



Swiss Re SONAR
New emerging risk insights

June 2021



Every year, Swiss Re SONAR informs and inspires conversations about emerging risks, so the insurance industry and its clients can continue to build resilience.

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Overview

Emerging risk themes impact and timeframe

0 – 3 years

 <p>Restarting suspended operations – larger accidents ahead?</p>	 <p>Health tracking devices – hidden risks in wearables?</p>	 <p>Electric scooters and beyond – micromobility risks</p>
	 <p>Modern slavery – pressure on supply chains</p>	
	 <p>Beirut explosion – dangers of hazardous materials</p>	

> 3 years

 <p>Zombie companies – sustained by COVID-19 support</p>	 <p>Income inequalities – pandemic hurts the middle class</p>	 <p>Lack of diversity in product testing – safe?</p>
	 <p>COVID-19 – the longer-term health burden</p>	

Most affected business areas

-  for Property & Specialty Lines
-  for Life & Health
-  for Casualty
-  for Operations incl. regulatory changes
-  for Financial Markets incl. insurers' assets

Potential impact

- High
- Medium
- Low

Trend spotlights



Urban mobility: innovation in short-distance travel

Ethics in digital nudging

Insurers on the road to net-zero

Are humans ready to engage with bots?

Pricing nature in insurance

What's next in insurance modelling?

Foreword

The story of the past months has been one of heightened uncertainty and repeated realignment of predictions and plans. For as long as the pandemic remains ongoing, that story will not change. The COVID-19 vaccine is a case in point: while on one hand providing light at the end of a (long) tunnel, even with vaccine availability the virus continues to inflict loss and suffering on many people in different countries, and global economic disruption. The pandemic is a timely reminder that “knowledge” can be a moving target, on account of many unknowns and aspects that can be easily overlooked.

For re/insurance, times of such heightened uncertainty are the hour of emerging risks. To address them proactively, risk foresight is needed. Every year, Swiss Re’s SONAR report offers new emerging risk insights with a re/insurance perspective. Through SONAR, Swiss Re has been sharing its insights on emerging risks since 2013. As an annual calendar item, we highlight trends in and disruptions to the risk landscape, and the implications thereof for re/insurers, our partners and wider stakeholders.

Swiss Re’s SONAR 2021 addresses the long-term effects of the pandemic as well as a wide range of re/insurance-focused emerging risk themes and trends. On climate change, we emphasize (again) decarbonisation and the road to net-zero emissions, also with respect to the efforts of insurance business in progressing the low-carbon economy ambition. We also continue the discussion around the dynamics of human-machine interactions, a nod to, for instance, the widening adoption of health monitoring devices and innovations in urban mobility.

New risks do not emerge during times of crisis alone. To regularly profile and think through new or changing risks, and their associated uncertainties, helps build societal preparedness for the future. We look forward to exploring emerging risk scenarios together with you.



Patrick Raaflaub
Group Chief Risk Officer



Introduction






Rapid changes give rise to “emerging risks” – changing or newly developing risks that are difficult to quantify and that can have a major impact on the re/insurance industry. Swiss Re identifies emerging risks by gathering input and feedback from underwriters, client managers, risk experts and others across the company, and also from external experts and research institutions. With the annual SONAR report, published since 2013, we aim to foster dialogue with all stakeholders to help insurers understand and manage emerging risks more effectively.

This year’s SONAR features nine new emerging risk themes and six emerging trend spotlights. The emerging risk themes are potential new or changing risks, with both downside risks and upside potential for the re/insurance industry. The “Trend spotlight” items highlight contextual developments we deem relevant for the insurance sector, without necessarily referencing a specific risk.

The emerging risk themes outlined in the SONAR report are based on early signals collected over the course of a year. They do not reflect entire industry-wide thinking with respect to emerging risks, nor necessarily the full list of associated topics currently on Swiss Re’s radar screen. The themes have been categorised according to their estimated impact and timeframe of materialisation, and with respect to lines of business where we think the biggest exposures will lie (see page 2). For all the risk themes, we flag where there have been topic-relevant mentions in previous SONAR reports. Some emerging risks presented in this year’s SONAR report may never materialise, while others may form the basis for future risk pools. Similarly, some of the trends depicted may lose importance while others may play a growing role in shaping the future business environment.

We begin the SONAR report with an overview of the macro trends relevant to re/insurance markets and the world at large, as seen by Swiss Re. These trends and their grouping into demographic & social, political & economic, technological & natural and competitive & business themes serve as a backdrop and ordering structure for the subsequent exposition of this year’s report of emerging risk themes and trend spotlights. The appendix explains all terms & definitions used in the report.

Per lines of business, the top emerging risk themes identified in this year’s edition are:

-  for **Property & Specialty Lines:** Restarting suspended operations – larger accidents ahead?
-  for **Casualty:** Lack of diversity in product testing – safe?
-  for **Life & Health:** COVID-19 – the longer-term health burden
-  for **Assets & Financial Markets:** Zombie companies – sustained by COVID-19 support
-  for **Operations:** Modern slavery – pressure on supply chains

Macro trends

Identifying and monitoring macro trends helps understanding of the risk landscape of the future. Based on internal surveys and workshops, Swiss Re curates a set of macro trends deemed to be of high importance for re/insurance in the next decade. The macro trends portfolio is reviewed annually and informs strategic priorities and associated decision making, and the creation of solutions for emerging risk pools. Given the systemic turbulence inflicted by the COVID-19 pandemic, we undertook a thorough re-inspection of the selected trends. While the macro trends portfolio was still found valid in general, two trends (“Public sector moving risk to private sector” and “Protectionism & fragmented regulation”) have been removed, some have been reformulated and some have been added.

The newly-added trends are:

Political and economic environment

Macroeconomic fragility: COVID-19 has led to significantly lower global economic growth. Across the world, governments are supporting domestic economies with massive stimulus packages. These can ease short-term crisis, but will lead to higher debt burdens and an increase in related risks over the long term.

- related article in this SONAR Report: “Zombie companies – sustained by COVID-19 support”, p. 12

Infrastructure funding needs: Infrastructure development is shaped by dynamics in capital availability, evolving social and environmental priorities and regulation, and rapid urbanisation. The COVID-19 crisis could reshape the focus on technology, resilience and sustainability.

- related article in this SONAR Report: “Restarting suspended operations – larger accidents ahead?”, p. 26
-

Technological and natural environment

Rising importance of biodiversity & ecosystem services (BES): BES are vital for societies and economies to function. Biodiversity and ecosystem decline are increasing, which will have tangible implications for business in the future.

- related article in this SONAR Report: “Pricing nature in insurance – Trend spotlight”, p. 36
-

Competitive and business environment

Increasingly litigious environment: This has been one of the drivers of US insurance (claims) costs rising faster than economic inflation, so-called social inflation. Litigation funding has grown over the last few years, and we expect this to continue.

Rising importance of Environmental, Social and Governance (ESG) criteria: Overall demand for material ESG-related information and metrics is growing rapidly across all sectors, largely driven by investor demand. Companies are now expected to have appropriate governance structures and governance priorities to address ESG issues. For re/insurers, such criteria will impact their investment activities, and also their liabilities and operations.

- related article in this SONAR Report: “Modern slavery – pressure on supply chains”, p. 40



Demographic and social environment

- Growing middle class in high-growth markets
- Longevity & radical medical innovation
- Connected & collaborative society
- Mass migration & urbanisation
- Changing workplace & talent gaps
- Rising social inequality & unrest

Political and economic environment

- Macroeconomic fragility
- Low- yield environment & risk of inflation
- Instability of geopolitical & economic systems
- Challenges to globalisation
- Infrastructure funding needs

Technological and natural environment

- Addressing the physical risks of climate change
- Transition to a low-carbon economy
- Rising importance of biodiversity and ecosystem services
- Massive expansion of digital & cyber risk
- Data as an asset
- Disruptive digital technologies
- Digital products & processes
- Autonomous transportation & robotics

Competitive and business environment

- Re/insurance value chain disaggregation and rise of alternative re/insurance providers
- Consolidation of platforms as a business model through strategic partnerships
- Regional champions going global
- Increasing digital customer interaction
- Increasingly litigious environment
- Rising importance of ESG

Human-machine interactions

Digital devices have become key components of leisure activity and work. The capabilities and range of applications of devices are ever increasing. Today, wearable health devices, for instance, can be used to monitor sleep patterns and nutrition, and also help people stay on top of chronic diseases, monitor mental health and manage stress and well-being (see “Health tracking devices – hidden risks in wearables?”, p. 18). The increasing capabilities mean ever-more availability of data, which insurers can access and analyse to design more personalised covers and services. A word of caution, however, data access systems also bring increasing cyber and privacy risks.

How are consumers influenced by online environments? When people visit websites and use mobile apps, the way purchase options are presented influences what one focuses on and eventually selects (see “Ethics in digital nudging – Trend spotlight”, p. 42). On social media, software and data analytics allow like-minded people to connect, for instance by determining what users see in their news feeds. Shared preferences integrate communities and nurture them through recommendation algorithms, creating and feeding partisan echo chambers. The design of websites, apps and underlying algorithms affects whom we interact with and how. This also applies to online engagement with insurers.

As life goes more digital, customer expectations towards insurance are changing. The Swiss Re COVID-19 Consumer Survey from 2020 indicates that in Southeast Asia, for instance, around 60% of consumers are open to buying insurance online.¹ To meet expectations of high-value and frequent-touch interactions, more personalized services and 24/7 support, the insurance industry is turning to digital intermediaries and AI-enabled technologies for customer-facing activities. However, while many people feel comfortable with guidance derived from health monitoring devices, consumers are still more reluctant to use chatbots for their financial dealings (see “Are humans ready to engage with robots? – Trend spotlight”, p. 44). Nevertheless, particularly with younger generations of insurance customers, demand for digital services and interaction is booming.

Connected infrastructures

Lockdown measures to curb the spread of COVID-19, and the recent blocking of the Suez Canal highlight risks inherent in global supply chains. Being dependent on one supplier or transport route in a just-in-time production set-up can lead to significant delays in case of complications in the chain. Consequently, firms may seek to diversify their manufacturing presence across new locations and build up parallel supply chains and transport channels.² Supply bottleneck risk is increased by trade disputes and geopolitical tensions, and reshoring of production is in turn favoured by nationalistic politics and the falling automation costs.

As business returns to normal, challenges emanating from other consequences of the pandemic, for example budget cuts and mothballed facilities in many industries, may come to fruition. Rushed and not-well-resourced start-up actions come with heightened accident risks (see “Restarting suspended operations – larger accidents ahead?”, p. 26). In case of accidents at critical (transport) infrastructure and suppliers, entire value chains may be affected. Usually the location of an industrial accident – be it an explosion, a toxic release or a fire – is a main determinant of overall losses. In many cities, what were previously industrial zones have become residential and business districts. As a result, many plants that in the past were at city outskirts are today surrounded by settled territory (see “Beirut explosion – dangers of hazardous materials?”, p. 20).

¹ Swiss Re COVID-19 Consumer Survey: Almost one-third of Southeast Asia consumers fear their financial future, Swiss Re, 15 September 2020, <https://www.swissre.com/risk-knowledge/building-societal-resilience/covid-19/covid19-consumer-survey-sea.html>

² sigma 6/2020: De-risking global supply chains, Swiss Re, <https://www.swissre.com/institute/research/sigma-research/sigma-2020-06.html>

As cities continue to grow and adapt to changing demographics, highly population- and property-dense towns and cities remain a focus for urban planning as well as for insurers. Cities are becoming smarter and more interconnected, and thus more efficient, attractive to live in and vulnerable at the same time. A further aspect of interconnected cities is the new urban short-distance mobility which brings new risks and insurance demands (see “Urban mobility: Innovation in short distance mobility – Trend spotlight”, p. 30). One challenge for insurers associated with the fast pace of new innovation, for instance in the area of electrified micromobility, is the lack of historical data on loss trends (see “Electronic scooters and beyond – micromobility risks”, p. 32). Another is that if the testing population of new products available on the market is not representative of end-user groups, insurers could face product liability claims (see “Lack of diversity in product testing – safe?”, p. 22).

New traction for ethics and sustainability

Sustainability issues are becoming core considerations in business. ESG criteria are increasingly valued by shareholders, employees and customers.³ Climate change is the centre of attention. In the private sector, 2020 saw a record number of corporate pledges on mitigating climate change: on average one new company each day joined the Science Based Targets initiative and committed to emission reduction goals (see “Insurers on the road to net-zero – Trend spotlight”, p. 34). This momentum gives rise to opportunities. Clean energy and electric vehicles are areas of potential technology leadership across the globe. Meanwhile, the common goal of transitioning to a low-carbon economy brings scope for cooperation.

The growing focus on climate change is extending to corporate disclosure, and there has been significant progress on this front. Europe is taking the lead on climate-related financial disclosures (TCFD), and other jurisdictions are following suit. With an emerging Task Force on Nature Related Financial Disclosures (TNFD), reporting recommendations on biodiversity and ecosystem services could soon evolve (see “Pricing nature in insurance – Trend spotlight”, p. 36).

The scope of attention on sustainability goes well beyond climate change and protecting nature. Different aspects of human rights, fair treatments of consumer, equal opportunities and diversity are also high on the agenda. And companies face increasing pressure to ensure they are not party to any form of people exploitation, including at the supply chain input/service providers level (see “Modern slavery – pressure on supply chains”, p. 40). Digitalisation of the insurance industry, including growing online purchasing of risk-protection covers opens up new ethical questions. For instance, how can choice sets on insurance websites and apps be designed in ways that are beneficial for consumers? In order to keep pace with new developments, regulator attention on consumer protection in online environments is increasing (see “Ethics in digital nudging – Trend spotlight”, p. 42).

