

FOCUS

#25 – February 2019

COMBINING SCIENCE & TECHNOLOGY TO ENHANCE INSURABILITY AND SPUR INNOVATION



CONTENTS

- 6 ____ TECHNOLOGY, INSURANCE AND INSURABILITY
Denis Kessler, Chairman and CEO, SCOR SE
- 11 ____ A SOUTH AFRICAN INITIATIVE ON THE PRINCIPLES
FOR SUSTAINABLE INSURANCE (PSI) WITH THE UNITED NATIONS
Ian Kirk, CEO, Sanlam
- 17 ____ EXTENDING INSURANCE COVERAGE TO
AN ADDITIONAL 400 MILLION PEOPLE BY 2020
Joan Lamm-Tennant, PhD, Chief Executive Officer and Founder, Blue Marble Micro, Limited
- 20 ____ DEFINING RISK FINANCE IN DEVELOPING COUNTRIES:
(RE-)DEFINING THE ROLE OF THE PRIVATE SECTOR
Olivier Mahul, Global Lead, Disaster Risk Finance, and Programme Manager, Disaster Risk
Financing and Insurance Programme, World Bank
- 27 ____ FLOOD INSURANCE IN THE US: BUILDING POLITICAL
COALITIONS TO EXPAND PRIVATE MARKETS
Ray J. Lehmann, Director, Finance, Insurance & Trade Policy, R Street Institute
- 29 ____ LEARNING FROM SUCCESSFUL PARTNERING APPROACHES
FROM OTHER INDUSTRIES
Nicolas Colin, Co-founder and Director of The Family
- 32 ____ OASIS LOSS MODELLING FRAMEWORK:
WHERE ARE WE ON THIS OPEN SOURCE INITIATIVE?
Paul Nunn, Head of Catastrophe Risk Modelling – SCOR Global P&C
- 34 ____ B3I, THE BLOCKCHAIN INSURANCE INDUSTRY INITIATIVE:
COMING NEAR YOU SOON
Paul Meeusen, CEO, B3i
- 37 ____ INDIAN EXAMPLES ON HOW TECHNOLOGY CAN SUPPORT
SMES AND AGRICULTURE'S INSURANCE MARKETS
Anuj Tyagi, Executive Director & Chief Distribution Officer, HDFC ERGO

Please turn the page →

CONTENTS

- 41 _____ NEW TECHNOLOGY APPLIED TO ENHANCE PRODUCT OFFERING AND INSURANCE SERVICES TO AGRICULTURE:
CONCRETE EXAMPLES
Michael Rüegger, Deputy CUO Agriculture, SCOR Global P&C
Fanny Rosset, Senior Underwriter Agriculture, SCOR Global P&C
- 43 _____ PRODUCT DEVELOPMENT IN LIFE (RE)INSURANCE -
INNOVATIONS WHICH SAVE LIVES
Barthélémy Philippe, Head of Health Assessment and Improvement, SCOR Global Life
- 45 _____ HOW PARAMETRIC (RE)INSURANCE CAN SUPPORT
THE DEVELOPMENT OF INSURABILITY
Vincent Foucart, Deputy CEO P&C Partners, in charge of Alternative Solutions & Technical Development, SCOR Global P&C
- 50 _____ CATASTROPHIC CLAIMS HANDLING AND
HOW TO WORK COLLECTIVELY
Jonathan Clark, Global Head of Business Solutions Claims, SCOR Global P&C
- 52 _____ CLOSING REMARKS:
THE FEDERATING ROLE OF RE/INSURERS
Victor Peignet, CEO, SCOR Global P&C

The views and statements expressed in this publication are the sole responsibility of the authors.



TECHNOLOGY, INSURANCE AND INSURABILITY



DENIS KESSLER
Chairman and CEO, SCOR SE

Denis Kessler is a graduate of HEC business school (Ecole des Hautes Etudes 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.

SCIENCE AND TECHNOLOGY DRIVE THE EXPANSION OF THE RISK UNIVERSE AND REQUIRE US TO GROW THE SPHERE OF INSURABILITY

SCIENTIFIC PROGRESS AND TECHNOLOGICAL DEVELOPMENTS LIE AT THE HEART OF THE EXPANSION AND TRANSFORMATION OF THE RISK UNIVERSE

The (re)insurance industry is confronted with a risk universe that is not only continuously expanding, but also constantly changing and becoming intrinsically more complex. While traditional risks remain, new risks constantly materialize and mutate.

The development of new technologies and scientific research are the key factors driving the expansion and transformation of the risk universe. Hence, as illustrated in Figure 1, a large proportion of emerging risks are directly related to scientific progress and technological developments: digitization, 3D printing, Artificial Intelligence (AI), nanotechnology, blockchain etc. These technologies were all intended to solve specific issues, however their development created new "intrinsic" risks.

For instance, the increased usage of AI has raised numerous questions, accurately embodied by the development of the autonomous car. Who is to blame in the event of an accident caused by an autonomous car: the user, the manufacturer or the creator of the algorithm? What will be the impact of AI on human life and biometric risks? and so on. Historically, humanity has succeeded in conciliating the development of technologies for the progress of mankind and economy with the development of solutions for technology-related risks.

As they have evolved, risks have become increasingly interdependent, less and less circumscribed in time and space and increasingly serial and global. For instance, what was known as "cyber risk" ten years ago does not designate the reality of that risk as it is known today. Cyber risks no longer constitute a national threat but have expanded to a global level. This marks the first instance in history where risk is not geographically fixed.

The acceleration of scientific progress and technological innovation explains why risks expand, change in nature and in form, in a manner that is far more accelerated and complex than in the past. The sector is in the middle of a burgeoning and prolific time of technological development. It is worth remembering, though, that the perceived acceleration of technological change is not new - this notion was already accurately depicted by the architect Daniel Burnham at the beginning of the 20th century.

The progress that is generated today suggests that technological development will continue to accelerate and fuel even faster and more profound change in the future (see Figure 2).

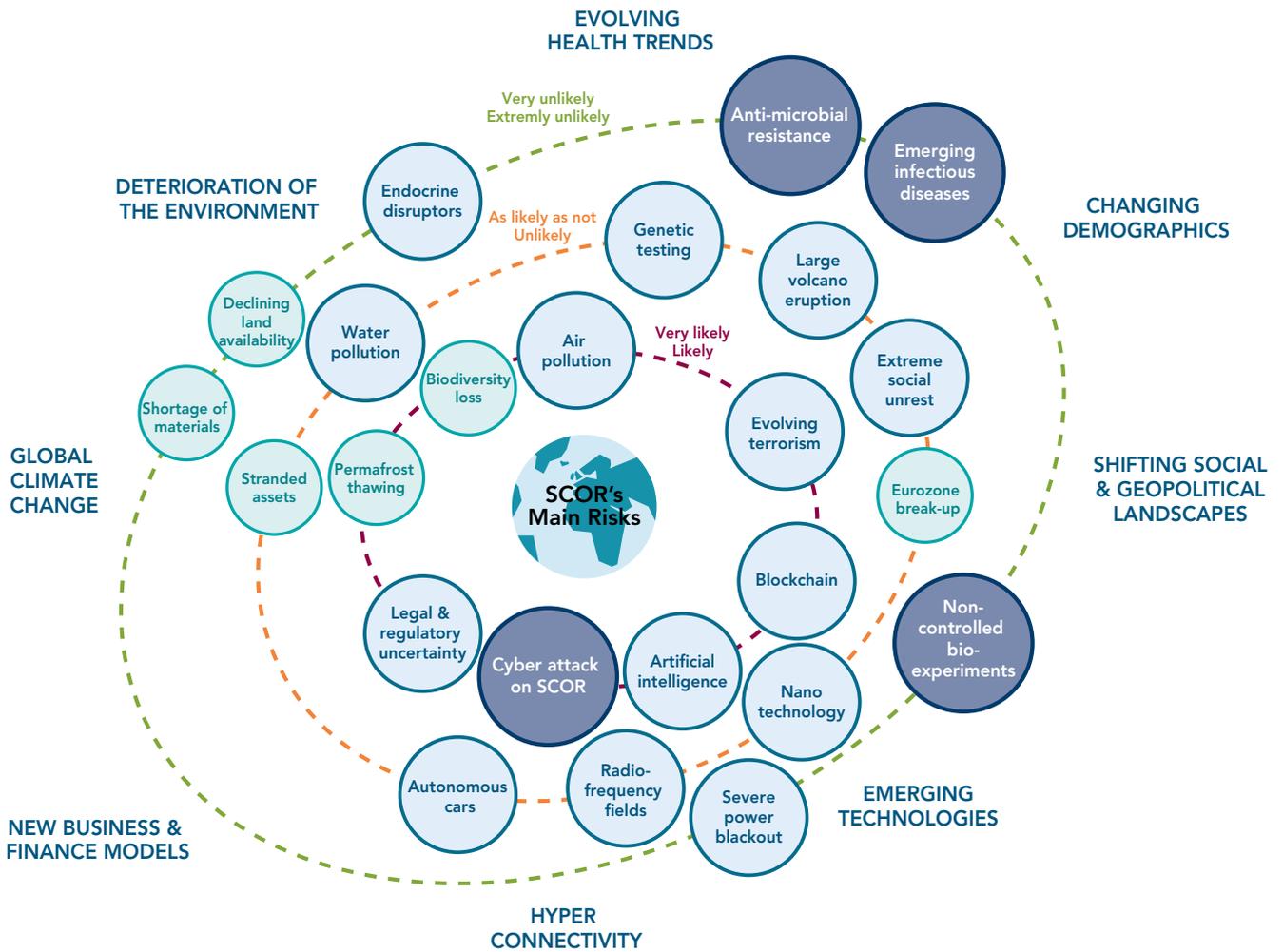


FIGURE 1 - SCOR'S EMERGING RISKS RADAR

Source: SCOR

"it is not merely in the number, facts or sorts of knowledge that progress lies, it is still more in the geometric ratio of sophistication, [...] the geometric widening of the sphere of knowledge [...] every year is taking in a larger percentage of people as time goes on [...] a mighty change having come about in fifty years, and our pace of development having immensely accelerated, our sons and grandsons are going to demand and get results that would stagger us"

Daniel Burnham, 1910 Town Planning Conference of London

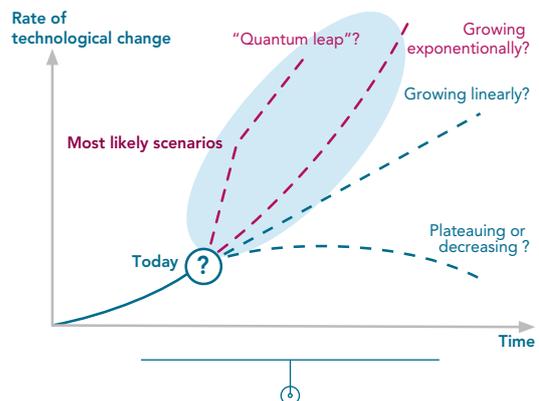


FIGURE 2 - EVOLUTION OF THE RATE OF TECHNOLOGICAL CHANGE

Source: SCOR



THE SPHERE OF INSURABILITY IS GROWING

With the expansion of the risk universe, the subset of insurable risks is also growing.

A few conditions are required for a risk to be optimally insurable, most notably the implementation by the insureds of active prevention and precaution measures, and the availability of data, measurement, modelling and analyses of aggregations for the considered risk. If these conditions are not fully met, the situation is suboptimal: supply of insurance coverage can only be structurally lower than demand. In other words, (re)insurance is not available, limited and/or too expensive, with restrictive conditions.

Historically, all emerging risks linked to new technologies have become insurable. As the knowledge and management of the risk progressively increase over time, the supply of coverage and hence insurability expand. As shown in Figure 3, the sphere of insurability is increasing, while the sphere of uninsurable risks is narrowing, resulting in a positive shift of the insurability frontier. In particular, all emerging risks linked to new technologies (e.g. aviation, satellites...) have progressively become insurable.



FIGURE 3 - INSURED, INSURABLE AND UNINSURABLE RISKS

Source: SCOR

SCIENCE AND TECHNOLOGY MAY SIGNIFICANTLY TRANSFORM THE PRODUCTION FUNCTION OF (RE) INSURANCE

The rise of new technologies, such as Artificial Intelligence, blockchain, robotic process automation and augmented underwriting, will significantly impact how insurers and (re)insurers conduct business operations and hence transform their production function. All of the listed technologies will enable:

- ♦ an increased efficiency all along the insurance risk-to-capital chain: from risk modelling, product innovation, distribution, customer experience and underwriting to claims processing;
- ♦ a reduction of the running costs of insurers and (re)insurers, increasing affordability of coverage, boosting demand and contributing to the increase of (re)insurance penetration.

Technologies will result, everything else being equal, in a positive shift of the (re)insurance industry's efficiency frontier (Figure 4). In other words: we will produce more with less!

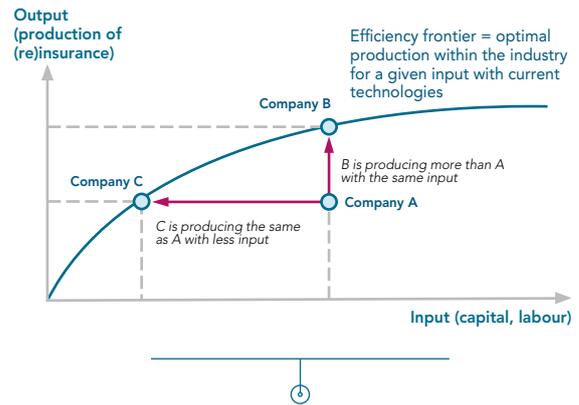


FIGURE 4 - THE INSURANCE EFFICIENCY FRONTIER (ILLUSTRATIVE)

Source: SCOR

The efficiency frontier describes the optimal production that companies can achieve for a given level of input (labour and capital).



One may distinguish between two main scenarios:

1. In the first scenario depicted by Figure 5, technological developments will progressively be embedded in the operations of all market participants. As all the actors integrate the new technology, the sector as a whole will increase its productivity. In this scenario, the process is progressive, and the efficiency frontier shifts gradually, as the technology is diffused into the sector. Companies need to integrate the new technology or risk the redistribution of market positions. Adaptability and timely investment in technology are key factors of competitive positioning.

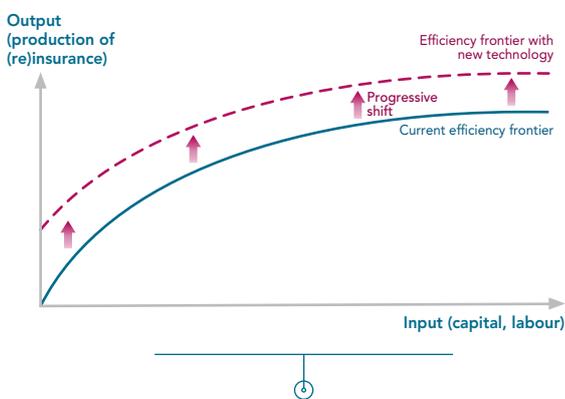


FIGURE 5 - SCENARIO OF A GRADUAL SHIFT OF THE EFFICIENCY FRONTIER (TECHNOLOGICAL "DIFFUSION")

Source: SCOR

2. In the second scenario illustrated by Figure 6, the technological development is not gradual - instead the market is faced with a brutal technological disruption. The sector is shaken by a newcomer, often from outside the industry, who penetrates the market by mastering the new technology. This outsider is not encumbered with the legacy and transitional issues that market competitors must face, such as workforce training and previous technology that has not been fully amortized. As a result of this disruption, the efficiency frontier is suddenly and profoundly transformed, rendering the production functions of incumbent companies obsolete. Incumbents confronted with this contestability have a huge transition cost to reach the (new) efficiency frontier.

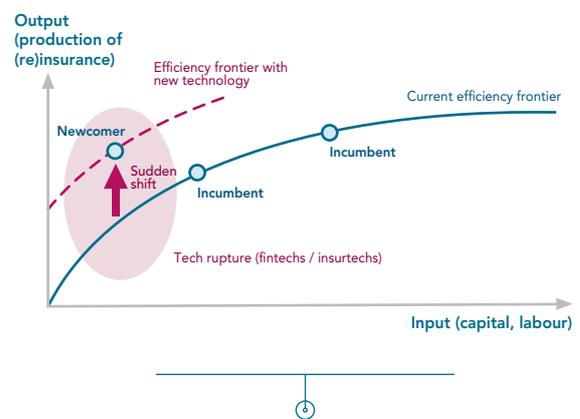


FIGURE 6 - SCENARIO OF A SUDDEN AND PROFOUND SHIFT OF THE EFFICIENCY FRONTIER (TECHNOLOGICAL "CONTESTABILITY")

Source: SCOR

SCIENCE AND TECHNOLOGY WILL TRANSFORM THE WAY SUPPLY AND DEMAND OF (RE)INSURANCE ARE MATCHED

SCIENTIFIC PROGRESS AND TECHNOLOGICAL DEVELOPMENTS WILL COMPLETELY REDEFINE HOW DATA IS ACCESSED AND PROCESSED...

Ongoing technological developments will completely redefine how data is accessed and processed by (re)insurers. They will allow full and dynamic observability and monitoring, making information available and processable on a highly granular basis at virtually no cost from multiple sources.

The (re)insurance industry being information-based, these fundamental changes in data collection and processing capabilities will be a quantum leap for the sector. They will notably significantly reduce information asymmetry between insurers and insureds and prevent strategic behaviors, rendering the historical concepts of moral hazards and adverse selection obsolete, facilitate access to (re)insurance from multiple platforms, provide another level

of possible analytics and enhance risk knowledge, but also improve comparability and result in sharper competition between (re)insurers.

Information yesterday Incomplete and static observability	Information tomorrow (era of sensors) Full and dynamic observability
Limited and incomplete	Comprehensive from multiple sources
Low granularity	High granularity
Static	Dynamic and ranked in quality
Time lags	Real-time
Costly to obtain	Cheap to obtain
Costly to process	Cheap to process (AI)

FIGURE 7

Source: SCOR



...HENCE CHANGING PROFOUNDLY HOW SUPPLY AND DEMAND OF (RE)INSURANCE ARE MATCHED, BOTH QUANTITATIVELY AND QUALITATIVELY

New technologies will lead to a better congruence between (re)insurance supply and demand in both space and time, through a more granular match between risk and the price of risk and a dynamic adjustment over time between risk and the terms and conditions – or even the price paid – for the insurance coverage of the risk.

Rideshare insurance for transportation network companies in the US provides an excellent illustration of these benefits of new technology. As shown in Figure 8, the insurance terms and conditions for an Uber car can change numerous times in a single day in order to reflect the current situation and associated risk, on a real time basis. Depending on whether the car is stationary, whether the driver is available, driving but has no passenger on board, whether the driver is making its way over to a client or whether the car has one to three passengers on board – the risk is constantly changing, so the insurance terms and conditions vary accordingly.

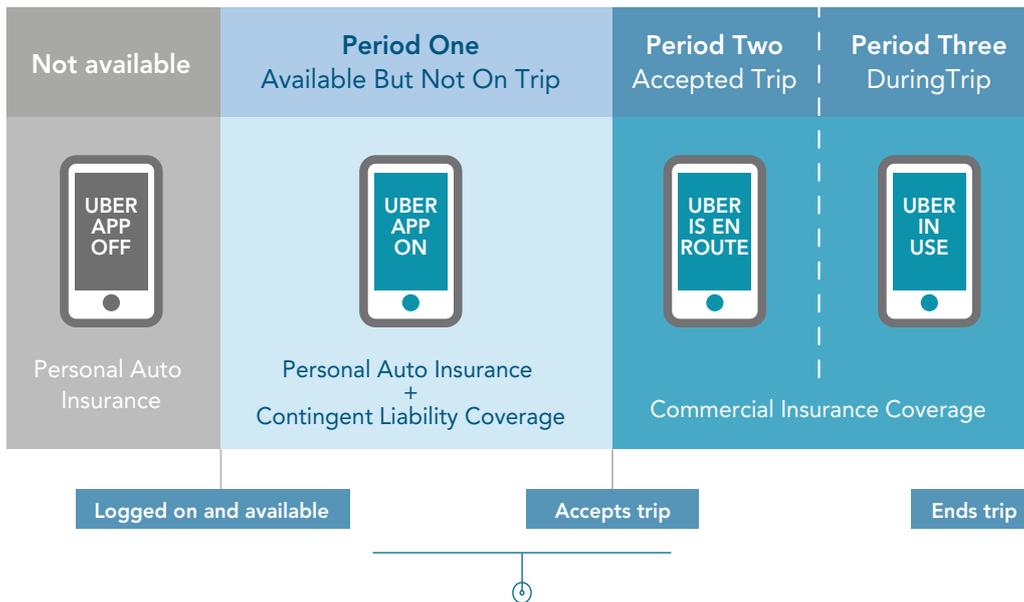


FIGURE 8 - RIDESHARE INSURANCE

Source: Dowling and Partners

SCIENTIFIC PROGRESS AND TECHNOLOGICAL DEVELOPMENTS ARE VERY POSITIVE FOR (RE)INSURANCE

Scientific progress and technology will contribute to enhancing risk knowledge, offering a better and more granular match between supply and demand of (re)insurance, improving efficiencies, reducing fraud, fostering prevention and precaution and making coverage more affordable, hence helping push back the frontiers of insurability and bridge the protection gap.

