



Swiss Re SONAR Emerging risk insights



Risks are a moving target. They are constantly changing or newly developing. That makes it difficult to quantify and judge them. The earlier the insurance industry starts adapting to emerging risks, the better prepared it will be for tomorrow's challenges. Foresight and knowledge sharing across stakeholders are essential to navigate into a future in which change might be the only constant that remains.

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Executive summary

This Swiss Re SONAR report features emerging risk topics which could impact the insurance industry in the future. Topics were mainly derived from Swiss Re’s internal SONAR process and have been assessed by Swiss Re’s emerging risk management experts.

To make it easier to interpret and develop appropriate mitigation measures, topics are grouped by insurance business area, with a topic being allocated to the area that would potentially be most impacted. Of the 27 emerging risk topics covered, six were allocated to Property, eight to Casualty, four to Life & Health, three to Financial Markets, two to Claims and four to Operations (see Figure 1). All topics feature an assessment of their potential overall impact on the insurance industry and the time frame within which they are likely to occur (see page 5 for details).

The majority of topics were rated by Swiss Re as being of medium impact for the insurance industry. With regard to time frame, most topics were assessed as being rather imminent – with the exception of four Casualty-related topics which are expected to manifest only in the more distant future. The topics “prolonged power blackout”, “run-away inflation and surging bond yields” and “big data” were assessed as being of highest concern as they could have a high impact on the entire insurance industry and might occur within a short period of time. Further topics assessed as potentially having a high impact are three casualty topics; these are characterised by their long latency periods: “endocrine disrupting chemicals”, “unforeseen consequences of nanotechnology” and “unforeseen consequences of electromagnetic fields”.

This report should not be understood as a forecast that accurately reflects what the future will bring. Rather, it is meant to serve as an early-warning system that provides a first indication of what might lie beyond the horizon. Some of the topics listed here may never even materialise for the insurance industry. But others most likely will – and the earlier the industry starts to understand their implications, the better prepared it will be for tomorrow’s challenges which, after all, could also present new opportunities.

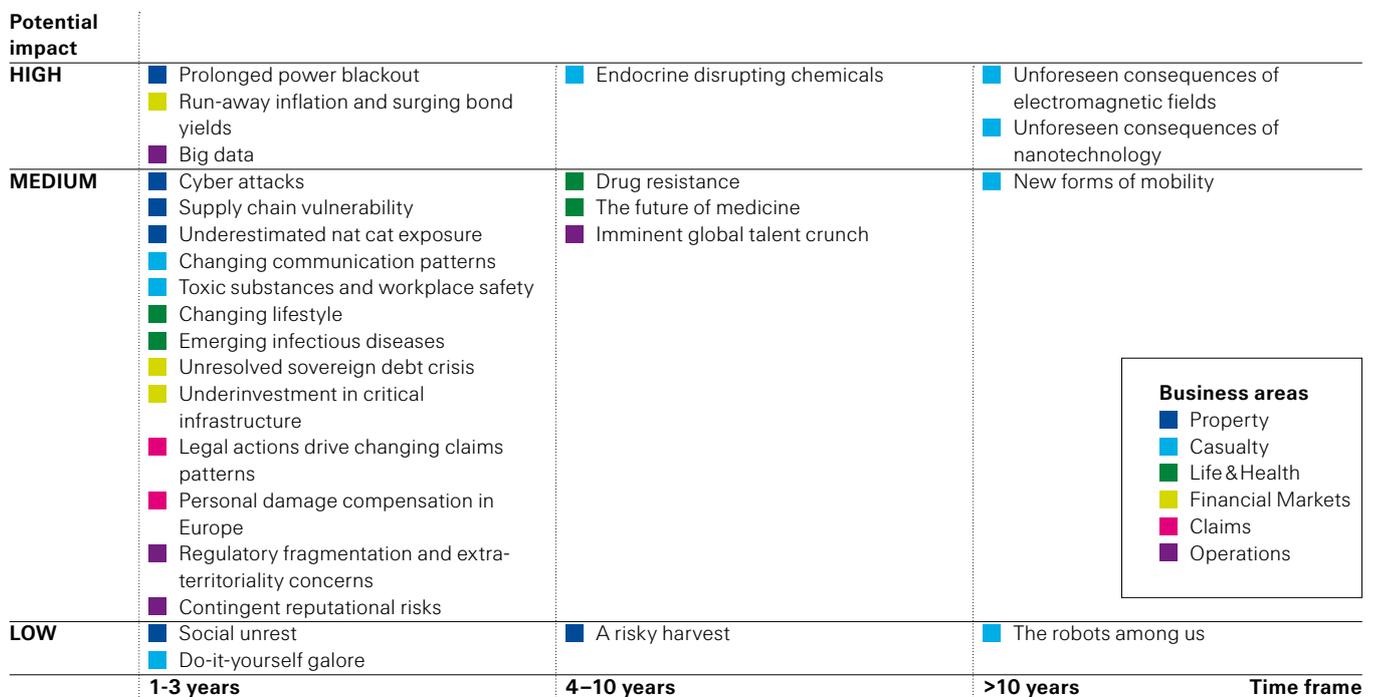


Figure 1
Overview of the emerging risk topics covered in this report by timeframe and potential impact. Colour coding indicates which area of the insurance business would potentially be most impacted by the respective risk.

