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Actuaries DIGITAL

In this issue

IMPORTANT INFORMATION FOR CONTRIBUTORS
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Retirement Incomes Working Group (RIWG) – August 2018

By Anthony Asher *(a.asher@unsw.edu.au)*

Reading time: 3 mins

As Australia's population ages, issues have been recognised in the superannuation and pension systems. Anthony Asher gives an update of what the RIWG is doing to make positive changes to the current systems and guide future product design.

Australia's population is ageing. By 2054-2055, the number of Australians aged 65 and over will more than double, and one in every 1,000 people will be aged over 100. Driven by this issue, both Government and Industry are working to get the settings of Australia's superannuation and aged pension systems right in the retirement phase. The RIWG is a working group of the LIWMPC whose purpose is to contribute to the development of better post-retirement income products and advice in Australia. Now that the Superannuation Industry Supervision (SIS) Regulations permit the introduction of more innovative income streams, including deferred annuities, the focus of work to improve post-retirement conditions has moved to a fairer and more consistent treatment of purchased income streams under the Age Pension Asset Test. Treasury have also issued a position paper which sets out a framework for a retirement income covenant for superannuation funds.

On the Asset Test, John De Ravin and I presented a paper at the Financial Services Forum (FSF) arguing that the current test is complicated and unfair, and should be abolished. The fiscal cost of the Age Pension could be reduced by including the house in a revised Income Test, with a reverse mortgage scheme providing cash flow to those with valuable houses and little income, who might not qualify for any Age Pension. Independently, both David Knox and Michael Rice made similar suggestions in presentations to the Forum, and the Institute is preparing a green paper combining these ideas.

On encouraging superannuation trustees to develop a retirement income strategy, the RIWG has focused on research that throws light on the current behaviour of pensioners and their financial planners. John De Ravin, Paul Scully, Jim Hennington and David Orford presented another paper to the FSF having researched how 2,500 planners formulate retirement income advice. They found that planners seem to assume an arbitrary age of death (such as 90 or 25 years from retirement) and where they used mortality rates, they did not include projected improvements. It seems that this advice could be improved by indicating the likely range of age at death – particularly for the last survivor of a couple in good health. Many planners also show "a heavy reliance on Risk Profiling Questionnaires despite growing sentiment that they only go part of the way to determining an appropriate asset mix." Advisors are clearly reliant on software providers, and the RIWG is considering how actuaries might contribute in this area.

The RIWG has also worked with Strategic Insights to collect data on the actual drawdown behaviour of account based pensioners. The outcome of this research is a longitudinal study of the strategies used by retirees, which has been analysed by Igor Balnozan in his UNSW honours thesis. (The data he used was for 44,000 "allocated pensions" – roughly divided between those started in 2004 and after 2009). This research has provided two insights that can contribute to the future development of post retirement strategies.

- Firstly, 28% of the sample showed a strong tendency for drawing level dollar amounts throughout their retirement, with a median amount of $5,800 per annum, suggesting that **there is demand for relatively small life annuities**.
- Secondly, only 35% of the sample made at least one ad hoc drawdown while under observation. **Ad hoc withdrawal accounted for 30% of the money withdrawn, but most of it was within the first five years of retirement**, suggesting that it is used for planned expenses while retirees are in the active phase of retirement. More work is required to understand these patterns.

Given that many companies and trustees are considering the development of innovative income streams and deferred annuities, the RIWG is working on an Information Note setting out the issues that need to be considered for a well-designed product. A first draft was considered at an Insight's session in December 2017, and a revised version should soon be available on the Institute website.

Climate Change Blog – August 2018

By David Hudson

Reading time: 5 mins

Welcome to the second instalment of the Climate Change Blog, an article series that aims to cover news and events related to climate change and relevant to actuaries and the industries they advise.

This month's edition summarises news relating to litigation risk.

What's litigation risk?

Climate change litigation risk is the possibility that in the future legal action will be taken as a result of an individual's or corporation's actions, inaction, products, services or other events with respect to the effects on the earths climate.

Companies in the energy and resources industries may be exposed to litigation due to their direct actions, products and services. Considering around 90 companies are responsible for contributing to the effects of climate change over the last 200 years and new measurement models more accurately attribute the effect climate change is having on extreme weather conditions, possible settlement figures have the potential to run into the billions of dollars.

Climate Change Litigation risk requires consideration of the Appointed Actuary within their mandate to provide high level observations in relation to capital management and risk management in the Financial Condition Report. While Insurers and Financial Institutions may mitigate any direct Climate Change Litigation Risk within their own company through their ERM policies, the large potential costs of litigation for the businesses affected may have a flow on effect through the Financial and Insurance sectors. These effects are now seen as a mandatory consideration of Actuaries working in Asset Management and Superannuation as highlighted in the recent REST court case.

It is quickly becoming the growing consensus that climate change risks would be regarded as foreseeable by the courts so this risk becomes pertinent for Actuaries working with providers of 'Directors and Officers' Liability insurance products, both in the Product Design cycle and the underwriting process. Company Directors and fund managers may be exposed to litigation due to inaction around mitigation of physical and transition risks since the Corporations Act mandates directors to act in the best interests of their firm. Conversely, providers have an opportunity to mitigate this risk through the direct education of their policy holders.

Climate change expert Professor Will Steffen and Gloucester Groundswell founder Julie Lyford.

The following section summarises a few litigation cases in Australia and other parts of the world.

Rocky Hill Coal Mine in Australian Court over Paris Agreement

In an Australian first, the Rocky Hill open cut coal mine proposal has been taken to court over the argument that its approval will negatively affect Australia's proposed climate targets. Evidence in the case is being presented by climate scientists that shows no new mines can be approved if Australia is to avoid overspending its carbon budget under the Paris agreement. The case is currently being heard in the NSW Land and Environment Court.

"This landmark hearing, the first its kind since the Paris Agreement, will hear expert testimony about climate change, the carbon budget and the impacts of the burning of fossil fuels."

Anne Keen – Gloucester Advocate.

News covered by a few websites:

• https://www.theherald.com.au/story/5599537/rocky-hill-coal-mine-a-threat-to-paris-agreement-obligations-court-told/
• https://www.theherald.com.au/multimedia/photos-video/5589439/gloucester-residents-turn-out-in-force-to-oppose-rocky-hill-mine-project/
• https://www.gloucesteradvocate.com.au/story/5584739/rocky-hill-mine-appeal-is-underway/

REST in court for no climate risk strategy

Last year we saw shareholders take action against the Commonwealth Bank for failing to disclose climate risks, which was subsequently withdrawn after the bank committed to disclosing risks. This year, a member of the REST superannuation fund has similarly taken legal action against the fund for not having a climate risk management strategy.

Conversely, in a report of over 500 super funds worldwide by international organisation the Asset Owners Disclosure Project, Australian superannuation funds were found to be fifth best for addressing climate risk in the world, behind only Sweden, Norway, New Zealand and Finland. Local Government Super was ranked first in the world with a AAA rating.

The cost of not being in Paris

A team of Australian scientists from local universities and the CSIRO has mapped out the economic impact of countries complying with the Paris Agreement and found that gains far outweigh losses. They have estimated that not meeting our Paris Agreement would cost Australia $126 billion in annual losses.

"The global economic gains from complying with the Paris Climate Accord are shown to be substantial across 139 countries"

- Tom Kompas.

News covered here

Report can be downloaded here

Attribution of blame

In an important article on physical risks in Nature, Friederike Otto, a climate modeller at the University of Oxford discusses the measurement of the influence of climate change on extreme events. As Attribution science becomes routine and global warming's influence on extreme weather events can be instantly assessed, big implications are predicted for liability risk.

Disclosure warning to directors

Companies in all industries, including finance and insurance, are increasing their disclosure of climate-related risks, but there is concern that regulation is not changing as fast as the climate. Both ASIC and APRA have made clear that where climate-related financial risks are material, directors of companies must make clear disclosures.

ASIC commissioner John Price has urged company directors to take seriously a leading barrister's opinion that they could face lawsuits for failing to consider risks related to climate change. News covered here

ASIC

Australian Securities & Investments Commission

According to a legal analysis paper by the Commonwealth Climate and Law Initiative (CCLI), under Australian corporate governance laws, company directors can be held liable for failing to manage risks associated with climate change.

US Kids Climate Case Goes Ahead

The Supreme Court denied the federal government's request to halt discovery and the trial in the youth climate lawsuit Juliana v. United States. The court's rejection on Monday of the defendants' application for a stay means the case will likely proceed to trial as scheduled in U.S. District Court on October 29.

News covered here.

ExxonMobil and Suncor win in court

Boulder County Colorado officials voted to sue ExxonMobil and Suncor Energy for their alleged role in causing climate change. Federal judges on either coast have dismissed two of the most prominent climate lawsuits against the oil industry. Risks to taxpayers may be increased due to failed lawsuits brought by local councils compounded by the impacts of the continuance of business as usual.

News covered here.

Irish courts in climate change battle

A small group of volunteers have been to the High Court many times before, challenging regulatory authorities whose decisions

or inaction, they contend, damage the environment. The case is one of a rapidly growing number of climate litigation actions around the world which is currently running at almost 1,300 a month.

News covered here

Would you like to know more?

Recent climate change articles published by members of the Climate Change Working Group:

- *Climate Change Log – July 2018* by Evelyn Yong
- *Climate Change Disclosure – Financial Institutions Feel the Heat* by Sharanjit Paddam and Stephanie Wong
- *Climate Related Financial Disclosures: The Way Forward?* by Wayne Kenafacke.
- *An Overview of the Actuaries Climate Index* by David Hudson
- *Climate Risk Management for Financial Institutions* by Sharanjit Paddam, Stephanie Wong and Alison Drill
- TCFD Webinar: *Climate Leadership – How to Support the TCFD*

2018 Joint Regional Seminar Report

By Kitty Chan

Reading time: 4 mins

The 2018 Joint Regional Seminar (JRS) achieved a new record this year, attracting more than 1,000 delegates across the region, Kitty Chan reports.

