

South African Actuary

ACTUARIAL
SOCIETY
OF SOUTH AFRICA

Actuarial Society of South Africa's E-magazine

Volume 6 Number 2 | JULY 2022

www.actuarialsociety.org.za



Hire an Actuary • Resilience and financial optimization post-COVID • **What is the International Actuarial Association** • Interview with South Africa's first blind Actuary • **Sleep, Wearables and the Future of Underwriting**

TABLE OF CONTENTS

Letter from the Chief Editor - <i>Michael Tichareva</i>	3
A Presidential Perspective - <i>Tjaart Esterhuyse</i>	4
Roots - <i>Themba Gamedze</i> – from Maths to Theology via Actuarial Science	5
What is the International Actuarial Association? - <i>Mathieu Langelier</i>	8
The 2022 Actuarial Convention: The Best of Both Worlds - <i>Roxanne Tobias</i>	11
Interview with South Africa's first blind Actuary – Elash Mistry - <i>Lydia Mutepfa</i>	14
Painting the Portrait of the Modern Actuary - <i>Caesar Balona</i>	17
Your actuarial training is not enough: How IT education can help actuaries stay relevant and support digital transformation - <i>Faheem Suban & Pamela Hellig</i>	24
Creating strategic options - <i>Dr. John Young & Iain Allan</i>	28
The Case for an Actuarial Function in Banks - <i>Iain Allan & Michael Tichareva</i>	32
Life Assurance Seminar 2022 - <i>Kadene Gibbs and Maseeha Rawat</i>	35
Funeral insurance and burial societies: Impact of the pandemic and lessons learnt - <i>Melusi Baloyi, Alvin Ngugi, Vhusi Phiri & Anelang Kakudi</i>	37
Hire An Actuary – says the Zambian Insurance Act No 38 of 2021 Sections 69-70 - <i>Raiza Sibongile Mtamira</i>	41
Lessons learnt from 4 decades of life assurance product development - <i>Paul Tuyens</i>	43
The fair value of Life Right Village Properties - <i>Reg Munro</i>	45
Sleep, Wearables and the Future of Underwriting - <i>Matan Abraham & Nicole Kriek</i>	49
Student Sub Committee Profiles	60
Mere conduits of data will not do - <i>Gregory Whittaker</i>	62
The South African Law Reform Commission and Medico-Legal Claims in Healthcare - <i>Gregory Whittaker</i>	66
Enter the Coronials - <i>Pamela Hellig</i>	69
Resilience and Financial Optimisation Post-Covid: - <i>Paballo Makupu</i>	74
Covid-19: Pandemic to Endemic - <i>Dr Prachi Patkee, Dr Adam Strange, Paul Turner</i>	76
Book Review - <i>Lydia Mutepfa</i>	82
The ASISA Classification Standard for Collective Investment Schemes - <i>Joao Frasco</i>	83

Published by the Actuarial Society of South Africa. All rights reserved.

Unless explicitly stated otherwise, views and opinions expressed here do not necessarily reflect those of the Actuarial Society of South Africa, its President, Council, editorial team or staff.

South African Actuary Editorial Team: Adrian Burke, Hannah Chivaka, Jo Coetzee, Mike McDougall, Lydia Mutepfa, Maseeha Rawat, Nomfundo Nkambule, Michael Tichareva (Lead Editor) Design & Layout: Vegiah Design



MICHAEL TICHAREVA

LETTER FROM THE CHIEF EDITOR



Greetings to you, all fellow actuarial professionals. We come again with another exciting edition of the SA Actuary, where we cover both technical and non-technical content that you, as our avid readers, contributed. They say **sharing is caring**, so we greatly appreciate your contributions, and please keep them coming!

As we continue to contemplate what the future actuary might look like, and as we debate how actuaries should integrate their risk management and decision-making skills with modern data science techniques in the advent of large data and computer power, it will be interesting to read the article by **Caesar Balona** on the actuary of the future. The article titled **"Painting the Portrait of the Modern Actuary"** compares the actuarial profession with the data science profession and gives insights on how we can bring the two skillsets together for better outcomes. This essentially defines the modern actuary, the actuary of the future. This article is a must read for those young actuaries looking to improve their skills, and for the older actuary looking to understand the work of the young actuary as they bring new skills to the profession.

We then have Themba Gamedze, a retired senior actuary and one of the first black actuaries in South Africa, telling his life story and how, from being a poorly paid university lecturer, he got to become an actuary. As he tells his story, Themba questions why lecturers are paid lowly when they are some of the most important players in imparting knowledge to our young generations. It is also fascinating to learn about Themba's interests not only as an actuary, but also a lot of other things. He refers to Frank Redington, one of the earlier great actuaries of the 20th century who said, in one of his speeches sometime around 1956/7, that **"An actuary who is only an actuary is not an actuary"**. This is a loaded statement that we must all reflect on as we work to develop sustainable societies around us.

The editorial team also held an interview with South Africa's first blind Actuary, **Elash Mistry**. Elash tells a fascinating story of how he conquered all obstacles from primary school, to high school, to university, and to eventually qualifying as an actuary. If you are feeling demotivated, and you think the load ahead of

you is insurmountable, then Elash's story is one for you to read for motivation. In Nelson Mandela's words, **"it always seems impossible until it is done"**. Elash demonstrated this by being resilient in the face of adversity, until he qualified. Today Elash is a practising actuary who certainly is doing great in his various roles.