Introduction

In an ever changing risk landscape, the insurance industry is continuously confronted with new challenges. Key drivers of this changing risk landscape include new economic, technological, socio-political and environmental developments as well as the growing interdependencies between them which can lead to an increasing accumulation of risk. Furthermore, liability and regulatory regimes continue to evolve, stakeholder expectations are strengthening and risk perceptions shifting. All of these factors result in a continuously changing business environment. This poses significant challenges for the industry, which can no longer rely solely on historical data to assess tomorrow's exposure.

In many cases, emerging risks are already on the insurers' books. They thus represent an important concern for the industry and its clients, and awareness of this challenge has risen steadily over the last couple of years. Swiss Re has fully embedded foresight and emerging risk management in its enterprise risk management framework. With SONAR, our tool for the systematic observation of notions associated with risk, we have established a solid process for identifying, assessing and managing emerging risks.

It is our pleasure to share with you some of the findings of this process through the first edition of Swiss Re SONAR. This publication seeks to share our knowledge and expertise to raise awareness for emerging risk topics which could become increasingly relevant for our industry. While the topics presented were mainly derived from Swiss Re's internal SONAR process, they also drew on some of the elements of the Risk Radar of the CRO Forum's Emerging Risk Initiative; this analysis highlights emerging risk topics that the initiative's members have identified as relevant to the industry.

Terms and definitions

This page provides an overview of key terms and definitions and explains the ratings used to assess the insights presented in this report.

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 insurance industry.

What is SONAR?

SONAR (**s**ystematic **o**bservation of **n**otions **a**ssociated with **r**isk) is Swiss Re's tool for identifying, assessing and managing emerging risks. By means of a network of experts across the company and an interactive web 2.0 platform, Swiss Re collects early signals of emerging risks. All signals are reviewed, assessed and prioritised by a dedicated emerging risk management team which closely interacts with a number of topic experts in Swiss Re's various business areas. The findings are regularly summarised, distributed to relevant stakeholders throughout the company and made available to all employees via Swiss Re's intranet. With this publication, Swiss Re now shares these findings with a wider public.

What are emerging risk insights?

Emerging risk insights illustrate potential new threats for the insurance industry. They were mainly derived from SONAR, but also incorporate key elements of the Risk Radar of the CRO Forum's Emerging Risk Initiative¹. All insights have been assessed by Swiss Re's emerging risk management experts. To make it easier to interpret and develop appropriate mitigation measures, insights are grouped by key insurance business area, with a topic being allocated to the area that would potentially be most impacted (Property, Casualty, Life & Health, Financial Markets, Claims, or Operations). Some well-known emerging risks such as climate change or gene technology are not listed as they are already being tackled by Swiss Re and the industry.

What is meant by overall impact?

The overall impact is an indicator of the potential financial, reputational and/or regulatory impact associated with an emerging risk topic. It is assessed using a high/medium/low scale:

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?

The time frame describes the period of time in which the risks associated with an insight might manifest and have an impact. We use three time frames to help readers assess the imminence of each topic: 1–3 years, 4–10 years, >10 years. These time frames should not be used as an indicator of when action is needed as some topics expected to occur in the more distant future may nonetheless require action now to prepare for their ultimate occurrence.

¹ For more information on this Initiative see <http://www.thecroforum.org/emerging-risk-initiative-2>

Emerging risk insights



Property



Prolonged power blackout

Overall impact	HIGH
Time frame	1–3 years

Electricity is the backbone of every industrialised society and economy. Increasing dependency on a continuous power supply, be it in the field of industrial production, electronic systems or everyday life, inevitably makes today's societies highly vulnerable to power outages.

Traditional loss scenarios only assume power blackouts for a few hours or days. However, space weather events or coordinated terror attacks could cause prolonged blackouts with significant impacts on society and industry. Critical infrastructure such as communication and transport would be hampered, heating and water supply would stop, and production processes and trading would seize.

Vulnerability to such large-scale power blackouts has increased in recent years due to the combination of increased connectivity and ageing, sometimes poorly-maintained power generation and distribution infrastructure and excess usage thereof.

Potential impact on the insurance industry

A prolonged power blackout could lead to large direct property losses as well as business interruption (BI) and contingent business interruption (CBI), which may even exceed those of large nat cat events. Even though some of the losses feared from past events did not materialise in the end, the potential and magnitude of future losses remains unknown.