Since it's inaugural event in 2002, the JRS is considered one of the most anticipated CPD event in Asia. In 2017, JRS visited the usual four Asia cities: Hong Kong, Kuala Lumpur, Taipei and Bangkok - as takes place every Summer.

To further reach out in Asia and enrich the CPD offering in the region, JRS was extended to cover Jakarta and Sydney for the first time in 2018. With the strong support of the regional speakers and local associations, the 2018 JRS managed to reach out to over 1,000 delegates in the six cities:

- 25 – 26 July – Taipei(300 delegates)
- 27 July – Hong Kong (130 delegates)
- 30 – 31 July – Kuala Lumpur(200 delegates)
- 1 August – Jakarta (180 delegates)
- 3 August – Sydney (85 delegates)
- 6 August – Bangkok (110 delegates)

The importance of the JRS to local associations and actuaries

Giovani Gracianti, Executive Director, Persatuan Aktuaris Indonesia (The Society of Actuaries of Indonesia)

The technological revolution is increasingly penetrating society and the development of data collection and computing power urges actuaries to adapt to an increasingly digital world. Being part of the JRS on this topic shows our willingness to equip our local actuaries to face challenges and take advantage of the opportunities in this era. We believe this is a fantastic opportunity for networking and sharing of experience among actuaries in this region.

Tommy Pichet, President, The Society of Actuaries of Thailand

The JRS has always brought up an up-to-date theme, containing diversified topics that are delivered by knowledgeable guest speakers. The Seminar provides an opportunity for actuaries in the local market to meet up, exchange views, and extend their network. This is truly beneficial not only to individual participants, but also to the actuarial profession as a whole.

The Society of Actuaries of Thailand (SOAT) has been working with the JRS Organising Committee for years. We are very pleased with its coordination each year. The Committee is so helpful, responsive, and understanding. We highly appreciate their best effort in facilitating and supporting local associations to ensure that the Seminar is held successfully.

Special thanks to the following Regional speakers for their contribution, attending various sessions and making the JRS roadshow a success!

- Bruce Porteous, Aberdeen Standard Investment
- Steven Tan, Gen Re Life/Health Asia
- James Lin and Dustin Ball, EY
- Mei-Chee Shum, Willis tower Watsons
- Ken Cheung, SCOR Global Life

A big thank you to our Members who also presented at the JRS sessions:

- Iris Lun, 10Life (Hong Kong)
- Steve Hui, Financial Consulting Company Limited (Hong Kong)
- Alston Liu, Deloitte (Taipei)
- Nick Li, NMG Consulting (Kuala Lumpur)

L-R: Kitty Chan, Shannon Lin, Alston Liu and Chris Tseng at JRS Taipei session

L-R: Ken Cheung, James Lin, Iris Lun and Steve Hui

JRS in Sydney

The JRS Sydney session was held on 3 August at the Actuaries Institute Australia.

85 delegates attended the seminar, with some of them joined the Webinar session from Melbourne and New Zealand. The theme for this year seminar was, "Back to the Future – Challenges and Opportunities in an increasingly Digital World"

We examined the role of technology and how digital is impacting our work in the region – in the areas such as Asset Management, Customer Behaviour Insights, Critical Illness Business and Robotic.

Actuaries Institute Council Member, Annette King (pictured seated centre below) gave the Keynote Speech, **"Actuaries – Disrupt Yourself or be Disrupted".**

Annette shared her insights on global innovations, what is happening at an industry level, organisation level and in particular what it means for actuaries and students in their careers, and current and future roles.

The Sydney session was very well received by the delegates!

The 2018 JRS would not have been complete without the support of local associations, regional presenters, local presenters and mostly importantly, the delegates!

For those of you who have an interest in the Asian market and are keen to learn about issues affecting the different regions, we look forward seeing you in next year.

Feel free to contact Kitty Chan if you would like to participate in the 2019 JRS.

In conversation with the Australian Government Actuary - Actuaries Institute Podcast

By Stephanie Quine *(stephanie.quine@actuaries.asn.au)*

Reading time: 3 mins

As the Australian Government Actuary (AGA) nears 100 years of service, Elayne Grace caught up with the current AGA Guy Thorburn, to find out what the office does.

Australian Government Actuary Guy Thorburn joined Elayne Grace (CEO of the Actuaries Institute) on Tuesday 14 August 2018 on the Actuaries Institute Podcast.

Listen to 'Australian Government Actuary - 100 Years of Actuarial Service' on Spreaker.

Listen on Apple Podcasts

Listen on CastBox

The pair discussed how the AGA, with its team of 12, operate in providing services to more than 40 Government departments and agencies.

These services include:

- superannuation and retirement incomes
- supporting insurance like programs such as the medical indemnity insurance fund
- supporting social security
- supporting the department of veterans affairs
- tuition protection

"one of the things that's really fascinating about the role is that it is probably one of the most diverse actuarial roles that you could find. I thought working in consulting was diverse but actually this covers a different level altogether" - Guy Thorburn.

The AGA's work on a DSS means-testing framework and parameters for the framework was a project Guy then described as one of the rewarding projects the office has worked on over the last 18 months.

"That was a good outcome from an actuarial perspective... it created something different in a complex environment the proposed solution seems to have generally been accepted. The resulting government policy was announced in the Budget," said Guy.

"...we know what's coming from a means testing perspective, so now we can think more broadly about the direction for CIPRs going forward." I expect that enhancing retirement incomes for all Australians should be high on the agenda for Treasury in the coming years.

Brand 'Actuary'

The conversation's focus then shifted to the importance of the reputation of actuaries as independent, professional advisers, which Guy described as being "critical".

"The reputation of actuaries provides the open door. People seek out advice at all levels because they know they're going to get independent advice that's well-grounded and well based [and] that's going to contribute positively to the development of a viewpoint about a policy recommendation..." said Guy.

He acknowledged the work of immediate past AGA Peter Martin who, with the support of senior actuaries Susan Antcliff and Michael Burt, built up the reputation of the AGA, enhancing its role and government's understanding of the contribution it can make.

The fact that actuaries typically represent the interests of the public at large; the individual or member; or what's good for the country was highlighted as something to preserve. As was guarding against getting caught up in the different vested interests of commercial or industry participants, at the expense of seeing the bigger picture.

Guy provided some tips for actuaries keen to get involved in public policy, including volunteering in one of many roles available through the Institute or writing (or contributing to) a submission to Government.

What makes a good submission?

- acknowledges the objective
- informs the objective to make it richer
- informs how we get to the objective
- represents the public at large, rather than a vested interest

"The best submission I've read actually is one that came in many years ago and was written by an actuary. They basically wrote what you would call a blueprint for how to achieve the objective, and it virtually happened," said Guy.

Listen in to the full conversation to learn about the history and current role of the Australian Government Actuary.

AASB 17 Information Note: Insurance Contract Update

By David Rush

Reading time: 3 mins

Institute of Actuaries AASB 17 Implementation Taskforce releases the first operating version of the Information Note for practitioners.

On Thursday 8 March 2018, the Institute released a draft version of the AASB17 - Insurance Contracts Information Note (IN) for discussion. Subsequently, the Taskforce has worked to address feedback received and reflect clarification on various aspects.

Version 1.1 is the first operating version, which has now been released.

The Institute would like to formally recognise the incredible amount of work put in by the Taskforce to get this operating version (V1.1) of the IN for the membership, particularly Ian Laughlin (Convenor) and the editorial team (Grant Robinson, Brett Pickett and David Rush) who have remained committed to keeping the document up to date and relevant. The interpretations of this accounting standard are still changing, and the Taskforce will continue to work to keep the Membership updated. Further version releases are planned, depending on the extent of the developments globally and locally.

Changes reflected in this new version 1.1 include:

- more clarity on **premium received** rather than accrued – unlike under AASB 1023 and AASB 1038 (where premiums are recognised on accruals basis and a receivable held for premiums due but not received), AASB 17 requires premium received to be used;
- revision of **treatment of expense** cash flows, including allocation of fixed and variable overheads and acquisition costs - in considering what expenses are included in FCF, distinction is made between (i) expenses clearly directly attributable at the individual contract level, (ii) expenses that are incremental at the portfolio level, and (iii) other expenses. Items (i) and (ii) are considered directly attributable and included in FCF; while (iii) are recognised in profit or loss when incurred;
- more detail on the level at which **diversification benefits** apply for risk adjustment purposes - an entity should only reflect diversification benefits in the risk adjustment to the extent that the diversification benefit has been included when determining the compensation the entity would require for bearing non-financial risk. At the May 2018 TRG, the IASB staff held the view that the risk adjustment for a specified group of insurance contracts is set by the issuing entity and could not differ upon consolidation in a group structure, even if the group had different appetite for non-financial risk. However, TRG members generally did not agree with the view and thought that basing it on the view of the reporting entity is valid under IFRS 17. There remain two valid views and it is likely to be further debated at a subsequent TRG meeting or be taken up by the IASB Board;
- more detail on **coverage units** - AASB 17 establishes principle on how CSM is to be released. However, on the more contentious issues, TRG members have observed that (i) lapse expectations are included to the extent they affect expected duration of coverage, (ii) a policyholder benefits from the insurer standing ready to meet valid claims should the insured event occur, and (iii) methods such as straight line allocation over time but reflecting the number of contracts in the group, use of maximum contract cover in each period, use of expected claim amounts each period should the insured event occur, use of premiums, or use of expected cash flows (but not if they result in no allocation of CSM to periods in which the insurer is standing ready), may be reasonable proxies depending on the facts and circumstances. The May 18 TRG also considered the question of whether coverage units are based on pure insurance risk excluding any investment, and the staff analysis concluded that the investment component could also be used as the basis for coverage units for contracts eligible to use the VFA – however, TRG members did not agree with this view, and argued that investment service was also present for non-VFA;
- more clarity on **treatment of contractual options** - a contractual right (not requiring agreement of the insurer) within the contract boundary (even though it gives rise to cash flows outside the contract boundary) must be appropriately modelled, and the exercise of such options is treated like other experience. The Staff view at the May 2018 TRG was that as the contract boundary applies to the contract as whole, repricing needed to apply to contract as a whole,

not just the option, otherwise the exercise of the option was inside the contract boundary. A number of TRG members disagreed and it remains an open question; and
- more detail on **derecognition** – the section on derecognition was restructured to make it more obvious as to what practitioners are required to do in certain circumstances.

