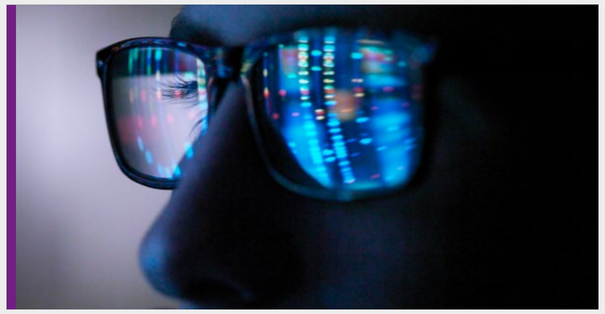
Executive Overview - Mega trends



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This document provides a high-level, executive summary, of the WTW TMT Futures Report published in July of 2021.

The full **WTW TMT Futures Report – Risks on the Horizon can be accessed here**. The report is provided to you using a software called Turtl. As a cloud-based software, Turtl docs are designed to read online in any device - from mobile and tablet, through to desktops of all sizes.

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Overview & methodology

The risk landscape of the Technology, Media and Telecommunications (TMT) industry continues to evolve. Major drivers include rapid innovation and the increased proliferation of technology, including digitalization of products and services, industrial and mobile technology solutions, demand for connectivity and content, industry competition with new entrants disrupting traditional business models and the expansion of connected infrastructure enabling virtual and digital transformation.

Amid these challenging crosswinds, the industry finds itself in an increasingly complicated regulatory and geopolitical environment further roiled by the impact and long-term implications of a persistent global pandemic as well as a global talent and skills shortage that threatens to inhibit efforts to shape and manage a successful, profitable enterprise. On top of everything, destructive evidence of climate change is surfacing globally.

To assist our clients' understanding of the full business and risk landscape, Willis Towers Watson prepared a 2021 Technology, Media and Telecommunications Futures Report. The report grew out of a 2020 - 2021 research project undertaken by Willis Towers Watson with the Mack Institute's Collaborative Innovation Program (CIP) at the Wharton School, University of Pennsylvania.

We set out to examine changes to the risk landscape that have surfaced over the past five years, as well as to identify emerging risks that the industry should expect over the next several years, with a particular focus on climate change implications. We share ideas that will help executives and their Board of Directors move beyond a "risk list" into a more holistic risk management view that better addresses the interaction of new and emerging risks and trends.

This brief captures highlights from Risks on the Horizon, Willis Towers Watson's 2021 Futures Report for the technology, media and telecom (TMT) industry. The full report with additional in-depth insights from our risk professionals and senior TMT business leaders is available on the Willis Towers Watson website.

This opinion-based report uses both internal and external expertise with insights from key executives in the TMT and broader risk management space. Five risk megatrends identified in earlier Willis Towers Watson research formed an overall framework: business model and strategy pressures; the global talent and skills race; digitalization and technological advances; regulatory & legal risks; and operational complexity and vulnerability.

Overall, TMT industry leaders receive high marks for dealing with these and other risks; however, they should consider some basic questions as part of their future risk management strategy:

- Could we have better anticipated, evaded or mitigated major risks, including a global pandemic?
- What risks should we most worry about in the future to protect our business?
- Do we have the optimal business model, strategy, and talent to deal with new and evolving risks?

Where appropriate, this report will include observations and recommendations that have been shaped by our work with TMT companies around the world. For example, with the rise of new supply chain risks, we see an alarming disconnect at times between procurement and risk management. Failure to embed risk managers in supply chain design can be problematic.

We are grateful to the TMT executives who shared their thinking with us and grateful to the students who worked with us via the Mack Institute. We believe the combination of sound research and business insights will help guide your decisions in the new TMT risk landscape.

Fig 1: Hi-Tech, Media & Telecommunication Industry Trends

Source: The future of work in Europe, McKinsey

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Business model & strategy pressures

TMT business models and strategies have been forced in recent years to accommodate sudden shifts in the macro business environment, including disruptive technological change, geopolitical stresses, a global pandemic, and climate change.

