FOCUS

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THE ACCELERATION OF HUBS, NETWORKS AND CONNECTIVITY

How to ensure the sustainability of insurability and its development?

SCOR
The Art & Science of Risk

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These articles are taken from the Annual Conference which took place on 3 & 4 October, 2019 in Paris.
The views and statements expressed in this publication are the sole responsibility of the authors.

FOREWORD BY LAURENT ROUSSEAU, DEPUTY CEO, SCOR P&C

ENSURING THE SUSTAINABILITY OF INSURABILITY IN A NETWORKED WORLD

In this publication, we will run through three major themes that are at the heart of economic and (re)insurance activity.

1. **Traditional "brick and mortar" networks** – with nodes (e.g. harbors) and links (e.g. bridges and marine routes) are being transformed by the growth in hubs. Real-time activity is accelerating through global interconnectivity, while the volatility of the geopolitical environment is increasing, as is the fragmentation of today's highly interconnected supply chains. In this context, the Chinese "One Belt one Road" experience serves as one of the best examples I know of the revival of traditional networks, and its impact will be felt in the long run.

2. **The transformation of traditional, tangible networks** is amplified by the growing importance of digitization and the intangibles, and the so-called "network effects". With this shift in focus – to assets that include the realm we generally refer to as "cyber", but also go far beyond this realm to include things such as liability, intellectual property and other digitally driven products – "old" industries are dematerializing as new ones continue to appear and grow. Automation and robotics are taking on an ever-more important role.

All of this brings with it the emergence of new vulnerabilities – and new (re)insurance covers. In the insurance business, the shift from tangible to intangible assets drives a number of phenomena, including in terms of risk financing.

3. **And of course, all of this must be managed in a sustainable way.** At SCOR we take a long-term view of our business. For this reason, when we look at how to ensure the development and sustainability of insurability, we leverage on the United Nations (UN) "Sustainable Development Goals" (SDG) framework.

Divided into four basic areas:

- empowering people through education, finance and social infrastructure;
- achieving the energy transition;
- preserving natural capital;

FIGURE 1 – THE SUSTAINABLE IMPERATIVE
GENERATING (RE)INSURANCE UNDERWRITING OPPORTUNITIES

Source: UN SCOR

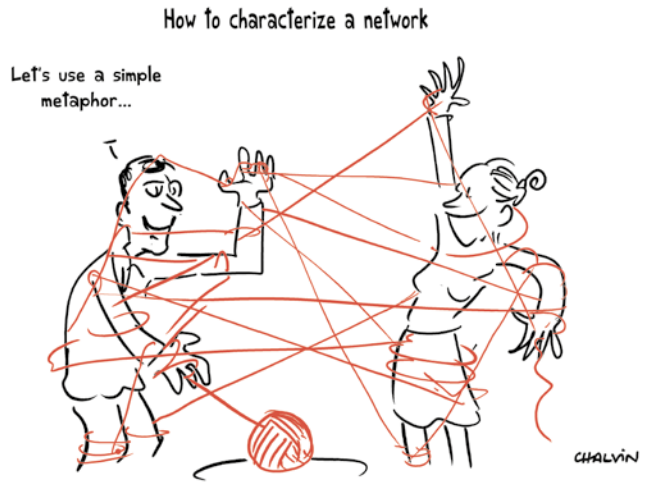
- and fulfilling basic needs through access to healthcare, sanitation, energy and nutritious food, these goals provide a comprehensive framework for action.

Insurance companies tend to often approach Corporate Social Responsibility through a negative lens, i.e. through the exclusion of certain risks and business. Yet there are a number of insurance opportunities that stem from the sustainability imperative. SCOR looks at renewable energy, for example, as a business opportunity. The SDG framework offers us the opportunity to accompany our clients in the transition towards a sustainable future and to contribute to reinstalling long-term security.

The shortening of economic agents' time horizon is another reality we can't deny. As reinsurers, we need to reconcile the short term with the long term. On the one hand, we need to deliver value to clients and society by strengthening the sustainability of human and economic activities. We need to create social value by carrying long-term liabilities, whose value is deeply connected to the state of the planet, nature and human beings. Yet at the same time, we need to deliver short term returns to our shareholders – and we need to sustain them.

Our rich expertise in data analysis, risk modelling and risk transfer solutions, as well as our shock-absorbing capacity and the fundamental function of pooling risks to optimize diversification benefits, ideally position us to promote insurability and to bridge the "protection gap".

I hope you will find, as I did, that these ideas, concepts and approaches are of vital relevance to the future of (re)insurance, and to its role in the sustainability of our highly networked planet.



REDEFINING THE ROLE OF REINSURERS: A QUANTUM LEAP

JEAN-PAUL CONOSCENTE
CEO, SCOR P&C

Jean-Paul Conoscente is Chief Executive Officer of SCOR's P&C division. He joined SCOR in New York in 2008, with over 25 years of professional experience in underwriting and risk assessment. Prior to SCOR, Jean-Paul worked for AXA Re/Paris Re in Paris overseeing their global property portfolio from 2004 to 2008, for AON Benfield in London and Paris from 2000 to 2004, and for EQE Engineering in San Francisco and EQECAT in Paris prior to that. Jean-Paul is a US-registered civil engineer with an MSc in Structural Engineering from UC Berkeley and a civil engineering degree from l'Ecole des Travaux Publics in Paris.

THE EVOLVING ROLE OF REINSURERS IN OUR RAPIDLY CHANGING ENVIRONMENT

We hear a lot every day about the changes and challenges we face as citizens, as corporations and, in particular, as members of the insurance industry in a rapidly evolving, hyper-connected world.

Ongoing and emerging geo-political risks threaten our global and local stability. Infrastructure needs grow and expand together with population, making us reevaluate how we look at risk and risk preparedness. Climate change and the increasing frequency, severity and interrelatedness of natural disasters call on us to reassess how we plan and adapt. In our increasingly interconnected world, cyber risks threaten us all – not only with disruptions in our businesses and our daily lives, but also with the potential to cause physical harm.

We spoke in depth about all of these considerations and also heard about many ways is which big data is offering solutions – as well as making demands on us in terms of adaptation. This includes adapting to changing consumer attitudes and behavior.

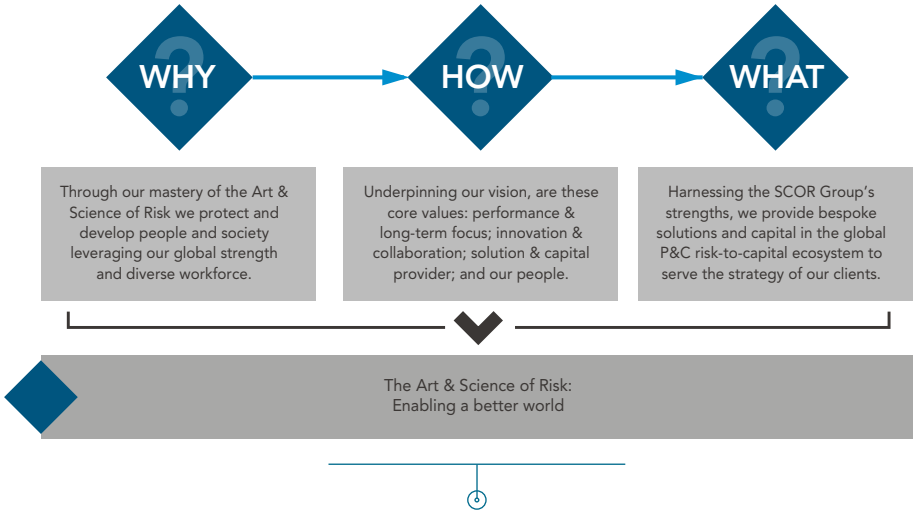


FIGURE 2 – WHAT IS THE ROLE OF INSURANCE IN THIS ENVIRONMENT?

Source: SCOR

The big question that emerged at the Conference was: how do we ensure the sustainability of insurability? It's not an easy question to answer, but to put it briefly, we need to transform ourselves and our businesses.

As reinsurers, our role is to protect and develop people and societies through the art and science of risk solutions. We achieve this by helping to generate value for risk owners, being cost effective through technology, innovating and evolving dynamically. The environment itself forces us to be innovative.

At the same time, the best way to adapt to the changing environment is to know more about it – both inside and outside the insurance industry. Therefore, SCOR invests heavily in science. We believe in the importance of attracting new types of talent – data analysts, cyber experts, modelers etc. – and of investing in new technologies and data strategies.

All of this means moving from the traditional role of insurance provider to that of risk solution provider.

In our industry we need to take a quantum leap. We need to provide the services we have provided in the past, but also to transform ourselves and offer new offerings meeting our evolving environment needs. We need to team up with different government agencies, but we also need to work together as an industry.

To provide solutions, we need to get closer to clients and to better understand their needs – understanding what keeps them up at night.

SCOR's new strategic plan – Quantum Leap – is designed to help us create the reinsurance company of tomorrow. To this end, SCOR is transforming itself profoundly. We are accelerating our use of new technologies, such as artificial intelligence, robots, blockchain, big data, multi-cloud and satellite imagery. We are innovating, expanding our products and services, and increasing our efficiency for the benefit of our clients throughout the world. All areas of the company are involved, from underwriting to asset management, and from risk analysis to claims settlement.

For this transformation to be complete, however, we need to act not just as underwriters, but also as responsible citizens. This means bringing the entire organization on board, encouraging our employees to commit to this ambitious and transformative agenda by helping us push the boundaries of how to enable a better tomorrow.

By adapting to the new environment as scientists, as investors, as industry partners and as responsible corporate citizens, we are convinced that we can increase the benefits for the corporation and for all its stakeholders.

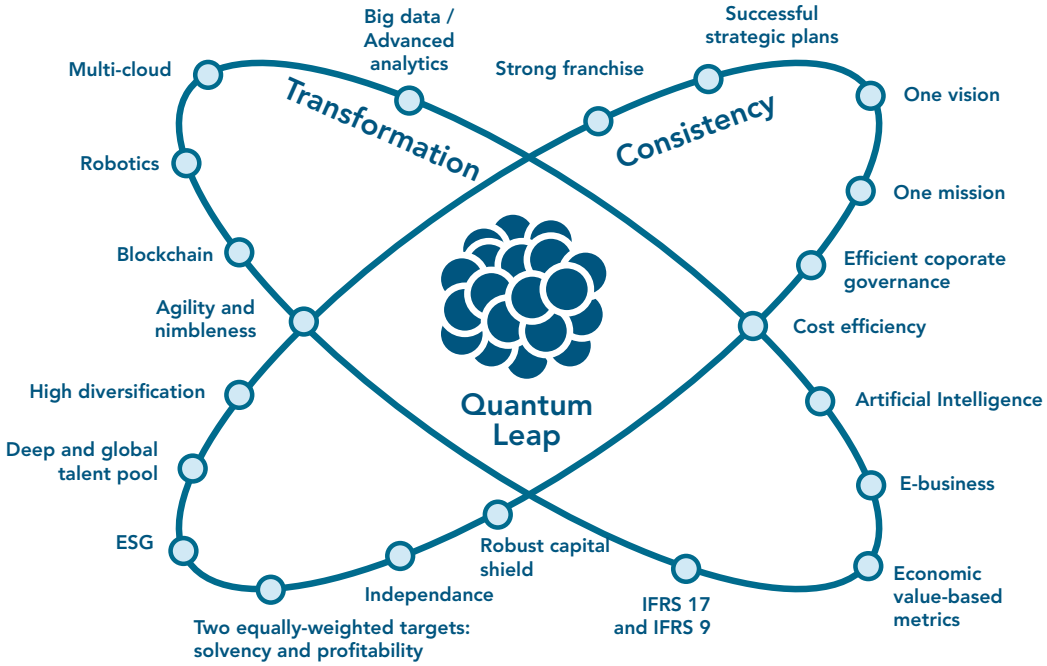


FIGURE 3 – AT SCOR, IN OUR NEW STRATEGIC PLAN "QUANTUM LEAP",
WE ARE TRANSFORMING OUR BUSINESS / ORGANIZATION / PROCESSES / SERVICES TO THIS NEW ENVIRONMENT

Source: SCOR

THE ACCELERATION OF HUBS, NETWORKS AND CONNECTIVITY: PRODUCING REINSURANCE IN AN INCREASINGLY COMPLEX RISK UNIVERSE

DENIS KESSLER
Chairman and CEO, SCOR SE

Denis Kessler is a graduate of HEC business school (École des Hautes Études Commerciales), holds a PhD in economics and advanced degrees in economics and social sciences, and is a Fellow of the French Institute of Actuaries. He has been Chairman of the Fédération Française des Sociétés d'Assurance (FFSA), Senior Executive Vice-President and Member of the Executive Committee of the AXA Group, and Executive Vice-President of the MEDEF (Mouvement des Entreprises de France).
He joined SCOR as Chairman and Chief Executive Officer on 4 November 2002. In January 2016, he was elected to join the French Institute's Academy of Moral and Political Sciences.

LARGE RISKS AND CATASTROPHES MAKE UP THE RAW MATERIAL OF REINSURANCE

Every economic sector is subject to positive, negative and disruptive forces whose patterns form trends, cycles, ruptures or shocks.

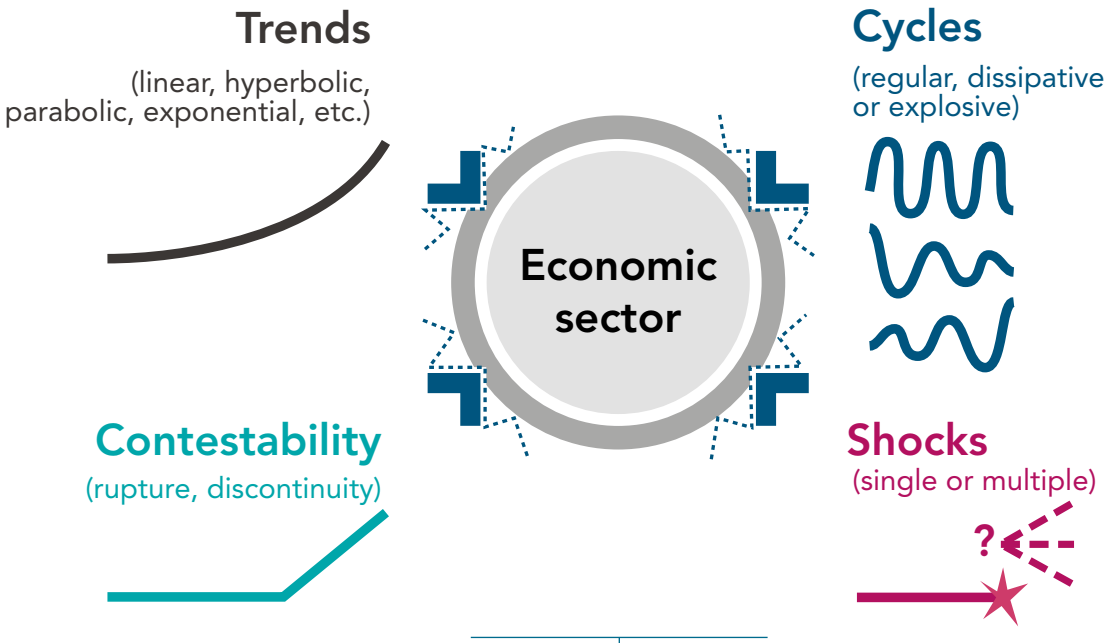


FIGURE 4 – FORCES AFFECTING EVERY ECONOMIC SECTOR

Source: SCOR

However, unlike any other industry, reinsurance is structurally shaped by extreme events and shocks. In reinsurance, shocks are a permanent feature, which is why resilience is such a defining characteristic of the sector.

The job of both insurers and reinsurers is to help economies and societies get back to a pre-shock state – to help them "get back on their feet", whatever the shock may be. Yet, as the diagram on the right shows, insurance and reinsurance operate in different "risk spaces". Insurance focuses on the belly of the risk probability distribution, i.e. on high-frequency and low-severity events. In this space, data is abundant and granular, and generates comprehensive statistics. Reinsurance, on the other hand, focuses on the tail of the probability distribution, i.e. on low-frequency, high-severity events. On this side of the spectrum, data is intrinsically limited, which is why reinsurers use probabilistic rather than statistical tools.