Insurers play an important societal role and can benefit in multiple ways from demonstrating a commitment to, and significant transparency around, ESG themes. On the flipside, the new traction for ethics and sustainability also brings potential reputational and litigation risks, and operational burdens.

³ For an example on investors see: Holmes N. et al., Insurance ESG Big Picture. Exiting coal – At the heart of insurance ESG, Societe Generale Cross Asset Research, 14 December 2020.

Demographic and social environment

United Nations projections (2019) estimate global life expectancy at birth to rise from 69 years in 2005 – 2010 to 77 years in 2045 – 2050 +++ Emerging markets are expected to account for a rising share of middle class population +++ The COVID-19 pandemic has forced the adoption of new ways of working +++ Human-machine interaction at the workplace and the overall automation of jobs are becoming more frequent.



Beyond pandemic – longer-term emerging risks for insurance

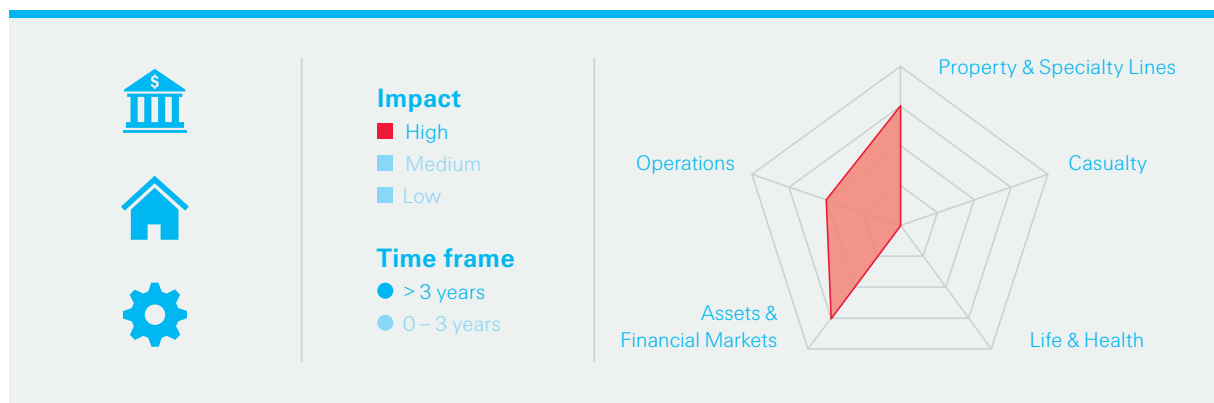
The world has been in pandemic mode for almost a year and a half. The situation continues to evolve and will not be fully resolved anytime soon. Global pandemic risk was on the radar well before the onset of the COVID-19 crisis, and insurers had priced for mortality shock. Even so, as the pandemic developed, it became clear that not all possible effects had been anticipated, and that some had been underestimated.

By definition, a pandemic is a global health crisis. The COVID-19 experience has brought continually emerging surprises and uncertainties, which historical observations alone cannot capture. For example, during the Spanish flu pandemic of 1918-1920, young people were most susceptible to death. This time around, the mortality risk in COVID-19 has shifted to the elderly and those with comorbidities.

Typical industry models had focused on potential mortality shock resulting from a pandemic. Yet, many impacts of the COVID-19 pandemic specifically relate to the sudden lockdown-measures induced halt to global economic activity to an extent that had not been foreseen. Since the outbreak of the pandemic, we have learned a lot about what COVID-19 can do to people's health, to economies and social systems, but many unknowns still remain. Emerging uncertainties become more pronounced the further out one projects into the future. Swiss Re SONAR 2021 does not aspire to cover and fully analyze all longer-term uncertainties that may emanate from the current pandemic experience. Instead we profile a select few resulting emerging risk themes, and the potential implications of these for the insurance sector.

One focus theme is the level of financial support that many companies have received, which has had the effect of keeping some potentially unviable companies alive. This distorts markets and, crucially for the insurance industry, makes it harder to distinguish between those at risk of defaulting and those not. In addition, different populations have been impacted differently by the pandemic, as reflected in growing income inequalities, a second focus theme. Growing income and wealth divides can also be profiled as the erosion of the middle classes, the most important market segment for insurers. A last pandemic-related risk theme is, unsurprisingly, the longer-term scars that COVID-19 may leave on life and health.

Zombie companies – sustained by COVID-19 support



Government financial relief programmes have been enacted during the COVID-19 crisis to prevent corporate bankruptcies. Credit subsidies have protected companies from COVID-19 related insolvency – that is both companies with a viable business model but also non-viable firms. The latter are often referred to as “zombie firms”, defined as companies “unable to cover debt servicing costs from current profits over an extended period.”¹ This is not a new phenomenon. A 2018 working paper from the Bank for International Settlements (BIS) documents an increase in zombie firms since the late 1980s.

¹ R. Banerjee and B. Hofmann, “The rise of zombie firms: causes and consequences”, BIS Quarterly Review, September 2018, 67-78.

The various pandemic relief and support measures, while clearly necessary, have further exacerbated the issue and thus again brought the topic to the forefront. Two pieces of evidence are worth considering. First, according to data from S&P, the global default rates in 2020 were lower than in past recent crises and are expected to remain below peak levels, highlighting the effects of the measures taken.² And second, according to the Institute of International Finance, non-financial corporate debt in the US has risen from under 75% in autumn 2019 to over 90% in spring 2020, while bank loans to small-and-medium enterprises (SMEs) rose by 6%.³ In the words of the report: “Low interest rates have enabled these fragile businesses to accumulate more debt, thus increasing the risks that more of these unprofitable businesses become “zombie” firms”, particularly those non-listed SMEs that are heavily reliant on bank loans as their main financing avenue.⁴

As such, while the financial support has been necessary and successful in dampening the adverse effects of the current crisis (such as higher long-term unemployment), it also comes with longer-term structural risks: one notably linked to financial markets, and others to economic consequences.

Regarding potential financial market implications, zombie companies may simply not be able to pay back their loans, leading to a notable rise in non-performing loans. And so in the long-term, once emergency fiscal measures start being lifted, rising interest rates could impact the refinancing costs, and thus profitability, of zombie SMEs. This could in turn have negative balance sheet implications for those banks highly exposed to non-performing loans. And on the second point, regarding potential economic consequences, the BIS study found that zombie companies are less productive, hence lowering a country’s aggregate productivity as it impedes “creative destruction”. Also, some research suggests that helping distressed firms to stay alive, while socially justifiable in many regards such as to avoid acute spikes in unemployment, also creates excess production capacity and thereby disinflationary pressures.

The key question for policymakers is when and how to scale back support. For insurers, the zombification of companies introduces new challenges in deciding which firms are insurable risks.

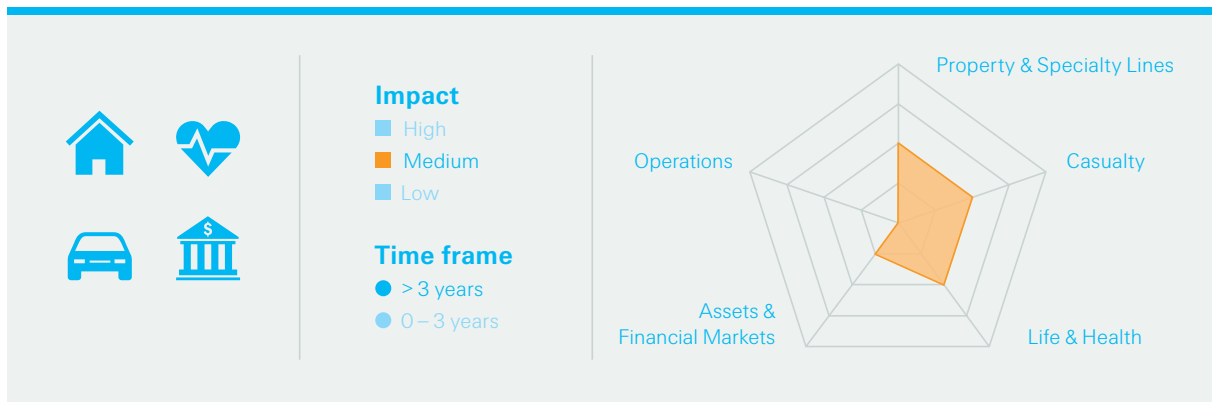
Related articles in Swiss Re SONAR – New emerging risk insights

- “Limits to tinkering – the fiscal and monetary policy balance at risk”, SONAR 2019, p. 22

Pandemic-related risk aspects	<ul style="list-style-type: none"> ■ Zombie companies have probably risen, helped by fiscal policies supporting struggling companies via various credit lending facilities
Socioeconomic impacts	<ul style="list-style-type: none"> ■ An acute bankruptcy crisis, with an associated surge in long-term unemployment, has been mitigated. ■ Fiscal support has also kept unviable firms alive. This may lead to: <ul style="list-style-type: none"> – Lower aggregate productivity related to inefficient capital allocation – Disinflationary pressures – Distorted market prices and potential lack of “creative destruction”
Potential insurance impacts	<ul style="list-style-type: none"> ■ Risk assessment challenge, in particular for credit and surety (C&S) lines: which companies to underwrite and on what criteria, because spreads no longer reflect fundamental corporate risk; also difficult to assess counterparty risks. ■ Asset management/financial markets: distortion and mispricing ■ Operations: increased supply chain risk from third-party defaults

² S&P Global Ratings, “2020 Annual Global Corporate Default And Rating Transition Study”, 7 April 2021.
³ E. Tiftik, P. Della Guardia, “IIF Weekly Insight: Zombies Inc”, Institute of International Finance, 1 October 2020, https://www.iif.com/Portals/0/Files/content/1_201001%20Weekly%20Insight_vf.pdf
⁴ Ibid., p. 2.

Income inequalities – pandemic hurts the middle class



COVID-19 has widened income inequalities. Not everyone is equally vulnerable to the virus, and similarly, not everyone has been hit economically to the same degree. Lockdown measures and the economic crisis have hit low-wage industries such as retail, gastronomy, tourism and leisure, and thus lower- and middle-income households particularly hard. The global middle class was estimated to be 54 million people smaller in 2020 than that projected prior to the pandemic, according to Pew Research Center.⁵

As middle-income households hit hard by the pandemic grapple with lower incomes, higher healthcare costs and the financial consequences of unemployment, they will likely reconsider their insurance spending. The COVID-19 crisis will thus likely increase protection gaps.⁶ Low- and middle-income households are not affected the same in every country. For example, the middle class in China is estimated to have suffered much less in last year's economic downturn than the middle class in India.⁷

Differences in the speed and effectiveness of vaccination programmes will likely also contribute to differing economic recovery paths across countries, which will impact how quickly those in low-wage industries are able to go back to work and resume earning a living, and which in turn will impact how demand for insurance recovers in different locations.⁸ Unequal social bearing of the pandemic has also been seen across generations, which may further impact the longer-term outlook for the middle classes and insurance demand in different markets.

Government aid packages and social safety nets can buffer the impact of the pandemic on lower-income households. In the US, for instance, massive stimulus measures actually raised the incomes of some low-wage workers during the first few months of the pandemic.⁹ However, not all countries are able to introduce generous fiscal-relief measures and for those that have done so, sustaining these will be challenging. In the medium term, as governments use up fiscal and monetary headroom with stimulus measures, funds available for social safety nets may decrease. In some cases, post-pandemic fiscal policies like higher rates of corporate tax may be implemented to fund social safety nets.

⁵ Middle income were defined in this analysis as incomes of \$10.01-\$20 a day; R. Kochhar, "The Pandemic Stalls Growth in the Global Middle Class, Pushes Poverty Up Sharply", Pew Research Center: Fact-Tank, 18 March 2021, <https://www.pewresearch.org/global/2021/03/18/the-pandemic-stalls-growth-in-the-global-middle-class-pushes-poverty-up-sharply/>

⁶ I. Fan et al., sigma Resilience Index 2020: global resilience put to the pandemic test, Swiss Re, 27 August 2020, <https://www.swissre.com/institute/research/sigma-research/2020-resilience-index.html>

⁷ R. Kochhar, "In the pandemic, India's middle class shrinks and poverty spreads while China sees smaller changes", Pew Research Center: Fact-Tank, 18 March 2021, <https://www.pewresearch.org/fact-tank/2021/03/18/in-the-pandemic-indias-middle-class-shrinks-and-poverty-spreads-while-china-sees-smaller-changes/>

⁸ sigma 7/2020: rebuilding better, Swiss Re, 11 November 2020, <https://www.swissre.com/institute/research/sigma-research/sigma-2020-07.html>

⁹ R. Avent, "Covid-19 leaves a legacy of increased inequality", The Economist, 17 November 2020, <https://www.economist.com/the-world-ahead/2020/11/17/covid-19-leaves-a-legacy-of-increased-inequality>



Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Tipping the scale? – Intergenerational imbalance on the rise”, SONAR 2020, p. 23
- “The fragility of healthcare systems”, SONAR 2020, p. 25
- “Vaccination – a shot worth more than politics and profitability”, SONAR 2019, p. 16
- “Risky bets? Insurance demand in an age of shifting markets”, SONAR 2019, p. 38

Pandemic-related risk aspects

- Lockdown measures most heavily affect person-to-person services in low-wage sectors (eg. gastronomy, barbers etc.). White collar workers able to work from home are less impacted.
- Increased speed of digitisation and automation will reduce demand for certain types of low-income labour (eg. increased threat from automation to low-skilled, person-to person services).
- In the mid- to long-term, increased debt levels may force countries to reduce social safety nets.

