



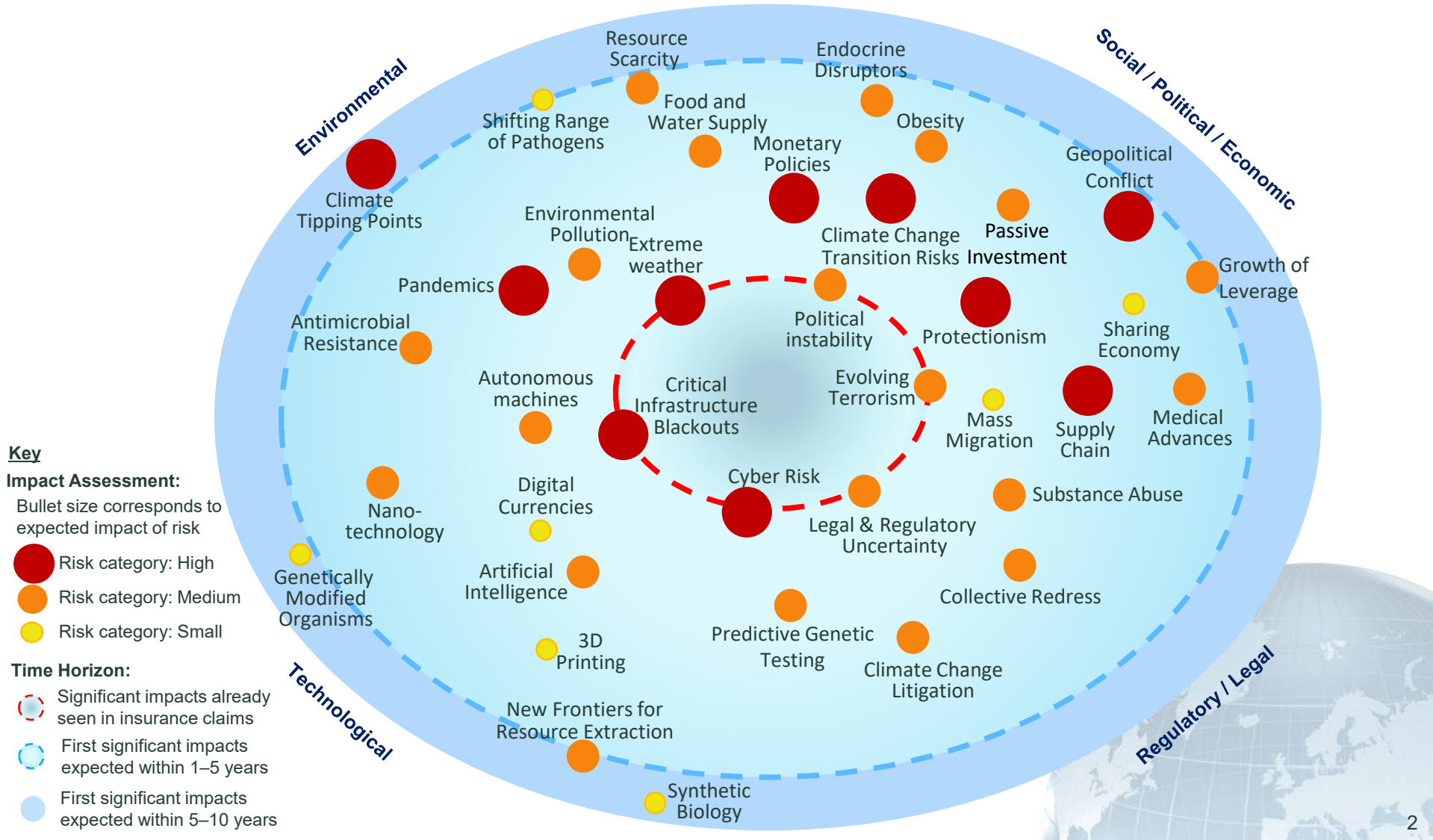
Emerging Risks Initiative

**Major Trends and Emerging Risk Radar
May 2019 Update**



TRENDS:

- Ageing and Health
- Changing Consumer Behaviour
- Economic Instability
- Environment and Climate
- Shifting Geopolitical Landscape
- Technological Developments
- Urbanisation and Demographic Change



