

Navigating risk in the transportation sector

Willis Towers Watson
Transportation Risk Index 2016

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Foreword

Welcome to Willis Towers Watson's Transportation Risk Index, a boardroom view of our industry as seen by 350 senior executives from across the globe.

Insights from the Index – and the reactions of the executives to its findings – have reinforced our opinion that those transportation companies who approach risk strategically open up a world of opportunity.

Risk, resilience, reputation, and return are inextricably linked in today's connected world.

From the macro perspective, companies across the transportation sector are looking for trusted advisors to help them assess three key areas:

- how their approach to risk compares to their peers
- how to identify and defend against emerging risks
- how taking a strategic approach to risk can unlock opportunities to gain a competitive advantage

Times are changing

This report's key themes weave a common thread: the risks that corporates face now and in the future are fundamentally different from the risks of yesterday. Risks are not always tangible, nor are they always physical. They can be multifaceted, all-encompassing and, often, elusive.

The responsibility of "risk manager in chief" has risen up the modern organizational hierarchy simply because the task is more demanding than ever. No longer is it a supplementary role or corporate afterthought. The cost of failure has risen sharply and in line with the rewards for success.

While proactive risk-mitigation strategies remain central to corporate resilience, preparedness, and response are now just as critical to a company's performance. The explosive rise of social media has already forced industry to re-examine its best practices for corporate crisis planning.

For insurers, our Index will provide a directional view of boardroom risks, which can be plotted against the current state of their industry's response. Vast opportunities lie in the gap between the transportation industry's risk-transfer needs and the insurance community's current product range.

Seizing that opportunity will demand new levels of commitment, intellectual capital, innovation, and stakeholder support, enabling forward-looking insurers to become the strategic partners that transportation companies need.

Managing today's complex risk environment also requires engagement from intermediaries, risk partners, and consultants. It is unlikely that a single company will have the expertise to provide cover for every facet of risk. Cyber-risk is clearly one area where community-based responses will provide fuller solutions.

Intermediaries will need to define clearly their specific areas of risk



Mark Hue-Williams

Head of Transportation Industry,
Willis Towers Watson

expertise, as well as the areas where they could offer proprietary access to expert third-parties to complete the picture. That is trusted partnership.

This Index is not designed to be static. It is provided to the community, from the community, in an information-rich format that we hope will stimulate debate and discussion. We welcome any feedback. After all, we all share the responsibility to ensure that transportation remains a vibrant and successful industry at the very center of our world's social and economic development.

“ Risk, resilience, reputation and return are inextricably linked in today's connected world ”

Methodology

The Willis Towers Watson Transportation Risk Index was compiled from data and insights derived from personal and telephone interviews with 350 C-suite executives. Survey participants came from a broad cross section of industry subsectors and geographical regions.

The interviews gauged the respondents' perceptions to risk in relation to five megatrends established from declarations in annual reports, to stock exchanges, and through independent qualified research. The senior boardroom executives were asked to rank the megatrends and their associated individual risks across three timeframes: the present, the next 12 months and

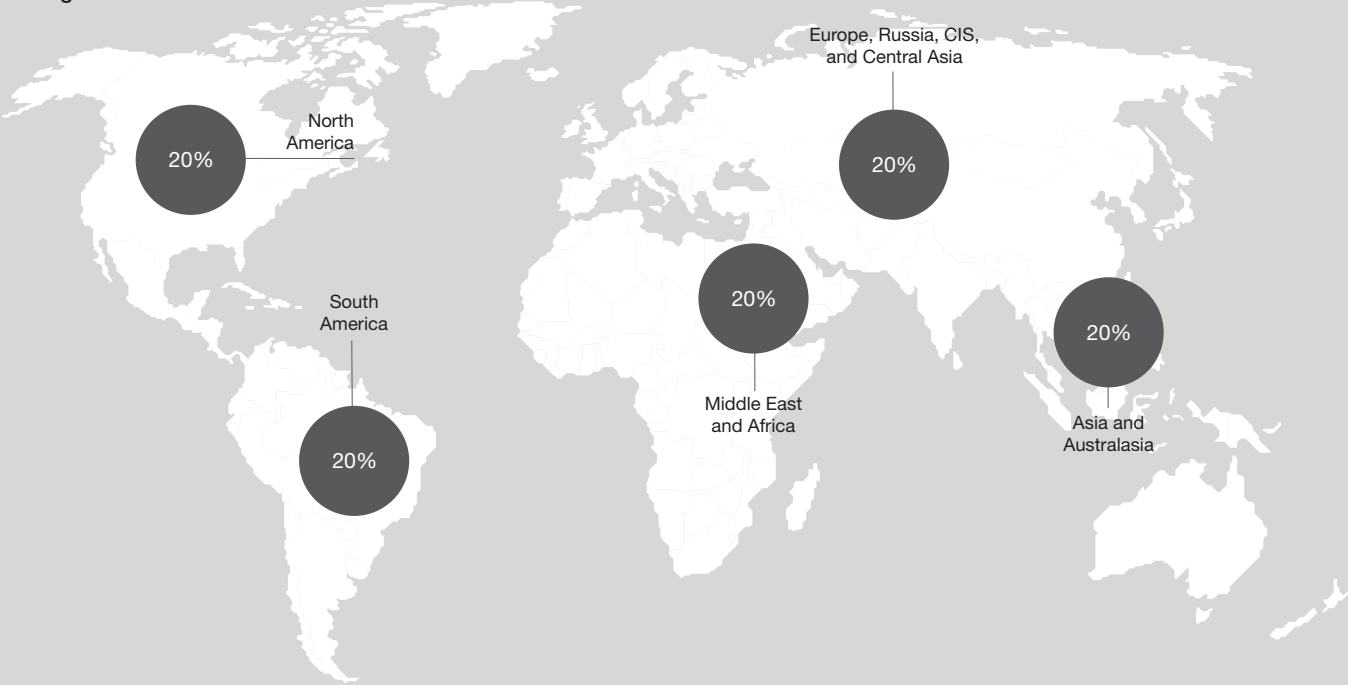
the next 10 years. An independent analyst collated the data and Willis Towers Watson supported the analysis.

The megatrends represent constituent categories of individual risk. Individual risk rankings were generated based on a composite score, which combined the perceived severity of the risk's impact, multiplied by ease of management (ie, impact \times ease = Combined Risk Score). The higher the CRS, the greater the perceived risk. A megatrend risk score, independent of the individual risks, ranks each category of risk by the same method.

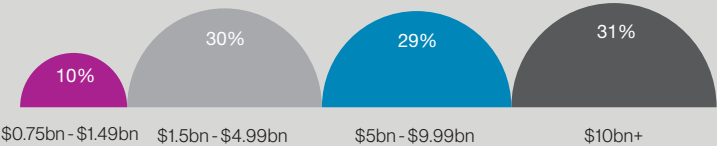


Demographic profile of respondents

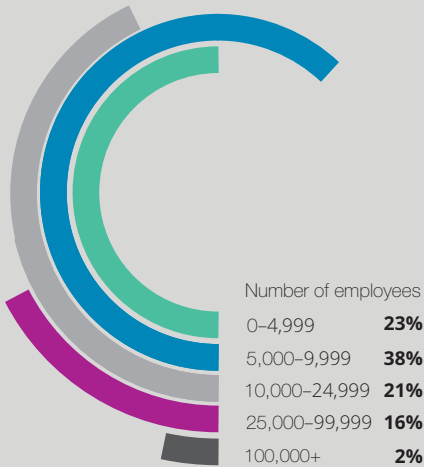
Region



Revenue



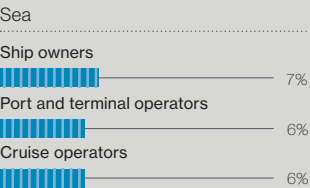
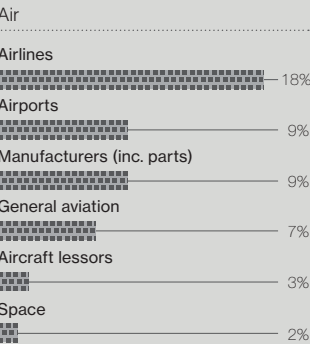
Company size



Job role

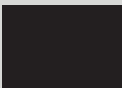


Sector



All percentages rounded to the nearest whole number

Contents



6 – 7

Executive summary

Transportation keeps the global economy moving. Any operational disruptions have wider consequences for society, making the management of the associated risks a priority that should transcend industry boundaries

8 – 9

The primary risks

The industry's top threats as seen through the eyes of senior executives

10 – 12

Geopolitical instability and regulatory uncertainty

In a world where uncertainty creates risk, transportation firms are navigating fluid geopolitical events and regulatory requirements that are often beyond their control

13

When foundations crumble

Companies calculating their risk profile have an increasingly pressing problem: Lateral risk - the potential impact of external events on a business' ability to return a profit - is on the rise. But it is very hard to assess. What lies behind this?

14 – 16

Digital vulnerability and rapid technological advancement

As transportation embraces the technologies of the digital age, it must build community risk strategies to ensure that all systems in the global value chain are secure and reliable



17

Building cyber defenses

Managing exposure to cyber-threats within an organization's enterprise risk framework is the key to a balanced investment in building resilience against this high-profile danger

18 – 21

The top 50 risks

Ranking the industry's Top 50 individual risks by megatrend





22 – 24

Talent management and the complexities of a global workforce

Finding - or creating - the talent to fill a new generation of high-tech transportation roles is critical to operators' success. The emphasis has shifted from finding enough people to finding the right people

25

Rating the megatrends by sector

For sea and land-transport companies, the top risks are associated with geopolitical instability and the regulatory response, while air-transport operators see digital risks as the biggest threats

26 – 29

Complex operating models in an interconnected world

The increasing connectivity of global supply chains - physical and digital - is exposing transportation companies to the cascading consequences of risk

30 – 32

Changing market dynamics and business model insecurity

Emerging markets and more educated consumers are changing tradition patterns of supply and demand just as technological advances and new national priorities are giving rise to powerful competitors

33

Rating the megatrends by region

Vast regional differences in the perceptions of risk make global solutions very rare, proving the value of a customized response

34 – 35

The strategic opportunity of risk

Industries tend to fixate on the dark side of risk, the threat and its potential to disrupt. But smart companies increasingly see risk as an opportunity, a chance to build a response that will differentiate them from the competition

36

The world is changing

Executive insight and key facts from across the five megatrends

Executive summary

Transportation keeps the global economy moving. Any operational disruptions have wider consequences for society, making the management of the associated risks a priority that should transcend industry boundaries

The world economy has surged over the last half century, and that growth has been largely driven by globalization and the consequent increase in trade. International trade in goods and services has increased from around \$4 trillion in 1990 to \$24 trillion in 2014, according to 2015 data from the United Nations Conference on Trade and Development.

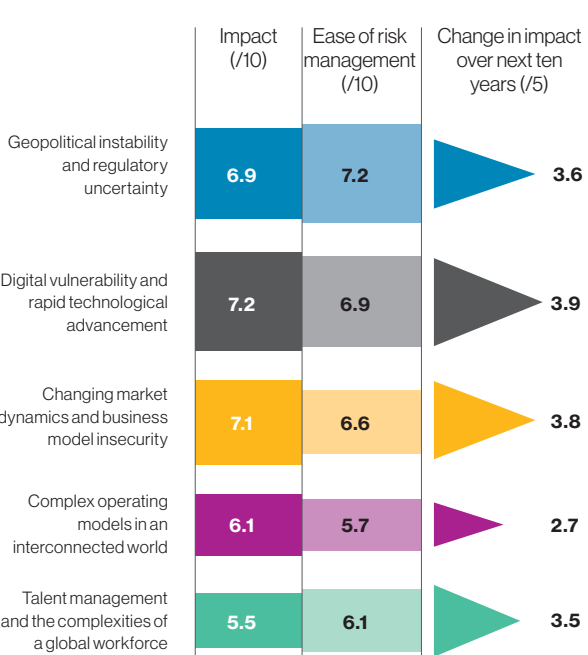
This increase in trade would not have been possible without an equivalent rise in the capabilities of the global transportation sector. More than just a mover of goods and people, transport is a key driver of economic and social development. It brings opportunities for the poor and helps economies to be more competitive. According to the World Bank, "transport infrastructure connects people to jobs, education and health services; it enables the supply of goods and services and allows people to interact and generate the knowledge and solutions that foster long-term growth."

The transportation sector's intimate relationship with the global economy means that the risks faced by the industry are influenced by factors such as increasingly complex markets, transient workforces, disparate regulatory frameworks, the inexorable march of technology and geopolitical shifts. Far from being isolated in silos, these factors interact with each other in complex ways that are difficult to understand, let alone predict.