Further feedback is encouraged by using the feedback form and should be forwarded to Tony Burke at Tony.Burke@actuaries.asn.au.

New IFRS17 and AASB 17 resource

A new resource has been set up on the new accounting standard for insurance business: AASB 17.

The webpage contains the latest versions of the Information Notes (IN), Task Force (TF) members, and an extensive list of resources.

Visit IFRS 17 and AASB 17 page

Analytics Snippet: Multitasking Risk Pricing Using Deep Learning

By Jacky Poon

Reading time: 13 mins

Jacky Poon shows you how to build a risk premium pricing model using deep learning, in this example for a motor portfolio - a classic general insurance problem.

Due to the complex coding, please view the original article on Actuaries.digital

The power of language in ‘fitting in’ - Dipping into Diversity - ‘sound bites of thought’

By Lesley Traverso

Reading time: 2 mins

How does the nature of the language and idioms you speak influence your perspectives? Here, Lesley Traverso, Convener of the Institute’s Diversity and Inclusion Working Group discusses a TED talk on this fascinating subject.

Have you ever thought about whether words create thoughts or thoughts create words?

When we consider the different ways that people from different backgrounds communicate, we may not always consider some of the reasons for these different ways of thinking and expressing ourselves. I know that when I first came to Australia I was very concerned the first time somebody said “look” to me at the beginning of a sentence. I thought he was cross with me for some reason or thought I was really daft, and I was very worried and couldn’t work out what I had done to offend him!

When we are considering the broader aspects of diversity and inclusion, we may concentrate on the ‘big stuff', but forget that it is often the little nuances that make someone feel an outsider, not included or inadvertently offended.

There is a fascinating Ted talk, given by Cognitive Scientist Lera

Boroditsky, about how the nature of the language that we speak influences our perspectives. Being adept at speaking the language of the country you are living in is one of the most important parts of fitting in. Even after 18 years I still feel a bit of an outsider at times when I use the wrong word – why is it that globes are not bulbs and zucchinis are not courgettes anyway?

Of course, it is much deeper than just using different nouns. How we speak shapes how we think and Lera's final thought sums this up –

"I've told you about how speakers of different languages think differently, but of course, that's not about how people elsewhere think. It's about how you think. It's how the language that you speak shapes the way that you think.

International CPD opportunities

By Kirsten Flynn

Reading time: 3 mins

There are over 30 committees, subcommittees, task forces, and working groups of the International Actuarial Association. These groups all commission, create and share content that may be relevant to Actuaries Institute members. Links to some of the content discussed at the recent meetings in Berlin, Germany are provided below.

The International Actuarial Association (IAA) is the worldwide association of professional actuarial associations and exists to encourage the development of a global profession.

There are over 30 committees, subcommittees, task forces, and working groups that contribute to the operation of the IAA. These groups meet (at least) twice a year in various regions of the world, with Australian representatives attending the meetings and reporting back to the Actuaries Institute Council.

These groups commission, create and share content that may be relevant to Actuaries Institute members. Links to some of the content discussed at the recent meetings in Berlin, Germany are provided below. **Don't forget that accessing this content can help you meet your CPD requirements!**

Mortality Working Group

The Mortality Working Group (MWG) within the IAA is devoted to the worldwide study of mortality.

More information on the MWG can be found here. Topics discussed at the latest IAA meeting in Berlin include:

- Climate Change and Mortality
- Mortality relating to E-cigarettes
- Older Age Mortality
- Underwriting around the world
- Long term drivers of future mortality
- Actuarial aspects of inequality
- An international look at recent trends in longevity

Further details on these topics can be found in the six-monthly report from MWG which can be found The update is also available in 13 different languages here.

In addition, the MWG has a list of papers and presentations, websites and recent events of interest which can be found here.

Population Issues Working Group

The Population Issues Working Group (PIWG) of the IAA identifies population issues of particular interest to actuaries and in respect of which the actuarial profession, at an international or national level, could make a useful contribution in the public interest.

More information on the PIWG can be found here.

The PIWG has produced two papers which may be of interest to members:

- Determination of Retirement and Eligibility Ages: Actuarial, Social and Economic Impacts – March 2016.
- Long-Term Care: An Actuarial Perspective on Societal and Personal Challenges – April 2017

Big Data Working Group

The Big Data Working Group (BDWG) of the IAA is devoted to identifying and discussing opportunities and practices for actuaries working with Big Data.

More information on the BDWG can be found here.

Topics discussed at the latest IAA meeting include:

- The publication of a paper by the American Academy of Actuaries (AAA) on Big Data and the Role of the Actuary (focusing on professionalism matters) which can be found here.
- A publication on the Singapore Actuarial Society website on Big Data & Insurance *Implications for SEA insurers* which can be found here.

Virtual International Congress of Actuaries (VICA)

With over 150 hours of presentations available from ICA2018 in Berlin via VICA, a list of some of the videos relating to Data Analytics have been picked out for suggested viewing here.

Actuarial Standards Committee

The Actuarial Standards Committee (ASC) of the IAA develops International Standards of Actuarial Practice (ISAPs) which are model standards of practice.

More information on the ASC and ISAPs can be found here.

The ASC is currently developing ISAPs on IFRS 17 (ISAP 4 – expected completion fourth quarter of 2019) and ERM and IAIS core principles (ISAP 6 – expected completion November 2018).

A webinar describing the purpose of ISAP 4 and giving some background on its development can be accessed here.

Enterprise and Financial Risk

The Enterprise and Financial Risk Committee (EFRC) of the IAA is working on an ERM Knowledge Database.

More information on the ERFC can be found here.

At the recent IAA meeting in Berlin, a list of ERM content from actuarial association websites was shared. Included was the Society of Actuaries in Ireland ERM Resource Database which is a collection of around 900 articles, papers and books related to ERM that can be found here.

Financial Risks and ERM Section

The Financial Risks and ERM (AFIR-ERM) Section of the IAA publish a monthly reference list full of interesting actuarial research.

The June 2018 reference list included an article from a University of Adelaide Professor on using @Risk to predict the FIFA World Cup, which can be accessed here.

AFIR-ERM has as its objective the promotion of actuarial research in financial risks and problems. The most important function of the AFIR-ERM is the organizing of annual colloquia at which knowledge is exchange among actuaries of different countries and disciplines.

Mike Sherris is Chairman of the AFIR-ERM Section. Mike is a Professor of Actuarial Science at UNSW, Sydney, where he was appointed in 1998 to establish the Actuarial Studies program, and recently retired to a part time research role. More information on the AFIR-ERM is available here.

Watch this space for more International CPD opportunities.

Where Fun and Facts Collide - 2018 Sydney YAP Trivia Night

By Mariella El-Azzi

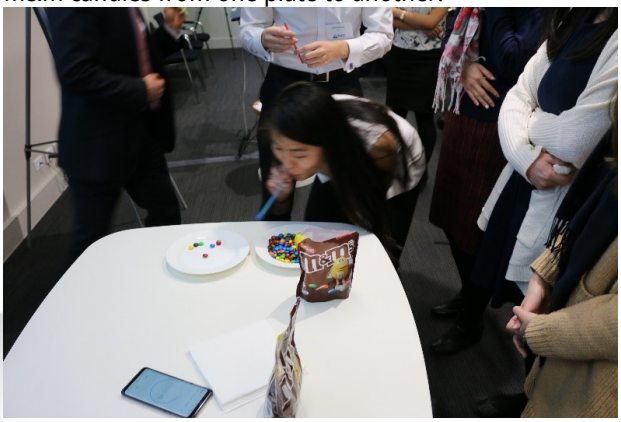
Reading time: 3 mins

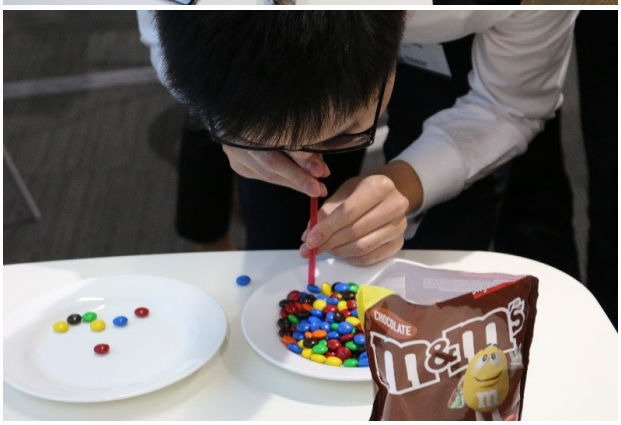
Did you know the titanic sunk in the North Atlantic Ocean? Did you also know that Lady Gaga's real name is Stefani Joanne Angelina Germanotta? These were some of the hot questions that were asked at the SKL Sponsored 2018 Sydney Yap Trivia Night.

The participants had the opportunity to network upon arrival and select their teammates for the night. With close to 70 people in attendance, all teams went head to head playing for the top prize of $250. There were also second and third place cash prizes to be won!

The question rounds were filled with a variety of topics where most participants would have some level of familiarity with. To name a few, these topics ranged from geography and anatomy to pop culture and history. A question that caused a bit of a stir in the crowd was: *who was offered presidency of Israel in the year 1952?* You would know this person!