If you practice in life insurance and you wish to improve your life office's underwriting standards, then you had better watch the sleeping habits of your prospective and current policyholders and how these impact their health. **Matan Abraham** and **Nicole Kriek** give a literature review and present a case study with some interesting examples where data was collected on individuals on their sleeping habits. In their article titled **"Sleep, Wearables and the Future of Underwriting"**, they suggest that collecting and analysing such data to understand the impact on the health of individuals is most likely the future of modern life insurance underwriting.

We also refer you to the article on the 2022 Actuarial Convention by **Roxanne Tobias**, the new Chair of the Convention Organising Committee. Roxanne promises the best of both worlds in a hybrid convention of online and in-person attendance where she encourages you all to register in numbers.

This edition contains many other interesting articles that we urge you all to read!

Until next time, keep well fellow actuarial professionals!

Michael Tichareva

Lead Editor, on behalf of the Editorial Team

If you wish to comment or
contribute to The SA Actuary

**PLEASE
CLICK HERE**



TJAART ESTERHUYSE
President, 2022-23

A PRESIDENTIAL PERSPECTIVE

It always amazes me how rich our Society is in its diverse membership and experiences. This edition of the South African Actuary again demonstrates that with some personal stories from Themba and Elash. When I first looked into becoming an actuary, the stereotypical view of what an actuary is supposed to be almost scared me off. Themba shows us that it is in no way true! What esoteric interest you have, Themba! I certainly learned some new terms and concepts from your very interesting discussion.

Elash provides a hugely inspirational personal account of his journey to become an actuary. It is also a story of how other people can have such passion in their own occupations to support someone else in very original ways, as with Rykie. It certainly reminds us all not to be one dimensional in our approach to our work and our life, but to keep our imagination alive to using our skills in a much wider way.

On the international front, I attended my first IAA in person meeting in April in Brussels as President of ASSA. It was a daunting prospect meeting presidents and other actuaries from around the globe, but I was quickly made to feel welcome. There were some meaty discussions, with many diverse views on matters. It is important that all voices are heard and considered. and in that, the IAA plays an important role in bringing people with diverse views from across the globe together to discuss matters affecting actuaries no matter where they find themselves.

One topic that, indeed, comes up is the relative attractiveness of data science as a career compared to being an actuary with a data science role, so Caesar is touching on a very relevant subject in his article. When I see what actuaries in data science roles can do with the tools and data that are available, I am less concerned than others. While we may have been slow on the uptake of this “new-ish” science, I believe we are rapidly catching up. As an older actuary, I can remember using very large IBM machines to do data analytics, i.e. data science. It’s just that the tools and the data we had available back then were a fraction of what we have now!

I wrote the above paragraph before I read what Faheem and Pamela are saying about actuaries and technology! I certainly agree with the premise being discussed in their article. We should keep up with what’s happening out there, and use it to transform the way we work. My day job is working with a small team to bring technology partners into the insurance value chain to aid the digitization of the industry. There are exciting prospects out there, but often the stumbling block is the readiness of the legacy systems to accept such changes. I think that is changing though, as people are accepting the imperative of modernizing insurance processes and systems.

John and Iain’s discussion of strategic options resonates a lot with me. It is not that I have been actively pursuing such a strategy with intent, but it certainly makes me think that it may be necessary! It reminds me of Peter Drucker’s statement that culture eats strategy for breakfast. In my working career, I have found that teams that are adaptable, that know what needs to be done, but need not be told how to do it, will go out there and get it done.

South Africa has been at the forefront of using actuaries in the banking industry for years. That culminated in a Banking stream in the actuarial exams. It is pleasing to note that this is gaining traction across the world, with other associations being interested in using our courses and exams for banking. I can well see the need to formalise the existence of actuaries in banking as an actuarial function, as Michael and Iain discussed. I certainly hope that we can see that progressing.

Let me not bore you any further, but the whole of this edition is interesting and thought provoking. Thanks to all that contributed, it is a compelling read. 🇿🇦



ROOTS

- Themba Gamedze -
from Maths to Theology
via Actuarial Science

I was born in Thaba 'Nchu in the Free State on 14 October 1958 to a Zulu mother from Sophiatown, Johannesburg, and a Swazi father from Bethel Mission in the south of Swaziland. I am the first of a very diverse group of children that includes the pastor of a vibrant charismatic church in Midrand, South Africa; a Rabbi in the Hasidic tradition based in Tzfat in Israel; and an accomplished jazz singer living in Sweden. At the end of 1959, my family moved from Bloemfontein to Alice in the Eastern Cape, where my father was a lecturer at the University of Fort Hare and also served as chaplain, and my mother obtained her BA in English.

Our family moved to Swaziland at the end of 1962, where I was raised, nurtured and educated, apart from a few formative years spent in the UK as an early teenager, when my father was posted there on diplomatic service. I attended Waterford-Kamhlaba High School in Mbabane, Swaziland, where my naïve political upbringing was challenged constantly by my rather more radical fellow schoolmates who were predominantly the highly politically conscious children of the household names that we associate with South Africa's anti-Apartheid struggle. After school, I attended the University of Warwick in Coventry, where I read pure mathematics, at which I eventually graduated at Master's level.

I will forever be grateful to my parents who established a firm foundation from which I have emerged. In particular, my most abiding memory of my father, who bought about five or six sets of encyclopaedias for us when we were very young, was his stock response whenever we asked him any question of a technical nature: "Go and read!" Similarly, my mother's gift to me of the prescient book "Future Shock", by Alvin Toffler, when I was about 12 or 13 years old, did an enormous amount to prepare me for the reality of our world of ever-accelerating change.

