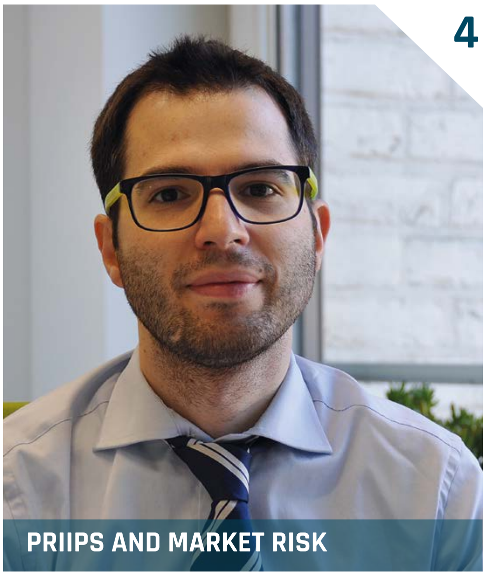
THE EUROPEAN ACTUARY

TRIANNUAL MAGAZINE OF THE ACTUARIAL ASSOCIATION OF EUROPE

2 INTERVIEW WITH SOPHIE IN 'T VELD



4 PRIIPS AND MARKET RISK

10 CONSUMER PROTECTION

7 ASTIN IN EUROPE

12 KAREL VAN HULLE ON SOLVENCY II

18 GENERAL DATA PROTECTION

22 CROSS-BORDER SOLUTIONS

THEME: CONSUMERS

14 ASSESSING GLOBAL RISKS

20 A WORKING PARTY

24 INTERNATIONAL CONGRESS OF ACTUARIES IN BERLIN

aae actuarial association of europe

Nº 16
MAR 2018

CONSIDERING A PAN-EUROPEAN PERSONAL PENSION PRODUCT

INTERVIEW BY **JENNIFER BAKER**


SOPHIE IN 'T VELD

As people live longer and the nature of work changes, the EU is considering a pan-European personal pension product (PEPP). Sophie in 't Veld, the Dutch MEP charged with steering the law through the European Parliament, presented a working document on the proposal to the Economic and Monetary Affairs Committee (ECON) in January. She told The European Actuary why it was so important.

'First of all, I haven't met anybody who is strongly opposed to the principle,' she said. 'People have question marks over feasibility, and how it would fit into their national system, or what it would mean for their own competitive position, but I haven't actually met anybody who says, I am opposed to this in principle.'

But Ms In 't Veld says some countries have other groundwork to do as well: 'As I've stressed in my working document, it is essential that Member States strengthen their first and second pillars of the pension system even before we start talking about PEPP, because we can see weaknesses and shortcomings in pension systems.'

'In some countries the system is very well developed, but in others it isn't and there isn't a lot that people can do. PEPP will offer them a product that will be very safe and reliable, so they can at least make their own personal provision for retirement, even if their national systems aren't properly developed yet,' she added.

Impact on the Capital Markets Union was one of the reasons for PEPP given by the European Commission, but for Ms In 't Veld that's not her main motivation. 'For me the prime objective is strengthening the pension system, making sure that we improve so-called pension adequacy. In my working document opening paragraph, I refer to the Charter of Fundamental Rights. The rights of the elderly to lead a life in

I think everybody agrees that a tax incentive is required

dignity and to fully participate in social and cultural life. It's a fundamental right, not just a hollow phrase.'

The MEP says EU-wide law is the best way to achieve this. 'Now of course, this can also be achieved without a European Regulation because national providers could try to provide their products across borders. But we all know that there are all sorts of obstacles to that. With PEPP, we're regulating a product. We're basically saying *'here's a list of features, criteria that the product has to meet in order to deserve the label PEPP'*. And when it has the label then people will know it is trusted, it's safe, it's a good product.'

But is a tax incentive needed to persuade citizens to save? If so what are the various alternatives?

'I think everybody agrees that a tax incentive is required,' says Ms In 't Veld. 'If there's no tax incentive at all, then it is highly unlikely that PEPP will succeed because simply it cannot compete with similar national products which do get a tax incentive.'

Ms In 't Veld says people also have to know exactly what it is that they're buying. 'I am not in favour of the option to waive the right to advice in the case of the no-frills PEPP, because that will be bought mainly by people who are financially illiterate – like most of us – and people who do not have a lot of money. So, advice is really essential for them. And not just in the phase before buying or at the moment of signing a contract, but also during the accumulation phase and in particular just before retirement.'

The MEP also wants to strengthen the rights of consumers in submitting complaints, jointly across borders. 'I am still also trying to figure out if I can somehow introduce an element of collective redress before the Courts. In any case, it cannot be that we have a pan-European product, but then we only have national markets. There has to be a pan-European buyers' community as well. I want to set up a monitoring panel which will be doing permanent monitoring rather than just a review after 5 years,' she concluded.

PRIIPS AND MARKET RISK
THE CASE OF ITALIAN TRADITIONAL PRODUCTS

BY **MARCO ALEANDRI, IIA, IABE, FRM**

On 1st January 2018, the new EU Regulation related to the disclosure of key information about PRIIPs (Packaged Retail Investment and Insurance-based investment Products) came into force. PRIIPs encompass any investment products offered to retail customers whose value fluctuates because of exposure to market variables or underlying assets. As such, PRIIPs include insurance products with embedded options, among others.

According to the Regulation, insurance companies should convey relevant information about a PRIIP through its own Key Information Document (KID), to be provided for potential retail customers before the actual sale of the product. We could think of a KID as a risk-oriented information note, with risk-oriented market-consistent valuations. Nonetheless, as an information note meant for retail customers, brevity and transparency should be a priority above all, considering that their financial and insurance culture is often scarce.

The KID focuses on some features of the product, the most sensitive ones from a customer perspective:

1. market, credit, and liquidity risk valuation
2. product performance sensitivities
3. cost disclosure.

Both 1. and 2. implicitly require a methodology either to simulate fund returns or bootstrap them from historical data.

Market Risk Valuation: PRIIPs vs. Solvency 2

As stated by the Regulation, market risk is measured by the annualised volatility corresponding to the value-at-risk (VaR) at a confidence level of 97.5% over the recommended holding period, unless stated otherwise. Such a volatility is called VaR-equivalent volatility (VEV), and relates to the market risk measure class (MRM class) through the table provided by the Regulation:

MRM class	VEV
1	0,0% - 0,5%
2	0,5% - 5,0%
3	5,0% - 12%
4	12% - 20%
5	20% - 30%
6	30% - 80%
7	> 80%

However, the VEV of a product should be calculated in different ways depending on its PRIIP category:

1. PRIIPs where investors can potentially lose more than the invested amount of capital (e.g., derivatives of illiquid assets)
2. PRIIPs whose payoffs are linearly linked to the performance of the underlying assets (e.g., unit-linked without guarantees)
3. PRIIPs whose payoffs are nonlinearly linked to the performance of the underlying assets (e.g., structured products)
4. PRIIPs whose payoffs depend on unobservable and unpredictable factors, that is, not strictly related to financial markets (e.g., insurance products with discretionary profit sharing).

