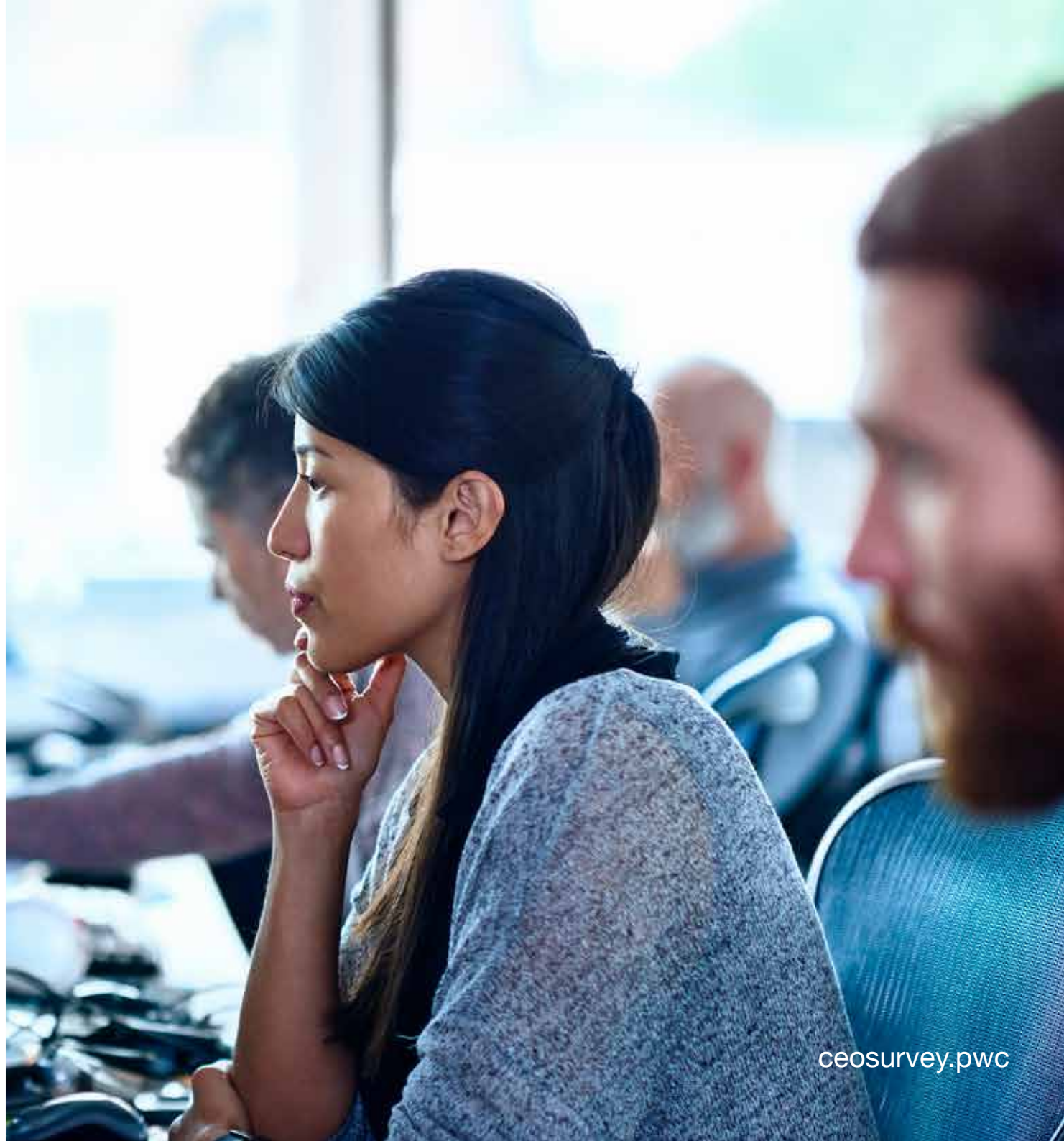


Technology trends 2019

The importance of trust

Part of PwC's 22nd Annual Global CEO Survey trends series



ceosurvey.pwc



Technology companies face digital dilemmas

Many technology executives will look back on 2018 with ambivalence. Although the hardware, software and online services industries did well on average in terms of profits and growth, there were many new pressures to manage, including those related to politics and technological disruption.