Overall impact	MEDIUM
Time frame	1–3 years

Cyber attacks

Cyber attacks on critical infrastructure are a topic of growing concern. Recent attacks on banks have highlighted that even the financial industry, which spends more on internet security than any other industry, is not fully capable of protecting itself. This gives rise to concerns about the vulnerability of other industries. A cyber attack on a system controlling power, water or transport could disrupt a country’s security, public safety and economic stability. Several cascading attacks could have an even more serious impact and ultimately result in severe social and economic disruption. As information and communication networks have become a fundamental part of a nation’s infrastructure, protecting them is no longer merely recommendable, but has turned into a critical enabler of economic stability and growth.

Potential impact on the insurance industry

Cyber attacks could trigger BI and CBI covers and thus cause large losses, and several coordinated attacks could lead to higher than expected loss accumulation. The insurability against the risk of cyber attacks has yet to be fully tested.

Overall impact	MEDIUM
Time frame	1–3 years

Supply chain vulnerability

Globalisation has increased the interconnectedness of risks, and events that occur in one industry or country can rapidly transmit to other industries around the globe. This has been vividly illustrated by the ripple effects of events such as the 2011 earthquake and tsunami in Japan or the floods in Thailand in the same year, which affected industries around the globe.

Increasingly complex supply chains together with growing outsourcing activities have increased the likelihood that organisations are caught by surprise and have their operations seriously disrupted. Supply chain disruptions can result from a number of different events outside the control of an organisation such as natural catastrophes, pandemics, cyber risks or terrorism.

Potential impact on the insurance industry

Increased supply chain vulnerability could result in higher than expected accumulation and correlation of insured losses in the aftermath of catastrophic events, and the dynamic nature of supply chains makes risk assessment very challenging. Furthermore, insurers face the challenge of identifying appropriate means of risk transfer by defining loss triggers that also work without physical damage.

Overall impact	MEDIUM
Time frame	1–3 years

Underestimated nat cat exposure

The insurance industry can play an important role in helping societies to adapt and become more resilient to natural catastrophes. However, the insurability of natural catastrophe events is based on the insurers’ ability to control their accumulation potential and identify the probability and severity of the events.

Economic losses from climate-related disasters are already substantial and are on the rise. This is due to a greater concentration of people and assets in risk zones as well as an increased frequency and/or intensity of extreme weather due to climate change (e.g. with regard to flood or storm surges).

Furthermore, the exposure due to natural catastrophes and consequential impacts may be underestimated in many parts of the world. Known risks such as hillside instability or landslides may change their properties going forward due to climate change. Other risks such as lake tsunamis may have been underestimated insofar as they are very rare; moreover the impacts of non-modelled loss agents and/or secondary effects such as dam breaks following an earthquake, liquefaction or pollution may not be properly considered. However, it is exactly such low frequency, high severity events that have the potential to cause significant losses while being difficult to model.

Potential impact on the insurance industry

Besides potential immediate implications for direct property losses, nat cat events may also trigger BI/CBI covers – in particular if critical infrastructure is affected. In addition, increased litigation may arise from such events, as various stakeholders might seek to increase their claim value. In the long term, these events imply robust demand for nat cat covers.

Overall impact	LOW
Time frame	1–3 years

Social unrest

Incidents of social unrest have frequently made the headlines in recent years, for instance the Arab Spring, the London riots, the Occupy movement or demonstrations in Greece. They all illustrate that violent social unrest can crop up suddenly and may spread rapidly, especially with the help of social media.

In developed countries, the cause of social unrest has its roots in fiscal and demographic developments. The austerity measures implemented in the aftermath of the financial crisis threaten to undermine the tacit agreement between the generations whereby younger people in gainful employment support the retired population through their social security contributions. Combined with an increasing wealth disparity, this has led to the development of social movements and the emergence of social unrest.

In developing countries, demographic development and economic progress are more promising, fostering expectations of a fast lift out of poverty. That said, the failure to redress social inequality and the growing wealth gap is also igniting swelling social unrest. In addition, separatist movements in some countries could also lead to social upheaval.

Potential impact on the insurance industry

Insurance losses under property policies (incl. BI/CBI) should be expected, where cover is granted, in particular in areas with high value concentration. It should be noted, however that in some areas SRCC (strikes, riot, civil commotion) is excluded or covered by government.

Overall impact	LOW
Time frame	4–10 years

A risky harvest

In the face of rapid population growth and declining arable land, food security has become a topic of rising concern around the globe. Ensuring sustainable agricultural production is a key element of dealing with the problem. This requires holistic risk management strategies that help to reduce, mitigate, and cope with various farm risks.

Agricultural insurance can make an important contribution and may offer interesting growth potential for the industry, particularly in emerging markets where agricultural insurance penetration is still low. However, agriculture is also a risky business as it is highly dependent on weather conditions. Furthermore, an unfolding pollination crisis due to globally declining bee populations could have unprecedented consequences for the production of fruit and vegetables.