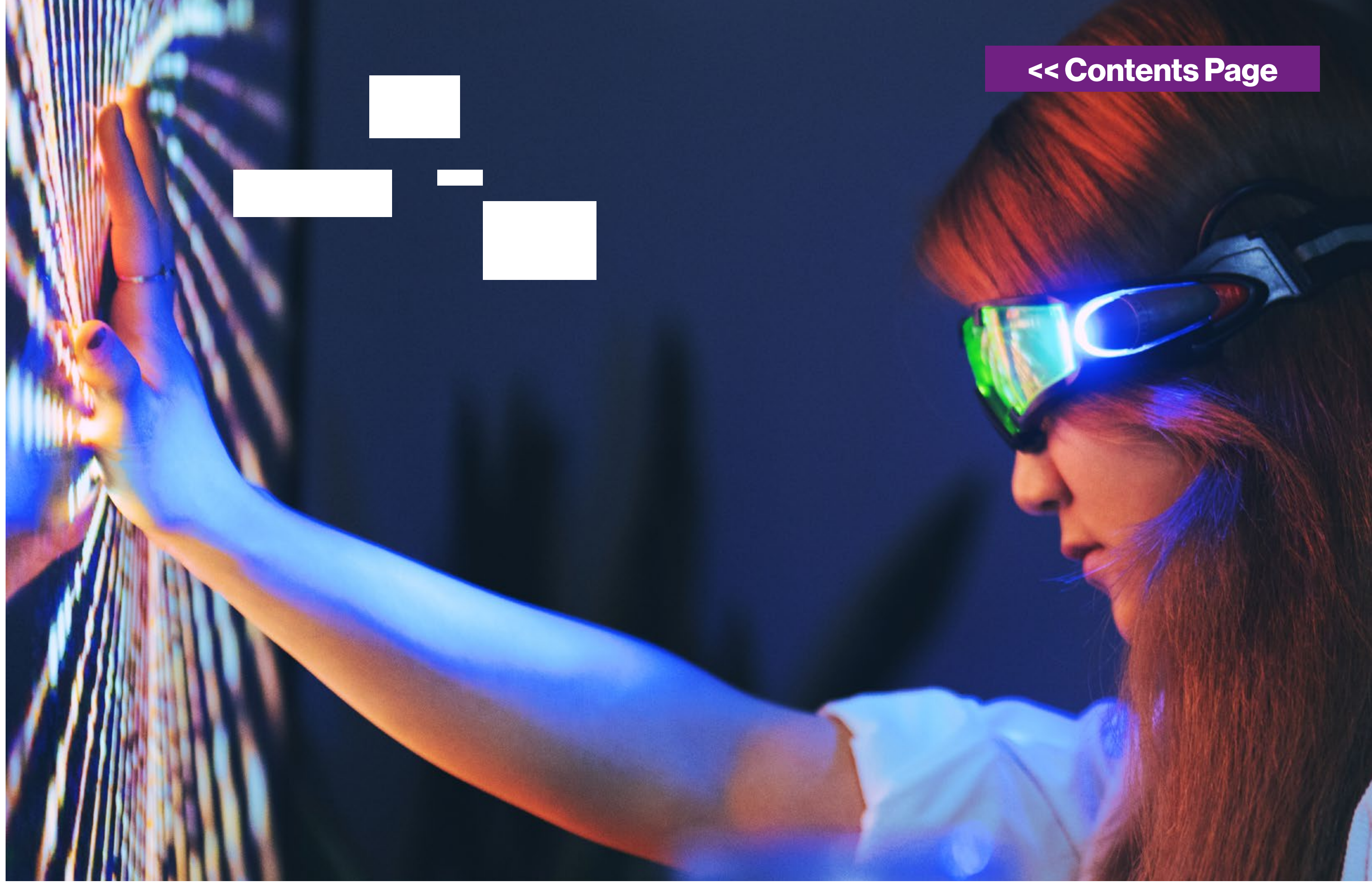
New or rapidly evolving TMT business models and strategies are having a hard-to-measure impact on revenues, return on investment and other key performance indicators. However, to remain viable, many businesses have few options but to look at alternative ways of doing business.

In a 2020 Ernst & Young survey, the professional services network found that 34% of its media industry respondents said their companies would not survive in five years if they didn't "reinvent" their business. Half had doubts about their business models and have made major restructuring a short-term priority.

Telecom and media companies, in particular, have felt pressure to expand outside their core businesses to diversify revenue streams and look for synergies across different segments. Mergers and acquisitions continue to reshape the industry. Other companies have in effect adopted "two-speed" business models as they shift to the cloud while having to rethink investments into existing IT assets with implications for sales, operations, and company culture.

Our research also highlighted the pressure to update, automate and digitize business.

A Boston Consulting Group survey found that 70% of digital transformations fall short of objectives – a big blow to potential earnings. BCG found that earnings grew 1.8 times faster among digital leaders than among digital laggards.



TMT respondents tended to agree that the price tag for full digitalization might be a challenge for companies already under margin pressures. Others need to balance the cost of full digitalization with investor expectations of strong quarter-to-quarter financial results at the risk of underinvesting in future operations.

Willis Towers Watson's research confirms the vital role played by a company's culture and leadership. (For furtherdetails, please see the Full Report The Change Management Imperative.) This is certainly true around digital transformation. Digital-savvy leadership can ensure that the organization accepts digitalization as a strategic necessity and are given the resources and structure to leverage data for decision making.

Nick Dunlop, a Willis Towers Watson Managing Director, has concluded that for most companies climate change is the next big challenge after Covid-19, and that tech companies will play a big role in applying big data and machine learning to help both financial services and corporates address their climate risk.

"Climate change is what many of us consider a 'grey swan' event," he says. "Unlike an unpredictable black swan event, climate change is perfectly predictable. It's something that we've known about for decades — the human role in atmospheric CO2 concentration has been accurately measured since the late 1950s. Yet, despite the existential threat, we as a society are not doing enough to address the climate change problem."

Many financial institutions and other companies increasingly understand their exposure to climate risks and are reducing their carbon footprint. The pace will pick up as more companies find themselves in a four-way squeeze among regulators, institutional investors, consumers and employees, and risk management that faces a growing "protection gap."

Risk management basics, of course, come into play across the full spectrum of risks that will force companies to rethink and frequently modify their business models and strategies. For this reason, it is vital that CROs engage with other senior managers to see that enterprise risk management is fully aligned with broader business objectives. .

A business model risk analysis by the Kelley School of Business, Indiana University, identified 28 categories of risk and uncertainty organized into four internal risk categories, including customer risk, value proposition, infrastructure (e.g. supply chains and operational risks) and financial viability. The analysis added an external risk category that includes political, environmental, economic, and competitive risks, such as those identified in our conversations with TMT business leaders.

A takeaway message for senior management is the study's ominous conclusion: Business model risks "have not been sufficiently addressed."