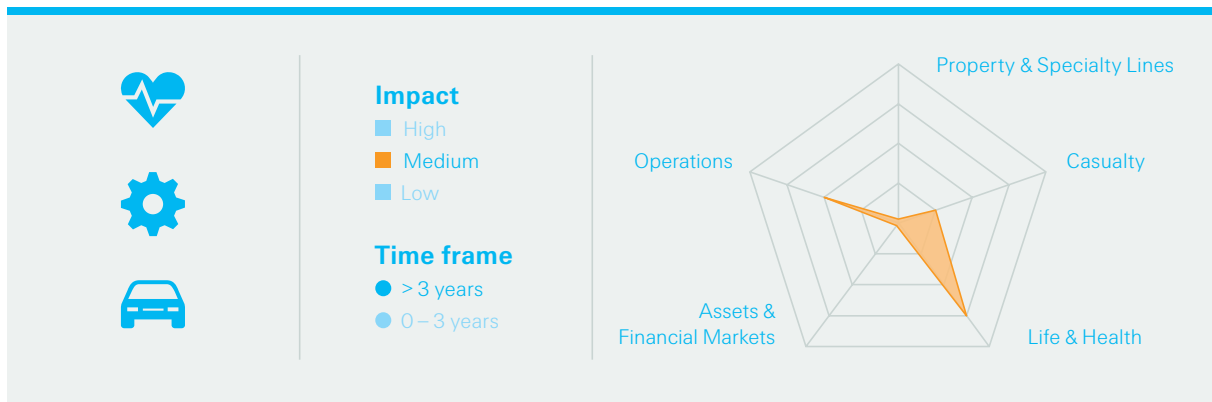
Socioeconomic impacts

- Challenged growth expectations for global middle class.
- Disproportionate impact on younger generations from pressured labour markets and lack of career opportunities. Impaired savings opportunities by young working cohorts may translate into future old-age wealth gaps.

Potential insurance impacts

- Increased focus on affordability of insurance products
- Potential increase in preference for riskier wealth-building attempts. Consumers may prefer riskier investments options over conservative insurance products.

COVID-19 – the longer-term health burden



From the start of the pandemic, the efficient deployment and use of medical products – from masks, disinfectants and test kits – has varied across markets. The rapid development of vaccines has impressed, but the success of rollout programmes is dependent on many different factors, including virus mutations, potential lack of vaccine efficacy to those variants, and public hesitancy to universal vaccination. There are also unknowns around the potential severity of long-term health effects of COVID-19 infection.

During the pandemic, across countries routine screenings, planned surgeries and treatments have often been postponed in order to prevent health services from collapsing. As a result, many patients have not received the care they need at the right point in time. This could lead to a decline in overall health status. At the same time, surveys show the incidence of mental health disorders such as anxiety and depression have increased during the pandemic. This is in addition to less healthy lifestyles, such as less physical activity and increased alcohol and/or drug consumption.

Long-term effects such as reduced life expectancy, particularly for at-risk population groups, is a very real possibility. Such effects may correlate with physiological characteristics like age or sex, but they may also correspond with economic and social status. Data from the US suggests a higher incidence of COVID-19 infection among lower-income groups. The reasons offered range from more crowded living spaces and, in the case of “essential workers”, a necessity for physical workplace attendance. The virus may also hit lower-income groups harder, for instance due to less access to healthcare. This would further exacerbate income and health-status inequalities, with associated implications for trends in insurance demand.

Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Global pharmaceutical supplies – breaks in the chain?”, [SONAR 2020](#), p. 16
- “Out of sight, out of mind – mental health issues among the young”, [SONAR 2020](#), p. 20
- “The fragility of healthcare systems”, [SONAR 2020](#), p. 25

<p>Pandemic-related risk aspects</p>	<ul style="list-style-type: none"> ■ Long COVID: prolonged recovery time and COVID-19-related symptoms (eg, respiratory, cardiovascular or neurological symptoms). Additional risk for comorbidity/complications in relation to other conditions that may arise in the future ■ COVID-19 priority in medical systems means halted/delayed diagnostics (eg, for cancer) and treatments for other conditions ■ Mental illness from isolation, economic hardship, home office burnout, health fears, grief etc. ■ Adolescents and young adults particularly affected by isolation and mental-health challenges
<p>Socioeconomic impacts</p>	<ul style="list-style-type: none"> ■ Longer sick leaves put pressure on companies and other organizations, and also family- and social/healthcare systems ■ Increased medical burden and mortality risk for certain (particularly vulnerable) groups ■ More undetected or late diagnosis, and therefore not adequately-treated conditions ■ Pressure on individuals, social and mental healthcare systems ■ Rising substance abuse and domestic violence ■ Potentially larger recognition of mental health dimensions
<p>Potential insurance impacts</p>	<ul style="list-style-type: none"> ■ Increased health expense and workers compensation claims from more severe morbidity and comorbidity ■ Increased disability and critical illness claims ■ Unexpected shifts in life expectancy/mortality for certain groups

Conclusion

The immediate management of the COVID-19 crisis will have longer-term consequences that cascade over different realms, from public health to economies to society. Respective insurance covers may be triggered and/or protection gaps be detected.

Pandemic-related decision-making is faced with central challenges: decision-makers need to take political decisions quickly without having all relevant information and support of robust scientific assessment at hand. Large scientific research studies take years from initiation to peer-reviewed publication, but pandemic urgency requires results in the here and now. As already evidenced in the current pandemic experience, policy decisions made have not always proved optimal, let alone fail-safe.

As we begin to see light at the end of the COVID-19 crisis tunnel, it is important to remember that a next pandemic is only a question of time. It is imperative that lessons from the present crisis are learned, as this will inform better preparedness for future pandemic as well as other crisis management situations.

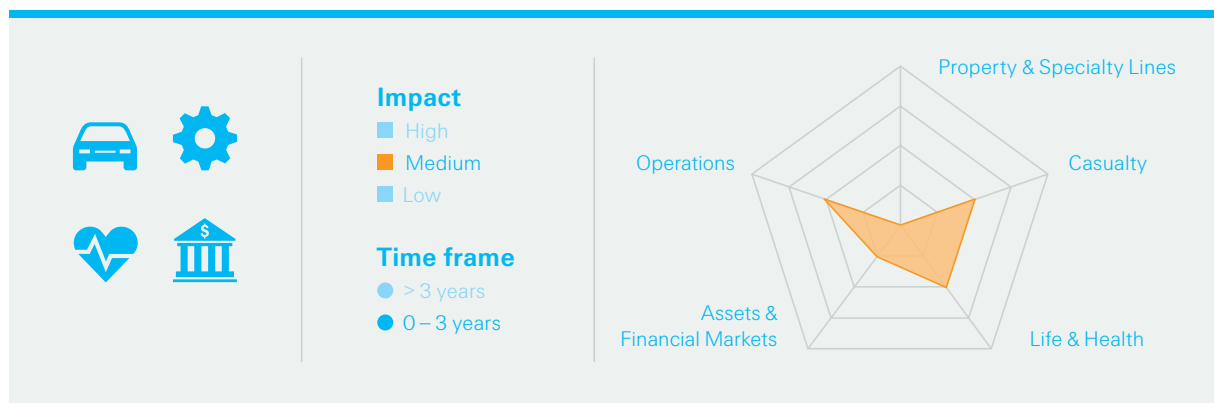
Pandemics are complex systemic risks, with broad reach, and demand coordinated and cooperative response across different stakeholders and interests. While a pandemic is by definition international and response should take a global perspective, every pandemic plays out locally and impacts every individual. To better prepare for and manage future pandemics, the interplay between private and public actors needs to improve. Public-private partnerships with certain insurance risk pool solutions may just be one case where the interplay can foster greater health, economic and social resilience for the future.

Health tracking devices – hidden risks in wearables?

All-singing, all-dancing health tracking devices are becoming more sophisticated and prevalent. The potential for product defects or faulty advice, as well as issues around data security, could increase the potential for rising insurance claims and reputational risk.

Potential impacts

- Faulty data or algorithm-bias can lead to inadequate health advice, resulting in bodily injury and single large-losses in casualty.
- Morbidity or mortality could rise in case of a serial product failure leading to multiple users being given inappropriate medical advice.
- Cyber risks associated with data-collecting health devices (including risks of data breach) could trigger liability covers.
- Liability and data privacy issues present reputational and investment risks for all parties, including insurers.



In recent years, wearable health monitoring devices have become ever-more sophisticated. Among many functions, today devices can be used to monitor sleep patterns, nutrition, exercise and help people stay on top of chronic diseases.¹ They can also monitor mental health (via AI face recognition capability), and be used to manage stress and well-being. Technologies such as brain-computer interface (BCI) are pushing boundaries even further. BCI can connect to a human's brain, to read and process brain activity into data. Trials have indicated that BCIs can detect impending epileptic activity and alert a user to take a dose of medication to halt coming seizures.² Several companies are developing BCI devices to, for example, reduce stress or as an aid in meditation.³

Such developments are driving initiatives to incorporate digital tools in health care services. For instance, in Germany a law with the aim of kick-starting digital transformation of the care system was recently passed.⁴ The law has smoothed the way for firms to take digital health applications to market and for use by physicians. Among the first available are apps to manage conditions like tinnitus, obesity and osteoarthritis.⁵ And in the US, companies like Apple and Google have secured FDA approval for some of their devices.⁶

¹ J. Schoonbee, "How lifestyle data can help us personalize the insurance industry", ITIJ, 1 February 2021, <https://www.itij.com/latest/news/how-lifestyle-data-can-help-us-personalise-insurance-industry>

² L. Drew, "The ethics of brain – computer interfaces", Nature, 24 July 2019, <https://www.nature.com/articles/d41586-019-02214-2>

³ L. Golembiewski, "Are You Ready for Tech That Connects to Your Brain?", Harvard Business Review, 28 September 2020, <https://hbr.org/2020/09/are-you-ready-for-tech-that-connects-to-your-brain>

⁴ Digital Healthcare Act (DVG), German Federal Ministry of Health, 29 November 2019, <https://www.bundesgesundheitsministerium.de/digital-healthcare-act.html>

⁵ Ariel D. Stern et. al, "Want to See the Future of Digital Health Tools? Look to Germany", Harvard Business Review, 2 December 2020, <https://hbr.org/2020/12/want-to-see-the-future-of-digital-health-tools-look-to-germany>

⁶ O. Ford, "10 FDA Cleared or Approved Wearable Devices that Redefined Healthcare", MDDI, 20 September 2020, <https://www.mddionline.com/digital-health/10-fda-cleared-or-approved-wearable-devices-redefined-healthcare>



The availability of a broader range of health data will enable insurers to design more personalised covers and services for customers.⁷ A challenge, however, is data security/privacy.⁸ Today's sophisticated devices collect very sensitive personal data, with brain activity data possibly the most intimate of all. Additionally, the insights derived from the monitoring devices could lead to over-diagnosis and rising healthcare costs.

Insurers could also face losses arising from litigation against manufacturers in the case of device defect. For instance, algorithm-bias could lead to inappropriate medical advice from devices. If this were to lead to bodily injury or other patient impairment, the resulting casualty claims awards could be substantial. Another complexity is that interconnected products do not fall neatly within conventional product liability regimes,⁹ meaning it is not always clear where responsibility for device malfunction lies: manufacturer, system designer, software provider or even the end-user?

Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Grey accountability – product liability in the area of smart everything”, *SONAR 2020*, p.42

⁷ J. Schoonbee, “How lifestyle data can help us personalize the insurance industry”, ITIJ, 01 February 2021, <https://www.itij.com/latest/news/how-lifestyle-data-can-help-us-personalise-insurance-industry>

⁸ L. Golembiewski, “Are You Ready for Tech That Connects to Your Brain?”, Harvard Business Review, 28 September 2020, <https://hbr.org/2020/09/are-you-ready-for-tech-that-connects-to-your-brain>

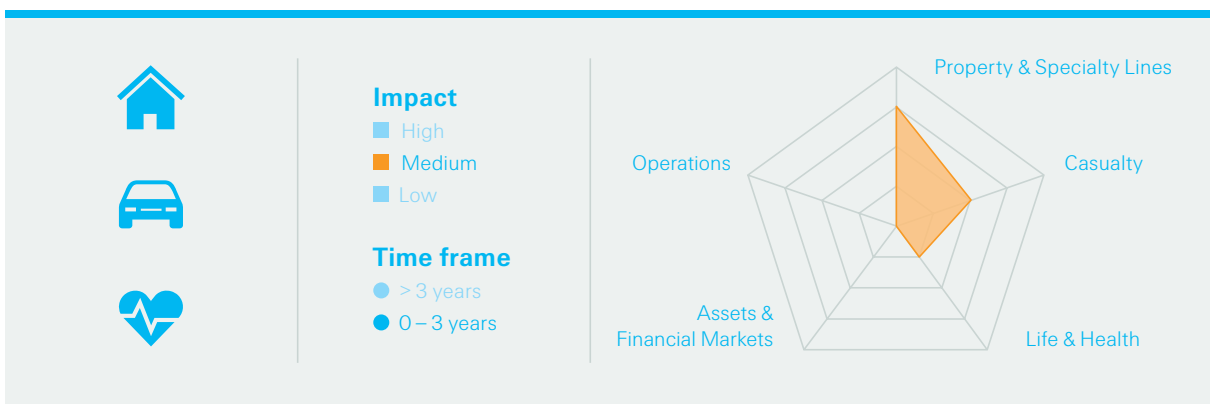
⁹ “Bodytech – a new wave of medical devices product liability litigation”, Taylor Wessing, March 2019, <https://www.taylorwessing.com/download/article-bodytech-litigation.html>

Beirut explosion – dangers of hazardous materials?

The Beirut explosion highlights, again, the dangers of storing, producing or transporting hazardous materials, particularly in or through areas of human settlement. Identification of so-called risky sites is critical, to enable risk engineering assessment and insurance coverage.