Potential impact on the insurance industry

High volatility of commodity prices may lead to a more pronounced commodity exposure and to a pricing risk for revenue-based products. Insurers could also face unexpected large loss events in the face of climate change which might exceed what is currently reflected in the industry's models. Nevertheless, the demand for agricultural insurance is likely to increase with a rise in weather volatility.

Casualty



Endocrine disrupting chemicals

Overall impact	HIGH
Time frame	4-10 years

Endocrine disrupting chemicals (EDC) are substances which can interfere with hormonal systems. First evidence for potential endocrine disrupting properties of certain substances was obtained from observations of reproductive disorders in animals.

There is a growing concern that maternal, foetal and childhood exposure to EDC could have a stronger role in causing many endocrine diseases and disorders than previously believed. Human health disorders possibly related to EDC include breast and ovary cancer, testes and prostate cancer, genital malformations, retarded sexual development, declining sperm counts, obesity, and neurological disorders such as retarded memory development. However, establishing a clear relationship between particular EDC and human health disorders has so far been difficult due to the ubiquity of EDC and the diversity of environmental contaminants.

Potential impact on the insurance industry

The establishment of a direct link between EDC and human health problems would have profound consequences for various types of liability insurance. Besides triggering higher than expected losses, it could ultimately lead to a rise of liability rates.

Overall impact	HIGH
Time frame	>10 years

Unforeseen consequences of electromagnetic fields

The ubiquity of electromagnetic fields (EMF) raises concerns about potential implications for human health, in particular with regard to the use of mobile phones, power lines or antennas for broadcasting. Over the last decade, the spread of wireless devices has accelerated enormously. The convergence of mobile phones with computer technology has led to the proliferation of new and emerging technologies. This development has increased exposure to electromagnetic fields, the health impacts of which remain unknown.

Anxiety over the potential risks related to EMF has risen. Studies are difficult to conduct, since time trend studies are inconsistent due to the still rather recent proliferation of wireless technology. The WHO has classified extremely low-frequency magnetic fields and radiofrequency electromagnetic fields, such as radiation emitted by cell phones, as potentially carcinogenic to humans (Class 2B carcinogen). Furthermore, a recent ruling by an Italian court suggested a link between mobile phone radiation and human health impairment. Overall, however, scientific studies are still inconclusive regarding possible adverse health effects of EMF.

Potential impact on the insurance industry

If a direct link between EMF and human health problems were established, it would open doors for new claims and could ultimately lead to large losses under product liability covers. Liability rates would likely rise.

Overall impact	HIGH
Time frame	>10 years

Unforeseen consequences of nanotechnology

Nanotechnology refers to the manipulation of matter on an atomic and molecular scale. Nano-sized particles exhibit unique properties relative to larger particles of the same substance. This enables new applications, but may also pose new risks.

Currently, little is known about the toxicity of nanomaterials or the potential for latent illness that could affect workers and consumers. Additional research in life cycle assessment of nanomaterials and products containing nanomaterials is necessary to better assess the potential exposures. However, there is some evidence that certain nanostructures may accumulate within tissues and organs and can be absorbed by individual cells. Adverse health effects have been observed in studies of material such as carbon nanotubes, nanoparticles of titanium dioxide, or silica nanoparticles.

Potential impact on the insurance industry

Due to the relatively unknown environmental, health and safety exposures arising from nanomaterials throughout their life cycle, nanotechnology presents the insurance industry with significant challenges. Of key concern are delayed impacts, i.e. the question whether nanomaterials hold some latent hazard. Similar to the asbestos case, there is potential for large losses under product liability, workers' compensation and environmental liability policies.

Changing communication patterns

Overall impact	MEDIUM
Time frame	1–3 years

When it comes to mobile phones, exposure to electromagnetic fields with potentially detrimental implications to human health is a well-known liability concern (see “Unforeseen consequences of electromagnetic fields” on page 11). However, the ubiquitous use of mobile phones may also have other implications for liability covers.

Millions of consumers now own sophisticated smartphones which are full of sensors and in most cases always connected to the internet. These devices are generally much less secure than computers as ‘screen real estate’ comes at a premium and developers are incentivised to drop security indicators. They also give rise to concerns regarding data privacy since the scope and amount of information they provide about their users is continually growing.

On an operational side, mobile devices could dramatically change payment patterns. In many regions of Africa it is already commonplace to carry out cash transactions via mobile phone (known as ‘mobile wallets’; the extremely successful M-PESA project in Kenya is a case in point). Even though many consumers in the western world still seem to be wary of paying for real-world transactions using their mobile phone, it will only be a matter of time until the trend also takes off elsewhere.

Potential impact on the insurance industry

Liability issues related to security breaches and information tracking are likely to multiply in the near future. On the positive side, mobile wallets could open up new distribution, payment and/or claims settlement channels for insurance companies.