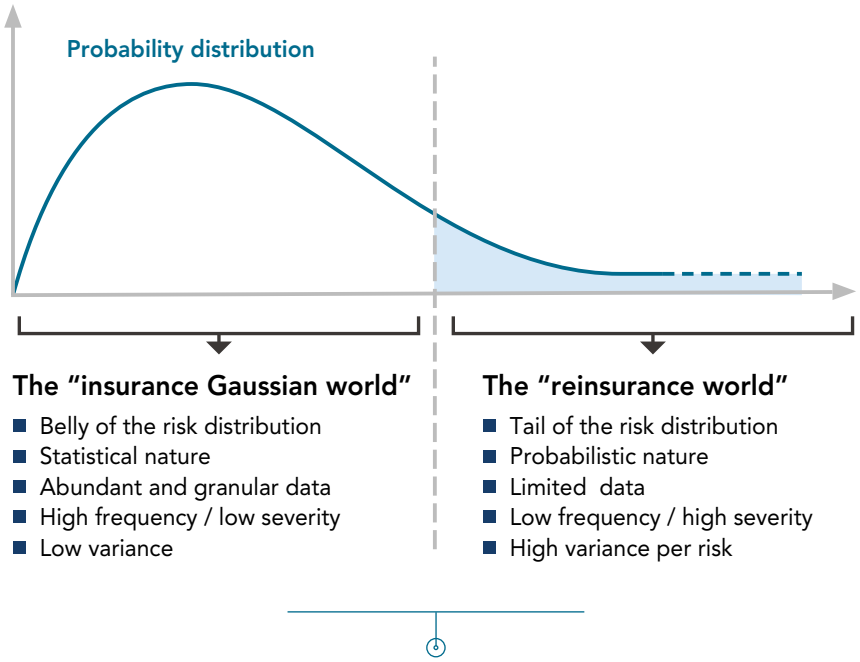


FIGURE 5 – THE DIFFERENT "RISK SPACES" IN WHICH INSURANCE & REINSURANCE OPERATE

Source: SCOR

SCOR CREATES VALUE FROM THIS STOCHASTIC RAW MATERIAL BY STRICTLY RESPECTING FOUR CORNERSTONES

To create value, reinsurers must anticipate and prepare for shocks on the one hand, and be able to absorb shocks when they occur on the other. With this in mind, SCOR has consistently applied a "recipe" based on four cornerstones:

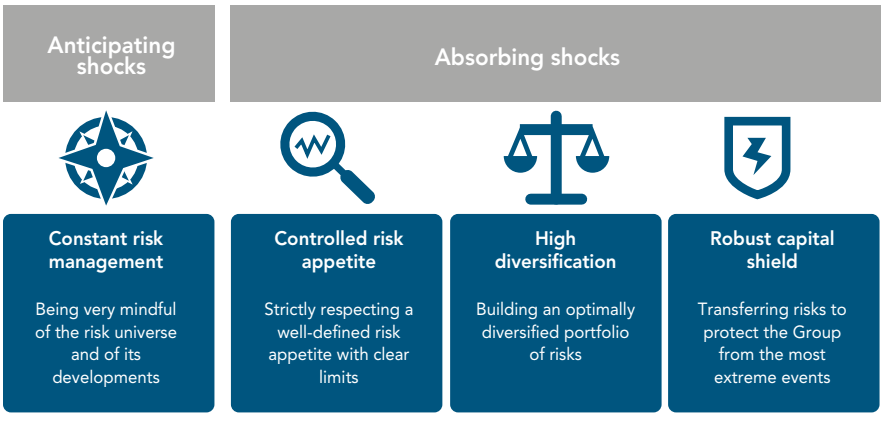


FIGURE 6 – A SCOR "RECIPE" BASED ON FOUR CORNESTONES

Source: SCOR

This recipe has enabled SCOR to create superior, long-term value. Over the last 15 years, we have not only successfully absorbed all the shocks that have impacted our balance sheet – financial and sovereign debt crises, political uncertainties, natural catastrophes, and so on – but have also more than quadrupled our shareholders' equity and successively taken our financial rating to best-in-class.

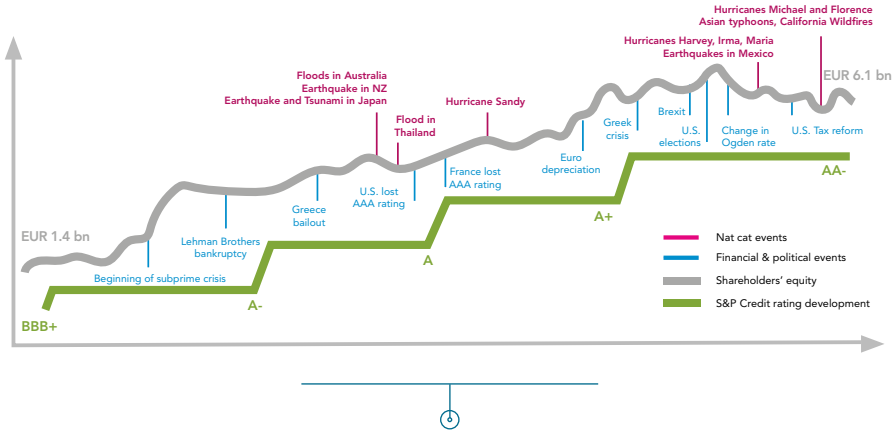


FIGURE 7 – EVOLUTION OF SCOR'S SHAREHOLDERS' EQUITY AND S&P RATING

Source: SCOR

Building an optimally diversified portfolio of risks – across both geographies and lines of business – is instrumental to the Group's superior shock-absorbing capacity. Reinsurance fundamentally rests on the principle of mutualizing large risks, by business line and by geographical area. All shocks will happen someday, but it is extremely unlikely that they will occur in the same year. So diversification provides a "compensation effect" between the different segments of the reinsurer's risk portfolio. Aggregating risks that are largely independent from each other allows the reinsurer to build a risk portfolio in which volatility is strongly reduced in relative terms, and hence to a certain extent to "recreate regularity" out of sheer stochasticity. This gives us a "workable" risk profile. To fully leverage this diversification benefit, a reinsurer must be global and present on all lines of business.

In a nutshell, SCOR is a "risk processing plant". We study risks, we model risks, we select risks, we underwrite risks, and we combine largely independent risks, in order to build a portfolio that benefits from optimal diversification across geographies and between lines of business. And ultimately, we transfer part of the risks we underwrite through retrocession and ILS.

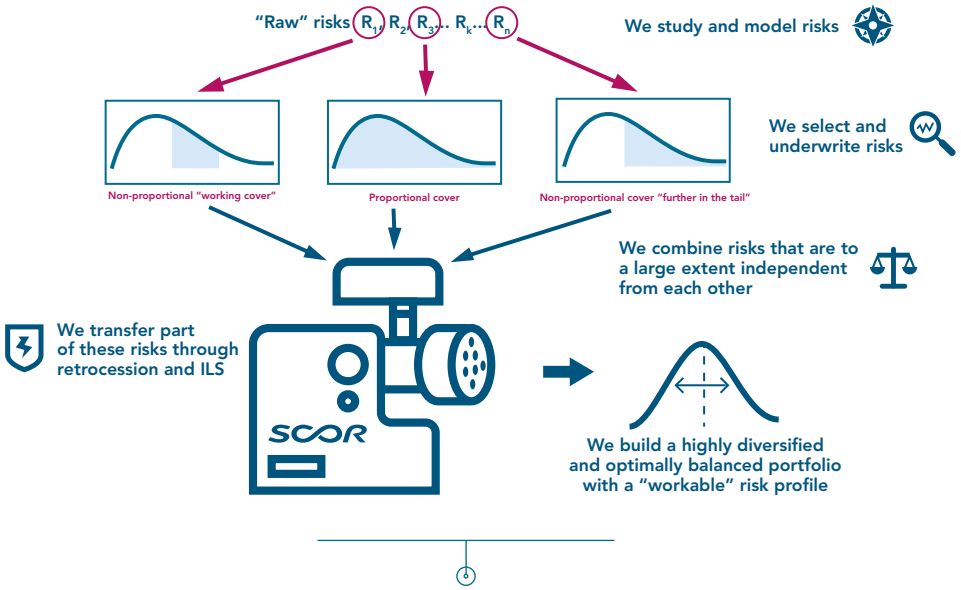


FIGURE 8 – "RECREATING REGULARITY" OUT OF SHEER STOCHASTICITY

Source: SCOR

THE DEVELOPMENT OF THE "NETWORK EFFECT" ACROSS THE BOARD PRESENTS A CHALLENGE TO THE REINSURER'S DIVERSIFICATION PARADIGM

The consequences of extreme events and shocks used to be largely localized. This is changing at a growing pace. Growth, globalization, the increasing fragmentation of global production and supply chains, technological developments regarding digital networks, the global interconnectivity of economic, social and business spaces – and of so many others – make for increasingly intricate interactions between risks. A flood in Thailand may affect a car plant in Nebraska that can no longer operate because it has run out of spare parts!

Risks are increasingly serial and global, i.e. less and less circumscribed in both time and space, and increasingly interdependent, with complex interactions. The acceleration of hubs, networks and connectivity is profoundly changing the risk universe.

This network effect means that some risks, which most of the time – and to a large extent – are independent from each other, are "re-correlated" in the most extreme events, i.e. in the tail of the probability distribution, which is precisely the space in which reinsurers operate. The table below illustrates this through three examples. Incidentally, a real-life illustration of this effect can be seen in the World Trade Center terrorist attacks and their significant impact on financial markets: terrorism risk and market risk have an upper tail dependence i.e. are re-correlated in the most extreme events.

Risks that are independent from each other most of the time…	…but that may "re-correlate" in the tail !
Mortality of individuals of different ages living in different countries	**Global pandemic**
▪ Business Interruption impacting different corporates in various economic sectors and countries ▪ Outage / disruption of the reinsurer's own IT systems	**Global large-scale cyber attack**
▪ Property and BI risks impacting various US corporates ▪ CBI risks impacting Japanese corporates ▪ Individual Life insurance risks in California ▪ Equity risks	**Devastating earthquake hitting the San Francisco area**

FIGURE 9 – THE TAIL DEPENDENCE CREATED BY THE "NETWORK EFFECT"

Source: SCOR

The tail dependence created by the "network effect" increases the probability of risks occurring simultaneously in the most extreme events, and hence may strongly affect diversification.

In probability theory, copulas are the appropriate mathematical objects to comprehensively describe the dependence structures among risks, and hence to specify this "network effect".

TECHNICAL EXPERTISE AND STRONG RISK MANAGEMENT – WHICH HAVE ALWAYS BEEN KEY COMPETITIVE ADVANTAGES IN THE (RE)INSURANCE INDUSTRY – ARE INCREASINGLY IMPORTANT IN A WORLD OF GROWING CONNECTIVITY

Our world is intrinsically stochastic. It is characterized by hazard. This is precisely where our fundamental mission as a reinsurer lies: safeguarding the resilience of economies and societies impacted by shocks. We are producers of security!

For the reinsurer, achieving this objective requires an art and a science of risk, which consists in modeling, limiting, transferring and combining risk exposures. Modelling enables us to assess, quantify and manage risks, in all their diversity and complexity. As risks are constantly evolving, and their interactions and interdependencies are increasingly complex, modelling techniques require continual improvement. Leveraging and optimizing diversification globally, both across geographies and between business lines, is the key ingredient in the reinsurer's recipe for consistent shock absorption and value creation.

In a world of extreme integration and increasing connectivity and interdependence, the main issues of today and tomorrow are global. The fact that risks are increasingly serial and global – i.e. there is a growing trend towards re-correlation in the most extreme events – is a challenge for reinsurers as it affects the fundamentals of the diversification paradigm, making it increasingly difficult to "produce regularity". This explains why reinsurers take a more prudent approach with serial risks, notably through strict exposure limits. It translates *ceteris paribus* into a comparatively lower available reinsurance capacity, and a higher risk premium.

Going forward, the shock-absorbing capacity and value-creation capability of reinsurers will depend, more than ever, on their ability to identify, measure and monitor aggregations of exposure and to model risk interdependencies throughout their portfolios, on a global basis.

THE SINO-AMERICAN RELATIONSHIP: HOW IT WILL AFFECT US ALL

ANDRÉ CHIENG

- CEO of AEC, Vice-President of France-China Committee

André Chieng has been living in Beijing since 2001, where he helps western and Chinese companies to reach agreements after analyzing and solving problems that may be obstacles, whether they are political, administrative or cultural. Currently Vice-President of the France China Committee, André Chieng is also a Member of Honor of the Chinese Council for the Promotion of International Trade and a Chevalier of the Legion d'Honneur.

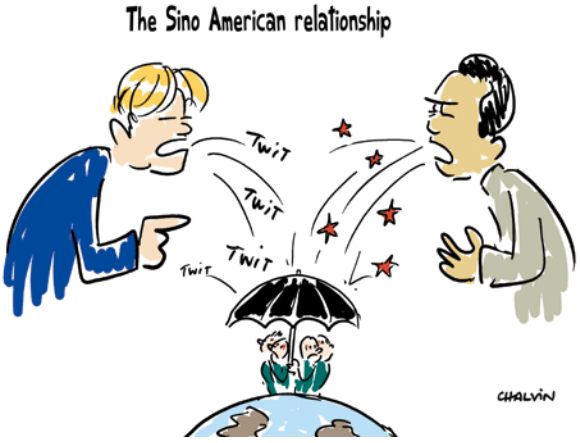
André Chieng was born in Marseille in 1953 in a Chinese family. He has received a 'Chinese' education at home and a 'French' education at school. Initially interested in Classic Humanities, he eventually studied Mathematics and Science, and entered the Ecole Polytechnique of Paris.

After graduating, he became interested in Economics, which he studied at the Ecole Nationale de la Statistique et de l'Administration Economique and at Institut d'Etudes Politiques of Paris.

In 1978, André Chieng decided to stay in China for two years, where he taught Economics at the university. He returned to France in 1980 and joined the Louis Dreyfus Group, which appointed him General Manager of Brambilla Company – one of the oldest French trading firms specialized in commercial exchanges with China. He then became Chairman and CEO of this company, renamed A.E.C. in 1988, with an activity including consulting.

I will use the example of the Sino-American trade war to illustrate the intricacies of interrelationships in today's interconnected world.

We are entering a new reality. New risks threaten us, and new technologies are emerging and developing. Compared to the industrial revolution, everything is happening much faster – and more globally.



The trade war between the US and China serves as a good example. The Sino-American relationship has become a kind of black hole in today's geopolitics. No one really knows what it is made of and at the same time, it swallows everything it comes into contact with. It is impacting everything from the international order to the evolution of future technologies.

How can a trade war have such an impact? To begin with, it is not simply a trade war – if it were, it would have been solved immediately.

Harvard Professor Graham Allison has studied the war between Sparta and Athens in the 5th century BC. At that time, Sparta was the dominant power in Greece and when Athens began to threaten this dominance, war became inevitable.

The similarity with the current world situation is clear. American supremacy, which has prevailed since WWII, is now threatened by China. So, is war inevitable? If we follow Allison's logic, the answer is yes – but this is not my point of view.

In the case of the Sino-American war, both leaders have read Allison and neither wants a full-on war. With the trade war, the US has initiated a kind of proxy – but the trade war is only thinly connected to trade.

The US has used the trade imbalance to justify all kinds of measures against China, the most important among them aimed at preventing China's emergence on two major battlefields: technology and global influence. The first is illustrated by the US attacks against Huawei; the second, by its opposition to the Belt and Road initiative, which Americans consider the main vector of Chinese influence in the world today.

President Trump's strategy is clear. He starts by taking measures that will prompt his opponent to take even more drastic ones. Then, he ends up claiming victory, even if the victory is not as brilliant as he pretends.

President Trump has been much more vocal about the trade war than the Chinese. This makes China look very passive, as if it were unable to take initiative. From a Western perspective, this means, ultimately, defeat.

Is this really the case?

As a child, I was often told the famous Chinese story of The Three Kingdoms. It relates a famous war at the end of the second century of our era. At that time, the most powerful of the three kingdoms was the state of Wei. The two other kingdoms – Wu and Shu – were allied against Wei. The Wei army was on the northern bank of the river and the allies on the southern bank. But the allied forces had a problem: they lacked weapons – in particular arrows.

The great Shu strategist, Zhuge Liang, declared that he would supply the needed arrows in three days. The first day he was very relaxed, strolling by the river, reciting poems and singing. The second day was very much the same. On the third day, a thick fog spread over the river. Zhuge Liang immediately ordered a fleet of boats to be loaded with figures made from bales of straw. He sounded the war drums and sent the boats upriver. Believing they were under attack; the commander of the Wei forces ordered his soldiers to attack the boats. After being rained with arrows, the boats retreated, prompting the commander to declare victory. Downriver, Zhuge Liang was satisfied: he retrieved the arrows from the bales of hay, thus gathering the weapons needed to defeat the opponent.

This story summarizes several elements of a winning strategy, according to the Chinese:

1. Turn the weapons of the enemy against him.

2. Let the enemy think he has won a great victory when actually it is the reverse.

3. Choose the right moment.

Why did the strategist ask for three days? He needed a very important success factor – the fog. Although fog is common in those parts, Zhuge Liang didn't know exactly when it would appear. But without it, the enemy would have realized that the boats carried bales of straw and not soldiers.

If we apply this to the present Sino-American trade war:

1. The weapons are the tariffs. The US has more weapons because the US imports USD 500 billion worth of goods yearly from China, while China imports only USD 150 billion from the US. Chinese growth relies heavily on exports and because Chinese economic prosperity is the only source of legitimacy for the Chinese Communist Party, they are forced to comply with the American demands. But these weapons can be turned on their originators. Studies show that it is actually the Americans who pay most of the tariffs, either on Chinese imports directly, or on the comparatively more expensive goods they are forced to import from other countries. In reality, very few products have been relocated to the US and the trade imbalance in that country, far from decreasing, has actually increased.