Ageing and Health (AH)

Medical advances in diagnostics and treatment continue, improving morbidity and mortality. On the other hand, many societies are ageing and lifestyles are changing (including sedentary habits, poor diet, lack of sleep, substance abuse), contributing to the rise in chronic diseases. Physical health is closely linked to mental health, which is also deteriorating in many places. Infectious diseases are on the rise, linked to climate change, increased mobility and antibiotic resistance, but also to social aspects such as anti-vaccination movements. All of this can have a negative impact on morbidity and mortality, and it remains unclear whether medical advancement would counter-balance the impact from these lifestyle changes, especially considering the costs involved.

Consumer Behaviour and Digitisation (CB)

Customer expectations are changing in terms of delivery, product experience, and precision. This, coupled with being time-poor and having a large range of choices, leads consumers to gravitate towards dominant platforms and trusted brands with a shift from physical to digital trading. Disruptive digital technologies may change customer habits quickly. Expectations of simplicity and access are rising driven by the increasing use of smartphones, social media and data analytics with support of AI leads to increasing individualisation of offers; to protect consumers from being exploited, regulation of fairness and data privacy are on the rise.

Economic Instability (EI)

Post financial crisis there have been doubts about underlying growth and stagnant standards of living for many. Instability in economic systems is compounded by rising inequality. Politically these factors fuel the rise in populism and a reaction against multinational institutions, leading to nationalism and fragmented regulation. Also long-term low yields and the stimulus tool of massive quantitative easing may stoke inflation risks and create asset bubbles

Environment and Climate (EC)

Environmental issues are now firmly in the spotlight, dominated by climate change, resource scarcity and pollution of the biosphere. There is growing concern about the consequences of the unchecked emission of greenhouse gases driving climate change, such as the occurrence of more extreme and frequent weather events. The pressure placed on the planet from a growing human population is causing resource scarcity, driven by unsustainable practices in mineral extraction, food and energy production. Anthropogenic activities are also polluting the land and sea with non-biodegradable waste such as plastics, and the air with particulate and gaseous pollutants. All forms of pollution are becoming ubiquitous, with harmful consequences for life on Earth.

Shifting Geopolitical Landscape (GL)

After the recent period of Western-based liberalisation and globalisation, there is movement towards a more multi-polar world and more assertive behaviours. This is visible through renewed protectionism, anti-global sentiment, Brexit, a resurgent Russia, and China increasingly flexing its economic and political clout. Heightened conflict risk is visible in many areas of the World, i.a. the Korean peninsula, South China Sea and Middle East tensions.

Technology Developments (TD)



Modern technology, digitisation, automation and robotics is boosting efficiency and displacing repetitive and tedious human tasks and is now progressing swiftly into automating more value-creating tasks. Transition to autonomous machines can be observed. Many processes are faster, cheaper and improved. At the same time talent needs and job mix are changing rapidly, creating the need for ongoing adjustments in the education system. The increased use of technology poses questions around data security and ethics.

Urbanisation and Social Change (UC)



There are several societal trends that are changing the way society functions and adding to migration. Among them are population growth, rising urbanisation and mobility, which affect how people work and socialise. On the other hand social cohesion is reducing in some countries and society is giving greater power to the individual. Meanwhile, the social make-up is changing, e.g. mass migration in some regions, and surging urban middle-class in higher-growth countries. Decreasing social mobility becomes more visible.

Topic	Associated Trends	Description	Assessment	ERI Publication
3D Printing	TD	3D printing mainly raises questions in relation to product liability and recall, but also worker's compensation and intellectual property rights. Given these questions and the potential lack of control / product quality assurance arising from online printing plans a new legal framework may be required. The development of 4D printing may further add to the risk. 4D printing utilizes materials that can change over time when exposed to specific elements (water, heat, air, etc.).	● ⇒	2015
Antimicrobial Resistance	AH	Drug resistance occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render certain medications ineffective. When microorganisms become resistant to most antimicrobials they are often referred to as “superbugs”. This is a major concern because a resistant infection may cause significant human and financial costs.	● ⇒	
Artificial Intelligence	CB TD	With progress in Artificial Intelligence (AI) and cognitive computing, machines may begin to make decision on behalf of humans. Decision transfer and lack of transparency or human oversight may result in unforeseen risks or unpredictable outcomes creating complex liability issues. Also ethical, social and market aspects linked do AI are getting more prominent.	● ⇒	2015
Autonomous Machines	TD CB UC	Thanks to new developments in mechatronics, speed learning and artificial intelligence there has been rapid progress in the field of autonomous machines, affecting most industries, military and everyday life. Autonomous vehicles are particularly well publicised. This is likely to change the risk landscape for various lines of insurance business.	● ⇒	2017