Beginning in the middle of the year, share value in many blue-chip tech companies tumbled; these companies are still struggling to reclaim their earlier highs. Concerns about collection and use of personal and commercial data have not gone away; they're resurfacing in the form of new data protection laws, and it's not yet clear how much trust tech companies have lost — or whether they will be compelled to change their business models as a result. At the same time, technologies such as autonomous vehicles, augmented reality and 3D printing, among others, are taking time to produce results, raising

questions about their short-term efficacy and viability. Moreover, technology companies continue to compete fiercely and globally for the talent needed to push their innovation strategies further, while ongoing trade tensions are constraining global trade in new technologies and disrupting supply chains.

In PwC's 22nd Annual Global CEO Survey, just 40% of technology leaders said they were 'very confident' in their organisation's revenue growth potential over the next 12 months. We also asked tech CEOs about their longer-term prospects for revenue

growth between now and 2021. Their confidence was at the lowest level recorded in the past five years.

The challenges tech companies face arguably are greater, and more complex, than any others the industry has come up against recently, in part because some of them go to the heart of their relationships with their customers — indeed, to the question of how seriously they take their consumer and business customers' concerns about privacy and data safeguards. Paradoxically, these challenges are appearing at the same

Just 40% of technology leaders said they were 'very confident' in their organisation's revenue growth potential over the next 12 months.



time as a new wave of digital disruption: the rise of artificial intelligence (AI)-based apps and platforms will increase the influence of the tech sector around the world. As they reclaim positions in this business environment, the leaders of the tech industry will further catalyse change in other industries around the world. Their trustworthiness, competence in innovation and ability to manage change — including the change they create — will continue to be tested.

Is innovation enough?

Any number of exciting and promising technologies have emerged over the past several years that are expected to have an outsized impact on the way we live and the way businesses operate: AI, augmented reality, blockchain, drones, the Internet of Things (IoT), robotics, virtual reality, 3D printing, cloud-based computing, various

systems 'as a service', the connected car and autonomous driving, among others. The companies on the front lines of the development of these technologies have attempted to tap into their commercial potential. So far, however, the usage examples have not been sufficiently robust or have not consistently generated a return on investment.

In some cases, we appear to be approaching limits not in innovation but in our ability to make a strong argument or provide a clear explanation for how technology beneficially transforms its environment, be it the workplace or the consumer arena. For instance, the use of robots (known broadly as robotic process automation, or RPA) has helped to increase efficiency and reduce drudgery in factories and offices, but these machines are not yet especially intelligent and the degree

to which they are taking jobs away from lower-income employees is not clear. Still, the suspicion persists that RPA has a harmful edge.

Separately, AI has yet to make real inroads into the world of business operations. Organisations that have implemented it typically do so only in discrete, siloed, back-office applications such as human resources and finance. And they continue to avoid establishing transparent oversight of the decisions made by AI software and the stubborn biases inherent in the algorithms on which the software depends, especially in areas that touch on social and political concerns such as HR, law enforcement and housing. Because AI systems evaluate job seekers or candidates for loans based on historic statistical patterns, people may be turned down because they share certain



characteristics with those of rejected applications in the past — such as gender, race, ethnicity and sexual orientation, even the neighbourhood they grew up in — despite the fact that those characteristics are not indicative of whether they should be refused or approved.

Self-driving cars pose a similar problem for many of the startups that are hoping to find a lucrative niche in this segment of the industry. Significant engineering problems in building true autonomous vehicles (AVs) still remain, but the neural networks and sensor systems companies have developed to teach cars to drive themselves have already become remarkably sophisticated. However, they still make mistakes — even if they do so just 0.01% of the time — mistakes that confound people's ability to mitigate them. And to the public at large, a single AV accident is amplified well beyond a pileup of traditional cars on the highway, because AVs are viewed as another alien technology coming to change their lives in ways that are not clearly beneficial.

Assuaging concerns about the fairness and safety of these technologies will be critical to monetising them and vital to

their widespread adoption. From a purely academic innovation perspective, many of the remaining questions surrounding these technologies are addressable with more research and breakthroughs. But business can't wait that long. It's increasingly obvious that technology lives or dies by its impact on people. Technology companies, and the companies that buy technology, must be willing to be open about the larger issues raised by new technologies and offer real answers for how these issues should be addressed. In turn, this will help new technologies become a valuable and trustworthy commercial proposition as they mature.

Is nothing private?