Enjoying these full benefits requires (re)insurers to embrace new technologies and to regard them as remarkable opportunities. Ongoing technological developments will have far-reaching impacts across the full risk transfer ecosystem, and coping with these changes will require timely innovation, investment and adaptation. The promotion of

a corporate culture of new technology adoption and “trial and error” approaches will become essential. The openness to change should run deep within companies, as (re)insurers have to incorporate the digital revolution rapidly within their processes and business models.

Likewise, management of the technological transition is key in the effort to remain on the industry’s rapidly changing efficiency frontier. Constant innovation and adaptation are necessary to maintain a competitive position. It has become clear that technology is today the Trojan horse of contestability in all economic sectors, and even more in an information-driven industry like (re)insurance.



A SOUTH AFRICAN INITIATIVE ON THE PRINCIPLES FOR SUSTAINABLE INSURANCE (PSI) WITH THE UNITED NATIONS



IAN KIRK

• CEO, Sanlam

Ian was born in Dublin and moved to South Africa in 1981. He qualified as a Chartered Accountant (CA) in 1980 and CA (SA) in 1983. He also obtained qualifications in Business Data Processing and Certified Information System Audit in 1985. He was appointed to the PriceWaterhouse partnership in 1986 and took overall responsibility for the computer audit function in the firm. Early in 1996, Ian was approached to join AGA Holdings as Managing Director, a relatively small JSE listed life insurance player with Investec as its significant shareholder. AGA Holdings later restructured as Capital Alliance Holdings Limited, one of the first broad-based black empowerment financial services companies in South Africa. In December 2004, Capital Alliance Holdings was sold to Liberty Group in a transaction valued at R3.3 billion and Ian was appointed Deputy CEO of Liberty Group in March 2005. In May 2006 Ian joined the Sanlam Group as Chief Executive: Strategy and Projects, where his responsibilities were to undertake a strategic review of the group, determine strategic direction along with the group executive, review capital allocation

arrangements and hurdle rates and drive new strategic initiatives including Project Helix, Shriram General and establishing a direct financial services business for the group. In June 2007, he was appointed Chief Executive of Santam, whose market capitalization has more than trebled since his appointment. As CE, Ian Kirk was responsible for overseeing all elements of the business as well as driving new initiatives to determine and execute the strategy for Santam's profitable growth in South Africa and, of late, into Africa, India and SE Asia. Ian was focused on continuous improvement initiatives and innovation, as well as continuous product and service reviews – thereby ensuring that Santam remained at the forefront of insurance. He was appointed Deputy CEO of the Sanlam Group in January 2015 and from 1 July 2015 he took over as CEO of Sanlam. Ian is a keen sportsman who played provincial cricket and rugby in Ireland. In South Africa, he played cricket and rugby for the Wanderers Club up until 1991. Golf is currently his game and he is also a keen cyclist. He is married and has four children.

SANLAM GROUP, A CENTENARY GROUP

In 2018, the Sanlam Group celebrated their centenary year - 100 years of providing diversified financial solutions and products to both retail and institutional clients, such as:

- ♦ Insurance (general & life) and Reinsurance;
- ♦ Financial planning;
- ♦ Asset management;
- ♦ Wealth management & stockbroking;
- ♦ Retirement solutions, fund administration & health administration.

With over 20 000 staff members in South Africa and operating in over 200 business in 44 countries around the world, the Sanlam Group is a leading presence in South Africa, selected emerging markets (Africa, India and Malaysia) and developed markets (UK, Ireland, Australia and the US).



KEY RISKS FACING THE GROUP

With the Group having a large presence in the emerging world, particularly in Africa, the predominant risks it is faced with are Environmental, Social and Governance (ESG) issues. Environmental risks in particular are not unique to Africa and emerging markets, as the world is experiencing the biggest wave of urban growth in human history and environmental catastrophes are increasing. However, traditional insurance methods will not suffice to address the massive underinsurance protection risk that subsists on the African continent.

THE INSURANCE PROTECTION GAP

As illustrated by Figure 1, the gap between the economic losses linked to natural catastrophes and the insured losses has increased during the course of the last decades. Economic development, population growth and a higher concentration of assets in exposed areas are increasing the cost of disasters. In 2016, the losses of the insurance protection gap were estimated at USD 121 billion¹, and in the 100 poorest countries, less than 3% of the population is served by effective insurance against natural hazards.²

In order to build an industry that is sustainable, the protection gap must be addressed, first by reducing the risks and exposure and by simultaneously enhancing resilience.

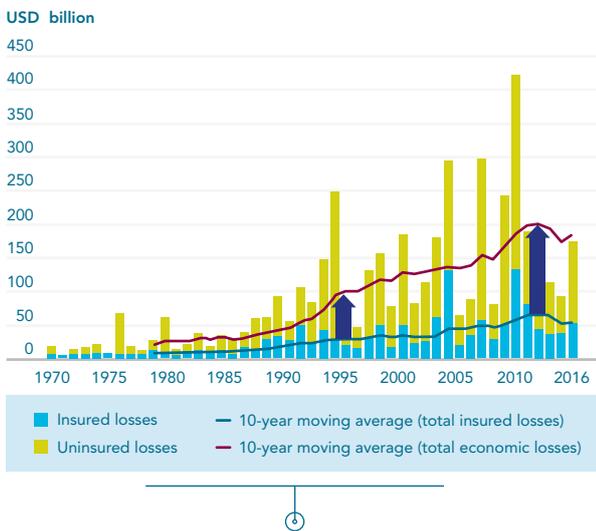


FIGURE 1 - "ECONOMIC LOSSES = INSURED + UNINSURED LOSSES"

Source: Cat Perils and Swiss Re Institute

A MOVE TOWARDS A RESILIENT SOCIETY

Reinsurance players operating in the developed world have known for years that reinsurance in the developing world provides significant diversification benefits. In order to attain those benefits, a proper level of understanding of the existing risks must be developed. Africa is decidedly a developing insurance market that comprises common issues such as climate change and floods. However, the level of knowledge of those issues and the ability to deal with them accordingly is at a significantly lower level. Furthermore, the fundamental issue that Africa faces resides with the clientele, being government, commercial, or retail, who does not in the vast majority of instances properly recognize the value of insurance.

THE NEW RISK LANDSCAPE

The nature of risks has changed: in the past, risks were simpler and evolved at a slower pace. Today, the industry is faced with diverse, interconnected and complex risks and ESG challenges. This notable change in the risk landscape impacts the conventional insurance approach, where insurers price in the risk, effectively "passing it on to the consumer".

During the past hundred years, the Sanlam Group has understood the value of embedding ESG principles into their business practices. A significant shift is however necessary, the industry must move away from conventional methods and conditions in policy contracts towards a more proactive and comprehensive understanding of the environments in which the insured evolve.

SURVIVING ANOTHER 100 YEARS

By understanding the need to do more than simply create products and services and to achieve a comprehensive understanding of the level of risk locally, the Sanlam Group was prompted to re-examine what ESG means to the industry. The result was a common vision on ESG within the Group, the development of an ESG insurance agenda in the countries operated in and strengthening their efforts of insuring for sustainable development.

Embedding ESG into a new strategy became a valuable source of new ideas with improved outcomes - early examples include:

- ◆ Increased efficiency in the supply chain for motor insurance
- ◆ Improved risk assessment on immovable properties in commercial insurance, by engaging government departments.

1. Swiss Re
2. UNEP Inquiry



THE UNITED NATION ENVIRONMENT PROGRAMME (UNEP) PRINCIPLES OF SUSTAINABLE INSURANCE (PSI) INITIATIVE

Launched in 2012, the Principles of Sustainable Insurance (PSI) initiative is currently composed of 120 members, 65 signatories and 58 supporting institutions. Eleven of the top tier insurers are signatories - the insurers who have adhered to the PSI Initiative represent over 25% of global premiums and USD14 trillion in Asset Under Management. Sanlam and its subsidiary, Santam, are both founding members, as well as the only two South African insurers currently part of the initiative.

Presently the largest collaborative initiative between the United Nations and insurance industry, the PSI Initiative's aim is to harness the insurance industry's role as risk managers, insurers and investor to close the protection gap and to support the transformation towards a sustainable economy.

THE NOTION OF SUSTAINABLE INSURANCE

The fundamental approach behind the PSI Initiative is to embed ESG issues into insurance. Sustainable insurance is a strategic approach where all activities in the insurance value chain, including interactions with stakeholders, are done in a responsible and forward-looking way, by identifying, assessing, managing and monitoring risk and opportunities associated with ESG issues.

THE STRATEGIC ROLE OF INSURERS

In terms of sustainable development, insurers play a triple role: risk management, risk carrying and investment (Figure 2).

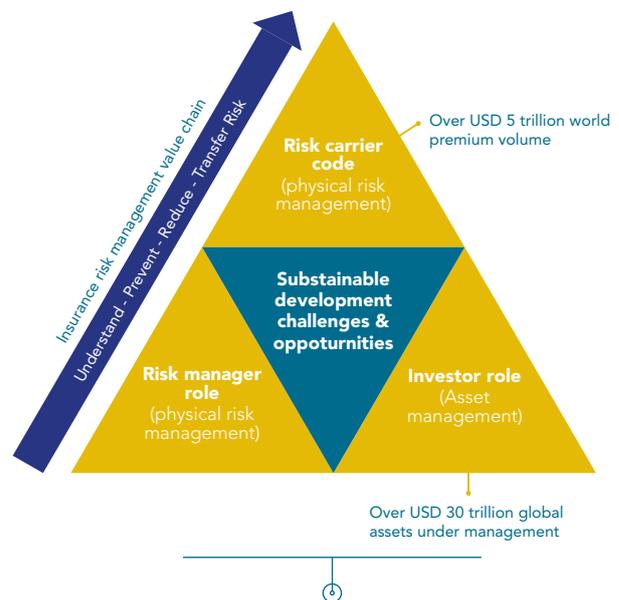
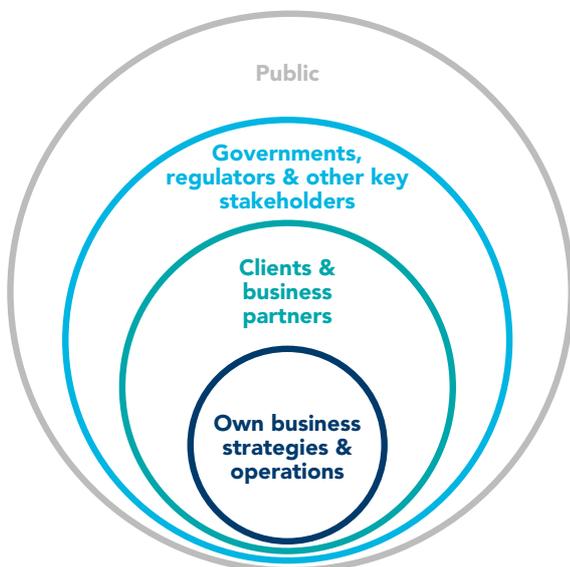


FIGURE 2 - THE TRIPLE ROLE OF INSURERS FOR SUSTAINABLE DEVELOPMENT

Source: UN EP PSI

THE FOUR SUSTAINABLE INSURANCE PRINCIPLES



- **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 propose 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.



THE CITY INNOVATION PLATFORM (CIP) FOR AFRICAN INFRASTRUCTURE RISK & RESILIENCE PROJECT

Several factors influenced the African focus given to the City Innovation Platform project:

- ♦ Pan-African GDP growth: in the case of many African countries, the GDP is currently increasing far more than the rate of insurance growth, with the exception of South Africa, as illustrated in Figure 3.

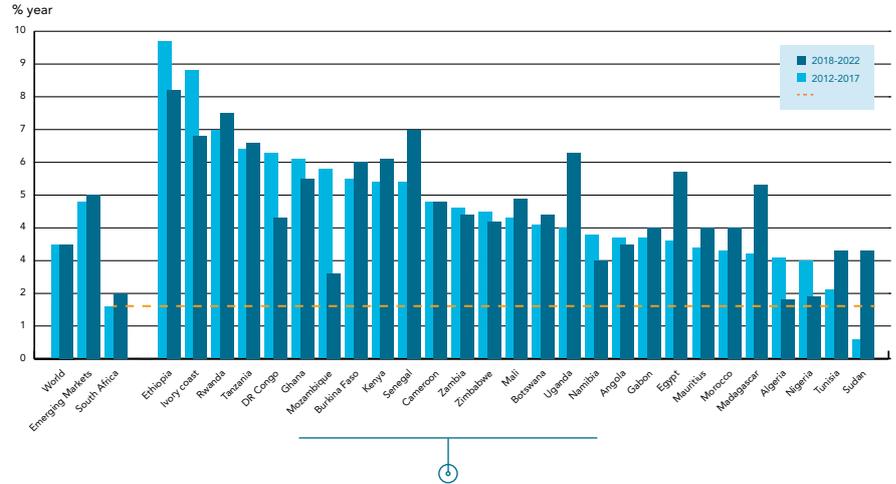


FIGURE 3 – PAN-AFRICAN GDP GROWTH

Source: IMF, World Economic Outlook

- ♦ Pan-African insurance penetration: the vast majority of African countries possesses a low insurance penetration rate, with the exception again of South Africa which has historically possessed a strong Life insurance business, as can be seen in Figure 4.

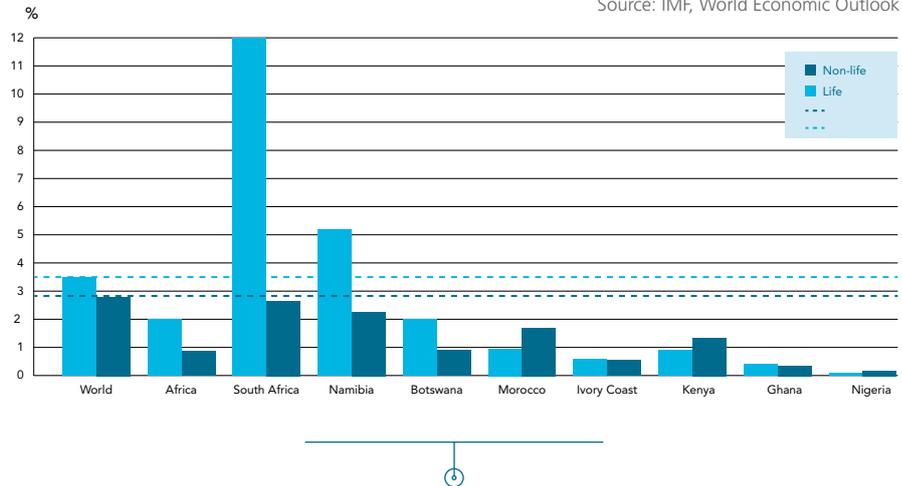


FIGURE 4 – INSURANCE PENETRATION AS % OF GDP

Source: Timetric reports

- ♦ The various factors impacting the resilience of African cities: figure 5 illustrates the specific causes of urban flooding in Lagos (Nigeria).

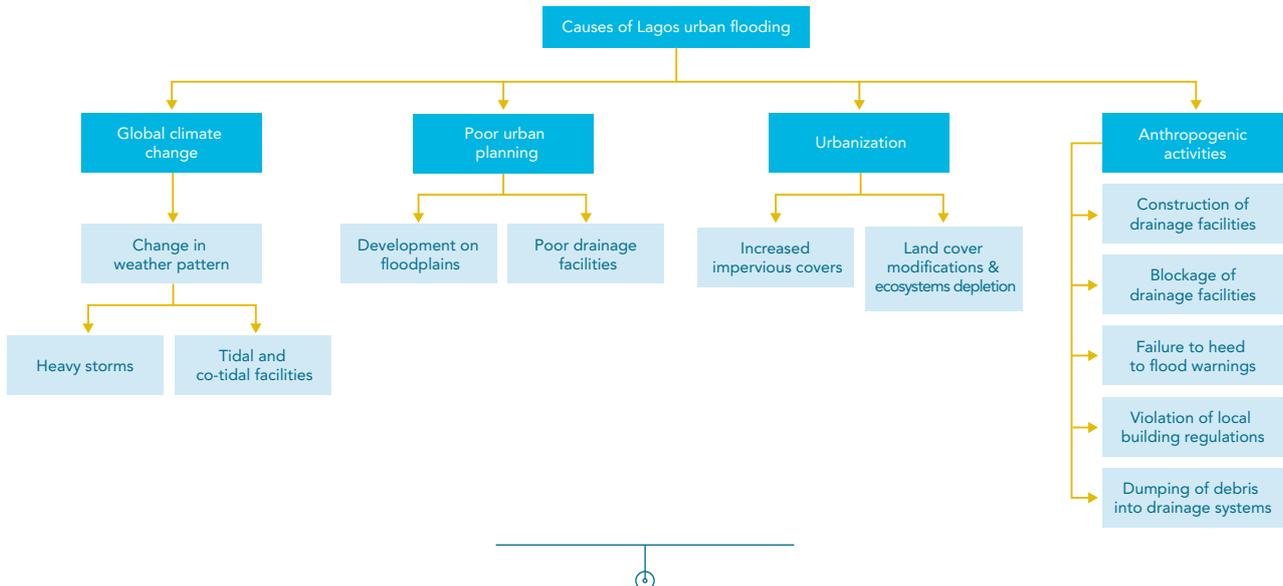


FIGURE 5 - A REVIEW AND CRITICAL ANALYSIS OF THE EFFORTS TOWARDS URBAN FLOOD RISK MANAGEMENT

Source: U. Nkwunonowu, Feb 2016



THE IMPACT OF CLIMATE CHANGE ON AFRICAN CITIES

The estimated climate risk protection gap in Africa, caused by extreme weather conditions over the past decade, is estimated at USD 1.7 trillion. This has led to the mounting concern surrounding the impact of climate-risk protection gap and the widening divide between total economic losses and the insured losses, with particular concern for emerging economies due to the pre-existing low levels of insurance penetration.

The selected city for the City Innovation Platform project, Dar es Salaam (Tanzania), is currently:

- ♦ growing at 5.6% per year;
- ♦ home to 4.5 million citizens;
- ♦ contributing 40% of the national GDP;
- ♦ comprised of 70% of urban dwellers living in unplanned and informal urban settlements.

The risk of a climate related catastrophe in Dar es Salaam places the Tanzanian economy in a precarious position.

In general, developing economies possess low levels of understanding concerning insurance and often struggle to make use of the insurance industry's risk transfer and risk management capabilities.

However, properly implemented public infrastructure projects play a vital role in enhancing resilience and managing the protection gap - insurers can play a key role in addressing that issue.

THE SANLAM GROUP CONTRIBUTIONS TO A RESILIENT SOCIETY

IMPLEMENTING THE LESSONS LEARNED FROM DAR ES SALAAM UN PSI

The UN PSI Resilient Cities project provided an excellent framework that highlighted the challenges of the industry, as well as the opportunities, and could be applied in a broader fashion. Examples of implementing our learnings include:

- ♦ The Partnership for Risk and Resilience (P4RR): in cooperation between Santam and the South African government,

CITY INNOVATION PLATFORM (CIP) PROJECT: A PILOT STUDY

This partnership between several notable insurers, the United Nations and University of Cambridge, aims to ascertain how the insurance industry can support sustainable infrastructure in emerging economy cities.

Through workshops in Dar es Salaam (Tanzania) that involved active participation from city officials, insurers, brokers, risk managers, regulators, etc., the project explored both how:

- ♦ the public and private sectors can collaborate more effectively to deliver sustainable, financeable and insurable infrastructure projects;
- ♦ insurance data and expertise can support cities to make better, more informed infrastructure and development decisions.

In addition to confirming the existence of a large protection gap and how little cities knew about the value of insurance was, the conversations proved the existence of a trust deficit towards the insurance industry.

The primary objective of project was to:

- ♦ capture the key learnings of the process;
- ♦ identify the methodology for how public and private can work more collaboratively in the future;
- ♦ map out how the insurance sector should collaborate with the public sector in response to closing the protection gap challenge.

While the solutions created in this pilot project cannot simply be applied to another city, the principles however can be transferred.