In fact, the VaR-based theoretical approach can be connected back to Solvency 2.

Two fundamental differences should be recognized:

- the PRIIP valuation is real-world by definition, whereas Solvency 2 reporting is based on risk-neutral projections;
- the PRIIP Regulation requires product-specific valuations, whereas Solvency 2 is designed for valuations at portfolio level.

As a consequence, leveraging Solvency 2 models, though not impossible, could be impracticable in the short-term. Of course, it would lead to significant ad hoc adjustments, and it could turn to be even unfeasible for complex products. For instance, in Solvency 2 projection models, assets are simulated to asymptotically return the risk-free rate. This means that market stocks yield the risk-free rate, coupons and principles of debt securities are risk-adjusted, embedded options of putable bonds are simulated through a risk-neutral scenario, and so on. At the same time, those models account for contingencies such as mortality and lapse. However, PRIIP valuations should not be designed within a risk-neutral framework with life contingencies.

These are some of the reasons why bridging from a portfolio-based risk-neutral valuation to a contract-based real-world valuation can be tricky. Then, let's build a model from scratch.

PRIIPs and Segregated Funds in Italy

Italian traditional products are backed by segregated funds, which mainly consist of a bond component, while a minor part is invested in equity and real estate. In practice, we need to model risk-free rates, bond yields and equity returns in the real world. For the former, we use the G2++ model with two correlated stochastic components and one deterministic component fitting the actual forward curve. The bond yields are modelled by the same G2++ adjusted with a deterministic spread parameter. The equity return is simulated by a risk-adjusted geometric Brownian motion calibrated on a market index (either S&P 500 or FTSE MIB).

figures ▶

Figure 1 and Figure 2 show the VEV shape for 10-year, 15-year, and 20-year deferred capital insurance with profit sharing 80%, guaranteed rate 1,0% and minimum margin 0,4%. Despite the various simplifications (e.g., no available-for-sale assets, fixed asset allocation, market-based crediting rates, etc.), the model represents a good proxy for some general conclusions. In particular, since segregated funds may marginally invest in equity, the assignation of MRM classes beyond the third one seems quite unlikely. The results related to high equity percentages may be instead referred to less traditional products such as linked tariffs, variable annuities, or hybrid products.

FIGURE 1: S&P 500

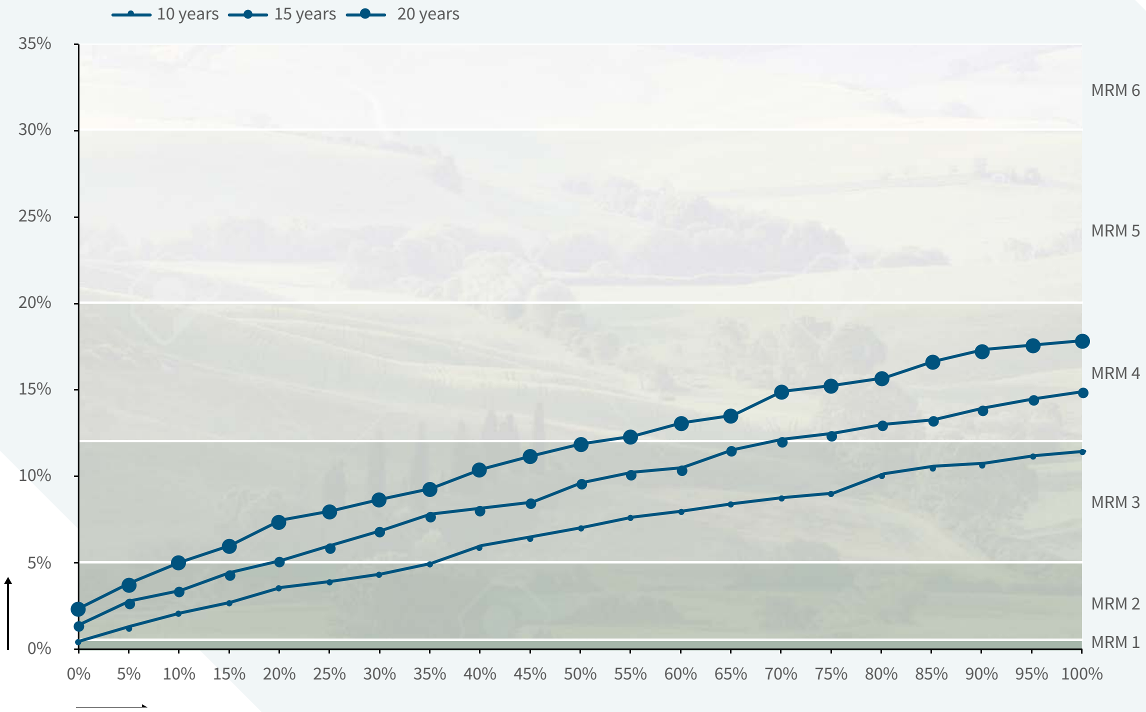
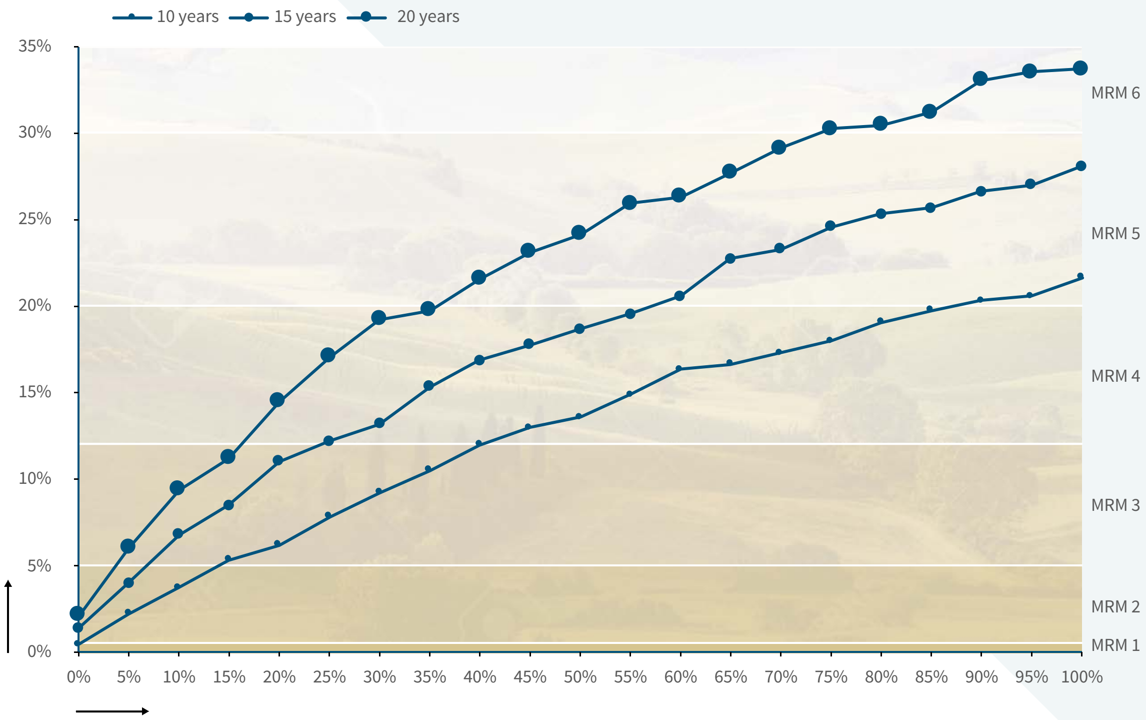