To balance the mix of skills in the crowd, there were also three rounds of challenges the participants were expected to face. The first being a minute-to-win-it style game where three members from each team using just a straw each had to transfer as many m&m candies from one plate to another.





The next, a guessing game where participants had to list down the ages of a given list of celebrities. Then finally, a paper airplane competition as an additional challenge to try and boost the momentum of the lower scoring teams.

Little did the teams know that it was not all over a yet. A final bonus question was thrown in for the gamblers out there where the teams could bet *any number of points*. Their fate all rode on a simple question: which cake is least preferred by the teams in the room, mudcake or cheese cake? Each team was to write what they think would be least preferred and the number of points they would like to bet. The cake with the fewest votes was the correct answer, and the teams either won or lost the points they had gambled.

At the conclusion of all the rounds and the bonus question the first prize winners were “Love Actuary” followed by “What flavour is the popcorn?” and “Table of Decrements”.

First place winners

YAP would like to thank SKL for their sponsorship and congratulate the winners. Thank you to everyone that attended and made it such a great night.

The Critical Line - Volume 23

By Dan Mayoh *(dan@fintega.com)*

Reading time: 2 mins

Dan Mayoh serves up a dicey problem for Volume 23 of the Critical Line. Plus, Oliver shares the solution to Volume 22 and its winner - who stood out by submitting an animated solution to the problem!

The problem this month is not of my own creation. It is based on a question that as I understand it originally appeared in the Online Math Olympiad. I quite like it though because there are a number of different ways of arriving at the solution, most of which should be familiar to those trained in the actuarial sciences, and it doesn't require a computer.

At exactly 12:00 noon, you begin a game with 6 regular 6-sided dice. Nothing much happens for the first 60 seconds. At exactly 12:01, you instantly roll all 6 dice. Any dice with a value of 4, 5 or 6 are considered 'locked' and set aside, not to be rolled again. Any remaining dice will be re-rolled after waiting 1 minute. At exactly 12:02, you instantly roll the remaining dice. This process is repeated, where dice with a value of 4, 5 or 6 are locked and set aside, and remaining dice re-rolled after 1 minute, until eventually all 6 dice are locked.

What is the expected value of the time at which the final dice becomes locked? Exact answers only to the relevant fraction of a second please!

For bonus marks (but no additional book voucher), what is the expected value if instead of 4, 5 or 6, the dice require a value of only 5 or 6 to become locked?

For your chance to win a $50 book voucher, send your solutions to ActuariesMag@actuaries.asn.au

Solution to Critical Line 22 – by Oliver Chambers

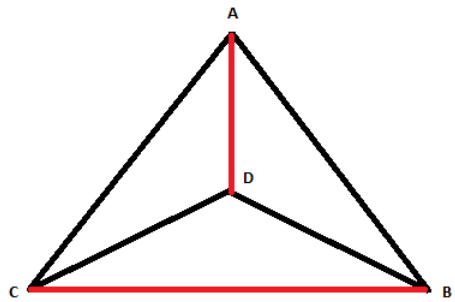
We had 13 submissions this month and 7 correct entries. Congratulations to Rob Deutsch, Tatiana Potemina, Mike Fowlds, Kelvin Duong, Ean Chan, Will Gardner and Andrew Parker.

This month's winner is Ean Chan – who not only gave a correct solution but also provided a program to test different strategies.

The strategy is to put the bug into a race with the spiders, and then it is guaranteed that the spiders will catch the bug because they are faster. One way to do this is as follows – as illustrated below have one spider follow the black path . We can keep the bug on this circuit by having the other two spiders guard the red edges (and). They move between the vertices at half speed and meet the first spider as it passes either vertex.

$$A \to B \to D \to C \to A$$

$$\overline{AD} \qquad \overline{BC}$$



Fast five with Fintechs - M&A Solutions Ltd

By Anna Knezevic

Reading time: 2 mins

In this instalment of 'Fast five with Fintechs', we ask Anna Knezevic about her experience setting up M&A Solutions Ltd, working on profit/capital optimisation based on incomplete data, and utilising data analytics to drive business insights.

About the fintech:

The fintech is called M&A Solutions Ltd.We provide solutions to small to medium size enterprises for variety of quantitative ailments. Our value add comes from in-depth understanding of client's problems and applying cutting edge technology to resolving them.

1. What skills do you need to succeed in Fintech/ Insurtech today?

Willingness to fail over and over again as you pick up new skills, and persevere. Data analytics (despite the hype) is still largely an emerging area, and a lot of the stuff still has loose ends. Your ability to think around them and come up with solutions despite "bug reports" is what will enable you to stand out.

2. What are some of the highs and lows of an entrepreneurial path in Fintech?

There are no highs and lows - in fact, every failure is a stepping stone if you manage to learn from it.

3. Where do you see the company in 12 months? What about five years?

In 12 months we will still be experiencing growing pains: establishing our reputation and getting new clients. In five years we hope to be able to get to stable revenue from returning customers.

4. What's your top tip for actuaries wanting to move into this space?

Practice solving problems. Listening to courses won't help you gain the knowledge that you need.

"Most of the programmers that made money from their skills were self-taught: they gained the skills before the skills became widely available."

By the time the right tools will percolate down to education, the momentum would have already been lost.

5. What has had the most influence on your professional mindset?

Ones ability to work hard is directly related to how much are you willing to accept the limited resources and time at your disposal. The experiences that highlighted that in my life (working across the globe, starting a family) helped shape me into the professional that I am.

I am an actuary

By Martin Mulcare *(martin@etiam.com.au)*

Reading time: 7 mins

Becoming an actuary brings endless opportunities to your career including working abroad and in versatile industries. Discover what opportunities the profession has brought to six recently qualified actuaries.

Amelia Mills

When I was in Year 10 we did something called the Morrisby Profile as part of my school's careers program. Interestingly, Actuary was the number one career suggested for me in my profile.

This was when I first found out what an Actuary was, but it was not something which I was initially sure that I wanted to pursue. However, fast-forward ten years and here I am, on the home stretch of my formal actuarial studies, with one Part III exam left to pass. Looking back, I think I really did find this profession because it combines many things that I enjoy and suits my natural skillset.

Following high school, I attended Monash University in Melbourne. I was one of the first cohorts to do the Part II program at Monash, which I did as part of an honours year in Econometrics. I joined Deloitte as a graduate in 2016, which has given me exposure to a wide variety of clients and industries and has been a great start to my career.

I have played tennis from a young age and it has always been one of my biggest passions. I still play pennant for my club and train as much as I can fit in around work and study.

I am happy and proud to be part of such a supportive and tight knit actuarial community. The actuarial journey is one that no doubt tests dedication and resilience, which I think makes it all the more rewarding.

A quote by Thomas Edison which resonates with me when I think of the actuarial journey is, "The three great essentials to achieve anything worthwhile are, first, hard work; second, stick-to-itiveness; third, common sense."

Anne Osborn

Being an actuary has helped me develop an exciting and diverse career in investment banking, M&A and investment advisory.

I started my career in investment banking at Macquarie, where not being afraid of complex financial models was a differentiator. After that, I worked in mergers and acquisitions in the valuations team at Deloitte. Subsequently I joined JANA, one of Australia's leading investment consultancies, where as a firm we advise on $450 billion of assets.

At JANA, I've had the privilege of being involved in multi-billion-dollar transactions, alongside some of Australia's largest superannuation funds and top tier fund managers. My role takes me beyond evaluating the financial returns of a transaction. We help our clients make strategic investment decisions that strengthen the superannuation savings of millions of Australians.

I decided to become an actuary when I was graduating from the Mac.Robertson Girls' High School. At the time, many of my peers aspired to become doctors or lawyers, however I knew my strong suit was mathematics. Although it has been a long time since I have had to solve stochastic calculus equations, the critical thinking skills that are honed by the actuarial degree have served as a strong foundation throughout my career.

Jane Wang

Long gone are the days when I needed to explain what an Actuary is while wondering if it is my Chinese accent that is making people confused. Many people know now what an Actuary is and the response is usually "you must love numbers" or from another perspective, "that sounds a bit boring". I am not sure where the "boring" bit comes from; certainly none of the actuaries that I know are boring. So to borrow a punchline from a friend, "I welcome the opportunity to change that perception."

I am an Actuarial Consultant working in Superannuation and I have to say, it is SUPER (pun absolutely intended). It is a huge industry worth approximately $2.7trillion and it impacts everyone. Considering its importance in our lives and the large amounts of money involved, I think Actuaries can play an important role for Superannuation Trustees and their members.

Our ability to translate financial complexity and data into strategic insights can add considerable value to Trustees in managing their members' funds and help drive increased engagement. To be able to assist our clients in their pursuit of these solutions is a very rewarding experience indeed.

When I am not being a Super woman (at work), I enjoy hiking a lot - the view at any mountain top is almost guaranteed to be spectacular. I also like to learn skills that are more on the creative side (e.g. playing guitar, drawing, etc.) to achieve the right (and left) brain balance. I am not good at any of them yet but I am trying!

Jonathan Venturi

Back in high school during my teenage years in France, I preferred spending my evenings and nights designing websites and learning programming languages rather than doing my homework. I guess at the time I was not predestined to be an actuary. But a few years and some good decisions later, I ended up as a Fellow of the French Institute of Actuaries and ready to take on a new challenge on the other side of the world.

This passion as a teenager did not go to waste as I started my career specialising in assets and liabilities modelling. I developed strong actuarial modelling skills that would prove very relevant for the Australian market. Today, I manage and ensure the integrity of the actuarial systems of AIA Australia and support the transformation of the actuarial valuation to better processes and new technology. Throughout my career, I have had the opportunity to work in three countries (France, Hong Kong and Australia) in three different continents and I hope to see more. "Change" is what drives me and keeps me passionate. I am excited about what the future will bring us and how it will reshape the actuarial profession. Count on me to bring in new ideas and shake things up!
But being an actuary is not everything. I also play football (I hear people call it "soccer" down here…), badminton, board games and chess. In general I can enjoy any activity - as long as it is competitive.