To better understand the hazards and opportunities inherent in this dynamic landscape, we asked 350 senior executives in the transport industry to rank the greatest

Fig. 1 | Megatrend rank order

Rank order determined by combined risk score
(severity of impact × ease of risk management)



Top two risks:
AIR

1
Failure of critical IT systems
43.7*

2
Competition/antitrust law scrutiny associated with M&A
43.2*

threats to their businesses over a ten-year horizon.

Participants were surveyed about their attitudes to 50 specific risks from five broad categories, or megatrends:

- geopolitical instability and regulatory uncertainty
- complex operating models in an interconnected world
- digital vulnerability and rapid technological advancement
- talent management and the complexities of a global workforce
- changing market dynamics and business model insecurity

In-depth interviews were then conducted with executives from each mode of transport – across passenger and freight services – to gain deeper insights into the challenges they face.

In a world where the so-called Islamic State, Brexit, European migration and US elections are dominating headlines, few may find it surprising that risks from the geopolitical instability and regulatory uncertainty megatrend (see page 10) rate most highly among respondents. The digital vulnerability and rapid technological advancement megatrend (page 14) runs a very close second, and the effects of changing market dynamics and business model insecurity (page 30) rank third.

The top four rated individual risks in the geopolitical megatrend were the domain of government, regulators or the judiciary; indicating that transport providers are at least as worried about a state's potential to disrupt their business as they are about non-state forces.

But there are also clear and influential dissenters. Sir Jeremy Greenstock, the UK's former permanent representative at the United Nations, warns of the perils of ignoring the "fragmentation of the political identity." He says: "Politics, the construction of states and the organization of human affairs in structures is not behaving as we have been used to for the last 70 years."

No one size fits all

While the megatrends give a broad overview of the threat landscape, the specific sector and regional

Top two risks: SEA

1 Increased security threat from cyber and data privacy breaches

49.1*

2 Globalization of customer base

47.8*

data highlight the disparities that continue to make global solutions so elusive for multinational transport providers.

In general, the prolonged economic struggles of most shipping lines have made the maritime sector more sensitive to risk than other modes of transport: its top four individual risks are all rated above the air sector's top risk. Maritime transport providers perceive cyber-threats and data privacy breaches to be their top risks. For aviation, failure of critical IT systems is the biggest concern.

However, all transport sectors in all regions share concern about another product of globalization: the growing reliance on third- parties for everything from quality assurance and contract delivery to cyber resilience and the maintenance of corporate reputations. Nowhere has this risk been more clearly illustrated than with the recent bankruptcy of South Korea's Hanjin Shipping. Its demise is a case study of the transport industry's interdependence - impacting on alliance partners, ship lessors, port operators, freight forwarders, insurers and cargo owners - stranding more than \$14 billion in goods at sea.

The single biggest individual threat across all modes of transport is the potential for cyber and data privacy breaches. Dissenters from that view argue that cyber-risk fears are fuelled by an alarmist media environment where discussion is dominated by hacking horror stories, ill-intentioned insiders and suggestions that the critical systems of most top corporations have already been compromised (the owners just don't know yet).

But there is no denying that the skillsets of the digital threat actors are growing, just as the transport industry's increased reliance on third-parties is multiplying the potential points of entry.

Clearly, an increasingly connected world requires a community response to many risks. No company, no matter how vigilant, is an island.

Top two risks: LAND

1 Increased security threat from cyber and data privacy breaches

47.6*

2 Increased complexity of regulation

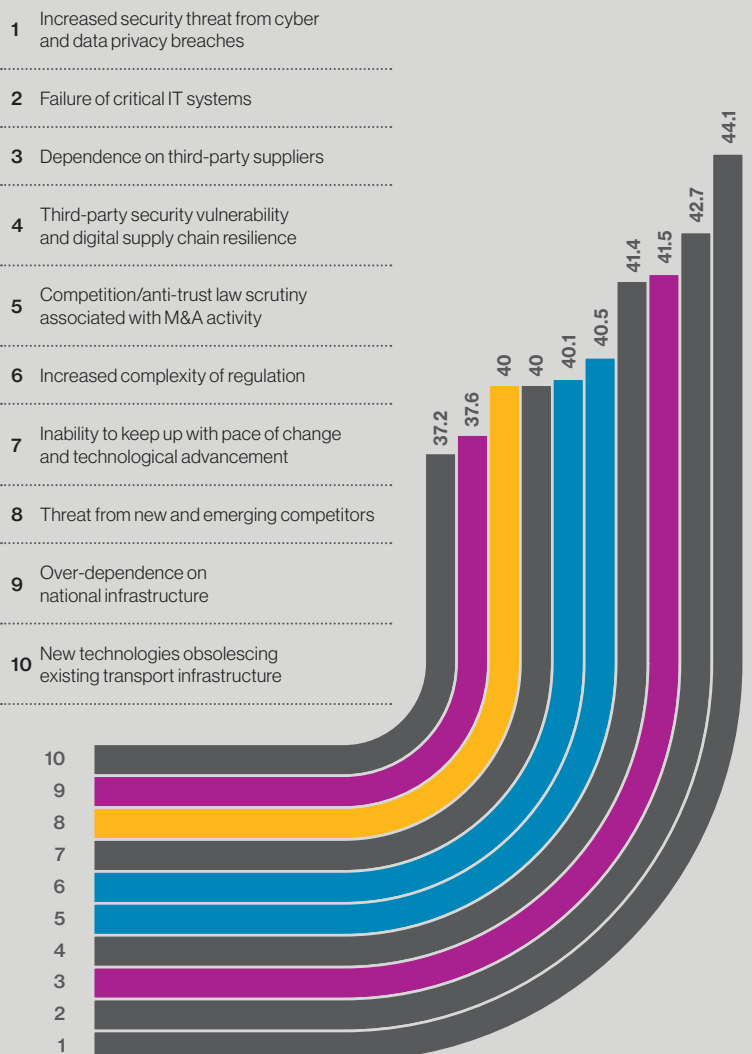
45.3*

*combined risk score (severity of impact × ease of risk management)





“ There's always been a risk that somebody might sabotage your business or vandalize it... [but now, they] can do those things from the other side of the world without having to expose themselves to much personal risk ”

— James Hatch, director, cyber services, BAE Systems Applied Intelligence


Fig. 2 | Top ten risks across the transportation sector




The primary risks


Sector  Air  Sea  Land  Region

Escalating duty-of-care costs to ensure workforce security and safety


 General aviation

Competition/antitrust law scrutiny associated with M&A activity


 Airports

 Port and terminal operators

Globalization of customer base

 Cruise operators

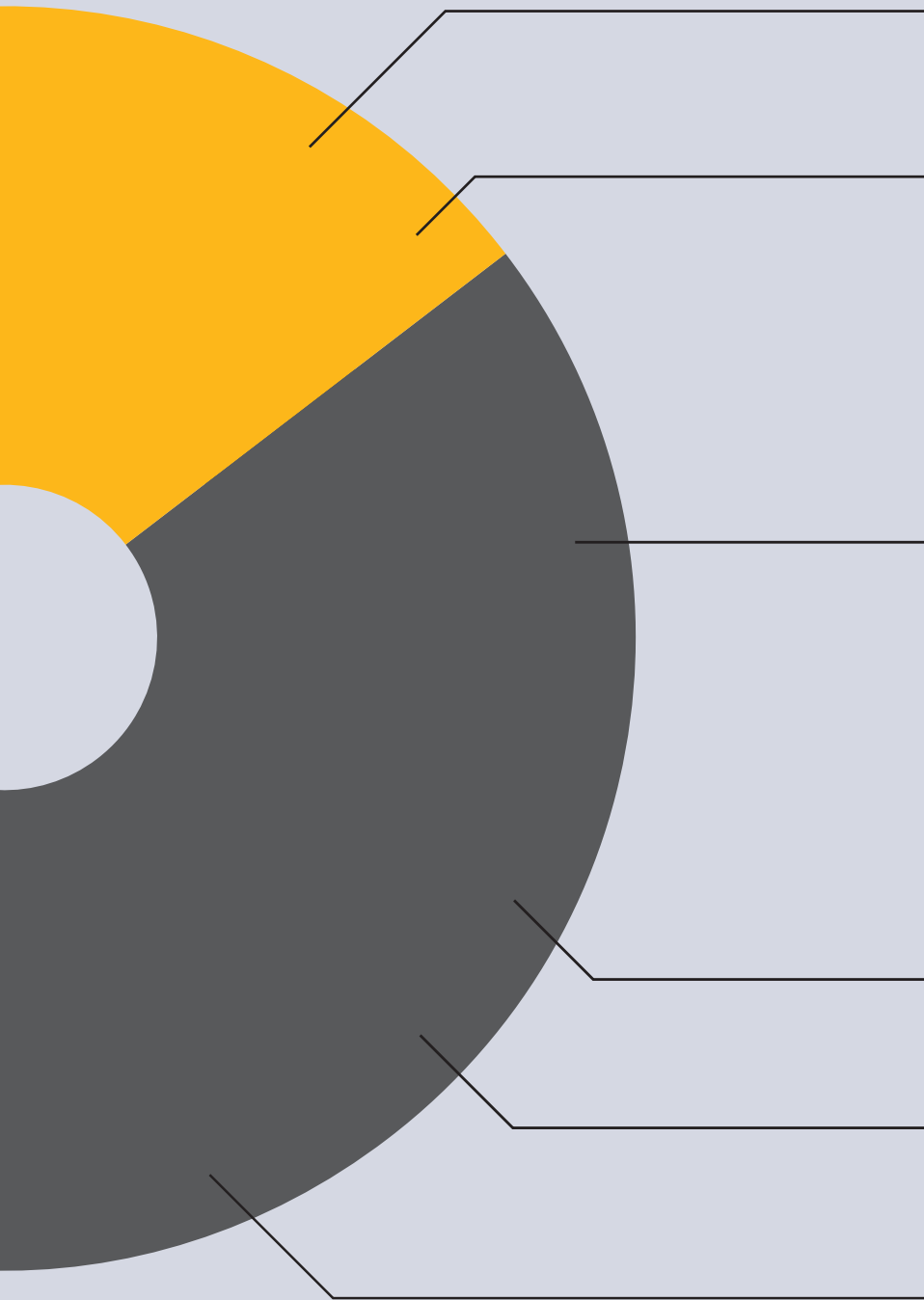
Overdependence on national infrastructure

 North America

The industry's top threats as seen through the eyes of senior executives

Megatrend

- Digital vulnerability and rapid technological advancement
- Geopolitical instability and regulatory uncertainty
- Changing market dynamics and business model insecurity
- Complex operating models in an interconnected world
- Talent management and the complexities of a global workforce



Change in seasonal demand, leading to shortfall or oversupply of transport (utilization/capacity) affecting prices

Manufacturers (inc. parts)

Threat from new and emerging competitors

Ship owners

Passenger rail

Middle East and Africa

Increased security threat from cyber and data privacy breaches

Space

Rail freight

Third-party logistics

Europe, Russia, CIS and Central Asia

Asia and Australasia

Inability to keep up with pace of change and technological advancement

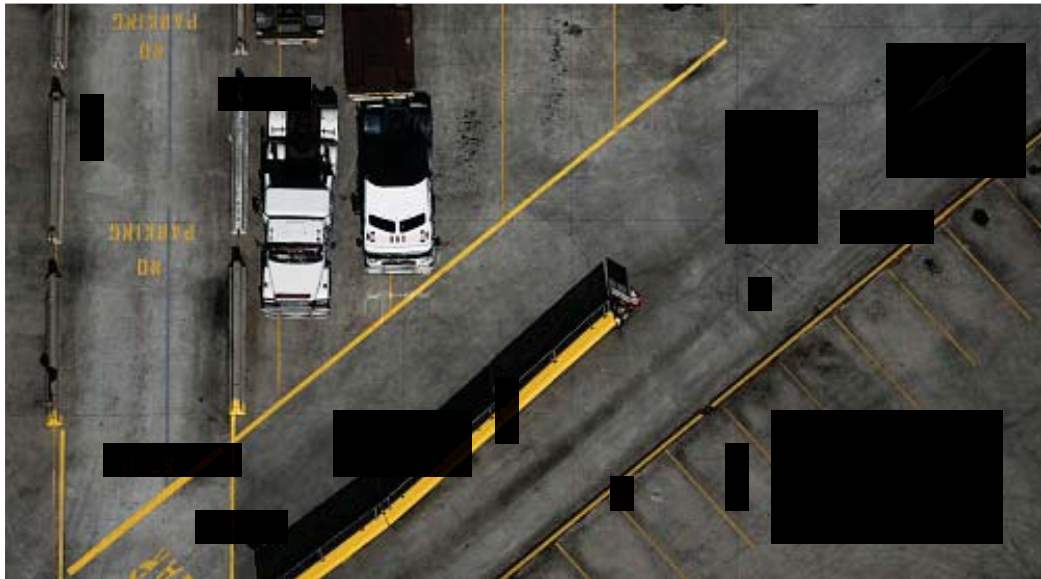
Airlines

Failure of critical IT systems

Aircraft lessors

Third-party vulnerability and digital supply chain resilience

Latin America



Of all areas of risk, it is geopolitical instability and regulatory uncertainty that most worry transportation executives. Even after being bombarded every day by media reports of cyber-breaches and the wholesale theft of personal data, the threats associated with digital vulnerability and related systemic failures came in second after geopolitical and regulatory risks.