FIGURE 2: FTSE MIB



ASTIN IN EUROPE

INTERVIEW BY **PIERRE MIEHE**

Kirsten Sasady is the chairperson of the Board of the Danish ASTIN Society and a member of the international ASTIN Committee. Non-life insurance has always been the focus of her career, including related aspects on risk management, solvency and accounting for non-life insurers.

Our Editorial Board member Pierre Miehe interviewed her about the history of ASTIN and its particularly close connection to Denmark, as well as the future of committees with specific non-life focus within Europe.

So what is the history of ASTIN actually and how did Denmark play a key role in the creation of the committee?

'The early actuarial activities were mainly in the field of life insurance. However, after World War II, a small group of actuaries around the world began to deal with issues of non-life insurance. This small group consisted of, amongst others, Gunnar Benktander, P.E. Beard and Danish Paul Johansen. During the 50's there was talk of forming a professional association where topics from non-life insurance could be discussed and which could encourage research in this field. This dream came true in 1957 with the formation of the international association ASTIN (which is an abbreviation of Actuarial Studies In Non-life Insurance). The association was structured as a section within the International Actuarial Association (IAA) with its own board of directors and Paul Johansen as chairperson.

Consequently, in Denmark we feel a specific connection to ASTIN and its creation! ASTIN still exists and is continually working to further develop the mathematical foundation of non-life insurance and reinsurance, not least through the yearly international colloquium. Denmark still has a tradition of having an actuary on the ASTIN committee – a role which I currently perform.'

KIRSTEN SASADY is the chairperson of the Board of the Danish ASTIN Society and a member of the international ASTIN Committee.

You also have a Danish ASTIN association?

'Yes! In 1995, the Danish ASTIN Society was established as a subdivision of the Danish Society of Actuaries.
The association's purpose is equivalent to the International ASTIN Association. That is, to contribute to spreading knowledge about the use of actuarial methods in non-life insurance. It is still going strong, and I am the chair of the committee and have been for the past three years.

The association's activities typically consist of an all-day event and 1-2 afternoon or evening events each year, where various interesting topics related to the non-life insurance business are addressed. In addition, the association organises study groups on relevant topics within non-life insurance and contributes to the planning of further training of non-life insurance actuaries in conjunction with the education committee of the Danish Actuarial Society.'

I hear that the Danish ASTIN society is quite successful in attracting new members and participants to the events?

'That is true. In fact, we have evolved from being a small subdivision of the Actuarial Society to having more than half of the Danish qualified actuaries as our members. Until now, we have been

> *More than 100 actuaries now typically attend our events*

able to rent premises free of charge at insurance companies, thus keeping costs down, but since more than 100 actuaries now typically attend our events, we will soon have some location challenges. I consider this a good problem to have!

I think the mixture of current hot topics within the industry coupled with more theoretical talks are one of the reasons for our success. We also try to inspire participants with presentations about new areas, in which they may not necessarily work in their day job but which nevertheless impact their roles. For instance, we recently had a talk from one of the best equity analysts specialising in the Scandinavian insurance industry. Most actuaries are not directly involved with increasing dividends and stock prices, but many requests from their management are driven by these ambitions.

At our events, we also place great emphasis on the possibilities of networking, which keeps people coming back and not wanting to miss out.'

You recently tried to gather some information on local ASTIN initiatives within Europe – what did you find?

'It seems quite different from country to country. Some (like Holland and the UK) have had subgroups focusing on non-life issues for many years, and others still only have one Actuarial Association, where life insurance topics dominate. Actually, my close personal friend Vishal Desai is past chairperson of the GIRO committee (General Insurance Research Organising Committee which organises the UK's flagship non-life actuarial conference) and member of the UK IFoA's General Insurance Board. He is currently the vice president (soon to be president) of the Casualty Actuaries of Europe which have aspects of similarity in their ambition to ASTIN. I asked him his thoughts on how to ensure that ASTIN initiatives continue to be successful going forward reflecting on his experience of organising GIRO and CAE events. This is what he shared:

"Always pick a good speaker over a good topic. You can have a brilliant topic, but it can fall very flat if the delivery is poor. Quite often people will base their decision on whether or not to attend events on the speaker line up. So it's always good to have at least one well-known name in your line-up."

"Audience participation is always a winner. No one wants to come to an event and be subjected to death by PowerPoint! We've used interactive voting polls in workshops and plenary sessions which work really well and are a relatively quick and easy way to engage the audience and spark discussion and debate."

I always encourage our committees to consider diversity when organising events, a dimension that is often overlooked but increasingly topical and one that I feel has been key to the success and continued growth of GIRO, in particular. Our audiences are no longer just a sea of white, middle-aged males, so neither should be our speakers. Reflect the audience in your speaker and panellist line up and you immediately make your event feel more inclusive. The more inclusive your event, the more likely your participation rate will be high and importantly, the more likely that it will grow. By encouraging new attendees to events it will likely bring new ideas and perspectives to the table, which in turn may well lead to new research, which speaks to the heart of why a number of these committees exist in the first place.'

INTERVIEW

CONSUMER PROTECTION

INTERVIEW BY **JENNIFER BAKER**

Katja Wuertz is head of the Consumer Protection Department at EIOPA – the European Insurance and Occupational Pensions Authority. Before joining EIOPA in 2011, the Danish national worked for more than 10 years at the European Central Bank as principal legal counsel in the area of financial law and legal oversight. She explains why EIOPA places consumer protection front and center of its strategy.