Topic	Associated Trends	Description	Assessment	ERI Publication
Climate Change Litigation	<ul style="list-style-type: none"> GL EI EC 	On the legal side: New regulatory developments, increased litigation activity and subsequent liability issues associated with climate change/greenhouse gas emission may lead to large losses under environmental liability, product liability and D&O/professional liability, particularly where the emitter is deemed to have misled.		2009
Climate Change Transition Risk	<ul style="list-style-type: none"> EI EC UC 	Transition risks arise as the world aims to adapt to the warming climate and reduce the emission of green house gases (especially CO ₂). This has implications for insurers in the product design and associated liabilities, plus the way they invest. One particular transition risk is the occurrence of stranded assets. These are assets that become obsolete due to policy changes (e.g. coal sector, diesel vehicles) or due to carbon pricing (e.g. surplus aircraft). They may not be climate-resilient and become uneconomic, risky or impaired by physical changes, or due to emerging liabilities e.g. for oil companies.		2018



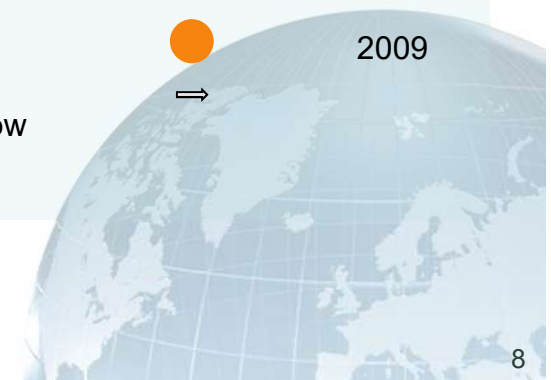
Topic	Associated Trends	Description	Assessment	ERI Publication
Climate Tipping Points	<ul style="list-style-type: none"> EC EI GL 	<p>In the climate system, most of the feedback mechanisms are of a gradual nature. However, tipping points arise where a critical observable threshold is passed, indicating a change in state or that a specific point in the warming process has been crossed. In some cases tipping points trigger further warming or an acceleration, such as permafrost thawing. Therefore, monitoring tipping points is key to tracking climate risks and major step-changes. With emissions and warming continuing near worst IPCC projections and Arctic ice melting accelerating the risk of tipping points increase. Therefore emissions and feedback effects may accelerate climate change and related disasters, and may enforce secondary effects. Moreover, climate-related hazards can have huge socio-economic and environmental impact if they interact with vulnerable ecosystems and societies.</p>		2018
Collective Redress	<ul style="list-style-type: none"> CB 	<p>Collective redress is defined as a “procedural mechanism which allows, for reasons of procedural economy and/or efficiency of enforcement, many single claims (relating to the same case) to be bundled into a single court action”. The development of collective redress mechanisms in Europe can create an inflation of claims as seen with Class Actions in North America.</p>		






Topic	Associated Trends	Description	Assessment	ERI Publication
Critical Infrastructure Blackouts	<ul style="list-style-type: none"> TD GL EI EC 	<p>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. The lack of capacity or outages results in blackouts. This could lead to a higher than expected frequency and severity of large property and non-property losses (incl. BI/CBI). Additionally the risk of natural catastrophes, solar storms or cyber attacks could impact the infrastructure, (incl. GPS and communications systems). Also energy transition may impact stability of energy supply.</p>		2008 & 2011
Cyber Risk	<ul style="list-style-type: none"> GL CB 	<p>The volume and sophistication of malicious cyber activity has increased substantially, and there are growing concerns regarding the security of proprietary corporate data and critical industrial control systems. Cloud computing poses elevated risks due to increased concentration and accumulations. Operational risks exist for corporations and could also lead to large property losses with high and previously unknown accumulation potential if industrial facilities were simultaneously attacked. The growing request for personal identification and authentication, the use of biometric identifiers and the multiple uses of identifiers will likely increase the risk of identity fraud and even theft.</p>		