The public and political pressure on companies such as Facebook and Google to take individual privacy more seriously and protect sensitive customer data is an indicator of the changing context for the entire technology sector. Meanwhile, relatively strong measures to secure greater privacy for Internet users have already been enacted in Europe, but this issue has yet to gain traction in the US, where even in Congress the inclination to support commercial success more often

trumps concerns about individual privacy. Yet despite the increased focus on data privacy issues, just 20% of the technology CEOs we surveyed said they were 'extremely concerned' about lack of trust in business as a threat to their revenue prospects. This may be shortsighted. As companies both inside and outside the tech sector increasingly pursue digital business models dependent on collecting greater amounts of personal data from customers and others, weaving their services ever deeper into the lives of users and the business activities of enterprise customers, the issues surrounding trust will only grow in importance — and the consequences of breaking that trust will likely become more severe.

For one thing, people will become less willing to give up their personal data, and enhanced data concerns about rising technologies such as AI, AVs, and the IoT and their impact on information security, privacy, and personal safety could begin to throttle the pace of innovation. In addition, corporate customers may get more skittish, wary that the technologies they buy and implement will behave in ways that put their own reputation in danger.

We believe that better management of technology risk and the effort to boost trust are essential for the industry as a whole.



That's why we believe that better management of technology risk and the effort to boost trust are essential for the industry as a whole. In this regard, one-off and siloed solutions will no longer work. For instance, focussing solely on cybersecurity to the exclusion of issues such as data use and transparency only highlights for consumers and regulators the negative aspects of digitisation and compounds their fears. Instead, cybersecurity must be presented as an

example of how companies are proactively safeguarding digital privacy and guarding against the misuse of personal data, while extending these protections to new technologies — such as AI and the IoT — that have the potential to dramatically increase the capture and analysis of data of all kinds.

If technology companies are to develop a holistic and sustainable ethics regarding issues of data use and trust, they must

develop the specific capabilities and organisational structures needed to counteract potential risks. These include:

- Reliable governance mechanisms for recognising potential internal risks and the operational capacity to manage and minimise them. Companies need to be willing to analyse the consequences of new technologies and the way in which they are brought to market, whether they are apps that surreptitiously capture user

data or seemingly innocuous motorised scooters. And they must be able to anticipate potential problems and deal with them openly if they arise.

- A board and executive-level team focussed on actively shaping government regulations by educating policymakers on the use and potential consequences of new technologies, and collaborating with them on developing sensible rules for regulating these technologies'



50%

of tech company leaders said they were 'extremely concerned' about finding the talent and skills they need

55%

of tech company leaders said lack of talent is adversely affecting their companies' ability to innovate

implementation and preventing their dual use. Stonewalling government officials and policymakers, as many companies have tried to do when bringing new technologies and technology-dependent business models to market, is no way to boost trust.

- Encouragement of a corporate culture in which mistakes are freely admitted and employees are willing to speak out about risky behaviour. A self-protective attitude is typically an endemic problem in older, bureaucratic companies, but it is becoming an issue increasingly in hard-charging technology companies as well. Here, reassessing compensation programmes that over-incentivise taking undue risks can quickly make a real difference.

These challenges, too

As the concept of trust gains importance throughout the technology industry, two other issues will also bedevil the tech sector's ability to maintain its high pace of growth and innovation: trade and the war for talent.

Trade and geopolitics. Trade talks with China and the spectre of additional tariffs on all kinds of goods are already affecting where tech companies do business, and disrupting their supply chains. Equally crucial to the future of the tech industry is the increasing attention paid to the protection of intellectual property – including company and trade secrets, and technological information of military value. Concerns about firewalls,

intellectual property theft and vulnerability, most visibly in China but also in other countries, will shape the deals tech companies make and their relationships with governments around the world. Indeed, more than 80% of technology heads who responded to our CEO Survey as 'extremely concerned' about trade conflicts cited US–China conflicts as their primary trade-related concern. Meanwhile, the EU's new data rules are changing how tech companies do business there, adding considerable friction to their operations and connections with customers, particularly when it comes to maintaining and commercialising data. And regulatory issues remain a concern in just about every market.

The war for talent. Tech companies are already facing considerable difficulties in finding the talent they need to innovate in areas such as AI, data analytics and AVs. It is no surprise that according to our 22nd Global Annual CEO Survey, 50% of tech company leaders were 'extremely concerned' about finding the talent and skills they needed, and 55% of these CEOs said lack of talent was adversely affecting their company's ability to innovate. And the competition is getting fiercer, as companies outside the tech sector have joined the hunt for workers with the skills needed to enable their own digital transformation. The spectre of Brexit threatens to stifle immigration of talented tech people into the UK, while tighter immigration policies in the US are already making it harder for potential workers to enter the country in search of new opportunities. More optimistically, the European Union, particularly its member country Germany, has expressed the desire to facilitate the entry of tech workers from developing areas in Asia.