Potential impacts

- Explosions, fires or toxic releases at storage, production and transport facilities can cause multi-million to multi-billion dollar losses for the insurance industry.
- This can affect property and casualty covers through local impacts and global supply chain effects.
- In the case of many fatalities, Life & Health portfolios in local markets can also be affected.



Last year's storage explosion in the port of Beirut destroyed many lives and properties. It was not the only event involving a hazardous site. On 20 May 2020, a toxic gas release in India killed 11 and injured 1 000,¹ a painful reminder of the worst industrial disaster in the country ever, when a gas leak in 1984 in Bhopal killed 14 410 and injured 200 000 – 300 000 people.²

The location of an industrial accident – be it an explosion, a toxic release or a fire, is the main determinant of the overall loss fallout. In many industrial zones, plants that in the past were at the outskirts of a city are today surrounded by settled territory. This is due to the expansion of cities. Residential quarters slowly encroached the previously remote facilities. Some sites are inherently risky, as the experience of the Tianjin harbour explosion in 2015 also showed. Storage and production of hazardous materials is in itself a risky business, but so too is the transport of the materials. For example, while one of the safest modes of transport, rail lines often pass through cities and populated areas. Accidents are rare but if they happen, the impact can be devastating.³

¹ "LG Polymers: South Korean CEO held over fatal India gas leak", BBC, 8 July 2020, <https://www.bbc.com/news/world-asia-india-53330370>

² Y. Ichimura and D. Baker, "Acute Inhalational Injury", Reference Module in Biomedical Sciences, 2019, <https://www.sciencedirect.com/topics/medicine-and-dentistry/bhopal-disaster>

³ "Lac-Mégantic train explosion: Three charged in Quebec", BBC, 13 May 2014, <https://www.bbc.com/news/world-us-canada-27387287>; "Italy court sentences former railway chief to 7 years in prison", Reuters, 31 January 2017, <https://www.reuters.com/article/italy-train-trial-moretti-idUKR1N1EG01Q?edition-redirect=uk>



Insurers need to identify risky sites. A helpful starting point can be regulatory frameworks. For example, the chemical plant explosion in Seveso, Italy in 1976 triggered the EU's "Seveso Directive".⁴ The law sets clear standards on what makes a hazardous site and associated risk management requirements. Currently, over 12 000 sites are governed by the directive. The US equivalent is the "Risk Management Plan (RMP) rule".⁵ Other countries like China or India are introducing comparable standards.⁶ There are also regulations with regards to safe passage/transport of hazardous materials.⁷

The power of directives depends on implementation. But for the purpose of risk assessment, even if insured sites adhere to robust regulatory standards, additional analysis of the location with respect surrounding population and land use, and exposure to natural perils that could trigger an accident, is required. Hazard mapping solutions like Swiss Re's CatNet® can facilitate such investigations.⁸

Related articles in *Swiss Re SONAR – New emerging risk insights*

- "Restarting suspended operations – larger accidents ahead?", SONAR 2021, p. 26
- "Teaching an old dog new tricks", SONAR 2019, p.26

⁴ "Major accident hazards: The Seveso Directive - Technological Disaster Risk Reduction", European Commission, <https://ec.europa.eu/environment/seveso/>

⁵ US EPA Risk Management Plan (RMP) Rule, <https://www.epa.gov/rmp>

⁶ J. Besserman and R. A. Mentzer, "Review of global process safety regulations: United States, European Union, United Kingdom, China, India", Journal of Loss Prevention in the Process Industries 50 (2017), 165-183, <https://engineering.purdue.edu/P2SAC/presentations/documents/Global%20Process%20Safety%20Regulations.pdf>

⁷ Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) with effect from 1 January 2021, Intergovernmental Organisation for International Carriage by Rail, https://otif.org/en/?page_id=1105

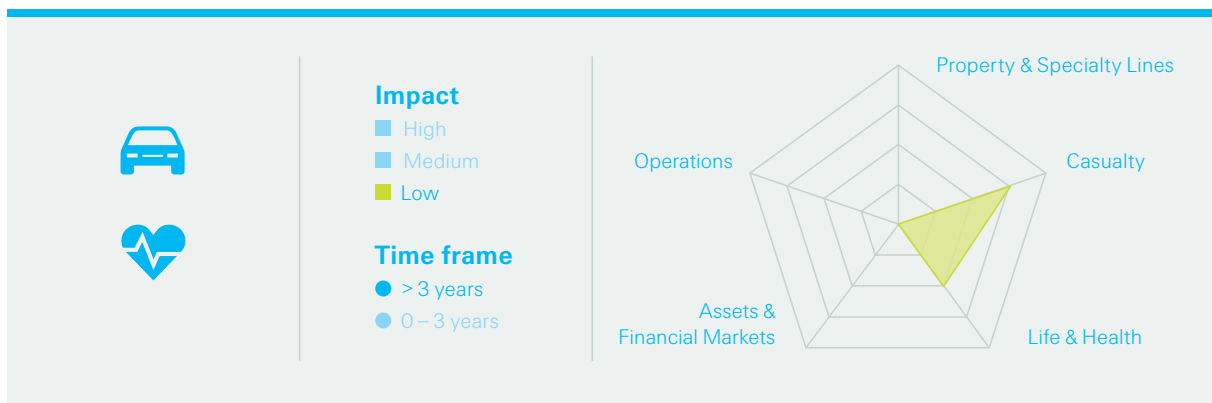
⁸ Swiss Re CatNet®, <https://www.swissre.com/reinsurance/property-and-casualty/solutions/property-specialty-solutions/catnet.html>; USEPA Murphy Oil Spill, <https://archive.epa.gov/katrina/web/html/index-6.html>

Lack of diversity in product testing – safe?

Weight and size are key variables in determining passenger safety, and a lag in adjusting test- to real-world conditions can have significant, even fatal, consequences. The same is true for the many other variables, including gender, age, ethnicity or genetics, which can make trial populations non-representative of end-consumers. Where so, caution in underwriting is advised.

Potential impacts

- Insurers could face product liability and/or product recall claims if the testing population for new products available on the market is not representative of end-user groups.
- This is especially so if new products are rolled out fast to many users. If a large serial-loss event involving body injuries or even death occurs after rollout, product flaws could also trigger claims in Life and Health policies.

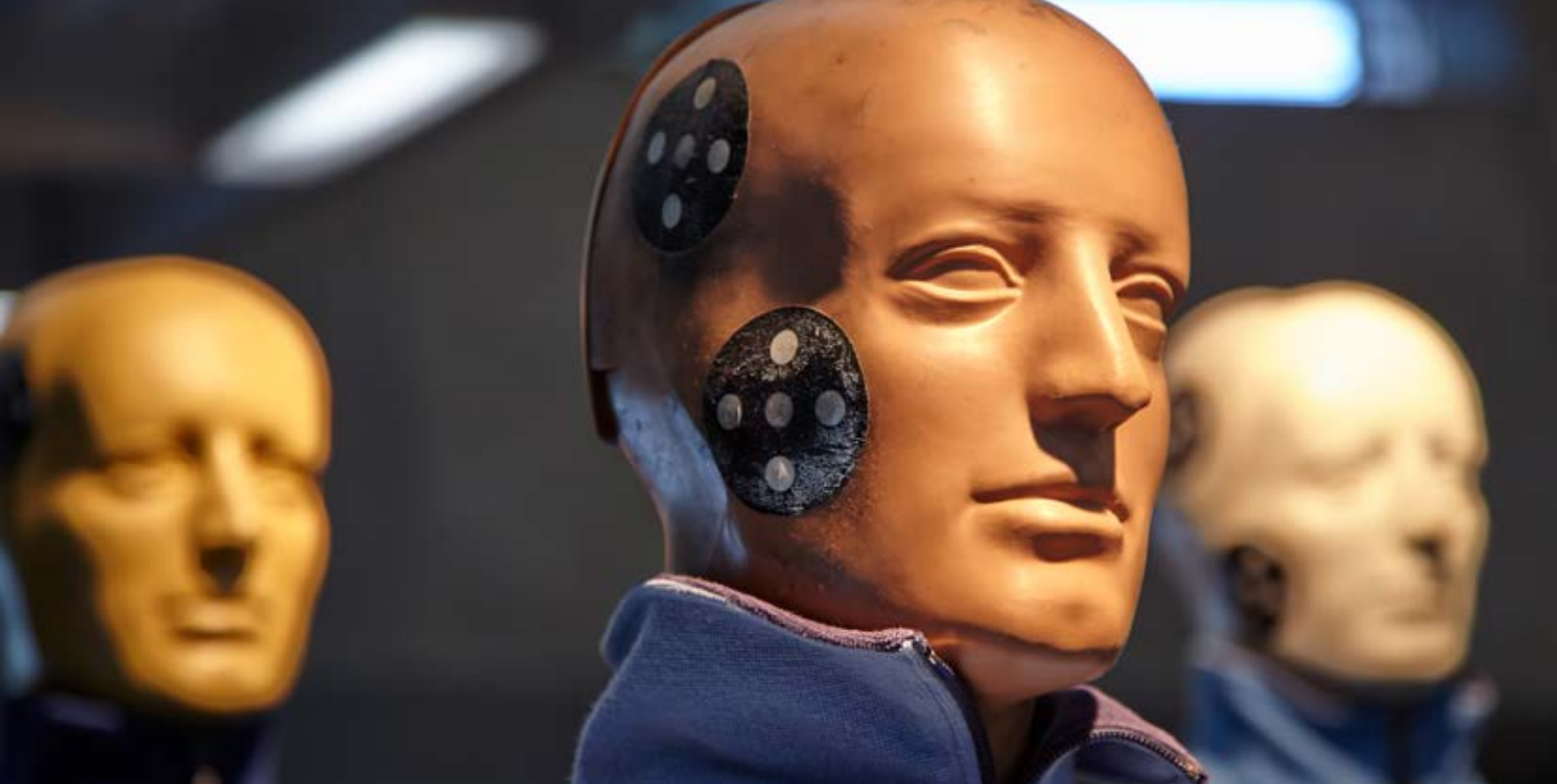


Making products safe for human use is not an easy task, not least because product testing needs to keep up with demographic trends. This includes adjusting test conditions and results for gender, and changes in weight, height, age and others. Failure to do so can have fatal real-world consequences.

Car-crash test dummies are a case in point. Typically, the test dummies are mostly modelled on the average male, who is not representative of the entire population. This is a factor in explaining why women are 47% more likely than men to incur severe injury in a car accident.¹ Accident statistics point to a similar story. For example, Europe's roads are getting safer, it seems. Between 2010 and 2017 the number of road fatalities went down 20%. At the same time, however, the proportion of elder people injured or killed on the roads had risen.² A suspicion is that as crash test dummies are modelled on the up-to 65-years of age bracket, they are not representative of older drivers. As more than 20% of the EU's population will be more than 65 years old soon, "older" test dummies are now in the making.

¹ European Commission, "Gendered Innovations: How Gender Analysis Contributes to Research", EU Horizon 2020, 10 December 2013, <https://ec.europa.eu/programmes/horizon2020/en/news/%E2%80%9Cgendered-innovations-how-gender-analysis-contributes-research%E2%80%9D>

² C. Collins, "Crash test dummies based on older bodies could reduce road fatalities", HORIZON, 11 June 2018, <https://horizon-magazine.eu/article/crash-test-dummies-based-older-bodies-could-reduce-road-fatalities.html>



Age, gender and physical properties are not the only issues. Genetics, lifestyles and other factors also make people different. In certain fields, notably health, these are important considerations. For instance, a recent study showed that women are more than twice as likely to experience adverse side effects to medications than men.³ The side effects range from mild symptoms like nausea and headache to serious problems including cognitive abnormalities, seizures, hallucinations, agitation and cardiac issues. Historically, it has been more usual for men to participate in clinical drug trials than women. However, at rest metabolism in females is typically slower than in males. This means that dosage levels determined by study results on males can be too high for women.

These examples highlight the hidden risk of safety trials, where the trial population does not represent end-users. For insurers, particularly in fields where product use could lead to bodily injury or health impairment, risk assessors should fully investigate the data set used by regulators as the basis for product approval. If test populations are not representative of end-user groups, a more cautious underwriting approach makes sense. This is especially so where potential for serial losses exists due to fast roll-out of new products to many consumers.

Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Algorithms are only human too - opaque, biased, misled”, *SONAR 2018*, p.26

³ I. Zucker and B. J. Prendergast, “Sex differences in pharmacokinetics predict adverse drug reactions in women”, *Biology of Sex Differences* 32 (2020), <https://bsd.biomedcentral.com/track/pdf/10.1186/s13293-020-00308-5.pdf>

Political and economic environment

Many governments are supporting their domestic economy through the COVID-19 pandemic with stimulus packages. These can ease the crisis in the short term but may prolong the debt crisis and increase related risks for the future +++ The low-yield environment will most likely continue +++ The ongoing rise of economies in Asia, will increasingly shift global economic, cultural and political powers from west to east +++ The COVID-19 crisis has accentuated global supply chain vulnerabilities and infrastructure needs.