Toxic substances and workplace safety

Overall impact	MEDIUM
Time frame	1–3 years

Workplace safety in the western world has increased significantly during the last decades. However, new hazards are still developing. Workplace exposure to organic solvents, for instance, has recently been linked to heart defects in new-borns. The synthetic chemical PFOA, for instance, which is used in products such as lubricants or paper coatings may increase the likelihood of heart disease and stroke.

Regulatory changes may also change the risk exposure. In the case of lead, for example, recent studies have shown that blood lead levels below the threshold deemed safe could already cause various health problems. Furthermore, liability may generally become easier to establish for various substances with increased scientific evidence and decreased legal barriers.

Demographic shifts also create increasing pressure towards prolonging individuals’ work life, which may also increase the detrimental health impacts of toxic substances at the workplace.

Potential impact on the insurance industry

These developments could have an impact on product liability, workers’ compensation and pollution liability covers.

Overall impact	MEDIUM
Time frame	>10 years

New forms of mobility

The looming energy crisis in combination with rising environmental awareness means that intelligent green vehicles will be the future of transportation. We will eventually see hybrids, electrics, fuel-cell cars and intelligent vehicles using telematics, collision avoidance and automated traffic law enforcement entering mainstream use on our roads. The progress of enabling technologies such as advanced IT systems, artificial intelligence and speech recognition will ultimately give rise to a mass production of smart cars that drive themselves.

Pilotless civil aircraft might also soon become reality, possibly even before the widespread adoption of self-driving cars. Already now, pilotless aircraft are widely used by the armed forces – albeit only in restricted airspace and conflict zones. Pilotless aircraft are potentially a huge new market as they could carry out many jobs at lower cost than manned aircraft and helicopters and could operate in conditions which would be hazardous for pilots.

Potential impact on the insurance industry

The increased spread of intelligent vehicles is likely to substantially reduce traffic accidents and insured automobile losses. Consequently, property/casualty insurers might see a major reduction in their auto insurance premiums revenue. The testing and roll-out of driverless cars could also expose manufacturers to new risks and may result in high litigation costs. With regard to air travel, pilot-less air travel could prolong the downward trend in air traffic accidents, putting further pressure on insurance prices.

Overall impact	LOW
Time frame	1–3 years

Do-it-yourself galore

With the rapid advance of enabling technologies, the western world is witnessing a strong growth of a new do-it-yourself culture.

On the manufacturing side, 3D printing – the process of additive manufacturing of three-dimensional parts by using a computer-controlled printer – is one of the key enablers for this trend. The use of this technique is rapidly spreading across various industries (e.g. automotive, aerospace, construction and prosthetics). It is also being used increasingly by individuals as desktop 3D printers become more affordable.

Potential impact on the insurance industry

3D printing raises a number of questions regarding liability issues (mainly with regard to product liability & recall, but potentially also affecting other lines such as worker's compensation) as well as intellectual property rights. Ultimately, even the marine business could be affected due to disruptive impacts on the global logistics value chain.

Overall impact	LOW
Time frame	>10 years

The robots among us

Developments in the field of robotics and artificial intelligence are progressing rapidly. This momentum will continue and even increase as improvements are leveraged to create further improvements.

Having been successfully used in various manufacturing processes, robots are now increasingly entering the private domain and may eventually take over more and more tasks of our daily lives. Before long, autonomous machines will be our work colleagues, house cleaners and tour guides; they will keep our cities clean and teach our children; they will carry out surgeries and support and entertain us when we get old.

The increasing prevalence of 'intelligent' autonomous machines capable of self-learning has already given rise to concerns about robot abuse and other ethical dilemmas. In a similar vein, lawyers have begun contemplating if and how robots themselves could potentially be held liable for their actions.

Potential impact on the insurance industry

This trend could have significant implications for the insurance industry, and liability cases are already cropping up. Currently, most of these involve car manufacturers and similar industrial producers, but over the long run this will likely decline compared to cases involving robots purchased by consumers. Ultimately, this may even open up a field for a whole new type of liability insurance cover for insuring both the actions and the performance of robots.



Changing lifestyles

Overall impact **MEDIUM**
Time frame **1–3 years**

Over the last century, tremendous advances in modern medicine have improved the quality and length of our lives and raised standards of living in many parts of the world. Now, however, we are in danger of becoming victims of our own success. Healthcare costs are becoming unsustainable, due largely to a chronic disease epidemic fuelled by unhealthy lifestyles and ageing populations. Increasingly, early death is less of an economic concern than decades spent alive and sick.

Chronic diseases are often directly driven by behaviours such as unhealthy diet, sedentary lifestyles, weight gain, smoking (which is still on the rise in many developing countries) and failing to adhere to treatment regimens. Obesity, for instance, is associated with chronic diseases such as diabetes, heart disease, hypertension and some forms of cancer. It is estimated that the number of overweight and obese people may double to 3.3 billion by 2030.