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Global talent & skills race

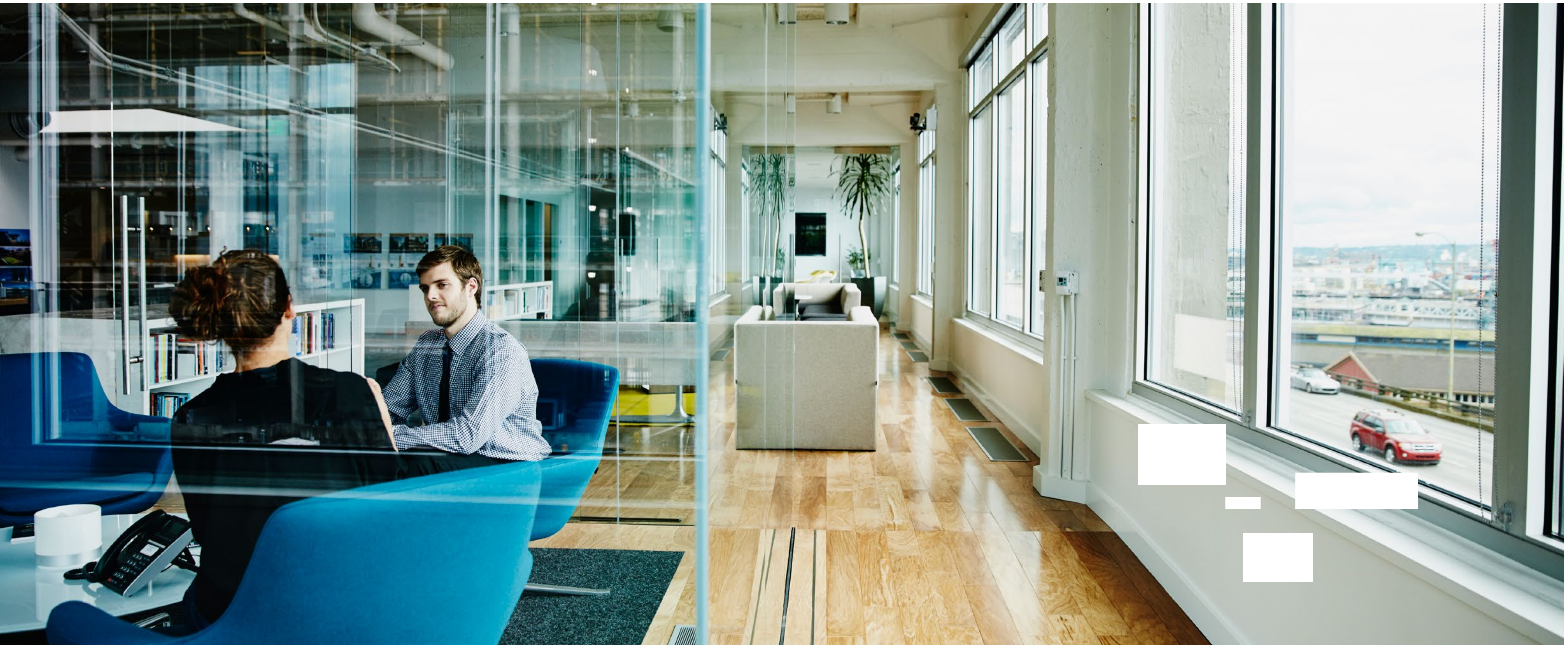
Although we have identified the global talent and skills race as a risk megatrend in its own right, TMT executives say that inadequate or poorly trained talent can contribute to the full spectrum of risks, including operational vulnerabilities, regulatory and legal exposures, and even business model and strategy shortcomings.

In previous Willis Towers Watson research, risks associated with the talent and skills race ranked below regulatory and legal risks, digitalization and technological advances, business model and strategy pressures, and operational complexity and vulnerability. Now many companies see talent and skill gaps as a top risk.

Our latest research reveals that talent concerns have climbed up the risk ladder as companies take a broad view of how enterprise success depends on the recruitment, training and effective deployment of talent. This assessment fits with findings in our Flexible Work and Rewards Survey 2021. This survey highlights the impact of accelerated automation focused on talent as critical factors in the re-organization of the workplace in the post-pandemic era.

What talent-related risks lies ahead? TMT executives share these concern which included - see full report for full list:

- Traditional talent pipelines are limited or obsolete, and companies need to deploy more creative and effective solutions to identify, attract, and retain key talent.
- Compensation is important but hardly enough as potential hires often are more concerned about skills development and personal satisfaction.
- Brand matters: Your company's values, image and culture can be an asset or a liability.



This need for talent has been described as a "war" for talent by one executive, forcing new approaches to finding or developing the talent necessary in the age of digital transformation, including an enhanced role for technology. (For further details, please see the Full Report Innovating around talent risk.)

Despite this dependency on specialized talent and skills, Willis Towers Watson finds that comparatively few companies feel they have found the secret to effectively identify, attract, recruit and retain key talent.

Upskilling is also emerging as important. Some companies have begun recruiting employees without a digital pedigree, instead seeking employees who exhibit such traits as curiosity, creativity, and a willingness to innovate. Disney and other companies are finding that these employees can be trained to gain digital skills while adding a higher level of creativity and innovation to the enterprise.

Technology employees are also being given opportunities to better integrate with other functions. CompTIA, in its Cyberstates 2020 report, noted: "Beyond technical skills, businesses are also looking for technology professionals that can speak the language of the business, collaborating with other departments in order to drive technology-fueled business results."

Employee satisfaction must be part of the equation. It's important that companies expand their digital talent pipeline. But this produces a short- term value – and an costly mistake – if TMT companies fail to recognize that employees want more interesting work, better opportunities, and have little patience if they feel badly managed or unchallenged.

Consequently, forward-looking TMT companies are taking new approaches to employee retention. These actions include offering the professional experience of "moving around", but within the business. The employees enjoy the experience and employers are reaping the benefits of the creativity dividend as they find these rotational programs are a good way to spread new ideas throughout an organization, ideas that might lead to product and service innovations, as well as operational efficiencies.

Employees will always value compensation and benefits. But it doesn't all boil down to money. Many of the more talented employees might be lured to another company where they will feel they are making an impact on the business or find more opportunity for movement and growth.