'Misconduct by firms may not only harm individual consumers, but may also have a wider prudential impact, posing a threat to the stability of the financial sector,' she explained to The European Actuary.

EIOPA's role is to promote transparency, simplicity and fairness of financial products and services across the whole internal market. As with many other sectors, convergence across different European Union Member States is an ongoing challenge, but one that can deliver results in the form of a level playing field, a healthy competitive environment, increased consumer confidence, and financial stability.

'The goal is not complete harmonization, but sufficient convergence to ensure the same high standards of consumer protection throughout the EU. We do this for instance by developing a framework for better governance, suitability and accessibility of insurance products for consumers, and developing a framework for proper selling practices for direct sellers and intermediaries,' said Ms Wuertz.

EIOPA works closely with its members to coordinate the development of this approach, with a particular emphasis on risk-based, pre-emptive and proactive business supervision to tackle any developing issues before they become widespread. But EIOPA is organized to deal with national specificities as well.

'We appreciate that the European retail financial services market is strongly impacted by local characteristics such as cultural and historical differences, consumer preferences, language barriers, contract law, etc. In addition, in a number of cases, EU legislation is minimum harmonizing, allowing for more flexibility to maintain or introduce more stringent national provisions. It can, however, be argued that minimum harmonization makes the case for convergence amongst national supervisors even greater,' said Ms Wuertz.

It could be claimed that the insurance sector is less heavily regulated than others, but in 2018, the Regulation on Packaged Retail and Insurance-based Investment Products (PRIIPs) and the Insurance Distribution Directive (IDD) will start to be applied.

Ms Wuertz believes there is a strong case for both in **'establishing a level playing field between firms and preventing regulatory arbitrage.'**

'Extending the scope of the IDD to direct writers and some ancillary insurance intermediaries means tangible improvements for consumers. It should not be forgotten that IDD is a minimum harmonizing directive, still leaving a lot of flexibility and allowing Member States to maintain or impose stricter rules and requirements in some areas,' she continued.

She also sees positives with the PRIIPs Regulation: **'For example, for customers purchasing insurance-based investment products, I expect PRIIPs to deliver improved comparability, enabling more informed decisions to be made.'**

'Looking forward, we hope that the improved product disclosure, in particular on costs, will drive improvements in products offered and better value and outcomes for customers. I would nonetheless recognize that the implementation of the PRIIPs KID has raised challenges, and that it may take time to perfect the rules and their implementation so they achieve the results we want to see,' said Ms Wuertz.

IDD requires manufacturers of insurance products to establish product oversight and governance (POG) arrangements. Ms Wuertz says these are a crucial part of the text. **'They really are the 'cradle' of consumer protection, as together with disclosure and selling rules, they complete the circle of consumer protection,'** she said.

'As regards the actuarial profession, I believe actuaries have the potential to play a crucial role in the product design process. For example, POG rules could mean that they play a type of independent oversight role within firms in the product approval process, the testing of insurance products, including scenario analysis, pricing and target market setting. Actuaries could play a role in establishing a methodology for rating the different risks which products present, assessing the risk profile of customers and matching products to customer needs,' she said.

KATJA WUERTZ

INTERVIEW

KAREL VAN HULLE ON SOLVENCY II

INTERVIEW BY **PIERRE MIEHE**

KAREL VAN HULLE

Mr. Van Hulle, you are often viewed as the main contributor in the setting up of the Solvency II Directive. After one and a half years of operation, what is your view about its application? Is it a success or a disappointment for you?

'The introduction of Solvency II went very smoothly. Of course, it will take time before all parties concerned will apply this sophisticated regime as it was intended. That is quite normal. Unfortunately, the regime has become very complicated and the first thing to do now is to reflect on how to make it easier to apply, particularly for the large majority of small and medium-sized insurers. This will require courage from all stakeholders. From a supervisory perspective, the very laudable objective of European convergence should not lead to another wave of rules and regulations.'

Some insurers want to have a Solvency Capital Requirement (SCR) ratio significantly greater than 100%, whereas others want to target around 100%-120%. What is in your view the best practice? What was expected by the European Commission?

'The SCR is meant to be a target level of capital. It is by nature volatile, a logical consequence of market consistent valuation. I have therefore difficulties with the tendency in some member states to require insurers to have a solvency ratio that is always well above 100%. This was not the intention of the legislator.

> ***The biggest mistake we could make is to call these changes Solvency III or IV or V***

The SCR is different from the Minimum Capital Requirement (MCR). It is an early warning signal starting a dialogue with the supervisor. Insurers may of course decide to have a solvency ratio that is much higher than 100%. That is however different from requiring this.'

You are preparing a book about the different stakeholders in the European insurance market, can you tell us more about it?

'I am indeed preparing a book about Solvency II, in which I intend to describe the development of Solvency II and the principles underlying the new solvency regime. One of the lessons I have learnt from the development of Solvency II is that insurance regulation is very complex and that it is not obvious for regulators to be interested in the subject. This means that everything must be carefully prepared to avoid things going very wrong. The title of my book will be "Solvency II is good for you!". I believe that this is still true, although I will be the first to admit that not everything is perfect. It was never meant to be.'

Who are in the end the key decision makers for Solvency II? Who are the most influential? And what about the actuaries?

'The key decision makers are the European institutions: the Commission as initiator of the process and the European Parliament and the Council as co-legislators. Solvency II is not an EIOPA project, as I hear sometimes. EIOPA has played and will continue to play a crucial role in the implementation of Solvency II but the final decision rests with the European institutions. Solvency II was intended as a project to be built bottom up and not top down. All stakeholders have contributed to its development. That should remain so. The actuarial profession has been one of the key actors, together with the insurance sector and others.'

Do you think actuaries will naturally become the Solvency II Pillar 1 specialists? What are the upcoming challenges for the profession in your opinion?