P4RR assists municipalities in combatting the risks of fire and flooding within vulnerable communities,

- ♦ The First African Market Event: organized in Sandton, in April 2018, the event was launched by Santam and the UN PSI³, and was targeted at insurers from around Africa. The aim was to stimulate the conversation around the best response to the systemic risk and opportunities presented by rapidly changing ESG⁴ trends globally. As a result of the success of the event, the Sanlam Group is preparing for the next event in Lagos, Nigeria, in 2019.

3. United Nation Principles of Sustainable Insurance

4. Environmental Societal and Governance



UN PSI PROJECT TO DEVELOP AN INSURANCE INDUSTRY STANDARD ON ESG

As of yet, there is no existing global guideline for the insurance industry on the integration of ESG risks into underwriting. In comparison, the banking industry has already launched the Project Finance Initiative, which incorporates an ESG standard.

Via the United Nation Environment Programme PSI initiative, the Sanlam group and a number of insurers are collaborating on a project that would define the ESG risks from an insurance underwriting perspective and identify how to prevent and reduce such risks, while uncovering opportunities and thereby laying the future foundation for an institutionalized approach to ESG issues.

ENVIRONMENTAL-RELATED RISK MANAGEMENT

In collaboration with FMO, the Dutch development bank, the Sanlam Group has provided seed capital for the establishment of a green, renewable energy fund. This global initiative fund is designed to combat the detrimental effects of climate change and fast-track renewable energy projects in emerging markets.

The fund combines three investments funds into a single facility to finance renewable energy projects at different

stages of the project lifecycle - from idea development to construction through to refinancing. This USD 525 million fund, available for green energy projects in emerging markets, is unique in its ability to recycle the capital injected into projects.

INCREASING INSURANCE COVERAGE WITH BESPOKE SOLUTIONS

The Sanlam Group's solutions allow for the creation of opportunities and solutions for populations of different social standing and in various geographies:

- ◆ A micro-insurance product (funeral insurance), which permits up to twenty-one beneficiaries to be added per policy and can be purchased via a mobile app solution, was launched in partnership with a local South African bank.
- ◆ Distribution networks are being established in emerging countries with limited insurance penetration, such as Uganda.
- ◆ In Mozambique, the inability to collect premiums was solved by implementing a debit order solution which allows for premiums to be deducted from mobile phone credits.
- ◆ The Sanlam Group is the first large insurer in South Africa to offer standard life cover for people living with HIV.
- ◆ An umbrella retirement fund that complies with ESG principles was established.

CONCLUSION: KEY LEARNINGS

- ◆ The Sanlam Group is based in South Africa and aspires to become a leader in insurance in Africa.
- ◆ Operating methods on the ground must change in order to close the insurance risk gap: the successful execution of the Sanlam Group's strategy would improve business quality while delivering insurance outcomes in areas with low penetration rates.
- ◆ The Sanlam Group is shifting away from the conventional insurance practices in that:
 - › ESG considerations have been integrated into both Life and general insurance business strategies;
 - › ESG projects have been proven successful in areas such as making a difference for people living with HIV by providing comprehensive life insurance.
- ◆ Most importantly, the Group has realized that the best results are achieved by collaborating with partners.



EXTENDING INSURANCE COVERAGE TO AN ADDITIONAL 400 MILLION PEOPLE BY 2020



JOAN LAMM-TENNANT, PHD

Chief Executive Officer and Founder,
Blue Marble Micro, Limited

Joan Lamm-Tennant is the Chief Executive Officer and Founder of Blue Marble Micro Limited, a startup with a mission of providing socially impactful, commercially viable insurance protection to the underserved. A UK corporation owned by nine insurance entities, Blue Marble incubates and implements microinsurance ventures that advance food security, financial inclusion and micro-entrepreneurship. Previously, Joan was the Global Chief Economist and Risk Strategist of Guy Carpenter Company LLC, a reinsurance and risk management operating company of Marsh & McLennan, and President of GenRe Capital Consultants, where she led the global advisory arm of General Reinsurance. Before joining industry, Joan had an academic career of over fifteen years. Joan was a tenured Professor of Finance at Villanova University where she held the Thomas Labrecque Chair in Business.

Upon joining industry, Joan was an Adjunct Professor at the Wharton School, University of Pennsylvania where she held the Laurence and Susan Hirsch Chair in International Business. She is currently a Senior Research Fellow of the Wharton Risk Management and Decision Process Center, University of Pennsylvania.

Joan is the recipient of the 2017 Insurance Industry Charitable Foundation Lifetime Achievement Award, the 2016 Wharton MBA Excellence in Teaching Award, the 2013 APIW Insurance Woman of the Year, and the 2012 International Insurance Society Kenneth Black Award for service and commitment to the advancement of the global industry.

Joan currently serves on the Boards of Hamilton Insurance Group, Ltd., Element Financial Management Corporation, Ambac Financial Group and The Institutes' Board of Trustees. Previously, Joan served on the Boards of Selective Insurance Group (1994 to 2015) and Ivans, an insurance technology provider (2001 to 2013). She was instrumental in the sale of Ivans to Ability, a portfolio company of Bain Capital.

Joan holds a Ph.D. in Finance and Investments from the University of Texas. In addition, Joan holds an M.B.A. in Finance and a B.B.A. with Honors in Accounting from St. Mary's University.

WHAT ROLE DOES INSURANCE PLAY IN DEVELOPMENT?

You may have heard the African proverb:

**IF YOU WANT TO GO FAST,
GO ALONE.
IF YOU WANT TO GO FAR,
GO TOGETHER.**

Several years ago, while traveling in China as an economist assisting insurers with large commercial risk, I came across a landscape that mesmerized me for two reasons. First,

I saw only two farmers working to harvest a huge rice paddy field, a task that seemed impossible to accomplish with so few people. Second, I considered how these farmers and many others like them were extremely vulnerable because they lacked safety nets to protect them in the event of misfortune. I began contemplating how insurance could reach the 4 billion people living in poverty and how, if designed appropriately, it could provide the safety nets necessary for economic empowerment, overcoming poverty entrapment. I recognized the complexity of that task because insurance as we knew it was not well suited to solve such a mammoth undertaking. We would need to think and act differently: not alone but together.



THE POWER OF COLLABORATION

You may be familiar with the Prisoner's Dilemma, a textbook example of game theory that illustrates how maximizing a common good requires cooperating as opposed to acting out of individual self-interest.

Recall that in the dilemma, there are two prisoners placed in solitary confinement without any means of communicating with each other.

Each individual has two options:

- ♦ to remain silent and thereby cooperate with the other prisoner or;
- ♦ to betray the other by testifying to his guilt.

Each prisoner can improve his own outcome by testifying against the other regardless of what the other prisoner does. However, the inherent dilemma is that while each individual is better off testifying, the best outcome in the aggregate, that which maximizes the common good, results from both prisoners remaining silent.

We can escape the Prisoner's Dilemma by working together, which requires trust and alignment in mission. Trust is developed over time and requires an initial leap of faith.

Addressing global issues requires collaboration across industries and sectors.

Providing meaningful, affordable financial services to the underserved requires collaboration. Economically empowering the financially underserved requires a bundle of financial services that address the unique needs of this population. Insurance is a social safety net that enables access to credit, provides individuals with a sense of security and promotes savings. Insurance is a catalyst for development. This social safety net is particularly meaningful to the underserved populations because of the significant toll that a shock, such as a drought or fire, takes on their livelihoods. Given their lack of or limited savings, the underserved are not particularly resilient to these negative events.

Collaboration between the public and private sector (especially the insurance industry) will be critical in reaching the goal of extending insurance coverage to an additional 400 million people by 2020.

BLUE MARBLE

Blue Marble Microinsurance is a startup with a mission of providing socially impactful, commercially viable insurance protection to the underserved. A United Kingdom corporation owned by nine insurance entities, Blue Marble incubates and implements microinsurance ventures that support the economic advancement of underserved populations.

Our initial ventures provide meaningful solutions to farmers in Africa and Latin America.

In Zimbabwe and Uganda, Blue Marble is addressing the financial vulnerability of smallholder farmers through the provision of affordable insurance protection against drought and excess rainfall across a number of crops, including maize, soybeans, small grains, groundnuts, paprika, and cotton. In Colombia, we are extending crop insurance protection against adverse weather conditions to smallholder coffee farmers in partnership with Nestlé Nespresso S.A. Blue Marble has a core management team supported by experts on a secondeed basis drawn from a pool of 250,000+ employees from the nine owner companies in 140+ countries.

Innovations are key to our ventures. Our solutions in both Zimbabwe and Colombia are not subsidized. We innovate using science and technology to understand the customers, develop incentives to improve economic choices among customers and reduce unnecessary frictional costs.

The price signaling of different crop insurance offerings can incent farmers to grow more resilient crops. By means of analyzing local climates and pricing accordingly, with partners, we incentivize the adoption of well-adapted crops to further improve the climate resilience of smallholder farmers.

For example, in Zimbabwe, working with Old Mutual and the United Nations World Food Programme (WFP), we are promoting the adoption of small grains and groundnuts in semi-arid areas. To do this, we showed farmers the premium they would have to pay if growing maize (the crop they are biased to grow) and the relatively lower premium associated with growing these other better-adapted crops. WFP and other partners are enabling access to these other crop seeds so that farmers have the necessary resources to better adapt to erratic weather.



BUSINESS MODELS AND STRUCTURES

Extending insurance protection to underserved populations is a significant, socially impactful business opportunity. Key questions that arise from social impact initiatives are how we measure their success and how we ensure their commercial viability and impact. While historically many people considered profitability and social impact mutually exclusive, there is a growing understanding that they can be complementary. It is possible to do well and to do good at the same time. In fact, we need commercial viability to be sustainable, sustainability leads to scale and scale is a driver of impact.

Success metrics need to balance traditional financial metrics, such as net present value and payback with indicators of improved livelihoods, such as caloric consumption per capital income.

We have established new entities to facilitate collaboration in extending insurance protection to underserved populations. Blue Marble is one example. Indeed, new business models, entities and ways of thinking are critical for driving innovation. Blue Marble's business model is based on Creating Shared Value, a concept developed at Harvard University, which involves "generating economic value in a way that also produces value for society by addressing its challenges. A shared value approach reconnects company success with social progress." Our partner, Nespresso is a proponent of Creating Shared Value. Nespresso redesigned its coffee procurement process, working intensively with smallholder farmers. Nespresso has an initiative called "The Positive Cup" and the company has a vision is create a cup of coffee that has a positive impact on the world. Insurance is a catalyst for development, and other sectors recognize this role. There is significant opportunity to extend insurance protection to underserved populations and many ways of doing so. The microinsurance market has potential estimated at 3-4 billion policies and USD 30-40 billion in annual premium revenue. While some companies are doing remarkable work on their own balance sheets, others are collaborating with their competitors. I urge you to consider joining existing initiatives to protect the underserved or developing new ones.



DEFINING RISK FINANCE IN DEVELOPING COUNTRIES: (RE-)DEFINING THE ROLE OF THE PRIVATE SECTOR



OLIVIER MAHUL

Global Lead, Disaster Risk Finance,
and Programme Manager, Disaster Risk
Financing and Insurance Programme,
World Bank

Dr. Olivier Mahul is Programme Manager of the World Bank's Disaster Risk Financing and Insurance (DRFI) Programme, supported by several donor partners including Japan, UK, Germany, Switzerland, USA, Canada and EU. Olivier also leads the establishment of the World Bank's DRFI hub, as part of the Center for Global Disaster Protection in London, in partnership with DFID. The Programme provides advisory services on financial protection against natural disasters in more than 60 countries, mainstreaming disaster risk finance within the broader disaster risk management and climate change adaptation agenda in developing countries. The Programme offers advisory services on sovereign disaster risk finance, property catastrophe risk insurance, agricultural insurance, and disaster-linked social protection, in close collaboration with the private insurance and reinsurance industry.

Since he joined the World Bank in 2003, Olivier has been involved in developing disaster risk financing and insurance solutions in more than 40 countries including Colombia, Costa Rica, Vietnam, Indonesia, Mongolia, India, Mexico, Philippines, etc. Olivier was closely involved in the product development of the World Bank contingent credit line that provides World Bank member countries with immediate

budget support in the aftermath of natural disasters. Since its launch, the CAT DDO has been approved for several countries such as Colombia, Costa Rica and the Philippines, for a cumulative amount in excess of USD 2.3 billion. Olivier is one of the key architects of the Caribbean Catastrophe Risk Insurance Facility, which provides 16 Caribbean island states with parametric insurance against major natural disasters. He has also led the design and implementation of the Pacific Catastrophe Risk Insurance Programme, which provides 5 Pacific island countries with parametric catastrophe insurance, as well as the sub-national parametric catastrophe risk insurance programme in the Philippines, which covers 25 local government of 25 provinces against severe tropical cyclones.

Olivier holds a Ph.D. in Economics from Toulouse School of Economics and post-doctorates from Wharton Business School and University of California at Berkeley. Olivier has authored more than 40 publications in international journals and two books: "Catastrophe Risk Financing in Developing Countries: Principles for Public Intervention" (with J. David Cummins) and "Government Support to Agricultural Insurance: Challenges and Options for Developing Countries" (with Charles Stutley).

At its core, the World Bank Group is a multilateral development bank that offers wide array of financial products and technical assistance mainly to governments, with an overall book of business that extends to roughly USD 60 billion. The International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), which share their staff, are the group's entity ensuring its primary mission: providing concessional financing to low and middle-income countries. The IFC (International Financial Corporation), is the group's private sector arm, operating across developing countries.

The notion of risk management related to disasters and climate change, is one that has particularly evolved over the last fifteen years. The tremendous earthquake in Marmara,

Turkey in 2000, marked a turning point for the World Bank's development agenda. For this very first project related to catastrophe insurance, the World Bank was asked to collaborate both with the private sector and the government to implement the Turkish catastrophe insurance pool. Another milestone occurred six years later when the World Bank extended a line of credit to disasters - a policy instrument meant to incentivize governments to integrate disaster risk finance into their agendas.

The World Bank Group has been involved on resilience and disaster risk management as part of their mandate to support development and address poverty and livelihood issues.



DRIVERS OF CLIMATE AND DISASTER RISK – INCREASING EXPOSURE

Economic growth, demographic trends, and rapid urbanization are among the main drivers of disaster losses. As shown in Figure 1, urban populations worldwide have increased in the past four decades and is projected to increase further still by 2050 - climate change is only expected to make matters worse.

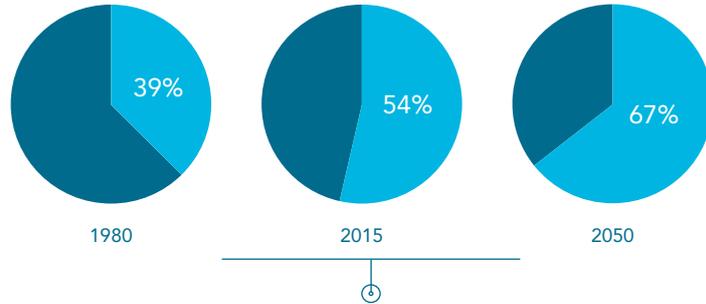


FIGURE 1: URBAN POPULATION AS A % OF TOTAL WORLD POPULATION

Source: World Bank (2017)

The insurance industry, as well as the World Bank, has historically assessed situations in terms of assets. However, to some extent, the populations most exposed by disasters and those at risk of loss in consumption of livelihood, are not necessarily the populations that possess a significant number of assets. Such traditional approach of risk management cannot be spontaneously compliant with the World Bank’s mandate – development and poverty reduction,

Disaster-risk finance is part of the answer, as one has to take into account that 93% of extremely poor populations live in fragile or environmentally vulnerable countries. These same countries face complex threats that can exacerbate disaster and climate impacts, in addition to lacking the financial, technical and political capacity to manage risk and relying heavily on exterior contribution and aid.

IMPACT OF DISASTERS ON POVERTY REDUCTION

When accounting for impacts on well-being, such as drop in consumption, natural disasters cost the global economy USD 520 billion. This loss is 60% higher than usually reported in studies which focus solely on physical assets and which overlook the loss in livelihood. However, through their

impacts on human capital, in particular, nutrition, education, and health, disasters can severely affect household’s earning potential, forcing an estimated 26 million people into poverty every year (Figure 2).

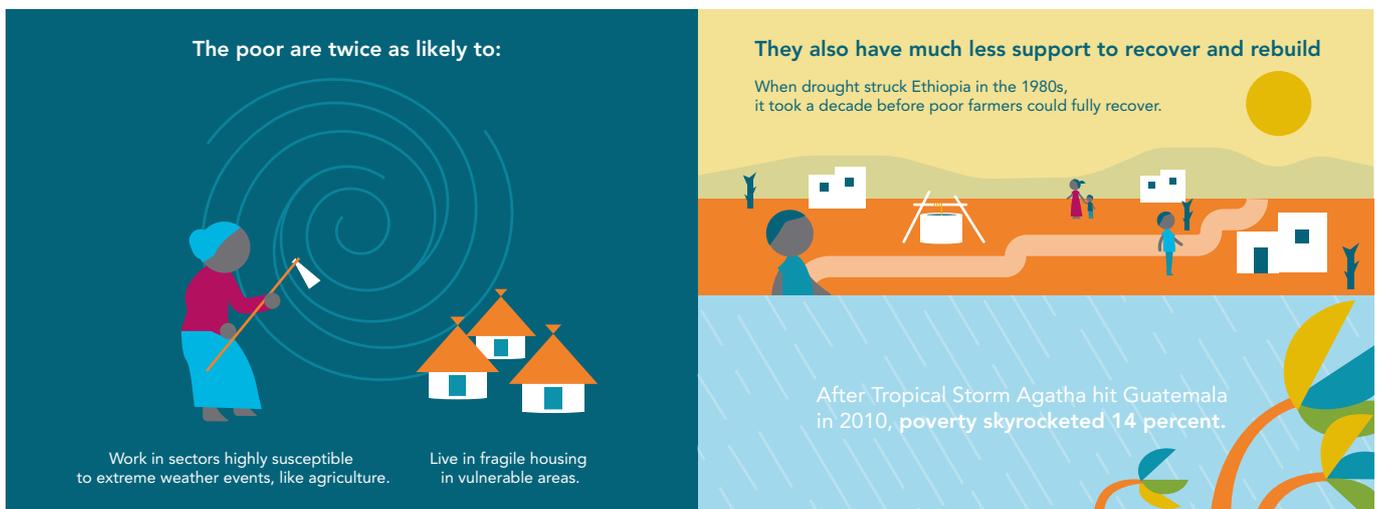


FIGURE 2: IMPACT OF DISASTERS

Source: World Bank (2017)



MANAGING CLIMATE AND DISASTER RISK

When dealing with government clients, the World Bank must factor in the country's political and budgetary rationale. Key decisions concerning risk management are attributed to finance ministries, specifically teams dedicated to budget and debt management. These preferred contacts traditionally possess a banker's background and little insurance knowledge - though the explanation of the notion of risk management is unnecessary, it is important to clarify the value of a carefully planned risk management plan, in the context of their country.

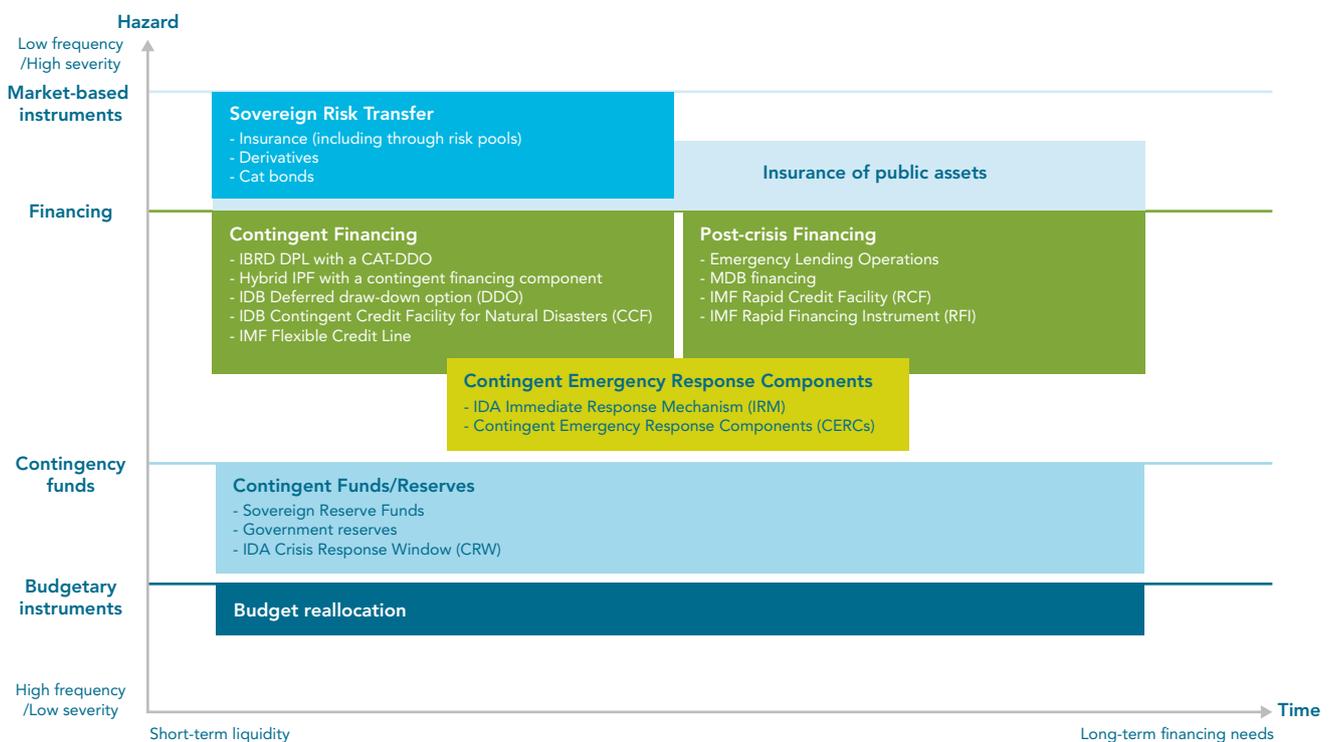
As such, a first step is to recommend a comprehensive approach to disaster risk management, which can prevent losses and reduce impacts. This approach detaches from the traditional *ex-post* humanitarian support, privileging preparedness based on national response systems, while combining efforts to avoid disasters through mitigation and adaptation and managing the unavoidable disasters.