Sensitivity to employee needs and expectations deserves at least as much attention as investment in a new technology. As one of our respondents noted, "It is a mistake when people management is less important than managing technology." As new generations move into the workforce, they are expecting this as a standard, not a nice-to-have.

Diversity & inclusion

Our latest research confirms that most companies care about workplace diversity and inclusion (D&I), but D&I implementation and execution varies widely. The very definition of D&I differs from company to company and among countries. We find that, for many TMT companies, workforce diversity and inclusion are blind spots.

At the risk of overstatement, we find that U.S. companies too often apply simple metrics to measure the success of D&I programs. The thinking goes like this: "About half of our workers are women, and we have 20% minority employees. So, we're done." Companies in

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Europe and Asia are less likely to apply specific metrics. They often take less formal steps, such as encouraging hiring managers to have an open mind about diversity and inclusion.

We offer extremes to illustrate a point: Neither approach guarantees the operational and financial benefits and competitive advantage of a genuinely diverse workforce.

"Leaders should focus on the business results of diversity and inclusion rather than see it as a moral thing or something that amounts to window dressing," noted one TMT executive. "Diversity gives better business results. It's that simple."

There are many TMT standouts in the D&I space. For example, Microsoft puts its full corporate backing into a vigorous D&I program. Microsoft reports modest, but steady progress while leaving no doubt about its D&I commitment in the company's Global Diversity & Inclusion Report 2020.

SAP, a leading software company, started its Autism at Work program in 2013 as one way to foster innovation by lowering barriers of workforce entry for a qualified but often overlooked skill base. (For further details, please see the Full Report: SAPs Autism at Work program leverages the unique abilities and perspectives of people on the autism spectrum to foster innovation.)

Unfortunately, too many TMT companies - and technology companies, in particular - allow a 'bro culture' that many women and minorities find uncomfortable. We've seen this culture up close and find that "tech bros" are oddly limited by their strong ideas and a preference for working with people who share similar views and prejudices. There is a correlation, to our thinking, between a lack of gender or racial diversity and a lack of innovative ideas.

Willis Towers Watson has described D&I this way:

- Innovation doesn't happen in a silo. If inputs are limited, then outcomes are also limited.
- To solve critical problems, we need to foster an inclusive culture that encourages diversity of thought, ensuring visibility for ideas and innovation on a global scale when faced with global challenges.
- An inclusive culture is achieved when all colleagues have the chance to contribute.

"Diversity of opinions really helps to improve basic operations and efficiency," a member of our TMT advisory group noted. "Different perspectives bring together different ideas. The worst thing a company can do is to have the same people with the same background coming to the same answers each time. This creates a flywheel effect."

There are, to be sure, reputational benefits to be gained from a D&I commitment. Some companies leverage forms of diversity to define the brand. For example, Verizon has made a substantive commitment to equality and social justice. Apple has taken a strong public stand for the U.S. immigration program known as Deferred Action for Childhood Arrivals, or DACA.

While D&I is not a "metrics only" program, some metrics are highly illustrative. Women remain underrepresented in most technology jobs at TMT companies. One estimate puts female workforce participation at only about 25% of technology positions. A Disney-type CODE: Rosie program is one way to deal with the disparity and gain the business advantages of diversity.

As the TMT sector embraces the advantages of D&I, they should also consider the broader landscape and direction of travel. Many of these issues cannot be dealt with in isolation and considering D&I as part of the ESG strategies will be an important step to ensure ongoing commercial success.

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Digitalization & technological advances

Long before the COVID-19 pandemic, TMT executives had learned to expect disruptive digital and technological change. Now they sense that disruptive change – and related risk and uncertainty — will intensify with the growth of artificial intelligence, 5G, the Internet of Things, and other innovations.

To prepare their companies for the next wave, business leaders are shaping more resilient, enterprise-wide cyber cultures. TMT executives say they can mitigate digital and innovation risks by instilling cultural values that welcome and leverage change. This is something we have seen ourselves through our work around cybersecurity-focused organizational and cultural transformation. (For further details, please see the Full Report Cybersecurity organizational & cultural transformation.)

More robust data analytics can help companies better assess their own risks and shape optimal insurance and risk financing strategies for themselves as well as with third parties and other business partners. Contractors and other outside business partners need to be held to the same high risk management standards that a company would apply to itself.

For their part, insurers are using data, including client data, to provide rates that reflect a company's risk profile rather than a broader industry grouping. For companies that have an effective risk management program, this opens the door to more cost-effective insurance and risk management programs. (For further details, please see the Full Report How data can inform risk decision making.)

Talent and workforce issues surface throughout the exposures linked to digitalization and technological advances. Organic or in-house talent is being developed and nurtured at many companies with upskilling programs such as courses or workshops for employees. In the most effective settings, these programs are combined with broader efforts to build employee satisfaction and create new routes to career development.

A good example can be found in the AT&T University and the AT&T Aspire programs, employee development efforts that support AT&T's position as a diversified provider of high- speed connectivity, software-based entertainment, premium content, and tailored advertising. (This topic is discussed at greater length in the Global Talent & Skills Race section.)

A confusing mix of data protection and privacy laws is likely to challenge TMT companies for years to come, especially as financial penalties and sanctions toughen. But related risks and uncertainty may be tempered if European GDPR standards, continuing to inspire regulators globally, become a de facto global standard.

Technology, media, and telecom companies should expect a rough ride if they are perceived to engage in anti-competitive practices, either in terms of market dominance (a bigger problem for technology companies) or mergers and acquisitions that might be seen as anti-competitive or against consumer interests.

Meanwhile, all TMT companies need to be alert to environmental, social and governance (ESG) issues with regulatory and legal implications highlighted in the earlier trends. In combination, how TMT companies handle these issues will have a profound impact on corporate brands and reputations, according to TMT executives. (ESG's impact on the TMT industry, particularly from climate change, will be examined in a separate WTW study.)