Before entering the commercial world, I was a lecturer in Pure Mathematics at the University of Swaziland, although most of that time was spent on postgraduate studies in the UK, rather than actually lecturing. I have also been a freelance newsreader on Swazi Television and spent a few years playing part-time, semi-professional football for one of the well-known teams in Swaziland. The highlight of my admittedly rather short soccer career was a glorious afternoon when I miraculously netted two goals for my soccer team, Mbabane Swallows, against the Swazi national team after coming on as a substitute while on a home visit from university. The fact that the match took place on my old school grounds perhaps gave me a home advantage that may help explain what happened.

I had always thought that I would follow an academic career in pure mathematics, which I could perhaps describe as my first love, but in the end my tentative exploration of the commercial world eventually became permanent after an unsuccessful attempt to obtain a doctorate.

But why the actuarial profession?

I found out about the actuarial profession completely by accident. It was late 1986 or early 1987 and I was doing mathematics research at the International Centre for Theoretical Physics in Trieste, Italy when I came across an academic paper, German or Swiss I believe, in which some very complex mathematics was being applied in the insurance industry. I was so surprised to see anything more than arithmetic actually being used in finance and soon became very interested in the subject.

Fast forward three years, to where I ended up managing to get a job as an actuarial trainee at a UK insurance company, Clerical Medical in Bristol, as a thirty-one-year-old amongst much younger recent UK graduates who were also beginning their actuarial careers. It was, at first, difficult to get over my sense of being well out of place in a company that was founded in 1824, made huge money off insuring an 18-year-old and rather sickly Queen Victoria (but who went on to live almost to the age of 82) and made the right decision to reject a life assurance proposal for Mussolini, who did not last quite as long.

The one thing that I have never forgotten about the profession was when the most senior actuary in the company, with the title of Appointed Actuary, presented our intake group of six trainees with our official letters of appointment. Just before handing over the letters, which were signed “Mr A. G. O’Leary”, he crossed that typing out on each one and wrote “Andrew” instead and announced that in the actuarial profession we are all on first name terms. I have never ever forgotten that life transforming gesture, particularly as a black African academic who was still very uncertain about himself in the cut and thrust of the world of British commerce.

Key milestones

I am a proud Fellow of the Actuarial Society of South Africa, having originally qualified as a Fellow of the Institute of Actuaries. I have served as President of the Actuarial Society of South Africa, Chairman of the South African Insurance Association and was the founding President of the Association of Southern African Black Actuarial Professionals, which was established with the express aim of growing the number of black qualified actuaries in South Africa.

My earliest memories as an actuarial trainee are rooted in the type of camaraderie which is probably impossible to reproduce these days because, until my family were able to join me, I lived in a house owned by the company in order to provide accommodation for any actuarial trainees who required it. This further consolidated my sense of the actuarial profession as being much more like an extended family than anything else, and helped to get me quickly into my studies. When I started my studies, there were ten subjects to pass. The first six provided the technical foundation and the last four covered the areas of practice in which almost all actuaries worked at the time; being, Investments, Life Assurance, General Insurance and Pensions, of which we had to choose one to be examined at Specialist level. I put the fact that my career has taken me through all of these financial sectors down to the breadth of this foundation.

I will never forget the sense of pride and relief that I felt when I passed the first 6 subjects within my first year and received a substantial increase in remuneration, and even a promotion, as a result. This was very much appreciated, as I was by then a married father of three young children and sole breadwinner, trying to settle into a new country and a strange occupation. A typical evening for me began with being handed our youngest baby, as I came in through the door and carrying out my pre-dinner studies at the kitchen table with him on my knee, as my wife prepared our evening meal, and kept the older children occupied. Little did I know at that time that it would take me ten times as long, and a return back to the land of my birth, to pass the other four subjects, during which time life unfolded in many unexpected ways.

I officially took early retirement at the end of 2015 from my executive role at Sanlam as Chief Executive of Strategic Projects and have since then intensified my involvement in renewable energy development projects. I have also found time to explore the practical aspects of Impact Investing, as well as to undertake Biblical Research, where my special interest is in the Jewish and socio-political context, and the narrative structure of the New Testament Gospels.

Over the last few years, I have also had the privilege of finding myself being drawn from time to time into a number of projects that actuaries would refer to as the wider fields, for which I always felt that my actuarial training, coupled with a healthy appreciation of the limits of my contribution, have prepared me well. I continue to champion the importance of effective governance, and the particular importance of independence in that regard. I regard the stability and success of our institutions as playing an absolutely crucial foundational role in achieving sustainable transformation and inclusive economic growth in our Country.

I MUST ALSO
ACKNOWLEDGE THE DEEP
SENSE OF PRIVILEGE I
FELT ON BEING GIVEN
THE RESPONSIBILITY TO
REPRESENT AND LEAD
THE SOUTH AFRICAN
PROFESSION BY BEING
ELECTED AS PRESIDENT OF
THE ACTUARIAL SOCIETY
OF SOUTH AFRICA.

Standout moments

The moment I felt most alive from a professional point of view must include the day I found out that I had finally passed my final actuarial exam and would soon be qualifying as a fellow. However, I must also acknowledge the deep sense of privilege I felt on being given the responsibility to represent and lead the South African profession by being elected as President of the Actuarial Society of South Africa. In that context, one of the proudest moments of my life is associated with the development of the Fellowship in Banking course that was spearheaded by the South African profession and I can only hope that I have, in turn, also done the profession proud. I honour those who came before me, appreciate the commitment of those who followed and extend my goodwill to those yet to make their contribution to the survival and growth of what I believe to be a most extraordinary profession.

PERSONAL SECTION

So, where does my inspiration come from?