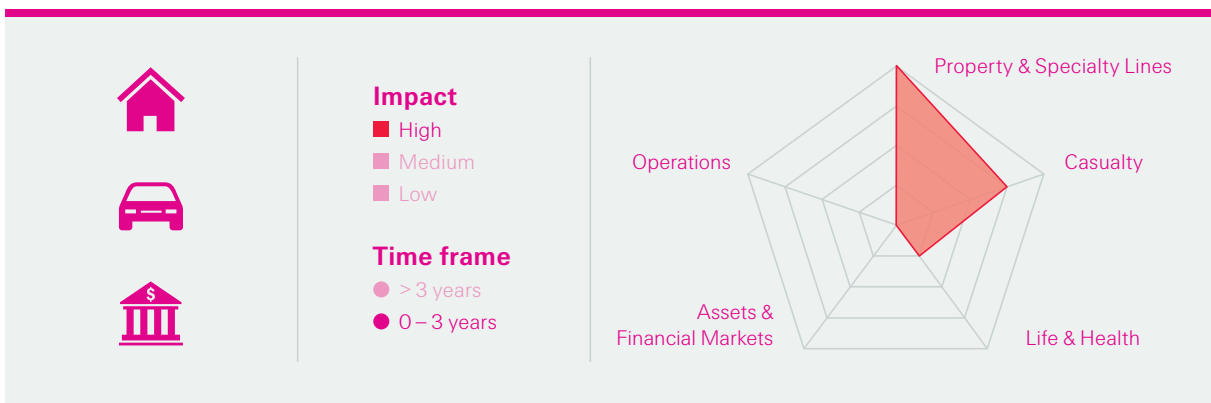


Restarting suspended operations – larger accidents ahead?

In oilfield services, on aggregate maintenance budgets were cut by USD 20 billion last year.¹ The COVID-19 pandemic has led to budget cuts and mothballed facilities in other industries too. There is heightened accident risks in rushed start-up actions as businesses seek to return to normal. In turn, this could lead to large losses in Property and Casualty insurance.

Potential impacts

- Not-well maintained facilities have a higher propensity to large accidents like fires, explosions, spills or toxic releases which can lead to large property, casualty and environmental liability claims.



High-hazard facilities like oil refineries, chemical plants, mines or power plants are inherently risky. The aim of industry standards with respect to plant design and operational procedures is to ensure safety. If the processes and installations do not comply with safety practices and standards, big accidents can happen. Keeping plants and processes safe requires ongoing maintenance by experienced and qualified staff, and time and finance to support shut-down activities with subsequent restorative and safety work. If one of these asset integrity pillars is impaired, high-consequence leakage and/or equipment failure scenarios could lead to catastrophic loss events like fires, explosions or the release of toxic materials into the environment. The result could be multi-billion losses for the insurance industry.

The COVID-19 pandemic experience has also put maintenance and inspection work under pressure. This is due to lack of availability of contractors and equipment/material. A consequence of a global economy in trouble has been a squeeze on maintenance budgets in many industries, and a delay to planned works. In the oilfield services sector alone, there was a USD-20-billion cut back in maintenance budgets last year.¹ And across many industries, as a savings measure, the choice has been to mothball facilities rather than use the downtime for maintenance. In addition, qualified and experienced staff have either been laid off and/or, due to restrictions on mobility in lockdown, not able to travel to sites of work.

¹ Oilfield service yearly demand forecast by segment worldwide from 2019 to 2023, Statista, <https://www.statista.com/statistics/1126854/oilfield-service-yearly-demand-worldwide-by-segment/>



From a risk perspective, experience shows that the start-up phase of a mothballed facility can be the time of most acute risk. Studies indicate that in the refining, petrochemical and chemical industries, around 40 – 50% of process safety incidents and/or major losses occur during start-ups after a period of shutdowns and other events that occur infrequently.² There is a risk that the start-up of mothballed facilities after the pandemic-induced interruption may take place under budget pressure: in other words, an environment in which approval for fast but not necessarily well-planned or well-resourced start-up is given.

The same applies to industries not involving hazardous materials, such as aviation, where planes that have been mothballed will be reactivated as demand for air travel picks up.³ Other than the physical maintenance of aircraft, another consideration is that pilots will resume work after a long period of no or less flying time. Human error accounts for two-thirds of root causes in aviation and other man-made accidents, and rusty flying skills as carriers ramp up their operations could be an additional risk.⁴

Across industries, insurers should focus their risk assessment on the three pillars of adequate funding, time and the availability of experienced and qualified staff as businesses move to return to normal post pandemic conditions.

Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Beirut explosion – dangers of hazardous materials?”, SONAR 2021, p. 20

² Restarting Operations Following Idle Periods, Swiss Re Corporate Solutions, 24 April 2020, <https://corporatesolutions.swissre.com/insights/knowledge/restarting-operations-following-idle-periods.html>

³ “Covid-19: Safety concerns over planes returning to service”, BBC, 15 December 2020, <https://www.bbc.com/news/business-55313504>

⁴ Human factor in fatal aircraft accidents, Department of Transport and Regional Development, Bureau of Air Safety Investigation, April 1996, https://www.atSB.gov.au/media/28363/sir199604_001.pdf; Accident Statistics, International Civil Aviation Organization (ICAO), <https://www.icao.int/safety/iStars/Pages/Accident-Statistics.aspx>

Technological and natural environment

A changing climate gradually increases the severity of large natural catastrophes +++ The transition to a low-carbon economy calls for innovation and offers new risks and opportunities for businesses across value chains +++ Biodiversity and ecosystem services are vital for societies and economies to function +++ Cyber security is a top priority for every organisation in the post COVID-19 world.





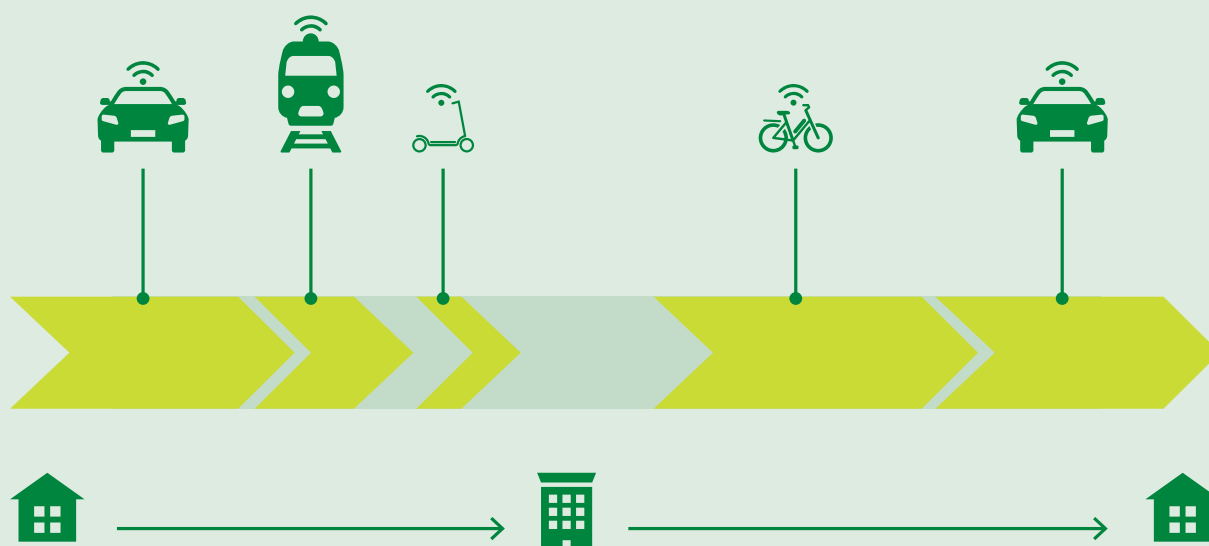
Urban mobility: innovation in short-distance travel

Important trends in short-distance mobility come with different time horizons and risks. The drivers are new technologies, changes in demographics and mobility needs, as well as sustainability and efficiency demands. Due to regulatory challenges, often some trends attract more hype than others: the relevance for insurance opportunities follow suit.

As the world becomes more urban, facilitating the flow of commuters, travellers and goods will remain a focus for city planners, and for insurers. Urbanites demand convenience in transport options, and safety and comfort. New mobility service demands drive new developments, and technological progress allows for innovations in on- and underground travel, and in the air. All this adds up to a revolution in short-distance mobility, with an emphasis on sustainability.

The service revolution

The future of urban mobility is not shaped by public vs. private traffic, but by a shift to integrated multi-modal (different transport and vehicle types) service ecosystems. Enabled by digital interconnectivity and wearable devices, the vision is for urban mobility service users to, for example, be able to hop from one service (eg. a privately-owned car) to another (a public train), and then on to a shared rental e-scooter, seamlessly and efficiently. To make this reality, mobility providers and insurers will need to offer integrated solutions that allow for flexible and easily-bought modular covers (see also risk theme “Electric scooters and beyond – micromobility risks”)¹.

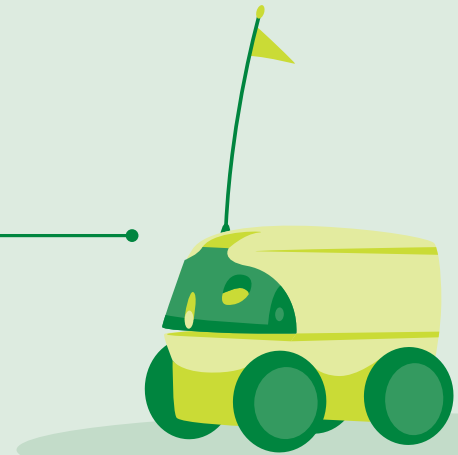


A commuter's journey on a working day – using different mobility services

¹ Mobility ecosystems see: E. Avramakis et al., Striving towards a seamless interface for customers, Swiss Re Institute, May 2019. <https://www.swissre.com/institute/research/topics-and-risk-dialogues/digital-business-model-and-cyber-risk/mobility-ecosystems.html>

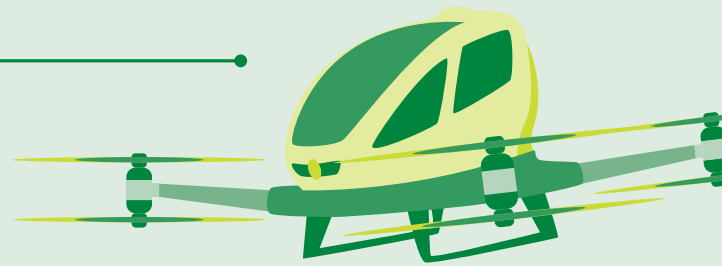
Autonomous vehicles

For many years, driverless cars have been hailed as the next big thing. However, high development costs, a number of accidents involving autonomous vehicles and still open questions on regulation mean the autonomous car has yet to become king of the road. Some cars offer advanced self-driving features, but still with human driver oversight and responsibility. Public transport like driverless metro trains and buses have become more common place, and there is testing of autonomous delivery robots in some sectors such as postal services. Overall, however, transport is still far off an autonomous utopia.



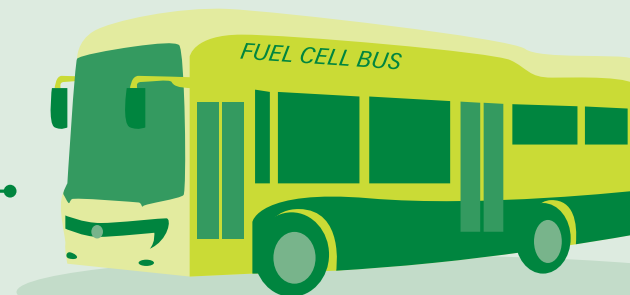
Urban Air Mobility (UAM)

New technology allows individuals and small groups to travel through air, taking the concept of taxis to a whole new level, in the sense of leaving traffic congestion and red lights behind. Air taxis and electrojets can be piloted or autonomously operated. They are usually equipped with multiple rotors allowing for vertical take-off and landing, analogous to smaller drones. To support horizontal flight, some UAM aircrafts are also equipped with wings. Start-ups and airplane and car manufacturers have UAM vehicle prototypes and, for example, unmanned air taxi services are being explored in experimental aviation zones in China. However, it will be a while before commercial services become scalable, not least because regulation has a lot of catching up to do. Do not expect autonomous air taxis anytime soon.



Non-fossil powered transport

Transportation is responsible for around 24% of direct CO₂ emissions from fuel combustion.² The move to electromobility, hydrogen fuel cells and non-fossil-based fuel alternatives is central to reducing society's carbon footprint. The transition is gaining traction and will progress over the coming years.



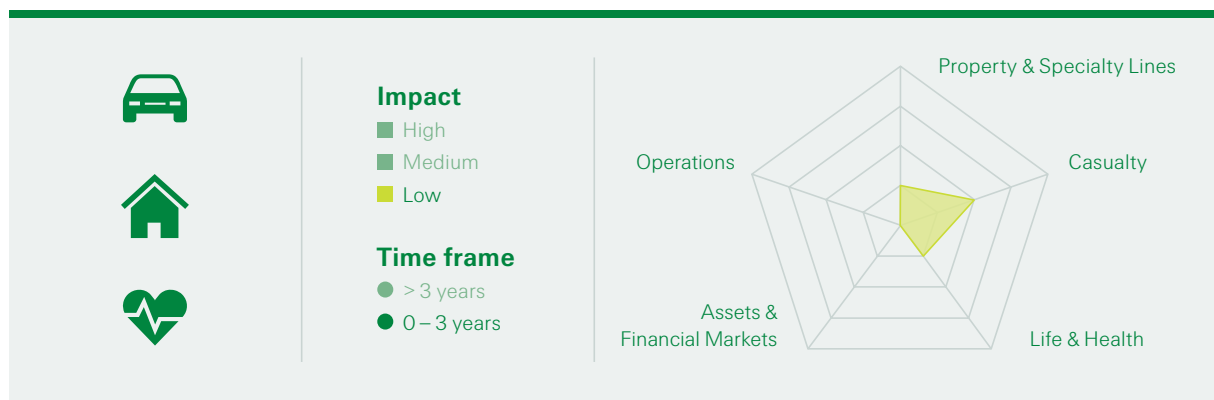
² Tracking Transport 2020, International Energy Agency (IEA). May 2020, <https://www.iea.org/reports/tracking-transport-2020>

Electric scooters and beyond – micromobility risks

E-micromobility – electrically powered e-scooters and beyond – is evolving fast, with ever new vehicle types and uses. It promises a sustainable response to traffic-loaded urban centres, and also to consumer demand for convenient and cheap short-distance rides. Regulation, however, needs to keep up with the changing dynamics and for insurers, new risks keep emerging.