Reputational risk is in some ways harder to measure and harder to define. It can come from any direction. Consumers, supported by regulators, are rightly concerned about how their data is gathered and used, and sloppy data protection and privacy practices can cause serious long-term damage to an image – or a balance sheet. Regulatory regimes, such as for example GDPR, are expanding or being mirrored across the globe with heavy fines likely if there is a failure to comply. If a merger is seen as a move to jack up prices or limit consumer choice, the parties may pay a heavy cost both in terms of reputation and in dealing with new barriers to a transformational strategic shift.

There is at least one area of appetizing risk and opportunity that is seen through a haze of uncertainty shared by nearly every TMT company: Finding ways to further monetize the huge mounds of data collected in the course of normal business operations through relationships with customers and business partners.

The financial stakes are high. A 2021 Accenture global study found that digital adoption – defined to include artificial intelligence and data analytics – could release more than $5 trillion in profitable growth. The professional services company said that "future-ready" organizations are more than 10 times as likely to use analytics at scale with diverse data sets to yield actionable insights and inform decision-making.

While corporate performance and profitability is top of mind for all TMT companies, it was more likely to be cited as a concern among telecom executives. The pace of change requires ongoing and growing investments in digital transformation and technology. A good example is the transition from 3G to 4G to 5G broadband networks. Each generational shift has demanded new investment.

PwC's Strategy&, a strategy consulting team, has estimated that TMT companies will be investing billions to build up equipment, network density and spectrum. But Strategy& notes that monetization of a large-scale investment proved to be a problem in 4G's wake. After 4G's 2012 introduction, for example, conventional telephone services plummeted, driving industry diversification and the application of new business models.

The growth of 5G looks to be much more disruptive than 4G, but TMT companies may have little choice but to make heavy 5G investments to remain competitive. Business models will no doubt change again with 5G and widespread use of artificial intelligence, the internet of things (IoT) and other developments that are likely to accelerate.

Some telecoms plan to better understand and to mitigate 5G risks by rigorously modeling various technical and business scenarios, including the identification of new revenue sources.

To a great degree, the ability to adjust to change and embrace innovation is influenced by the size of the company and the nature of its leadership. Bigger companies typically have greater financial and technological resources, but size may work against them for reasons that include:

- A large customer and shareholder base that may resist far-reaching strategic and operational change, slowing innovation.
- Corporate bureaucracies or siloed operations that resist change or thwart effective implementation.

TMT executives say they can mitigate the failure-to-innovate risk by instilling cultural values that welcome and leverage change. In the short term, organic options can include formation of small teams in which effective leaders have senior management support to plow through internal barriers to change. Other companies are finding that it's easier to acquire outside talent – a team, perhaps, or even talent though corporate mergers and acquisitions. Business partnerships can also boost innovation if accompanied with good system and process design.

Whether TMT companies have out-performed expectations or not, nearly all are finding that their business models and risk profiles have changed significantly amid the rush of technological change. Risk management must change, too. This is something we have seen ourselves through our work around cybersecurity focused organizational and cultural transformation. The section below is provided to provide further insight to this type of work.

In our work with TMT business leaders, there was one overarching theme: Without constant innovation, they fear being left behind by their TMT rivals or pushed aside by nimble, growth- hungry start-up companies backed by ample capital. They don't see innovation as simply improving existing products and services. They also look for innovations that might leapfrog existing products or services.

A classic example of innovation failure is a one- time market leader in cell phones that was pushed aside when it didn't anticipate the smartphone revolution. Post-mortems point to a culture that discouraged innovation, poor strategic planning, and what might be called a form of institutional lethargy.

"There are a lot of examples of companies that become obsolete by not anticipating or promptly reacting to technological change that threatens their existing business model," one executive said. "We don't intend to be among them."

Regulatory & legal risks

The uncertain direction of data protection and related privacy laws and regulations is among the top risk management issues that face technology, media and telecom companies, according to Willis Towers Watson research and interviews with TMT executives.

TMT business leaders also find themselves increasingly wary of regulatory and reputational risks associated with environmental, social and governance (ESG) criteria as well as fears of an unpredictable global political environment and changes to international trade agreements that may disrupt manufacturing patterns and even content development and distribution.

Most companies are making whatever technical accommodations are necessary to ensure that the gathering and use of data occur within legal and regulatory guidelines. At the same time, consumers are more attuned to privacy and data protection issues, fueling further regulation and consumer protection laws.

"It's fair to ask what TMT businesses are doing wrong to be hit with so many financial penalties or face reputational damage related to data protection and privacy," said Lay See Ong, divisional TMT director at Willis Towers Watson. "TMT companies need to do a better job anticipating regulatory developments and moving proactively to deal with them." (For further details, please see the Full Report Privacy: A Willis Towers Watson Perspective.)

A global data and privacy model is the European Union's General Data Protection Regulation (GDPR). The EU is in the process of significantly expanding its body of regulations as it considers a new Digital Services Act and Digital Markets Act. The regulations, among other things, will carry the EU deeper into the realm of content moderation and add additional user safeguards.

Until recently, the U.S. has taken a comparatively relaxed approach at the national level with privacy laws covering identifiable individual financial or health data. California and other U.S. states have begun adding tougher legal and regulatory regimens with the threat of financial penalties.

Asian and Latin American countries are taking similar actions with emphasis on cross-border data flows and rising interest in establishing more consistent data and privacy standards across the region. The Asian Business Law Institute acknowledges that many companies find it difficult to follow local laws and regulations that change too frequently for translations to keep pace. Compliance risk is an obvious outcome.