Lukas Zdanius

I graduated with Honours and Masters in Mathematical Statistics but had never really considered an actuarial career until someone mentioned it. I found an Actuary article in the University careers office with a picture of Martin Fry grinning at me and informing me that they earn $50-$100k, up to $150k. This was in 1990 - you do the wages inflation calculation! However, it was the application of probability and statistics and solving complex problems in a real business environment that captivated me the most.

I got my first "real" job with National Mutual where I joined a large community of students and Fellows. I wanted to utilise my statistical modelling background and it was hard to get good GI roles in Melbourne so I moved up to Sydney to work in home and motor pricing, building price-elasticity models in the early 2000's. More recently I worked as a Pricing Manager for commercial property and liability products. I am currently in the Workers Compensation space with Suncorp who are very supportive of my ongoing study towards Fellowship.

Full-time work and raising a family with three kids tend to get in the way of studying and it has been a long road to Associateship, especially following the UK path. I owe it to my wife, family and employers for all the support they have provided over the years. I also owe it to my own tenacity and never-give-up attitude. I have built up almost 20 years' pricing experience across a wide range of domestic, commercial and statutory products. Varied work experience even helps with the Part III exams!
When I do have spare time and am not studying, I enjoy spending time outdoors with my family and three children, going kitesurfing in Melbourne's windy bay or riding a bike.

Matthew Oates

After failing five straight semesters, I began to wonder if being an actuary was really for me. Although, fortunately or unfortunately, being a Canberra Raiders fan I am much better able to cope with frustrating performances on game day (or exam day) than most. I had almost given up and spent my weekends alternating between snowboarding and studying, when something just clicked. After being the highest fail for multiple semesters, being the highest pass for both 6A and 6B was a nice surprise. I wouldn't recommend failing, but you should experience everything at least once right….?

My advice for students struggling with exams would be:
To keep them in perspective as they are not the be all and end all to your career; to discuss industry developments with peers; and to not underestimate the importance of exam technique.
My actuarial career started after graduating from ANU in 2012 and I moved to Sydney to work in the Retirement team at Towers Watson. After fours year working within Superannuation I decided to make the switch across to the Life Insurance industry. I joined Suncorp in the Valuations team and have recently moved to the Capital Modelling team to broaden my experience. I continue to have a keen interest in retirement income products and am interested to see how the industry evolves over the next few years in offering innovative pooled longevity products.

Outside of work and study I enjoy playing basketball, watching rugby league, surfing and riding my motorbike. I used to think that I wasn't your typical actuary, although the more actuaries I meet the more I question if there is such a thing.

How to make flexible work arrangements work - CareerView Podcast

By Ashish Ahluwalia *(ashish.ahluwalia@finity.com.au)* and Darren Robinson

Reading time: 2 mins

This instalment of the Institute's Diversity and Inclusion series asks the Chief Actuary at MLC Insurance, Darren Robinson, about his experience managing employees with flexible work (remote location and part time) arrangements. Darren discusses the value of an 'agile coach' in supporting part-time staff and how productivity, retention and morale can be affected by flexible working.

Ashish Ahluwalia (Principal at Finity Consulting) discusses with Darren, the increasing take-up of flexible work arrangements and how - with the correct planning, level of trust, capability and communication - both employers and employees can benefit.

Darren explains some of his own staff's requests - including when returning from maternity leave and scenarios where 'Head Of' Departments moved interstate - and offers advice for both employees and managers.

Listen to 'Flexible Work - CareerView (Diversity and Inclusion)' on Spreaker.

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"both came to me with a plan of how they would make it work for them, for the team and for MLC and part of that meant getting their teams to step up into broader roles..." said Darren.

Darren emphasises that maintaining strong lines of communication, despite the geographical distance, is important. As is facilitating 'water-cooler' moments: those chance meetings of colleagues in the office or on coffee breaks that often spark innovations, for individuals not always physically present.

"Trust in the individual is important. The impact on the rest of the team [and on productivity] needs to be considered. A question that most managers will ask is "Has this individual properly thought through the consequences of this change?" They ... would expect whoever is requesting it to have thought through it particularly in a professional services organisation." - Darren Robinson.

Listen to our first instalment in the Diversity and Inclusion podcast series and read our article on the DIWG's goals and members.

Data Science: golden age or AI winter?

By Milton Lim *(milton.lim@taylorfry.com.au)*

Reading time: 6 mins

Is data science over-hyped? Or is the hype justified? Is there a risk of another AI winter in the near future? Milton Lim assesses the risks (both upside and downside) of the data science revolution and considers how best to ride the "Big Data" wave.

This article is the first in a series that explores the breakthroughs, history and philosophy of artificial intelligence (AI), computer science, machine learning, statistics, and high dimensional problems. It will also examine the issues of data quality, modelling, consulting, ethics and professionalism in data science.

Part 1: AI Breakthrough

Figure 1: AlphaGo vs Lee Sedol challenge match

"Any sufficiently advanced technology is indistinguishable from magic."
- Arthur C. Clarke

AlphaGo

On 15 March 2016, a breakthrough in AI history occurred in Seoul, South Korea. AlphaGo, an AI computer program developed by Google DeepMind, beat Lee Sedol, the world's best player over the last decade, at the game of Go with a score of 4 games to 1. The ancient Chinese board game Go, translated as "surrounding chess", was invented over 2500 years ago, with only a few simple rules where players aim to acquire more territory by surrounding the opponent's stones. In Go, the number of potential options at each move is about 200, much larger than chess which is about 20. The number of possible Go board positions is (10^{170}) and the number of possible Go games is at least $10^{\wedge(10\wedge 48)}$, much larger than the 10^{120} possible chess games or the 10^{80} atoms in the observable universe.

Mastering the game of Go has long been considered the holy grail of AI research due to its complexity, which requires human intuition, creativity and strategic thinking. Acquired by Google in 2014 for £400 million, London-based Google DeepMind's mission is to "solve intelligence", which is based on the principles of general "strong" AI (learning like a human), rather than narrow "weak" AI (pre-programmed with rules). AlphaGo's victory was about a decade earlier than anticipated, potentially viewed as an "Apollo mission" to start the AI race.

AlphaGo was built from deep neural networks trained with supervised learning and reinforcement learning. It used supervised learning to identify the patterns in a database of 30 million moves from 100,000 historical games (labelled as winning or losing) played by Go experts. It then applied reinforcement learning by playing against different instances of itself repeatedly to refine its strategies. During such a game, AlphaGo operated with the following components: [1]

1. **Policy neural network** to search for promising regions to place a move based on the training data by analysing popular human playing moves
2. **Value neural network** to evaluate board positions to determine the probability of winning
3. **Monte Carlo tree search algorithm** to simulate a probabilistic range of game outcomes for each potential move

Can machines "think"?

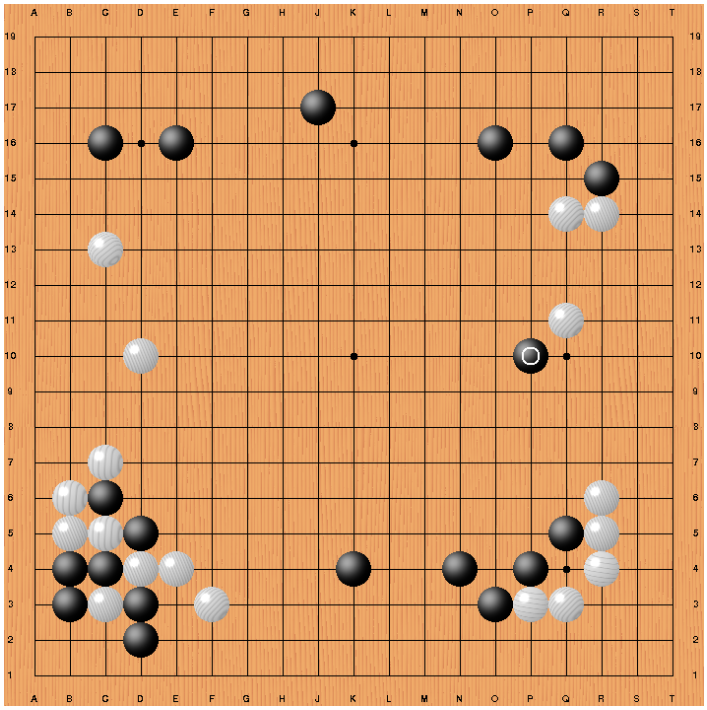

Figure 2: Game 2, Move 37 – AlphaGo's genius move (black stone with circle)

During the games, AlphaGo even produced a genius move (Game 2, Move 37) described as "creative and beautiful", which connected all the previous stones played to form a network of influence around the board. This move had a 1 in 10,000 probability of being played by a human. AlphaGo transcended the limitations of its human creators to form its own original creations. Ke Jie, the current world No.1 ranked Go player commented "*After humanity spent thousands of years improving our tactics, computers tell us that humans are completely wrong… I would go as far as to say not a single human has touched the edge of the truth of Go*"[2]