Potential impacts

- With a lack of claims data and regulatory disparities, the dynamic e-micromobility sector brings significant uncertainties and increased risk for insurers.
- Liability exposures arise from injured riders alleging product defects and/or lack of warnings. Pedestrians who have been hit by scooters or who have been injured after tripping over discarded scooters are also bringing suits. In addition, there are environmental concerns, with e-scooters being thrown into waterways by people opposed to their presence.
- The rental of e-scooters requires sharing of personal information, which gives rise to cyber risk. Data theft may be an issue, and hacking could lead to remote vehicle manipulation, potentially affecting entire fleets.
- E-scooter related injuries are increasing.¹ Life & Health books can be impacted by increased mortality, disability and medical expense claims. Workers compensation insurance may cover employees injured using shared mobility for work purposes and/or while commuting.

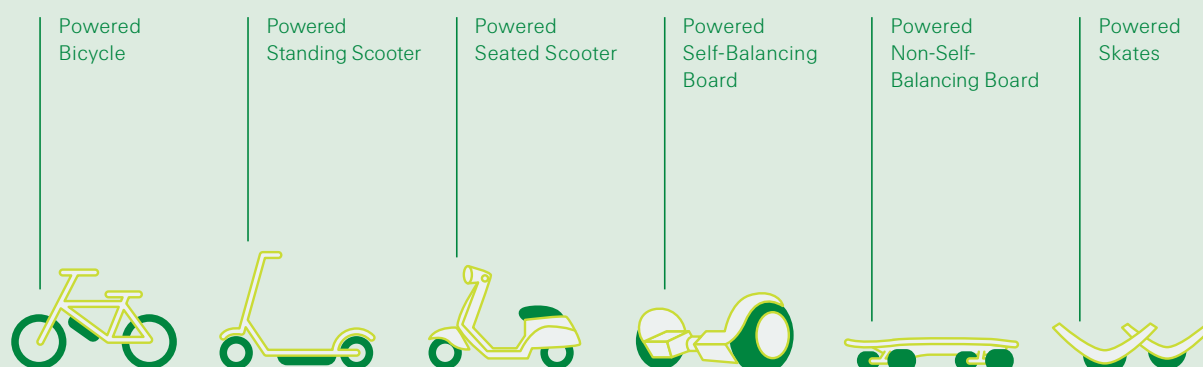


Do you remember the Segway that appeared on cityscapes two decades ago, a symbol of personal transport means for the future? The self-balancing single-axle electro-mobile amazed for short distance rides but has already been consigned to history. After a number of spectacular accidents – involving prominently a former US president, the Segway company owner, and world champion runner Usain Bolt – production was halted in 2020.²

¹ E-Scooter-Related Injuries Are on the Rise: CPSC Releases New Study and Public Service Announcement, 16 September 2020, <https://www.cpsc.gov/Newsroom/News-Releases/2020/E-Scooter-Related-Injuries-Are-on-the-Rise-CPSC-Releases-New-Study-and-Public-Service-Announcement>

² N. Gray and K. Hall, "Lessons from the Awkward Life and Death of the Segway", Bloomberg CityLab, 15 July 2020, <https://www.bloomberg.com/news/articles/2020-07-15/rip-segway-the-dorky-grandfather-of-micromobility>

Types of powered micromobility vehicles



Source: Society of Automotive Engineers SAE³

The Segway may disappear but it set in motion a trend of e-micromobility, which continues to develop fast. There has been an e-scooter revolution since 2017, with cities across the world becoming a battleground for shared rental models. There is also competition among pedestrians, cyclists, cars, buses, trams and e-scooter users, for public pavement and road space. With their increasing usage, accidents involving e-scooters have risen, usually due to user inexperience or technical failure.⁴

The associated limited loss experience to date is a challenge for insurers. So too is the slow pace of regulatory adjustment and large diversity across jurisdictions with respect to definitions, age restrictions for e-scooter use, speed limits, and allowable areas of operation and parking. These factors, along with different use and ownership models (from individual private ownership to fleet shared rentals), and technological innovation that is yielding ever-more new vehicle types, add to the emerging risks around urban e-micromobility.

Insurers need to consider potential impacts on existing covers and opportunities from new e-mobility offerings. Lack of long-term (loss) experience makes risk pricing difficult. Market entry of large transport firms (eg, big ride-sharing service providers or traditional car manufacturers) may be a game changer for what has typically been a start-up business sector. It could increase the size of the risk pool for the insurance industry.

³ SAE J3194™ Taxonomy & Classification of Powered Micromobility Vehicles, Society of Automotive Engineers SAE, <https://www.sae.org/binaries/content/assets/cm/content/topics/micromobility/sae-j3194-summary--2019-11.pdf>

⁴ E-Scooters – Micromobility menace or urban transport revolutionary? Swiss Re Institute Life & Health Underwriting Insights 2019. Hazards can be categorized according to three broad areas: 1. mechanical, 2. electrical, 3. human factors. Consumer Product Safety Commission USA, Safety Concerns Associated with Micromobility Products, 8 April 2020, https://www.cpsc.gov/s3fs-public/Report-on-Micromobility-Products_FINAL-to-Commission.pdf?THHlorYXAZ_KiZnobh1o7.7



Insurers on the road to net-zero

In 2020 and early 2021, new commitments from countries and companies have increased traction in the transition to a low-carbon economy. This is a major opportunity for the insurance industry that will, however, also come with certain risks on the liability, investment and the operational sides.

Climate change is one of the biggest challenges facing society. We need to achieve net-zero emissions by 2050 to avoid a more-than-2°C rise in global temperature, leading to serious and irreversible damage to our planet. Many organisations and industries are developing their own decarbonisation pathways to reach this goal by 2050 or before. To achieve net-zero, any emissions which cannot be avoided must be removed from the atmosphere and stored permanently (see graphic on the required stylised trajectory of global CO₂ emissions below). To reach this goal, emissions need to be cut by 50% by 2030.

The global net-zero target is gaining more traction, with more than 100 countries committing to a net-zero by 2050 target. China, which has the highest emissions, has pledged to a 2060 timeline.¹ In the private sector, in 2020 on average one new company each day joined the Science Based Targets initiative and committed to emission reduction targets.² Overall, companies with a combined revenue of over USD 11.4 trillion (more than half annual US GDP) have committed to a net-zero carbon economy by 2050 as part of the UN Race to Zero campaign.³ Importantly, emissions have to remain net-negative after 2050.

The insurance industry can play an active role in supporting the transition. Risk knowledge and transfer solutions and investments will be key to deployment of green infrastructure and low-carbon technologies. For instance, marine, air and road transport powered by new low-carbon fuels will need appropriate risk management and risk transfer to achieve economic viability and scale. The same is true for the nascent carbon removal industry. Insurers can take on the risk of transition where price levels are adequate. The resulting demand for insurance will be new source of premium growth. On the asset side, aligning investments with net-zero targets can help to improve portfolio performance and avoid stranded assets.

The new momentum in the transition to a low-carbon economy could also come with new risks for the insurance portfolios. Design and construction of new technologies has the potential to change the risk landscape of insurance coverages for architects, engineers and construction. Fundamental changes in business models can imply that the underlying risks of certain lines of businesses may change significantly. Stricter emission regulations could lead to increased litigation risks where the targets are not met. In addition, such regulation may impair high-emission companies and industries. Increasing cost pressure on high-emission assets can increase the likelihood of default-triggering losses in Credit & Surety (C&S) lines or stranded assets on the investment side. Moreover, cost pressure and subsequent lower maintenance may increase operating risk. This could lower risk quality for impaired assets and thus impact property insurance.

¹ L. M. Lombrana, "The benchmarks countries must hit to reach net-zero emissions", Bloomberg Green, 1 February 2021, <https://www.bloomberg.com/news/articles/2021-02-01/the-benchmarks-countries-must-hit-to-reach-net-zero-emissions>

² Science based targets initiative steering committee: "The new normal: 1000 companies aligned with science, RACE TO ZERO", 10 October 2020, <https://racetozero.unfccc.int/the-new-normal-1000-companies-are-now-setting-science-based-climate-targets/>

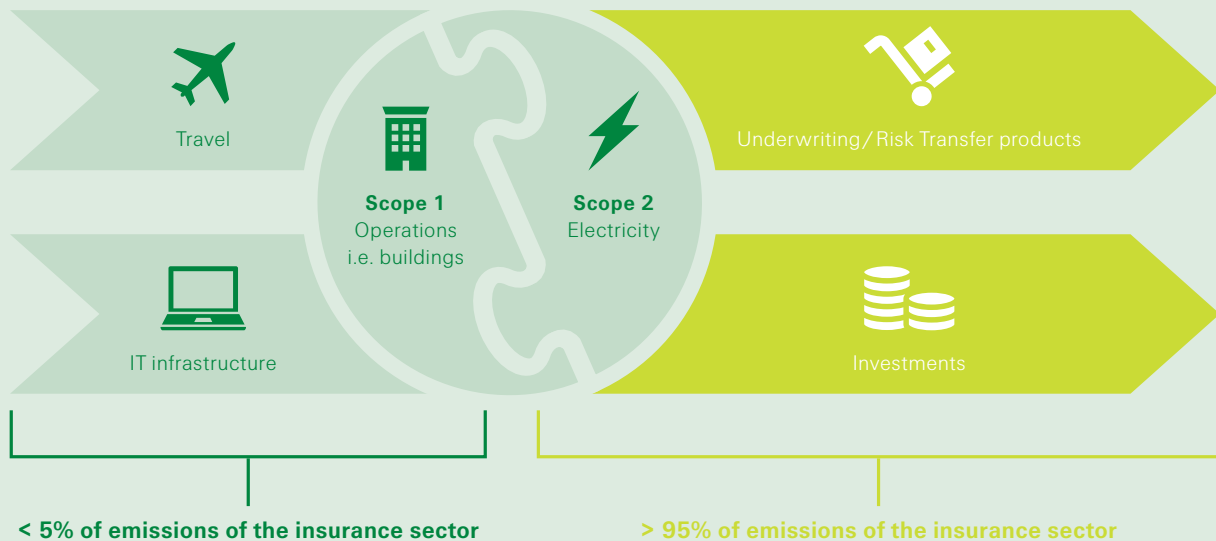
³ Commitments to Net Zero Double in Less Than a Year, UN Climate press release, 21 September 2020, <https://unfccc.int/news/commitments-to-net-zero-double-in-less-than-a-year>

Emissions in the insurance value chain:

Investments and risk transfer products constitute the majority of the emissions

Scope 3 upstream emissions

Scope 3 downstream emissions



For insurers, the emissions of the value chain of their clients and investment targets are typically much higher than from their own operations (see graphic “Emissions in the insurance value chain” above). Pressure from stakeholders like society and investors to mitigate climate-related impacts beyond insurers’ operations is increasing. Insurers face reputational risks not only from own emissions but also from those of their investees and insureds.

Given the opportunities and risks associated with climate transition, it is in the insurance industry’s interest to: 1) measure and steer the net-zero alignment of its own insurance and investment portfolios; and 2) to support its business partners and clients in the transition to a net-zero economy. While the net-zero idea is gaining traction, more countries and companies need to adopt clearer roadmaps and policies with short- and mid-term measures to deliver on the target. Collaboration and knowledge exchange will be key to move from ambition to reality, and insurers can play an important role as risk knowledge partners, risk takers, investors and pioneers of green operations. Initiatives such as the “Net-zero Asset Owner Alliance” and the WEF Alliance of CEO Climate Leaders are adding momentum in this regard.



Pricing nature in insurance

As reporting standards of the Task Force on Climate-Related Financial Disclosures (TCFD)¹ are implemented a new topic takes off: Nature & Biodiversity. A Task force on Nature-related Financial Disclosures (TNFD)² is about to emerge with the aim of developing recommendations, which could also change how insurers report and write business.

Reporting requirements (voluntarily or mandatory) have a strong impact on how insurance companies report and steer their business. This has been demonstrated by the Task Force on Climate-related Financial Disclosure (TCFD) currently being implemented. This approach seems now to be replicated with an emerging Task Force on Nature Related Financial Disclosures (TNFD).

This comes in the context of the 2021 Conference of the Parties to the Convention on Biological Diversity,³ where the next global biodiversity framework to stop species decline will be a main topic agenda.⁴ The majority of the biodiversity goals set in the last decade have not been met, and the conference will seek to establish new ones. One proposed goal is to value nature “through green investments, ecosystem service valuation in national accounts, and public and private sector financial disclosures.”

As comparison, the TCFD has more than 1 000 supporters, including insurance supervisors and financial firms representing assets of USD 138.8 Trillion.⁵ TCFD recommendations are now being implemented through legislation and regulation in many jurisdictions.⁶

Under the TCFD recommendations, insurers as well as agents in other industrial sectors should show how climate-change resilient their portfolios are. Implementing climate-change related considerations into actuarial models is one way to do this.⁷ On the life side, the impacts of climate change are currently under investigation. As the WHO and the Lancet Countdown on Climate Change and Health suggest, without action negative impacts on excess morbidity and mortality can be expected.⁸ This will impact insurance. Finally, investments will also be influenced by TCFD.

Quantifying the impact of the decline of nature will pose an even bigger challenge. TNFD thinking on how to halt deterioration is still in nascent stage, and understanding the impacts or adapting actuarial models and reporting figures will be challenging. The COVID-19 pandemic points to the inherent complications.