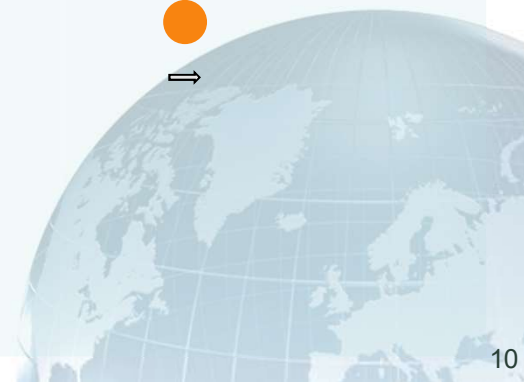
Topic	Associated Trends	Description	Assessment	ERI Publication
Digital Currencies	EI CB TD	Digital currency is a form of currency or medium of exchange that is electronically created and stored. Some digital currencies such as Bitcoin are cryptocurrencies, that is they rely on cryptography for chaining together digital signature of token transfers. There are concerns that cryptocurrencies are extremely volatile and prone to 'pump and dump' fraud. Digital currencies, like Bitcoin typically use "Blockchain" or distributed ledger as the technology platform to record and validate transactions. Blockchain has wider application beyond digital currencies and is expected to be substantially disruptive to incumbent operators in a variety of markets, including insurance.	● ⇒	
Endocrine Disruptors	AH EC	Endocrine disruptors are substances which can interfere with hormonal systems. If a direct link between such substances and human health problems could be established, this would have profound consequences for liability insurance throughout the entire value chain. In addition, it would have a negative impact on morbidity and mortality.	● ⇒	2012
Environmental Pollution	UC EC	The International Agency for Research on Cancer (IARC), classified outdoor air pollution as carcinogenic to humans. Water Pollution is an endemic and growing issue. Noise pollution, light pollution and soil pollution – the latter including that from the widespread and growing use of pesticides – are having major damaging impacts on biodiversity and the environment. Plastic litter and debris of all kinds, including micro-plastic 'smog', is now ubiquitously found on all surfaces of the planet and in the food-chain, with implications for human health and liability claims.	● ⇒	2009



Topic	Associated Trends	Description	Assessment	ERI Publication
Evolving Terrorism	<div style="background-color: #00728f; color: white; padding: 2px 5px; margin-bottom: 2px;">GL</div> <div style="background-color: #00728f; color: white; padding: 2px 5px;">EI</div>	The risk of terrorism has been evolving for the last two decades, making it difficult and subjective to assess. Its inventive and adaptive nature undermines probabilistic modelling inferred from the past. Therefore assessing the plausibility of a specific type of terrorist attack in the future largely relies on expert judgment. Potential threats are NBCR terrorist attacks (Nuclear, Biological, Chemical, Radiological) and other non-conventional terrorist attacks on computer systems and industrial installations (Cyber terrorism, Electro-Magnetic Pulse (EMP)).		2007
Extreme Weather	<div style="background-color: #00728f; color: white; padding: 2px 5px;">EC</div>	Extreme weather refers to phenomena that are at the extremes of the historical distribution and rare for a particular place and/or time, making their behaviour difficult to assess. The effects and mechanisms are hard to isolate and fully describe. This presents challenges for measurement and modelling. However, the incidence and intensity of extreme weather is growing. Climate change is predicted to trigger more frequent severe events, especially floods and heatwaves. The increasing cost of claims is compounded by higher value insured properties concentrated in vulnerable locations (e.g. on the coasts).		
Food and Water Supply	<div style="background-color: #00728f; color: white; padding: 2px 5px; margin-bottom: 2px;">AH</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; margin-bottom: 2px;">GL</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; margin-bottom: 2px;">EI</div> <div style="background-color: #00728f; color: white; padding: 2px 5px;">UC</div>	As the world population reaches 7.7 billion inhabitants, there is an increased competition to satisfy basic water and food needs of large parts of the world population, leading to supply shortages and geopolitical conflicts. In many countries, supply infrastructure is ageing and efforts to limit waste are faced with tight budget constraints. This results in reduced quantity and quality of supply, with known adverse effects on health, urbanization, economic growth, and social and political stability.		2013