2. Trump thinks he has won because so far, the American consumer hasn't felt the impact of the increase in prices. He has placed the tariffs on products imported by American industry and the actual cost has been absorbed in the production chain. But very soon the tariffs will affect the consumer directly, as is demonstrated by the fact that Trump had to postpone some tariffs to avoid spoiling the American Christmas.

3. In my view, timing is the most crucial factor. Although the American economy seems to be flourishing, most economists predict that the country is on the eve of a recession. No one can say exactly when it will happen, but when it does, the moment will be critical. It will make the positive effect of a trade deal more advantageous than China-bashing – which is now very popular not only with Trump, but in all sectors of American society. The only place this isn't true in on Wall Street: on the world market, dips occur when the two giants clash; whenever relations relax, the market becomes bullish. Is it foolish to think that a time will come when the advantages of the economic boost provided by a deal between the US and China will override China-bashing? This is the moment China is waiting for, and I think the odds are in favor of it happening. When it does, China will let Trump claim he has won a big victory.

Nonetheless, don't think that I am optimistic about the end of the war between the two countries. This is not at all the case. The fundamentals of this war are too deep and too severe to allow it to disappear instantaneously. Trump's demands go far beyond the balance of trade, to the very core of the Chinese economic and political system. At the same time, the US can use many other weapons against China: cutting access to American technology in the name of national security, using the explosive situation in the South China sea, stirring trouble in Hong Kong, to name a few. A real peace treaty is very far away because the US will not accept to be overcome by China and China will not accept being dominated by the United States.

We should get used to the idea that the Sino-American war is going to be very, very long and multidimensional. We can only hope that it will be restricted to the world of diplomacy and will not degenerate into military confrontation.

The great Prussian strategist Clausewitz said, "War is a continuation of politics by other means." Maybe we should modify this to say, "Diplomacy is a continuation of war by other means."

CLOSING THE INFRASTRUCTURE GAP: THE AFRICAN CASE

KADE SPEARS
Global Line Head for Political & Credit Risks, Specialty Insurance, SCOR P&C

Kade Spears is the Global Line Head for Political & Credit Risks at SCOR Specialty Insurance. He was previously the head of a Political and Credit Risks team in the London market and has worked in Bermuda, Houston, London, and Singapore during his career. Kade has a Master of Arts in International Relations from the Fletcher School of Law and Diplomacy at Tufts University and a Bachelor of Science in Business Administration from Washington & Lee University.

MAX NDIAYE
Acting Director, Cofinancing Syndication & Client Solutions, African Development Bank

Max joined AfDB in 2009 and heads the Client Solutions division. Max is currently the acting Director of the Cofinancing, Syndication and Client Solutions Department where he is responsible for loan syndication and cofinancing and the development and implementation of the Bank's innovative financial products. Max also leads the balance sheet optimization strategies of the Bank and the financial structuring and advising of the Bank's initiatives and projects across many sectors. Prior to joining the Bank Max worked at IFC Treasury Liquid asset management and at Wachovia Bank in the USA, on the foreign exchange, interest rate and derivatives trading desk. Max has a Master's degree in Finance and Capital Markets from the Paris Superior School of Management and an MBA in Finance from the University of North Carolina in Charlotte.

NOKUTHULA MANYOHA
Financial Director, Old Mutual Insure

Nokuthula is currently the Financial Director of Old Mutual Insure (OM Insure) and was previously a Finance Executive at the listed insurance group MMI Holdings Limited (MMI).

She is a Chartered Accountant with 10 years of specialist knowledge in Financial Services and management experience. Previously, she was senior manager at Deloitte, with expertise in commercial banking, retail banking, and investment management.

Infrastructure is important for all people and countries. But perhaps nowhere is it so critical to accelerate the pace of infrastructure development as in Africa, we with Nokuthula Manyoha, Financial Director of Old Mutual Insure, and Max Ndiaye, Acting Director of Co-financing, Syndication and Client Solutions at the African Development Bank will present our thoughts how to close this infrastructure gap.

Imagine if you didn't have access to electricity, or if your electricity was only supplied at certain times of the day.

Imagine if you couldn't hop on a plane and go pretty much anywhere in the world. Imagine if you didn't have access to the internet. What would life be like? How would your networks, communities and societies be different?

Africa as an important case in point.

Looking back to 20 years ago, according to Nokuthula Manyoha, we haven't made the inroads we thought we would in terms of closing the infrastructure gap on the African continent. Instead, sadly, the gap continues to widen.

The World Bank estimates that closing this gap will require an investment of USD 150 billion every year until 2050. "At the moment," says Nokuthula, "we fall quite short."

Why haven't we made the investment needed? Nokuthula cites many reasons, including the political climate, social instability and rule of law in many countries.

To address the shortfall in investment, Old Mutual partnered with Macquarie. Together they established an Alternative Investment solution for global investors, managing funds and ensuring returns for all.

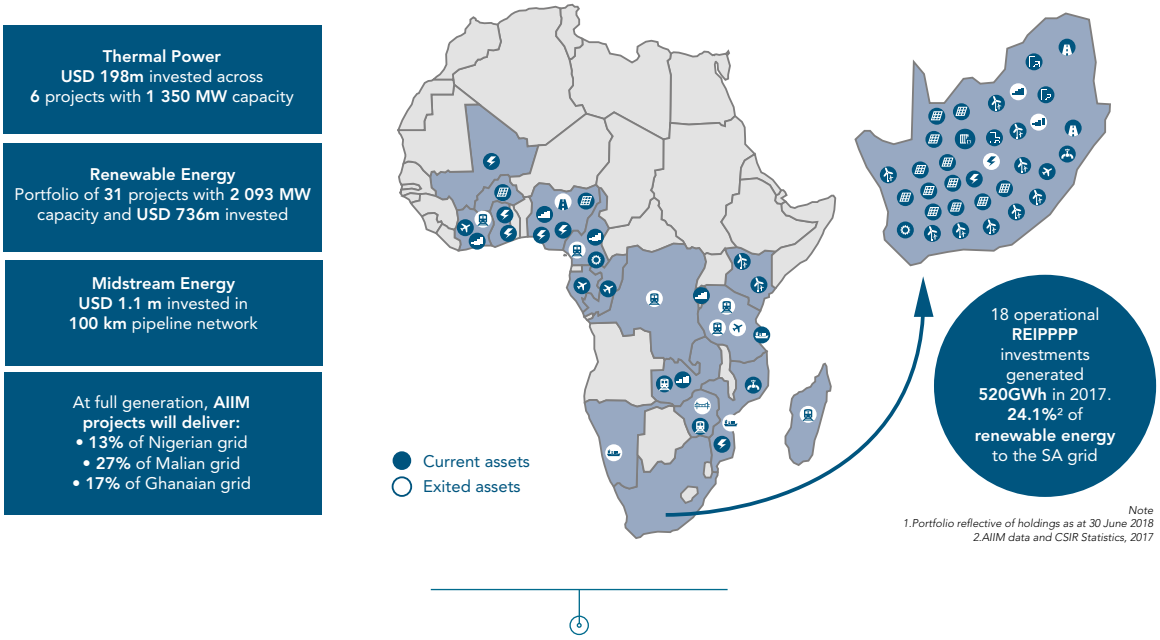


FIGURE 10 – OLD MUTUAL'S ENERGY INVESTMENT PORTFOLIO

Through AIIM, Old Mutual has built a successful track record of investing across the energy sector throughout Sub-Saharan Africa making it one of the leading private sector infrastructure investors

Source: Old Mutual Insure

Today Old Mutual manages USD 4 billion of assets on the continent, across a wide spectrum that covers transportation, energy, electricity and water.

"Energy continues to be the number one concern across Africa," signals Nokuthula. "It is close to impossible to do business without electricity – and more specifically, constant electricity. Africa's rolling blackouts are a drain on the economy." In Nigeria, they have been able to increase the energy-generating capacity by 12%.

Nokuthula notes that sustainability underpins everything we do. Renewable energy is key to how we look at electricity generation. We have moved away from state-owned, coal-dependent power producers to independents using wind energy, solar panels and others, thereby increasing competition in the region.

The solar and wind farms Old Mutual backs are located in rural areas, where jobs are typically scarce and many live below the poverty line. Aside from generating employment, the projects reinvest revenues in local enterprise and skill development, investing up to 5% of project funds in the community.

While typically these projects have a 20-30-year time frame, Old Mutual manages them to provide an exit strategy for equity shareholders in 6-8 years, thereby assuring the commercial viability of the investment.

According to Max Ndiaye of the African Development Bank (AfDB) the infrastructure gap in Africa means from a development perspective that 640 million people lack access to energy – the lowest electricity access rate in the world. It means that only 63% of the population is using basic water services. Africa has the lowest rate of both fixed and broadband subscription in the world. And it has the lowest paved road density in the world: 2 km of paved roads per 100 km² of arable land, compared to 25 km in Asia and 122 km in Europe.

Bridging the infrastructure gap is extremely important for the AfDB because their ultimate role is to reduce poverty.

WHY DOES THE GAP EXIST?

1. Lack of strong legal frameworks to support investment – both national and foreign
2. Lack of bankable projects because of weaknesses in infrastructure planning and preparation
3. A high level of perceived risk, despite the fact that statistically Africa has a lower default rate on infrastructure projects than Asia or Europe
4. The private sector's need for help in mitigating investment risks.

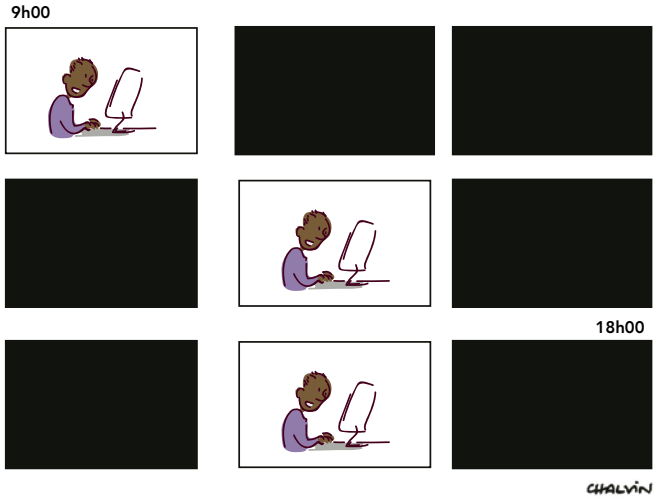
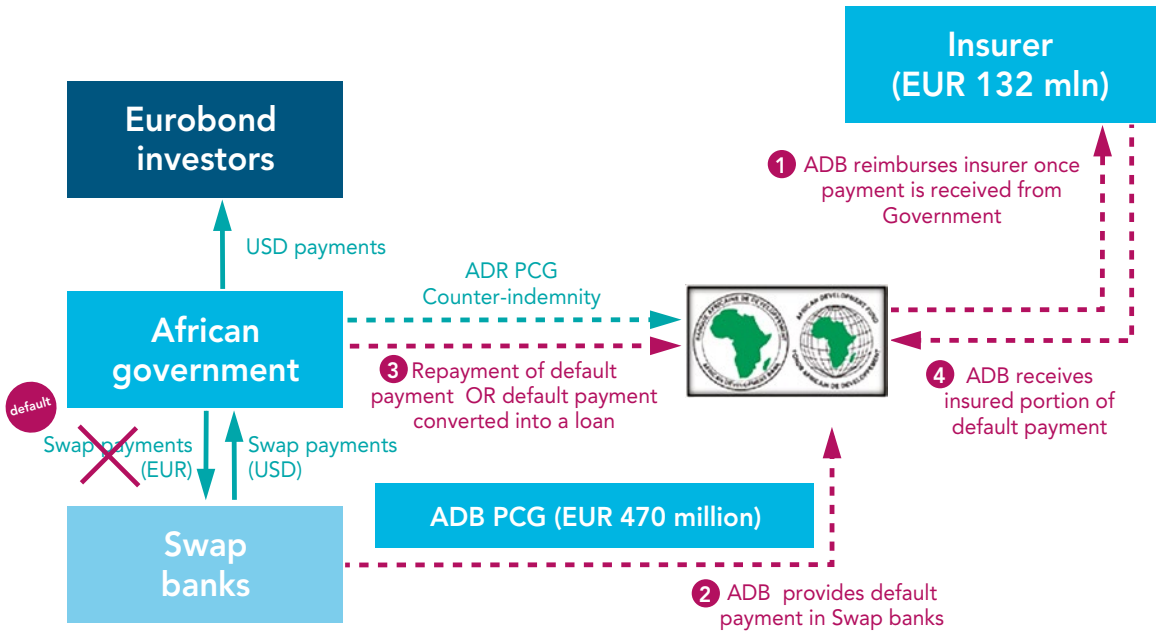


FIGURE 11 – A BUSINESS DAY IN SOME AFRICAN COUNTRIES



The AfDB provided a partial credit guarantee of EUR 470 million to cover Senegal's default on interest and principal on a swap with commercial banks. To optimize our balance sheet and to attract private investors into the transaction AfDB bought credit protection on EUR 132 million from AA and/or A rated private insurers.

FIGURE 12 – A ROLE FOR INSURERS
ENSURING SUSTAINABLE DEBT ACCUMULATION

Source: African Development Bank Group

The African Development Bank is working in both the public and private sphere to help bridge the infrastructure gap. In 2016-17 thanks to their investment:

- 14 million people benefitted from improved transportation services
- 390 km of cross-border roads were constructed or rehabilitated
- USD 1.9 billion worth of power projects were approved
- 8.2 million people benefitted from improved access to water and sanitation.

In Senegal and other places, we have been able to achieve a lot of these results because we had the insurers behind us. We can't do it alone. Our objective is to catalyze finance and investment.

We need many and diverse actors including government, the private sector, entities like the AfDB, institutional investors from the insurance and other sectors, etc. By sharing the risk, we can build the curve and channel the necessary investment into Africa.

The AfDB provides risk mitigation and guarantees. It also shares its portfolio with investors. Insurers are coming to us and taking risks they have never taken before. They take the initial risks and we worry about the long-term. The AfDB's actual loss rate for all of their completed projects is low: 0.63%.

Listening to my colleagues, I couldn't help but wonder: how do we change the perceptions that are limiting investment in Africa?

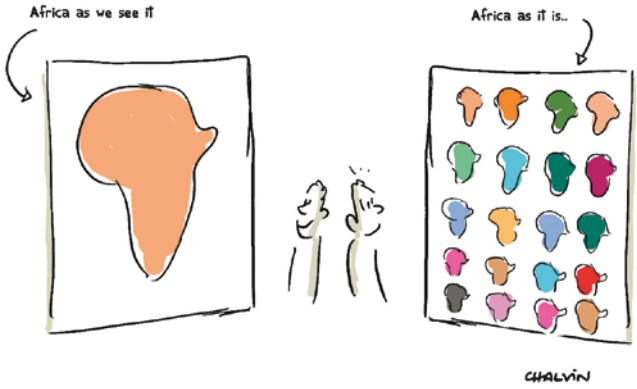
According to Nokuthula, it's fundamental to know the countries and their reality on the ground. In each country or region, there are factors that make a project successful or not. Old Mutual has a two-pronged strategy: one for the Southern African Development Community and another pan-African one. Data is also important, to support the facts and demonstrate that the return is there.

According to Max, the diversity of culture and language is so rich that in order to do business one needs to understand the partners and their territories. It is also fundamental to bring together the key players to help them understand the risk. He cites the African Investment Forum, a platform dedicated to advancing projects to bankable stages, raising capital, and accelerating the financial closure of deals.

Challenges remain. Many governments do not yet take the necessary steps to facilitate investment by the private sector. At the same time, corruption – whether in the government or prompted by corporate interests, makes projects less attractive.

At SCOR Channel, we support tangible finance and investment. Whether it's in the form of offshore windfarms or electricity grids, we help the key pieces of infrastructure to get built. We get planes up in the air and allow people to connect.

Listening to my colleagues Nokuthula and Max, it is clear to me that we all share some important and urgent objectives and that there is much we can do together to close the infrastructure gap.



INFRASTRUCTURE FUNDS: A SUSTAINABLE APPROACH

PATRICK LIEDTKE

- Managing Director, Head of the Financial Institutions Group (FIG) for Europe, Middle East Africa, BlackRock

Patrick Liedtke is responsible for developing BlackRock's business with financial institutions, heading some of the largest relationships as a globally accountable executive. He is a member of the global FIG Executive Committee.