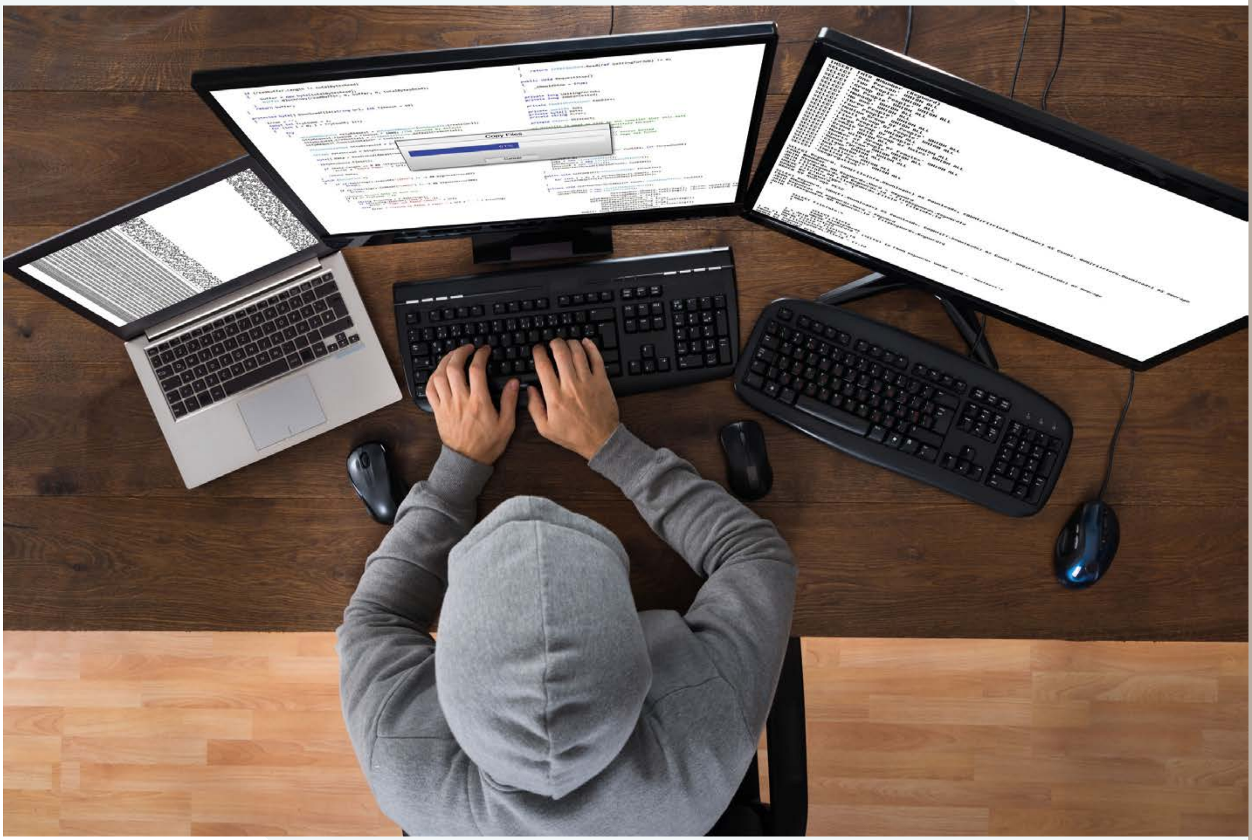
'Some people have argued that Pillar 1 was too much influenced by the actuarial profession. It is true that many actuaries were involved in the development of the standard formula. That is almost unavoidable as actuaries find in Pillar 1 their natural habitat. However, Solvency II is not just about Pillar 1. The three pillars of Solvency II are of equal importance. One of the challenges for the actuarial profession is to translate the numbers into understandable language. We have created an actuarial function as one of the key functions under Solvency II but I am not sure that actuaries are doing enough to give to this function the importance which it deserves.'

Do you believe we will have a Solvency III, like the bank industry had a Basel III ?

'Solvency II was meant to be a flexible regime, to be regularly adapted when required. However, these adaptations should not change the basic approach of Solvency II, which is the introduction of a risk-based solvency regime. Within that regime, many things can change, for instance the calculation of technical provisions or the structure of the standard formula. The biggest mistake we could make is to call these changes Solvency III or IV or V. That would give the impression that we move away from the approach that we started in 2016. The banking experience is quite different. There are important differences between Basel II and Basel III. We should however not confuse insurance with banking. We should not depart from a risk based solvency regime for the insurance sector. We should therefore stick to Solvency II!'

ASSESSING GLOBAL RISKS
PANDEMICS AND CYBER RISKS

BY **PETRA WILDEMANN AND MARKUS SCHAEDELI**



PETRA WILDEMANN, SAV, DAV, IFoA (AFFILIATE) is Business Partner at Arocha & Associates

MARKUS SCHAEDELI is CEO at The Consulting Group

BEGIN WITH A STORY

Most human infections have their origins in livestock, including cattle, chickens, pigs, goats, sheep and/or camels. This is why agriculture-control is so important and why governments monitor any infectious disease in livestock so carefully - at least in the more developed countries. In poor countries, more than 25 percent of livestock show signs of current or past infection with bacterial foodborne diseases (also named zoonotic gastrointestinal disease) causing food contamination. Other deadly diseases from livestock which can severely harm humans include leptospirosis; cysticercosis; zoonotic tuberculosis (TB); rabies; leishmaniasis (caused by a bite from certain sand-flies); brucellosis (a bacterial disease that mainly infects livestock); echinococcosis; toxoplasmosis; Q-fever; zoonotic trypanosomiasis (sleeping sickness), hepatitis E; and anthrax.

In case of severe damage to existing infrastructure and/or controlled environment due to e.g. natural disaster or cyber-attacks, bacterial infections can develop and hit both animals and humans. The infection can potentially even jump from one to others. The example of leptospirosis which occurred 2017 after the hit of hurricane Maria, demonstrates the seriousness for humans and animals if the environment in which we live is stuck by natural catastrophes.

LINK TO EPIDEMIC RISKS IN AN UNBROKEN ENVIRONMENT

When mitigating risks, we need to understand what has happened in the past to attempt to predict future risks. We need to understand the risk of disease as well as cultural and demographic factors associated with transmission, vulnerability and/or insufficient preparedness.

While epidemics in humans and livestock may appear inherently stochastic, they actually demonstrate distinct patterns, just as other natural catastrophes do. This means that their risks can be quantified and analysed, with the results used to insure against their impact, despite their substantial diversity.

Since the majority of poor people in rural areas live in close proximity to livestock, sometimes without a safe water supply and usually dependent on livestock for food and milk, the risk of a pandemic spreading from poor regions is greater than many realize. Bird flu and tuberculosis are examples of diseases which can be transmitted between animals and humans. 13 different animal-to-human diseases were already observed, killing more than 2 million people, according to a study from Dreamstime.

Another way to introduce such diseases has been observed in countries such as Georgia, Ukraine and Poland, where most cooking and food production is done in private homes. Viruses have been spread by students returning home during their holiday period and throwing remainders of their fast-food packages into the woods (so called ‘Christmas Sandwiches’). Ducks, pigs, frogs and other animals have been infected and have carried diseases to livestock. African Swine Fever and Avian Flu have now entered those countries and will remain there as a threat to humans.