It's little wonder. Uncontrollable events such as weather, terrorism,

involuntary migration, and criminal activity added \$56 billion to global supply chain costs in 2015, according to a 2016 report from the British Standards Institution.

Managing complexity

Increased interconnectivity and interdependency between companies – as well as leaner production and warehousing processes – mean that most supply-chain disruptions these days have a serious ripple effect. The World

Economic Forum found that, more than just being an inconvenient interruption to business as usual, companies caught up in such disruptions can expect an average 7 per cent fall in profitability for the year.

With acts of terrorism seemingly on the rise and involuntary migration demanding more of the world's attention, geopolitical risks have moved quickly up the industry register this year. Risks once considered "emerging" are now at corporate doorsteps. And what were formerly million-dollar consequences are now measured in billions.

Add to this what risk experts from London-based Gatehouse Advisory see as the shrinking effectiveness of governments and the institutions that bind international agreements, and you have a level of uncertainty that demands a deeper, multidimensional approach to mitigation efforts than most corporations are prepared to apply.

Tim Holt, head of intelligence at Alert:24, believes many companies fall short of a fully dimensional analysis because they look at risk and the associated costs purely from an economic perspective. "Many investors and some companies give quantitative economic analysis primacy in their decision-making. It's important not to divorce the political, economic and legal, but to recognize their intimacy."

Geopolitical instability and regulatory uncertainty

In a world where uncertainty creates risk, transportation firms are navigating fluid geopolitical events and regulatory requirements that are often beyond their control

1. Antitrust scrutiny associated with M&A
2. Increased complexity of regulation
3. Increasing government interference
4. Increasing regulatory safety standards
5. Globalization of customer base
6. Sanctions and anti-bribery compliance
7. Social unrest, involuntary migration and terrorist threats
8. Regulator competence in emerging nations
9. Protectionist policies
10. Volatile export duties and taxes

Yet, as daunting and complex as the current geopolitical climate may seem to the casual observer, it is the potential for governments and market regulators to disrupt business that has senior transport executives most worried, according to the Index findings.

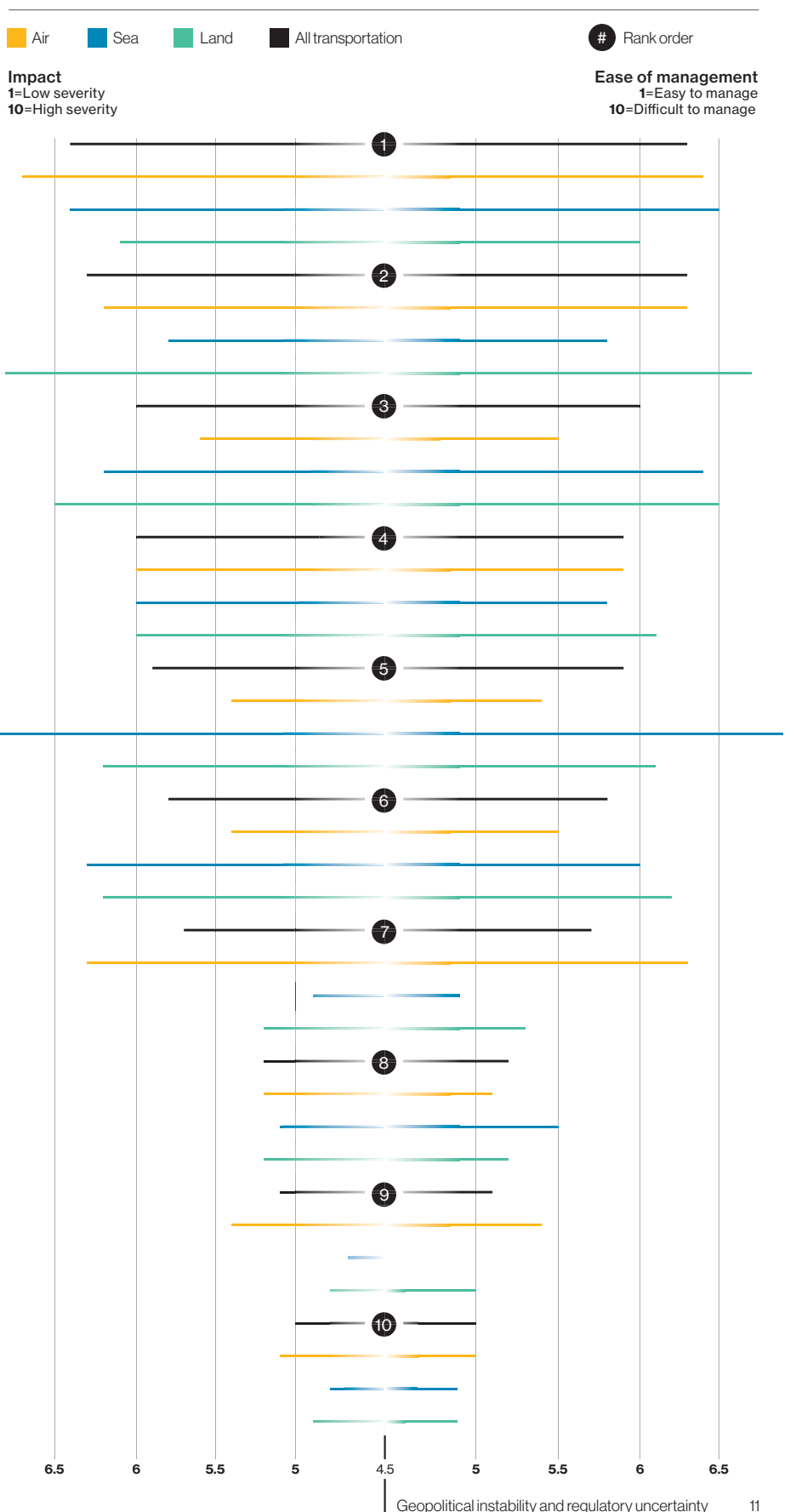
The top risks

In a year when transport providers fought rising unit costs with industry consolidation and the formation of more commercial alliances, the three top perceived risks are: competition/antitrust laws associated with mergers and acquisitions (the top risk for air-transport firms and second for sea); the increasing complexity of regulation (the top risk for land and

“ We have to get our equipment certified in each country where we sell – that's very complicated and it's not getting any better ”

– Hervé Borel,
insurance director, Alstom

Fig. 3 | Top risks for geopolitical instability and regulatory uncertainty



third for air); and growing government interference and unpredictable political cycles (the second risk for land and third for sea).

Tony Tyler, the former director general and chief executive officer of the International Air Transport Association (IATA), offers the air transport providers' perspective: "We do feel as an industry we're suffering a death of a thousand cuts from all the rules and regulations we have to comply with everywhere. And there's a whole other area that is coming up: environmental rules."

The transportation sector, given its reliance on fossil fuels and the limited carbon-light options currently available to replace them, is comparatively vulnerable to growing public demand for cleaner business practices. But it is the permanency of regulation that draws the most suspicion from some risk experts. Once passed, regulations rarely go away, they say. Bad rules – such as those designed to protect national interests and markets – tend to grow worse over time. Constructive, forward-thinking regulation requires a community response between industry and regulators.

While sea and land companies rate the risks associated with "social unrest, involuntary migration and terrorist threats" lower down the risk register (seventh and eighth respectively), aviation companies are more concerned. This area of risk ranks first in the airline, general aviation and aircraft leasing subsectors. Almost half (45 per cent) of lessors rate the risk nine or ten out of ten, reflecting the immediate hit that the industry takes when terrorists attack airlines and associated infrastructure. However, other sectors are not immune to these risks: it is estimated that border controls implemented in France following the November 2015 Paris attacks cost the Belgian shipping industry \$3.5 million.

It should be noted that while migration can present a short-term challenge, it presents an opportunity for airlines and their suppliers in the

long run. For example, the 50-year migration of Turks to Germany has created a strong market for both countries' national carriers.

Companies associated with the seaborne transportation of people and goods see their biggest risk as the "globalization of customer base." The most concerned maritime subsector was cruise operators.

Land transport companies are comparatively more worried about risks associated with "emerging global regulation: sanctions and anti-bribery compliance" (ranked third).

Transportation is clearly a complex landscape, one where the perception of risk shifts dramatically according to each mode, subsector and region. While most risk managers tend to focus on risks that are within their area of operational control, geopolitical risk requires a deeper analysis, one that expands beyond the elements of the traditional risk register.

“ There has been such a large amount of [regulatory] change in such a short period of time. It is still quite unclear as to whether it has achieved its social objectives, which are to make our financial system safer. But it has added very significantly to costs and complexity, and those two things together are always bad for business, and for the consumer in the end ”

–Peter Norris, chairman, Virgin Group



“ Companies have to reassess their self-sufficiency and recalculate their exposure to events beyond their control ”



Sir Jeremy Greenstock

chairman, Gatehouse Advisory Partners

Sir Jeremy Greenstock's principal career was with the British Diplomatic Service, ending his career as UK Permanent Representative at the United Nations in New York (1998-2003) and then, after a suspension of his retirement, as the UK Special Envoy for Iraq (September 2003-March 2004).

Corporate experience with BP and De La Rue; deep geopolitical and analytical expertise from his 2004-2010 leadership of Ditchley, the international think-tank; Chairman of Gatehouse Advisory Partners, The United Nations Association-UK and Lambert Energy Advisory; Special Adviser to the NGO Forward Thinking; Trustee to the International Rescue Committee (IRC); and Board member at Chatham House.

When foundations crumble

Companies calculating their risk profile have an increasingly pressing problem: Lateral risk - the potential impact of external events on a business' ability to return a profit - is on the rise. But it is very hard to assess. What lies behind this?

The global scenario is one of independent, innovative but interconnected actors. Institutionalized standards and rules of behavior are breaking down as the established systems of order from one political and social culture (the West) are being rejected as inappropriate by other, newer players. Political choices are increasingly focused on identity, and the networks of trust are narrowing. The result is a strong trend towards fragmentation, between – and even within – national societies.

This is putting our familiar institutions, the cornerstones of our organized lives, under great strain. This is most obvious in the international arena – most recently illustrated by Brexit – as the UN and the EU (to take the most visible instances) struggle to overcome national differences or to provide specific and relevant delivery at the local level. At the national level, parliaments and indeed governments themselves are finding it harder to produce adequate policies or provide the variation that localism demands. The antidote to fragmentation is dialogue, cooperation and compromise. But these actions do not come naturally to communities raging at inequality, exclusion and poor governance.

What can businesses do?

Businesses need to understand that these trends are not cyclical. Historically, they are typical of long periods without major wars, when rapid institutional change is a necessary response to the challenges of conflict. If in this

century we can avoid another global war, change that outpaces institutional competence will be an inevitable life companion.

If the political weather is getting stormier, companies have to reassess their self-sufficiency and recalculate their exposure to events beyond their control. This does not mean just counting up the potential threats. The analysis has to be more precise than that, concentrating on the serious operating constraints that may emerge from a change in the environment for each part of the business chain.

Three things are particularly important: understanding what is happening around you; developing adaptability; and finding the right partnerships. Of these, adaptability is perhaps the hardest to get right, for who knows what new circumstances are brewing? Diversification of product lines and good contingency preparation make for a good start, but risk mitigation and risk transfer are set in a new and wider context now. Every international business needs a team constantly reviewing the road ahead and challenging assumptions that may wilt under the pressures of change.

It sounds daunting, but lateral risk can be assessed, and expert help is available from specialists who interpret global change. Allied with greater risk-sharing (partnerships and/or insurance), organizations can find greater adaptability and reach. Simply sticking with comfort areas and trusting to luck is no longer an acceptable choice. Be prepared for a rougher ride.

Digital vulnerability and rapid technological advancement

As transportation embraces the technologies of the digital age, it must build community risk strategies to ensure that all systems in the global value chain are secure and reliable

Global commerce is increasingly conducted in a digitalized world where automation and the Internet of Things are transforming virtually every sector of the economy. While some modes of transportation have been slow to adopt new digital tools, the overall pace of engagement is quickly escalating.

Elon Musk's Hyperloop One envisions a not-so-distant world where people and freight are propelled through vacuum tubes close to the speed of sound. This year, Airbus' 3D-printed subscale plane took to the skies, while passengers at Abu Dhabi airport can now travel from check-in to boarding without human contact. Rolls-Royce has unveiled plans for drone ships that will operate without a single human aboard by the end of this decade. Drones and robots will also radically transform traditional supply chain models. According to Deutsche Bank, they will cut the cost of delivering a typical package to just a few cents per delivery mile.