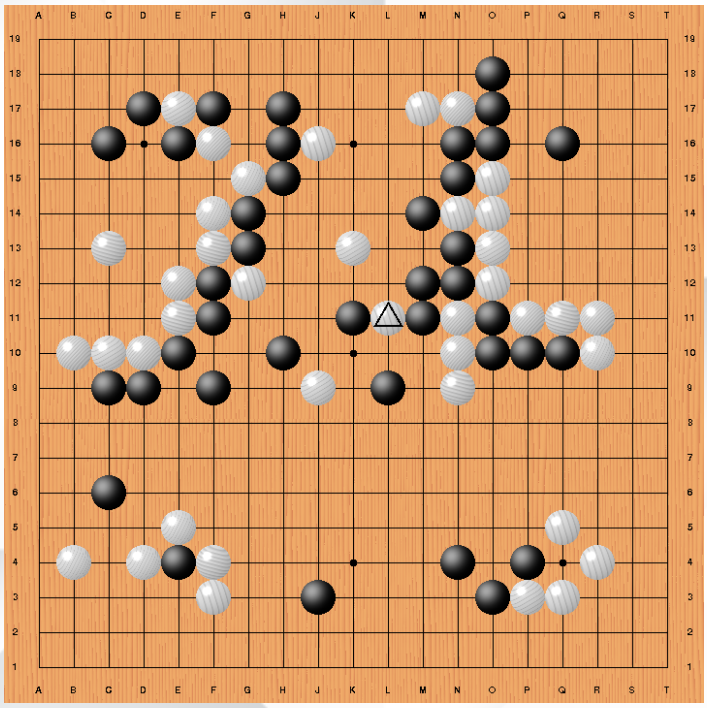

Figure 3: Game 4, Move 78 – Lee Sedol's "hand of God" wedge move (white stone with triangle)

After losing the first 3 games, Sedol managed to stage a comeback in Game 4. He responded by playing a type of extreme strategy known as *amashi*, by aggressively forcing the opponent into an "all or nothing" situation (like going "all-in" in poker). Sedol found a wedge move that allowed him to control the centre and turn the game around, which was praised by commentators as the "hand of God". AlphaGo evaluated that move at 0.007% probability of being played by a typical human, which reflects Sedol's genius in identifying that move. Conceptually, Sedol forced AlphaGo into a "blind spot" in the high dimensional search space, which was not calibrated with enough training data to secure a win. Had Sedol won at least 3 games by successfully "stress testing" AlphaGo's algorithm, he could have picked up the US$1m winner's prize rather than just US$170k (a handsome reward for one week of work though).

AlphaGo was programmed to maximise its probability of winning, regardless of margin, over the long-term by searching on average 50-60 moves ahead. Hence, it focussed more on likely wins by a small margin (as a win by one stone is still a win), than unlikely wins by high margins. As a result, AlphaGo tended to play quite conservatively with a lot of "slack" moves that appeared to be suboptimal for maximising territory, in contrast to humans who intuitively claim as much territory as possible at every opportunity. It seemed that AlphaGo was able to navigate very close games "down to the wire" with great precision, better than humans relying on intuition. AlphaGo could easily "interpolate" strategies amongst existing training data and its simulations with great accuracy, but it was terrible at "extrapolating" into unknown territory without domain-specific knowledge, where it appeared to make "delusional" decisions.

Alchemy or chemistry?

Historically, artificial neural networks have been perceived as "black boxes" with little understanding of how they truly operate. As non-linear statistical models, currently the best way to look inside seems to be some simple sensitivity testing with the weights of the component neurons. Some critics have described the current state of research in neural networks as "more alchemy than chemistry"[3] due to the lack of mathematical rigour and solid theoretical understanding behind them.

The success of AlphaGo showed that deep neural networks appear to be capable of capturing the complex non-linearities in the very high dimensional search space of Go games. However, it has not "solved" the game of Go exhaustively in a precise mathematical sense, but merely consolidated all the information contained in the human styles of playing into an effective machine learning algorithm. This is similar to the statistical strategy of "boosting" weak learners (in this case human data) into a strong learner (AlphaGo). Reinforcement learning allowed it to learn from all its past mistakes by rehearsing with itself (imagine if humans could learn to do this too!).

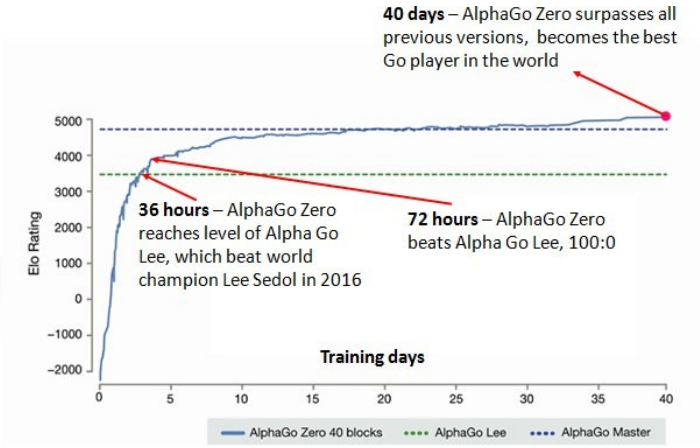

Figure 4 AlphaGo's speed of self-improvement

Google DeepMind has subsequently produced superior versions of AlphaGo:

- **AlphaGo Zero**[4]: by playing against itself and without any human data, AlphaGo Zero surpassed the strength of AlphaGo Lee (version which won over Lee Sedol) in 3 days by winning 100 games to 0

- **AlphaZero**[5]: generalized AlphaGo Zero's approach into a single algorithm to play different games such as chess and shogi to achieve a superhuman level of play within 24 hours of training.

Into industry: the future of society

Google DeepMind is also applying its research to the healthcare and energy industries. AlphaGo's algorithm has even been used as the basis for a new means of computing potential pharmaceutical drug molecules[6] and protein folding. With the recent success and publicity, the prospect of an upcoming AI winter (a period of reduced funding and interest in AI research) seems unlikely. The implications of large-scale machine learning and AI for the future of society are very promising.

For interested readers, I would highly recommend watching the fascinating documentary "AlphaGo" (available on Netflix).

In the next article in this series, we will examine the history of AI since the 1950's with booms and busts (AI summers and AI winters) to get an idea of where it might be heading in the future.

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[3] Rahimi, Ali (2017) NIPS 2017 Test-of-Time Award

[4] Silver et al. (2017) "Mastering the game of Go without human knowledge" Nature

[5] Silver et al. (2017) "Mastering Chess and Shogi by Self-Play with a General Reinforcement Learning Algorithm" preprint

[6] "Go and make some drugs" The Engineer, 3 April 2018

Analytics at the Virtual International Congress of Actuaries (VICA)

By Actuaries Institute *(Actuariesmag@actuaries.asn.au)*

Reading time: 2 mins

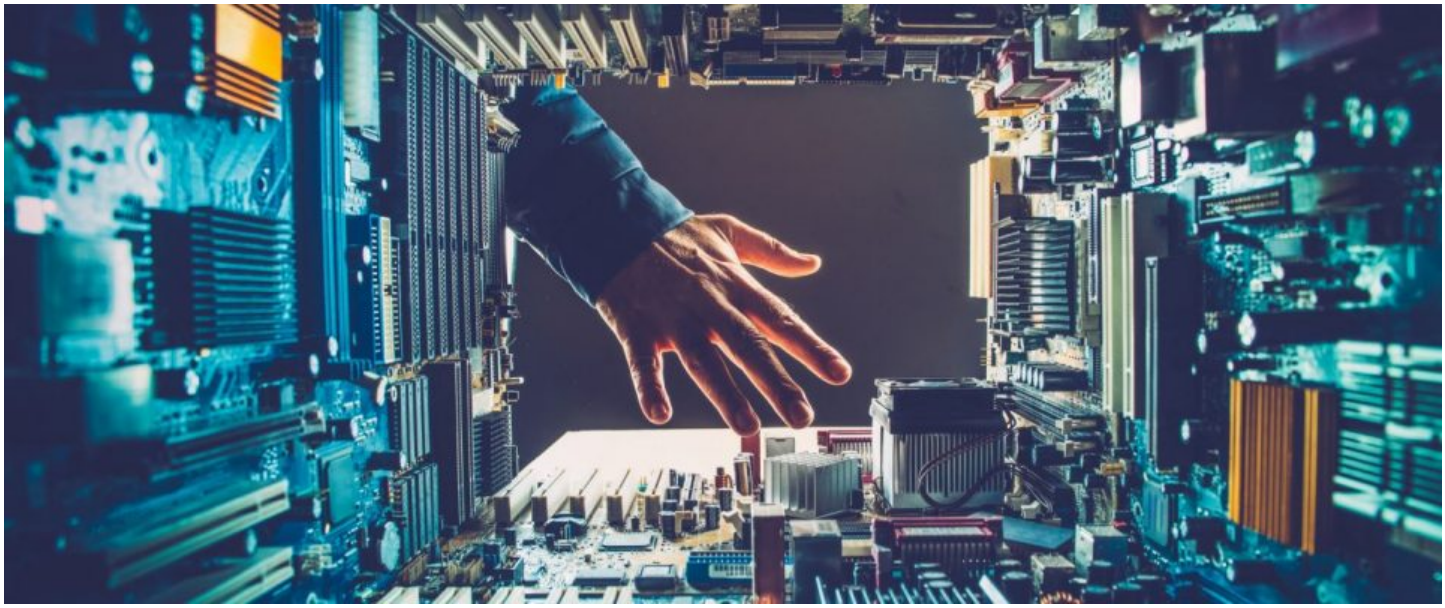
With over 150 hours of presentations available from ICA2018 in Berlin, we've had a look at some of the videos relating to Data Analytics and picked out a handful for suggested viewing.

The Actuaries Institute Australia is proud to be one of the hosts of the very first VICA, with recordings available online for Members until December 2018. View the full program.

Fellows and Associate Members do not need to register – you should have received a unique email access code to access VICA. Student Members can register here to receive a code.