A key risk driver for the frequency of pandemics is deforestation in biodiversity-rich tropical areas. Deforestation can connect new pathogens via roads to population centres: in other words, forest loss makes pandemics more likely.⁹ To quantify such scenarios could be one of the tasks when reporting on “Nature-related Financial Exposures” becomes a requirement of corporate disclosure.

¹ Task Force on Climate-Related Financial Disclosures, <https://www.fsb-tcfd.org/>

² Task Force on Nature-Related Financial Disclosures, <https://tnfd.info/>

³ Fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, <https://www.cbd.int/meetings/COP-15>

⁴ Discussion paper Post 2020 Global Biodiversity Framework, <https://www.cbd.int/conferences/post2020/post2020-prep-01/documents>

⁵ About: History, Task Force on Climate-Related Financial Disclosure, <https://www.fsb-tcfd.org/about/#history>

⁶ TCFD Status Report 2020, October 2020, [2020 Status Report: Task Force on Climate-related Financial Disclosures – Financial Stability Board \(fsb.org\)](https://www.fsb-tcfd.org/status-report-2020)

⁷ Climate change and related risks have truly significant implications for underwriting, investment, and even an insurer’s operational activities., KPMG, <https://home.kpmg/xx/en/home/insights/2020/05/preparing-for-climate-related-disclosures.html>

⁸ Climate change and human health – risks and responses. Summary, WHO, 2003, <https://www.who.int/globalchange/summary/en/>; N. Watts, “The 2020 report of the Lancet Countdown on health and climate change: responding to converging crises”, THE LANCET, 2 December 2020, <https://www.lancetcountdown.org/2020-report/>

⁹ IPBES #PandemicsReport: Escaping the ‘Era of Pandemics’, ipbes, <https://ipbes.net/pandemics>



As the risks related to the loss of nature become more material, the pressure for stringent measures increases. Economic growth is a big driver of nature's decline, and a way to change course is to make the financial impacts in corporate accounts visible. For the insurance industry, this is good news. The increasing transparency on client exposures enables more informed and targetted underwriting and risk selection. It also opens up business opportunities such as nature-based insurance solutions.¹⁰

Related articles in *Swiss Re SONAR – New emerging risk insights*

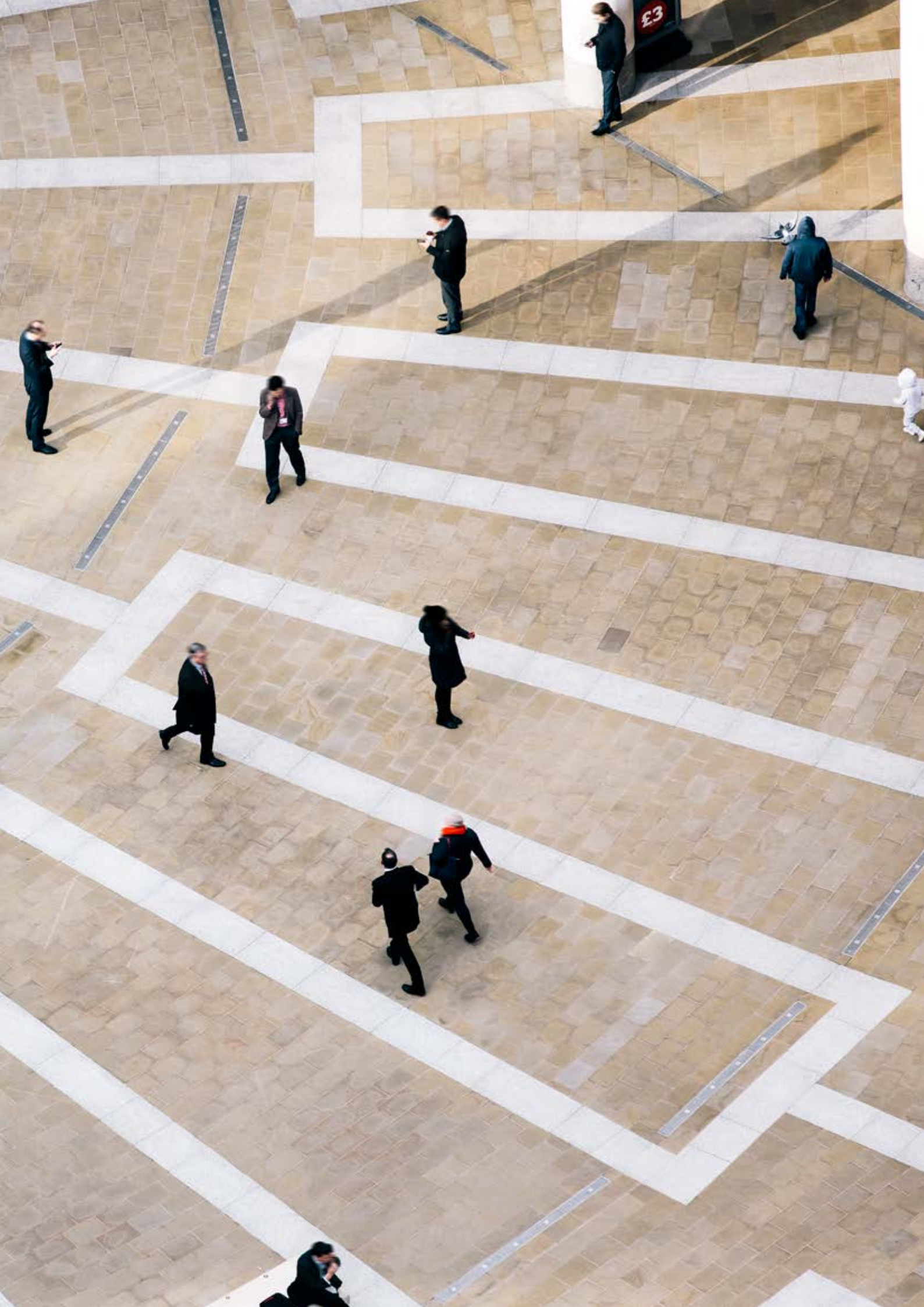
- "Resilience at stake – forest's vital functions", *SONAR 2019*, p.33
- "Paradise Lost – the price of ecosystem services", *SONAR 2018*, p.31
- "Collapse of oceanic ecosystems", *SONAR 2014*, p.26

¹⁰ Swiss Re Nature-based insurance solutions, Swiss Re, 27 November 2020, <https://www.swissre.com/our-business/public-sector-solutions/our-solutions/nature-based-solutions/world-heritage-site-nature-based-solution-leads-way-reducing-risk-rising-sea-levels.html>

Competitive & business environment

As traditional industry borders fall away, digital platforms (ecosystems) and strategic partnerships will greatly influence the future of insurers

- +++ Customer engagement will increasingly be digital
- +++ Driven particularly by investors, demand for material Environmental, Social and Governance-related information and metrics is growing.

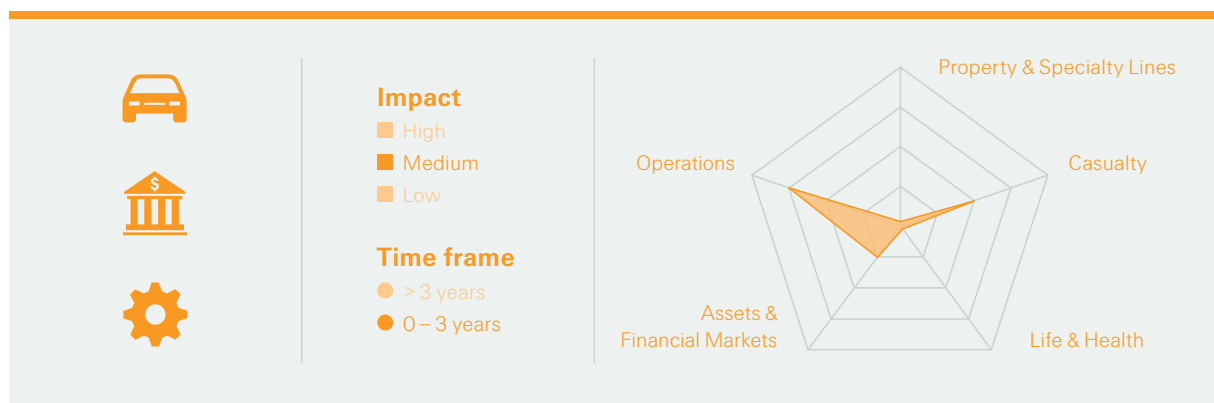


Modern slavery – pressure on supply chains

Companies face increasing pressure to ensure they are not party to or associated with any form of people exploitation, including at the input/service providers in their supply chains. Newly-introduced laws and regulation could potentially increase litigation risks associated with modern slavery. Identification of exploitation could lead to large liability claims, in particular with respect to director & officer (D&O) covers.

Potential impacts

- Increased pressure on companies, including insurers, to disclose information on human rights along their entire supply chains. If human rights violations are identified, the stock price of a company could be negatively impacted.
- Reputational risks could arise from doing business with input/service providers in the supply chain associated with any form of modern slavery.
- In casualty, alleged human rights violations in supply chains could lead to more claims in D&O lines of business.



Modern slavery is an umbrella term for different forms of people exploitation, including forced and child labour, human trafficking and forced marriage. Of the estimated 40 million people trapped in modern slavery, 16 million “work” in the private sector.¹ In recent years, non-governmental organisations have raised the profile of human rights violations in public debate. This has put pressure on companies to ensure they are not party to any such exploitation, including in the operations of all those participants that make up their supply chain.

Today’s supply chains are global and complex, with many agents involved at different stages. As such, it can be difficult to trace the origins of a final product and to identify occurrence of human rights violations along the production path. The increased attention on the topic exposes companies to legal, financial and reputational risks.² For example, the US Supreme Court is considering a case in which a multinational is being sued for child labour in Africa.³

¹ Global Estimates of Modern Slavery: forced labor and forced marriage, ILO, 2017, https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_575479.pdf

² GRI, Responsible Labor Initiative, Advancing modern slavery reporting to meet stakeholder expectations, 2019, <https://www.globalreporting.org/media/r1ydr40k/rli-advancing-modern-slavery-reporting-to-meet-stakeholder-expectations.pdf>

³ In this case, plaintiffs aim to apply a dormant 18th century law on a 21st century global supply chain phenomenon; Agence France Presse, “US Supreme Court Considers Firms’ Liability For Africa Child Slavery”, Barron’s, 1 December 2020, <https://www.barrons.com/news/us-supreme-court-considers-firms-liability-for-africa-child-slavery-01606851008>



There is also pressure from shareholders, who expect companies to adhere to ESG principles. At any level, modern slavery is the antithesis to ESG principles. Further, any company seen not be acting on human rights abuses in any part of their operations will likely struggle to attract and retain high-quality and motivated employees.⁴

The heightened awareness of new forms of slavery is reflected in implementation of more stringent regulations. For example, in 2015 the UK adopted the Modern Slavery Act, which requires commercial organisations to publish a statement on how they ensure they are not party to slavery and human trafficking at any of their operations, including supply chains. The State of California (Transparency in Supply Chains Act), Australia (Modern Slavery Bill), France (Duty of Vigilance Law) and the Netherlands (Child Labour Due Diligence Law) have introduced similar measures.

More rigorous laws and growing expectations of due diligence give rise to new liability risks. A first successful claim based on the new regulations could lead to an avalanche of subsequent claims. For insurers, this means more detailed appraisal of the issue of modern slavery in underwriting, notably with respect to D&O liability covers.

Related articles in *Swiss Re SONAR – New emerging risk insights*

- “Sustainable supply chain management just as crucial for financial services”, *SONAR 2020*, p. 47
- “Shifting litigation regimes”, *SONAR 2019*, p. 25

⁴ W. Henisz, T. Koller, and R. Nuttall, “Five ways that ESG creates value”, McKinsey Quarterly, November 2019, <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Strategy%20and%20Corporate%20Finance/Our%20Insights/Five%20ways%20that%20ESG%20creates%20value/Five-ways-that-ESG-creates-value.pdf>



Ethics in digital nudging

Choice sets on websites and mobile apps can be designed in a way that is not beneficial to consumers. These so-called “dark patterns” and “sludges” come with reputational risks. Increasing attention on such unethical design practices could lead to regulatory intervention, including for insurers.

When people visit websites and use mobile apps, the way purchase options are presented affects what one focuses on and eventually selects.¹ So-called “nudges” are design features of websites and apps that make it more likely for a consumer to take a particular decision or direction without, at the same time, reducing the set of possible choices.² For instance, an easy-to-understand and clearly-illustrated list of insurance options steers potential customers by informing and making their choice easier. Nudges on websites and apps can create a win-win situation for customers and insurers alike by helping potential customers better understand policy content and increasing the likelihood that they select a product that best suits their needs.

However, websites and app design features can also be devised in ways to drive consumers to options that are not the most beneficial for them. These are called “dark patterns.”³ Similarly, design aspects can also discourage behaviour that is in a person’s best interest, such as cancelling subscriptions or changing privacy settings.⁴ For instance, websites can be opaque about how to cancel insurance policies. This is when potentially beneficial nudges become “sludges”, a term that scholars and practitioners increasingly use to refer to design features that make the purchase decision-making process more cumbersome, not easier.⁵ The Behavioural Economics in Action at Rotman (BEAR) research centre (University of Toronto) has introduced a framework that illustrates the key differences between ethical nudges, dark patterns, and sludges (see adapted version below).⁶

Deploying dark patterns and sludges can not only harm consumers, but also damage a firm’s reputation when the practice is discovered and made public. In 2019, for example, a British online travel retailer made headlines when customers complained that the checkout process was so confusing, they inadvertently bought travel cancellation insurance that they did not want.⁷

Online purchasing continues to grow and, as the potential harm to consumers from dark patterns and sludges becomes more widely known, regulatory attention on the topic is increasing, including in the insurance sector. In the European Union, the Insurance Distribution Directive foresees that member countries will need to ensure that information on insurance products provided to (potential) customers “shall be fair, clear and not misleading” and that “insurance distributors always act honestly, fairly and professionally in accordance with the best interests of their customers”.⁸ In addition, the European Commission announced that it will address online commercial practices such as dark patterns as part of its “New Consumer Agenda”.⁹

¹ C. R. Sunstein, “The Ethics of Nudging”, Yale Journal on Regulation, Vol. 32, 2019, <https://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1415&context=yjreg>

² “A nudge (...) is any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives.” R. H. Thaler and C. R. Sunstein, Nudge: Improving decisions about health, wealth, and happiness, 2018, p.6.