Prior to joining BlackRock in 2012, Patrick Liedtke was the Secretary General and Managing Director of The Geneva Association, a position he held starting in January 2001. He joined The Geneva Association in 1998, and began his career in capital markets analysis and economic research in England, Germany and Switzerland. Mr. Liedtke was also a Surveillance Board Member of Zwiesel Kristallglas AG, Zwiesel, a company he accompanied during its management buy-out and subsequent successful turnaround, and of IT Future AG, Frankfurt, a technology company. He is a member of the Club of Rome, having served two terms on its Executive Committee, a member of the World Academy of Arts and Sciences, and of as several other expert groups. Patrick Liedtke earned graduate and post-graduate degrees from the Technical University of Darmstadt in electrical engineering and financial economics. He is the founder of the Chief Investment Officers Network, the Financial Directors Network, the Amsterdam Circle of Chief Economists, and co-founder of the Chief Risk Officers Network in insurance, the World Risk and Insurance Economics Congress, and the Silver Workers Institute.

Patrick Liedtke has authored and edited several books and over 150 articles and papers on insurance, finance and economics and is an Honorary Visiting Professor at Cass Business School at City University in London. He speaks English, Spanish, French and German fluently.

In his presentation Patrick Liedtke, Managing Director of BlackRock, examined the challenges of sustainable infrastructure investment in a world of growing unpredictability.

How do you ensure sustainability over longer periods of time? This is a big question when we're talking about infrastructure.

EXPECTING THE UNEXPECTED

Some events have cataclysmic effects that nobody foresaw. Before September 11, no one really expected that a manmade event would not only affect the passive side of insurance companies' balance sheet, but at the same time significantly shrink the values of assets that insurers held to pay out claims.

Insurers underwrite risk. But between the time when someone pays up front and when an insurer eventually needs to pay the money back, they need to invest it. Normally we look at these as two unlinked processes, aside from trying to match duration over time with the payout process.

Comprehensive risk assessment that combines both sides of the balance sheet at once is fairly new.

Insurers owe it to their clients to make good on the promises given. Working at BlackRock, I look at infrastructure and sustainability through the asset lens and what it means for insurers to invest.

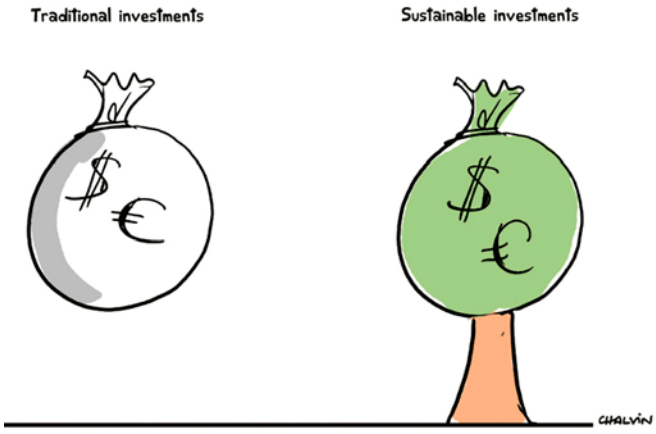
Working closely with the asset owners, I have learned that they like, of course, to be compensated for the risk they take – they just don't like taking it. This is a bit of a conundrum, especially where long-term exposures are concerned.

THE DRIVERS OF SUSTAINABLE INVESTING

Why is this particularly important to insurers? Regulatory, sustainability and reputational drivers are changing the otivations around investing, with repercussions far into the future. This is important because insurers need to ensure sustainability at any point in time, even when the goal posts are moving.

Depending on where and when you are investing, a change in the regulatory and governance context can happen quite suddenly and investment decisions that were taken in the past might be more or less sustainable. We need to be ready for this.

At the same time, new generations have new values and views. These values and views shape and drive the regulatory and governance universe, which in turn affects the profitability of investments Then there are things that we know are going to happen, but we don't know what their impact will be. For example, we have a good idea of how many people will be living anywhere, at any point in time – we just don't know what they will do, or even where they will migrate to. Infrastructure investments need to reflect this properly. We know about resource efficiencies and climate change, but we don't know how they will play out. We need to think about things like mobility in a decarbonizing economy. Environmental, Social and Governance (ESG) considerations are very much at the core of sustainable investing. At BlackRock, we have surveyed the world's major insurers and verified that the



vast majority now incorporate ESG considerations into their asset allocation calculations.

The whole concept of investing with a focus on resilience and sustainability is growing very dynamically.

Investors have concerns over potential trade-offs, as well as challenges around implementation. As they restrict their investing universe in line with reputational issues, for example, what's left seems not to be very diverse or potentially less productive. When we did our last Global Insurance Report, 77% of the respondents indicated that they believed they were compromising either diversification or income outcomes when they considered ESG investments.

ENSURING SUSTAINABILITY OVER THE LONGER TERM

The question is what to do to create better outcomes – particularly for infrastructure investments, which have such a long-term horizon? We need market resilience. Real asset investors are looking for stable returns and cashflows that are not procyclical and as such, act as natural diversifiers to their otherwise more liquid and short-term orientated portfolios.

Then there is sustainability. Real assets need to survive and thrive in the face of social and environmental shocks and stressors, including – but not limited to – climate change. And finally, real assets are subject to a host of idiosyncratic risks, including counterparty, regulatory and geopolitical risks. These issues need to be robustly addressed for all investments.

To do this, we need to think differently. We need to ask ourselves: can I protect my asset by actually driving resilience to make the outcome more sustainable? That's what's happening now. Investors are waking up and taking an active role during project design to make the asset more resilient – for instance, a sturdier toll road that does not collapse when there is an earthquake or a stronger bridge that does not wash away easily even as floods become more common.

It is not easy to get the equation right. At BlackRock, we are tracking hundreds of ESG variables and have created knowledge around them. We consider a multiplicity of decision factors when we make our investment decisions, a lot of them linked to ESG and sustainability.

This gives a totally different quality to our decision-making process.

A FRAMEWORK FOR DECISION MAKING THAT TELLS THE STORY

Our experience is, however, that if you give people too much data and too many variables they disconnect. To help people understand the impact of their decisions we try to distill things down into a metric that everyone can understand – to create a common denominator. This is what we do when we "dollarize" – we create help people to make decisions based on the relative value of the investment.

We also know that we need to "sell" the choices we support. We have a fund called the Global Renewable Power Fund – about USD 2 billion dedicated to helping the world with the energy transition. To explain the impact of investing in this fund, we make a story out of it that everyone can relate to, using the Sustainable Development Goals as a framework. The figure below shows how this works.

** UN SDGs 7 & 13 will both be measured by the same metric: greenhouse gas emissions avoided.*
Please refer to the appendix for methodology and metrics. Metrics represent impact created over fund life.
Sustainable Development Goal images sourced from UN.org, April 2019.

FIGURE 13 – TARGETED SUSTAINABLE DEVELOPMENT GOALS
CASE STUDY: MEASURABLE & COMPARABLE IMPACT IN GLOBAL RENEWABLE POWER II PORTFOLIO
We use the UN Sustainable Development Goals (UN SDGs) as a framework to determine the specific areas of impact we measure.

Source: BlackRock, data as of June 2019.

One of the most challenging areas is climate risk. There is a lot of social pressure on companies to invest in decarbonizing. We know there is climate change, but the complexity of everything that is linked to it – from the physical risks like earthquakes, floods and hurricanes; to the impact on technology development; to the regulatory and political angles – makes these investments particularly challenging.

In short, things are changing. These changes are providing more opportunities and markets are growing dynamically around the world. But a lot of the opportunities lie in countries that are outside the traditional investment realm. We need to understand and work with this.

We are at a vital intersection, between what the insurance industry knows how to do – intelligent risk-taking over a long timeframe – and things we are trying to create. Sustainable infrastructure investing is one of these things.

CLIMATE CHANGE
THE GREAT DISRUPTOR?

JUNAID SERIA
Head of R&D and Governance,
Pricing & Modelling, SCOR P&C

Junaid is Head of R&D and Governance in the Pricing & Modelling department at SCOR P&C.

Junaid joined SCOR in 2015. Together with scientists and actuaries in London, Paris, Zurich, Chicago and Singapore, his team conducts research, validates and builds cat models in support of Cat Pricing, Capacity Monitoring and Capital setting. Trained as an actuary, he has worked in Insurance, Reinsurance and consulting over the past 15 years with experience in Underwriting, Actuarial and Cat Risk management. He chairs the Institute and Faculty of Actuaries Cat Risk Working Party and serves as a cat modelling and climate change expert in working groups for EIOPA, the Geneva Association and the Bank of England / PRA.

In this article Junaid illustrates how we can assess the potential loss impacts of climate change and argues for a more prospective assessment of catastrophe models in light of observed climate trends. He calls for more collaboration in helping clients translate science around climate change and extreme events into the language of risk. He also outlines how SCOR can help clients in their transition to a low-carbon environment. Although climate change has not, to date, been a great disruptor for our industry, things will be quite different in the future.

For the reinsurance business, climate change promises to offer growing cause for concern not only in terms of physical disruption and damage, but also with regard to the financial risks involved in transitioning to a low-carbon economy.

CLIMATE CHANGE AND EXTREME EVENTS

In 1960 the carbon-dioxide level was 315 parts per million (ppm); unprecedented, but only 40ppm above what it had been two centuries earlier. The next 40ppm took just three decades. The 40ppm after that took just two. In 2018 we surpassed 415 ppm. This rapid increase in CO_2 has translated into accelerated global temperature increases within a few decades. Climate models are only able to explain this rate of increase by considering human activities.

While the link between greenhouse gas emissions and temperature increases are established in science, the link between temperature increases and extreme events is less clear. While we cannot tell whether one event was or was not due to climate change, we can assess how much more (or less) likely types of events or event characteristics are, due to observed and projected climate trends. We do this by applying the scientific framework: (1) try to detect a trend over the background noise or natural variability and (2) try to attribute it to climate change. Emerging exposure concentrations is also a major loss driver.

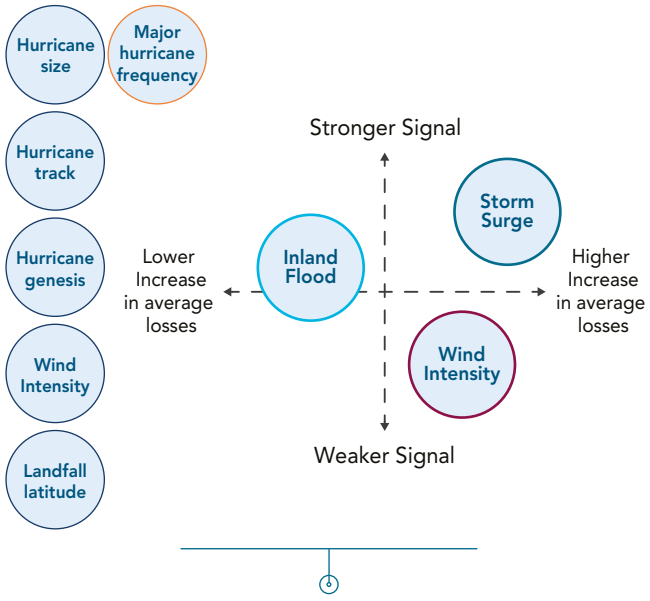


FIGURE 14 – NORTH ATLANTIC TROPICAL CYCLONES

Source: SCOR

At SCOR, we started this work for US hurricanes, the most material weather peril to the global (re)insurance industry. We did this by trying to understand which characteristics of a hurricane might change in a warmer climate, but also whether observed changes are appropriately captured in our models. We reviewed the academic literature to assess the consensus view on each of these characteristics. We also partnered with software modelling vendor, KatRisk, to convert the scientific findings into loss impacts using a present-day industry portfolio. I really encourage more such collaboration between vendors and risk carriers.

While we considered a range of factors, such as hurricane genesis, frequency, track, and landfall latitude, the flood-related factors held the most promise, in terms of lower relative uncertainty and higher impact. Given projected increases in wind intensity, rainfall rates and sea-level rises, we expect more severe flooding from hurricanes in a warmer world. These projections appear to validate well against recent experience, if we consider flooding from hurricanes in the US and Japan.

These studies help us tune our models to better reflect current climate risk and arguably forces us to think beyond our one-year time horizon. The global weather losses of 2017, 2018 and 2019 compel us to challenge our models on their skill in costing severe weather events appropriately. In fact, since 1950, if we consider global weather losses of $10 bn or more (inflation-adjusted) there have been only four years with two or more of these events in a year. All these multi weather cat years have occurred since 2004. Much of this is exposure growth, which is captured, but can we be as confident on the costing of current climate?

FIGURE 15 – THE NEW CLIMATE ECONOMY

Sources: 1. PwC analysis (United Nations Populations Division - 2014)
2.PwC analysis
3.The New Climate Economy, Seizing the Global Opportunity

Despite the benefit of annual re-pricing, a more prospective assessment of models in light of climate trends may help us be less reactionary – thus serving clients better. Given the expertise required, our industry needs to join forces to extend this type of review to other perils and regions, especially for more complex perils, where there are many steps between temperature increases and genesis of the event. While end-of-century projections are of interest for society, our immediate focus is the current costing of climate perils, and the adjustments necessary to reflect non-stationary trends over the next 5-10 years.

TRANSITION RISKS: WHAT'S ALL THE FUSS ABOUT?

Since 1980, over the past 40 years we've doubled our CO_2 emissions. If we want to meet the commitments under the Paris Accord we'll need to half emissions from 40 bn tonnes to 20 bn tonnes per year, in just a decade. The later we leave it, the more negative emissions we need to stay within 2 degrees above pre-industrial temperatures. This is our great challenge of the 21st century. The Paris agreement gives governments licence to act. If we are to see radical policies to limit emissions, our carbon intensive clients will need to undergo significant business model transformation. We need to support clients through this transition, not abandon them. There have been commitments in the past and it's unclear if these commitments will be more successful than Rio or Kyoto. However, one does get the sense that there is a ground-swell of activism and action in several economic sectors, including our own.

COULD CLIMATE CHANGE DISRUPT THE LAWS OF DIVERSIFICATION?

Our business model is rather simple. We try to write risks that are uncorrelated in nature or geographically, and we try to write a lot of them. Climate change is influencing various lines of business across Life, Investments and P&C in different ways. The extent to which they will influence all of them in the same way should be a concern. Our ability to exploit the opportunities that arise from climate change will ensure our sustainability.

Regarding opportunities,

- SCOR's underwriting teams are well-positioned to support insurance of wind across the supply chain from manufacturing of turbines to transit to construction and then also after hand-over. This sector becomes more attractive as the economics become more favourable. Parametric solutions (covering lack or excess of wind) can be attractive to windfarms to reduce volatility in their revenue. Should we see deregulation of wind electricity prices, we may see growing interest in such products.
- We see opportunities in both Solar Photovoltaic (PV) and solar thermal sectors. Further, our Alternative Solutions team for instance offers parametric solutions attached to warranty coverages.
- Melting ice caps is expected to shorten the Northwest passage from Shanghai to New York by about 4,000 km (2,500 miles) which is 19,500 km via Panama.
- Water is not the first thing we think about in terms of climate change impacts on (re)insurance, but it does offer opportunities. Climate change influences the water cycle in so far as where it rains, when it rains and how much it rains. Our Alternative Solutions team can help clients design parametric insurance solutions based on weather indices. These become more attractive with more intense (and volatile) weather, affecting for example hydro energy production and crop yields. Further, parametric index covers offer an efficient means of servicing markets under-served by traditional re/insurance.
- Forestry as a natural CO_2 sink is expected to increase in demand, offering opportunity for more agriculture insurance.
- Underwriting criteria can be modified to incentivise an energy transition. This is being introduced by our Specialty Insurance Energy and Power underwriters.

The (re)insurance Industry needs to join forces to translate science around climate change and extreme events into the language of risk. We can leverage our expertise and technology to be Climate Risk Partners to the global economy and thus support an orderly transition.

CYBER RISK AND THE SUSTAINABILITY OF INSURANCE IN A HYPER-CONNECTED WORLD

DIDIER PARSOIRE
Chief Underwriting Officer,
Cyber Solutions, SCOR P&C

Didier Parsoire is currently Head of Cyber Solutions, managing the development of SCOR P&C Cyber Insurance and Reinsurance business. Beginning his career as a Space engineer, he joined SCOR in 1992 as a Space Underwriter, taking over responsibility for the Space Department a few years later. Didier has also held various managerial positions in the field of Large Corporate Risks, from New Tech clients to Captives and Structured Solutions. More recently, he was involved in the design of an innovative system for large risk underwriting before becoming the head of SCOR P&C Cyber Operations in 2014. Didier Parsoire is a graduate in Aeronautics & Space Engineering from ISAE-SUPAERO.

Didier Parsoire explored the changing landscape of risk and particularly the role of cyber risk in reshaping the reinsurance market. He also looked at the protection gap: the reasons for it, as well as the difficulties in closing the gap.

With the expanding use of digital technology, cyber risk is becoming more and more pervasive. Yet as an industry, we face the issue of defining what exactly is a cyber-attack. This is difficult for several reasons. For one, attribution – identifying the perpetrator and the source – is very difficult.