FINANCIAL PROTECTION

Until recently, most countries acted as *ex-post* emergency borrowers. In the event of a disaster, the nation would call for international assistance and resort to budget allocations and debt issuance. A shift has occurred towards an *ex-ante* risk manager approach that helps countries proactively manage residual risk by planning ahead and setting resources aside to finance disaster response activities, with methods such as contingency-reserve funds, contingent financing, market-based risk transfer solutions and catastrophe risk pools.

A combination of the two approaches would be optimal, as well as the consideration of insurance.

Figure 3 illustrates the tools offered to countries in terms of risk management and disaster financing. When disaster strikes, governments can quickly access an amount of funding which can amount to a maximum of USD 500 million, on the condition that they implement policy reforms.



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

FIGURE 3: RISK LAYERED RISK FINANCIAL PROTECTION

Source: World Bank (2017)



WORLD BANK SOVEREIGN DISASTER RISK FINANCING INSTRUMENTS

Figure 4 lists the major instruments offered by the World Bank Group, starting with immediate solutions and

contingent loans, to various regional facilities of insurance pools, and finally insurance linked securities.

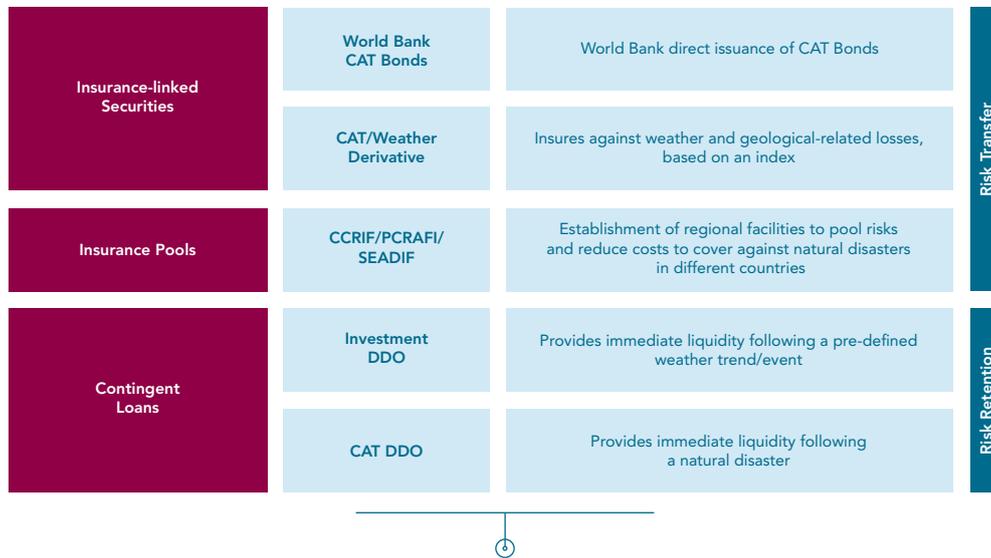


FIGURE 4: WORLD BANK SOVEREIGN DRF INSTRUMENTS

Source: World Bank

DISASTER RISK FINANCING AND INSURANCE PROGRAMME (DRFIP)

The World Bank Group has developed a specific programme to strengthen financial resilience: the Disaster Risk Financing and Insurance Programme (DRFIP). Its main objective is to increase the financial resilience of the countries by minimizing costs and optimizing the timing of post-disaster

funding. Through this programme, the World Bank helps governments identify beneficiaries, prioritize their efforts and create solutions capable of leveraging the capacity of the market (Figure 5).

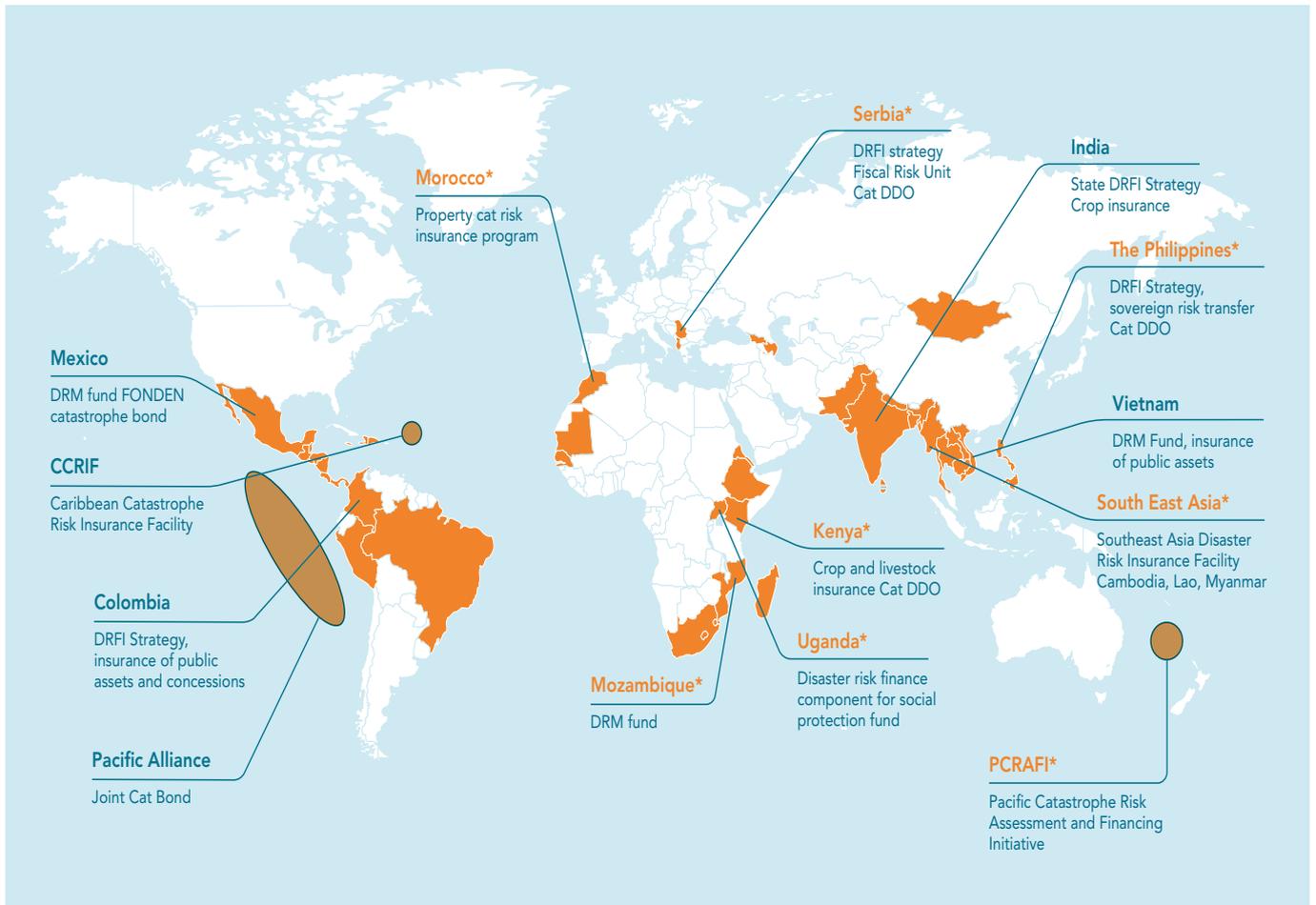


FIGURE 5: DISASTER RISK FINANCING AND INSURANCE PROGRAMME BUSINESS MODEL

Source: World Bank (2014)



As shown in Figure 6, the DRFIP possesses operational engagements worldwide and is active in over 50 countries.



Note : (*) TA linked to lending

FIGURE 6: OPERATIONAL ENGAGEMENTS WORLDWIDE

Source: World Bank

The DRFIP was most notably entrusted with the preparation of reports for the G7 summit of 2016¹, which led to the creation of the insurance resilience agenda for 400 million additional insured in the world.

1. This statement is inferred from transcript, which mentions "we were asked two years ago to prepare reports for the G7"



SOVEREIGN CATASTROPHE RISK POOLS

The World Bank Group has facilitated the establishment of regional facilities to pool risks and reduce costs to cover against natural disasters in different countries, such as the Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company (CCRIF SPD), the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) or the South East Asia Disaster Risk Insurance Facility (SEADRIF).

The latter pool, SEADRIF, provides climate and disaster risk management as well as insurance solutions for ASEAN countries² - Figure 7 details the complicated organization of this structure, which allows various countries with different models to contribute their own solutions and initiatives.

These sovereign catastrophe risk pools present several advantages which, assembled, offer countries financial protection from catastrophes:

- ◆ **Ownership:** strengthened regional/sub-regional cooperation and policy dialogue;
- ◆ **Cost of capital:** lower premium by pooling diverse exposures, retaining some risk and transferring excess risks to capital and reinsurance markets;
- ◆ **Timelines:** rapid payout (with parametric triggers);
- ◆ **Discipline:** risk based premium and clear payout rules;
- ◆ **Appropriate risk information:** a collective and standard approach to quantitative catastrophe risk analysis and modelling.

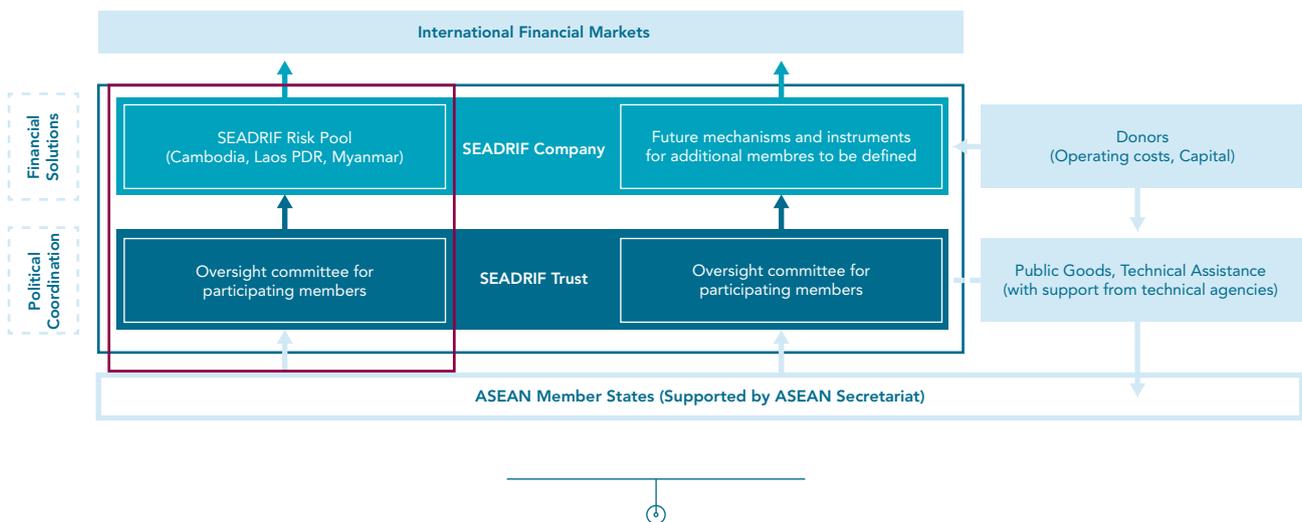


FIGURE 7: SOUTHEAST ASIA DISASTER RISK INSURANCE FACILITY

Source: World Bank (2017)

2. 10 member states – Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. 1 observer state – Papua New Guinea.



FOCUS - PHILIPPINES: RISK LAYERING TO BUILD FISCAL BUFFERS

The World Bank has been involved with the Philippines' elaboration of many advanced scenarios for fiscal buffers in the event of a disaster, detailed in Figure 8.

The collaboration with the Philippines was the first instance of subnational governments, in this case provinces, involvement. Sovereign solutions have often been the norm, however a shift has recently occurred towards a subnational level, whether at the province level, state level or even municipal level - this often follows the process of

fiscal decentralization. As local governments gain more independence, they must assume a higher responsibility of risk management, but equally create new solutions and instruments as a consequence.

The Philippines will be investing over the next five years USD 150 billion of public funding in infrastructure, with the assistance of private sector funding. The main concern is to build assets that will be properly constructed, secured and insured.

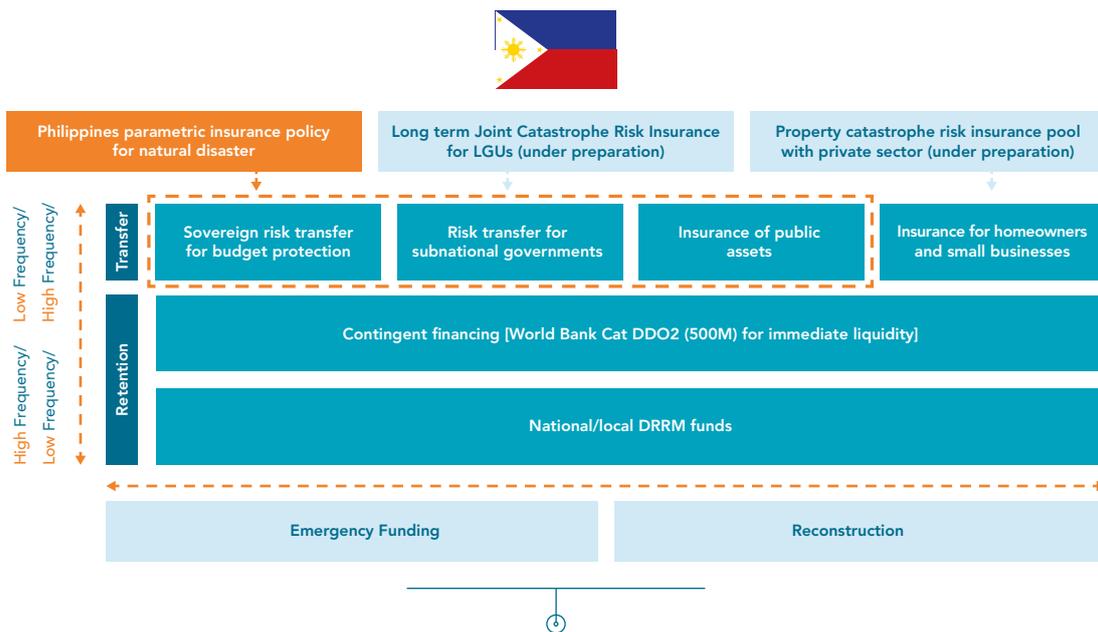


FIGURE 8: PHILIPPINES' RISK LAYERED DISASTER RISK FINANCING STRATEGY

Source: World Bank

CONCLUSION / RECOMMENDATIONS TO THE G20 - SET OF KEY PRINCIPLES

The G20 could adopt key principles for innovative climate and disaster risk finance, insurance and pooling:

- ◆ Ownership;
- ◆ Mutual commitment;
- ◆ Financial planning;
- ◆ Comprehensive strategy;
- ◆ Financial sustainability;
- ◆ Accountability and transparency;
- ◆ Disaster risk reduction.



FLOOD INSURANCE IN THE US: BUILDING POLITICAL COALITIONS TO EXPAND PRIVATE MARKETS



RAY J. LEHMANN

Director, Finance, Insurance & Trade Policy,
R Street Institute

R.J. Lehmann is senior fellow and director of finance, insurance and trade policy for the R Street Institute, overseeing the institute's research into effective and efficient regulation of financial services and the benefits of the international rules-based trading system. R.J. was a co-founder of R Street in June 2012, having previously served as deputy director of the Heartland Institute's Center on Finance, Insurance and Real Estate. Before joining Heartland, he spent nearly a decade covering the insurance and financial services industries, first as manager of A.M. Best Co.'s Washington bureau and later as a senior industry editor with SNL Financial (now S&P Global Market Intelligence).

ORIGINS OF THE US FLOOD INSURANCE & ESTABLISHMENT OF THE NATIONAL FLOOD INSURANCE PROGRAMME (NFIP)

Originally, the US flood insurance was a private market for first dollar flood insurance. By the middle of the 20th century, the majority of private providers had abandoned the residential flood market, and the popular myth took hold that "flood is uninsurable". Issues included excessive concentration of risk, the quantity of local providers, as well as insufficient mapping and rate-making ability. However, a commercial flood market insurance market survived and still exists to this day.

In the 1950s and 1960s, a series of hurricanes in uninsured areas led to severe demands for ex-post disaster assistance. The federal government sought to encourage pre-funding of disaster risk and investments in mitigation such as building levees, dams, and water treatment plants. In 1968, the federal government established the National Flood Insurance Programme (NFIP), which provided coverage sufficient for most middle-class homeowners and many small businesses. Community mitigation efforts were also encouraged.

To promote take-up of NFIP's policies, NFIP offered rates below what would be actuarially fair. However, policymakers failed to foresee the massive population shift from the Northern states and industrial Midwest towards the Southern states - the State of Florida in particular. At the

start of the Second World War, Florida was the least populous state in the American south - it now has the third largest population in the entire US. Half of Americans currently live within 50 miles of the coast, intrinsically increasing flood risk. This massive shift to the coast means more people are in harm's way, the subsidies are greater, and the flood insurance system is less sustainable.

NFIP: THE AFTERMATH OF TWO YEARS OF MAJOR HURRICANES

Many people think of flooding as rivers and lakes overflowing, but most major floods in the US are actually storm surges. The years 2004 and 2005 were some of the worst ever for hurricane losses. In 2004, four major hurricanes struck the state of Florida. In 2005, New Orleans was hit by Katrina, the largest insurable event in US history. Immediately after, Rita and Wilma struck the Gulf States – they are now the 2nd and 7th costliest Atlantic hurricanes of US history.

In the wake of the 2004/5 storm season, insurers revisited their climate and vulnerability models and concluded that homeowners and businesses near the coast were paying less than they should have been, with their risk having been subsidized by those who lived inland. NFIP itself



struggled under the weight of USD 20 billion of debt to the US Treasury.

As consumers faced higher rates or even cancellation of their insurance, many policy makers concluded that the answer was to expand the NFIP - the programme would not only offer flood insurance, but equally provide windstorm insurance. Another proposal moved to create a federal (re)insurer for all property risks. The proposals were popular, but dissenting voices emerged.

The Smarter, Safer coalition & the Biggert-Waters Flood Insurance Reform Act

Three distinctive communities were united in opposition to the consensus of expanding the NFIP. In 2009, representatives of these three groups formed the Smarter, Safer coalition:

- ♦ center-right organizations, including the R Street Institute, which were concerned with taxpayer dollars being used inefficiently. They pointed out that 2% of NFIP policies account for a third of the claims.
- ♦ most of the reinsurance industry, which feared the precedent of displacing available private capital.
- ♦ the environmental community, which pointed to negative effects of NFIP. As the NFIP grew, suburbs were built on wetlands (i.e. places that flood), and people build homes on barrier islands, precious coastal ecosystems with vast biodiversity.

KEY LEARNINGS

American government in 2012 was divided, with a Republican Congress and Democrat president. The project's initial success came from its bi-partisanship - the ability to unite voices from the left and the right for sensible and moderate policy reform, replacing the typical "us vs. them" battles for power.

As the coalition worked more closely together, both sides influenced each other. For instance, because of the discussions within the coalition, some in the center-right have a greater appreciation for the role of government spending in promoting disaster mitigation. Similarly, the environmental groups gained a greater appreciation of where private reinsurance markets can serve the public good by signaling risk.