The pandemic and epidemic risks are part of today’s reality; whether it’s Zika, a vector borne disease (spread through mosquitos), SARS, MERS or other airborne, waterborne of foodborne diseases. What makes vector borne disease very much unpredictable is the fact that mosquitos carrying Zika can also carry diseases such as Dengue Virus or West Nile Fever. And they can carry these diseases throughout the globe.

INFORMATION ABOUT ECONOMIC LOSSES OF A DISEASE: FROM FOODBORNE, EBOLA, SARS, MERS, ETC.

The cost of birds lost to avian influenza can be very large, according to economist Thomas Elam of the Indiana-based consulting group FarmEcon. The direct costs associated with the avian influenza in 2015 in central United States were 1.57 billion US dollars. The additional costs associated with businesses that support farms (i.e. egg and poultry wholesalers, food service firms) pushed the total loss to 3.3 billion US dollars. In addition, the US Department of Agriculture committed 500 million US dollars to emergency efforts to block the disease, and paid out 190 million US dollars to farmers whose birds were destroyed.

Costs linked to foodborne diseases can vary from a relatively modest 450 million US dollars (due to the 2013 Enterovirus 71 outbreak in China) adding up to of 77 billion US dollars, which is due to a large 2012 case of food-borne illness in the USA.

Not only the direct impact of diseases can be a disaster but also the costs related to hospitalizations, treatments, and recovery. Any outbreaks in an economically well-developed country is more costly than an event in a poor country. However, the risk of a spread is higher in a poor country due to the density of living and the lack of preparedness, healthcare and even awareness of the risks.

The number of casualties (deaths or sickness) in outbreaks is not always a good predictor of the extent of the associated economic damages. Other factors also play a significant role. As another example, the costs of the outbreak of Ebola between 2014 and 2016 in Guinea, Sierra Leone and Liberia were - in fact - relatively modest at 2.8 billion US dollars. This is

MARKUS SCHAEDELI

due to the fact that the victims of epidemics in those regions either died or recovered quickly. On the other hand, as seen in the UK, the persistent foot (hoof)-and-mouth epidemic in 2001 resulted in damages of 11.7 billion US dollars, after 10 million cows and sheep needed to be killed to prevent the highly contagious disease from spreading.

Globally, there have been over 400 high priority human disease outbreaks over the past 10 years. These have caused significant economic losses, the bulk of which has been uninsured. The World Bank estimates that infections from the Zika virus cost the world nearly 3.5 billion US dollars in 2016. While regional losses due to the 2015 Ebola outbreak were moderate, global losses exceeded 32 billion US dollars. The MERS 2008 loss in South Korea cost approximately 8.2 billion US dollars.

Such economic losses will continue to escalate, due to the fact that the underlying factors driving the emergence of infectious disease are individually and collectively increasing. Keep in mind that the Spanish flu of 1918, which originated in a US soldiers' camp in Kansas, killed between 50 and 100 million people, more than the total number of deaths in the First World War. One billion people were infected by the Spanish flu worldwide.

TELL WHY EPIDEMIC RISKS CAN FOLLOW OTHER EVENTS: NATCAT, CYBER-ATTACKS, ETC.

The late event of Hurricane Maria hitting Puerto Rico in September 2017 demonstrated the vulnerability of bacterial outbreaks after natural catastrophic events. Relying on our environmental infrastructure makes us more vulnerable than we are aware of. Even one month after the event, still 25% of its 3.4 million citizens were without clean water and 80% had no electricity. It will be several months before continuing with a normal life in Puerto Rico. The reported cases of the bacterial infection leptospirosis in the region have increased during this period, increasing the possibility of a bacterial outbreak.

In 2010, the earthquake in Haiti demonstrated that epidemics following a natural catastrophe can significantly increase the number of casualties due to the natural catastrophe. The earthquake resulted in more than 230,000 people being killed and 1.5 million people without a shelter. However, the breakout of the cholera killed more than 4,500 people with 300,000 sicknesses. This can be viewed as tragic, but it is not unexpected. Prevention and monitoring of potential epidemic risks in aftermath natural catastrophes can reduce the additional casualties after an event.

Power grids and clean water can be damaged by cyber-attacks, war and/or terrorism. If not available, lack of these infrastructures may impact our living environments. As described earlier, bacterial diseases can spread if the environment in which we are living is stuck due to external factors. The damage and loss of a power grid up to a blackout of several days, weeks or months, can damage our environment and our business. The impact of a loss of the power grid is underestimated with a huge risk to pandemic and epidemic disease. We all rely on electricity in our daily life from financial transactions, communication up to access to food supply. Losses in power grids can follow a natural catastrophe, an outage or being the result of a cyber-attack either on purpose or by human failure.

WHAT CAN CYBER RISK LEARN FROM PANDEMIC RISK MODELS?

Cyber Risk is a global risk, which can hurt people, industries and infrastructure. The globalization, in particular with respect to power grids and communication, of many countries and regions have a much higher impact on our risk in life than any other business. An attack to any infrastructure can be done on purpose or for harm and in most cases it has


PETRA WILDEMANN

the purpose of illegally gaining resources and capital. With these thoughts in mind, it makes cyber potentially more dangerous than pandemic risks. The start of a virus in a system can occur from many locations which are invisible to the attacked infrastructure. Pandemic risks are a failure in the nature of the health system from zoonotic to human diseases. Cyber risks can be also be seen as a failure in the IT systems and communication platforms. Man-made attacks on this system for espionage, sabotage and/or extortion lead to loss or exploitation of relevant information.

The different stages from Cybercrime to Cyberwar can be compared to the impact of a pandemic disease outbreak. Cyber-crime has the goal of potentially gaining illegal capital or – in a lighter way – developing addiction or satisfying curiosity. Cyber-attack includes the purpose of doing harm. Cyber-terrorism has the motivation of damaging the enemy, to create fear and panic and chaos. Cyber-war can be compared to pandemic risks with bio-purposes by using poisoning gas on people or chemical plants. This is – in both cases – very critical as attacks do not depend on the size of the countries and do not have the purpose of gaining territories. Acts of Cyber-war or Cyber-terrorism are often part of a "silent" trigger, which distinguish them from Cyber-crime.

Past epidemic and pandemic events are not only acquainted, also the costs and the damage of an outcome of the outbreak are known. Forecasts can be calculated and modelled both for zoonotic and human infectious diseases. In case of the various cyber risks, forecasting the costs is much more difficult to achieve if we think of a broader impact than just damaging medium-sized businesses. Modelling the potential costs of a cyber-attack is beyond mathematical standards because cyber exposures are not so clear. This is partly due to the frequency and return periods of cyber accumulation events.