Rising ESG-related risks can surface if regulators, investors and other stakeholders conclude that a company is falling short of ESG obligations that may range from workforce diversity to ethical outsourcing or carbon emissions. (For further details, please see the Full Report The ESG Basis for Commercial Success.)

Reputational risks could be more costly than a regulator's heavy hand. Twitter, Facebook and other social media platforms can spread damaging information (accurate or not) at light speed. As one of our research participants noted, "Reputational risk is challenging to manage because it's not always fact-based."

Intellectual property infringement is another risk that isn't going away. In our latest research, IP infringement risks have expanded into two relatively new areas. The first is connected to the remote working arrangements that many companies adopted to help control the spread of the COVID-19 pandemic.

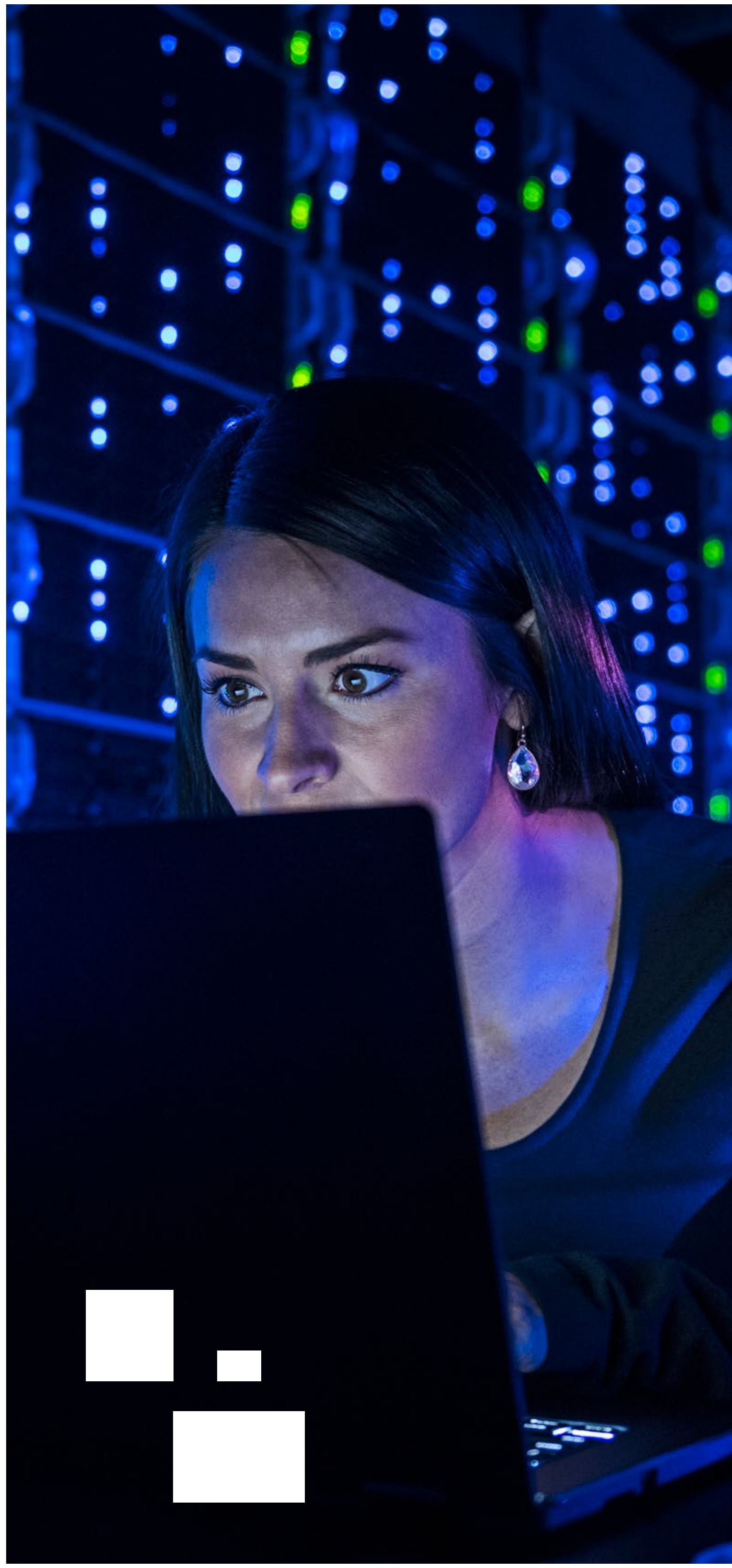
Improvised technical arrangements and isolated, often less-supervised workers can open the door to IP loss or theft. The larger problem of IP infringement, some TMT executives say, surfaces when companies find it necessary to work with third party organizations that might be infringing on IP rights for their own business objectives.

Mergers and acquisitions remain in favor with TMT companies that need to shift their business models or improve profitability. But antitrust concerns are increasingly common if a company is seen as squeezing out competition. In the United States, federal agencies and various states have targeted the tech companies with what the Wall Street Journal describes as "competition-focused probes".

Antitrust actions are not confined to the United States. The European Commission is taking a hard look at TMT M&A for any trace of anti- competitive behavior, as when it concluded in a 2020 "preliminary view" that Amazon might be using non-public business data of independent sellers "to the benefit of Amazon's own retail business." In China, the government launched an antitrust action against the Alibaba Group, among other actions.

Willis Towers Watson, in a recent political risk survey, also finds political risks arising along with trade tensions.

"When thinking about the 'unknown' risks, don't just look at what's regulated. Ask yourself, 'What could be regulated?' Especially in an M&A situation, you have to consider what's on the horizon of regulation," advises Sara Benolken, Willis Towers Watson Global TMT Industry Leader.



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Operational complexity & vulnerability

Cyberattacks, data security and other risks associated with operational complexity and vulnerability were TMT concerns long before COVID-19, but the pandemic's impact on business operations and buyer behavior exposed new organizational shortcomings or aggravated old ones.