Step by step, transport companies are embracing the digital revolution. In fact, digital technology is becoming so pervasive that many businesses underestimate the extent to which they are now dependent on it. Even risk-savvy firms are

struggling to map the chain of consequence that informs an effective mitigation strategy.

While the commercial opportunities inherent in these technological advances are too numerous to list, so are the vulnerabilities and risks. Those that find the balance will thrive. Those that do not will find themselves left behind by changing markets and consumer expectations, or left vulnerable to the growing army of threat actors.

According to Interpol, "more and more criminals are exploiting the speed, convenience and anonymity of the internet to commit... criminal activities that know no borders... cause serious harm and pose very real threats to victims worldwide." Consultancy firm PwC believes the global cost of data breaches alone could exceed \$2 trillion by 2019.

Criminals are clearly flourishing in the unprecedented access and connectivity the internet provides. Just as the connected business world has proved fertile ground for innovators such as Airbnb, Uber and citizen journalists, it has similarly enabled the digital underworld.

Quantifying cyber-risk

Understandably, the risks inherent in the rapid rise of the digital economy are a primary concern



“ One of the reasons why [cyber-risk management] is challenging is that it's a very theoretical and intangible thing; boards know it could happen but they can't touch it and the catastrophic situation hasn't happened to them before, so they struggle to feel it ”

– James Hatch, director, cyber services,
BAE Systems Applied Intelligence

Fig. 4 | Top risks for digital vulnerability and rapid technological advancement



Air Sea Land All transportation

Rank order

Impact
1=Low severity
10=High severity

Ease of management
1=Easy to manage
10=Difficult to manage



1. Increased security threat from cyber and data privacy breaches
2. Failure of critical IT systems
3. Third-party security vulnerability and digital supply chain resilience
4. Inability to keep up with pace of change and technological advancement
5. New technologies rendering existing infrastructure obsolete
6. Over-reliance on technology
7. Inadequate crisis response
8. Inferior customer experience
9. Uncertainty of insurability of new technologies
10. Increased usage of mobile devices



for transportation leaders, judging from the results of our Risk Index. Senior executives from all modes of transportation rate either cyber-threats or the failure of critical IT systems as their top individual risks.

Indeed, digital vulnerability and rapid technological advancement runs a very close second to geopolitical instability and regulatory uncertainty as the overall top-rated risk megatrend.

Cyber is the primary risk when an aggregate rating is taken across the five regions, and across the 12 transportation subsectors. Through that lens, the threat of cyber-attacks is the top perceived risk for companies operating in such diverse business arenas as space, rail freight and third-party logistics.

Sceptics say cyber's primacy on most risk registers is heavily influenced by ubiquitous and alarmist media coverage. It's important, they say, to perform a deeper assessment of a company's vulnerabilities to differentiate the perceived threats (possible risks) from the actual risks that can impair corporate performance or reputation.

But there's no doubting cyber's ability to multiply and

magnify the existing risks on any company register. If a company is technologically vulnerable, a cyber-attack will magnify that. And cyber-risks multiply for each partner taken on, for every alliance struck and for each link in the digital supply chain.

The weakest link

The formation of partnerships and alliances is the natural response to market downturns. When they're formed, each partner absorbs the risks of the other, digital or otherwise. Pre-contract due diligence fosters a degree of transparency, but most risk managers agree that there is no real way to know if new partners share their company's commitment to resilience-builders such as cargo and employee scrutiny, regulatory compliance or cyber-security.

The digitalized world has introduced elusive and intangible components onto the corporate risk register that are proving very hard to mitigate through simple risk-transfer solutions such as insurance, where the industry response to cyber-crime is nascent.

Common platforms, global tracking systems and customer interfaces

may enhance cost efficiency, collective intelligence and product delivery, but they also multiply digital entry points to strategic command-and-control centers, commercially sensitive information and private third-party data.

As industries become more connected, levels of resilience are increasingly dictated by the weakest link in the digital supply chain. As such, organizations have less individual control to mitigate their digital risks. In that environment, security is a communal issue. It is a collective responsibility where every participant in every supply chain is responsible – not only to shareholders but also to their other partners.

Executive response

Business crises tend to have broad technical, financial, operational and reputational consequences, so risk mitigation strategies have to be formed in the boardroom, where the full spectrum of possibility is recognized. The responsibility for digital risk management no longer belongs in the IT suite, where technical solutions take priority over any business-continuity response.

Not only is it costly to construct a technical response to a cyber-attack or critical systems failure, there are simply more effective ways to limit their commercial and reputational impact.

There's a lot to consider when building digital security strategies for an increasingly connected world. Industry leaders in this field have learned not to start with an examination of their company's threats or risks, but instead by looking at its vulnerabilities.

Glyn Thoms, executive director for cyber & TMT at Willis Towers Watson, says a company can achieve this by asking three questions about the failure of its digital assets: How will it affect financial stability? How will it affect compliance with regulatory obligations? How will it affect an organization's corporate reputation and consumer trust?

These questions will put companies on the road to digital resilience and commercial opportunity.

Building cyber defenses

Managing exposure to cyber-threats within an organization's enterprise risk framework is the key to a balanced investment in building resilience against this high-profile danger



Glyn Thoms

executive director for cyber &
TMT, Willis Towers Watson

“ As digital and physical supply chains become more integrated, companies have less individual control over the effectiveness of their cyber response ”

Without a holistic approach to managing cyber-risk, many companies will face an existential shock by 2020 from a ballooning cost of capital, so board members need to stop seeing cyber-defense as a discretionary investment.

There are parallels to be drawn between the cost of a holistic approach to cyber-risk management and the emergence of quality management in the 1970s. Then, corporate boards wrestled with the costs of the quality-management systems being advocated. "Who's going to pay for it?" they asked. Of course, everybody – from manufacturers to consumers – already was. Then, after Japan rolled out the total quality management concept, the companies that invested in it were prepared, and survived.

Similarly, companies that today can't show they're managing cyber-risk within the enterprise risk framework will face a prohibitive cost of capital by 2020. Why? Because capital markets will not be prepared to sustain the huge and inevitable losses and will tie the effectiveness of an organization's cyber-defense to the cost of its investment capital.

Old risks in new clothes?

While cyber weaknesses create new risks, they also amplify an organization's existing risks. They increase the probability that known risks will occur, so quantification of the incremental exposure is key. The question is not so much where cyber-risks should reside in the top ten risks an organization faces, but to what degree cyber vulnerability makes all primary risks worse.

Some in the industry mistakenly believe that the transportation sector is not a high-value target. The importance of the sector to international trade is obvious and, with all the revenue and trade passing through the value chain, it is clearly a very attractive environment for cyber-

attacks. In July alone this year, two more airlines fell victim.

In addition to being victims of a direct attack, companies can be indirect casualties. Consider any organization with payment and settlement systems that reconcile through a trading platform. For an attacker seeking access to that platform, going through a participating organization is much easier than attacking the platform directly. Earlier this year, for example, Bangladesh Bank was tricked into making \$81 million in fraudulent payments through the SWIFT payment system.

This issue is exacerbated by the ongoing integration (vertical and otherwise) of the value chain, where every organization depends on the effectiveness of other organizations at thwarting cyber-attacks. Organizations in the value chain that view cyber-defense as discretionary effectively weaken the entire value chain and other organizations within it. Attackers understand this.

Collective defense

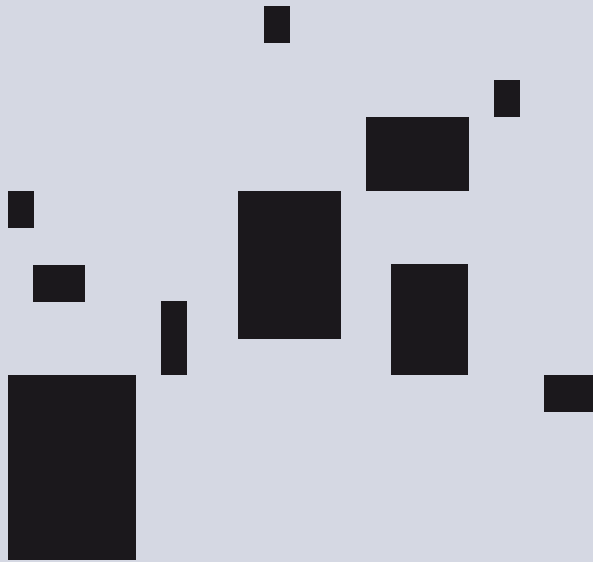
As digital and physical supply chains become more integrated, companies have less individual control over the effectiveness of their cyber-response. They become increasingly dependent upon the rigor and commitment of other contributors to the value chain.

An effective defense thus becomes an issue for the community, a collective responsibility where all participants in the value chain have a duty not only to their shareholders but also to and from their other partners.

To fulfil this responsibility, all community members need robust enterprise risk frameworks that clearly identify their critical digital assets – including data, applications, infrastructure and third-parties. Only after this has been achieved can organizations adequately understand the specific threats they face and thus how to protect against them.



The top 50 risks



Geopolitical instability and regulatory uncertainty

- | | | | |
|----|---|----|--|
| 5 | Competition/anti-trust law scrutiny associated with M&A activity | 27 | Emerging global regulation: sanctions, anti-bribery compliance |
| 6 | Increased complexity of regulation | 32 | Social unrest, involuntary migration and terrorist theaters |
| 16 | Increasing government interference and unpredictable political cycles | 38 | Regulator competence in emerging nations/operational theatres |
| 19 | Increasing regulatory safety standards | 41 | Protectionist policies and regulation restricting open competition |
| 21 | Globalization of customer base | 46 | Volatile export duties and taxes |



Talent management and the complexities of a global workforce

- | | | | |
|----|---|----|---|
| 11 | Lack of skilled labor or mobility | 25 | Cost of maintaining competitive compensation and benefits systems |
| 12 | Staff retention | 34 | Labor disputes and industrial strikes |
| 14 | Rising labor costs | 36 | Complexity of local employment laws |
| 15 | Escalating duty-of-care costs to ensure workforce security and safety | 39 | Ageing workforce and related health issues |
| 22 | Lack of potential leaders and succession planning | 42 | Over-reliance on contracted employees |



Digital vulnerability and rapid technological advancement

- | | | | |
|----|--|----|--|
| 1 | Increased security threat from cyber and data privacy breaches | 33 | Over-reliance on technology, increasing risk of human error |
| 2 | Failure of critical IT systems | 43 | Inadequate crisis response to manage fallout on social media |
| 4 | Third-party security vulnerability and digital supply chain resilience | 44 | Inferior customer experience/service compared to competitors |
| 7 | Inability to keep up with pace of change and technological advancement | 47 | Uncertainty of insurability of unproven or new technologies |
| 10 | New technologies obsolescing existing transport infrastructure | 50 | Increased usage of (own) mobile devices |



Complex operating models in an interconnected world

- | | | | |
|----|--|----|--|
| 3 | Dependence on third-party suppliers | 30 | Extreme weather events/natural disasters, epidemics and armed conflicts |
| 9 | Over-dependence on national infrastructure | 31 | Capacity issues arising from delay and disruption to repair and delivery of assets |
| 17 | Change in demand due to macro-economic conditions | 35 | Customer consolidation |
| 20 | Disruption to operations due to security issues | 37 | Over-reliance on global partner alliances |
| 29 | Inflexible asset agreements in a rapidly changing economic environment | 49 | Strikes and industrial action |



Changing market dynamics and business model insecurity

- | | | | |
|----|---|----|---|
| 8 | Threat from new and emerging competitors | 26 | Threat of economic environment on asset strategy |
| 13 | Pricing strategy pressure | 28 | Increasing cost of maintenance policies and materials |
| 18 | Illiquidity and the availability of competitive capital | 40 | Increasing cost of risk mitigation |
| 23 | Volatility of interest rates, currencies, fuel and commodities impacting cost model | 45 | Infrastructure investment risk |
| 24 | Change in seasonal demand | 48 | Product recall/defect |