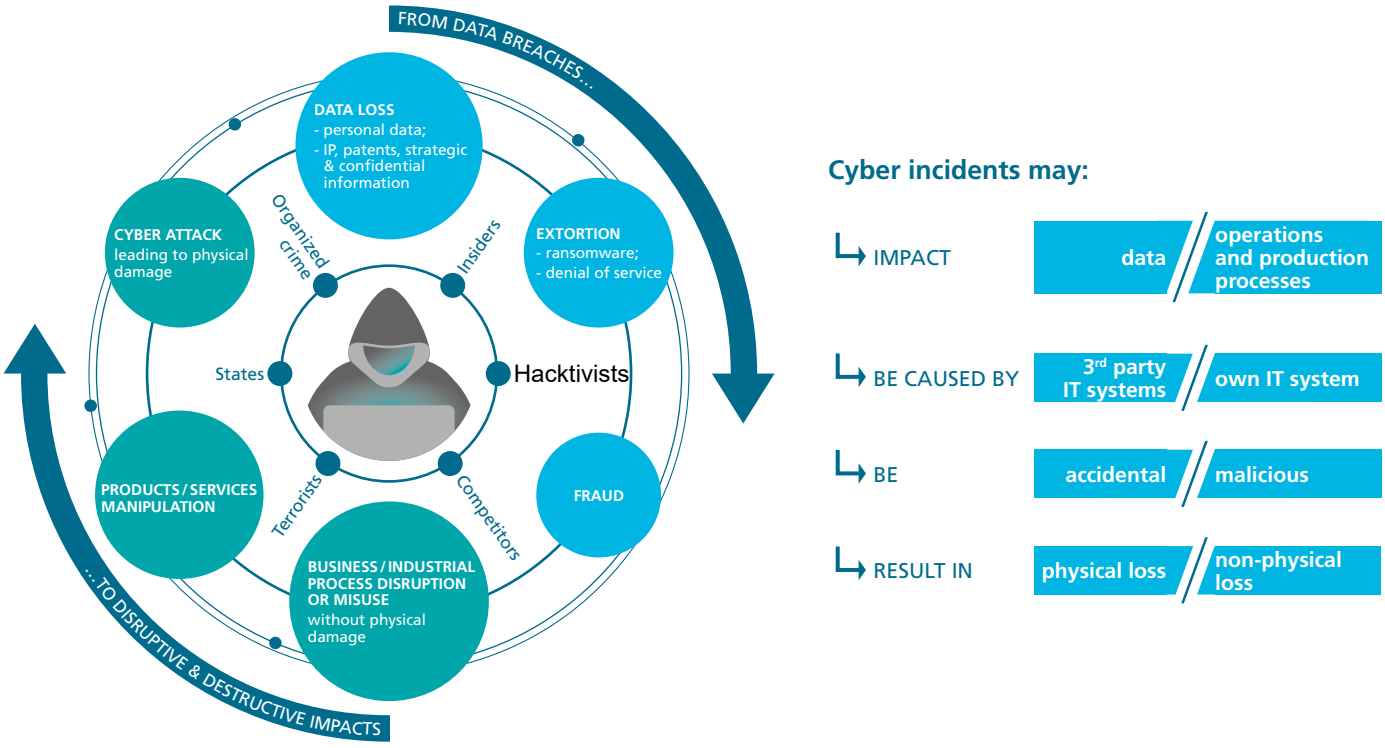


FIGURE 16 – AS THE USE OF DIGITAL TECHNOLOGIES EXPANDS, CYBER RISK BECOMES MORE AND MORE PERVASIVE
Cyber peril is arising from loss, failure or misuse of information technology systems

Source: SCOR

Also, the time between when the attack is made and its discovery and/or manifestation can be quite long. Lack of clarity about the causation chain and attack pattern raises issues for insurance and reinsurance coverage like claims trigger, application of exclusions or definition of a cyber event.

Above and beyond cyber-attacks, however, we also need to think about accidental events and computer and/or software failures which have proven to be quite costly in some recent cases.

Cyber risk connects the dots between the digital and the physical world. We usually equate "cyber" with "data" and therefore with non-physical losses. But the risks are not only a question of data – there is also the risk of business disruption through failures in a company's IT systems as well as in its industrial control systems. Cyber-related outages of the IT and non-IT supply chain is another source of disruption. Also, we are likely to see more and more physical loss and damage from cyber incidents – both in terms of property and bodily injury – and this damage is sure to be increasingly destructive. Take, for example, airlines or hospitals and their vulnerability to accidents or failures in the computer systems they depend on.

In short, Cyber risk cover a full spectrum of business impacts from data breach to disruptive and destructive events.

In the digital economy, we have all the conditions for large cyber risk aggregation and propagation, largely because of two factors: standardization and concentration.

1. Standardization: the market for software and hardware products is heavily dominated by a few major providers, which increases the footprint of any vulnerability. More than 90% of computers in the world today operate under Microsoft operating systems. Cisco and Huawei provide more than two-thirds of routers. And Huawei, Nokia and Ericsson supply more than three-quarters of total mobile infrastructure.

2. Concentration: the growing concentration of IT services is particularly evident in the cloud business. Amazon Web Services captures more than one-third of total cloud services.

But risk aggregation can only happen if there is vector for propagation. In the case of cyber risk, the vector is provided by connectivity through the internet.

All of this means that we now have all the conditions for a perfect cyber storm. And unlike storms in the physical world, a cyber storm has no geographical boundaries and no limits in time or seasonality.

Although we have not yet had the perfect cyber storm, Wannacry and NotPetya were both very widespread events. Each resulted in major disruptions in many companies, with economic losses on the order of USD 4-8 billion for Wannacry and up to USD 10 billion in the case of NotPetya. And both exploited the same vulnerability in the Windows operating system. Any future attack on major operators, such as power grids and other critical infrastructure, could have cascading effects as well.

How do we address this issue as insurers and reinsurers? We are at the early stages of modelling cyber risk and while we are looking at emerging risk, we really have very little data on which to base our calculations. How do we manage something that has not yet happened, at least at such a large scale? We build scenarios, as Denis Kessler ably described earlier. As we get more data, probabilistic models are providing some distributions. The challenge is to see if the calibration reflects reality. Current scenarios suggest that economic loss of large cyber events could be of same magnitude as some large natural catastrophes.

Currently, penetration rate of cyber insurance is still low. In 2017, the global cost of cybercrime was estimated at USD 600 billion, whereas the cyber insurance premium was USD 4.5 billion. This evidences a high protection gap. However, (re)insurance exposure to cyber risk is bound to increase for at least three reasons:

1. Take-up rate is increasing rapidly. Written premium is expected to reach USD 20 billion by 2025.

2. Insurance coverage is expanding from data privacy to business interruption and physical loss, hence capturing more of the threat.

3. Last, the exposure base – the number of connected objects – is also growing very quickly.

In short, while (re)insurance exposure is expanding, it is still quite difficult to properly model cyber risk. What is certain is that this type of risk is on its own very capital-intensive due to lack of time and space diversification.

Are we going to be able to find the capital needed to address this challenge? This is the real issue. Because these are large-impact public events so we will probably see some risk-pooling schemes, but cyber is global and pooling schemes are largely local.

As we can see, sustainability of the(re)insurance market in this hyper-connected world is closely linked to how the digital economy will develop.

In that respect, we begin to witness some fragmentation of the cyber industry. Look at China and Russia, for instance, where the internet has been ring-fenced. Or the US trade ban on Huawei. All of this contributes to fragmentation. There may also be sovereignty issues. More and more, giant players like Google, Amazon and Facebook are being contested. In the future, we may see some new anti-trust laws. Privacy is another big issue and more and more stringent regulation is shaping the way the digital industry operates.

Can risk be another driver of change? Today risk is not really incorporated into the decision-making process when products are adopted, but one way or another this is sure to change. Negative externalities of poor security and lack of diversity in the offering will soon manifest in increased loss frequency or severity as discussed above. In this context, insurers and reinsurers can play a key role in establishing a price signal for risk. This will, I believe, help to drive us towards more secure and safe – but also more diverse – IT products to sustain the expansion of our digital world.

LEVERAGING TECHNOLOGY AND DATA TO IMPROVE SECURITY AND SERVICES

SYLVAIN GAUDEN
Chief Underwrting Officer
for Marine & Energy, SCOR P&C

Over the past 25 years, Sylvain has acquired broad international experience in Shipping, logistics and Marine Insurance and Reinsurance. He is a former Captain and naval Engineer. He started his career at sea before working in the shipbuilding industry until 2006, when he joined AXA CS, first as Marine Technical Advisor, then Marine Underwriter and finally Marine Hull Chief Underwriting Officer. He finally joined SCOR Business Solutions in April 2015 as Head of Offshore Energy. In January 2017, he launched the Marine LOB for SCOR Business Solutions acting as a Global Head of Marine. Since January this year he has held the position of Chief Underwriting Officer for Marine & Energy at SCOR Global P&C, based in Zurich.

FRANÇOISE CARLI
Co-Founder, SICMEC

Françoise has spent all her career, or almost, in the insurance world. She worked for 12 years at Sanofi Group as Insurance Risk Manager VP and held roles as CEO and President of the Management Board in many of the insurance and reinsurance captives of the group. Previously, Françoise held several positions in Risk Management and Insurance at Zurich Insurance, were she worked for 18 years, 5 of those as CEO for France. Françoise started her career as an engineer, later a controller, at Framatome (now AREVA). Françoise holds a Master of Science in Civil Engineering and Materials Science from Stanford University, a Master of Finance from Université d'Orléans and a Finance PhD from H.E.C. She has participated in, and still contributes to, several professional associations (AMRAE, FERMA, RIMS). Today, she dedicates her time to helping startups in the insurance sector, continues to help develop the insurance market via Zakubo Consulting and has co-founded with 2 associates the company SICMEC, an insurtech supporting marine insurers.

LARS HENNEBERG
Vice President, Head of Risk Management,
MAERSK

Lars is Vice President and Head of Risk Management at A.P. Møller-Maersk A/S, a global integrator of container logistics. He is a lawyer by background with a particular focus on Energy, Transportation & Logistics, and Insurance. From 2005 to 2010 he held the position of General Counsel at Maersk Oil and in 2010 he assumed his current position as Head of Risk Management at A.P. Møller-Maersk A/S as well as Managing Director of Maersk Insurance A/S. Lars has broad international experience, including a five-year posting for Maersk Oil to the Middle East (Qatar) from 1999 to 2003.

MICHEL JOSSET

Group Treasury/Insurance, Loss control, Real estate, Faurecia

Michel Josset is currently Director for Insurance, Loss control and Real estate for Faurecia, Automotive equipment supplier for seating, clean mobility and connected vehicle interiors solutions. 300 production sites in 33 countries, more than 100.000 employees and a turnover of EUR 18 billion. Michel Josset is also the Head of the Commission for Property Insurance within AMRAE, the French Risk Managers association.

PAULINE DES VALLIÈRES

Marine Underwriter, Specialty Insurance, SCOR P&C

Pauline has been working in the shipping industry since 2009. She spent 5 years as a Shipbroker at Barry Rogliano Salles, one of the top 3 shipbroking firms in the world. Before that she worked for other shipowner corporations such as CMA-CGM and Louis-Dreyfus Armateurs.

She joined SCOR as part of the Marine division in February 2018, acting as an Underwriter. She holds a Master's degree in Geography from Nantes University and a MSC in Sustainability and Social Innovation from HEC Paris.

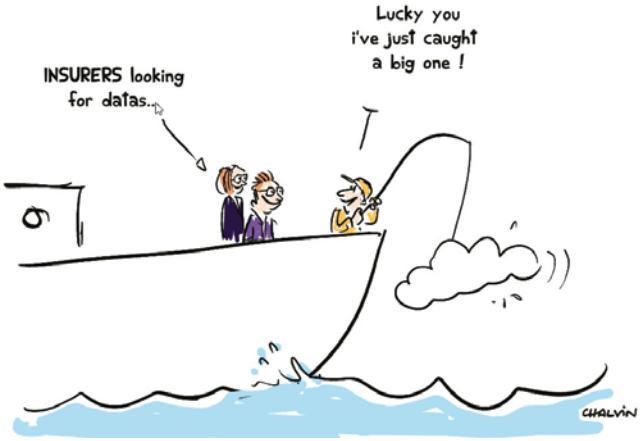
Sylvain Gauden led a panel that explored how industries leverage technology and data – including blockchain, big data, artificial intelligence and predictive models – to better monitor their supply chains and improve security and services. Panel members included Francoise Carli of SICMEC; Lars Henneberg of MAERSK; Michel Josset of FAURECIA; and Pauline des Vallières of SCOR P&C.

Although the economy is shifting from tangible to intangible assets, trade in material goods continues to grow. Sea-born trade accounts for some 71% of all trade. Today some 12 billion tons are shipped every year – equivalent to 1.5 tons per capita – up from 4 billion in 1990. In other words, the volume has tripled in less than 30 years.

Shipping costs have decreased as the volume has increased, but the supply chain has become more complex. Issues of storage, packaging, regulations, taxes and others have made the supply chain more and more challenging to manage.

Data can help and indeed, supply chains are huge consumers of data. The question is, how do you manage the data? Today paper is still very important in shipping, but this needs to change. Big data combined with artificial intelligence are allowing us to build better predictive models, and to better assess and understand our risks.

I asked the participants in this panel to share their experiences with leveraging technology and data.



LARS HENNEBERG: AT MAERSK, HOW HAS DATA IMPACTED YOUR BUSINESS MODEL?

Simplification of business processes is a big priority for MAERSK. We see it as a means of improving our customer service. Better protection, risk planning and recovery processes are critical in our digital business model. We can't afford to have e.g. our Global Customer Services System go down.

In 2016 our board launched a strategic transformation to make MAERSK a transport and logistics company, not just a shipping company. This means covering the full supply chain, from door to door and warehouse to warehouse, creating a one-stop-shop for the customer.

We already have most of the pieces in place. We just need to expand the portfolio on the land side and to put it all together into one cohesive service. Working with our digital partners we are digitizing the ecosystem of global trade. We are creating platforms that standardize and integrate all of the complex processes in transportation and logistics, from bookings and movements, to customs declarations, insurance and finance. Our customers will interact digitally with us and get everything they need from the same platform. This means better business for us and better service for our customers.

Insurance is a big part of the complexity of shipping. In the risk management department, we typically spent about 70% of our time on insurance contracts. Now our vessels are all connected, enabling us to change the discussion around insurance: more about risk and less about insurance procurement. Data enables us to think about emerging risks – to do predictive analytics – and to monitor and manage risk much more effectively. Because we have many more data points and providers, we can do much more tailored risk management and we can differentiate risk in real time.

Finally, we are reducing the administrative burden, using blockchain, algorithms and other data processes to streamline our transactions. Everything that was previously done manually is now automated, making our insurance services faster and cheaper.

MICHEL JOSSET: HOW IS FAURECIA INNOVATING TO CONTROL LOSSES IN THE SUPPLY CHAIN?

In the automotive industry, the supply chain is very long and complex. Any interruption can have serious financial consequences. Several events in recent years have hit the supply chain hard, from the Fukushima quakes to the Thailand floods, to fires in the Czech Republic and the US.

Insurers are lowering the tiers for coverage and reimbursement because of the unpredictability of risks, so we are moving more to loss control and prevention. We have started to collect information on our top suppliers – not only to evaluate suppliers but also to assess their physical risks. This makes risk management routine – and makes their lives easier.

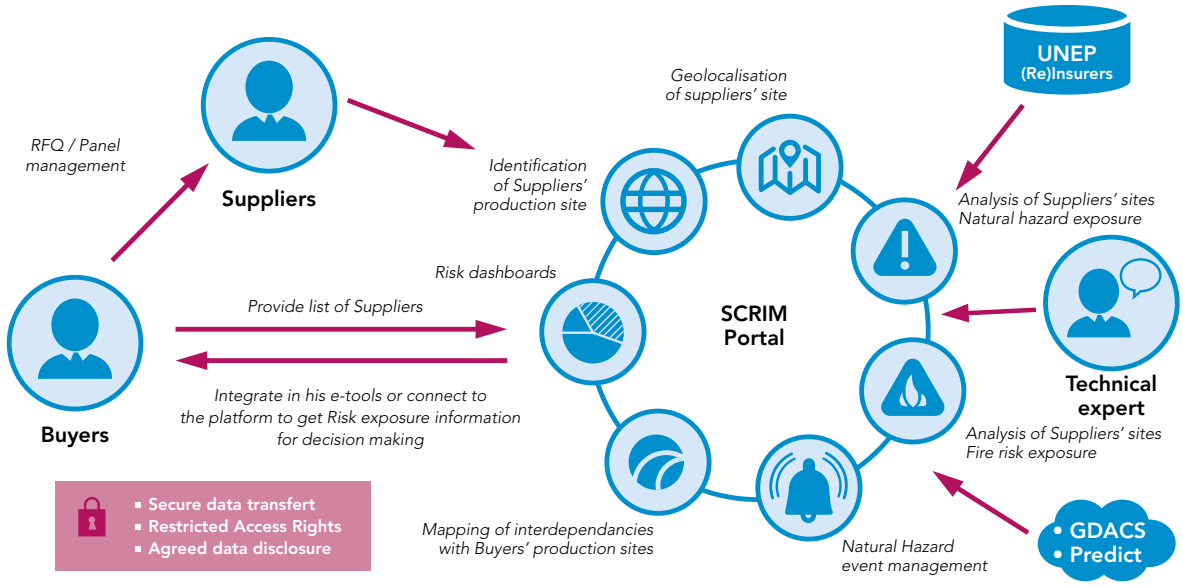


FIGURE 17 – SUPPLIER INDUSTRIAL RISK MAPPING PROCESS FLOW

Source: Kyu Associés

The main challenge is mapping the supply chain. We need to collect a lot of information on suppliers' production sites and then make the connections with objective data on natural hazard exposure. We have created a dashboard to do this, but because the data collection is costly and time-consuming, we have realized that we cannot do it alone. By externalizing the data collection process to a third party, we have lowered the cost and also limited conflicts of interest. And finally, the dashboard allows us to warn customers as we see dangers evolving.