Potential impact on the insurance industry

The growing prevalence of obesity and other life-style related health impairments suggests that mortality figures of existing, in-force life business could differ from expectations in the future. Furthermore, a rising number of chronic disease sufferers will drive up health-care costs and thus affect health insurers.

Overall impact	MEDIUM
Time frame	1–3 years

Emerging infectious diseases

New advances in science and medicine have helped us gain ground against certain infectious diseases, yet even in the twenty-first century other contagious illnesses continue to emerge at a rapid pace. Emerging infectious diseases (EID) comprise those illnesses whose incidence in humans has increased in a defined time period and location. This includes new or unrecognised diseases, those that are spreading to new geographic areas and hosts, as well as those that are re-emerging.

Recent cases include Dengue fever and West Nile fever. Dengue fever is a mosquito-borne, viral illness that causes severe flu-like symptoms. The global incidence of dengue has grown to significant proportions in recent years, with two-fifths of the world’s population potentially at risk. West Nile fever is another a mosquito-borne viral illness that can show up with varying seriousness, ranging from no symptoms at all to mild flu-like symptoms and even to brain damage and death. It appeared in the US for the first time in 1999 and has by now caused an estimated four million infections (albeit most without symptoms).

EID are largely a product of societal-based decisions, demographic changes and climatic developments. The threat of naturally occurring EID is compounded by factors such as the increased mobility of humans, an increased import and export of food products, and a potential deliberate use of pathogenic micro-organisms or toxins for hostile purposes.

Potential impact on the insurance industry

EID could impact the loss estimates of Life & Health insurers and – in severe cases – may lead to mortality shocks.

Overall impact	MEDIUM
Time frame	4–10 years

Drug resistance

Until recently, there has been very little focus on the threat from antibiotic-resistant bacteria. There is, however, evidence which suggests a growing resistance of bacteria and parasitic worms to known medication due to its misuse and/or overuse; this phenomenon may result in incurable diseases.

Yet there still seems to be a general belief that antibiotics will always be available. However, this is a fallacy: With every usage of antibiotics, small numbers of bacteria resistant to the specific drug survive – and the more antibiotics are used, the more antibiotic resistant bacteria prevail. This development is especially troubling given the slowdown in the discoveries of new antibiotics. Even though new antibiotics have come to the market, they have been based on old discoveries, and the drug pipeline seems to be drying up. This is the result of regulatory restrictions, a smaller return potential compared to medication for chronic illnesses and the aggressive pursuit of new life science technologies such as genomics or synthetic biology.

Potential impact on the insurance industry

Increasing drug resistance may bring higher than anticipated losses under L&H covers, but also under product liability policies (e.g. defence costs related to claims involving the food or health-care industry).

Overall impact	MEDIUM
Time frame	4–10 years

The future of medicine

Due to rapid technological and scientific advancements, individuals increasingly have the ability to assess their own health status as a growing number of ‘self-check kits’ becomes available.

Furthermore, a rapid expansion in the development of new diagnosis tools and new treatment options such as biological therapies, gene therapies and nano-medicine continues to improve diagnosis and treatment of many diseases.

Personalised medicine – drug development based on tailoring drugs to patients based on genetic profiles – is also on the rise. It is expected to increase the safety and efficacy of drugs in the long run, but will also decrease the market size of blockbusters.

Potential impact on the insurance industry

Health self-assessment kits could be a source of risk for life and health insurance products due to information asymmetries, particularly in territories where data protection legislation is well developed and customers are not obliged to disclose test results. New diagnostic tools could present a risk to critical-illness and medical insurance by increasing the incidence of diagnosed cases, and new treatment options may increase claims costs for medical insurance due to increased per-unit treatment costs. On the other hand, these developments could improve the general health of the population, reducing healthcare costs and further prolonging life.



Run-away inflation and surging bond yields

Overall impact	HIGH
Time frame	1–3 years

Major central banks' policy actions of near zero-interest rates, quantitative easing and other non-standard monetary policy measures have helped support the economic recovery, lower the probability of tail risks such as a deflationary spiral and reduce global risk aversion. However, the central banks' ultra-loose monetary policy has also created distortions in financial markets and asset prices. Most notably, the massive government bond purchases of central banks have led to negative real interest rates by lowering nominal interest rates, which can also be viewed as a tax on savers (financial repression).

The challenge for the central banks is to implement exit strategies from the various extraordinary policies currently pursued – even more so as this is all uncharted territory. If the economy were to recover more quickly than expected and market participants did not think monetary policy was being tightened fast enough in response, longer-term inflation expectations might very well increase disproportionately, causing both government bond yields and inflation to surge.