As long as bi-partisan coalitions retain value and are capable of uniting opinions from across the spectrum, they can

The so-called "odd bedfellows coalition" met regularly with members of Congress and members of the administration. The bill to expand NFIP to include wind risk passed the House of Representatives twice but failed in the Senate.

THE SMARTER, SAFER COALITION OFFERED A COUNTERPROPOSAL FOR REFORM, WHICH DID THE FOLLOWING:

- ♦ based NFIP rates on actuarial calculations;
- ♦ reduced subsidies for those who do not need a subsidy to afford insurance;
- ♦ encouraged the NFIP to purchase reinsurance;
- ♦ allowed the NFIP to buy out "repetitive loss properties";
- ♦ provided additional resources to speed flood mapping efforts;
- ♦ moved to implement legislation which stipulated that private flood insurance was satisfactory for mortgage collateral requirements.

This proposal became the Biggert-Waters Flood Insurance Reform Act of 2012. The legislation is currently in-force, though changes have been made in the past years. The reform was unpopular with certain communities which had to pay higher rates, property developers, and the real estate sales industry. As a result, certain rate increases were slowed, and the process of updating flood insurance maps was halted.

continue to be a good model applicable to various public policy problems. The insurance and reinsurance industry in particular were a key part of the public dialogue surrounding flood insurance.

There are other applications of bipartisan coalitions. As California recovers from wildfires, a solution will have to involve insurance, community risk mitigation, and land use management. The success of a bipartisan, policy-focused, pragmatic approach to flood risk mitigation could help produce better outcomes for California too.



LEARNING FROM SUCCESSFUL PARTNERING APPROACHES FROM OTHER INDUSTRIES



NICOLAS COLIN

Co-founder and Director of The Family

Nicolas Colin began his career in the French civil service and then brought his clear understanding of regulatory systems across Europe to his work as a tech entrepreneur. In 2013, he became Co-founder and Director of The Family, a pan-European investment firm supporting early-stage entrepreneurs, now with a portfolio of 150+ fast-growing startups. He sits on the board of Radio France, the French national radio broadcasting corporation, and teaches university courses on corporate strategy and public policy at Sciences Po in Paris.

He has previously served as a member of the board of the French personal data protection authority. Nicolas is a thought-provoking voice in the conversation about new institutions in the digital world. He has co-authored several works on technology, including a 2013 Report on Taxation in the Digital Economy (for which he was voted one of that year's ten most influential people by the International Tax Review). His articles regularly appear in both English and French publications, including Foreign Affairs, The Financial Times and Le Monde. Hedge is his third book, and the first published in English. Nicolas was born in Normandy, France and raised by musician parents, becoming an accomplished bass guitar player. He lives in London with his wife Laetitia Vitaud and their two children.

From their three European offices (Paris, London and Berlin), The Family shares their view on the future of economy, more particularly on the transition from the industrial economy of the 20th century to the new digital economy currently unfolding. As an investment company for early stage technological start-ups, they understand the importance of spreading their learnings of various industries and their own investment thesis, with traditional industries who are confronted with the digitalization of their sector.

THE FIFTH TECHNOLOGICAL REVOLUTION

The world is undergoing what economists call a technological revolution. The Venezuelan economist, Carlota Perez, has designed a framework based on the notion that since the industrial revolution, four subsequent technological revolutions have occurred.

The first is indeed the industrial revolution, where machines and labour were combined through the creation of factories - an occurrence generally thought to have originated in the region of Manchester, England. The second technological revolution is attributed to the invention of the railway, as it radically changed the economy by redefining the relationship between areas across long distances. The steel mills in Pittsburgh, Pennsylvania were at the core of the

third technological revolution, centered on steel and heavy engineering. Cheap oil, manufacturing cars and discovering the notion of scientific management led to the paradigm of mass production - the fourth technological revolution.

Finally, this fifth technological revolution revolves around personal computing and networks which have radically changed the mechanisms of economy.

A revolution changes the way that value is created, the way we work, the way we produce, the way organizations interact with individuals, the way we consume. It equally calls for the creation of new institutions which allow for a more sustainable and inclusive economy. For instance, during the techno-economic paradigm of the Fordist industry in the 20th century, institutions such as the tax systems, labour laws, the welfare state, and many insurance products were designed to help support value creation in the most efficient manner possible.

THE DIGITAL ECONOMY - OR THE DISPLACEMENT OF POWER OUTSIDE OF ORGANIZATIONS

In the past, the most powerful organizations were those which managed to concentrate their assets, resources, employees, brands and information on the inside. In order



to compete in the Fordist economy, companies needed to attract resources and secure them inside their organization. Today, in a more digital economy, the successful organizations are those who have realized the importance of “the multitude” - individuals who are equipped with an array of increasingly powerful devices and are connected amongst themselves. These competitive companies have been designed to harness that exterior power, funnel it into their value chain and use the power of connected individuals to generate growth, and eventually profit.

If the digital economy were to be summarized in one sentence, it would be the following: “in the age of ubiquitous computing and networks, there is more power outside than inside organizations”.

INSURANCE & THE DIGITAL ECONOMY

The digital technological revolution impacts every industry, though some have already been radically transformed by the transition, such as publishing, music, advertising, retail, etc. Other industries still have time before they undergo the radical transformation and firms will have to quickly reposition to make the most of their transition. In the case of the insurance industry, two different factors should be considered in order to assess when the sector will be touched by the current revolution.

In theory, insurance should have been transformed early on as it relies heavily on intangible assets - software can easily absorb the entire industry, therefore creating a digital economy with new firms claiming the value chain. However, insurance remains a highly regulated and fragmented market, which has protected the industry against the wave of radical disruption.

Though the process is evolving slowly, several signs point towards the acceleration of the disruption:

- ♦ Connected individuals are extending the reach of their connection, through the proliferation of smartphones which are currently estimated at eight billion worldwide.
- ♦ People are more connected, and networks are becoming larger and denser - for instance, Facebook possesses over two billion active users.
- ♦ Large technological companies have morphed into powerful conglomerates - by expanding beyond their initial market, these entities have radically changed the balance of power between incumbents in a certain industry and new entrants.
- ♦ Entrepreneurs are more experienced than in the past. Modern entrepreneurs can acquire knowledge from blogs to accelerators and venture capital firms and typically found a variety of start-ups. This experience facilitates their entrance on newer and more difficult industries.

- ♦ Increasing amounts of capital are being invested in technological companies, as their returns are superior to other asset classes.

When excess capital meets seasoned entrepreneurs to address markets that are more connected than before, transitions can occur rapidly. Though the insurance industry has not yet been targeted, these factors must be taken into account by firms to prepare for their reposition.

THE FIVE STRATEGIC LESSONS

1. The transformation of an industry begins with customer experience

New entrants on a market typically start at the bottom of the value chain and learn to provide their customers with an improved user experience. For instance, Uber is not significantly different from traditional taxi services, however the company radically transformed the relationship between the platform and the customers by providing a seamless, well designed app that was equally capable of collecting data.

2. Strategic assets are not sufficient protection

A company can own the strategic assets that are critical for the entire industry to function, however that does not guarantee their safety - these strategic assets can be replicated by new entrants who decide to aim for vertical integration.

Netflix perfectly illustrates this scenario: initially, the company distributed movies and series through a streaming platform, without competing with studios. The data collected on their platform allowed them to identify a new notion, capable of creating equal amounts of value and a different way of addressing the market: “binge-watching” - Netflix users readily appreciated the possibility of watching an entire season in one sitting. The company brought this concept to the incumbent traditional studios - the offer to produce a series that would be launched by providing all the episodes at once onto the Netflix platform - but were turned away. Netflix then replicated the strategic assets and created the famous series “House of Cards”, moving from mere distributor to a strong and threatening competitor for the incumbents of the industry.

3. The most dangerous position in the value chain is always in the middle

The middle of a value chain is usually where the largest companies will be situated. For instance, a publishing company is at the middle level of the book industry's value chain - the authors write the manuscripts, the bookshops sell the final product. However, publishing companies are dominant as they are logistic experts, effectively controlling



production as well as distribution. Being in the middle of a value chain is precarious because if the company does not possess the raw materials that allow the industry to function or the relationship with the end-user, when the value chain is radically deformed by the transition, the possibility of loss is high. Firms should reflect on their position in their current value chain - if they are situated at the middle, they must prepare to shift downwards and secure a direct relationship with the final customer, or upwards and secure the strategic assets necessary to compete on their market.

For instance, airlines companies previously dominated the airline industry, however today they are compressed between the entities which operate airport facilities - the strategic assets - and the powerful marketplaces which sell the plane tickets. They are faced with the high expense of their planes and heavily unionized employees. It is difficult to cover the cost of operations with what remains of the value, as it is mainly attracted by airports and online travel agencies.

4. Opportunities exist to reposition within a value chain

The technological revolution generates mainly strategic issues for incumbents, however it additionally produces problems which call for a new product or solution. Providing a new product or solution that satisfies new customer needs is an opportunity for an incumbent to reposition themselves in their value chain.

The economy is becoming progressively more entrepreneurial, as an economy fueled by competition and networks is highly unstable due to network dynamics and network effects. Firms must be prepared in every industry to a high level of precariousness - many will disappear over time or technological companies will emerge to constantly reinvent their business model. This paradigm will expose workers to a number of risks that were inexistent in the previously stable

Fordist economy. Risks are generally regarded as serious issues, however in the case of the insurance industry they constitute opportunities to expand towards new markets, creating new employment and new products.

5. Entrepreneurs can become allies

Identifying issues without solutions, understanding that technology can solve those issues, learning to harness the outside power of the multitude by collecting data, orchestrating peer to peer contributions - these are the tasks that entrepreneurs undertake. Traditional companies and incumbents of every industry have difficulties adopting an entrepreneurial vision and must learn to collaborate with outsider entrepreneurs. Various possibilities of collaboration are conceivable: hiring and integrating entrepreneurs within the organization, investing in start-ups, deploying platforms for entrepreneurial use and sealing an alliance with entrepreneurs by co-signing a product.

CONCLUSION

Babak Nivi, venture capitalist and co-founder of AngelList, beautifully explains the importance of entrepreneurship in an economy driven by computing and networks: "entrepreneurship is the ability to serve a customer at the highest level of quality and scale simultaneously. We will learn to put entrepreneurship to great use, it will be the basis for an organization's differentiation and victory."

The key notion captured by this quote is the combination of scale and quality - in the past, companies were forced to choose between the two. Today, because of technology and the outside power, it has become possible to reconcile quality and scale, notably through machine learning and network effects. In this lies the art of entrepreneurship.



OASIS LOSS MODELLING FRAMEWORK: WHERE ARE WE ON THIS OPEN SOURCE INITIATIVE?



PAUL NUNN

Head of Catastrophe Risk Modelling –
SCOR Global P&C

Paul Nunn is responsible for pricing catastrophe risk on inwards business, and accumulation of catastrophe loss potential for natural hazard perils globally. A key aspect of the role is the provision of analytics and data for internal and external stakeholders including SCOR's internal capital model, rating agencies, regulators and retro-cessionaires. Paul is also responsible for directing SCOR's strategic Cat platform system development to facilitate more efficient deployment of capital to support the catastrophe risk SCOR is exposed to.

Alongside his role at SCOR Global P&C, Paul is a director of the non-profit Oasis Loss Modelling Framework company, an open source platform for developing, deploying and executing catastrophe models. He is also actively participating in the Insurance Development Forum working group on Risk Modelling & Mapping Group with the goal to improve global understanding and quantification of disaster risk, particularly in developing countries, to support and enable decisions on its mitigation, adaption and transfer. The focus is on creating a sustainable and accessible framework that promotes risk understanding and quantification.

Before joining SCOR Global P&C, Paul was Head of Exposure Management at The Corporation of Lloyd's and was responsible for all aspects of accumulation and concentration risks. Paul has held many senior level positions in catastrophe management having also worked for ACE European Group and Applied Insurance Research Ltd.

Oasis was constituted as a non-profit company in 2012; the OASIS Loss Modelling Framework is an open-source initiative, which provides to over thirty subscribing (re)insurance industry members:

- ◆ a platform for running catastrophe models;
- ◆ a web-based user interface;
- ◆ an API for integration with other systems, and;
- ◆ a Model Development Toolkit for developing, testing and deploying catastrophe models.

One of the rare industry-led and funded projects, the framework's existence illustrates the challenges faced by the loss modelling sector, which have led the industry to look past its competitiveness and collaborate on the issues at hand.

THE HISTORY OF CATASTROPHE MODELLING - A SUCCESS STORY

Insurtech, Fintech, etc. are currently generating a high level of excitement regarding the disruptions that are set to occur within the industry. However, thirty years ago, the development of catastrophe risk models was the focus of

similar enthusiasm as these models radically changed the quantification of risks in catastrophes, initially for hurricanes and earthquakes in the US followed by other peril regions of the world.



This new, multi-disciplinary approach combined science, engineering, insurance and software programming. Simply put, catastrophe models function by simulating thousands of hypothetically plausible physical events. These simulations create “synthetic experience”, as historical data is insufficient to create standard actuarial practices for catastrophes. With this approach, the (re)insurance industry

can adopt a probabilistic framework for catastrophe risk management, which has created a full new set of insurance jargon: Occurrence Exceedance Probability (OEP), Aggregate Exceedance Probability (AEP), Event Loss Table (ELT), Average Annual Loss (AAL), Tail Value at Risk (TVaR), etc.

In 2017, a record amount of insured losses for catastrophes was attained – USD 135 billion.

KEY ISSUES TARGETED BY THE OASIS LOSS MODELLING FRAMEWORK

If catastrophe modelling is largely a success story, what are the issues that have arisen? Why does the industry need to collaborate and innovate? Priorities differ by company, however the key issues listed are:

- ♦ **Choice** - the pioneers of CAT modelling at its inception thirty years ago were three distinct companies: RMS, AIR and EQECAT (owned by CoreLogic). These three providers subsist to this day since the barriers for entry for alternative providers of CAT models and their implantation on the market currently remains extremely high. Many in the (re)insurance industry consider this lack of real choice to be unhealthy.
- ♦ **Availability** - the initial models were created for US perils of hurricane and earthquake, and over time progress has been made in terms of constructing models for different countries and for different perils. However, a vast part of the world does not have access to appropriate models.
- ♦ **Openness and transparency** - the models are intellectual property-based products created by commercial organisations. These companies will not communicate the ‘secret sources’ which allow the models to function, else they could be replicated - this creates a “black box” effect.
- ♦ **Affordability** - CAT models are costly toolkits - they are expensive to license and to deploy, and they require large computing frameworks along with human resources for their operation.
- ♦ **Standards** - this is a common challenge for the insurance industry. In order to profit from present and future technologies and to continuously push the efficiency frontier, the (re)insurance industry must collaborate to implement standards concerning the construction of models, the description of hazards and vulnerability, as well as attempt to increase the amount of interoperability within the industry through global exposure standards.

OASIS LOSS MODELLING FRAMEWORK - PROGRESS UPDATE

Over thirty companies actively support the initiative and several landmarks have been attained over the past year:

- ♦ Full Open Source code published and free to download from GitHub;
- ♦ Accelerating adoption and operationalization;
- ♦ Increasing model choice in a cost-effective way;
- ♦ All “independent” model providers commit to make models available on the Oasis Platform, with over 80 models available from 15 suppliers in 2018;
- ♦ Reducing deployment costs;
- ♦ Deployment options are becoming cheaper and more flexible;
- ♦ Free testing environments and shared services currently being offered for most models;
- ♦ Working with Global Earthquake Model (GEM) to integrate OpenQuake models;
- ♦ Funding from the German Government to build freely available CAT models for the Philippines and Bangladesh;
- ♦ Building new Danube River flood model, which include climate change signals - this endeavour is funded by Horizon 2020.



B3I, THE BLOCKCHAIN INSURANCE INDUSTRY INITIATIVE: COMING NEAR YOU SOON



PAUL MEEUSEN
CEO, B3i

Paul Meeusen is CEO of B3i, the Blockchain Insurance Industry Initiative, that is overhauling the way insurance companies exchange data and trade risks.

He has over 25 years of experience in advising, building and operating teams in an international environment in the disciplines of finance, accounting, operational treasury, audit and risk control. Prior to reinsurance, he was a Director in the Financial Advisory practice of PwC and he started his career with a provider of treasury, cash management and financial planning software.

Paul designed the first blockchain use case for retrocession insurance in 2016, developed on Ethereum. He holds a Masters in economics from Leuven University (Belgium) and is a Certified Internal Auditor.

Launched in 2016, the Blockchain Insurance Industry (B3i) is a collaboration of insurers and (re)insurers dedicated to the potential of using Distributed Ledger Technologies within the industry. The collaboration led to the incorporation of B3i Services in Switzerland, which develops the original aims and objectives of the B3i Initiative to apply the potential of blockchain to the insurance industry.

THE SIX CORE CHALLENGES OF THE INSURANCE INDUSTRY

B3i's thirteen shareholders consider the following challenges to be critical and shared by the entire insurance industry:

- ♦ Closing/reducing the protection gap;
- ♦ Improving data quality and consistency;
- ♦ Reducing transaction costs;
- ♦ Entrance of new market participants;
- ♦ Enabling optimal utilization of data;
- ♦ Setting standards and enabling interoperability.

A video presentation summarizing these challenges can be found via [this link](#)¹.

THE INSURANCE INDUSTRY'S NEED TO ACT AS A NETWORK

What are the potential applications of modern technology for insurance risk exchange? Figure 1 illustrates the classic insurance process, where risk trickles down from the owner towards the rest of the value chain: reinsurance, retrocession, securitization, etc. With each intermediary, risks are packaged, and the data is aggregated in a specific way. The further down the value chain a company is, the greater the distance from the actual risk. The current process is too sequential, involves duplicate data entries and causes multiple reconciliations, process breaks and delays. It also hinders effective risk accumulation control.

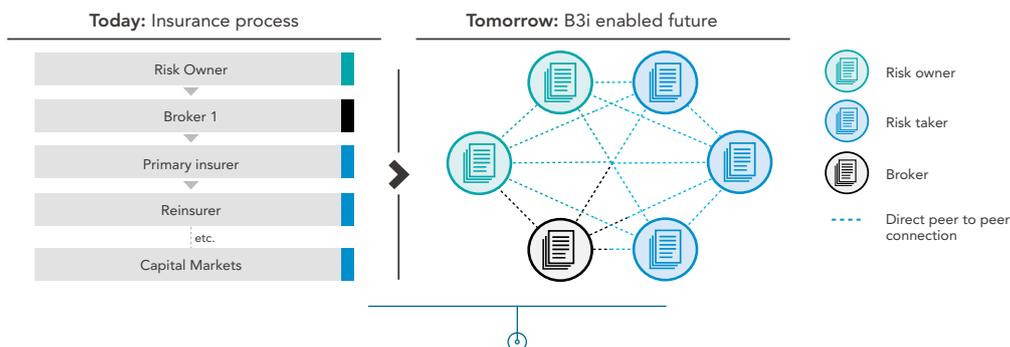


FIGURE 1: B3I - ENABLING THE INSURANCE INDUSTRY TO ACT AS A NETWORK

Source: B3i

1. <https://b3i.tech/single-news-reader/the-b3i-way-with-paul-meeusen.html>



B3i enables different business partners to create a network, as depicted in Figure 1. Blockchain gifts companies with the ability to share their data, while preserving their confidentiality – data can be cryptographically secured and only de-anonymized for other contract parties. Every party

has a node on the network which holds ‘smart contracts’ which embed the rules of the (re)insurance policies that parties have with each other. This way the data is not only exchanged more efficiently but also validated more effectively

B3i – VISION & ECOSYSTEM

The Blockchain Insurance Industry Initiative aims to help the industry to become more:

- ♦ relevant, in light of growing risk data volumes;
- ♦ affordable, by creating network efficiencies.

Over the course of two years of existence, B3i has developed an ecosystem of products and services around the platform, represented and explained in Figure 2.

B3i believes that the industry should be able to self-develop specific applications. Such applications currently exist in the marine industry, with examples such as Insurwave, a platform which has prototyped marine hull insurance on a blockchain platform. B3i’s ambition is to allow the products to coexist on a unique platform. The network also will incorporate partner services, from providers such as RMS (Risk Management Solutions): risk modelling, risk indexes, risk loss reporting, rating data.