We plan to share the information with insurers transparently. In this respect, one of the challenges is confidentiality. We need to make sure that the information provided by suppliers is protected.

FRANCOISE CARLI: AS CO-FOUNDER OF SICMEC, CAN YOU SHARE WITH US YOUR VIEW ON DATA MANAGEMENT IN THE SUPPLY CHAIN?

In the late 1980s everyone was talking about data in the marine industry, but the conversation revolved around a few critical points, among them pricing and claims management. In other words, it was driven by what the insurers required. No one was really focusing on customer needs.

In the 1990s there was a shift. We began to ask ourselves: is there information that the customer would like to have that is not really driven by insurance concerns?

But the marine industry is still living in ancient times. We are still trying to figure out what kind of data we have. This means that the industry faces a big risk: if we keep on the way things are, by 2025 there won't be any more marine insurers on the planet. You won't be able to get insurance coverage for the goods you are shipping, especially when this happens in areas that are critical for risk management.

We really need to use data differently. We need real predictive models: not only what and where the products are, but also what's going to happen? This is critical so that you aren't insuring in the dark.

The truth is that insurers all have tons of data – but nobody wants to share it. You share it only when there is a problem. Sharing is key. You all need the right information, and you need it when it matters. You need to be alerted as to where, when and how something is happening to your goods. For this, you need a trusted third party. This is what SICMEC aims to be.

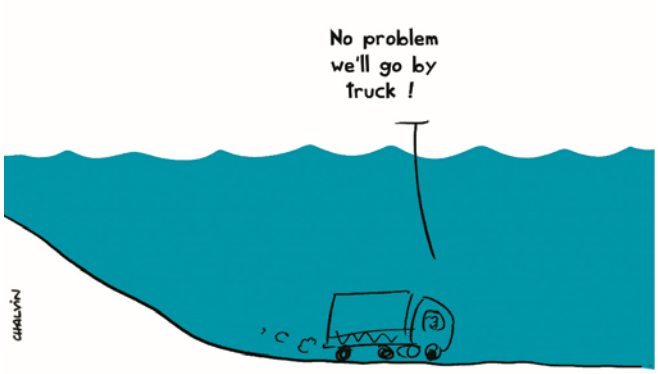
PAULINE DES VALLIÈRES: CAN YOU TELL US HOW MARINE UNDERWRITING IS EVOLVING AT SCOR P&C?

At SCOR, technology and big data are allowing us to use more precise and more predictive tools. We have identified three main challenges in doing this:

1. Internally, we need to speak the same language.
2. We need to make sure we have the right data.
3. We need to convince management to go further.

The best way we have found to achieve this is to use the tools in our daily work. Thanks to the technology we have developed, we have been able to go from an exclusion-based policy to a more inclusive one.

For example, two vessels may seem to be technically identical: same type, same size, same flag, same owner, same age. Basically, this is the kind of static information an underwriter traditionally receives – between five and ten technical criteria, based on which two vessels may be assumed to have the same risks.



In actuality, however, one of those vessels may have sailed nearly twice as much as the other. This type of information is quite easy to find; it is available on the internet and may even be free. But an underwriter rarely has the time or the internal tools to study it.

Thanks to artificial intelligence (AI), we can now add important behavioral data to the static data we have traditionally used. We can take into account more than 500 criteria, generating a predictive risk score and adjusting the premium to the risk.

Of course, we still have a long way to go to integrate all these data into our daily underwriting. Nevertheless, one year ago we would have declined risks than today we are able to negotiate and underwrite, thanks to analysis using artificial intelligence.

DESIGNING AND MANAGING A SATISFYING CONSUMER JOURNEY

NA JIA

- CEO, ReMark International

Na Jia is a Fellow of Society of Actuaries and holds a Master's Degree in Statistics from Renmin University of China. Qualifying as an Actuary in 2001, she was one of the earliest FSAs in mainland China.

Na began working for Swiss Re Life & Health Australia and later on worked in Zurich, London and South Korea in various pricing and client management roles. In 2004 she joined ReMark in Singapore as the regional pricing actuary for Asia. She since has held various positions in ReMark, including the International Chief Marketing Officer (based in Amsterdam) and Head of Asia (based in Singapore). Na was instrumental in building ReMark's proprietary capabilities in data modelling and digital channel and played a key role in acquiring strategic clients contributing to ReMark's success in Asia today. In addition to the distribution field, she is also active in actuarial academic research. Her research paper on Epidemic Modelling and SARS as a Case Study was published in the North American Actuarial Journal in 2005. She frequently speaks at insurance and actuarial forums and conferences in Asia.

In August 2017, Na was appointed as CEO, ReMark International, a SCOR Group Company.

Remark is SCOR's InsurTech solutions provider that is *"dedicated to reshaping the way insurance is developed, distributed and perceived."* Na Jia described how ReMark works to create the best possible user journey by keeping up to speed with developments in other areas of commerce and incorporating them into the life-insurance purchase journey.

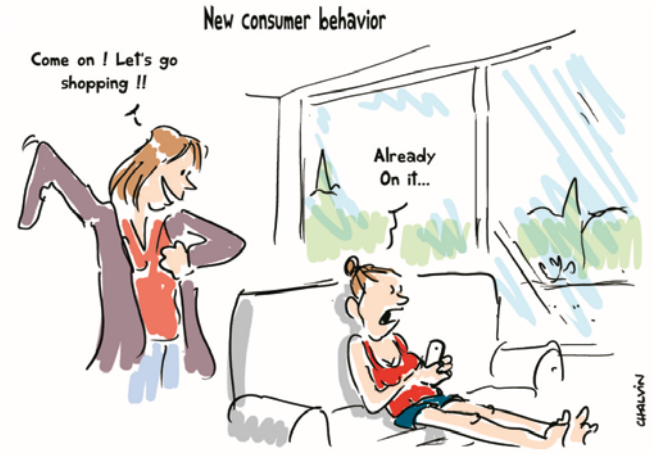
Today's customers of are evolving fast. They are educated, responsible and health-conscious – and above all, they are open to technological advances that work for them. Unsurprisingly, these tech-savvy consumers expect more: more guidance, more relevance, more speed and less hassle. The internet empowers them to shop around.

At ReMark we're all about consumers. We've spent six years studying the consumer journey. What have we learned? The journey begins with value, and price remains the number-one factor valued by consumers.

Number two is convenience. Most customers are looking for a hassle-free process and interestingly enough, for Generation Z – today's 18-22-year-olds – a hassle-free process is equally as important as price.

Today's consumers also expect everything at their fingertips, and they want the process to be completed instantaneously.

Among the respondents to our Global Consumer Study, 74% said that they expect to complete a purchase within 24 hours; a significant portion of these – 30% – expect completion in less than an hour. Only 10% say they would be happy to wait a week.



WHAT ABOUT ARTIFICIAL INTELLIGENCE?

Most people today say they are open to artificial intelligence (AI) and the convenience it offers. Around 40% of people worldwide claim they already have an AI device and some 23% say they have a good understanding of AI. Around 40% of interviewees said they would be comfortable with the insurer using AI – if it improves their user experience.

But these are global figures. The differences by country can be big, often depending on exposure. Only 23% of Japanese consumers said that they owned automated personal assistants such as Siri, Amazon Echo and Bixby, and just 8% claimed to have a good understanding of the technology. Conversely, in India – where cheap technology is widely available – 65% of people surveyed said they owned an AI device and 52% claimed to have a good understanding of the technology.

By country	% always prefer human interaction
Australia	54.6%
Canada	57.8%
Chile	49.2%
China	31.8%
France	60.6%
Germany	57.6%
India	49.9%
Indonesia	48.1%
Japan	22.7%
Malaysia	44.6%
Mexico	41.9%
South Africa	40.3%
South Korea	28.2%
Spain	49.1%
UK	55.9%
USA	53.6%
Average	**46.6%**

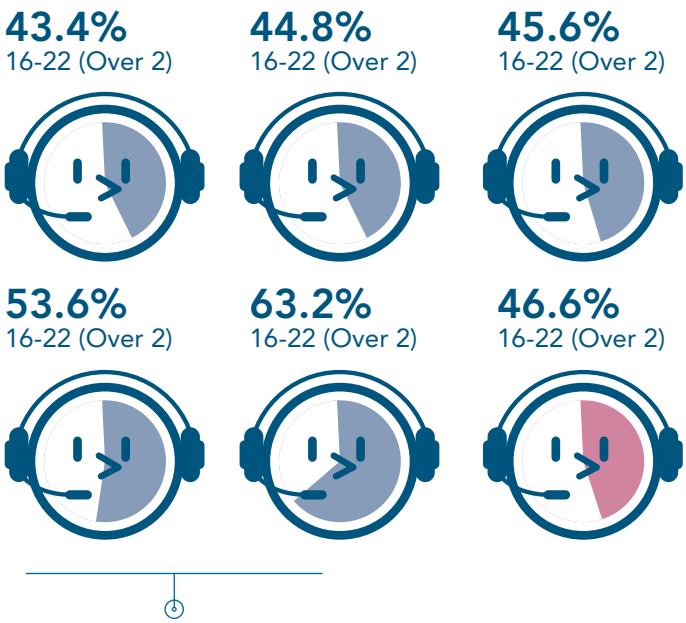


FIGURE 18 – ATTITUDE TOWARDS ARTIFICIAL INTELLIGENCE
What is your attitude towards the use of Artificial Intelligence in the provision of customer services ?

Source: ReMark

These confidence levels extend to the use of AI within the insurance sector. Just 28% of Japanese respondents said that they would be comfortable with AI-based insurance solutions. But in India, 78% of respondents said they would be open to them.

Why do we worry about this? It's important to understand consumer attitudes – what makes people feel safe, comfortable and willing to come on board. There is still some resistance to AI, but attitudes can often soften once people feel the benefits, such as faster response and 24/7 customer service.

Brand familiarity is another important factor. When asked how important brand reputation is when buying insurance, 44% of respondents rank it as very important, with a further 38% saying it is important. Just 4% showed no concern for brand reputation. So well-known brands can still depend on the advantage of their financial stability and reliability, which gives customers peace of mind.

Increasingly, however, they will have to compete with platforms like Alibaba in China – a member-based insurance scheme. People can sign on to Alibaba without paying any premium. If a member has a critical illness, the cost is shared,

but because it is divided among all members, the cost can be less than 1 cent each. Alibaba also has a jury that decides if a claim is legitimate. This is just one of the new items coming onto the scene and is a powerful example of how affordable protection can be. If a new brand positions itself well, it can be very powerful.

My point is that the insurance market is ripe for disruption. We need to be aware of this. With technology dismantling most of the barriers to entry, established insurers are finding themselves forced to share the marketplace with new providers who have little or no experience in the sector. This includes a wave of InsurTech start-ups targeting specific niches or delivering new types of propositions, as well as trusted non-insurance brands that are eyeing the insurance space with a view to trading in on the trust, they have built up with their customer base. Whether they can translate their brand loyalty into insurance sales remains to be seen. Nonetheless, while our surveys highlight this disruptive potential, it should be noted that the vast majority of customers said they would not feel comfortable purchasing from a company not associated with life insurance.

Another example of the new wave of customer products is WeChat, a travel platform we are working with in China to provide a seamless customer journey in a hassle free, one-click environment. On WeChat you can do everything – from getting travel info, to booking and insurance. You don't ever need to leave the environment. But when we get tested as to whether we can really deliver on our promises is when claims happen. We promise to settle most claims within 24 hours – most within an hour – and we're talking about four million customers per month. There is no way you can handle this sort of volume through a manual process. AI and algorithms allow us to do this, as well as to detect fraudulent claims. Expectations are very high – and we have the will to make it work.

Ours is a fascinating digital world – and it changes every second. It offers the insurance industry a great opportunity to align its purpose with the customer's. Creating the best consumer experience is the name of the game – and understanding consumer preferences and expectations is crucial to this.

INSURTECHS ARE USING DIGITAL INFRASTRUCTURE TO DELIVER THE PRODUCTS OF TOMORROW

ADRIAN JONES

Deputy CEO of P&C Partners in charge of Ventures & Strategic Partnerships, SCOR P&C

Adrian Jones, an American citizen, is a graduate of Columbia (MBA) and Wharton (BSEc).

He joined the insurance industry at Bain & Company, where he spent nine years as a consultant in the U.S. and Europe. From 2010 to 2016, he was Head of Strategy at RenaissanceRe Holdings Ltd, based in Bermuda. He founded SCOR P&C Ventures and is responsible for P&C InsurTech. He sits on three start-up Boards in three different countries.

He regularly writes and speaks about InsurTech and partnerships with incumbents, both internally within SCOR and externally

ARNAUD ALEPEE

Head of Data Science, Hokodo

Arnaud leads Data Science at Hokodo, an InsurTech pioneering the trade credit insurance market for SMEs, which has partnered with The Channel Syndicate.

Hokodo's Data Science team have designed and implemented an innovative architecture that allows them to build models rapidly and deploy them in a matter of clicks. Prior to Hokodo, Arnaud was a senior manager at KPMG, where his work enabled insurers such as AXA, Aviva and SwissRe to get the most out of their data with new solutions or advised them on how to meet regulatory requirements such as Solvency II or IFRS17.

ANDY MAHDAVI

Chief Data Officer, States Title

Andy has 15+ years bringing large datasets and scientific rigor to credit card lending, hyper real-time fraud detection, high-energy particle physics, and astrophysics. His research career began in the physical sciences, where he derived new results on galaxies, cosmology, and dark matter. The statistical techniques he utilized found a surprising application in financial services, where Andy, as Director of Data Science at Capital One Bank, created several transaction and application fraud models for credit cards. At States Title, Andy has led the deployment of the first title insurance model of its kind, which determines risk for title defects using proprietary algorithms inspired by his past experience in these diverse applications of statistics.

B.A., M.A., & Ph.D., Harvard University.

At the 2019 SCOR Annual Conference, Adrian Jones, Deputy CEO of SCOR P&C Partners, spoke with the heads of data science from two SCOR partners: Andy Mahdavi of States Title and Arnaud Alepee of Hokodo. States Title uses machine intelligence to make residential real estate closings simpler and more efficient. Hokodo makes insurance and financing available to millions of European SMEs who are not well-served by today's financial services industry.

Although the word InsurTech is barely five years old, InsurTech is as old as insurance. In 1867, a land surveyor named Daniel Sanborn started making highly detailed maps of every city and town in the US, which soon became a standard tool for insurance underwriting. The standard pricing policy included pulling out a Sanborn map book, finding an address, measuring the distance to a fire hydrant.

The basic concept is similar to how business is done today, 150 years later, and yet the way we do it is entirely different.

Every 20 years, a technology has greatly altered the way insurers operate. In the 1950s, it was the mainframe computer, which enabled large multi-line insurers to develop, operating big parts of an insurer on a single computer. The minicomputer came in the 1970s, with greater flexibility to enable specialist underwriters to flourish. The personal computer and spreadsheet in the 1990s enabled sophisticated risk modelling at one's fingertips, which was critical for catastrophe underwriting and risk management.

Today, a number of powerful technologies have come together around data infrastructure to allow the rise of InsurTech – cloud-based storage and processing, extensive new data sets, mobile, social, geospatial analytics.

SCOR forms partnerships with leaders in using new technology. We believe that these technologies will first be differentiators and soon become table stakes for successful insurers and reinsurers. As with previous waves, today's technologies will transform the industry, but more slowly than the hype would lead you to believe.

I asked Andy and Arnaud, to share how their firms are using data infrastructure.

ANDY MAHDAVI: WHAT IS YOUR FOCUS AT STATES TITLE?

States Title's goal is to make residential real estate closings vastly simpler and more efficient through the use of technology. The process of buying and selling a home in many parts of the US is coordinated by a title company. The title company is responsible for validating and insuring that the buyer has the rights to the property described in the deed, as described in the deed. Title defects range from unpaid tax bills to multiple parties claiming ownership of the same property.