If there is any one thing that has kept me going over the past 15-20 years, it has been my research of and writing about the New Testament Gospels, following a Judeo-centric approach to the texts, in the hope of developing a non-confrontational framework for sharing my thoughts on this. In particular, I never cease to be inspired by the main character of the New

Testament Gospel accounts, Jesus (i.e. Y'shua) of Nazareth. My latest contemplation revolves around how he deliberately selected role models not only from outside his own people group, but also from beyond his own faith paradigm, and embedded them directly and consistently into his teaching, in a way that was clearly intentional.

As an example, the well-known parable of the Good Samaritan, in which the hero would have scandalized Y'shua's Jewish audience presents us not just with a strong role model from a different faith and racial group, but also includes a deep criticism of the innate tribalism and harsh coldness of the religious formalism of many of his own people. I have found these narratives about Y'shua to be endlessly intriguing and so deeply inspirational that I have now completed a series of five books on the subject: The ATOGA Kingdom Series. My basic idea was to attempt to place all the events of the Gospels onto a single time-line, based on my personal application of a Judeo-centric approach to understanding these fascinating manuscripts that often permitted me to place a number of time markers in the narratives, drawing from the flow of the Jewish liturgical timetable.

And, what about my family, interests and idiosyncrasies?

I have been married to my wife Shirley for over 38 years and we have five children, although we are now true "empty-nesters". In keeping with her personal ethos of continually challenging herself, Shirley has just completed the second of two Zulu textbooks and a Zulu Grammar book. Not bad for a Lancashire lass who studied German at University and only began learning isiZulu 10 years ago!

My ideal escape would be a cruise taking me somewhere remote. Perhaps I suffer from the (virtually untranslatable) condition that the Germans refer to as "fernweh" - literally the ache to go far - perhaps not quite as far (or cold!) as Antarctica, but maybe Alaska or the Norwegian Fjords. My quirkier side finds profound amusement in collecting labels and instructions written in Chinglish - that unique version of English that emanates from China - but I am unfortunately coming across it less and less often these days.

I have also developed a special interest in Chindogu, a Japanese society dedicated to the art of creating gadgets for everyday use but which are "almost but not totally useless". The principle is that while each Chindogu is indeed capable of solving a particular problem, in doing so, it automatically creates so many more problems or generates so much social embarrassment that it would never be manufactured commercially. I find that both of these interests provide me with the important reminder that the lighter moments in life are definitely worth celebrating.

Final thoughts

Probably one of the more important lessons learnt over my career, especially when it has involved highly technical work, is that technical capability counts for very little if one is unable to communicate the underlying concepts or results using language that is both readily comprehensive and persuasive. In this context, I watched first-hand, and in absolute horror, as one of the actuaries of a team I was supporting in pitching to an important client not only contradicted the client directly, but actually went on to prove that he was wrong. Needless to say, we failed in our quest. Being right is definitely not the be all and end all of life.

I also believe that we should make every attempt to ground ourselves in reality, no matter how important society may make us feel. For me this often comes down to recognising that, when I was an educator, and therefore pursuing what I still believe is one of the most important occupations on earth, I found my family having to find innovative ways to supplement our meagre income. And yet, as a corporate executive, whose relative value to society is in my view not quite as easy to assess objectively, I was remunerated much more handsomely.

What is that about?

Finally, taking the lead from a well-known quote from the great British actuary Frank Redington, although I have always thoroughly enjoyed working as, and with, actuaries, and pushed myself to be the best actuary that I could be, I have always tried to recognise that there was far more to life than just being an actuary and that, indeed: "An actuary who is only an actuary is not an actuary." 



INTERNATIONAL ACTUARIAL ASSOCIATION
ASSOCIATION ACTUARIELLE INTERNATIONALE

WHAT IS THE INTERNATIONAL ACTUARIAL ASSOCIATION?



Mathieu Langelier,
IAA Executive Director

In the March 2022 issue of *South African Actuary*, Desmond Smith – one of our former presidents – and our current President Roseanne Harris provided you with a glimpse into the International Actuarial Association (IAA). However, many individual actuaries might still be wondering,

“What does the IAA actually do and how does it benefit me?”

The IAA is composed of 74 Full Member Associations (FMAs) – including ASSA in South Africa and actuarial organizations from six other African countries (Egypt, Ghana, Ivory Coast, Kenya, Morocco, Nigeria) – and 27 Associate Member Associations, including 10 from Africa.

One important benefit of full IAA membership is that each FMA can delegate representatives to the IAA's 18 committees and forums, and submit candidates for leadership roles within them. ASSA is well represented across all of our entities and holds four of the Chair positions. As Desmond noted, ASSA has always punched above its weight on the international scene.

To provide you with an overview of the IAA, we should begin with our Vision and Mission respectively (you will notice that our Mission has been craftily written to form the initialism I-A-A):

The actuarial profession is globally recognized as leading experts in risk and financial security, contributing to the well-being of society.

The mission of the IAA, as the worldwide organization of actuarial associations, is to:

- **Impact** global stakeholders
- **Assure** the reputation of the profession
- **Advance** the competency of the profession

Our most important role is to provide actuarial contributions that **Impact** our long-standing stakeholders: the International Association of Insurance Supervisors (IAIS), plus its Access to Insurance Initiative (A2ii) and the Sustainable Insurance Forum (SIF), run in partnership with the United Nations Environment Programme; International Accounting Standards Board (IASB); International Organization of Pension Supervisors; International Social Security Association; and Organization for Economic Cooperation and Development, to name just a few.