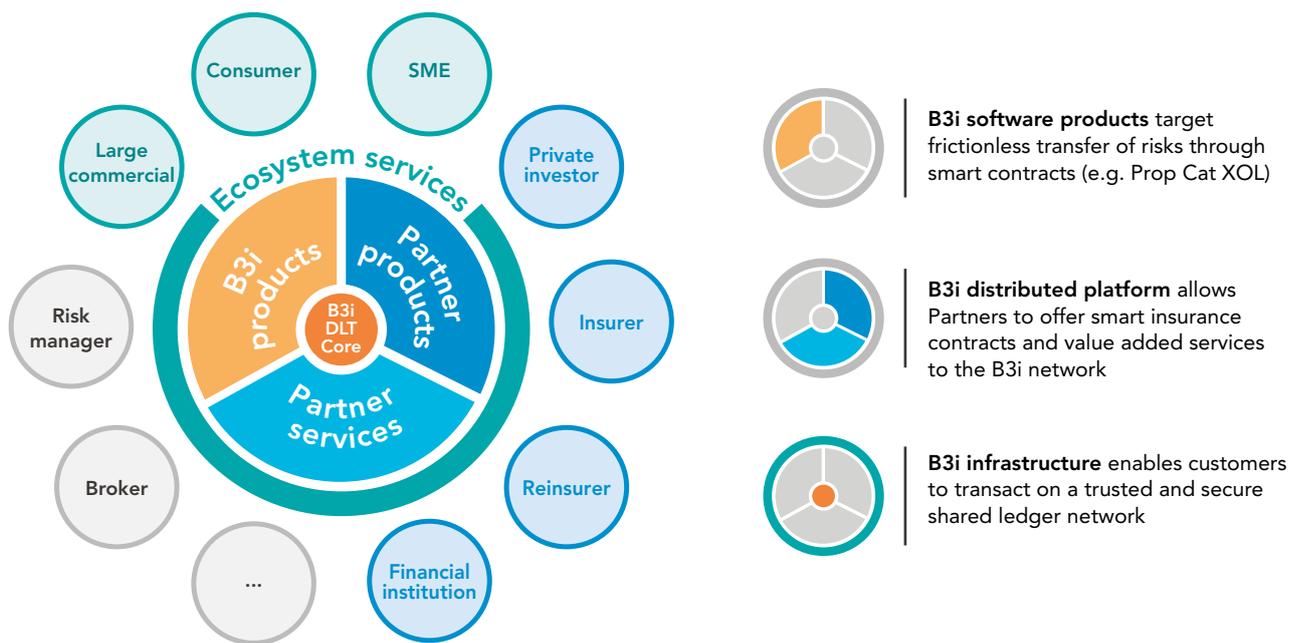


FIGURE 2: THE B3i ECOSYSTEM

Source: B3i



PRACTICAL CASE – NAT CAT INSURANCE PROCESS TRANSFORMATION

As shown in Figure 3, B3i offers a simplified process for Nat Cat insurance. The placement part - which exchanges exposure data from parties seeking loss cover, via brokers, towards a panel of (re)insurers - traditionally takes up to several weeks. B3i allows for a more efficient exchange of submission and exposure data, a single and shared counter party check. Similarly, in the post-event process, an Oracle provides weather data and information reverent to the characterization of a Nat Cat event, inherently reducing settlement latency.

B3i is launching a first version of such a Nat Cat application with the go live of its Nat Cat excess-of-loss (XoL) application that will be used by first clients at the 1.1.2019 renewal. The introduction of this first product is closely guided by B3i through its "Early Mover Programme" (see [link²](#) for detail) by which a group of insurers, brokers and (re)insurers who renew contracts with each other will pioneer in placing there contracts for the first time enabled by the B3i network. B3i aims to make its first users more familiar and comfortable with the new technology and experience hands-on the benefits that it can provide, such as increased contract certainty.

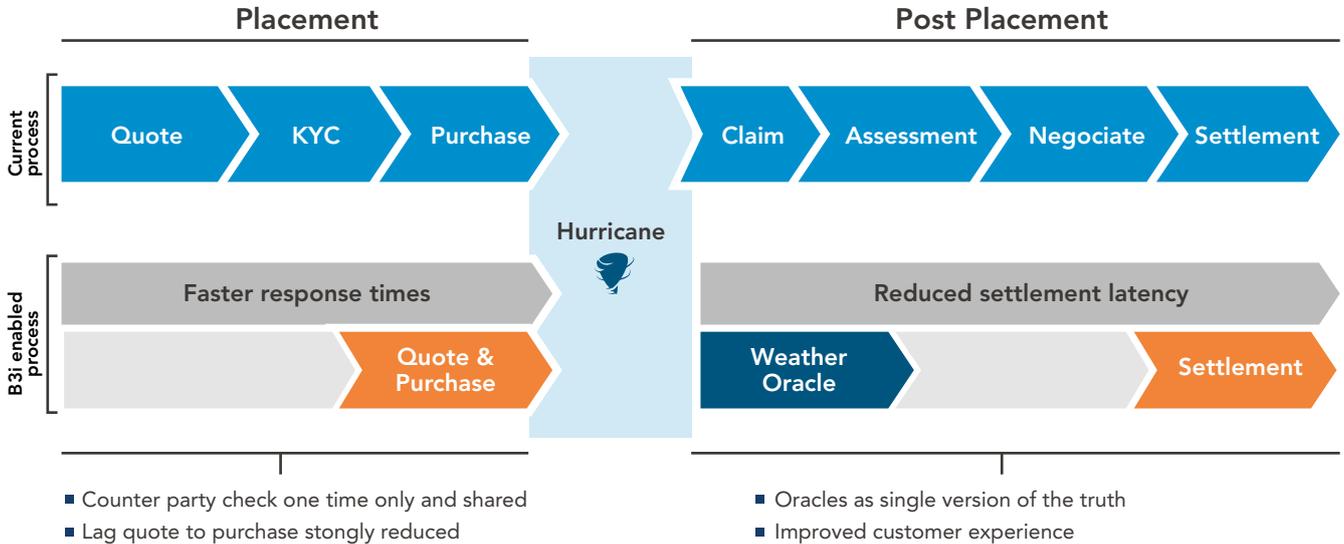


FIGURE 3: NAT CAT INSURANCE PROCESS TRANSFORMATION

Source: B3i

2. <https://b3i.tech/single-news-reader/interview-b3i-will-make-it-happen-regis-delayat-monte-carlo-2018.html>



INDIAN EXAMPLES ON HOW TECHNOLOGY CAN SUPPORT SMEs AND AGRICULTURE'S INSURANCE MARKETS



ANUJ TYAGI
Executive Director
& Chief Distribution Officer, HDFC ERGO

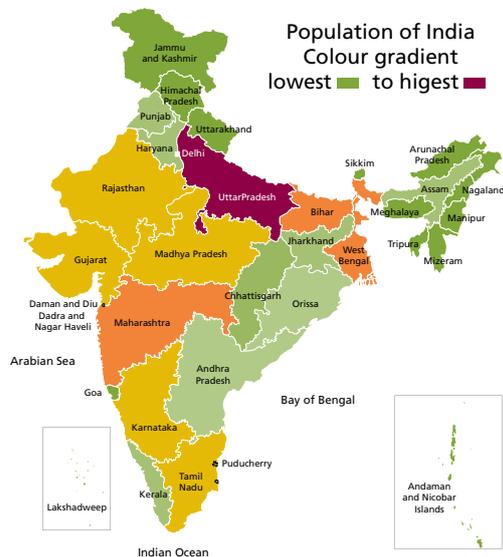
Anuj is the Executive Director and a Board Member at HDFC ERGO.

He joined HDFC ERGO in 2008 as Head of Corporate Business Group and has worked with various departments over the years. He currently heads Business, Claims, Underwriting, HR and Reinsurance functions at HDFC ERGO. After completing his Post Graduate Diploma in Business Management, Anuj began his career with SIDBI and entered the BFSI sector and has been working in the BFSI industry for past 17 years, of which a decade has been with the HDFC group.

HDFC ERGO's activities are located in India - a country which eats, breeds and sleeps technology, with 500 million smartphones, between 5 and 15 million e-commerce transactions and 50% of the population aged below 35. As a country at the heart of technology-related innovations today, in India, technology is about survival.

ECONOMY OVERVIEW

Numerous differences can be noted between Europe and India, as detailed in Figure 1. Despite measuring a third of the area of Europe, India possesses roughly double the population and most notably an incredible language barrier: 22 official languages are spoken, 65 languages are registered and the nation accounts for over 2000 local dialects. The difference in language in northern, southern, eastern and western regions is joined by cultural disparities - despite these differences, the insurance industry must transact and provide for every population within the country. Generally, the GDP is growing exponentially - 8.2% during the last quarter - while the penetration level of insurance and the premium *per capita* remain low. The per policy premium is particularly low which confronts Indian insurance companies with the reality of selling policies at low per ticket premium while remaining commercially viable.



	Europe	India
Population	~ 0,75 bn	~ 1,35 bn
Area (mn sq. km)	~ 10,3	~ 3,3
Languages	23 official (~ 60 regional)	22 official (~ 2000 local dialects)
GDP per capita (PPP)	€ 33,200	€ 5,450
GDP growth (Last QTR)	2,1%	8,2%
Insurance (Prem as % GDP)*	2,7%	0,8%
Insurance (Prem per capita)*	€ 560	€ 11

FIGURE 1 : INDIA – PENINSULAR REGION WITH DIVERSE CLIMATE, GEOLOGY & TOPOGRAPHY
Source: world population review, maps of India, Special Euro barometer 386 report, tradingeconomics.com, Swiss Re sigma No. 3/2017 *Non-life insurance



NON-LIFE INSURANCE INDUSTRY OVERVIEW

With the Compound Annual Growth Rate growing by 17% over the past 15 years, the Indian Non-Life industry represents:

- ♦ 33 players (multiline: 25, monoline: 8);
- ♦ EUR 19 billion of premium written in 2017;
- ♦ 190 million policies issued in India, of which on an average one out of nine resulted in a claim;
- ♦ An average ticket size of EUR 100;
- ♦ Over 11.000 offices;
- ♦ 10 reinsurance companies (Indian: 1; foreign branches: 9);
- ♦ Over 425.000 agents;
- ♦ A market divided between:
 - › Motor: 39%
 - › Health: 28%
 - › Crop: 17%
 - › Corporate: 16%

SMALL TO MEDIUM ENTERPRISES IN THE INSURANCE LANDSCAPE

One of HDFC ERGO's major initiatives was to reach out to SMEs in India - a market segment which represents significant opportunities for (re)insurers.

As shown in Figure 2, SMEs are sizably contributing to corporate lines - between 17% and 20%. For instance, 20-25% of property portfolio premiums and 20% of marine portfolio premium are contributed by SMEs. Direct marketing is impractical in this segment, due to smaller ticket size and a wide geographical spread - 465.000 villages and approximately 210 districts. As such, brokers are an important channel for the development of an SME portfolio.

In insurance, SMEs are defined by:

- ♦ Insured sum below EUR 12 million (1 billion INR);
- ♦ Wide distribution across the country in industrial and in tier 2/3 cities;
- ♦ Low usage of technology.

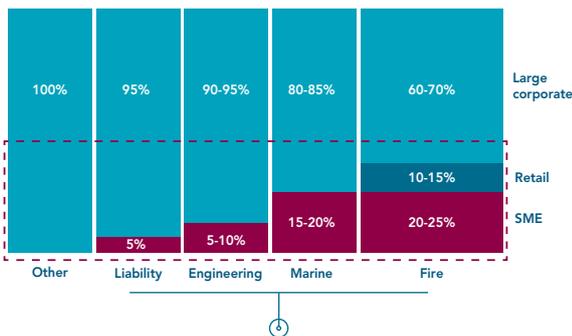


FIGURE 2: INSURANCE LANDSCAPE: OPPORTUNITY BY SEGMENT BASED ON THE FICCI REPORT "INDIA-GENERAL-INSURANCE-VISION-2025"

Source: IRDAI, BCG analysis

The market is predominantly written by state owned companies, which possess a wider distribution reach. The loss ratio is generally sufficient on a larger volume and relatively surpasses that of large corporate portfolios - however, the claims settlements administered by state owned companies are far from satisfactory.

The main challenge faced by Indian insurance companies is one of scalability, due to the need for a risk engineer to assess the quality of each individual risk. Additionally, as the ticket premium is relatively low - less than EUR 1500 per policy - inspection costs can reach so far as 50% of the premium.

For all the reasons listed above, SMEs portfolios were initially largely unattractive to insurance companies in India.

SME - A MAXIMIZATION STRATEGY

Faced with these challenges, HDFC ERGO decided to apply technology as a solution and elaborated the strategy described in Figure 3. Within the framework of a separate business vertical - focusing solely on SMEs - a mobile application was launched, as a one-stop solution for SME-related issues. More specifically, the app enables any authorized app user (agent, broker or branch staff) to inspect and rate risk on a scale. The risk profile is captured by uploading videos, photographs and questionnaire responses into the application. Then, the underwriter accesses the portal and calculates the risk basis and risk score - this risk score and app output is then available to the client on the underwriting portal.

There are numerous advantages for both the insurer - scalability, underwriting oversight, risk improvement specific to SME and spread of activity - and the insured - quick service and cost-effective risk advisory services specific to their requirements, which results in lower long-term costs.

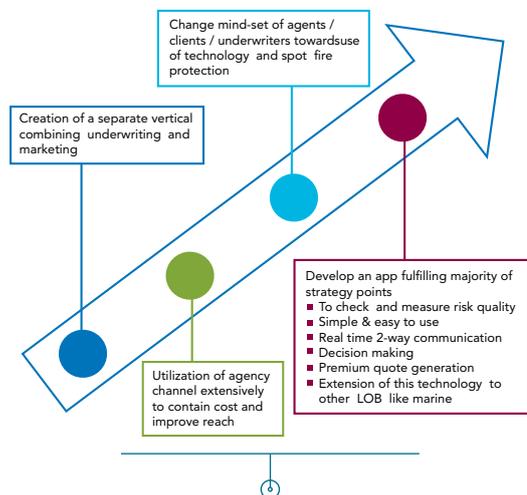


FIGURE 3: STRATEGY TO SCALE UP



AGRICULTURE INSURANCE LANDSCAPE

Agriculture insurance is the third largest insurance product in India, with roughly 17% of revenue generated by crop insurance - a government sponsored scheme which provides insurance to approximately 58 million farmers. 70% of the Indian population lives in rural areas of the country and 52% are employed in the crop sector. A new scheme Pradhan Mantri Fasal Bima Yojana (PMFBY) was launched in 2016, with an increased scale of finance, low premium rates and which introduced add-on covers.

In terms of crop insurance, HDFC ERGO is the 2nd largest private insurer, possessing 9% of market share and covering over 7 million farmers in last two years. The company is a prominent thought leader within the industry, a member of a committee formed by the World Bank and the government of India.

The agriculture insurance sector does present certain challenges:

- ◆ manual crop acreage estimation;
- ◆ delay in receiving crop health statuses for reserving;
- ◆ non-representative yield data due to manual Crop Cutting Experiments (CCEs);
- ◆ delay in claim settlements due to large CCE timeframes.

USE OF TECHNOLOGY IN AGRICULTURE INSURANCE - CLAIMS MANAGEMENT & TECHNOLOGY

HDFC ERGO developed a monitoring mobile application which delivers the GPS, as well as the latitude and longitudinal coordinates of plots selected by the government for CCEs. The application captures video, images and geographical coordinates. Through this application, the issue of wrong selection of sample plot can be addressed, thus limiting anti-selection. Additionally, the application ensures – that the assessment will be signed by the government representative, processed through the application to the insurance company for confirmation, providing a full-proof system.

HDFC ERGO carried out 38000 CCEs in 2016, which covered 83% of their exposure that year.

Case study: usage of satellite imaging

In the context of CCEs, HDFC ERGO has resorted extensively to the use of satellite technologies and Normalized Differential Vegetative Indexes (NDVI) data. This technology usage has resulted in a reduction of claims, reaching approximately EUR 13 million.

To this day, there remain occurrences of CCEs without the use of HDFC ERGO's mobile application or the presence of an insurance representative, for reasons such as urgency. To counter this, the company relies heavily on crop satellite imaging, an aid to estimate yield - however, the correlation of NDVI data with the actual yield is still not fully established.

In one instance, an agency communicated a yield estimation following a major crop incident, with a high loss ratio. The satellite images reported yield estimation was dated to the 22nd of November. HDFC ERGO possessed satellite images of that same crop for the 28th of October (Figure 4) and the 17th of November 2016 (Figure 5).

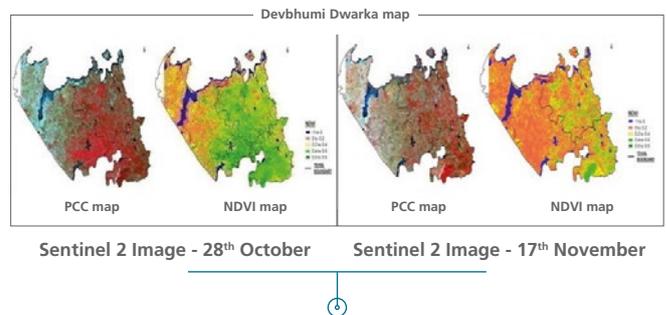


FIGURE 4 & 5: CROP AVAILABILITY STUDY

Source: Sentinel 2 Image

These images were used to settle the case with the actual yield situation on the ground.



USE OF TECHNOLOGY IN AGRICULTURE INSURANCE - DRONES, THE FUTURE OF CROP LOSS ASSESSMENT

In addition to the mobile application, the extensive use of satellite imaging and Normalized Difference Vegetation Index (NDVI) data, HDFC ERGO deploys Unmanned Aerial Vehicles (UAVs), commonly referred to as drones. Remote sensing through UAVs permits non-destructive sampling, to observe agronomic indicators in every square meter. These aircrafts can capture images every fifth second and provide geo-referenced images.

Flying drones in India requires an authorization from the Ministry of Civil Aviation. However, the usage of drones, along with satellite images is undeniably the future of crop loss assessment and could replace CCEs. Through their use at various stages of the crop cycle, governments can accurately prepare their treasury in the event of an intervention and insurance companies are able to plan their risk mitigation and advise farmers on the appropriate practices.

Case study: the usage of drone technology

An unprecedented, flood occurred in a village located close to Mumbai. Initially, the local body assessed the risk and required the insurance.

The images and videos captured by the drone were extrapolated to a village level, as featured in Figure 6, and the results ultimately differed from the report - the actual losses calculated were lower against initial loss estimates.

Below mentioned picture taken for a village where loss affected area was around 9%

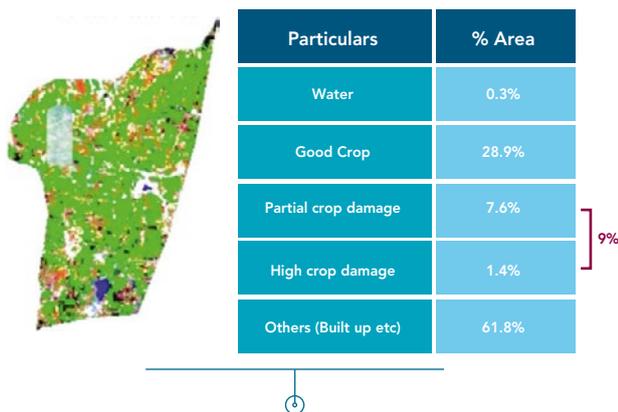


FIGURE 6: SAMPLE DRONE IMAGE THAT WAS CAPTURED

Source: HDFC ERGO

OTHER TECHNOLOGICAL INNOVATIONS: PICTURE BASED CROP INSURANCE

Crop insurance has an inherent problem: the business relies on an area-based system, which takes sample information from an area and extrapolates it to a larger unit. A field can suffer a loss; however, the extrapolation can assess an absence of loss - this situation is referred to as the basis risk.

As a response to this issue, HDFC ERGO has been collaborating with International Food Policy Research Institute (IFPRI) on the development of the Picture Based Crop insurance claim settlement. The pilot project is being carried out in six districts in Haryana and Punjab, for Rabi wheat crops. The project objective is, through the usage of geo-tagged pictures provided by a farmer, to detect crop damage, in order to reduce the basis risk and cost of loss verification. This application eliminates suspicion of tampering, moral hazard and adverse selection in the first season.

Areas for future research include:

- ◆ Agro-advisory services, no-claim discounts;
- ◆ Developing automated procedures for identifying damage;
- ◆ Identifying growth stages from pictures to improve index product.



NEW TECHNOLOGY APPLIED TO ENHANCE PRODUCT OFFERING AND INSURANCE SERVICES TO AGRICULTURE: CONCRETE EXAMPLES



MICHAEL RÜEGGER

Deputy CUO Agriculture, SCOR Global P&C

Michael Rüegger is Deputy Chief Underwriting Officer of the Agriculture specialty team at SCOR and was at the origin of the building of the current Agriculture underwriting team, responsible for many emerging countries such as China, Korea, Turkey, Russia and some further European Countries, and Latin America including Brazil.