We've had a look at some of the videos relating to Data Analytics and picked out a handful for suggested viewing:

- In "Digital disruption: The impact of information management on new products and business models for society", non-actuary Tom Jenkins takes us on a non-technical journey through the data landscape, the sheer volumes of data and the implications the future holds for data models and usage in business with the emergence of "markets of one". (30 mins)
- In "Using risk factors in insurance analytics: data driven strategies", Katrien Antonio takes us through a stepwise, technical example of LASSO regression in R. The presentation "unifies penalty-specific (machine learning) literature with statistical (or: actuarial) literature" and shows the construction of an R package for a "multi-type penalized proximal gradient algorithm". A free online course, Valuation of Life Insurance Products in R, is unveiled at the end. (34 mins)
- In "The transition towards semi-autonomous vehicle insurance: the contribution of usage-based data", Montserrat Guillen explains Usage Based Insurance (UBI) – in the case of vehicles, Pay-How-You-Drive (PHYD) insurance – and how these are interacting with advanced driver assistance systems (such as speed control); observation of the "learning effect"; and "correction" of the insurance premium using telematics information to complement traditional risk factors. (33 mins)
- In "Actuarial data science versus data protection – update against the background of the General Data Protection Regulation", Stefan Nörtemann delivers a brief history of data directives in the EU, highlighting key changes that the GDPR brings, and the implications for targeted marketing using data available from various sources and requirements for customer consent. (27 mins)
- In "Application of machine learning in health insurance to reduce claims leakage and improve underwriting", Satraajeet Mukherjee leads us through a health insurance-specific example with a detailed and informative analysis of machine learning models compared to GLMs. (38 mins)



Why packages are the new black

By Hugh Miller

Reading time: 2 mins

Hugh Miller comments on the plethora of packages available to data scientists, and its implications for businesses.

Most surveys around popular data science languages show a steady rise for R and Python. The rise of these free tools runs in the opposite direction to other types of software, where polished commercial software still dominates (Microsoft Office anyone?). While cost is a factor, there is another huge reason –packages. There are now tens of thousands of packages written to achieve very specific tasks. They can be big (The Rcpp package now drives much of R's higher-performance functions) through to the tiny (like making your computer beep).

Navigating the maze of packages can sometimes be a daunting task. Partly for this reason, the Institute is running a competition right now asking people to share their favourite packages and how they can be used to make their workday easier. Check it out and get involved. There are other ways too; you can keep an eye on packages people are using on Kaggle kernels, or there are sometimes people who will do the hard yards for you by reviewing new packages.

One of my favourite things is finding people who've used a bunch of packages to solve a really niche problem. For instance, this article describing how to auto-generate fantasy-world maps using Python is amazing. In a similar vein, there's some nice computer-generated art that can be made using some packages and a few lines of code.
The rise of packages fundamentally changes how we think about how data science works too. Rather than spending significant development time writing and implementing functions (while there's still a place for this), we can find something off the shelf that is near enough and prototype a method much faster. Deep knowledge of programming can partly be substituted by cobbling together solutions.

This approach to data science relies on a culture of sharing and goodwill that seems to permeate the R and Python communities.

People are keen to share their research (and have their code used) and will often point to their public github repositories. This has helped lower the barriers between academic research and business application. This also supports the reproducible research movement, where people are invited to check an analysis beyond what was possible in a traditional journal article.
The open package movement raises natural questions around support, quality assurance and updates. Nobody wants a crucial model dependency to disappear or fail at the wrong time. These are issues to be balanced against the significant benefits of better code availability. One answer is to continue to improve in-house expertise to keep an eye on tools that are used. Another answer is to look to commercial providers who've seen the opportunity in supporting this type of development in a more formal way (like Rstudio or Anaconda).
All of this makes it an exciting, and at times bewildering, time to be building models and writing code.

Going global - Interviews with IAA representatives

By Brendan Counsell, Nicolette Rubinsztein, Fred Rowley and Kirsten Flynn

Reading time: 6 mins

Kirsten Flynn is a Member of the International Committee. In this article, she speaks to Brendan Counsell, Fred Rowley and Nicolette Rubinsztein about their involvement with the IAA and reflections on the recent IAA meeting in Berlin.

Twice a year the Council and Committee of the International Actuarial Association (IAA) meet in various regions of the world. In the past five years, meetings have taken place in the USA, Hungary, South Africa, Russia, Canada, Switzerland, the UK, Singapore and the Netherlands. The latest meeting was held in Berlin, Germany over 30 May to 3 June 2018 and 332 delegates were in attendance, including 14 from Australia. These meetings provide an opportunity to discuss ongoing projects and consider new developments as well as to network and collaborate.

Kirsten Flynn recently caught up with 3 of the Australian delegates – Brendan Counsell, Fred Rowley & Nicolette Rubinsztein – about their involvement with the IAA and the Berlin IAA meeting. For more information about the IAA, including information about Council and Committee meetings, visit actuaries.org.

How and why did you come to represent the Australian actuarial profession at IAA meetings?

N: I went to Berlin in my capacity as Senior Vice President of the Actuaries Institute. My main aim was to learn from what other actuarial associations are doing around the globe and bring back some best practice ideas to Australia.

B: For a number of years now, I have been involved in local industry working groups covering the new accounting standard for insurance contracts, IFRS 17. There was an opportunity to join the IAA's working group on the topic, the Insurance Accounting Committee, or IAC, so I volunteered. Because IFRS 17 is a global accounting standard that affects Australia, I think it's important that Australian actuaries and accountants have a seat on the various international bodies so that we can influence interpretations and emerging practice.

F: I started to contribute to a few IAA discussions on technical topics in the 1990's. The Australian profession's pioneering experience (in some areas) and 'can do' approach seemed to give opportunities to promote progressive ideas that hadn't been tried elsewhere in the world.

When I was President of the Institute in 2007, I saw a much greater range of opportunities to influence the leadership of the profession globally – in ways that would support their collective goals and our local goals at the same time. The global CERA (Chartered Enterprise Risk Actuary) credential came out of one of those opportunities.

Brendan, Fred and Nicolette pose for a photo at the IAA Meeting

Why do you think it's important for the Australian actuarial profession to be represented at IAA meetings?

F: We can contribute a lot to the development and influence of the profession at the global level – and the development of the industries we serve – in a way that benefits our members directly.

We have always been thought-leaders in our region, and sometimes globally. I think of the Actuarial Control Cycle, and pioneering realistic accounting for insurers. We can use our insights to influence the direction of global developments, for the greater good. But at the same time we can learn a lot from others, and work together with parts of the profession around the world, wherever we have common interests. If you don't know what they're doing, you can't work together – and you can't compete either!

B: The ability to influence debate and emerging practice is very important e.g. for IFRS 17. If you don't attend and participate in the meetings then you can't really complain if you don't like the outcomes!

Further, a wide range of ideas and thinking is brought to the meetings from around the world. By attending these meetings, we can leverage new ideas and improve the way we operate as a profession here in Australia. The IAA produces a lot of very good quality material on a wide range of topics that many of our members may not be aware of (you can find links to much of this by exploring actuaries.org).

Which of the sessions you attended at the IAA meeting in Berlin were the most interesting and why?

F: One committee I attended deals with Insurance Regulation at the global level. We are in the process of contributing to the design and development of international frameworks for insurance regulation, which means promoting better ERM and more consistent capital management. The ultimate 'customer' for this work is actually the G20 group, although it is being driven operationally by the International Association of Insurance Supervisors (IAIS). Its goal is to improve the stability of world economies by enhancing the supervision of financial institutions that operate globally.

B: Being new to the IAA meetings, I found the most interesting sessions to be the Presidential Town Hall on the opening day, and the Council meeting on the closing day. Both of these sessions provided me, as a newcomer, a good overview of what the IAA does, their membership and some of the key challenges facing actuaries as a global profession. For example, did you know that the IAA has around 100 member associations from around the world, but 60% of their funding comes from the three largest associations? However, the smaller associations obviously have a lot to gain from membership of the IAA and make up the remaining 40%. So, while the large associations are big stakeholders, the IAA must also remain relevant and accessible to all of the smaller associations, including ours!

N: One of the most interesting sessions for me was the Mortality Initiatives session. This session involved several presenters giving an update on the latest research. Some of the interesting areas were:

- Impact of e-cigarettes
- Impact of inequality on mortality
- What is happening on improvements to older age mortality
- Impact of climate change on mortality.

Fred catches up with his old friend Prof. Xie Zhigang, from Shanghai (making the most of the networking opportunities provided by the international meetings)

What issues were discussed that are most relevant to the Australian actuarial profession?

B: Some of the challenges that the IAA is grappling with are also very relevant to the Australian profession. Two key challenges for the IAA that are also relevant here are 1) how we communicate and publicise all the good work and thought leadership that we are doing and make it accessible to a wider audience and 2) how do we best make use of our limited, mostly volunteer, resources in an efficient way that focuses on the topics that are most relevant and useful to the profession and wider society?

F: I also attended the Banking Working Group. The South African Association (ASSA) and the UK are both strong in this area and are leading the work on a possible syllabus for Banking as a specialist exam. It's probably safe to say that Banking practice around the world is more uniform than insurance practice. As a result, the syllabus work has the potential to rapidly expand the capabilities of the profession in Australia, without re-inventing the wheel.

N: The meetings that I found most useful were the bilateral meetings with other associations. We met with the IFOA (UK), the SOA (US), CAS (US) , CIA (Canada), ASSA (South Africa). It really opened my eyes to a world I hadn't really appreciated. During these meetings, the main focus was what they are doing on education and CPD. Given that our main strategies are around education and CPD, it was very useful to learn about what the various associations are doing. A few interesting examples:

- The approach to CPD varies a lot between countries. Many are leveraging technology to create a platform and easier user interface for members. Some are requiring specific CPD hours for professionalism.
- Some associations have made significant progress on data analytics. The SOA and CIA have developed specific data analytics courses
- The South African association appears to have done a very good job on professionalism, moving away from a single day and spreading it over the parts of the qualification

What are some of the things you did with your free time in Berlin?

B: I bumped into a few of my EY colleagues from other parts of the globe (networking is a good reason to attend these meetings!). I joined one of my colleagues from the EY Amsterdam office on a bike tour around the city and visited all the tourist traps – it was good fun. Being from Amsterdam he spoke a bit of German and was familiar with Berlin, so I was lucky to have a "semi-local" guide.

F: When you've travelled so far, the opportunity to catch up with overseas actuarial friends – old and new – is irresistible. So I spent a lot of time with them – talking about a range of things while we enjoyed the boat tour of the city, or admired the wonderful museums.