³ Mathur et al., “Dark patterns at scale: Findings from a crawl of 11K shopping websites”, Proceedings of the ACM on Human-Computer Interaction (3), November 2019, <https://collaborate.princeton.edu/en/publications/dark-patterns-at-scale-findings-from-a-crawl-of-11k-shopping-webs>

⁴ R. H. Thaler, “Nudge, not sludge”, Science Vol. 361, Issue 6401, p. 431, 3 August 2018, <https://science.sciencemag.org/content/361/6401/431.full>

⁵ D. Soman, Sludge: A very short Introduction, The paper is based on remarks made at the Nudgestock 2020 annual conference on 12 June 2020, <https://www.rotman.utoronto.ca/-/media/Files/Programs-and-Areas/BEAR/White-Papers/BEARxBIOrg-Sludge-Introduction.pdf?la=en&hash=DCB98795CB485977A04DDB27EFD800C3DA40220E>

⁶ The BEAR research centre from the University of Toronto is one of Swiss Re’s academic partners



⁷ S. Duke and D. Walsh, “Travel insurance cancellation ploy ‘earns millions’ for Lastminute.com”, The Times, 2 November 2019, <https://www.thetimes.co.uk/article/travel-insurance-cancellation-ploy-earns-millions-for-lastminute-com-c5kjbwbkz>

⁸ Directive (EU) 2016/97, Chapter V, 2., <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016L0097>

⁹ New Consumer Agenda: European Commission to empower consumers to become the driver of transition, European Commission, 13 November 2020, https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2069

The UK’s Financial Conduct Authority (FCA) is well advanced on the topic of dark patterns and sludges. Back in 2013, the FCA set out a framework looking at how behavioural biases affect decision making about financial products, and has since published further insights on how sludges and dark patterns can adversely influence consumer behaviour and reduce welfare.¹⁰ Regulators in other jurisdictions are following suit. The Australian Securities and Investments Commission (ASIC) and the Dutch Authority for Financial Markets have published a joint report in which they warn about the deliberate use of sludges and misleading website/app design features in sales of financial products.¹¹ In March 2021, a first US state banned companies from using dark patterns.¹²

This increasing attention means that insurers and their insurance distribution partners using dark patterns and sludges face risk of regulatory intervention. To portray options on websites and apps in a transparent way and in the best interest of the consumers is thus advisable. Clear internal standards and compliance reviews on user interface designs can help insurers and their distribution partners make best use of ethical nudges and avoid misleading design tricks.

	Facilitate decision making	Impede decision making
 Help consumers	Nudges: making decisions that are in a consumer’s best interest easy	Prompting vigilance and thoughtfulness (eg, by making decisions more time-consuming)
 Harm consumers	Dark patterns: making it easy to choose welfare-reducing options	Sludges: discouraging behaviour that is in a consumer’s best interest

Graphic adapted from BEAR’s “The Nudge and Sludge Framework”¹³

Related articles in Swiss Re SONAR – New emerging risk insights

- “Digital innovation”, SONAR 2020, p.12, (Macro trends overarching topics)
- “Gamification”, SONAR 2016, p. 25

¹⁰ K. Erta et. al, Applying behavioural economics at the Financial Conduct Authority, Financial Conduct Authority, April 2013, <https://www.fca.org.uk/publication/occasional-papers/occasional-paper-1.pdf>; and e.g. Relending by high-cost lenders, Financial Conduct Authority (FCA), 6 August 2020, <https://www.fca.org.uk/publications/multi-firm-reviews/relending-high-cost-lenders>

¹¹ Disclose: Why it shouldn’t be the default, ASIC AFM, October 2019, <https://download.asic.gov.au/media/5303322/rep632-published-14-october-2019.pdf>

¹² A. Akhtar, “California is banning companies from using “dark patterns”, a sneaky website design that makes things like cancelling a subscription frustratingly difficult”, INSIDER, 16 March 2021, <https://www.businessinsider.com.cdn.ampproject.org/c/s/www.businessinsider.com/what-are-dark-patterns-2021-3?amp>

¹³ D. Soman, Sludge: A very short Introduction, The paper is based on remarks made at the Nudgestock 2020 annual conference on 12 June, 2020, <https://www.rotman.utoronto.ca/-/media/Files/Programs-and-Areas/BEAR/White-Papers/BEARxBIOrg-Sludge-Introduction.pdf?la=en&hash=DCB98795CB485977A04DDB27EFD800C3DA40220E>



Are humans ready to engage with bots?

As expectations on digital user-experience rise, and pressure from non-traditional players grows, insurers are turning towards AI-enabled technology for customer interaction. While this promises personalised, fast and intuitive end-to-end insurance experience, the industry needs to beware of regulations relating to the use of AI, the limitations of the technologies, and acknowledge that many clients still want human interaction.

Customer expectations on digital user experience are rising. To meet expectations of high-value and frequent-touch interactions, more personalized services and 24/7 support, the insurance industry is turning to digital intermediaries and AI-enabled technologies for customer-facing activities.¹ This is creating a new dimension in client-machine interactions.

Developments in natural language processing, computer vision including image recognition and other technologies bring many opportunities. Virtual agents like chatbots allow clients to address their issues at any time. Robots can also send reminders to clients to finish processes if they were interrupted, request missing information and analyze images of incidents. AI-enabled assistants can sift through vast amounts of client data and formulate more personalized service much faster than a human could. AI can also help accelerate claims processing and underwriting services. Algorithms integrated with internal policy data can enable insurers to fully automate and execute claims payout in real time.²

AI has limits though, not least the lack of certain cognitive skills.³ This is one reason why humans are still needed, to take care of cases that require special handling. Machine learning technologies can spot unconventional cases, which should then be referred to humans. Integrating all automated systems, and also making them work with humans to offer a reliable and efficient end-to-end customer experience can be challenging, and costly if not executed carefully.

There are other challenges also. For instance, virtual assistants can carry out a variety of tasks, but these may be regulated differently across various jurisdictions. In a recent case in the UK, an insurer was fined for over-reliance on voice-analytics software, which led to some claims being unfairly declined or not adequately investigated.⁴ Large-scale serial claims could also arise should chat-bot software be incorrectly programmed. And should a claim be incorrectly accepted, this could create a precedent for similar claims. With respect to compliance or operations, the insurance industry's use of virtual advice could also be exposed to risk arising from tighter regulatory restrictions.

An underlying consideration is that only 20% of consumers say they are comfortable using chatbots for their financial dealings.⁵ Tech-savvy generations are more accepting but overall, many are not comfortable with the idea of taking advice from a robot. While expectations on digital user-experience are rising, customer reluctance as well as risks related to regulatory restrictions and technological errors need to be balanced when deciding where and to what extent to go artificial and automatic.

¹ The Age of With – Accelerating the impact of augmented intelligence in insurance, Deloitte, 2020, <https://www2.deloitte.com/ca/en/pages/deloitte-analytics/articles/age-of-with-insurance.html>

² Ibid.

³ "An understanding of AI's limitations is starting to sink in", The Economist, 13 June 2020, <https://www.economist.com/technology-quarterly/2020/06/11/an-understanding-of-ais-limitations-is-starting-to-sink-in>

⁴ J. P. Raman and R. Lam, Artificial intelligence applications in financial systems, Oliver Wyman, 2019, <https://www.oliverwyman.com/our-expertise/insights/2019/dec/artificial-intelligence-applications-in-financial-services.html>

⁵ Acceptance of artificial intelligence chatbots by customer worldwide, as of 2017, by service, Statista, <https://www.statista.com/statistics/717098/worldwide-customer-chatbot-acceptance-by-industry/>





What's next in insurance modelling?

Models for risk assessment, capital allocation or projecting financial market trends are core to insurance business. Traditionally, models have been built relying mostly on historical data. In view of present- and future-day uncertainties introduced by factors such as climate change, record-low interest rates and low inflation, among many others, insurers need to debias their risk assessment models and make them also forward looking.

Traditionally insurance models have relied on historical loss and exposure data, and sometimes reflect just the last one or two decades when it comes to financial markets. However, real-world risk dynamics are forever changing. To improve the basis of sustainable underwriting and investment decision-making, a modelled risk needs to reflect both past experience, and present and likely future developments. This means actively debiasing past data points for already-known trends and thinking of trending variables of the future.

Climate change, for instance, is impacting insurers' assets and liabilities.¹ Rising global temperatures are leading to increased intensity of severe storms and increasing losses when an extreme weather strikes areas of high population and economic value. By far the biggest risk driver remains the rapid increase of assets in exposed areas, mainly through urbanisation. The range of forward-looking variables to consider for insured risks is wide, and different by line of business. For instance, in long tail casualty, uncertainties exist not just around inflation and interest rates, but also the future trajectory of technological, legal, judicial and capital requirement developments.

Today, scientific understanding of how micro-climates and weather can shape potential losses is improving.² And insurers can turn to professional scenario analysts and forecasters for a forward-looking view on a range of economic variables. Such knowledge can be incorporated as forward-looking risk assessment components in insurance modelling. There are several ways to do so, including counter-factual "what-if" analysis and consideration of potential crisis situations in the future, the latter important for better evaluation of tail risks in particular. As an example, systematic indices and heatmaps for local, industry and sector situations are enabling improved risk scenario analysis. Application of such future-oriented scenario assessments include mappings of the economic resilience of countries, estimations of climate change effects, say on health, and on biodiversity and ecosystem services.³ Forward-looking scenario analyses which combines historical experience and future trends and scenarios can help insurers anticipate and better price risk, and support underwriting performance.

¹ An overview can be found e.g. in Swiss Re Institute, 13 July 2020, https://www.fintegral.com/storage/app/media/blog/Climate%20Risk%20Webcast/20200713_Fintegral%20Webcast_Dr.%20Salomon%20Billeter_Climate%20stress%20testing%20for%20financial%20resilience.pdf

² M. Bertogg, "Why hurricane risk modelling has to change," Swiss Re, 6 January 2021, <https://www.swissre.com/risk-knowledge/mitigating-climate-risk/why-hurricane-risk-modelling-has-to-change.html>

³ For examples see: sigma Resilience Index 2020: global resilience put to the pandemic test, Swiss Re Institute, August 2020, <https://www.swissre.com/institute/research/sigma-research/2020-resilience-index.html>, Swiss Re Institute's Biodiversity and Ecosystem Services (BES) Index, September 2020, <https://www.swissre.com/institute/research/topics-and-risk-dialogues/climate-and-natural-catastrophe-risk/expertise-publication-biodiversity-and-ecosystems-services.html>, Swiss Re Climate Risk Score to assess the impact climate change will have on the wetness, dryness and sea level rise of any given location in the long-term (forthcoming).



Appendix: Terms and definitions

What is SONAR?

SONAR stands for Systematic Observation of Notions Associated with Risk. It is Swiss Re's process for identifying, assessing and managing emerging risks. Experts across the company use a web-based platform to collect early signals of emerging risks. All signals are assessed and prioritised by an emerging risk management team, which closely interacts with topic experts from Swiss Re's different business areas. The team serves as a catalyst for risk identification and assessment to define and implement recommendations in collaboration with the business. The findings are regularly shared internally and summarised for external audiences here.

What are emerging risks?

We define emerging risks as newly developing or changing risks that are difficult to quantify and could have a major impact on society and industry.

What are emerging risk themes?

Emerging risk themes illustrate potential new or changing risk developments for the insurance industry. They are mainly derived from SONAR but also draw on other sources. All themes have been assessed and edited by Swiss Re's emerging risk management experts. This report only features new emerging risk themes (ie, topics covered in previous editions are not listed again). You can retrieve prior reports from our webpage: www.swissre.com/sonar.

What is meant by overall impact?

The overall impact of an emerging risk is an indicator of the potential financial, reputational and/or regulatory effect on the insurance industry. It is assessed on a scale from high to low:

HIGH	Potentially high financial, reputational and/or regulatory impact or significant stakeholder concern
MEDIUM	Potentially medium financial, reputational and/or regulatory impact or moderate stakeholder concern
LOW	Potentially low financial, reputational and/or regulatory impact, or low stakeholder concern

What is meant by time frame?

We divide themes into those likely to occur in less than three years and those likely to occur over a longer time horizon. This assessment should not be used as an indicator of when action is needed, as some themes likely to occur in the more distant future may, nonetheless, require immediate action to prepare.



What is meant by impact per business area?

Spider graph indicating the potential impact on major insurance business areas on a scale from 0 (= no impact) to 4 (=significant impact).

What are trend spotlights?

Boxes throughout the text provide selective spotlights on emerging trends which could become relevant for the re/insurance industry and its clients. The selection of topics is non-exhaustive, and descriptions are intended as food for thought and discussion starters rather than comprehensive reviews.

What are macro trends?

Swiss Re has identified a set of macro trends assumed to have a high impact on the re/insurance industry within the next five to ten years. The macro trends featured in this report have been selected independently through expert discussions and surveys. They provide context to the emerging risk insights from the SONAR process.

Title

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