He holds a master's degree in environmental sciences from the Federal Institute of Technology in Switzerland. Before joining the reinsurance industry, he worked in Alpine natural disaster prevention and spent several seasons as a herdsman. In 1998, he joined the Winterthur Insurance Group in the department for Strategy and Organization, before entering, the reinsurance department of Winterthur Insurance as a junior agriculture underwriter in 1999.

During the merger of Winterthur Re with Partner Re in 2000, he took over the coordination of the Latin American operations of the new Agriculture department at PartnerRe, located in Buenos Aires, Argentina. In 2003, he joined GE Insurance Solutions to re-structure GE IS Latin American Operations in agriculture and then joined SCOR in 2006.



FANNY ROSSET

Senior Underwriter Agriculture,
SCOR Global P&C

Fanny Rosset is a Senior underwriter at SCOR Global P&C with 12 years' experience in agriculture reinsurance, including 5 years as a pricing actuary.

Fanny graduated with MSc. in Actuarial Sciences in 2006. After graduation, Fanny joined SCOR as a pricing actuary for property and agriculture businesses, then specialized in agriculture business.

SPECIFICS OF AGRICULTURE PRODUCTION

When discussing agriculture insurance, an important notion to integrate is that the science concerns living systems, capable of resolving its issues or dying. In such, each crop season is unique and depends upon multitudes of factors (external and internal to each farm).

- ◆ Historical field performance analysis: field analysis, soil type, intra-field variabilities, crop rotation, etc.
- ◆ Season planning: sub-soil moisture, season weather forecast, crop prices, etc.
- ◆ In season decision: best planting dates, agronomic prescriptions, seeding rates, etc.
- ◆ Creating an index which takes all above-mentioned into account is a difficult if not impossible endeavor.



Crop production is increasingly becoming a data driven process, with producers making use of extensive sets of technology-driven tools which attempt to increase efficiency, output and ultimately profitability. The insurance industry and their products need to equally adjust to these evolutions and take advantage of the evolving technology available.

CONCERNS TO OVERCOME

SCOR possesses a global mandate, allowing its teams to cover various territories, market specificities and farming practices. One particular feedback is common among the territories observed by the teams: producers are reluctant to purchase agriculture insurance. The reasons vary: lack of information, high expense, insufficient cover, lack of access, the belief that the government will intercede in the event of a disaster, etc. Similarly, the (re)insurance industry has expressed concerns regarding this specific business venture: heavy infrastructure costs, long investment & testing cycles, difficult insurance penetration, slow portfolio development, volatility of results and income, portfolio diversification, asymmetry of information, moral hazard, anti-selection, etc.

It has become necessary to change this paradigm in order for insurance to become a fully integrated tool in production risk management. For this to occur, the insurers' and producers' interests must be aligned, with insurance products rewarding best farming practices. The common goal must be the stabilization and optimization of producer returns.

KEY TAKE-AWAYS

Agriculture concerns are living systems, seasonal dynamics and resilience:

- ◆ Data quantity and availability do not mirror biological reality - only new methods and interlinks between data can approach agriculture realities on the ground.
- ◆ An important part of product roll-out is driven by testing, as well as discussing the results with clients, which makes it a long-term undertaking.

New technologies are tools, not methods:

- ◆ The development of a new tool does not change reality.
- ◆ An in-depth understanding of the socio-economic farming environment is key.

Case study: Mongolia

The Mongolian government and SCOR have a long-lasting relationship through livestock insurance. Several years ago, the government decided to develop their agriculture production, specifically wheat as the good is too expensive to import and the nation is not self-sufficient - agriculture insurance is part of this strategy due to extreme weather conditions. Mongolia is composed of comparatively large farms and fields, in vastly remote areas and their coverage at the time consisted of a traditional MPCI (Multi-Peril Crop Insurance) cover, which had been in place for two years.

The approach undertaken in Mongolia to model wheat yields was composed of several elements:

- ◆ Calibration of plant models for wheat, specific to Mongolian circumstances;
- ◆ Yields generated artificially on the basis of weather data over the past ten years (5x5 km pixels);
- ◆ Aggregation of yield outputs on logical geographical units;
- ◆ The purchase of an insurance policy based on location;
- ◆ Trigger of a pay-out based on actual weather conditions and the calibrated model (according to seed variety and the planting date).

Several challenges presented themselves:

- ◆ Different grid lengths of data;
- ◆ Detrending of yields;
- ◆ Geographical aggregation;
- ◆ Calibration of model: as insurance incorporates outliers, is the model able to match all pay-out cases?

- ◆ Insurance needs to be in line with new farming trends and adjust their product design and offer accordingly.
- ◆ Data collection, storage and computing power are no longer a challenge - the application will be the differentiator.
- ◆ Data cleansing and validation is complex - outliers must remain the focus.

New technology should not replace traditional methods, but enhance them:

- ◆ The roles of agriculture insurance will evolve from a pure loss compensation role to become an advisory partner for producers.
- ◆ "Boots on the ground" will remain a relevant part of agriculture insurance.



PRODUCT DEVELOPMENT IN LIFE (RE) INSURANCE - INNOVATIONS WHICH SAVE LIVES



BARTHÉLÉMY PHILIPPE

Head of Health Assessment and Improvement, SCOR Global Life

Barth is SCOR Global Life’s Head of Health Assessment and Improvement. He oversees the provision of health assessment services (medical underwriting – both traditional and automated), the deployment of solutions that will improve the health of both new and in-force policyholders, and the “SCOR Life and Health Ventures” arm, established to create and invest in a community of trusted partners to enhance the value proposition of SCOR Global Life.

Barth’s previous roles with SCOR included General Manager of SCOR Global Life Canada, and Global Head of Strategy & Development for Life. Prior to joining SCOR, Barth was a Vice-President with a global Venture Capital fund, originating, executing and managing investments in the US and in Europe.

When contemplating scientific innovation, SCOR considers two main questions: what is the main purpose that we serve? What role do we wish to play? Historically, the life and health insurance business has mostly relied on two tools - mortality tables, which provide the basis for pricing new policies, and death certificates, which are the proof that a claim must be paid. However, beyond the mechanics, it is important to remember that for each claim that occurs,

a life is lost. This is the very nature of the life and health insurance business and by apprehending this notion, the industry can be motivated to create new products and act beyond pure risk taking.

The mortality business, more specifically the mortality related to the human heart, powerfully crystallizes all of the elements that are typically embedded into the innovation concept.

THE ISSUE AT HEART

Cardiac arrest is the main cause of death in the majority of countries – actually, in all lower middle, higher middle- and upper-income countries. Every year, 600000 people suffer from sudden heart stoppages in the United States alone.

In lower income countries, heart-related conditions rank third as cause of death, however they are the largest non-communicable cause of death (i.e. excluding infections and nutrition issues).

As an aside, cardiac arrest should not be mistaken with a heart attack, as it refers to “the sudden, unexpected loss of heart function, breathing and consciousness [which] usually results from an electrical disturbance in [the] heart that disrupts its pumping action, stopping blood flow to the rest of [the] body”¹. Typical consequences, in case of survival, are most often neurological.

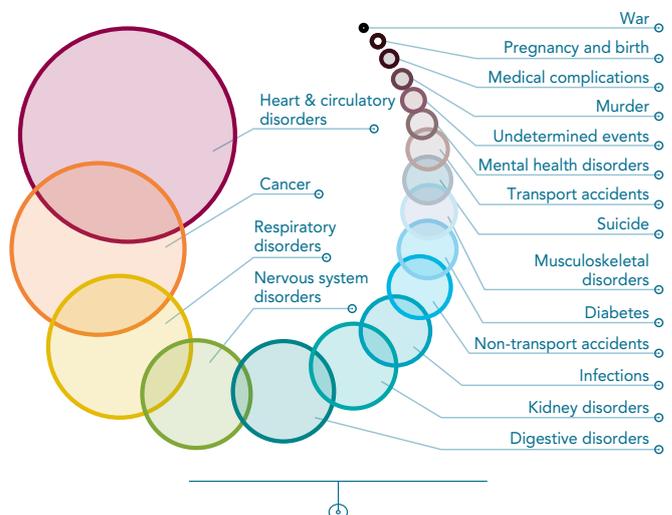


FIGURE 1 - DEATH CAUSES IN UNITED KINGDOM

Source: National Health Services

1. Mayo Clinic



SURVIVING CARDIAC ARREST

For every minute that passes without intervention, a cardiac arrest victim's survival chance drops by 10%. Figure 2 illustrates the various scenarios of a cardiac arrest occurrence and how they influence survival rates. Without a witness, the chance of survival is abysmally low; which is the biggest issue as two-thirds of cardiac arrests happen in closed spaces, such as at home or in a building. The scenario with the best survival rate is the presence of a witness, the ability to get trained help very quickly, and access to a defibrillator.

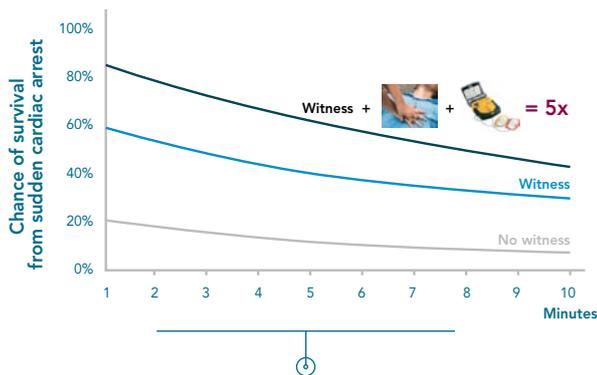


FIGURE 2 - CHANCE OF SURVIVAL AFTER SUDDEN CARDIAC ARREST
Source: iBeat

This combination multiplies by five the survival rate of cardiac arrest victims.

IBEAT, THE HEART MONITORING SMARTWATCH

Based in San Francisco, iBeat is a start-up which has developed a heart monitoring smartwatch, capable of saving lives. Equipped with medical grade sensors, the watch accurately tracks heart rates and blood pressure changes and can detect oncoming cardiac arrests. If the wearer's heart is in danger of stopping, iBeat will immediately alert the emergency contacts listed on the device and the emergency services. The user can also trigger the watch, in the event of a fall, to connect a dispatch team, which will send immediate assistance.

SCOR LIFE & HEALTH VENTURES

In 2018 SCOR created its own venture investment arms. On the Life & Health side, the focus of is purely on start-up companies that can help enrich SCOR's value proposition towards its customers (i.e. Life & Health insurers).

The start-up also developed the Heart Hero Network smartphone app in the United States. The app has been installed by 1.4 million people who by joining the community have declared themselves ready and able to volunteer within the network - most of this population are trained professionals (firefighters, police agents, citizens, etc.). They will be alerted by the app in the event of a cardiac arrest in close vicinity. If the circumstances allow for this, the watch will alert two volunteers - one who could perform manual resuscitation and the second would be informed of the closest publicly available defibrillator and join the victim with the device.

SCOR & IBEAT COLLABORATION

The collaboration between iBeat and SCOR was made possible by a shared vision and mission - SCOR strives to contribute to the welfare and resilience of society, while iBeat's mission is to "empower people to be fearless, explore and live longer lives", and their vision is to "make the world feel safer by giving people the fastest access to care in an emergency".

The iBeat product strives to lower mortality rates linked to cardiac arrest. Together with the moral considerations regarding mortality, SCOR joins iBeat in this endeavor as claims caused by circulatory and heart related diseases represent a yearly cost of roughly one billion euros. The alignment of economic incentives thus matches the alignment of values between both companies.

The partnership between SCOR and iBeat has two components:

- ◆ investment, by buying equity into the company as part of their financing round;
- ◆ a more classical commercial partnership, with the intent to subsidize the cost of purchasing the device and of subscription to the service for certain portions of the SCOR portfolio, particularly in the US.

The goals of the venture, in regard to iBeat in particular and innovation in general, are to:

- ◆ Enrich the reinsurance value proposition;
- ◆ Save lives & improve the overall mortality experience;
- ◆ Increase the insurability of people with health risks.



HOW PARAMETRIC (RE)INSURANCE CAN SUPPORT THE DEVELOPMENT OF INSURABILITY



VINCENT FOUCART

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

Vincent Foucart is a graduate of ENSTA (École Nationale Supérieure de Techniques Avancées), HEC (Ecole des Hautes Etudes 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.

INTRODUCTION INTO PARAMETRICS

The insurance market is evolving, however key challenges remain, such as:

- ♦ The protection gap: over 90% of emerging Asian catastrophe losses are uninsured, earthquake losses are largely uninsured worldwide and the insurance gap is continuously increasing over time.
- ♦ The evolution of the corporate risk landscape: business interruption remains the main concern for many risk managers and the speed of settlement and the clarity of triggers are still a concern.
- ♦ The rise of digital and the Internet of Things: an estimated 20 billion connected devices in the world by 2020 are enabling an increase of pricing precision instant selling, faster settlements and lower costs.

WHAT IS PARAMETRIC?

Parametric insurance, or index-based insurance, pays out benefits based on a pre-determined index for the loss of assets and investments as a result of weather or other catastrophic events. In contrast, traditional insurance relies on assessments of the actual damage.

SCOR further elaborates on the matter by describing an insurance or derivative product with a payout structure that does not solely depend on protection buyer's incurred loss but rather is linked to an externally observable variable or index (e.g. weather, market loss, prices).

The main advantage of parametric solutions is the speed of pay-out, as the objective of this type of mechanism is to provide the most efficient calculation of a pay-out and lowering the dispute risk. It is commonly advised to place parametric cover as a natural complement to a traditional insurance programme.



FIGURE 1 - FROM TRADITIONAL TO PARAMETRIC COVERS

1. Transmission & Distribution network - 2. Business Interruption
Source: SCOR

THE PARAMETRIC MARKET

Historically, parametric products - whether they are pure weather-derivative or commodity-weather combined - were developed by energy companies.

However, combination products have also been launched, with a dual trigger of natural event and damage observed on the insured assets.

A field of parametric insurance has been developed for corporate entities that are affected by events not directly damaging their assets but creating a business interruption or activity loss. In that respect, certain payouts based on the number of days of factory closure have been an interesting addition to traditional programmes.

Solutions based on a fixed pay-out in case of observed data (weather or non-weather, Cat or non-Cat) have been

developed. This trend is of note as it is not solely related to corporate clients, but equally public authority entities, SMEs and individuals.

BASIS RISK MANAGEMENT & THE EFFICIENCY OF PARAMETRIC SOLUTION

The difference between the ultimate net loss of a claim and the actual payout of the index is referred to as the basis risk. There are cases of negative basis risk, where the parametric payment is lower than the ultimate net loss encountered by insured, and of positive basis risk, where the payments exceed the ultimate net loss suffered.

Basis risk is managed by optimization algorithms and the combination of extensive use of available data sources and experience on the perils.

CASE STUDIES

The energy and the agriculture sectors have been the drivers for parametric solutions globally, for rainfall, temperature or observations of vegetation development. The construction sector has equally been interested in parametric techniques, typically in cases of delay in construction due to heavy rainfall and low temperatures. Other interested sectors include, as listed in Figure 2, sports & events, retail, transportation, travel & leisure, and public authorities.

Sector	Risk factor	Consequences
Energy	Rainfall, Temperature, Wind, Sunshine	Energy demand by consumers Production capacity
Agriculture	Rainfall, Temperature	Impact on yields
Construction	Temperature, Wind	Work interruption Extra costs and late penalties
Sports, Events	Rainfall	Cancellations
Retail	Rainfall, Temperature	Decrease of sales
Transportation	Ice, Snow	Access, Cancellations
Travel, Leisure	Rainfall, Snowfall, Temperature	Customer satisfaction
Public Authorities	Rainfall/Snowfall, Temperature	Costs of snow removal, salting

FIGURE 2 - POSSIBLE APPLICATIONS OF PARAMETRIC SOLUTIONS

Source: SCOR



EXAMPLE OF PARAMETRIC SOLUTIONS FOR CORPORATE CLIENTS

The following case studies (1 to 5) illustrate the benefits of such covers for corporate clients.

Case study #1 - Revenue shortfall protection for hydro power generation

CLIENT PROFILE: the turnover from hydro generation dropped by over two-thirds following a catastrophically dry year. The client was interested in limiting similar impacts in the future and willing to consider expanding their insurance programme by having a parametric cover for lack of rainfall.

SCOR'S POSITION:

- ◆ Protecting revenue directly is difficult due to moral hazard and regulatory interventions redirecting flows;
- ◆ A parametric index was developed based on river flow data exhibiting 95% correlation with actual production;
- ◆ Payout based on defined layer and fixed price per GWh;
- ◆ Term one to five years.

BENEFITS:

- ◆ Revenue floor: transparent minimum guaranteed revenue;
- ◆ Multi-year volatility management;
- ◆ Financing flexibility: can pre-finance or post-finance losses in successful years, similarly to a swap structure.

Case study #2 - Combining traditional and parametric coverage for a solar park

CLIENT PROFILE: the investor of a 100MW solar park wanted to protect its cashflows against the impact of standard property damage, consequential loss, but also the lack of solar irradiation loss.

SCOR'S POSITION: Combine traditional coverage, structured elements and parametric approach:

- ◆ Property damage and consequential loss coverage on all risks;
- ◆ Solar irradiation shortfall:
 - › Based on third party estimate of annual irradiation;
 - › Shortfall below 85% of expected irradiation;
 - › Payout covering approximately 30% of actual financial shortfall.

BENEFITS:

- ◆ Fixed cost: cost can be budgeted for the whole project duration;
- ◆ Holistic coverage: combining traditional and parametric elements;
- ◆ Structuring flexibility: uninsurable risks can be financed over time.

Case study #3 - CAT protection for T&D Lines provides budgeting certainty

CLIENT PROFILE: Transmission & distribution network in Eastern Asia exploring alternative ways for protection against Wind and Quake. A parametric approach was preferred as T&D is traditionally considered uninsurable with unpredictable loss potential.

SCOR'S POSITION:

- ◆ Bespoke parametric index developed by peril to proxy actual damage;
 - › Earthquake based on US Geological Survey Shakemap (post event measurements);
 - › Windstorm index based on extrapolated windspeed field from the observed typhoon track;
 - › Rain index following typhoon based on satellite imagery;
- ◆ Localized approach with exposure represented by Province weights;
- ◆ Term: three years.

BENEFITS:

- ◆ Cash flow: fast settlement based on available weather/Cat measurements;
- ◆ Cost predictability: fixed cost (advantageous for a government owned business);
- ◆ Structural flexibility: implement any deductibles or bespoke "rain following typhoon" structures.

Case study #4 - Solar power plant cover against lack of rainfall

CLIENT PROFILE: a solar power plant requires water to cool down its innovative mechanism and engines. It faces the paradox of not being able to operate following long-term drought periods and an empty water reservoir hinders its ability to benefit of sunny and warm days.

SCOR'S POSITION:

- ◆ Considering accumulation of rainfall over multi-year periods;
- ◆ Structuring a "put option" payment if rainfall falls below a given strike point;
- ◆ Commensurately to a fixed tick value;
- ◆ Rolling over calculation periods.

BENEFITS:

- ◆ Compensate lack of revenue from inoperative plant.

Case study #5 - Attendance shortfall at water park due to rain

CLIENT PROFILE: a worldwide operator of entertainment parks wants to protect their revenues from attendance fluctuation due to the rain.

SCOR'S POSITION:

- ◆ Definition of an index: number of days between June and September with rain level higher than a given threshold;
- ◆ Payout is agreed per attendance shortfall measured in the index
- ◆ Historical measures indicate that recent years are not exceptional, leading to a relatively expensive cover => coverage is limited in excess of a threshold.

BENEFITS:

- ◆ Compensate lack of revenue.



EXAMPLE OF PARAMETRIC SOLUTIONS FOR INSURANCE CLIENTS

The following case studies (6 to 8) illustrate how parametric reinsurance can benefit from insurance companies supporting local economy in disruptive regions.

Case study #6 - Multiple-trigger coverage for volcanic eruption

BACKGROUND:

- ♦ Volcanic regions in Japan are also centers of intense economic activities: some volcanoes shelter tourism like Mounts Fuji, Bandai and Zao, and Mount Sakurajima hosts the activities of the large city of Kagoshima;
- ♦ Evacuation or warning for eruptions is prejudicial to tourist industries or SMEs.

SCOR'S POSITION:

- ♦ Considering warning level in relation to the normal level of volcanic activities;
 - › Mounts Fuji, Bandai and Zao are less active zones but a warning level of 4 out of 5 can scare tourists away;
 - › Mount Sakurajima is very active but evacuation (level 5) would paralyze the economy;
- ♦ Building an index combining warning level, effective eruption and evacuation order.

BENEFITS:

- ♦ Protection and support of industry and services in catastrophe-exposed area;
- ♦ For an immediate fixed payout to policyholders;
- ♦ Fixed costs and budget certainty;
- ♦ Manageable basis risk through double trigger.