It could be said that the technology industry is at a crossroads. The remarkable hardware and software produced by this sector is crossing from simply being an adjunct to our lives to actually integrating into them — our homes, our workplaces, our social and commercial interactions, our politics, and even the look and feel of our built environments. As this technology becomes an increasingly fundamental part of our lives, issues of trust — and fairness and accuracy, too — will only grow in importance. Thus, the entire technology ecosystem — tech companies and their customers and users — needs to be renewed and enabled through much more far-reaching digital trust initiatives.

Strategy made real

What role should technology companies play in managing the way innovations are perceived by society at large — for example, the effect of AI on hiring or the impact of autonomous cars on mobility? How can these companies continue to advance technology while mitigating the hyped or real risks of innovation?

It should come as no surprise that cities and citizens alike are pushing back hard against the many companies currently dumping motorised scooters on city streets, particularly because these companies appear to be operating on the principle that it's better to beg forgiveness than ask permission. Examples like this, typical of the so-called sharing economy, are perceived by people not so much as technology innovations, but rather as new revenue streams for companies that haven't been thought out quite well enough.

It's becoming increasingly apparent that this approach will no longer work when it comes to truly transformative technology innovation. Concerns about technologies such as artificial intelligence, the Internet of Things and autonomous vehicles are growing, and the companies developing these technologies cannot afford to take the 'beg for forgiveness' approach to ensuring their acceptance. Resistance among consumers and government regulators against several big tech companies that are taking this path only highlights the risks involved.

What's required is a change in the strategies used to bring new technologies to market. The key element to focus on is trust — making sure that how these technologies work, how they will be used and what their potential effects on society will be are clearly understood and communicated to people on the receiving end. Tech companies should take three factors into account as they develop and implement new technologies.

1. Transparency. First, companies need to be forthcoming about how their new innovations work. AI is a case in point. Already, concerns are being raised about the spectre of bias and unintended consequences in the algorithms that AI systems use to sort data and draw conclusions, in fields as varied as hiring, loan applications and criminal justice. Demands are rising that AI systems be 'explainable' — transparent in how they make decisions, and clear in their impact on the people they potentially affect. Tech companies developing and selling these systems must lay the groundwork needed to satisfy demands for

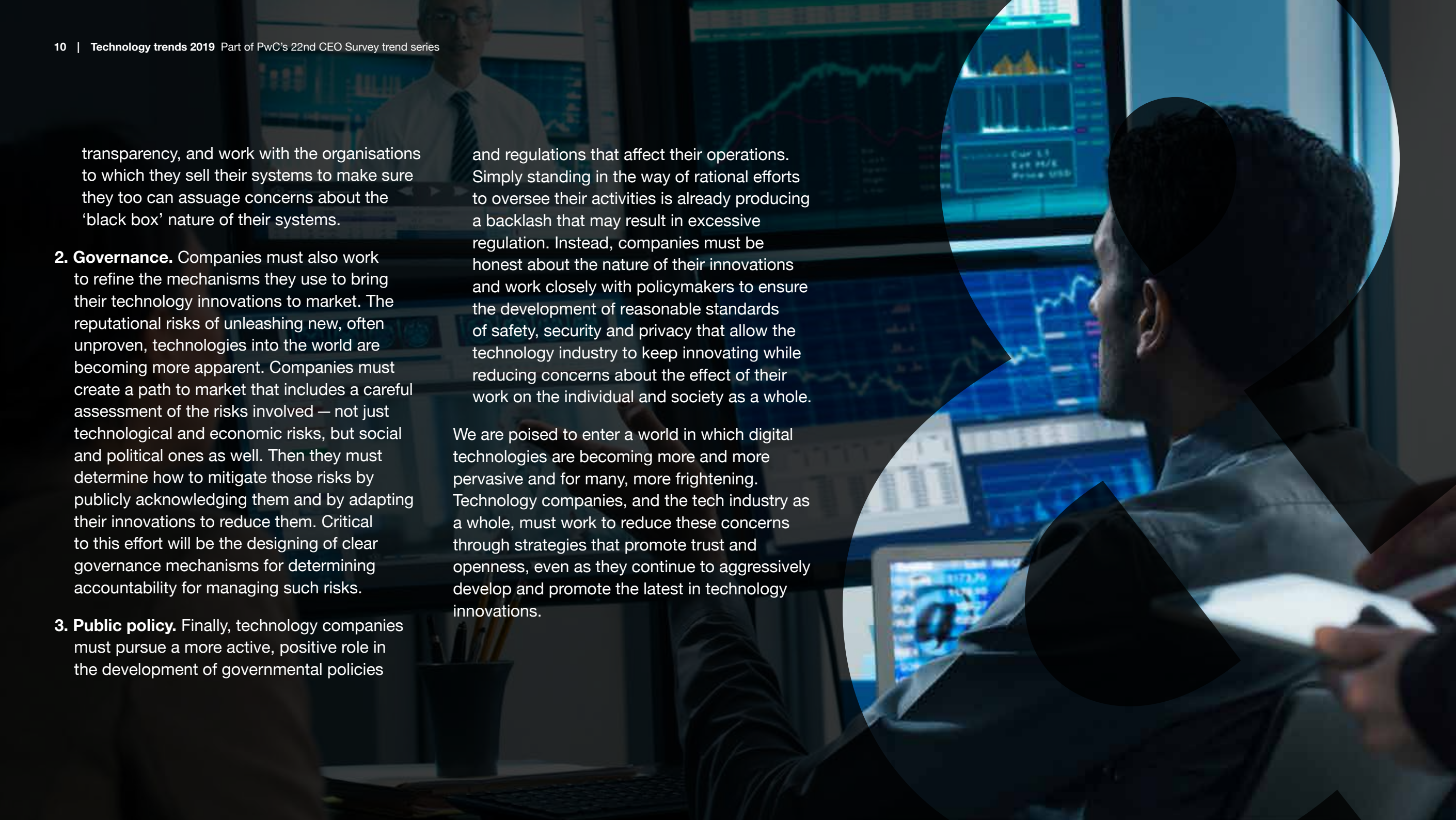
transparency, and work with the organisations to which they sell their systems to make sure they too can assuage concerns about the 'black box' nature of their systems.