6.5

Severity of impact

10=High severity

1=Low severity

Rank order

6

5.5

5

4.5

5

5.5

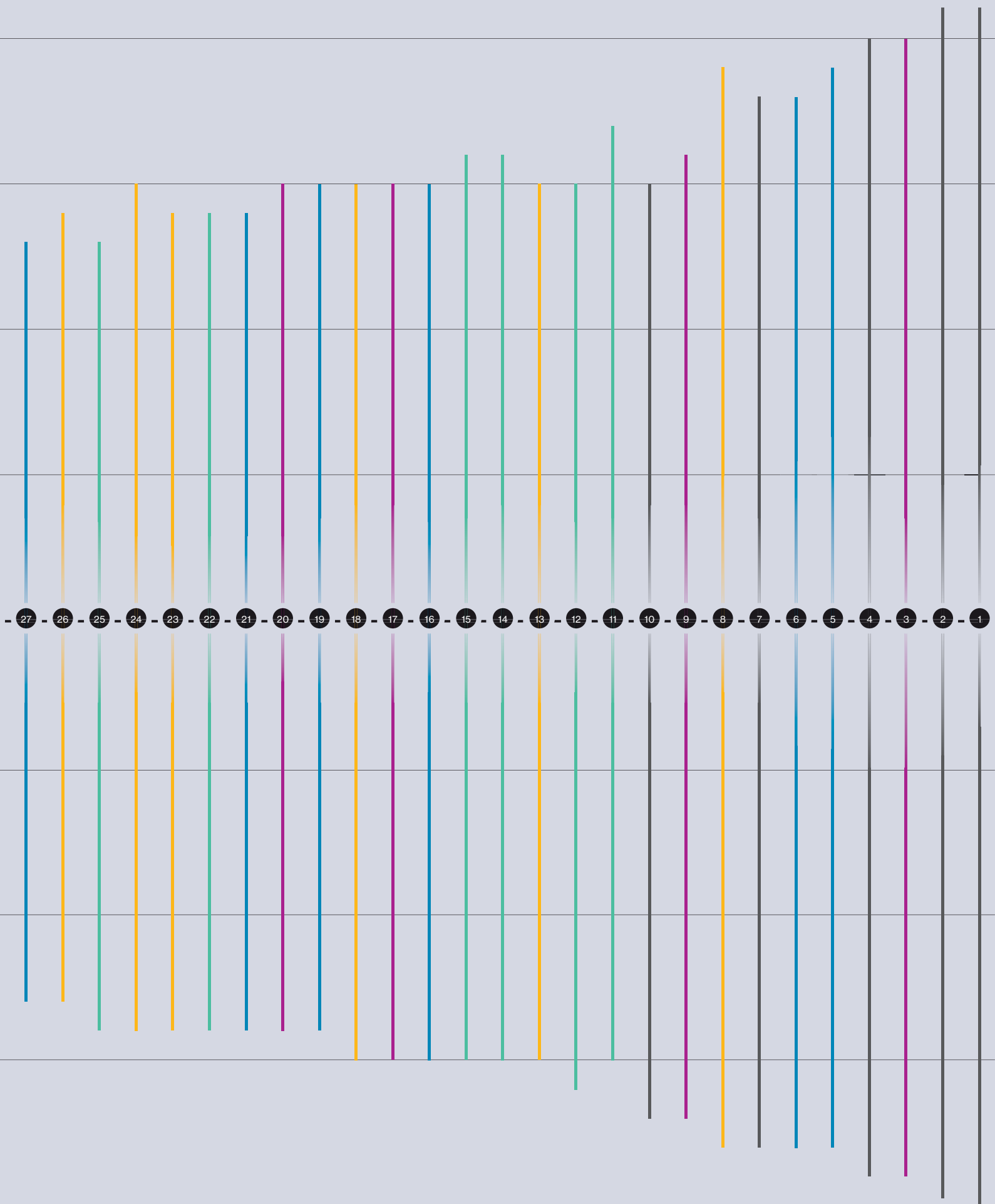
6

Ease of risk management

1= Easy to manage

10=Difficult to manage

6.5



Talent management and the complexities of a global workforce

Finding - or creating - the talent to fill a new generation of high-tech transportation roles is critical to operators' success. The emphasis has shifted from finding enough people to finding the right people

"People are our most important asset." It is a common corporate refrain. Even as the automation of industry draws nearer, corporate growth and rising demand for trade and travel continue to drive the global competition for skills. The transportation industry is no exception.

In a snapshot of the potential demand for skills, Boeing predicts the aviation sector will need 1.1 million more pilots and technicians by 2030.

On the sea, BIMCO and the International Chamber of Shipping believe the merchant fleet will require another 147,500 officers by 2025. The fleet currently operates with 16,500 fewer officers than it needs.

On the roads, an ageing workforce and relatively unattractive working conditions have truck owners everywhere worried about the prospect of finding new drivers. In the US alone, the American Trucking Associations estimates the driver shortage could reach 175,000 by 2024.

Despite fears that automation will ultimately prove to be the enemy of the labor force, the escalating pace of technological change is

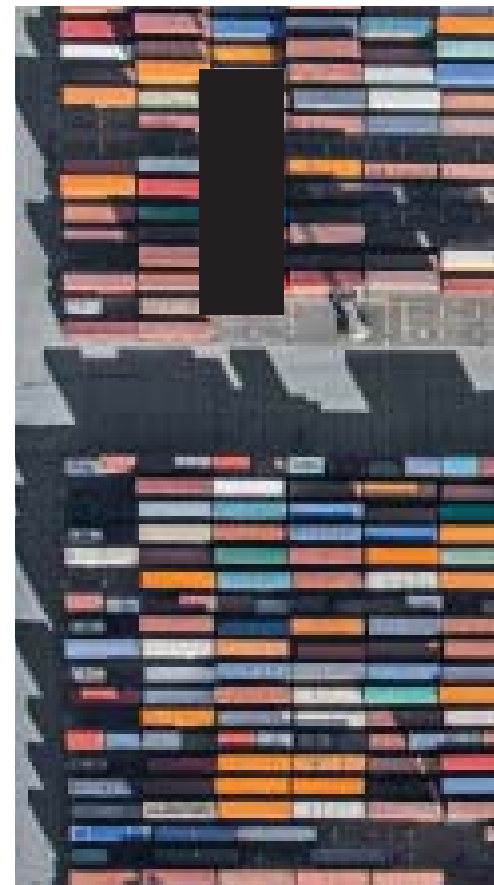
spurring demand for skilled people, such as data analysts, systems programmers, cyber-guardians and digital engineers. The competition for new-age talent is on the rise.

The quality of a company's workforce has a direct influence on its ability to mitigate other key areas of risk and is intimately linked to issues such as a firm's ability to meet financial targets, build cyber resilience, protect its corporate reputation and satisfy client expectations. So, as technology evolves, the ability to attract and retain people who can adapt to the changing business environment becomes ever more integral to corporate health.

Traditional capital assets and systems may evolve over time but the workforce will remain the moving part of any corporate makeup, the binding agent that differentiates a company and builds that ever-elusive competitive advantage.

Yet talent risks rank low

If people are a company's most valuable assets, it stands to reason that talent-management risks would feature near the top of any company's risk register. But our



Risk Index does not bear that out, at least not at the macro level. In fact, concern about the risks associated with talent management and the complexities of a global workforce rank last among the five megatrends across all modes of transportation.

Geographically, talent-management concerns also rank last in the three most industrialized regions – Europe, North America and Asia – while in Latin America and the Middle East and Africa they rank fourth out of five.

Moreover, responses from the companies' chief human resource officers differed only marginally from those of other survey participants. Only in the risks associated with the mobility of skilled labor was there a significant differentiation of concern (15 per cent higher) from the rest of the executive group.

Some of this apparent apathy to talent risks may be attributable to the fact the risks are transitional in nature. The democratization of work and technology enablement are rapidly redefining what the



“ As automation rapidly increases across the sector, it is clear that we are seeing shifting skill premiums; from those associated with routine execution to those associated with customer empathy, innovation and decision-making under uncertainty. In other words, those uniquely human attributes ”

– Ravin Jesuthasan, managing director, Willis Towers Watson

“ We have to move from a concept of finding talent, to one of creating talent. Talent creation means showing people the potential that they don't even know they have ”

– COO, leading container operator

industry requires of its talent. Industry in general is moving from requiring people to fill whole jobs to recognizing that jobs are increasingly being fragmented into tasks that require different methods to execute them: for example, robotics for routine tasks, artificial intelligence for the more analytical, and specific types of talent for activities that require the human touch.

For some executives, irrespective of job description, the key to managing workforce-associated risks lies in making the transition from the current practice of finding talent to one where a commitment to forecasting and training allows a company to create the talent it needs.

Different subsectors, different issues

While transportation industry concerns about risks associated with talent management are surprisingly low at the macro level, an inspection of the individual risks within the megatrend reveals substantial disparity at the subsector level.

Airlines, which see themselves as attractive employers, do not rank any workforce-management issues in their top ten individual risks. But aircraft lessors and companies in the space subsector each rate the escalating costs associated with keeping their people safe seventh.

Ship owners, who beyond the elite companies face a comparatively bigger struggle to attract new employees, rate a lack of skilled talent and mobility as their third risk. Cruise operators rate talent retention fourth.

Land-based operators – rail, road and third-party logistics providers such as freight forwarders – rate a lack of skilled labor as their seventh-highest risk.

The trucking subsector in particular has struggled in recent times to attract and retain drivers, given the relatively low pay and demanding lifestyle. This has not only idled trucks and the goods they carry, it has prevented operators from adapting to any new customer requirements in the digital era and

1. Lack of skilled labor and mobility
2. Staff retention
3. Rising labor costs
4. Escalating duty-of-care costs
5. Lack of potential leaders
6. Cost of maintaining competitive compensation
7. Labor disputes and industrial strikes
8. Complexity of local employment laws
9. Ageing workforce and related health issues
10. Over-reliance on contracted employees

limited their potential to capitalize on opportunities presented by broader economic rebounds.

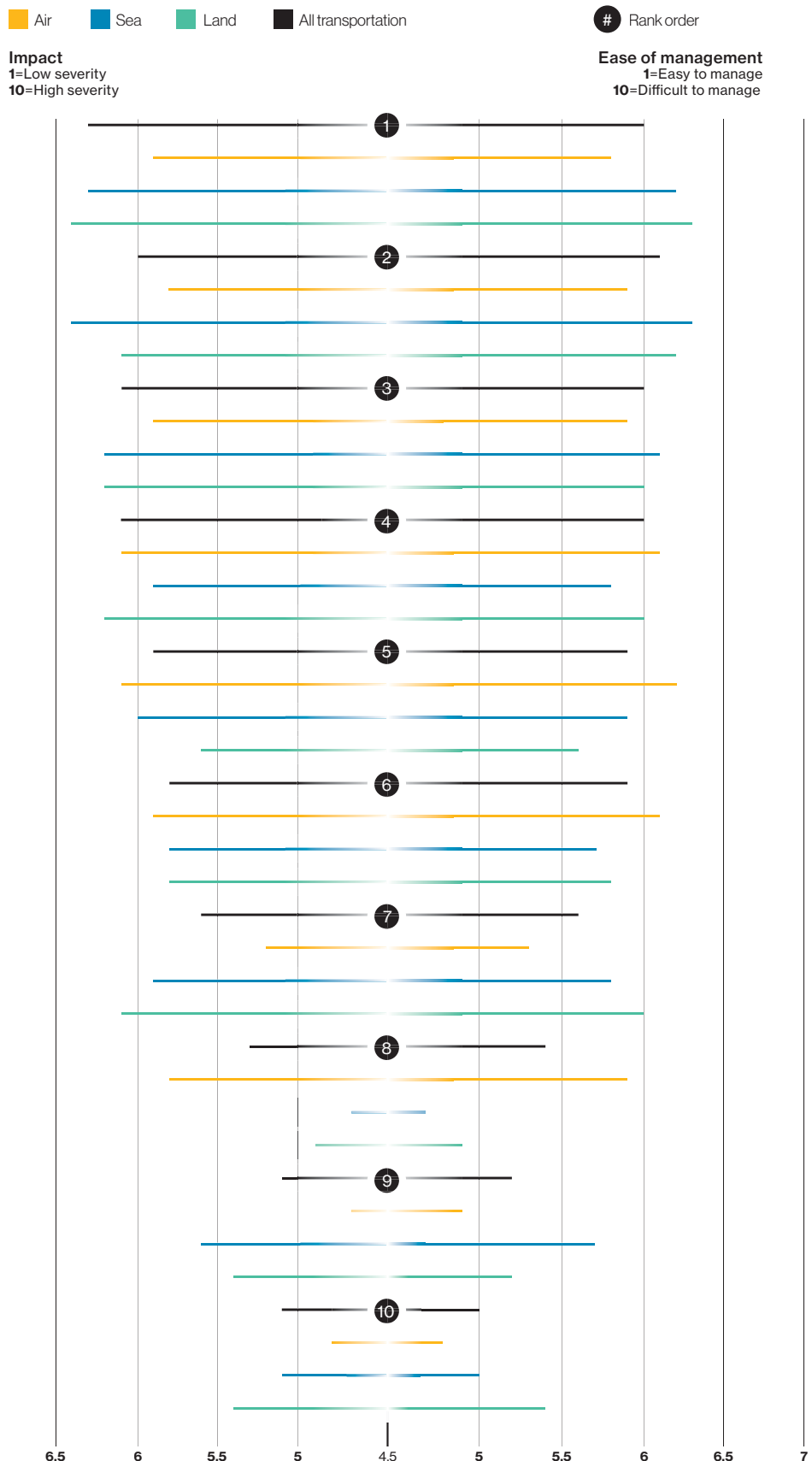
When it comes to managing a competitive global workforce, the air transport sector's perception of people risks is not aligned with other modes of transport. Airline executives believe that the attractiveness of their employee proposition helps them manage staffing challenges. Conversely, land-based transport companies struggle to fill strategic positions and often rely on workers who see the sector as a stopping place on the road to a better job.