Topic	Associate d Trends	Description	Assessment	ERI Publication
Genetically Modified Organisms (GMOs)	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">AH</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EC</div>	Genetically modified organisms are organisms whose genetic material has been altered using genetic engineering techniques. Concerns have been raised over possible ecological or health impacts, ethical issues and control of technologies. On the other hand they may also be a vital tool for resilience in a warming world.	 ⇒	
Geopolitical Conflict	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">GL</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EI</div>	Heightened tensions between countries, resulting from shifts in the international order and the rise of a multi-polar world, have substantially increased the risk of inter-state conflict. Potential hotspots include the Korean Peninsula, the South China Sea, and the Middle-East, where the regional rivalry between Saudi Arabia and Iran is playing a key role in current conflicts including Iraq, Syria and Yemen.	 ⇒	
Growth of Leverage	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EI</div>	Global debt levels have risen sharply over the past decade, from US\$120 trillion in June 2008 to US\$178 trillion by September 2018. The increase has taken place across the government, corporate and household sectors driven by, variously, sluggish economic growth and the slow pace of fiscal consolidation since the Financial Crisis and loose monetary conditions, which has encouraged private sector borrowers to take on more debt. The increased indebtedness, however, leaves borrowers more vulnerable to changes in background conditions, such as a slowdown in economic growth, or higher interest; or to market shocks, for example, a further escalation of the trade war. This heightened credit stress could, in turn, have further negative consequences, including a spike in defaults (resulting in losses for banks and investors), or could lead to a period of forced deleveraging that would exacerbate any economic downturn.	 ⇒	

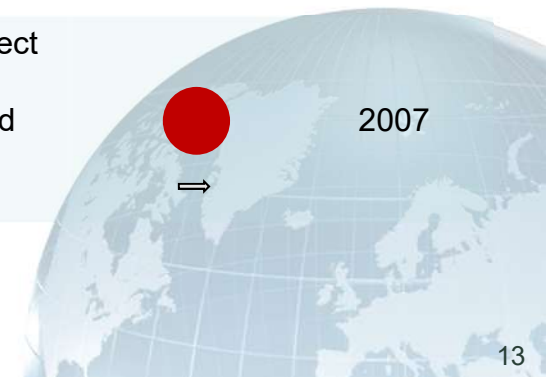


Topic	Associated Trends	Description	Assessment	ERI Publication
Legal & Regulatory Uncertainty	GL	Current regulatory trends have prompted companies to re-examine the effectiveness of their governance and oversight. The continued adoption of new or proposed regulations, capital standards or accounting changes (e.g. IFRS17) can lead to compliance challenges and to increasing regulatory complexity. Conduct regulation continues to gain prominence and is one key example of where this risk can emerge. Furthermore, 'non-regulation' has also been identified as a risk in some areas.	● ⇒	
Medical Advances (new risk)	AH	Significant breakthroughs in medical advances have been witnessed in the recent past, with promising inventions such as liquid biopsy and CAR-T-cell therapy. Such advances bring potential benefits in prevention, diagnosis and treatment and thus can improve health and longevity. At the same time, this could increase the cost of some insurance products, such as health covers, in addition to presenting opportunities for other products such as life insurance covers.	●	