Over the last 25 years, the IAA's volunteers have contributed immeasurable hours to the IASB's work, most notably on International Accounting Standard 19 and International Financial Reporting Standard (IFRS) 17. This has led to our own efforts to develop model International Standards of Actuarial Practice (ISAPs) that IAA Member Associations can adopt or adapt. In addition, we have developed educational materials such as monographs on stochastic modelling, discount rates and risk adjustments, and most recently International Actuarial Note 100 – Application of IFRS 17 Insurance Contracts. Hundreds of volunteer actuaries from around the world help us shape how the actuarial profession is valued by our counterparts.

Regarding engagement with the IAIS, one of our most important partners, we have focused on several key areas. Our long ties with the Association's leadership have seen us repeatedly called upon to provide actuarial insights in the development of IAIS standards (Insurance Core Principles) and other subjects. Most recently, these have involved the response to the coronavirus pandemic, plus sustainability and climate change. Over the last five years, together with A2ii, we have provided in-person capacity-building training for insurance supervisory staff in China, Indonesia, Mauritius and Trinidad & Tobago. During the pandemic, we pivoted by providing online webinars and instructor-led courses in English and Spanish, and we will soon add French to this training initiative. The IAA, IAIS and A2ii have recently re-signed an agreement to continue our work in this area, and we have also agreed to partner with the SIF.

As mentioned in Roseanne's article, climate change has long been a key focus for the IAA, which created the Climate Risk Task Force (CRTF) more than two years ago. The CRTF has already released four of eight planned papers (with the fifth, on standards and leading practices regarding climate disclosures and risk management, expected shortly):

1. Importance of Climate-Related Risks for Actuaries
2. Introduction to Climate-Related Scenarios
3. Climate-Related Scenarios Applied to Insurers and Other Financial Institutions
4. Application of Climate-Related Risk Scenarios to Asset Portfolios

The remaining three papers will focus on the climate change adaptation gap, a review of existing publications, and the link between climate-related risk scenarios and social security.

Additionally, in conjunction with the International Panel on Climate Change (IPCC) – Working Group I, the CRTF has recently released the paper Climate Science: A Summary for Actuaries – What the IPCC Climate Change Report 2021 Means for the Actuarial Profession.

All of our papers can be accessed through our website, and you can watch our webinar recordings on our YouTube channel. You can also keep abreast of our activities through our social media channels on LinkedIn, Facebook and Twitter.

Our **Assure** strategic objective is aimed at “providing support for the development of the actuarial profession worldwide” and promoting “appropriate professional/education standards through Member Associations”. Developing model actuarial standards has been a key focus of our Actuarial Standards Committee for a decade, and provides a tremendous benefit to FMAs who may not have the capability to write their own standards. In addition to the two previously

mentioned ISAPs, model ISAPs have been developed on general actuarial practice, social security programs, enterprise risk management and enterprise risk models. A new ISAP, “Current Estimates’ and Other Matters in Relation to the IAIS Capital Standards”, is expected to be approved very soon.

Further work in this area has focused on ensuring that the education syllabus is relevant and modern, and that the IAA is providing support for the development of the actuarial profession, including to Associate and nascent actuarial associations in Africa.



Lastly, our **Advance** objective focuses on ensuring that our forums provide a gathering place for association delegates from across the world to share knowledge in areas of all actuarial practice, including new fields. ASSA has served as a role model in several of these areas, including banking and inclusive insurance (microinsurance).

For individual ASSA members, the **IAA Sections** is your go-to place to enrich your actuarial career through networking opportunities, effective continuing education events and insightful technical publications. For a small annual fee, Section members can attend webinars and conferences; access the actuarial profession's leading international refereed journal, the *ASTIN Bulletin*, and engage with colleagues on our global networking platform. You might also want to participate in Section working parties and eventually become a board member. I encourage all actuaries to join at least one Section.

The International Congress of Actuaries (ICA) – or, as some have called it, the “Actuarial Olympics” – is a tremendous opportunity for the world's actuaries to share their challenges and triumphs, expertise and insights, and plans for a better future. Cape Town hosted ICA 2010 through the skillful guidance of Desmond Smith and his team at ASSA. Next year, we will return to the southern hemisphere, **hosted by the Actuaries Institute Australia** in Sydney. The program is being assembled from over 400 submitted abstracts, and registration opens in June 2022. We look forward to welcoming you in person or, for the first time, in a virtual format. 🇦🇺

THE 2022 ACTUARIAL CONVENTION: The Best of Both Worlds



ROXANNE TOBIAS

Roxanne Tobias is the new Chair of the Convention Organising Committee for 2022. She is a qualified actuary (FASSA) with 13 years financial services industry experience. Roxanne is currently the Head of Intermediary Support for the Sanlam Savings division. She has held various roles within the industry, starting her career in actuarial valuations at Sanlam, moving on to actuarial consulting at EY, heading up the Risk Technical Marketing team at Liberty and she was the Head of Technical Marketing & Communications for the Employee Benefits division at Discovery.

Before taking over as Chair, Roxanne served on the Actuarial Convention Organising Committee since 2018, having supported on the Delegate Experience and Programme Sub-Committees in the past.

Two years ago, the Actuarial Convention, as we knew it, changed taking on a virtual format as became the norm for most events during Covid.

This year we again find ourselves taking on an exciting new angle, where we combine the convention as we knew it before, with the latest format we have come to know, by hosting the first Hybrid Actuarial Convention.

Even though a hybrid event in essence means hosting two events in one, I am really looking forward to this

format as it gives us the platform to combine the best of both an in-person event and a virtual event into one.