Whether a sector is attractive to jobseekers or not, the rapid advance of technology is changing the skillsets required across the transportation spectrum. For example, the promise of big data, the threat of cyber vulnerability and the demand for better forecasting are all driving demand for digital skills.

However, few technical evolutions will pose greater challenges for CHROs than the rise of robotics. By most estimates, the transportation and distribution industries will be on the front lines of potential redundancies. The tens of millions of jobs that serve those supply chains could be at risk, posing a retraining challenge on a scale never seen before. The potential for labor unrest will also loom large for those who cannot manage that transition.

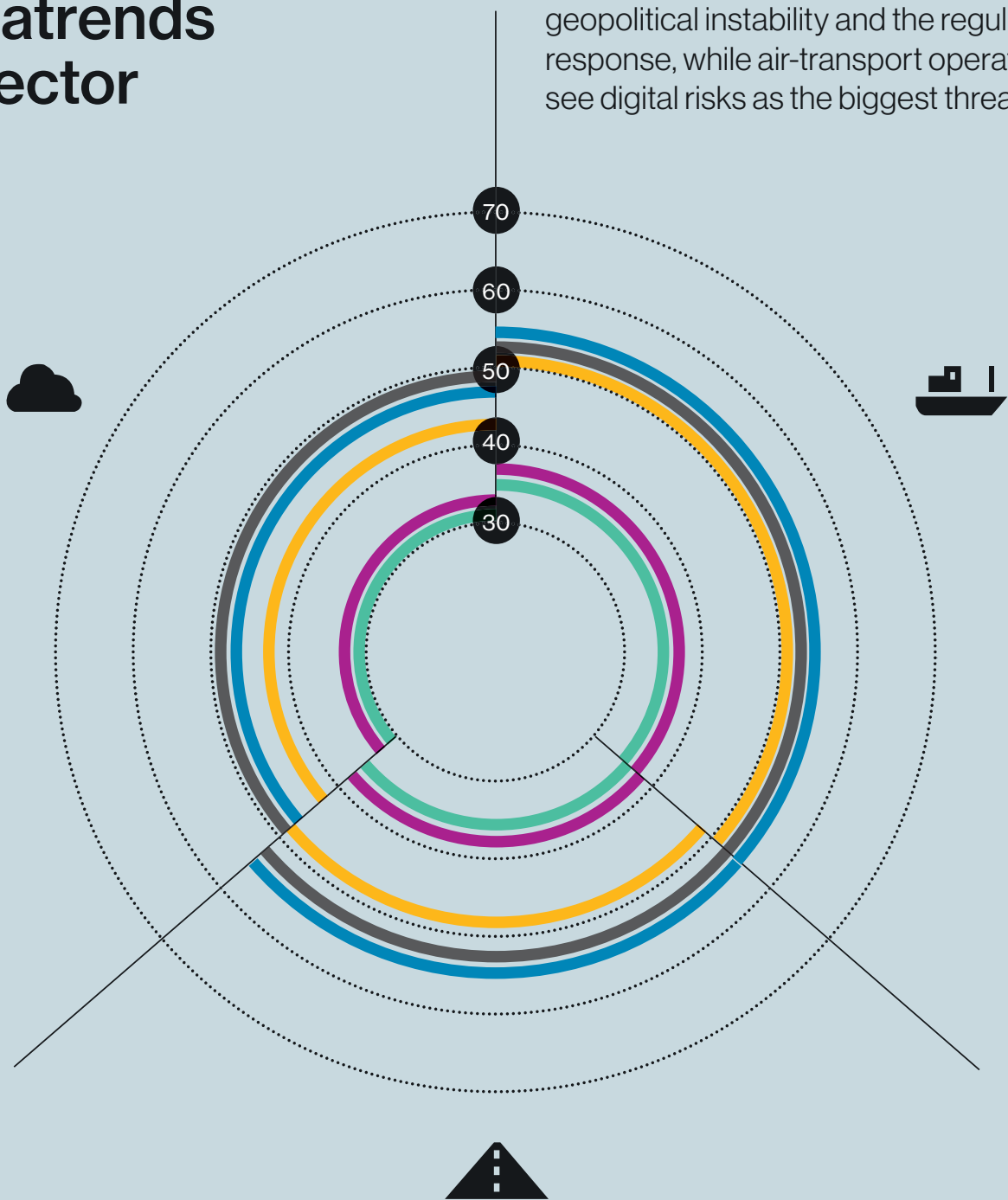
Amidst all this change, workers' ability to not only manage but also develop new technologies in response to the changing demands of the consumer will remain central to corporate reputations.

Fig. 5 | Top risks for talent management and the complexities of a global workforce



Rating the megatrends by sector

For sea and land-transport companies, the top risks are associated with geopolitical instability and the regulatory response, while air-transport operators see digital risks as the biggest threats



Sector



Air



Sea



Land

- Geopolitical instability and regulatory uncertainty
- Changing market dynamics and business model insecurity

- Complex operating models in an interconnected world
- Digital vulnerability and rapid technological advancement

- Talent management and the complexities of a global workforce

Rank order determined by combined risk score (severity of impact × ease of risk management)

Complex operating models in an interconnected world

The increasing connectivity of global supply chains - physical and digital - is exposing transportation companies to the cascading consequences of risk

Economic historians cannot agree on the single event that signalled the start of globalization. But there is general consensus that it is driving the growing operational complexity of business.

In addition to globalization, many of the factors that drive complexity in the transportation sector's operating models are easy to identify: the 1970s brought just-in-time manufacturing; in the early 1990s the internet became an established business tool; and demands from an increasingly knowledgeable consumer base have driven innovation – and prompted governments to add layers of regulation.

Globalization has opened a wider path to corporate growth and increased organizational complexity with each new acquisition, product sector and marketplace. It has multiplied the number of markets that are profitable to serve and stretched supply chains and the transport networks required to serve them. The cost of operating

in this environment has led to outsourcing. Supply chains are now reliant on the performance of multiple third-party operators, which means that local events can have global consequences. The recent collapse of Hanjin had significant and detrimental consequences for exporters such as Samsung Electronics, which rely on the carrier for 40% of their overseas shipments; many of Hanjin's vessels were stranded at sea and a few were seized by creditors.

The commercial practicalities of serving a wider geographical network of emerging markets have prompted the formation of partnerships and alliances. Compromises have had to be struck. It is not unusual for companies to find themselves working with partners who wouldn't have been their first choice, and operating in areas where risk levels exceed traditional comfort zones.

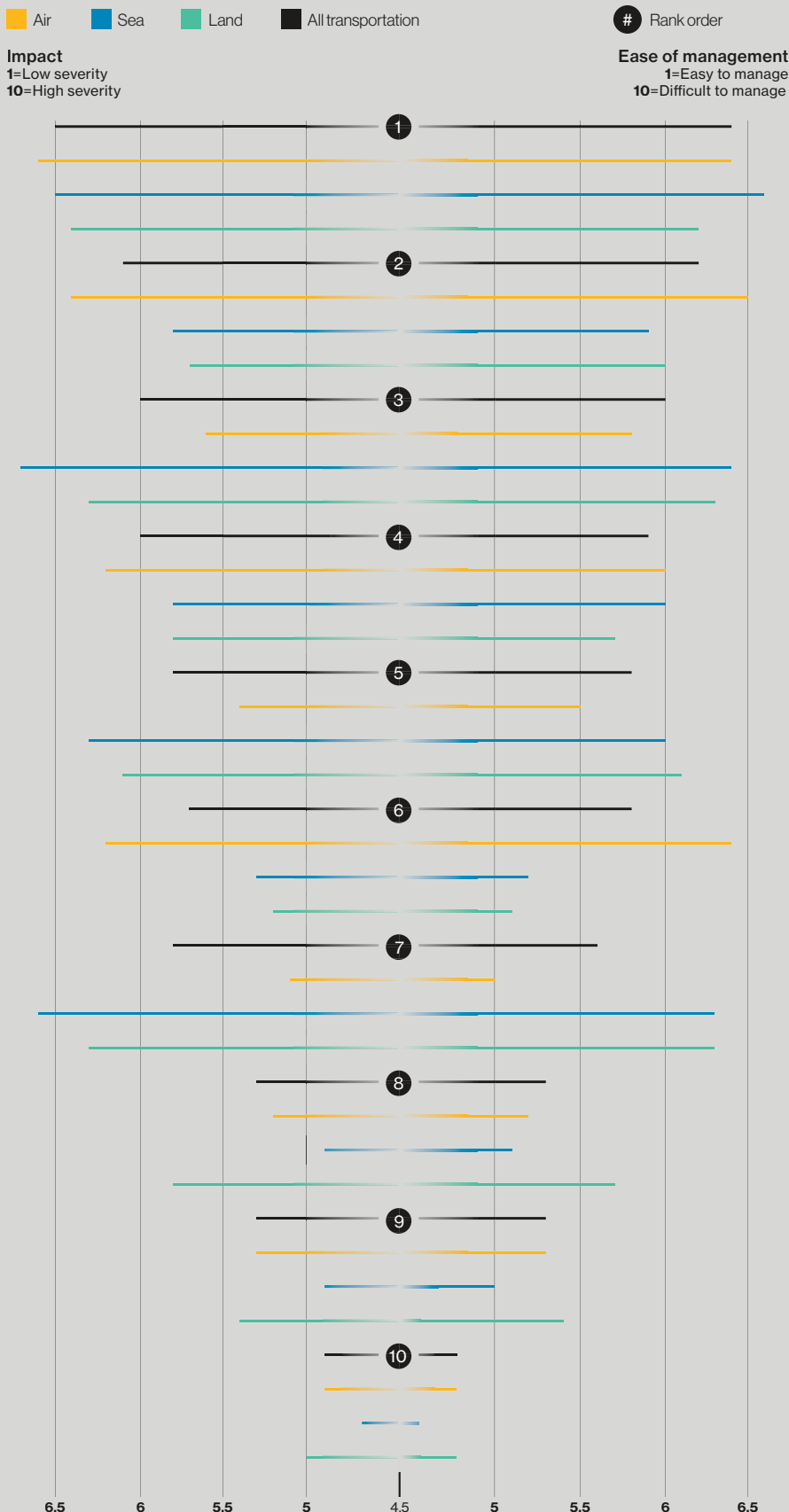
Transportation companies can find the lines between risk and reward too blurred in these regions. "Some



“ It's all about making sure people out there in the business in the relevant positions understand risk and use risk as a way of making decisions ”

– Helen Hunter-Jones,
head of group risk, Network Rail

Fig. 6 | Top risks for complex operating models in an interconnected world



1. Dependence on third-party suppliers
2. Over-dependence on national infrastructure
3. Change in demand due to macro-economic conditions
4. Disruption to operations due to security issues
5. Inflexible asset agreements
6. Extreme weather events/natural disasters
7. Capacity issues arising from delay and disruption to repair and delivery of assets
8. Customer consolidation
9. Over-reliance on global partner alliances
10. Strikes and industrial action

of the riskier environments are disproportionately complicated for us as a business. We believe complexity is the enemy of cost, so keep it simple," says Peter Duffy, group commercial director of easyJet.

Although globalization has been stretching supply chains for the course of the 20th century and into the 21st century, risk managers can ill afford to get comfortable with the trend. Emerging technologies such as 3D printing have the potential to begin a global supply chain retraction: future goods will be printed where the consumer base is located. Other technologies are further localizing the supply chain. Twenty years after it moved its manufacturing arm to Asia, one sportswear brand recently announced that production will begin again in Germany, but this time it will be robots making the shoes.

Daily complexity

For transportation providers, simply managing the complexity of modern operating networks and supply chains is a daily challenge. Having to do so in an increasingly connected world amplifies the security challenges and requires a level of inter-company co-operation

“ There will be a lot of reliance on outsourcing [for cyber-security], which causes its own problems ”

— **Hervé Borel**, insurance director, Alstom

that sits uneasily in an environment of fierce competition for resources and market share.

"Any business can control what's within its own scope, but you are very dependent on your suppliers and your partners to do their part," says Tony Tyler, the former director general and CEO of IATA. "We see this from the pressure we put on our business partners to be very much on top of the risk issues, and particularly the IT cyber-security issues. And we see it from our downstream partners, the airlines particularly, who expect us to be fully compliant with the regulatory and best practice provisions in the functional areas we operate."

Climate change, extreme weather events and epidemics multiply the risks associated with globally connected supply chains. According to the British Standards Institution, the five biggest natural disasters in 2015 caused \$33 billion in damages to global businesses. In this interconnected world, the effects of extreme weather are no longer isolated, and organizations need to understand the implications across the supply chain network. For transportation companies operating in areas of exposure, these risks are "huge," says Helen Hunter-Jones,



head of group risk at Network Rail. "For big future risks one of my top ones is weather: climate change, flooding and wind."