Topic	Associated Trends	Description	Assessment	ERI Publication
Mass Migration	<ul style="list-style-type: none"> GL EI UC 	<p>Numerous conflicts as well as economic pressure have resulted in large-scale disruptive cross-border migrations. The arrival of large numbers of migrants translates into increased pressure on welfare systems and infrastructure. This may result in socio-economic and political consequences which are not yet fully recognized or understood.</p>	 	
Monetary Policies	<ul style="list-style-type: none"> GL EI 	<p>The low interest rate environment that has prevailed in many advanced economies since the Financial Crisis (and is a function of the very weak inflationary pressures over this period) poses a variety of risks. For insurers, low interest rates increase the cost of funding guarantees embedded in life insurance contracts (which are typically benchmarked to long term government bond yields). The problem for insurers is likely to become more acute, the longer the low interest rates persist.</p> <p>For financial markets and the broader economy, the low interest rates have also contributed to a build of imbalances: in equity and real estate markets (which have undergone sharp increases) and in increased borrowing by corporates and households. These imbalances leave markets and economies vulnerable to the risks that interest rates might need to rise sharply, say on signs of resurgent inflation.</p>	 	
Nanotechnology	<ul style="list-style-type: none"> TD 	<p>The manipulation of matter on an atomic and molecular level raises concerns about nanomaterial toxicity as inherent risk exposures are relatively unknown throughout the product life cycle. Similar to the asbestos case, there is potential for long latent large losses across various industries. However, nanotechnology-related advances in medicine and healthcare could have an overall positive impact on mortality and morbidity.</p>	 	2010

Topic	Associated Trends	Description	Assessment	ERI Publication
New Frontiers for Resource Extraction	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">TD</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EC</div>	<p>Increased demand for natural resources is leading to exploration in previously unexplored areas, resulting in potential ecological disasters and the destruction of natural habitats (e.g. drilling in the Arctic). Complex technologies applied in extreme situations lead to increased risks. For instance, development and production of unconventional oil and natural gas resources, including fracking, oil sands or undersea methane hydrates, require processes and technologies that differ considerably from those used for conventional resources. As these techniques expand, concerns about environmental impacts and sustainability increase too, displayed through e.g. increased activist criticism and media coverage.</p>	<div style="color: orange; font-size: 24px;">●</div> <div style="color: gray; font-size: 24px;">⇒</div>	
Obesity	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">AH</div>	<p>The increasing prevalence of obesity has a direct impact on life-expectancy as well as on healthcare costs, with the latter also subject to potential future changes in legislation regarding reimbursement. Liability might be affected where e.g. sedentary jobs or specific products consumed (e.g. sugars) can be directly linked to weight gain. Medical progress with the aim of reducing future obesity presents an opportunity especially for life insurers.</p>	<div style="color: orange; font-size: 24px;">●</div> <div style="color: gray; font-size: 24px;">⇒</div>	
Pandemics	<div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">UC</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">AH</div>	<p>Pandemics represent a material risk that has the potential to affect all life insurance markets around the world. Ongoing medical developments along with changes in the way that individuals and authorities respond to a pandemic threat make it difficult for life insurers to predict the scale and nature of the next pandemic.</p>	<div style="color: red; font-size: 24px;">●</div> <div style="color: gray; font-size: 24px;">⇒</div>	



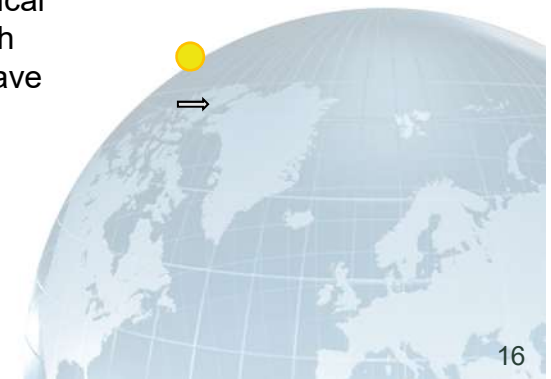
Topic	Associated Trends	Description	Assessment	ERI Publication
Passive Investment (new risk)	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">CB</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EI</div> </div>	<p>The dramatic expansion of passive investment management (where assets are not selected based on individual criteria, but a given index is mirrored instead) in recent decades poses risks to the stability and functioning of markets.</p> <p>In particular, market volatility could increase, and shareholder accountability decline (with negative implications for corporate governance). Competition could also be harmed as a result of the growing concentration of ownership of companies.</p>	●	
Political Instability	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">GL</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">EI</div> </div>	<p>Political instability and violent social unrest can appear suddenly and may spread rapidly if underlying structural causes are present. These include high food and energy prices, water scarcity, high unemployment, income inequality and poor public services. This is likely to impact insurance losses under property schemes (incl. BI/CBI), particularly in areas of high value concentration.</p>	● ⇒	
Predictive Genetic Testing	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">AH</div> <div style="background-color: #00728f; color: white; padding: 2px 5px; border-radius: 3px;">TD</div> </div>	<p>Genetic testing is the analysis of chromosomes (DNA), proteins, and certain metabolites. Most relevant for insurance is direct-to-consumer or Personal Genomic Testing, which is not diagnostic, but provides predictive risk information on disorders with a genetic basis, such as certain types of cancer and metabolic diseases. This can bring information asymmetry between insurer and applicant, with impacts on pricing and claims. Current genetic tests do not satisfy accuracy and reliability criteria, but improvements in data processing algorithms and AI are expected to change this in the near future. The legal landscape and the related ethical implications around the use of genetic data is fragmented and in constant evolution.</p>	● ⇒	