The existence of the three layers of Webs enhance that complexity. From the Surface-web, to the Deep-web and the Dark-web, the crime and attacks become less and less visible, but the process to prevent, to respond and to detect a potential crime is similar to the process to prevent, to respond and to detect a potential outbreak of a new pandemic disease.

CONCLUSION

Although, modelling of cyber risks is far more challenging than pandemic risks, they both require data of past attacks, understanding of the costs of the damage and strong actuarial models. There are more and will be more questions than answers from various anchors such as the insurance industry, technology and security firms. Who should lead such developments? Cyber or Pandemic specialists? Or Cyber-Pandemic specialists…

GENERAL DATA PROTECTION REGULATION COMES INTO FORCE

BY **STEFAN NÖRTEMANN**

Due to technological progress in connection with **actuarial data science** and **digitalization**, summarized under the buzzword **big data**, a plethora of opportunities & challenges for the insurance industry is arising.

Insurance companies have a wealth of customer data and we actuaries have always used them for our tasks. In addition, we are learning more and more to use methods of *machine learning* and *artificial intelligence* for our activities.

On the other hand, there are strict rules for data protection in the European Union. On 25 May 2018, the *EU General Data Protection Regulation (GDPR)* comes into force. Following this, fundamental changes in the data protection rules apply throughout the European Union.

We actuaries are not lawyers, but nevertheless we have to know the basic principles of legislation and develop a sensitivity for the law-abiding processing of personal data.

Informational self-determination

Data protection, specifically protection against abusive data processing, is a key fundamental right of every individual and became an integral part of article 8 of the *Charter of Fundamental Rights of the European Union* in 2000.

So far, the guidelines of individual directives have been implemented differently in each EU country, resulting in an EU-wide heterogeneous data protection landscape with data protection islands and the possibility for data protection arbitrage.

The *GDPR* supersedes the directives 95/46/EC and 2002/58/EC and applies without any act of national implementation in the same way directly in all EU member states. It defines common standards in data protection in the form of principles, rights of the persons concerned (= data subjects) and obligations of the controller.

Principles relating to processing of personal data

Within the *GDPR*, several principles relating to processing of personal data are established (see article 5). Personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject. Data shall be collected only for specified, explicit and legitimate purposes in an adequate and relevant way and limited to what is necessary in relation to the purposes for which they are processed.

The data shall be accurate and up to date and processed in a manner that ensures appropriate security of the personal data, including

STEFAN NÖRTEMANN is actuary at msg life central europe gmbh

protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical measures.

Lawfulness of processing

The *GDPR* (Article 6) generally prohibits the processing of sensitive personal data unless there is an explicit approval of the concerned person or in case of important reasons.

Relevant reasons are, for example, if processing is necessary for the performance of a contract to which the data subject is party or for compliance with a legal obligation.

Rights of the data subject

With the *GDPR*, the rights of the data subject were strengthened. In addition to the right of access to the data, the GDPR establishes (amongst others) the right to rectification and the right to be forgotten.

The data subject shall have the right to obtain the rectification of inaccurate personal data. If personal data are no longer required for the original purpose, they must be deleted without undue delay.

In case of violation of the rights of the data subject, administrative fines in the amount of the maximum of 20.000.000 EUR and 4% of the total worldwide annual turnover of the preceding financial year may apply.

Impact on the insurance industry

Like all other industries, of course, the insurance industry is also affected. Extended information obligations as well as the rights of customers require completely new business processes. In addition, with regard to the security of the data, the protective rights of customers require concrete measures in the IT landscape.

The most important thing, however, is careful handling by all parties, especially actuaries, of personal data of the customers, especially in the context of data science methods.

In a lecture (*"Actuarial Data Science versus Data Protection – Update against the background of the General Data Protection Regulation"*, 8 June 2018) at the *31st International Congress of Actuaries* (ICA 2018), the author will analyze concrete business cases in the context of data science with regard to data protection.

The ICA 2018 will be hosted by the German Association of Actuaries DAV in conjunction with the International Actuarial Association IAA from 4 – 8 June 2018 in Berlin, Germany. Around 2,000 actuaries, academics and high-ranking representatives from the international insurance and financial industry as well as related institutions are expected to join the conference. Major topics of the congress will be the future of insurance, longevity/demography, the low interest environment, regulation issues as well as actuarial data science.

INTERVIEW

A WORKING PARTY

INTERVIEW BY
PIERRE MIEHE

To launch a working party one needs to define a research goal with specified Terms of Reference (ToR). On the ASTIN web page there is a detailed explanation what should be included in the ToR. Once the document is prepared the author should submit it to the ASTIN Committee for approval. If the research goal is approved, ASTIN will help the author to organize a working group in the form of governance, access to IAA infrastructure and with the appropriate funding. ASTIN will help with the recruitment process of experts that want to participate in the working party. The working party is then ready to start with the research.

> *There are some important issues that need to be considered and further developed*

BOJ HAREJ is Head of strategic analysis at Zavarovalnica Triglav, Slovenia

HOW DID YOUR WORKING PARTY GO?

‘The title of the working party that I championed was “Individual claim development with Machine Learning”. It lasted one year, starting from August 2016 and ending in July 2017. More than 20 people volunteered to participate in the working party.

I could distinguish among three types of participants. The first group of volunteers joined in order to stay in touch with the research, the second group was actively involved and helped to coordinate and guide the research group and the third was the group that prepared the code, excels, simulations and the report. At the end there were 10 active members of the working party.

We used Slack as a core infrastructure program, Skype to organize regular brainstorming sessions and ASTIN mailing list to share core information.

I am very satisfied with the working party and all the colleagues that joined to work with me and I would say that our working group successfully reached the goal set at the beginning.’

WHAT WERE THE FINDINGS?

‘The main goal of the working party was to apply neural network techniques to develop individual claims on the basis of pattern recognition. We managed to implement an algorithm in R and we tested it on synthetic data that we prepared specifically for this purpose.

The results gave a strong indication that individual claim development with machine learning could be used for non-life reserving. We pointed out some data examples in which chain-ladder as a core algorithm used today in reserving practice failed to appropriately estimate reserves, but our algorithm gave better results.

With the research we proved the potential of machine learning algorithms. However, we open many questions where additional research could further improve the results.’

ISN’T IT TOO THEORETICAL? HOW YOU SEE THE IMPLEMENTATION OF IT IN PRACTICE FOR INSURERS?

‘Our research was very practical by nature. We researched the theoretical background of the problem, but we managed to implement the algorithm that could already work in practice on real data samples. However, there are some important issues that need to be considered and further developed. The working party didn’t manage to test the algorithm on real data and one could miss important underlying features of the data that the algorithm was not suitably adjusted for it.
I see the algorithm as very useful in being used in addition to standard techniques to create an alternative measure and to look at the estimates of individual claims ultimate severity, which cannot be really estimated with traditional methods.’