Case study #7 - Parametric earthquake reinsurance in Taiwan

CLIENT: Insurance Company

TERRITORY: Taiwan

FORM: QS reinsurance of a parametric EQ product, targeted at SME, residential

TRIGGER:

- ♦ Earthquake magnitude ≥ 7.0 in Taiwan;
- ♦ Pay out decreasing in function of distance.

Case study #8 - Large cities coverage

CLIENT: Chinese insurance company, covering city governmental bodies in Guangdong province

FORM: QS reinsurance of underlying product

TERM: three years

TRIGGER & COVERAGE EXAMPLE FOR ONE CITY:

- ♦ Typhoon: maximum two minutes average windspeed in a 90 km radius;
 - › Payout based on a table;
 - › Measurement national meteorological center;

- ♦ Rainfall: 47 stations in Shantou City;
 - › Payout based on weighted cumulative rainfall index;
 - › Additional payout for stations with daily rainfall $> 300\text{mm}$;
 - › Measurement Hydrological Bureau.

PARAMETRIC SOLUTIONS FOR PUBLIC AUTHORITIES

Parametric products provide efficient coverage for governments, mostly when dealing with post-event emergencies (case studies 9 to 11).

Case study #9 - Philippines parametric cover

BACKGROUND: the Philippines are regularly swayed by natural catastrophes such as typhoons, earthquakes, floods and the hazard map is broad due to the distribution of islands. Immediate recovery is key for the local economy.

COVERAGE PROGRAMME:

- ♦ The government of the Philippines launched a one-year programme in July 2017;
- ♦ A multilateral development bank acts as an intermediary to transfer the risk to a panel of international (re)insurers;
- ♦ USD 206 million coverage against losses;
- ♦ Has been renewed by the end of 2018.

SOLUTION:

- ♦ Wide-spread coverage, covering the twenty-five provinces most impacted by climate disasters;
- ♦ Reduced basis risk due to targeted modelling for climate resilience. Post-event emergency loss model tuned for Asia Pacific;
- ♦ Defined pay-out for provinces and overall as a function of the modeled return period;
- ♦ Fast pay-out.

Case study #10 - Caribbean Parametric Protection

BACKGROUND: following hurricane Ivan in 2004, twenty Caribbean and Central American Governments rallied to establish a disaster risk protection mechanism.

COVERAGE PROGRAMME:

A parametric protection contributes to the financing of the pool - it covers the risks of tropical cyclones, earthquakes and excessive rainfall. The USD 30 million Cat bond was issued in 2014. Benefits from the parametric protection are calculated from a fixed payment table, which reflects the expected intensity of the events.

LATEST DEVELOPMENTS:

- ♦ Hurricanes Irma and Maria triggered the cover in 2017. Over USD 50 million have been paid in the aftermath of the storm season and all payments were made within fourteen days;
- ♦ All of the members have renewed their parametric risk transfer protection for the 2018-19 policy year;
- ♦ Twelve governments have increased their coverage;
- ♦ Three new members have joined the pool in 2018.



Case study #11 - Mexican parametric protection

BACKGROUND: Mexico established in the late 1990s a natural disasters fund to support the rapid rehabilitation of federal and state infrastructure after a disaster. The resources are leveraged with market-based risk transfer instruments - parametric Cat bonds and parametric reinsurance. Payment parameters are based on the magnitude of the earthquake or the minimum pressure for a storm.

LATEST DEVELOPMENTS:

- ◆ IBRD / FONDEN 2017 multi-peril cat bond issued in August 2017;
- ◆ USD 360 million covering per year:
 - › 150 million for earthquakes;
 - › 100 million for a storm on the Atlantic side;
 - › 110 million for a storm on the Pacific side;
- ◆ A magnitude 8.1 earthquake struck off the coast of Mexico in September 2017 - the earthquake triggered the parametric protection for the maximum sum of USD 150 million, yet the nation suffered limited losses.

TOWARDS THE NEW FRONTIER OF PARAMETRICS

The case studies listed above are illustrations of SCOR's endeavors and attempts to accompany the expansion of the risk universe, to build on traditional techniques with improved access to data networks and modelling tools, etc. SCOR has internally developed their optimization algorithm, as well as designed tools attempting to fit solutions to the expected model loss of any given period or given cover.

Emerging trends for parametric products include:

- ◆ Parametric insurance solutions for individuals: for example, individual trip cancellation insurance, based on temperature or other weather-linked index.
- ◆ Parametric covers for other perils, based on advanced modelling and synthetic triggers: for example, famine risk or cyber risk.



CATASTROPHIC CLAIMS HANDLING AND HOW TO WORK COLLECTIVELY



JONATHAN CLARK

Global Head of Business Solutions Claims – SCOR Global P&C

A Chartered Loss Adjuster and Chartered Insurance Practitioner Jonathan has over 35 years claims handling experience. He has dealt with claims in over 40 countries and has worked with many of the world's largest corporations on their claims programmes. He joined SCOR in 2013 as head of claims in London and is now Global Head of Claims for Business Solutions. Qualifications: MA, MSc, Dip Eng, ACII, FCILA

Jonathan is Past President of the London Business Interruption Association and the Chartered Institute of Loss Adjusters and current President of the Chartered Insurance Institute.

The background to the workshop was to consider opportunities for insurers to contribute to reducing the impact of disasters by looking at ways to work together. Using case studies and prior experience several areas for co-operation were identified.

TWO MAIN THEMES SAT BEHIND THE WORKSHOP

1. Pre-planning for a major incident– predictive modelling, information and resource management

2. What are post-event priorities?

Both lead to the question of what opportunities there might be to work together and what innovative tools might be out in the market for use in more effective claims handling.

There are already some examples of collaboration in action for example where interactive maps had been set up to allow policyholders to see what areas have been impacted by flood following Hurricane Harvey. Following Hurricane Irma to help policyholders file and manage claims insurance villages were set up at strategic locations to provide a focal point for the industry response to this incident. In the United Kingdom, the industry has collaborated using the Association of British Insurers as a conduit to ensure there are high quality briefing notes and resource in the event of floods.

The United Kingdom experience has extended to promoting risk awareness both in terms of resilient repairs and design but also in making consumers aware of the threat of flood. For example, United Kingdom insurers use text messaging

linked to flood warnings to advise policyholders who might be at risk. This was backed up in major flooding incidents by the use of “town hall” briefings.

Where might this take insurers in the event of a major Nat Cat? The key areas of focus must be about getting a clear understanding of what the impact of any incident might be and then how to implement a response on the ground to meet policyholder’s legitimate demands of the industry. Whilst there are shared resources in terms of hurricane tracking for example what happens after an event is critical in gaining policyholder trust and helping affected communities recover.

So, what can we learn from recent claims responses following Nat Cat events to see what some of the critical success factors might be:

- ◆ Insurers need to be prepared logistically;
- ◆ Many Loss Adjusters and technical experts required – Possible shortage during large events;
- ◆ Sufficient Staff to be provided – right time / right place / right skill >> cooperations;
- ◆ Ability to quickly and transparently segment claims into key groups;
 - › low value claims (cash settlement) / detailed adjudication / total loss;
 - › establish simple claims validation and payment methods;
- ◆ Pooling of external adjusting claims resources – if that is realistic?

But to move back to the need to have a clear understanding of the “ground truth” is this an area that collaboration speaks to? The parameters for a shared resource or report



can be clearly defined between us and a variety of information sources consolidated to one overall and consistent picture. This has been done successfully on several occasions, however the opportunity must be to have a pre-agreed means to collaborate so that a timely assessment of the “ground truth” can be established and managed collectively.

If we look for areas to collaborate in the event of a major incident some ideas can include:

Co-ordinated assessment and evaluation of the impact of an incident

- ◆ Damage image mapping;
- ◆ Satellites and drones;
- ◆ Radar mapping for storms and floods;
- ◆ On ground deployment of video cars.

More consistent and effective deployment of claims teams

- ◆ Pre-emptive planning – pre-prepared information sheets – how do I claim, what is the process?
- ◆ Exposure mapping – what have we got to deal with, mix of business and damage;
- ◆ Communication together and individually – use of an “insurance village”.

What external and internal expertise is needed and available?

- ◆ Relevant and trained Third Party Expert Capabilities;
- ◆ Proper assessment of claims adjusting capacity – how many adjusters are there?
- ◆ Focus on complexity of insured businesses or loss types;
- ◆ Fast track response models – early cash payments and assessments.

To take this back to basics what is the focus or purpose of any collaboration? For all the benefit can be that a more effective claims process could be established by working together. A major disaster sees the whole insurance industry under scrutiny and by working together it should be possible to speed the claims process and develop a more “cost effective” delivery by having one ground truth and by using scant adjusting resource as a collective rather than competing for this and driving up costs.

For the whole market there may be an opportunity to build trust in insurance by being seen to work together to help a community. One of the keys to being able to settle claims quickly is developing simplicity in validation and payment methods. By using high quality satellite imagery, video cars and other tools a shared “ground truth” allow both validation and damage assessment which underpins claims resolution.

We can share local and global knowledge of managing major catastrophe incidents with that trust agenda in mind but we must not lose sight that the resilience of any response by the industry is judged as a collective by customers, politicians and other stakeholders. Recent experience shows that in a major incident the industry is judged as a whole, major incidents put great demands on the claims teams. Adjuster capacity is reduced in recent years so any collaboration might be good to embrace that important component.

In summary we considered and debated possible areas for collaboration being:

- ◆ One shared model of the incident?
- ◆ One shared “ground truth”?
- ◆ One shared “command centre” / insurance village?
- ◆ A pooled field adjusting / claims resource?
- ◆ Possible shared triage team;
- ◆ Pre-prepared press releases and information sheets?

Major catastrophes continue to be an ongoing challenge for society and the industry. Whilst the claims response is but one part of the overall resilience and insurability picture it is an area which offers some positive areas for collaboration. We look forward to continuing the dialogue.



CLOSING REMARKS: THE FEDERATING ROLE OF (RE)INSURERS



VICTOR PEIGNET
CEO, SCOR Global P&C

Victor Peignet, a Marine & Offshore Engineer and graduate of the Ecole Nationale Supérieure des Techniques Avancées (ENSTA), joined SCOR's Facultative Department in 1984 from the offshore Oil & Gas contracting industry. He has more than 15 years' underwriting and management experience in Energy & Marine insurance at SCOR.

He has been at the head of the Group's Corporate Business Division (Business Solutions) since its formation in 2000, first as Executive Vice President and then as Managing Director from April 2004.

Since July 2005, he has been the Chief Executive Officer of SCOR Global P&C, which is one of the Group's two operational entities and which manages the Group's Non-Life business worldwide. He is a member of the Group Executive Committee.

CHANGES IN THE MACRO-ECONOMIC ENVIRONMENT, TECHNOLOGY AND DATA CONTRIBUTE TO THE GROWTH OF THE SPHERE OF INSURABLE RISKS

The risk universe is growing - the changes in the macro-economy environment, technology and data are contributing to the expansion of the sphere of insurable risk, resulting in a shift of the insurability frontier.

The current challenge faced by (re)insurers is to grow the sphere of insured risks - pictured in Figure 1.

Historically, many risks have been insured because coverage was required by law or contract. Today a broader set of risks is insurable, but coverage penetration rates in the markets often remain much too low. Affordability of coverage is a necessary but not a sufficient condition – the customers must want to buy the product and see value in it: therefore raising risk awareness and acknowledging behavioural factors are key.

The insurance industry must help customers understand their risk and be willing to manage it, mitigate it, or transfer it in the optimal way. Only when the offer is there to transfer risk optimally or, when the customers see other value from insurance-related services, we as an industry have found ways to make more risks insured.

During the past years, SCOR has attempted to respond to this challenge, and contribute to grow the sphere of insured risks.

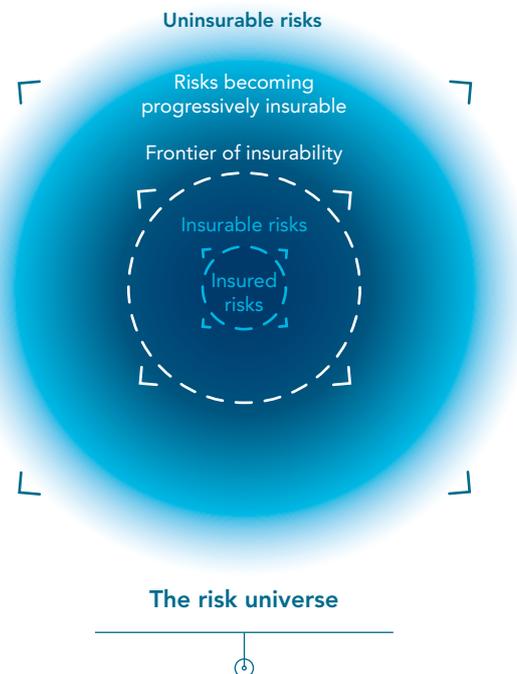


FIGURE 1 - INSURED, INSURABLE AND UNINSURABLE RISKS

Source: SCOR



(RE)INSURERS ENABLE LARGE-SCALE ECONOMIC DEVELOPMENT BY RESPONDING TO RISK UPSCALING AND AGGREGATION

The first documented reinsurance contract, dating from the 14th century, was for marine voyage. As ocean shipping technology developed and became more sophisticated, vessel sizes and specialization increased, and so did risks. Today, vessels continue to be upscaled. The largest container ships have doubled in capacity over the past decade, which is a boon for global trade and economic development but means that any individual loss is also far bigger.

It's not just shipping – risks around the world are rapidly growing.

- ♦ Hurricane risk has been on the rise. Certain Atlantic Wind possible maximum losses have doubled since 2005, in part because coastal areas have grown far more rapidly than interior areas, so there is more property in harm's way.
- ♦ Cities are expanding, with many of them exposed to disasters, creating massive aggregations of risks. There are major cities exposed to wildfires, floods (both rising waters and subsidence), cyclones, earthquakes, volcanoes, and terrorism. As of today, insured values are concentrated in mature markets, but China and India are the next to become peak regions for insurance and reinsurance exposures.
- ♦ The possible consequences of cyber risk have also immensely risen with the overall digital economy. The development of real-time connected networks involving mono-suppliers has exacerbated cyber risk - supply chains have become increasingly connected and cloud based, with only a few public cloud providers globally. A cloud attack could create like a "total meltdown" with business interruptions which would resonate directly and indirectly throughout the industry, worldwide, in a matter of hours.
- ♦ Pandemic risk has also grown with global warming and increased travel. Diseases are travelling further and faster and are more resistant to eradication.

(RE)INSURERS PROVIDE POST-EVENT ECONOMIC STIMULUS BY MUTUALIZING RISKS AROUND THE WORLD

By mutualizing risk globally, (re)insurance can provide an immediate injection of capital into an economy after a loss. (Re)insurance is far faster and more reliable than raising taxes, selling bonds, or asking donors for help. Consider the difference between New Zealand and Haiti.

Between 2010 and 2011, New Zealand suffered USD 23 billion from two separate earthquakes, of which 75% was insured and 73% was reinsured, mostly overseas. New Zealand received an economic injection of between USD 13 and 15 billion through its risk management programme.

In comparison, Haiti suffered an USD 8 billion economic loss in 2010, of which only 1% was insured. Therefore, Haiti received less than USD 80 million in stimulus from global (re)insurers.

Whilst remote, New Zealand has the advantage of being English-speaking, unlike other countries where there have been shortages of loss adjusters and reconstruction contractors after major losses, showing how much investments are worth being made in crisis management preparedness.

(Re)insurance can be highly beneficial for helping countries respond to disasters but, in a number of cases, the size and complexity of the risks are such that it has not the ability to deliver solutions on its own.

(RE)INSURERS ENABLE THE MUTUALIZATION OF NEW RISKS ON A GLOBAL BASIS

(Re)insurers like SCOR are carefully studying solutions for political and climate change-related risks to help all concerned parties understand the risks and deal with the consequences. The foremost consequence of climate change is that populated and economically critical areas may be exposed to an increased frequency and severity of climate-related natural catastrophes as climate and oceanographic patterns change, affecting the size and behavior of tropical cyclones, wildfires, severe storms, floods, and droughts. These areas that will experience worse natural disasters may not be built with resilient enough infrastructure.



FIGURE 2 - VENTA MAERSK

Source: Hasenpusch-photo

A second consequence of climate change can be exemplified by the recent voyage of the Venta Maersk container ship. Venta Maersk was the first container vessel ever to undertake the North East passage, from Vladivostok north over Siberia to St Petersburg - a major breakthrough, which was only possible due to melting sea ice. If sea ice continues to melt, this passage will become a commercial route, in direct competition with the Suez Canal. Since temperatures are rising more quickly at the poles, many experts estimate



that this may occur in the next 15 to 20 years. The reserves of gas in this region - owned by Russia - will then be more technically accessible and economically viable. Aside from the fact that ships will be taking uncharted routes, the development of major infrastructure in the Arctic and the effects on geopolitics will present major global risks.

CLIMATE CHANGE IS NOT AN OPPORTUNITY, BUT IT IS UNDENIABLY CREATING PREVIOUSLY UNTHOUGHT OF OPENINGS, WHICH WILL CHANGE GLOBAL DYNAMICS.

CONCLUSION: (RE)INSURERS ARE WELL-PLACED TO FEDERATE STAKEHOLDERS TO DESIGN AND IMPLEMENT SOLUTIONS

Insurers and (re)insurers are tasked with understanding complex risks and developing solutions to manage risks and transfer them to capital - whether capital be their own, borrowed or from a third party.

Many major risk solutions will require private/public partnerships (PPPs) and will revolve around five key elements, featured in Figure 3 which will each be rapidly evolving thanks to new technologies and data:

- ♦ **risk awareness:** without risk awareness there can be no development of solutions;
- ♦ **risk knowledge:** awareness of risk must be complemented with the ability to measure, to quantify or qualify risk in order to design solutions, which (re)insurance can only be a part of;
- ♦ **risk management, risk transfer & risk financing:** most solutions will come as integrating and blending these three ingredients.

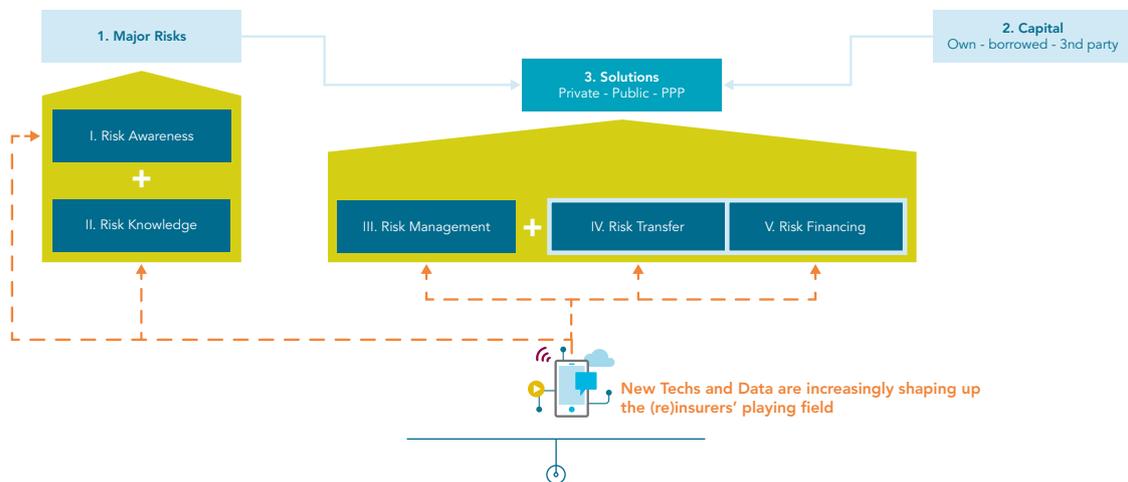


FIGURE 3 - FIVE ELEMENTS NECESSARY FOR THE CREATION OF MAJOR RISK SOLUTIONS

Source: SCOR



Electronic distribution only

To request an electronic copy, please email: scorglobalpc@scor.com

All rights reserved. No part of this publication may be reproduced in any form without prior permission of the publisher. SCOR has made all reasonable efforts to ensure that information provided through its publications is accurate at the time of inclusion and accepts no liability for inaccuracies or omissions.



PLEASE FEEL FREE TO VISIT US AT [SCOR.COM](https://www.scor.com)

SCOR
5, avenue Kléber - 75795 Paris Cedex 16
France
scorglobalpc@scor.com

SCOR
The Art & Science of Risk

Photo credits: hasenpusch-photo, Sentinel
Editor: SCOR Strategy & Development
ISSN: 1638-3133

© Focus #25 - February 2019 – Design and production: Periscope