Bringing back the in-person platform gives those that attend in person the opportunity to interact, network and socialise with other delegates in a more personal and natural way, as I am sure we all missed over these past two years, while also maintaining the virtual format ensures that those who cannot or prefer not to attend in person don't miss out and can still partake in the convention and view all the presentations and discussions online.

The 2022 Convention takes place over the 25th to 28th of October, including the African Seminar on the 25th of October with the in-person event taking place in Cape Town at the CTICC. Through the superior guidance and support of our tried and trusted convention partners, Africa Agenda, the 2022 Convention Organising Committee is deep into planning and preparation mode and even though we know the logistics and co-ordination required in planning and running a hybrid event is no small feat, we are all committed to making sure that this year's convention will definitely be one to remember.

It will be a convention where all delegates will get to, once again, enjoy the things we know and love about the convention, but also get to experience some new and different things.

We are in the process of securing some exciting plenary keynote speakers who will look to bring diversity, thought-provoking content and entertainment to the programme.

The Call for Papers and Speakers has just closed and we received an overwhelming response, as always. We are in the process of working through the submissions to ensure the programme is filled with good quality, engaging and stimulating sessions across all of the practice areas within the industry that encourage discussion, facilitate learning and development, and provide food for thought.

Utilising the virtual platform as well means that we are not affected by geographical constraints, so there are no limits in terms of the speakers or presenters that we can include in the programme. The virtual platform also means that we can again include pre-recorded presentations, so we have capacity to include more of the society's submitted presentations into the convention.

On the delegate experience and entertainment side, we would like to make sure delegates have lots of fun and that the in-person informal sessions provide the platform for people to really connect and socialise with each other again as this was not really possible for the past two years.

We are looking to have an in-person happy hour event on one evening as we had with the virtual events, and then an in-person cocktail dinner on another night. We are putting plans in place to ensure these events stand out, are entertaining, and are a real celebration of us being back together again.

The 2022 Convention takes place over the 25th to 28th of October, including the African Seminar on the 25th of October with the in-person event taking place in Cape Town at the CTICC

Those attending virtually will still get to enjoy those exciting refreshment pack deliveries that we have all come to know and love.

To date we have already secured good sponsorship, so I am really thankful to those sponsors for their support in maintaining the high standard we have come to know from the convention, and to adding to making this year's event that much more special.

Those attending in person will once again experience the exhibition hall and get to interact with the various sponsors who I am sure, as always, will have exciting entertainment, prizes and freebies for delegates to enjoy.

Because it worked so well with the virtual events, we will be keeping the Programme host format for each stream for this year's function to ensure continuity and lively discussion between sessions.

Just like the last two years, hosting a virtual event was quite a learning curve for us. I think we managed to deliver successful events on both occasions. This year we again find ourselves as novices when it comes to a hybrid event, but as the Convention Organising Committee together with our partners, Africa Agenda, we are up for the challenge. We aim to once again deliver a high –class, successful Hybrid Actuarial Convention that we can all be pleased with and all will enjoy.

Furthermore, I think because of the flexibility, option and choice it provides, the hybrid model will most likely be the way of the future, so the quicker we become experts in this type of event, the better.

Registration for the Hybrid Actuarial Convention opens to delegates in July. I look forward to seeing and engaging some of you in person and interacting with others online in October :-)





A LIVING TRIBUTE TO WIM ELS

and his fervent contributions to diversity.

**HELP MAKE A CHANGE.
PLEASE DONATE TODAY**

HOW CAN I HELP?

You can contribute to this fund by paying into the account of the Actuarial Society of South Africa:

STANDARD BANK

Account number 070005478

Branch code 051001

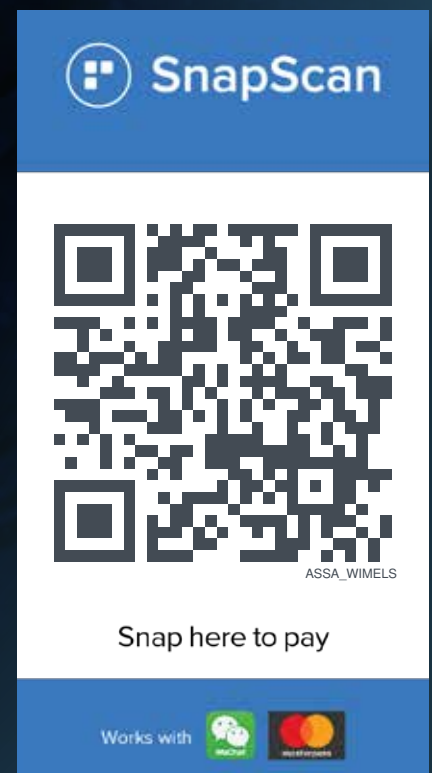
Reference Wim - Donor name or ASSA member nr.



* All donations will qualify for Section 18A tax certificates.

Please send an email to Renche Jansen (rjansen@actuarialsociety.org.za) with instruction on how you would like your donation allocated between the two causes. Where the allocation is not specified, the donation will be spread equally between the two causes.

Address queries to Mike McDougall (mmcdougall@actuarialsociety.org.za)



Interview with South Africa's first blind Actuary – **Elash Mistry**



My Background, family life and upbringing.

I was born in Pretoria but I spent less of my life there than anywhere else. I left Pretoria at the young age of six, to attend a boarding school in KwaZulu-Natal, Pietermaritzburg. That was the only school for the blind that I could attend in the apartheid era. There was another school that was roughly 20 km away from my home but it was not for Indians, therefore I could not attend it. Hence, I spent most of my childhood years in Pietermaritzburg and only went home for school holidays. After matriculating, I went on to do a Bachelor of Economic Science degree, majoring in Actuarial Science, at the University of Witwatersrand.