I also took some time out to visit a few memorials to those who have suffered in the past to defend (or just for trying to enjoy) our democratic freedoms. It was sobering to reflect on what they went through, and why.

And on a more cheerful note, I also met up with my nephew, who is lucky enough to live and study there!

N: Berlin is a city with a great energy. I had breakfast on a rooftop terrace in one of the trendy areas, wandered the streets of Mitte, went to the Stasi museum, went to Checkpoint Charlie, visited KaDeWe department store (which has survived the highs and lows of German history). I also ate out at some great restaurants and was very happy that vegetarians were well catered for – as I was expecting a lot of sausages to be on offer!

Brendan takes in the sights of Berlin

Private Health Insurance: metallic paint, game theory and product standardisation

By Barry Leung *(barry.leung@defencehealth.com.au)*

Reading time: 4 mins

The interaction of reforms to categorise all hospital insurance products into Basic, Bronze, Silver and Gold with the commercial and political environment will require careful planning and detailed risk assessment, writes Barry Leung.

On 16 July 2018, Minister for Health, the Hon Greg Hunt MP, invited comments on the exposure draft of the Private Health Insurance (Reforms) Amendment Rules 2018. The measures contained in the rules provide the detailed framework for several reforms announced by the Minister in October 2017.

One of the key reform measures is the mandated categorisation of all hospital insurance products into four different categories – Basic, Bronze, Silver and Gold. The intent of this measure is to address concerns that many consumers do not fully understand the benefit coverage of their hospital insurance policy. All health insurers must comply with a raft of requirements under the proposed rules, including:

- **Product coverage requirement** – All products must meet minimum coverage levels for products under defined categories[1]. The rules do allow insurers to cover more than the minimum requirement if they choose to do so. The minimum coverage requirements go hand in hand with the new standardised clinical categories detailed below.
- **Product naming convention** - all insurers must include the appropriate product category as part of a hospital policy name and may not include any other metal or gemstone. If the product covers more than minimum requirement for the Basic, Bronze and Silver product tiers, the products may be named [Basic] Plus or [Basic]+, as an example.
- **Changes to "Restricted" benefit coverage** – So called 'restricted' benefits are a feature of some hospital insurance products in the current market. Where treatment is covered on a "restricted" basis, a policyholder will be fully covered if admitted to a shared room in a public hospital. If the treatment is provided in a private hospital, the patient will not be fully covered, with the insurer's hospital benefit liability capped at the shared room public hospital accommodation rate and the patient likely to incur significant out of pocket expenses.

  > As restricted benefit coverage can be confusing for consumers, the Government has proposed that it be removed for most clinical categories from the Gold, Silver and Bronze product categories.

  "Restrictions" would still be allowed on Basic products, as well as for psychiatric, rehabilitation and palliative care under Bronze and Silver products. The Government's position on "Restrictions" will be reviewed in 2020-21.

- **Standardised Clinical Categories** – A persistent problem in PHI is the varied interpretation and language used by different insurers to describe the benefit coverage of their products, and the adverse impact on consumers when comparing products in the market. For example, the Commonwealth Ombudsman has received complaints concerning definitions of "minor gynaecological procedures", "minor eye surgery", and "minor joint investigations". These policies can present difficulties if an individual's procedure is considered minor by their surgeon, but is not considered minor by the insurer. When this occurs, the consumer may be aggrieved that the insurer's definition of a "minor" procedure differs from their doctor's view, and as a result the treatment is not covered. To enable consistent interpretation of what is covered under each clinical category, the Government has proposed to mandate standard clinical categories across all hospital insurance products. Each clinical category sets out the conditions that are within scope and the treatments for which benefits must be paid.

The proposed product categorisation has been subject to independent review, consumer testing and extensive consultation with stakeholders. Independent actuarial modelling has also been conducted to evaluate its impact on industry participation and premium rates. Mandated product categorisation is expected to become effective on 1 April 2019.

The introduction of product categorisation raises some interesting challenges for insurers' product portfolio

management. Health insurers must assess the implications for the product coverage of existing products, competitive dynamics, marketing, administration system, operations, customer communication and retention and the upcoming premium increase application.

Some key questions insurers should ask themselves include:

- Would the coverage of existing products need to change to meet the standardised clinical categories, and/or removal of "Restrictions" on the Bronze and Silver product tiers? What are the implications for sales, retention and pricing/ profitability?
- Which product category will each existing product fall under?
- Would the competitive positioning of existing products shift under the new system?
- Does the insurer need an offering in all product tiers? How would that link to its marketing and product strategy?
- Are current product names compliant with the mandated product naming convention? If not, what decisions need to be made?
- What will be the impact of any upcoming new products?
- What is the best way to engage and communicate these reforms and changes with staff, as well as new and existing customers?

Product categorisation is only one of the many new measures which will become effective in 2019.

Other important reform measures include:

- Voluntary implementation of age-based discounts for people aged 18 to 29 under a hospital insurance policy;
- Increased the maximum voluntary excess levels for hospital products providing individuals an exemption from the Medicare Levy Surcharge;
- Allowance to provide travel and accommodation benefits under a hospital insurance policy.
- Increased flexibility with how standardised information on health insurance policies can be presented to consumers;
- Removal of coverage for some natural therapies from extras cover;

The interaction of these reform measures with the commercial and political environment will require careful planning, detailed risk assessment, and appropriate actions. Actuaries are well positioned to assist health insurers to assess the uncertainties and devise strategies to minimise adverse impact on the business.

And to everyone working in the health insurance industry, it will be an exciting (and challenging) year ahead!

[1] The minimum requirements for each product tier can be found here.

The role of the actuary in social schemes – National Redress Scheme for Child Sexual Abuse

By Danielle Casamento

Reading time: 3 mins

The Royal Commission engaged actuaries at Finity Consulting to conduct an actuarial assessment of the potential costs of an Australian National Redress Scheme, *estimating the scheme would cost around $4 billion. Since then, Finity have worked* closely with many organisations to help estimate their exposure to sexual abuse liabilities. Here, Danielle Casamento discusses the estimates and the framework used for assessing liabilities.

The Catalyst

In late 2012, the Royal Commission into Institutional Responses to Child Sexual Abuse was announced. Over 5 years, 42,000 calls, 26,000 letters and 8,000 private sessions later, the National Redress Scheme commenced on 1 July 2018 in response to the Royal Commission's recommendations.

The Scheme

The National Redress Scheme will operate for 10 years and offers to eligible survivors of institutional child sexual abuse:

- a redress payment of up to $150,000,
- access to counselling and psychological services, and
- a direct personal response.

The scheme operates on an opt-in, responsible institution pays basis meaning responsible institutions need to join the scheme to allow fair access to redress for survivors. To date, all major governments and non-government institutions have committed to the scheme.

The scheme operates in parallel to civil litigation, as an alternative option for survivors of child sexual abuse. While scheme participants might not achieve the same level of financial compensation as they would in a civil claim, some of the benefits of redress for survivors include:

- The lower burden of proof required under redress, noting the passage of time and lack of records can add significant difficulty in suing the institution directly.
- The nature of the civil claim process can be source of re-traumatisation for victims.
- Historically, limitation periods, questions of vicarious liability and difficulties in identifying a proper defendant have made pursuing civil litigation difficult for survivors.

The scheme only covers victims of child sexual, and related physical abuse within institutions. This represents a small fraction of all historical child abuse within Australia with a high proportion of children experiencing institutional physical and emotional abuse (but not sexual abuse) and also noting that most abuse in Australia occurs outside of institutional contexts (particularly within families).

How can Actuaries assist?

No scheme can operate without consideration of design, costing and funding arrangements. In 2015, the Royal Commission engaged Finity Consulting to conduct an actuarial assessment of the potential costs of an Australian National Redress Scheme. This involved estimating the volume of participants that might report institutional child sexual abuse as well as considering the monetary payments, counselling and administrative costs of such a scheme.

How many survivors do we expect to come forward?

Based on our analysis, we estimated around 60,000 participants would approach a National Redress Scheme. The volume of participants was derived by extrapolating the number of survivors from past State-based redress schemes to a national level. One of the challenges of this analysis was that the past schemes only covered a limited range of institutional contexts while the proposed scheme was intended to be 'universal'. Investigation and analysis of past civil claims and the Royal Commission's private session data were coupled with actuarial techniques and judgement to estimate the varied 'development' of different institutional contexts.

How much will the scheme cost?

The cost per participant is dependent on how each abuse case is assessed and the corresponding payment awarded. Based on the Royal Commission's recommended payment scale, which scored each participant based on severity, impact and additional factors, we estimated the scheme would cost around $4 billion. The assessment framework which will be used to determine the redress payment under the actual scheme has not been made publicly available.

How will it be funded?

A participating institution will be liable for the cost of redress if the institution is determined to be responsible for the abuse. Institutions that have opted-in or are considering opting-in, need to understand their potential financial exposure. Over the last four years we have worked closely with a number of organisations to assist with estimating their exposure to sexual abuse liabilities arising from both redress and civil litigation. As a relatively new area of actuarial involvement, we've spent a lot of time thinking about how best to approach these challenging questions. We've come up with a framework for assessment of liabilities and the key considerations are outlined below.

Beyond the National Redress Scheme

Actuaries understand numbers, claim patterns and the impact of legislative change and environmental forces. We've seen this many times before with asbestos, CTP reform and workers compensation schemes. The actuarial skill-set is uniquely versatile and can be applied in a range of unfamiliar contexts to solve challenging problems where information is limited. The thought-processes and approaches used in the costing of the National Redress Scheme could be applied to other schemes.

The number of participants is a function of: Who is the exposed population? Who is eligible?

As with the development of any new scheme to achieve the desired outcome requires a balance of purpose versus sustainability. Survivor focused outcomes must be weighed against the ability for payments to be funded over the next 10 years.

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