Potential impact on the insurance industry

Financial repression has led to increases in financial institutions' exposure to sovereign debt, making them more vulnerable to adverse interest rate shocks. A prolonged period of low interest rates, which is particularly a risk in Europe, would be debilitating for the life insurance industry. A sharp rise in rates would be helpful to insurers with large blocks of interest rate guarantee products, but a burden for most other re/insurers.

Unresolved sovereign debt crisis

Overall impact	MEDIUM
Time frame	1–3 years

The Eurozone authorities and the European Central Bank have taken policy action in recent months to reduce tail risks stemming from a break-up of the monetary union. However, the underlying debt crisis remains unresolved, and European policymakers must recommit themselves and push forward the implementation of national structural reforms, strengthen the architecture of the monetary union and stimulate growth.

In the US, the financial health of the private sector has improved. However, the lack of political consensus and the uncertainty surrounding the appropriate content and pace of fiscal consolidation is still a negative for the economy. The US Administration and Congress need to put in place a plan for funding the long-term social security and medical needs of the people. In addition, a tax reform would be helpful for the economy.

Japan also needs to move away from short-term partial fixes and adopt a comprehensive programme of structural and fiscal reforms.

Potential impact on the insurance industry

Ongoing sovereign debt crises are likely to cause widespread liquidity and growth problems, which may ultimately result in shrinkage of the global insurance market. As insurers are important investors in government bonds, they may also be indirectly exposed through their securities holdings.

Under-investment in critical infrastructure

Overall impact	MEDIUM
Time frame	1–3 years

Infrastructure is vital for the proper functioning of an economy. However, in many regions of the world there is a chronic failure to adequately invest in, upgrade and secure infrastructure networks such as electricity provision, water supply or transport infrastructure. This is due in no small part to investors engaging in more short-term activities instead of long-term project financing.

Recent regulatory provisions have stepped up capital and liquidity requirements and prompted banks, insurers and non-traditional long-term investors to refrain from longer-term infrastructure funding. Nevertheless, most developed countries need to upgrade and maintain their infrastructure while developing countries need infrastructure investment to support their growth.

Historically, governments have employed infrastructure investment to stimulate a flagging economy. Currently, however, the public sector is reducing its debt burden and funds become increasingly scarce. The possibility of a downturn in long-term infrastructure financing could dampen economic prospects for some time to come. There is consequently a need to encourage more institutional investors to enter the market not only by providing tax breaks or lowering capital requirements, but also through creating infrastructure-financing bond markets.

Potential impact on the insurance industry

Long-term investment in infrastructure is compelling for the insurance sector. That said, the regulatory environment has to become more accommodating if the actual investment appetite is to satisfy the infrastructure project pipeline.

Claims



Legal actions drive changing claims patterns

Overall impact	MEDIUM
Time frame	1–3 years

As illustrated by a wave of negligence claims in the aftermath of hurricane Sandy, there seems to be a propensity in the US towards suing more and targeting more distant parties (e.g. construction companies in case of buildings incurring nat cat damage). This development is possibly driven by a depressed economy which tempts people into court seeking easy money. There are indications that this trend might also spill over to Europe, changing its so far comparatively benign litigation landscape.

In addition, self-proclaimed 'consumer protection' lawyers in the US are increasingly seeking new targets, and the growing obesity epidemic has spurred them to set their sights on the food industry. By now, they have filed several cases against big industry players, asserting that food makers are misleading consumers and violating federal regulations by wrongly labelling products and ingredients.

Potential impact on the insurance industry

These ongoing legal actions could change the insurance landscape and may result in claims and litigation costs far in excess of what could have been expected.

Overall impact	MEDIUM
Time frame	1–3 years

Personal damage compensation in Europe

An escalation of medical expenses and a steady increase in indemnity create a difficult environment for workers' compensation products. Medical expenses are increasing at a pace clearly above the rise of the consumer price index. This development is driven by medical progress and a tendency towards costly home care.

Medical progress has made new treatment options available, which may often result in increased per-unit treatment costs (see also "The future of medicine" on page 17). Ultimately, everything which is medically possible is sooner or later applied, with insurance carriers having to bear the costs.

In richer European countries there is also a tendency to grant victims a high standard of individual care in a familiar environment, often involving professional carers and sometimes even the installation of medical equipment in the victim's home. Even if treatment/care were available at lower cost in specialised facilities such as nursing homes, patients are often allowed to stay at home where they feel more comfortable closer to their families.

Potential impact on the insurance industry

These developments are likely to drive up costs for workers' compensation claims, which could also be mirrored in liability claims since the insurers providing the medical care will often be allowed to exercise recourse against a liability insurer.

Operations



Big data

Overall impact	HIGH
Time frame	1–3 years

The amount of data is growing at an ever-accelerating pace, resulting in ‘big data’ – an unprecedented amount of structured as well as unstructured information that can no longer be handled by means of traditional data management and data processing solutions.

Big data can be the key for targeted, tailor-made solutions in many industries. In healthcare, for instance, big data can help aggregate the delivery, administration and documentation of medical treatment, hence providing cost-efficient personally-tailored medicine.