2. Governance. Companies must also work to refine the mechanisms they use to bring their technology innovations to market. The reputational risks of unleashing new, often unproven, technologies into the world are becoming more apparent. Companies must create a path to market that includes a careful assessment of the risks involved — not just technological and economic risks, but social and political ones as well. Then they must determine how to mitigate those risks by publicly acknowledging them and by adapting their innovations to reduce them. Critical to this effort will be the designing of clear governance mechanisms for determining accountability for managing such risks.

3. Public policy. Finally, technology companies must pursue a more active, positive role in the development of governmental policies

and regulations that affect their operations. Simply standing in the way of rational efforts to oversee their activities is already producing a backlash that may result in excessive regulation. Instead, companies must be honest about the nature of their innovations and work closely with policymakers to ensure the development of reasonable standards of safety, security and privacy that allow the technology industry to keep innovating while reducing concerns about the effect of their work on the individual and society as a whole.

We are poised to enter a world in which digital technologies are becoming more and more pervasive and for many, more frightening. Technology companies, and the tech industry as a whole, must work to reduce these concerns through strategies that promote trust and openness, even as they continue to aggressively develop and promote the latest in technology innovations.



Authors and contacts

Germany

Marcus Gloger

EMEA Technology Leader
Partner, PwC Strategy& Germany GmbH
+49-89-5452-5572
marcus.gloger@pwc.com

United States

Conall Dempsey

Global Technology Leader
Partner, PwC US
+1-408-817-5871
conall.dempsey@pwc.com

Mark McCaffrey

US TMT Leader
Partner, PwC US
+1-408-817-4199
mark.mccaffrey@pwc.com

Roger Wery

Global Advisory TMT Leader
Principal, PwC US
+1-415-498-6401
roger.wery@pwc.com

About PwC's 22nd Annual Global CEO Survey

PwC conducted 3,200 interviews with CEOs in more than 90 territories. There were 224 respondents from the technology sector, and 18% of technology CEOs reported an annual revenue greater than US\$1bn.

Notes:

- Not all figures add up to 100%, as a result of rounding percentages and exclusion of 'neither/nor' and 'don't know' responses.
- We also conducted face-to-face, in-depth interviews with CEOs and thought leaders from five continents over the second half of 2018. The interviews can be found at ceosurvey.pwc.
- Our global report (which includes responses from 1,378 CEOs) is weighted by national GDP to ensure that CEOs' views are fairly represented across all major regions.
- The research was undertaken by PwC Research, our global centre of excellence for primary research and evidence-based consulting services: www.pwc.co.uk/pwcresearch.

You can find other CEO Survey reports here:

ceosurvey.pwc



At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 158 countries with more than 236,000 people who are committed to delivering quality in assurance, advisory and tax services.

Find out more and tell us what matters to you by visiting us at www.pwc.com.

This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, PwC does not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.

© 2019 PwC. All rights reserved. PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.