In some European countries, a notary or government agency transfers title, guaranteeing a buyer a clean title or recourse if there are problems. In the US, property deeds and encumbrances are filed at county recorders' offices, who stamp the documents as having been presented for recording but do not validate their correctness. It's a "buyer beware" situation: the buyer must search the recorder's records to identify anyone with a prior claim on the property, and the buyer must immediately record their own ownership to avoid claims by others to own the land. Hence title companies.

Over the years, title has become a concentrated business in the US, with four companies controlling over 90% of it. They run at an incredibly low 4% loss ratio, but expense ratios are typically in the 80s or low 90s. These high expense ratios are the result of investing heavily in sales and operations that require costly, time-intensive, manual processes. To date, title companies have been focused on automation to increase human productivity. States Title is the first title company to apply machine intelligence to eliminate low-value-added human work and focus humans on the exceptions and difficult situations that require human intervention.

The real estate data infrastructure in the US has become quite robust over the past 20 years. High quality land records and transaction data are available in many jurisdictions. Our algorithm uses state-of-the-art machine learning techniques to ingest all the available property information starting with only an address.

From the data we ingest, we can directly observe many title defects and predict the risk of unidentified defects eventually affecting a property. We set a confidence threshold such that we instantly underwrite 80% or more of title refinance policies. The remaining 20% is sent to humans via traditional underwriting approaches, with the

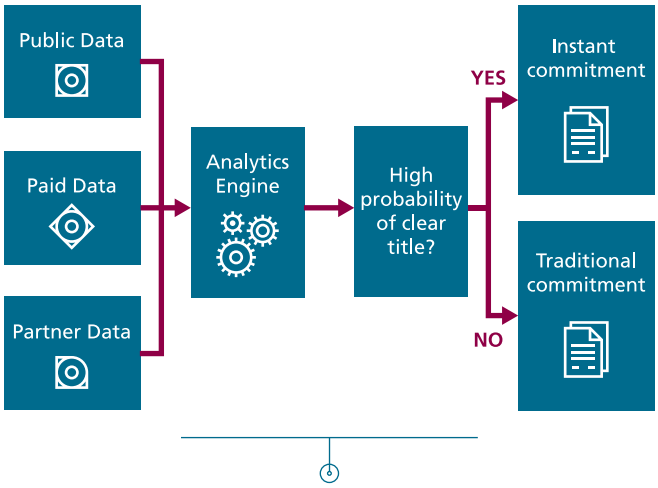


FIGURE 19 – DATA AND MODEL FLOW IN THE STATES TITLE INSTANT UNDERWRITING ALGORITHM

Source: States Title

machine having identified why it believes issues exit. Tests by our customers have shown that the model is highly robust at identifying title issues that require manual review or resolution.

Thus, we have a balanced approach. We use machine intelligence where machines perform well and deliver the best value to the customer. We use humans, informed by machines, where a machine cannot yet.

ARNAUD ALEPEE: WHAT IS THE ROLE OF MACHINE LEARNING AT HOKODO?

Our focus is single-invoice trade credit insurance. Studies show that in the UK, 30% of bankruptcies are caused by the nonpayment of an invoice. But traditionally, only large companies have had access to invoice insurance. We saw a need and a market for providing trade credit insurance to small businesses at the invoice level.

We saw three main challenges:

1. We needed to automate the underwriting process, since there was no way we could afford to review every invoice one by one.
2. We needed to price it in real time, which means assessing the risk of someone not paying an invoice.
3. We needed to distribute the high acquisition costs.

Application Programming Interface (API) provided the solution and is at the core of everything we do. Explained succinctly, an API is like a message protocol between systems or companies, like Uber using Google maps.

Basically, you need five pieces of information to insure an invoice:

1. Who is the client?
2. Who is the client dealing with?
3. What is the amount of the invoice?
4. What is the issue date?
5. What is the due date?

Machine learning gathers all this data. Then we push it into algorithms that map customers and give us the risk probability. Machine learning and digital products allow us to feed the results back to the user in real time to let them know if their invoices are protected. In this process, partnership is fundamental. I benefit from my partners' customer base and I offer them my API.

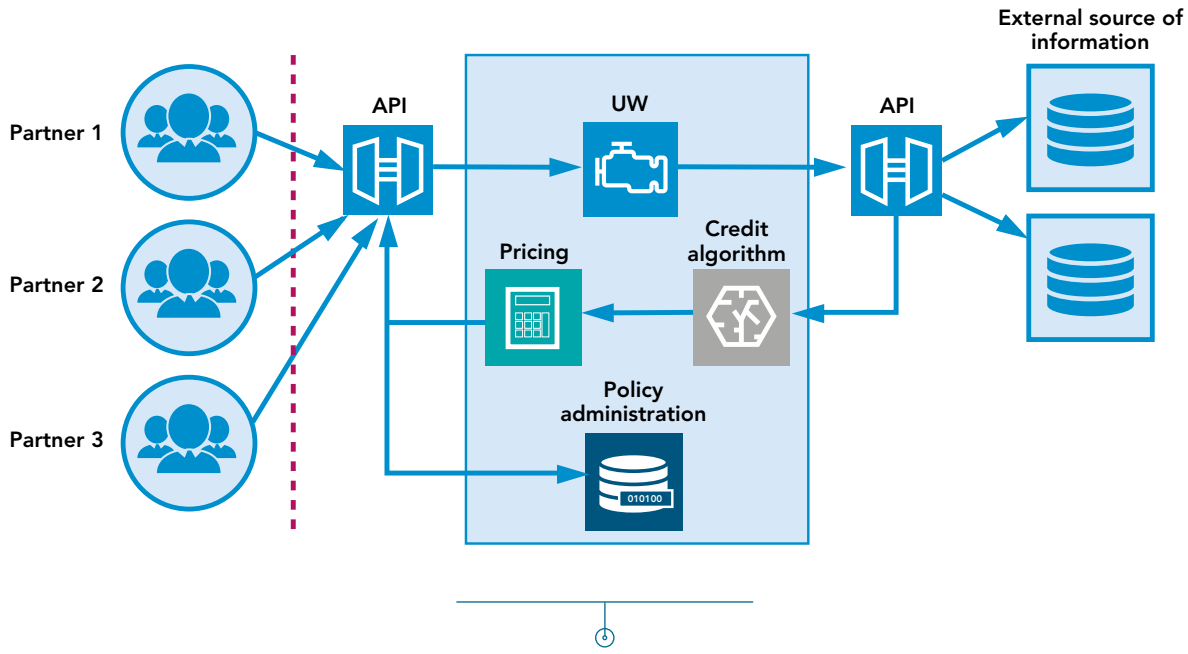


FIGURE 20 – SCALE DISTRIBUTION BY INTEGRATINGTHE SOLUTION WITH PARTNERS

Source: Hokodo

At SCOR we are building the insurers (and reinsurers) of tomorrow. We provide our risk capacity, our expertise, and sometimes investments. Ultimately, we believe that leveraging the emerging data infrastructure will make the insurance industry itself better able to serve its purpose of efficiently protecting people, businesses, and governments from losses.

REINSURANCE TOOLS TO SUPPORT THE RESILIENCE OF ECONOMIES AND COMMUNITIES

VINCENT FOUCART

- Deputy CEO of P&C Partners in charge of Alternative Solutions & Technical Development, SCOR P&C

Vincent Foucart is a graduate of ENSTA (École Nationale Supérieure de Techniques Avancées), HEC (École des Hautes Études Commerciales) and CHEA (Centre des Hautes Études de l'Assurance). He is also a Certified Financial Analyst and Actuary. He began his career at Société Générale in Asia, before joining the Allianz group in 2001 as an Investor Relations Officer. In addition to his functions he took on the management of the AGF Chairman's Office, adding the management of the long-term investments portfolio in 2006.

In 2007, he became Managing Director of the asset management company Tocqueville Finance. He joined SCOR in 2009 as Manager of the Chairman's Office, before taking on the role of Group General Secretary. More recently, he contributed to the development of ILS Strategies for SCOR and in May 2014 took over the Alternative Solutions Specialty Line, acting as CUO. Since 2018, he has been a SCOR SE Board Member representing the Group's employees. He was appointed Deputy CEO of P&C Partners, in charge of Alternative Solutions & Technical Development in September 2018.

ERIC LE MERCIER

Chief Underwriting Officer Alternative Solutions, SCOR P&C

Chief Underwriting Officer of Alternative Solutions since 2019, Eric joined SCOR in 2015, initially as Deputy Chief Underwriting Officer of the unit. With more than 20 years of experience in finance and (re)insurance, including 8 years focusing on "ART" solutions at Allianz, he has gained considerable experience in the various aspects of alternative risk transfer techniques. He has particular expertise in solutions designed for capital relief and the reduction of earnings volatility.

Vincent Foucart and Eric Le Mercier discussed the role of reinsurance in helping to build resilience in economies and communities around the world. They looked at the "insurance protection gap" – the difference between economic losses in disaster-stricken countries, and what is effectively covered by insurance. And they examined ways of helping to bridge this gap.

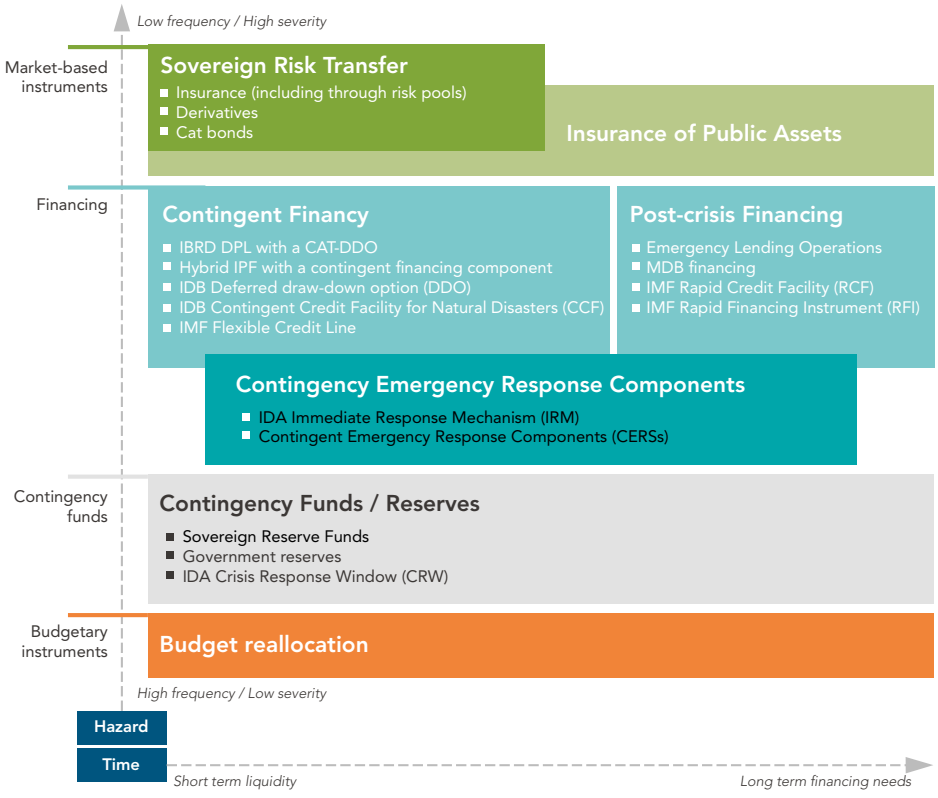
WHAT IS RESILIENCE?

It is the capacity to absorb and recover from shocks or stress, while maintaining essential functions. Natural disasters have the potential to undo years of development by destroying both human and physical capital across multiple channels. In some countries, the impact of the losses on the local economy are more severe than in others. Yet even when there are schemes in place to anticipate natural catastrophes, the impact can be huge – sometimes more than 10% of GDP.

Conscious of the increased risks generated by combined human activities and natural disasters, United Nations (UN) members have formulated the Sendai Framework for Disaster Risk Reduction and Strengthened Resilience. The Framework has concrete priorities for action and one of its guiding principles is that responsibility for building resilience and supporting recovery must be shared by public authorities and the private sector. This is the first time this important shared responsibility has been clearly affirmed.

Unfortunately, most risk management kicks in after the fact – after disaster has hit. The lack of preparatory disaster risk management seriously limits resilience and makes it harder to bounce back. Once the catastrophe has happened, most countries focus on the fiscal response – usually by reallocating budget and increasing taxes. This, in turn, creates an increased burden, which in countries affected by severe shocks is usually more detrimental to recovery than beneficial.

The key is to move from *"ex post"* to *"ex ante"* disaster risk management, layering different types of mechanisms that combine risk retention, risk transfer and risk financing.



Note: IBRD = International Bank for Reconstruction and Development - DPF = Development Policy Financing
IMF = International Monetary Fund - MDB = Multilateral Development Bank - IDA = International Development Association

FIGURE 21 – DISASTER RISK LAYERING FRAMEWORK

Source: World Bank Group/DRFIP

Another key action is to bridge the insurance protection gap: the difference between the economic losses in a country hit by disaster and what is effectively covered by insurance. In vulnerable countries, this gap can be huge and over the past 20 years, protection gaps have tended to grow.

Insurance penetration varies by economic sector as well as by country. Regulatory and behavioral patterns, as well as the frequency of natural catastrophes, are also important. Yet even in developed countries like the US and Japan, the largest economic losses stemming from natural catastrophes are unevenly covered. Take the example of hurricane Katrina, where only 52% was covered.

Reinsurers are in a unique position to help protect societies and the economy. They can facilitate comprehension, mitigation and protection thanks to:

- their extensive expertise in data analysis, risk modelling and risk transfer solutions
- their shock-absorbing capability
- their fundamental function of pooling risks to optimize diversification benefits.

Public authorities' broad set of missions also make them key partners, and state-backed financial institutions are particularly relevant players. Reinsurers can cooperate with public authorities on multiple fronts, for example through climate and infrastructure finance.

But no one can go it alone. Pooling risk is key. Addressing the growing frequency and severity of disasters requires the combined efforts of governments and the private sector in the form of strong and innovative public-private partnerships.

Protecting the welfare of citizens and communities is an integral part of the reinsurance industry's corporate mission. SCOR is committed to helping to close the insurance gap and has put together several teams to help do so. One of the challenges they face is to grow the sphere of insurable risks. Changes in the macro-economic environment, technology, and data are contributing to growing this sphere.

This is the focus of SGPC'underwriting teams. Working with countries, multilateral lending institutions, bilateral development agencies, export credit agencies and domestic and regional finance institutions, we are finding numerous ways and approaches to bridge the protection gap and build resilience where it is most needed.

FACING THE CHANGING RISK UNIVERSE

DANIEL THEBEN
Chief Risk Officer, SCOR P&C

Daniel joined SCOR in 2010 as Internal Control Manager, and leader of the Group-wide internal control system project. He was appointed Chief Risk Officer of SCOR P&C in 2014. Daniel has more than 20 years of experience in the (re)insurance industry across various functions, including audit, internal control and risk management. He holds a degree in Business Law from the Rhenish University of Applied Sciences (Cologne, Germany) and is a Certified Public Accountant of the Swiss Institute of Certified Accountants and Tax Consultants.

HENRY BOVY
P&C Accumulation Property Lead,
SCOR P&C

Henry is Accumulation Property Lead at SCOR P&C. He has work within SCOR since 2009 in the cat modelling team as Regional Manager, Head of Cat Underwriting Analytics and Cat Aggregation for the provision of the internal model. He has been working in the catastrophic area since 2000 with EQECAT (developing models like Eurowind or Euroflood),
AXA Re/Paris Re (cat modelling for branch offices in Montréal, Miami and Singapore) and AonBenfield prior to joining SCOR P&C. Henry holds a Master in Physics from the EPFL.

WHAT DOES THE EXPANDING RISK UNIVERSE MEAN FOR THE (RE)INSURANCE INDUSTRY?

The challenge for insurers is to manage the downsides of existing and new emerging risk while seizing opportunities to provide new solutions and support for their clients. This requires (re)insurers to pro-actively identify, assess emerging risks and capture new risks in their risk models, once relevant for their risk profile.

The risk universe is expanding and evolving. It is increasingly challenging to understand this universe, and to respond to it. Yet as insurers and reinsurers, one needs to keep an eye out for the unexpected. A growing number of emerging risks may not even be on the radar screens yet, especially since many of these risks are systemic and tend to be "slow burners".

FIGURE 22 – THE RISK UNIVERSE IS EXPANDING

Source: SCOR

There are various definitions of risk. Within SCOR, risks are considered as emerging, if the following characteristics are met:

- They present a very high degree of uncertainty.
- They are difficult to quantify, to assess in terms of frequency and severity, and to anticipate in terms of potential future consequences.

This includes not only new threats, but also at those that are known, but are rapidly developing.

SCOR's approach is to consider a wide range of emerging risks. One starting point is to look at the linkages between risks and trends. Evolving health trends, changing demographics, shifting social and geopolitical landscapes, emerging technologies, hyper-connectivity, new business and finance models, global climate change and deterioration of the environment will all have associated one or multiple emerging risks. In addition, emerging risks and trends don't operate in isolation; each one is connected to many other factors and phenomena.