Asked to identify major exposures associated with operational complexity and vulnerability, TMT executives identified four broad risk categories:

- Operational continuity, including supply chain shocks.
- Rise of pandemic-related virtual operations.
- Cyberattacks, data privacy and related operational security.
- Workforce wellbeing and flexibility of work styles.

For many TMT executives, operational continuity risks are increasingly seen connected with supply chain disruption and related geopolitical friction, particularly on the hardware and semiconductor side of the industry. They point out that their supply chains are complex webs to start with. It doesn't help to see growing resistance to free trade agreements. They also see geopolitical risk as a long-term exposure as countries jostle for competitive advantage.

Trade disputes also have revealed an overconcentration of suppliers – and even customers – adding to the checklist of TMT action steps. Excessive dependence of technology companies on a single country's manufacturing facilities was brought into sharp focus by recent trade conflicts as well as security concerns raised around the possibility of intellectual property theft or even fear of government-backed spying.

Supply chain concentration is a factor in the thinking about globalization versus localization. Several TMT executives with whom we spoke noted that it's tricky to strike a balance: Globalization with supply chain concentration had significant cost-and-delivery advantages, but trade stresses are prompting many companies to think about looking at alternative solutions, including bringing production closer to home.

The MIT Sloan Management Review, in a Summer 2020 article, asked, "Is It Time to Rethink Globalized Supply Chains?" The author, Willy Shih, a professor at Harvard Business School, wrote, "For many companies, the combination of lean production and global multistage supply networks is leading to crises. This should be a wake-up call for managers who need to understand their supply chain's strategic vulnerabilities."

"Procurement teams and risk management need to work jointly to better identify and mitigate supply chain risks," according to Frederic Lucas, Willis Towers Watson Regional TMT Industry Leader, Western Europe. "Procurement naturally will focus on costs and efficiencies, while the risk manager would think about location, third party risk, and so on. It's vital to get the risk manager involved."

There also is a disturbing lack of supply chain visibility, as one executive told us. Some supply chain managers have no clear idea of the full range of suppliers and sub-contractors, much less the risks that might be found in a big supply chain network.

"Supply chains are complicated and changing them isn't easy," he said. "You have to start with improving supply chain visibility. If you can see it, you can get your hands on it. If you get your hands on it, you can better manage it and mitigate the risks."

Politics aside, TMT executives say they intend to concentrate on supply chain resiliency and the need for what a 2020 IDC survey describes as a general "lack of digital competencies" at a time when virtual operations have become standard.

TMT executives interviewed for our 2021 study also say that operational risks are rising as cybercriminals adjust tactics to exploit pandemic-related vulnerabilities. For example, with so many people working at home, cybercriminals have stepped up phishing attacks. This technique relies on, say, bogus emails with attachments that, when opened, can introduce ransomware into a company network.

Early last year, in the first stages of the pandemic, COVID-19-related cyberattacks had already ensnared nearly half of the companies in a Tenable Inc. survey of more than 800 business and security executives. Alarmingly, about 75% of the respondents said that business and related security efforts were not fully aligned.

"Our financial investment in raising technology barriers against cyberattacks will be wasted if our employees aren't alert to phishing and other security threats," noted one executive. "This is hard to achieve when so many of us are working in remote locations and, our network is already stressed by the workforce fragmentation that we're seeing with COVID-19."

One lesson learned among many TMT executives is that technology leaders must embed cybersecurity and privacy processes into business and technology initiatives from the start. The importance of a strong cyber culture is also being recognized as key. (For further details, please see the Full Report: Cybersecurity organizational & cultural transformation)

To underline the point, a 2020 Willis Towers Watson Cyber Claims Analysis Report found "high average severity" of business disruption events related to data breaches. Together with ransomware events, the report noted, both types of losses can severely affect productivity and "end up being very costly."

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Observations and recommended next steps

Finance executives, risk managers and other TMT business leaders have learned much from today's complicated risk landscape, but they are left now to brace for emerging risks that will include, perhaps above all, the global implications of climate change.

Climate change, in our view, will profoundly reshape each of the five risk megatrends that we have examined in this report, from risks surrounding business models and geopolitical uncertainty to more exacting regulations, technological advancements and talent.

(For a detailed discussion of climate change risk, see Willis Towers Watson's "Why climate change is a particularly challenging risk for strategic CROs.")

Climate change is not the only risk that will spill over each megatrend. For one thing, our work with TMT business leaders confirms that the global talent and skills race sends a similar jolt across other risks. It's clearly not enough to have digital wizards on staff when talent also is needed for developing an effective business model or strategy, or even meeting ESG criteria.

The organizations that will succeed tomorrow must ensure the development of resilient operations and workplace cultures. They must ensure that employees keep pace with the evolving workplace (which in many cases will become a hybrid home-and-office arrangement), adopt new technology and processes, update their skills and competencies and stay engaged and productive.

COVID-19 and its disruptive impact on business will accelerate corporate resilience efforts. Although the idea of resilience has been kicked around corporate offices for years, the virus has added a greater sense of urgency. We therefore expect to see new efforts by TMT companies, many of which are already leaders in their field, to continue to build genuine resilience into business strategies and operations in 2021 and beyond.

From a risk management perspective, it will be more important for insurance and other risk financing decisions to flow from a risk management program that begins with a clear understanding of a company's risk tolerance and appetite. This will require unprecedented use of data. Although data is "king" in a heavily digitalized business, TMT data savvy often falls short when applied to risk management, beginning with defining risk tolerance.

This was a lesson learned by some companies in early stages of the pandemic; imagine when climate change engulfs the global economy from many more directions with even greater intensity on operations and assets, including the workforce.