Epidemics and health disasters further emphasize the need for transportation companies to focus on supply-chain resiliency. Labor disruption and protests, impediments to travel and economic slowdown are risks associated with health disasters that were realized during the Ebola outbreak. With 2.2 billion people currently living in areas at risk from the Zika virus, and the World Health



Organization warning of a potential Yellow Fever epidemic, these threats remain present. For aviation sector respondents it is the idea of an airborne virus that presents the biggest danger to operations. "One of the things that can really harm [the airline] industry would be if some health problem emerged that was deeply associated with air travel," says Tyler. "That could knock us back for a long time."

A high-performing organization builds its operating model to deliver a unique business strategy; that's the heart of its competitive advantage.

So it follows that the risks associated with complex operating models in an interconnected world are among the highest rated in this year's Risk Index.

The top perceived risk from this category is "dependence on third-party suppliers." It ranks in the top two individual risks for every mode of transport and is the highest risk in the aircraft-leasing subsector. Across the full risk landscape, it is rated the third-highest overall threat to airlines.

The air sector provides the weight behind the category's second-

biggest risk – overdependence on national infrastructure – with manufacturers leading the way. The influence of the global economy on demand, operational disruption from security issues and inflexible asset agreements round out the top five risks in the category.

Executives from both the land and sea transport sectors fear operational disruptions stemming from any delays in the repair or delivery of commercially critical assets. Land-based companies rank that as their primary risk from the category, as do executives from the cruise shipping and ports and terminals subsectors.

Tricky relationships

From a risk perspective, the growing complexity of an operating model requires a proportionate assessment of company resources and strategy. Complex risks require comprehensive solutions. And while partners and alliances can offer access to economies of scale and new markets, they also expose a company to the partners' weaknesses, requiring another layer of due diligence.

While due diligence may not result in perfect partners, it will bring a fuller understanding of their weaknesses. It will also support knowledge-based decisions on how much risk to retain and how much to transfer.

The same can be said for new and emerging markets. Supply chains do not always offer an operator's preferred choices. There may be 15 potential partnerships in a relatively safe market, while riskier markets may only offer one.

Operating a complex, connected business is about taking manageable risks. Without risk, transport profits, like those in other industries, would be negligible. A reasonable balance between risk and reward is required to take risk profitably.

Trends in the transportation of people and cargo have long been studied for their ability to predict economic health. For example, demand for air cargo capacity and business-class seats are the first to fade ahead of an economic downturn. Likewise, demand for the transportation of relatively high-value containerized goods will fall before essential commodities such as grain or oil.

The sector's role as an economic bellwether has also made its participants uniquely exposed to the vagaries of market demand. Asset-capital costs are extensive – some would say a formidable barrier to entry – as are the consequences of insufficient cash flow or credit lines. In an era where some sectors have slavishly pursued the benefits of scale, matching supply with demand has proven tricky and forecasting errors costly.

Maersk, for example, ordered their ultra-large 'Triple E' vessels to derive the economic benefits of scale during times of rampant globalization and high oil prices. Their main rivals had little choice but to follow suit. But,

with growth having slowed and more manufactured goods being produced locally, those ships now contribute to over-capacity problems of up to 30% with the industry's 'super-cycle' in remission.

These are the traditional challenges and risks that transportation providers must navigate, along with issues such as shifting markets, the rise and fall of national economies, commodity price crashes, social unrest, epidemics, protectionist legislation and the emergence of state-sponsored rivals.

“ One of my first questions when I'm meeting an airline CEO is: 'how's business?' Invariably, they quickly talk about the competitive environment and how it's constantly getting tougher with new carriers coming in ”

– Tony Tyler, former director general and CEO, IATA

Modern practitioners can now add the impact of new technologies to the list of factors that have owners and operators questioning the sustainability of their business models. The technological horizon is clouded with business disruptors, and the rise of 3D printing clearly illustrates their potential to elevate market risks.

Manufacturers see 3D printing as a way to streamline operations, improve product quality and lower costs. PwC believes that up to 37 per cent of goods presently carried in containerships are at risk from 3D printing.

Products that are prime candidates for the new manufacturing process include electronic equipment, toys, footwear, computers, auto parts and plastics. 3D printing would move their manufacturing closer to the centers of consumer demand and reduce the need for transport by land and sea, and, to a lesser degree, air.

In the aviation sector, GE Aviation plans to 3D print more than 100,000 of the aircraft parts it now sources externally to build its aircraft components. Either development has significant potential to disrupt present trade patterns and expose inflexible business strategies.

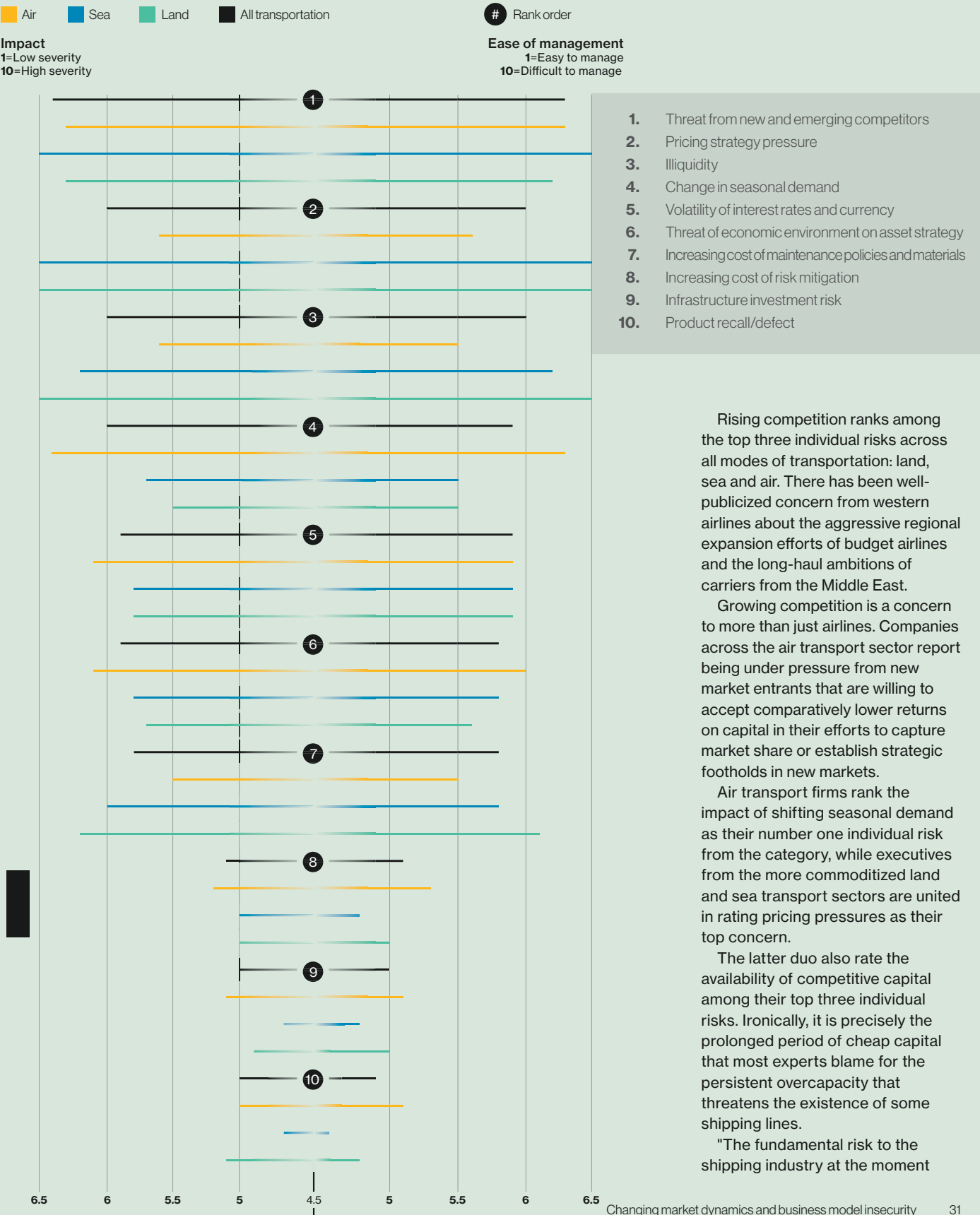
Competition fears lead the risks

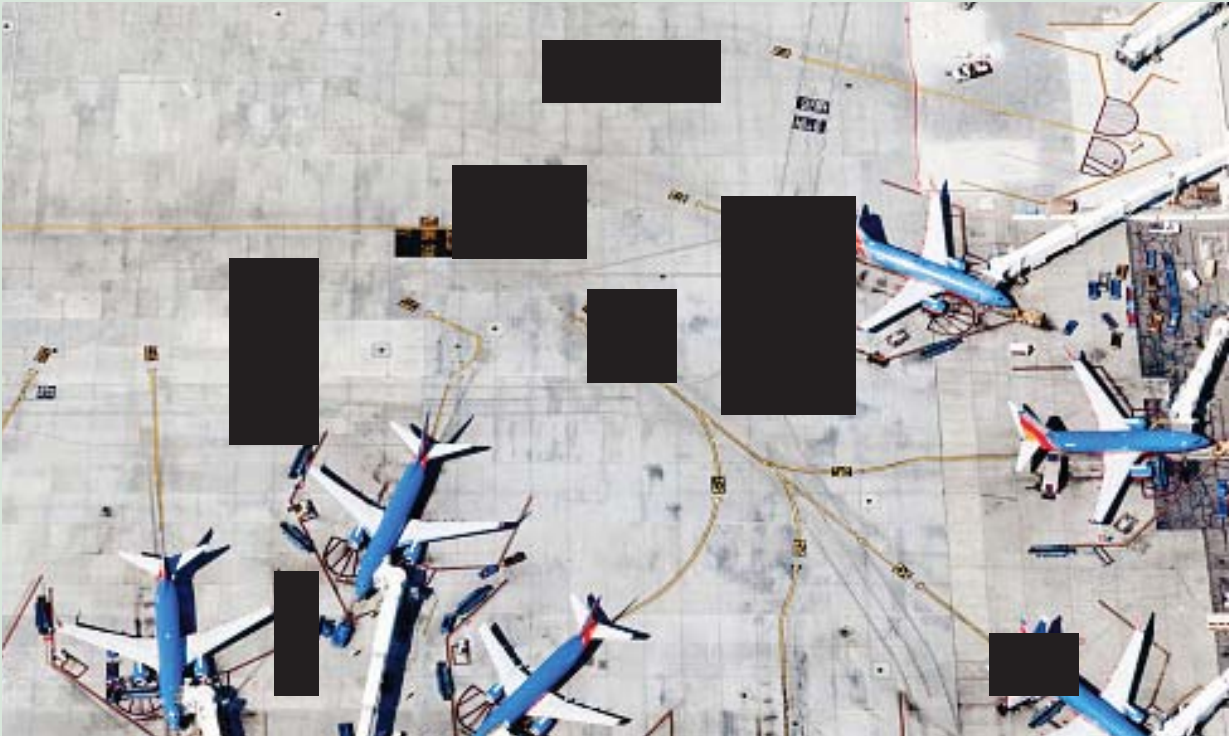
With both traditional and new-age forces at play, senior transport executives rate changing market dynamics and business model insecurity as the third-highest group of risks in the Risk Index.

Changing market dynamics and business model insecurity

Emerging markets and more educated consumers are changing tradition patterns of supply and demand just as technological advances and new national priorities are giving rise to powerful competitors

Fig. 7 | Top risks for changing market dynamics and business model insecurity





is capacity," says Lars Henneberg head of risk management at Maersk. "There is an imbalance between supply and demand because growth expectations have been too high, and it's not going to go away before we see consolidation in the industry or more discipline in new building."

The rise of technology

Overall, air transport providers rank fears about the inability to keep up with the pace of technological change as their fourth-highest risk. But most references to technical risks across all three modes of transport relate to security issues and business interruptions, rather than their broader ability to change the dynamics of the markets.

Technology's influence on the shape of markets will be pervasive, however. Driverless vehicles will dramatically change the trucking industry, reducing labor-related costs, increasing efficiency and

extending the operating hours for each truck. In April 2016, a fleet of semi-autonomous trucks arrived in Rotterdam from starting points in Belgium, Germany and Sweden, marking the first time the technology had travelled across borders. The trucks were "platooning," driving just seconds apart with speed controlled via a wi-fi connection. According to research firm TNO, two trucks driving 100,000 kilometers annually can save €6,000 on fuel when platooning, compared to driving with cruise control.

Drone sales are expected to reach 7 million units annually in the US alone by 2020. The escalating adoption of commercial drones will further change the economics of the trucking sector and significantly alter the business models of third-party logistics providers and integrators such as FedEx and DHL.