Emerging risks can have myriad and diverse impacts on the (re)insurance industry. As an example, climate change – a risk that is at the top of everyone's thoughts. Climate change can, of course, lead to more frequent property claims related to natural catastrophes, challenges future business profitability. On the casualty side, it has the potential to increase risk of litigations against companies because of their contributions to carbon emissions and to increase health and healthcare costs, with potential impacts on workers compensation lines.

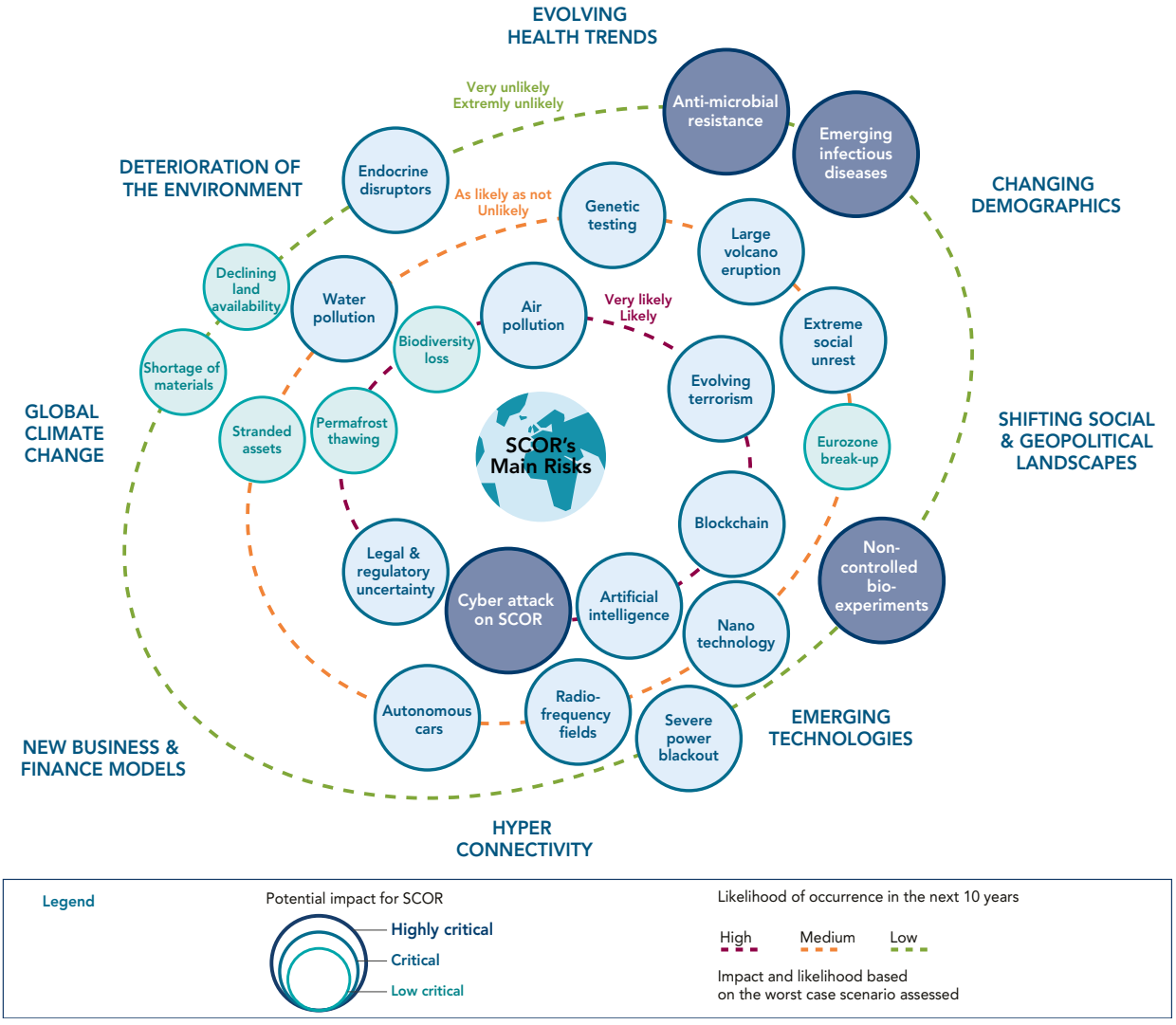


FIGURE 23 – SCOR'S EMERGING RISKS RADAR

Source: SCOR

In terms of life insurance, one needs to consider things like the impact of heat waves on mortality or chronic conditions, or the changing patterns of disease occurrence resulting from the migration of disease vectors such as mosquitos.

At the same time, emerging risks provide raw material for new (re)insurance solutions. For example, as the frequency and severity of cyber threats evolve, cyber is becoming one of the biggest areas of opportunity in terms of increasing demand for insurance solutions. The gaps in our understanding of these risks, however, result in huge challenges around loss-estimation and risk-pricing. A model is a tool that needs to be fed with a considerable amount of data (on frequency, etc.) in order to provide useful insights for assessing risks, and the industry is still far from capturing the data needed on new risks like cyber.

(Re)insurance of autonomous cars is another example. There is potential for decreasing claims and therefore increasing profitability thanks to a reduced frequency in accidents. Yet at the same time, there is the possibility of larger claims resulting from system failures, as well as the difficulty in assigning fault in the case of an accident.

How do we handle this expanding risk universe at SCOR? We have an emerging risks process that is open to all colleagues through an internal collaborative website. Staff are encouraged to add new risks as they hear about them or are exposed to them in the course of their daily lives. From this database, SCOR specialists select those topics they feel have the greatest potential impact – both in terms of risk and of opportunity. Then risk assessments are performed – from an underwriting risk angle as well as from an operational and reputational risk perspective – including first quantification on a scenario basis. These assessments are reviewed and discussed by a multidisciplinary expert group through quarterly meetings. From this process, the risks with the most significant potential impacts are regularly reported to management in order to aid developing mitigation strategies and new business cases.

SCOR's communications department also contributes to this process, with an ongoing news search on subjects that could impact the (re)insurance industry, using key words related to emerging risks such as climate change, pandemic or glyphosate. New keywords are added as "hot topics" emerge.

Once emerging risks are identified, an ongoing monitoring and a dedicated risk mapping process ensure material risks are captured within SCOR's risk models. The modelling approach consists of three phases:

- understanding the exposure (insureds, notional exposures);
- understanding the risk through more realistic scenarios (probable maximum loss);
- modelling of many scenarios (full stochastic model).

Given the potential downside and the importance for developing new risk solutions, emerging risks are a key component of strategic decision making at SCOR.

Integrating Scenarios and Modelling risks (known or emerging) in decision making process requires that several steps are considered:

- Understanding the exposure of cedants (with emerging risks, exposure is often not systematically collected and/or made available to reinsurer in a systematic organized way) by adding context on that exposure: across peer's, over time and in relation with the overall market.
- Scenarios and Modelling is a result of a set of assumptions. It is far not enough to just operate a model (especially an external one). It is much more important to build the adequate knowledge around those assumptions and understand how they drive the evaluation/quantification of that emerging risks.
- Building that knowledge helps to validate the model, understand sensitivities in the potential outcome and enable to better foresee impact on the evolution of that emerging risk.

Therefore, what is key within an organization that faces emerging risk is not only to rush into modelling, but as well build a space by which the knowledge of that evolving risk can be tested, query and diagnosticated in order to have better support the decision making.

ENVIRONMENTAL, SOCIAL AND GOVERNANCE FACTORS IN THE INSURANCE SECTOR

OLIVIER PERRAUT
Chief Underwriting Officer,
Specialty Insurance – SCOR P&C

Olivier is an engineering graduate of the Ecole Centrale Paris. He started his career with Technip (Oil and Gas contractor) as a Process Engineer, then successively became a Startup

Engineer and Project Engineer. After joining SCOR's Energy department in Paris, he spent 7 years in Singapore as Deputy then Regional Manager for Business Solutions.

Then, he became Chief Underwriting Officer in charge of the Oil & Gas, Power, Mining and Shipbuilding sectors, globally and across Property and Casualty lines, heading a team of underwriters located in Paris, London, New York, Toronto, Rio and Singapore.

He has been Chief Underwriting Officer with SCOR P&C – Specialty Insurance since May 2018.

LYDIA SANDNER
Senior Associate, ESG Ratings and
Regulatory Affairs, ISS ESG

Lydia Sandner has a background in International Relations (BA) as well as International Trade Law and Economics (MA), which she studied in the UK, Sweden and Switzerland.

She joined ISS ESG, then Oekom research, in 2011 as an ESG analyst. For several years, Lydia has been the sector specialist responsible for the insurance sector, and the in-house expert on corporate sustainability reporting. She also heads the regulatory affairs team working on sustainable finance regulation.

Olivier Perraut and Lydia Sandner of ISS ESG explored the value of a company seen as closely tied to its relationship with its stakeholders and society and the ways in which this can be concretely assessed.

ESG: HELPING COMPANIES HELP SOCIETY

What is the purpose of companies? This is a question that is increasingly asked today. If law is justice as medecine is to health, then business is to what? Growth? Wealth? Wellbeing?

Public expectations in this respect are evolving. According to Fortune magazine, today 64% of Americans believe that a company's primary purpose should be to "make the world better." Experts like Paul Collier are questioning the future of capitalism…and he is not alone. Industry leaders themselves are assessing the relationship of business to society.

Jamie Dimon, CEO of JP Morgan Chase and Chair of the business roundtable, spearhead the effort to reevaluate the BRT's statement of purpose. The resulting revision, he says, **"is an acknowledgement that business can do more to help the average american."**

People are asking fundamental questions about how well capitalism is serving society.
- Ginni Rometty, CEO, IBM

Society gives each of us a license to operate. It's a question of whether society trusts you or not.
- Alex Gorsky, CEO, Johnson & Johnson

FIGURE 24 – BUSINESS LEADERS' QUOTES

Source: Quotes from Fortune.com – America's CEOs Seek a New Purpose for the Corporation by Alan Murray (August 19, 2019)

At the 2019 Business Roundtable, Chiefs Executive Officers of America's leading companies issued a Statement on the Purpose of a Corporation. While recognizing the primacy of corporate purpose, they highlighted a company's fundamental commitment to stakeholders, including customers, employees, suppliers and the communities in which businesses work. The reason is simple – they recognize that the future value of their companies depends on delivering value to their stakeholders.

How can insurers and reinsurers contribute? By making wise choices as to who they work with.

At the 2019 SCOR Annual Conference, Lydia Sandner of ISS ESG led a rich and stimulating conversation around ESG (Environmental, Social and Corporate Governance) and the issues it brings into play. ISS ESG rates companies on their ESG performance, helping insurers to pick and choose their partners according to their own corporate values and commitments.

WHAT ARE SOME OF THE FACTORS ISS ESG CONSIDERS WHEN THEY EVALUATE A COMPANY?

Our goal is to provide an independent evaluation of the social, governance and environmental performance of corporates across all sectors. We are not paid by the companies we rate. The coverage of our universe of rated companies is based on relevant stock indices and currently consists of around 9000 issuers. As part of our rating process and on top of using publicly available information, we invite the rated entities to provide additional information to help us assess the impact of their activities.

We base our criteria on international standards such as the Universal Declaration of Human Rights, the ILO Declaration on Fundamental Principles and Rights at Work, the United Nations Global Compact, industry standards, ISO certification and others. In some cases, we also take national legal labor standards into consideration. Aside from corporate ratings, we also offer country ratings – for sovereign bonds – and provide the data to investors.

In the ESG assessment of the insurance sector, there are five key issue areas:

- the company's internal operations, including employee relations
- climate change including the impact in the value chain
- the company's relation with its customers, including activities related to low-income customers and regions, and to high-risk groups
- asset management, including socially responsible investment and controversial investments
- insurance underwriting, including green insurance products, green claims management, contribution to the achievement of the SDGs (Sustainable Development Goals) and controversial underwriting

The SDGs provide an important framework for our assessments of corporates. For the insurance industry, opportunities to make a positive contribution include:

- **SDG 1 – No Poverty:** Insurance products for high-risk groups and low-income customers and regions:
  - › microinsurance;
  - › index insurance related to drought and rainfall;
  - › catastrophe pools; alternative risk transfer (CAT bonds).
- **SDG 3 – Good Health and Wellbeing:** insurance for people with pre-existing conditions or disabilities, as well as for elderly customers; micro health insurance.
- **SDG 7 – Affordable and Clean Energy and SDG 13 – Climate Action:**
  - › green insurance products, (e.g. lower premiums for hybrid or electric cars, eco-efficient buildings, certified appliances and machinery, or companies with environmental management systems);
  - › green claims management (for example repair instead of replacement, use of environmentally friendly and/or recycled materials, use of eco-labelled appliances or machinery, and rebuilding to green standards).

Aside from these opportunities, we look carefully at controversial practices and the recurrence of claims for these practices. This can include selling unnecessary or unsuitable products, overcharging, in-admissive contractual clauses, and lack of or insufficient pay-out when a claim is made.

Health
- Opioids producers and distributers
- Tobacco, drugs, e-cigarettes producers and distributers
- Animal testing

Environmental impact
- Large footprint operations and construction projects (e.g. Dams, mining)
- Oil & gas production and treatment, with special attention to arctic operations and oil sands extraction
- Coal extraction and use
- Energy intensive industries
- Palm oil production

Human rights
- Forced labour, child labour (construction projects, garment industry)
- Military grade weapons production

FIGURE 25 – UN 17 SUSTAINABLE DEVELOPMENT GOALS / SENSITIVE TOPICS

Source: SCOR

RESPONSIBLE TREATMENT OF CUSTOMERS IS HIGH ON OUR LIST

For example:

- Is the marketing material regarding costs and conditions comprehensive, accurate, not misleading, and easily understandable?
- Does the company ensure responsible sales practices by not incentivizing quantity over quality (in terms of commission and targets) and by conducting training and monitoring?
- Is claims management easy and fair?
- Are there internal reviews and independent ombudspersons?

ON THE RISK SIDE, WE LOOK AT THE UNDERWRITING PROCESS AND ASK OURSELVES:

- Does the company conduct client risk and impact analysis?
- Does it exclude activities such as controversial weapons, tobacco, coal, fracking and arctic drilling?
- Do the contractual clauses comply with human and labor rights, as well as health and safety management standards?
- Are there requirements in terms of environmental management and climate change strategies (emission intensities, risk exposure, scenario analysis, reduction targets, action plans) and biodiversity strategies?
- Does the company support engagement and awareness-raising with clients?
- Does it undertake monitoring and request improvement plans?

An insurer has a choice as to who they will work with. Overall, the insurers are increasing scrutiny and implementing restrictive policies when it comes to coal, tobacco, and certain types of weapons production.

WHAT MOTIVATES COMPANIES TO PERFORM WELL IN OUR RATINGS?

- **Reputation:** Customer demands and expectations can drive decisions at the corporate level as to who is acceptable as a business partner. Companies prefer to avoid putting their reputation at risk through involvement with controversial business partners.
- **Good business:** ESG makes good business sense. Good ESG risk management and taking opportunities like those mentioned above reduce risk and enhance future prospects for prosperity. Better long-term investment choices mean better performance.
- **Good corporate citizens:** Enlightened companies are more aware of their responsibilities as citizens. As an employer, this contributes to attracting and retaining talent from a pool of well-qualified professionals who are increasingly looking for purpose.

SCOR'S COMMITMENT

SCOR's commitment to Corporate Social Responsibility (CSR) is strong. In 2012, we adhered to the Principles for Sustainable Insurance and we belong to the United Nations Global Compact. In deciding who we want to support, our underwriting guidelines are clear: we are sensitive to issues in the areas of health, environmental impact and human rights. At the same time, we work to increase our clients' awareness of environmental risks, encouraging them to develop a sustainable approach.

We are tracking our evolution over time – after all, "what gets measured gets managed" we are pleased to partner with companies like ISS ESG to challenge and help us improve our approach.

PSI Principles for Sustainable Insurance

PRINCIPLE 1
We will embed in our decision-making environmental, social and governance issues relevant to our insurance business.

PRINCIPLE 2
We will work together with our clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions

PRINCIPLE 3
We will work together with governments, regulators and other key stakeholders to promote widespread action across society on environmental, social and governance issues.

PRINCIPLE 4
We will demonstrate accountability and transparency in regularly disclosing publicly our progress in implementing the principles

- SCOR signed in 2012 the Principles for Sustainable Insurance
  With this founding support of the PSI, SCOR is strengthening its commitment to sustainable development, which the Group began in 2003 when it joined the United Nations Global Compact.
- SCOR made several public and concrete commitments, both on the assets side (SCOR Global Investments) as on the liability side (SCOR Global P&C – Underwriting)
- Extract from our underwriting guidelines:
  In addition to profitability and respect of laws and regulation, we aim at being responsible underwriters and favor clients in each sector of activity, who go beyond the legal requirements in terms of human rights, environmental protection and energy transition.

FIGURE 26 – SCOR'S COMMITMENT

Source: SCOR

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