More effective data mining and analytics will enable companies to build a model for the total cost of risk. This involves identifying exposures and risks while modeling the loss frequency, severity, and volatility of each. Risk modeling outputs can then be examined within the context of risk appetite, cost of capital and the cost of transferring risk. This way you define the optimum balance between risk retained on the balance sheet or captive and risk transferred to insurance or capital markets. TMT companies will need to continue to re-examine their risk finance strategies with the aim to create savings in total cost of risk, with dual renewal and risk financing strategies. What constitutes "material" risk must include also include any new risks emerging from the current risk landscape.

In our experience, senior company management must assert responsibility for the development, communication, monitoring and updating of the risk appetite framework and risk mitigation within an enterprise business context that brings together risk, financial and technology leadership.

Hardening insurance market conditions are going to continue in major lines of coverage. Organizations should prepare by detecting, analyzing, and managing both existing and emerging risks by using all the necessary analytical and advisory tools. Alternative risk transfer solutions and captive insurance strategies will no longer be a luxury but, under certain risk circumstances, a necessity.

Every organization purchases insurance for a particular reason, or as part of a particular strategy. Consequently, each insurance policy should be evaluated based on its own merits within an enterprise context that supports your current business strategy and protects stakeholders from income statement and balance sheet shocks.

Underwriting discipline is back with a vengeance, and it is a trend that will likely continue for the foreseeable future. Insurers increasingly will pay close attention to the nature and quality of each risk as hard market conditions continue. More scrutiny will be on businesses to show, for example, that engineering recommendations are being satisfied, and that they are supplementing the loss control recommendations that insurance companies put forth.

In this environment, companies will need to step up efforts to better collect and interpret data around risk exposures and loss experiences. These actions should include data-mining solutions that will enable risk managers and their advisors to identify, prioritize and manage exposures that may have material impact on operations and revenues. Insureds will have to demonstrate that they are a compelling risk and that they have proactive risk management in place.

As recent events have demonstrated, no risk can be considered in isolation. The pandemic increased geopolitical tensions, climate change and other developments have highlighted the need to future proof the corporate infrastructure against risk extremes.

New challenges and risks will unfold as the world emerges from the worst COVID-19. If not managed correctly, these exposures will threaten the very resilience and long- term profitability of the business.

Credits & acknowledgements

About this report

Willis Towers Watson prepared this 2021 TMT Futures Report as part of a 2020/21 research project undertaken with the Mack Institute's Collaborative Innovation Program (CIP) at the Wharton School, University of Pennsylvania.

Drawing on both internal and external expertise with insights from key executives in the TMT and broader risk management space, this opinion-based report examines five risk megatrends identified in earlier Willis Towers Watson research:

- The global talent and skills race.
- Operational complexity & vulnerability.
- Regulation and legal risks.
- Digitalization and technological advances.
- Business model and strategy pressures.

About our research and sources/references

To encourage candor or to preserve the privacy of TMT business leaders and other contributors to this report, not all quotes are attributed. However, the quotes, while edited in some cases for clarity and context, accurately reflect their professional insights. We also endeavored to link cited material, including relevant research conducted by Willis Towers Watson and other organizations, to original sources when appropriate.

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About Willis Towers Watson

Willis Towers Watson (NASDAQ: WLTW) is a leading global advisory, broking and solutions company that helps clients around the world turn risk into a path for growth. With roots dating to 1828, Willis Towers Watson has 45,000 employees serving more than 140 countries and markets.

We design and deliver solutions that manage risk, optimize benefits, cultivate talent, and expand the power of capital to protect and strengthen institutions and individuals. Our unique perspective allows us to see the critical intersections between talent, assets and ideas — the dynamic formula that drives business performance.

About the Technology, Media and Telecommunications Industry Group

The Willis Towers Watson Technology, Media and Telecommunications (TMT) practice is innovative, experienced and global. With 7 Centers of Excellence in North America, Europe, Asia and Latin America, our global team is designed to understand rapid and complex changes facing the TMT sectors. We leverage powerful insight and innovation to deliver globally consistent service.

Powered by market analytics and behavioral insight, our integrated teams reveal hidden value within the critical intersections of our clients' organizations. We are committed to designing and delivering solutions that manage risk, optimize benefits, cultivate talent, and expand the power of capital to protect and strengthen institutions and individuals.

We're skilled in the complex technology, media and telecommunications marketplace, and experienced in exposures associated with global broadcasting, foreign manufacturing, supply chains, outsourcing, and cyber risk, along with intensified government scrutiny and regulations.

Our team delivers:

- **Client advocacy:** We foster an entrepreneurial and proactive spirit to ensure that we provide value-added insights and best practices to influence client outcomes. We have an understanding of our clients' unique business model and risk appetite, and develop solutions with the best tools, markets and terms.
- **Strategic planning and program design:** Market updates and collaboration with clients on renewal goals. We leverage leading analytics to determine optimal limits, retentions and structure to design programs that specifically meet their short and long-term goals.
- **Marketing:** Our practice has extensive capabilities in creating streamlined submissions and the capability to negotiate terms, coverage and pricing. We focus on effective collaboration globally to ensure optimal client outcomes.
- **Placement implementation:** We leverage our knowledge and experience in the tech, media and telecom industries to review policies for accuracy and to ensure that appropriate enhancements are made.

About the Mack Institute's Collaborative Innovation Program (CIP) at the Wharton School, University of Pennsylvania & the Students

The Mack Institute's Collaborative Innovation Program connects students with business leaders and researchers in the study of innovation management and its practical application to address challenges. We would like to thank Zhiqin Hu, Sulianet Ortiz Torres, Stephen Ipe Varghese, Shihui Wang and Calvin Wong for their support with the TMT Futures report.

For more information, please contact local entities of the Willis Towers Watson Group

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