CROSS-BORDER SOLUTIONS

TO EUROPE'S RETIREMENT CHALLENGES

BY **PAUL BONSER FIA**

With over $15tr already invested internationally in define contribution (DC) assets, the market understands that DC is set to become and remain the dominant global retirement savings mechanism. Many expect there will be major income adequacy issues with future generations being unable to retire with dignity, and creating future pressure on Governments and employers.

At the national level, many Governments are taking steps to increase DC coverage, mandate contributions, and encourage access to multi-employer vehicles which deliver advantages through access to economies of scale. This is also true at the European level where one of the key strategies of the European Commission is to create sustainability in European occupational pension provision.

While DC is the problem of the future, employers still need to find efficient ways to manage the defined benefit (DB) legacy of the past. Local strategies include buy-out, benefit conversion or simply running off the benefit, and each have different cost and risk implications.

The European Pensions (Institutions for Occupational Retirement Provision (IORP)) Directive provides both employers and providers with a highly efficient alternative cross-border solution for managing retirement challenges. Both DB and DC can be consolidated cross-border into a single pan-European pension vehicle. This delivers significant benefits from economies of scale, more flexible DB funding, investment consistency and enhanced governance.

The market is segmented into two approaches for implementing cross-border solutions:

- Single-employer pan-European pension funds
- Multiple-employer (mastertrust) pan-European pension funds

A number of large multinational companies have established single-employer Pan-European pension funds over the last 5 years. Most of these vehicles were established as a way to consolidate existing DB pension funds. This is probably because asset sizes are larger and it is easier to build an internal business case to cover the cost of implementation. Some of these multinationals are now starting to extend their pan-European pension funds to cover DC because the additional cost and work to cover DC is manageable and economies of scale have already been established.

However, for the majority of multinationals, the most practical solution to gain access to cross-border solutions is to look for a single provider or smaller number of providers to deliver their European DB/DC pension benefits. This particularly applies to the increasing segment of multinational companies who take the view that delivery of DC and the associated risks are best outsourced to a professional provider.

The belief until recently was that there were no providers who were able to deliver such a solution...but that is changing. More providers are entering the market in response to increased demand. For example, Aon has established United Pensions which is a multi-employer, multi-country, occupational pension fund delivering DB and DC pension benefits. It is established and regulated in Belgium as a cross-border IORP, and is in the process of extending coverage to more European countries. In addition, Aon is also using United Pensions as the financing vehicle for their own DB and DC pension benefits.

Smaller pension funds can be disproportionately expensive and onerous to run; a costly and time-consuming legacy for employers and fiduciaries/trustees to manage. United Pensions offers smaller employers the opportunity to finance their pension benefits more efficiently creating greater sustainability for DB and better and more consistent member outcomes for DC. In particular, United Pensions provides access to:

- reduced operational costs
- delegated investment options not usually available to smaller pension funds
- access to Belgium's prudent, but not prohibitively prudent or prescriptive, DB pension financing regime
- professional governance

United Pensions is not the only example of multiple-employer cross border solutions. In addition to other financial service providers' solutions, the European Commission has sponsored RESAVER which is a cross border retirement fund for researchers working within the European Union.

Cross border retirement solutions are becoming established practice within Europe, and will continue to grow in popularity as the number of multi-country multiple-employer solutions and their coverage increases.

PAUL BONSER is a Senior Partner at Aon. He leads Aon's UK international retirement practice and is responsible for Aon's cross-border retirement solutions in EMEA.

INTERNATIONAL CONGRESS OF ACTUARIES IN BERLIN

From 4 – 8 June 2018 the German Association of Actuaries (DAV) in conjunction with the International Actuarial Association (IAA) will host the 31st International Congress of Actuaries in Berlin. The ICA is held every four years in a different global capital city. Following the ICA 2010 in Cape Town and the ICA 2014 in Washington this year's International Congress is coming to Germany.

Registration for the ICA 2018 opened on 1 December 2017 and it took only 8 weeks until the event was fully booked. In total, over 2,250 delegates and accompanying persons from 59 countries will attend the ICA in Berlin. The ICA 2018 will therefore be the best attended world congress in the history of the ICA so far.

Delegates can look forward to an outstanding congress program. Various formats offer a broad selection of high-class international talks and presentations on current and future developments in the field of actuarial science and finance. Daily plenary sessions will see renowned international experts from business, regulatory affairs and academia, including Gabriel Bernardino, Chair of the European Insurance and Occupational Pensions Authority (EIOPA), Peter Praet, Member of the Executive Board of the European Central Bank, and Scott Cochran, Executive Vice President Global Acquisitions of RGA, speak about strategic issues of the future and the most pressing challenges facing the insurance and financial industries. Moreover, over 30 invited speaker sessions will give delegates the opportunity to hear fascinating talks from renowned experts from insurance and finance. A large part of the scientific program will be made up of the contributed talks: 280 abstracts from a total of around 600 submissions from more than 57 countries have been selected and these will certainly ensure fascinating actuarial talks for both practitioners and academics alike.

Another highlight will be the very first Virtual ICA. Thanks to the support of a number of Sections of the IAA as well as institutional partners from the actuarial community, many sessions from the stages in Berlin will be broadcast live online and provided as recorded sessions afterwards. This will allow a much wider audience from all over the world to follow the high-value content presented during the ICA and help to secure this knowledge in a sustainable manner. Furthermore, the successful Call for Papers means that the VICA will also feature many online presentations by qualified authors to whom the ICA could not offer a presentation slot in Berlin. All information on how to participate in the Virtual ICA will be provided in April 2018. For regular information about the ICA please visit **www.ica2018.com**

Michael Steinmetz
Project Lead ICA 2018

COLOPHON

The European Actuary (TEA) is the triannual magazine about international actuarial developments. TEA is written for European actuaries, financial specialists and board members. It will be released primarily as e-mail newsletter.
The Editorial Board welcomes comments and reactions on this edition under **info@theeuropeanactuary.org**.

www.theeuropeanactuary.org

aae actuarial association of europe

Actuarial Association of Europe
Maison des Actuaires
1 Place du Samedi
B-1000 Brussels
Belgium

For futher informations contact
Chief Executive Ad Kok
(aamkok@actuary.eu)

Lay-out Manager: Linda van den Akker
Magazine Manager: Frank Thooft

NEXT ISSUE

The next issue will appear in june 2018. Suggestions can be e-mailed to **info@theeuropeanactuary.org**

EUROPEAN AGENDA

Please check
http://actuary.eu/event-calendar/
for the most actual forthcoming events.