However, non-traditional, unstructured data sets also pose challenges regarding their reliability as it is more difficult to verify that the information contained in a tweet, text message or social media posting is accurate. All data sources have their limitations, but the trustworthiness of very large, unstructured amounts of data with little or no process wrapped around them elevates this concern. Other worries are related to data ownership and intellectual property rights as well as data protection and information security, but also to the accessibility of big data.

Potential impact on the insurance industry

Limited access to and use of big data could lead to competitive disadvantages for insurers as data-rich and data-apt organisations can differentiate themselves through tailor-made offers for their customers.

Overall impact	MEDIUM
Time frame	1–3 years

Potential impact on the insurance industry

Regulatory fragmentation and extra-territoriality concerns

The implementation of policy reforms by individual jurisdictions reveals increased fragmentation of regulation and markets, threatening to reverse progress toward a more global and coordinated financial services sector.

This trend toward a more territorial approach, especially ring-fencing assets, capital and liquidity, threatens not only to undo recent movement toward regulatory cooperation under G20 initiatives, but also to set back earlier achievements of cross-border cooperation that have helped fuel global economic growth.

There is a growing need for the Financial Stability Board (FSB) to address the effects of unilateral, protectionist, or extra-territorial regulatory measures by member states.

Uncoordinated regulatory reforms will be less effective in promoting financial stability and could undermine the ability of insurers to undertake their core functions in supporting economic activity and recovery.

Overall impact	MEDIUM
Time frame	1–3 years

Potential impact on the insurance industry

Contingent reputational risks

A company’s sustainability risk management and the way it communicates its risk handling through interaction with stakeholders can positively or negatively affect its reputation. The stakeholders in question consist of a broad group of interested parties including investors, rating agencies, shareholder associations, pension funds, clients, governments/regulators, employees, NGOs and the wider public.

Reputational damage does not even require direct involvement in any illicit activity. The insurance industry can also be impacted indirectly by insuring companies involved in illicit, unethical or otherwise reputationally damaging activities – that is, it could incur contingent reputational damage.

The importance of environmental, social and governance issues is increasing the risk of a mismatch between a company’s sustainability risk handling and stakeholder expectations. This may lead to reputational risks and ultimately also to financial damage.

Overall impact	MEDIUM
Time frame	4–10 years

Potential impact on the insurance industry

Imminent global talent crunch

Talent and skills shortage is threatening to escalate in the near future. This is mainly driven by demographic pressures as the baby boomer generation reaches retirement age and fertility rates simultaneously go down in many parts of the Western world.

As a result, companies may face problems in recruiting and retaining qualified staff. This is exacerbated by the fact that the dominant role of traditional universities is increasingly challenged by a growing number of open online courses so that assessing qualifications will soon be much less straightforward than it is today. In addition, tuition and consequently student loan debt are mounting to ever greater heights, which might deter talented young people from enrolling into higher education in the first place.

To respond to this challenge, companies may have to change their recruiting paradigms going forward, both in terms of formal qualifications used as judgement criteria and the geographical scope of their search. It could well be that business might soon follow the example of soccer where regions such as Africa already serve as a reservoir of skilled talent for the Western world. Furthermore, companies will have to invest more heavily in early and continuous education and training in order to remain competitive.

As they face problems in recruiting and retaining qualified staff, companies may need to revise their talent management approach and increase their use of technology.

Conclusion

Lately, some observers have suggested that the relevance of the insurance sector may be declining due to its inability to innovate and to large corporates holding their own risks. Given the breadth of the risk landscape described by this publication, however, possibilities for solutions are vast, and the insurance industry could and should expand its role of mitigating others' risks and enabling society to advance further. Although some of the 27 emerging risk topics presented here may never materialise, others definitely will – and the earlier the industry starts adapting to them, the better prepared it will be for tomorrow's challenges and opportunities.

Emerging risks are particularly relevant for the insurance industry because many of its actions are still based on historical data, i.e. yesterday's experience. However, when the future is no longer a simple linear extrapolation of the past but rather characterised by rapid and continuous change, looking back will no longer be sufficient to assess tomorrow's exposures. This is particularly important for insurance lines such as casualty or life insurance which have a long time horizon due to the inherent long-term exposures. However, foresight information can also be valuable for other lines of the insurance business to prepare for what might lie ahead and avoid being caught by surprise by new developments and newly unfolding exposures.

Managing emerging risks requires agility and alertness and is ultimately about good change management. There is unfortunately no silver bullet that will work for all cases as new threats and opportunities come in various shapes and sizes from a multitude of sources. However, working together and sharing knowledge across stakeholders can help the insurance industry to better prepare for and deal with emerging risks.

We have launched this publication in this spirit and look forward to discussing further with you. Please reach out to your local Swiss Re contact if you wish to continue this dialogue.

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