What influenced your decision to study Actuarial Science?

It is rather amusing how I ended up pursuing Actuarial Science because I knew absolutely nothing about it beforehand. When I was in matric, I completed an interest-finding test, which revealed that I am inclined towards logical thinking and working with numbers. My career counsellor then searched for careers that aligned with my interests and strengths. He suggested that I consider studying Actuarial Science. I then did a little more research in the school library using the Braille encyclopaedia where I found just two paragraphs describing Actuarial Science. From what I read, I gathered that this was indeed aligned with my interests and I was eager to step up to the challenge knowing that no other blind person in South Africa had travelled this journey. Apart from pursuing my own interests, I decided it was important for me to venture into uncharted territory so that I could open up doors for other blind people. Not long after I started studying Actuarial Science other blind people were inspired to study subjects of a Mathematical nature and to venture into unconventional areas for blind people. There was one other blind person that decided to study accounting even though he had not taken Mathematics up to matric.

Did you ever doubt your decision to study Actuarial Science?

Throughout my studies, I sometimes regretted my decision, thinking I should have done something simpler. I knew I was swimming against the tide after I spoke to one of the professors at Wits University before I started. I informed him of my intention to study Actuarial Science and that I would need his support. He immediately replied, "There's no way you should even think about that because Actuarial Science is difficult for sighted people as it is. You'll just be setting yourself up for failure if you even try". He encouraged me to reconsider my options and possibly pursue a career in the arts. After some reflection, I decided that difficulty is a relative concept and what may be difficult for one person may not be so for another. So, I decided to study Actuarial Science even after being warned of what I was up against. It was not easy, but I passed my first year. The same professor came back to me and said, "Well done, I think you should continue. You have my full support".

Fortunately, I had the support of Rykie Woite, from the Wits disability unit. Rykie would painstakingly type up hand-written notes from my lecturers onto a computer so that I could read the material with my braille display.

How did you access the study material given that there would be a lot of formulae, Actuarial notation and diagrams?

Adjusting to university was difficult because it was my first time being part of an academic institution where everyone else could see. Furthermore, there was no braille notation for Actuarial Science. Therefore, I used a computer with a braille display, which is a device that

converts the output from a computer into electronic braille, a system of raised dots that blind people can read using their fingers. The braille display shows whatever is on the screen in Braille half a line at a time.

Fortunately, I had the support of Rykie Woite, from the Wits disability unit. Rykie would painstakingly type up hand-written notes from my lecturers onto a computer so that I could read the material with my braille display. We had to form our own notation because the Braille display only shows you text in a straight line. Fractions, actuarial functions, triple integrals, and the like could not be displayed in the usual format. We had to find creative ways to write that all in a straight line using notation similar to what is used in Excel and computer programming.

While I was raising funds to buy a computer and braille display, I used to record my lectures, and then transcribe the recordings into braille at the end of each day. The challenge with this was when lecturers did not verbalise everything they were teaching, especially when they wrote out formulae etc. on a whiteboard.

Hence, there were many gaps in my notes.

As time progressed, it became a little simpler. When I studied for the later board exams, the actuarial society had all the study material and exams available electronically. This still required some effort because the notes had

equation boxes that had to be converted from graphic format into legible text for me. These days, it's even simpler as technology advances. We have a program, similar to LaTeX that is used to convert the code behind equation boxes. Eventually, I started writing macros to convert the code for me into my notation.

For graphs, we worked with a cellophane sheet. We drew on this plastic with an ordinary pen and it created markings that allowed one to feel the graphs. Lecturers presented diagrams to me in this manner, and I did the same in exams.

Sometimes my Rykie would create 3D sculptures out of clay or sponge so that I could feel the sculpture and engage with the concepts. She was amazingly patient. These learning techniques were valuable to me because Actuarial Science is rather visual and audible learning was not always effective.

What drove you to make the sacrifices you made to arrive at your destination?

Overall, the path I chose required many sacrifices, particularly as I had to dedicate all my time in university towards making the coursework accessible and studying. I barely had any time at all, even for leisurely activities. I was driven by the fact that I hate quitting. Whenever I almost quit somewhere along the journey, passing an additional exam would motivate me to keep going until I eventually qualified, 18 years later. I knew that I can't sacrifice so much for so long just to give up.

What do you treasure most in your journey?

I received great support from my lecturers, academic support systems, friends, my wife and my family. My wife would look after the children while I went to study and that helped a lot.

What does your daily routine look like?

I wake up at 4:30 a.m. to meditate. Meditation and spirituality have kept me grounded throughout my career, especially when things got tough. After meditation, I do some physical exercise for 30 to 40 minutes. As I am in meetings for most of the day, this helps with blood circulation and general fitness. I usually spend an hour cooking before I start work so that there is food available at lunchtime. During the week, work takes up a large part of my day. Evenings are spent with the family and preparing for the next day.

What hobbies do you enjoy in your free time?

I love coding. So, I spend some time on weekends doing small coding projects. This is more for my own

When you are passionate about what you do, any obstacles you encounter are easier to overcome because you are working with love rather than working hard.

learning and having the satisfaction of writing code and seeing it work. At the moment, I am learning HTML and JavaScript. These coding languages allow me to use a text editor instead of a graphical user interface, and are very accessible with a screen-reader. The challenge for me is to create a user-interface that looks good. It is not easy to do this using a screen-reader.