Technological advances such as emergence of aerial drone delivery

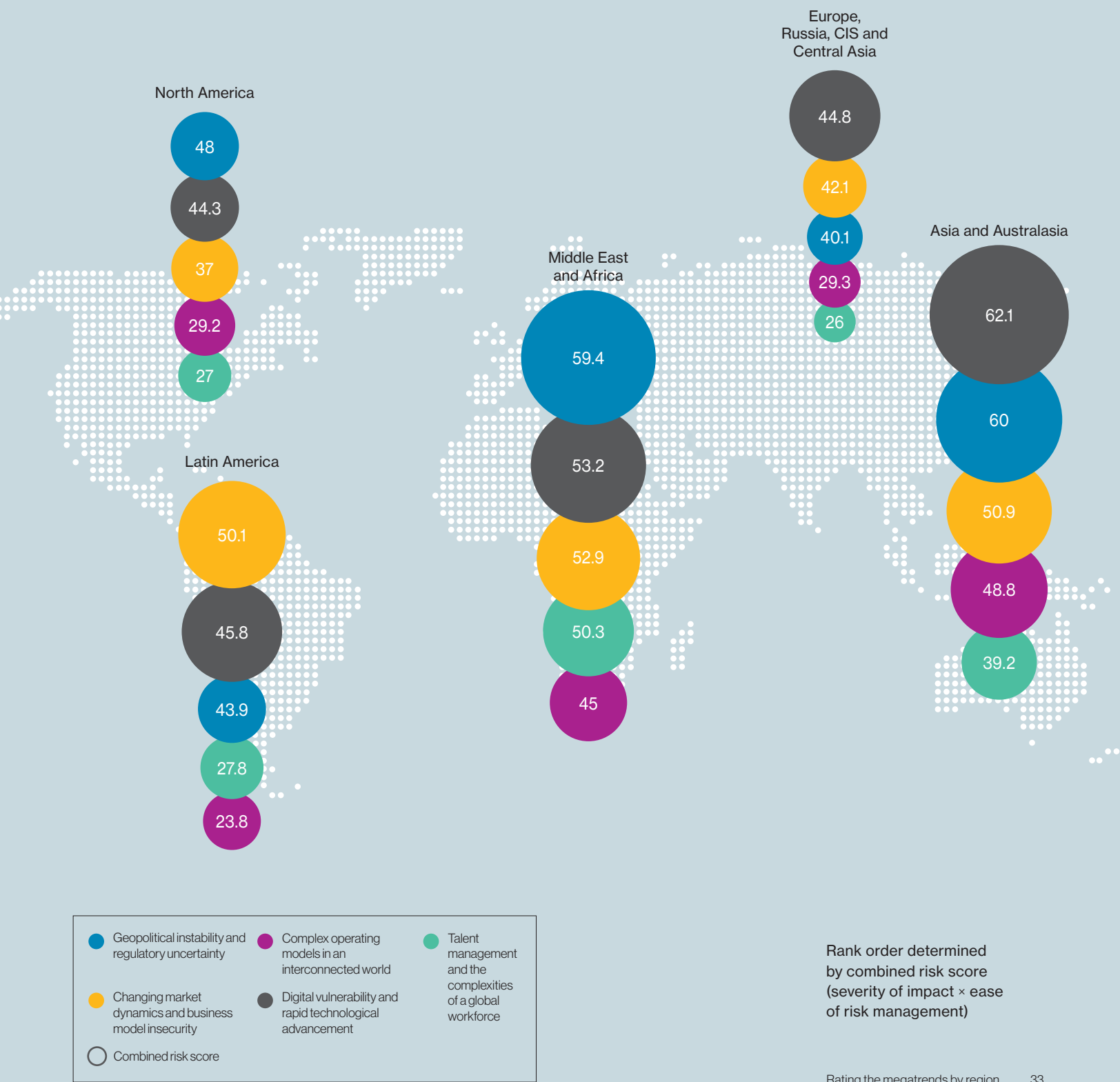
fleets, assembly and sorting-line robotics, as well as 3D printing, will also heighten competition by opening the door to new tech-savvy competitors.

Indeed, Amazon has just been granted a patent in the U.S. for a "multi-use unmanned aerial vehicle docking station system." Empowered by deep consumer-behavior intelligence, the company is working on extending their online sales activities into areas traditionally served by transport companies. If this happens, airlines, shipping lines, rail operators and trucking companies alike could see their roles reduced to simple asset-owners, with no go-to-market interface and fewer levers to pull to protect profit margins.

At the mercy of supply and demand, market dynamics will always be fluid and business models will have to adapt. However, shifting market dynamics are now destined to be driven by more than economics.

Rating the megatrends by region

Vast regional differences in the perceptions of risk make global solutions very rare, proving the value of a customized response



The strategic opportunity of risk

Industries tend to fixate on the dark side of risk, the threat and its potential to disrupt. But smart companies increasingly see risk as an opportunity, a chance to build a response that will differentiate them from the competition



Risk is a path to growth. Industries tend to fixate on the downsides of risk – its potential to disrupt operations, destroy profits and damage reputations. But risk can also present opportunities for those able to see the potential. Smart companies seek out measured risks to gain competitive advantage. They don't always play safe.

Managing modern business risks is a far more complex proposition than it was when the responsibility fell exclusively to structural engineers, finance managers and the champions of the IT room. Today, the assessment of the risk landscape is almost more important than the mitigation strategy, although ideally the two should mutually support and deliver corporate strategy.

In fact, in an era where risk is becoming more elusive and intangible, the emphasis has shifted toward preparedness for and response to events, rather than development of static strategies that mitigate individual risks. The new complex, interconnected risk landscape requires a comprehensive, knowledge-based response that is coordinated from the boardroom, where corporate strategies are formulated.

"If I take the provocative view, I would say that taking risk is a natural part of doing business. It's what we make a living from," says Lars Henneberg, head of risk management

at Maersk. "Our risk capacity is a competitive advantage because we can afford to take risks in emerging markets, for instance, where our competitors can't because they do not have the same balance sheet, they do not have the same access to capital and they do not have the same risk-bearing capacity because of our scale and size."

New opportunities

Examples of opportunity in risk abound. As a category of risk – or megatrend – geopolitical instability and regulatory uncertainty is the biggest concern for the 350 C-suite executives whose opinions inform this Risk Index. Trends such as the globalization of the economy and urbanization are escalating and now seem to constantly shift centers of buying power, trading patterns and consumer demand. Responsive, flexible and informed corporate strategies will be key to mitigating risk, but they will also be central to seizing opportunity.

Take urbanization, for example. The UN believes there will be 41 cities with ten million inhabitants or more by 2030 (up from 34 today) as the rural populations of Africa and Asia flock to urban areas in search of their own opportunities. The migration will put stress on existing road infrastructure, making the logistics of trade distribution more difficult. But it is also a huge opportunity for rail operators, who rely on population density to function efficiently and profit.

Advances in big data mining will give the rail industry the market intelligence to compete with the emergence of ride-sharing networks by simplifying the user experience and adapting new low-cost pricing models. For example, tracking customer movements through digital-payment systems will allow operators to offer personalized travel options, which could optimize capacity and drive revenue growth.

In general, finding ways to use big data to customize the travel or trade transport experience and drive monetary return is a substantial opportunity for companies in those sectors.

“ The greatest opportunity of technology is the ability to be first to market with a performance enhancing application of relevant technologies. We have applied new vessel-design technologies that really created a paradigm shift rather than an incremental improvement ”

— Peter Curtis, COO, Seaspan

Executives who can identify the specific data streams that predict market trends or monitor increasingly educated consumer behavior will gain an advantage for their companies and, ultimately, remuneration for themselves.

Technological power

The transportation industry rates the risks associated with digital vulnerability almost as highly as they do those in the geopolitical sphere. Globally, cyber-crime is the highest-profile threat that businesses presently face. But there, too, lies opportunity. Beyond the first-mover reputational advantages of being among the few who have their cyber-risks under control, there are opportunities with a more direct influence on the bottom line.

According to Glyn Thoms, Willis Towers Watson's executive director for cyber & TMT, companies who fully understand and quantify their exposure to cyber-risks within an enterprise framework will be first in line for the cheaper capital they need to fund other growth opportunities.

"It will empower those who are able to fend off the increase in the cost of investment capital that the markets will demand from those organizations that cannot prove the effectiveness of their cyber-defense," Thoms says. "Inevitably, this will mean that good cyber is good business. It will be a differentiator in the cost of capital."

According to the Index, companies in the air transport sector are the most sensitive to the risks associated with the accelerating pace of technological change, and they rank the inability to keep up with technological change as their fourth-highest risk. No other mode of transport ranked it in the top ten.

The challenges of staying abreast of technological change are considerable in transport's most technologically advanced sector. As will be the opportunities for the technological pioneers, or those based in jurisdictions governed by forward-thinking regulators.

Airlines benefit greatly from every incremental advance in the efficiency of air traffic control. The route data and analysis tools are already there to improve routings, lower fuel costs and

lessen the industry's environmental impact. But governments bear the lion's share of the cost for upgrades and receive fewer direct benefits, so change has been slow, or at least too slow for the airlines.

Every mode of transport would benefit from the development of more efficient fuels and propulsion technology. At present, ship owners in particular face significant regulatory and technical uncertainty, which is raising investment risks. Some are using advances in computational fluid dynamics and model laboratories to streamline hull and bow structures and design more efficient propellers to achieve roughly the same end.

Advances in technology are transforming even the humble container; while automated lock sensors have proven vulnerable to cyber-hacking, the latest containers can literally "smell" danger (in the case of fires, for example), sense light, detect movement and changes in temperature, and tell the carrier whenever cargo is vulnerable.

But amidst all the automation, the digitalization of business processes, the cascade of emerging technologies and the endlessly shifting markets and consumer trends, perhaps the transportation industry's biggest opportunity lies in the competition for talent. People are the binding agent between corporate strategy and goal delivery. As technology changes, the importance of retaining and retraining the associated skillsets to manage the systems, tools and assets will not diminish. Even robots will need programmers. Those who have the market intelligence to align the skills of their workforce with emerging technology will have grasped a significant opportunity.

“ Equipping containers with remote monitoring devices could become widespread in our industry, but right now the use of this technology is not common. On the one side, you take cyber-risk to every single container, on the other side there are good opportunities, especially for cargo that requires temperature control, to react to risks such as the container shutting down, or high-value cargo being compromised. It gives us the opportunity to react quicker ”

– Margarita Herrmann, senior director, corporate insurance risk management, Hapag-Lloyd AG



The world is changing

Megatrend

■ Geopolitical instability and regulatory uncertainty

■ Digital vulnerability and rapid technological advancement

■ Talent management and the complexities of a global workforce

■ Changing market dynamics and business model insecurity

■ Complex operating models in an interconnected world

“ Politics, the construction of states and the organization of human affairs in structures, is not behaving as we have been used to for the last 70 years”

– Sir Jeremy Greenstock, chairman, Gatehouse Advisory

“ There has been such a large amount of regulatory change in such a short period of time... It has added very significantly to costs and complexity and those two things together are always bad for business, and for the consumer in the end”

– Peter Norris, chairman, Virgin Group

“ The more the Internet of Things develops, the more the safety of assets will be at peril”

– Lars Henneberg, head of risk and insurance, Maersk

“ It's not so much specifically one problem, it's a whole bunch of people who want to do bad things to your organisation who are taking advantage of the changing dynamics of the global technology to do those things more easily”

– James Hatch, director, cyber services,
BAE Systems Applied Intelligence

“ One of my first questions when I'm meeting an airline CEO is: 'how's business?' Invariably, they quickly talk about the competitive environment and how it's constantly getting tougher with new carriers coming in”

– Tony Tyler, former director general and CEO, IATA

“ Some of the riskier environments are disproportionately complicated for us as a business. We believe complexity is the enemy of cost, so keep it simple”

– Peter Duffy, group commercial director:
customer, product & marketing, easyJet

“ Technology is not a replacement for people; it is a complement for people”

– Leading container operator

“ Investment in the workforce will definitely remain important if you want to stay ahead of the potential adverse effects”

– Peter Curtis, COO, Seaspan

\$56 billion

The costs to global supply chains in 2015 from crime, extreme weather, terrorism and the European migrant crisis

2016 British Standards Institute

By 2020

Smart cities will be connected to 9.7 billion IoT devices

2015 Gartner report

50%

of global population growth between now and 2050 will be in Africa. Europe's population, meanwhile, is projected to fall

2015 United Nations report

By 2060

Trade share in OECD countries will halve, yet more than double among non-OECD economies

2016 International Transport Forum study

80%

of cyber-breaches may originate in the supply chain

2015 SANS Institute study

1.1 million

more pilots and technicians will be needed by 2030

2015 Boeing outlook

By 2025

The first drone ship will make its experimental maiden voyage. It will be 40% cheaper to run than a manned vessel

2015 Rolls-Royce and Inmarsat research

80%

of logistics facilities today are still manual

2016 DHL report



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