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Protectionism	GL	With a general shift of global economic power from the West to the East in a multi-polar world, the new context and ambitions are increasing the complexity and instability of global power balances. Failure of global governance, and increasing bilateral or multilateral dispute between states increase the risk of trade wars and military conflict, compounded by nuclear proliferation and new military technology (e.g. autonomous weapons). This may destabilise the world economy and particularly financial markets.	● ⇒	
Resource Scarcity	GL EC	As the world economy continues to grow – to a large extent driven by the rapid industrialization and growth of developing nations – and world population increases, so does the demand for natural resources putting increasing pressure on limited resources. Growing scarcity may lead to conflicts in the future. Furthermore, activities aimed at the extraction of resources result in greater environmental impact.	● ⇒	
Sharing Economy	CB	The sharing economy is an economic system in which assets or services are shared between private individuals, either for free or for a fee, typically on the Internet. From UberPOP to AirBnb, customers are taking charge, and business models are shifting from B2B/B2C to C2B. New challenges arise from this shift away from classic to new business models in insurance services (e.g. peer-to-peer insurance).	● ⇒	



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Shifting Range of Pathogens	AH	Due to the impacts of climate change, trade and an ever greater density of global travel networks, many pathogens are expanding and/or shifting their range, with potential implications on human health and agricultural production.	● ⇒	
Substance Abuse	AH	Currently the United States face a substantial “Opioid Crisis” with more than 2 million Americans suffering from an addiction to prescription opioids or heroin. Drug overdoses are the leading cause of death of Americans under 50. The numbers of death cases from drug overdoses are increasing year after year. Similar substance abuse crises may develop in other countries as well. Other substances at risk for abuse followed by severe health damage and even death are e. g. psychotropic drugs and alcohol.	● ⇒	
Supply Chain	EI CB	Hyper-optimisation of supply chains due to improvements in technology and global logistics may increase vulnerabilities to disruption and concentrations of risk. Further risks arise from increased complexity resulting from the rise in interconnectivity. This may result in higher than expected accumulation and correlation of insured losses.	● ⇒	
Synthetic Biology	TD AH	Synthetic biology refers to the design and construction of biological devices and systems. It relies on key enabling technologies such as DNA sequencing and measuring gene expression. It could have far-reaching consequences for medicine and human health.	● ⇒	



Previously deleted entries since 2011

- EMF : Electromagnetic Fields
- Asbestos / Silica
- MTBE - Methyl Tert-Butyl Ether
- Welding rods
- Toxic Moulds / Implants
- Alcohol
- Occupational Diseases
- Blockchain – merged with Digital Currencies
- Personal Damage Compensation
- Permafrost Thawing
- Longevity



Emerging Risks Initiative Position papers published by the CRO Forum

Topic	Year
The heat is on - Insurability and resilience in a Changing Climate	2018
Autonomous Machines	2017
Water Risks	2016
The Smart factory	2015
Pushing the Limits, Human Rights & Corporate Insurance	2014
Food, Risk Appetite, Diversification, ESG	2013
Endocrine Disruptors	2012
Power Blackouts	2011
Nanotechnology, Longevity, Carbon Nano Tubes	2010
Environmental Liabilities, Work Related Stress	2009
Critical Information Infrastructure	2008
Terrorism, Influenza Pandemics	2007

CROF ERI Position Papers 2005-2018