Another hobby of mine is to look at business opportunities that are aligned with my values. I love finding win-win solutions that are simple, sustainable and affordable. I am currently working on a design for a mechanical device that can be used to make eco bricks (a way of recycling plastic by stuffing plastic bottles with softer plastic to make "bricks" that are actually used to build).

I am very much an outdoors person. I love gardening and leisurely walks in nature. I am also a DIY enthusiast and have acquired the necessary skills to use a drill and other power tools. DIY fits in very well with my constant need to fix things that don't work.

Any last words to aspiring Actuaries out there?

I have learnt that giving general advice doesn't usually work. Each aspiring actuary needs advice that is specific to them. However, one piece of advice that everyone can do with is to follow your passion. When you are passionate about what you do, any obstacles you encounter are easier to overcome because you are working with love rather than working hard.

We are not always lucky enough to know what we are passionate about. So, if you are studying Actuarial Science even though you are not passionate about it, make sure you reflect on your journey as often as you can. If it is something that you are not happy about, move on.

Lastly, don't study Actuarial Science just because you think you will be paid well or for the status it may bring. There are easier ways to become rich and famous. 

A person with curly hair is seen from the side, painting a portrait on a canvas. The canvas is on an easel, and the person is holding a paintbrush. The background is blurred, showing what appears to be a studio or gallery setting. The title 'PAINTING THE PORTRAIT OF THE MODERN ACTUARY' is overlaid on the image in large, white, sans-serif font.

PAINTING THE PORTRAIT OF THE MODERN ACTUARY

It is a topic that is always at the back of our minds as actuaries: What impact will data science and artificial intelligence (AI) have on our profession, and are our jobs at risk? This is an important question – so important that numerous working groups have been set up to tackle it. One that comes to mind immediately is the Data Science working group of the Institute and Faculty of Actuaries (IFoA). In fact, most actuarial bodies have some subset of their membership tackling the question.

Further, it is quite a popular topic to write on, with most of the big 4 consultancies routinely putting out surveys and opinion pieces on it. Of course, I am not immune to this, and hence I am doing the same. But, before your eyes glaze over at the prospect of another open-ended article, I plan to provide clear, practical answers on what the modern actuary will look like. If you'd like to see even more practicality and actual implementations, I run a blog that tackles the topic in a lot more detail.

And with that, let's dive into the topic.

Comparing Apples to Oranges: They May Have Differences, but They are Both Fruit

In attempting to answer how data science and artificial intelligence will impact the actuarial profession, a good starting point would be to highlight the key differences between the two careers. I am choosing to highlight four that I think are core to the topic of this article.

The Modelling Paradigm: Shifting Focus from Inference to Prediction

In most cases, both actuaries and data scientists use modelling to predict certain quantities. How we get to those models, and the structure of those models, differ due to how we approach the modelling.

Actuaries aim to understand and interpret our predictions. We use statistical modelling with interpretive techniques. Often, our selection of a model depends more on what the model tells us about the data rather than on how accurate it is. We opt for more parsimonious models as they are easier to understand, and we limit our use of non-linear approaches and interactions because they complicate interpretation. Again, our end goal is to predict something; but our path and focus is to understand and interpret the prediction.

Within data science, the goal is also to predict, but the approach focuses on maximising predictive accuracy, often at the cost of ease of interpretation. The selection of the model and data almost never comes down to interpretation, and depends on objective metrics such as minimising a loss function or maximising predictive accuracy on a testing set of data.

Nowhere is this more apparent than when browsing through Kaggle competitions. Having a look at the famous Titanic competition, the most popular notebook (aptly named Titanic Data Science Solutions) selects the best performing model out of nine different models with little regard to their ease of interpretation. Only one of these would likely be familiar to the traditionally trained actuary.

In a financial world, where understanding risk is important, actuaries are valued for their skills in finding relationships in data and translating them to financial implications. In non-financial settings, the data scientist is more valued as they can take any amount of unstructured or structured data, and fit complex models that predict with a high degree of accuracy.



Computational Advances are Quickly Encroaching on More Restricted Traditional Methods

Almost all the machine learning methods we hear about today have existed for decades. Outside of specific architectural advances within the field of deep learning, most of what is driving the hype is nothing new. What is new, is the sheer amount of cheap and powerful computational ability, as well as the exponential growth in the amount of data available to us, and the reduced cost of storing large amounts of data. With the advent of cloud computing, Graphical Processing Unit (GPU) computation, and a boom in tech financed open-source research, available computational power and data has exploded.

Neural networks (the mind of deep learning) are the prime example of this. They have existed since the 1950s however there was not enough processing power and data available to see their benefits. Recently, with the explosion of data created through an interconnected online world, and massively increased computational power, neural networks can consume gigabytes and even terabytes of data, with billions of parameters, and produce amazing results. This has led to a boom in interest in machine learning methods, and the expansion of the data science industry.

Actuarial methods have arguably been slow to adapt. We stick to our traditional methods that were built in a time when computational power and data were limited.



WITHOUT REALISING IT, YOU INTERACT WITH OPEN-SOURCE TECHNOLOGIES ALL DAY, EVERY DAY.

That is not to say our methods are no longer useful, or that they don't work. Rather, new tools and computational abilities unlock new methods, as well as enhance old ones.

The risk is not that data science methods replace actuarial methods. The real risk is that we are too slow to adapt to a rapidly changing world. The pace of change and the speed with which InsurTech's and data science firms can experiment, fail, adapt, and succeed is the risk. This speed is driven by open collaboration.

Look to Software Development to See the Power and Speed of Collaborative Open-Source Research

Much of actuarial science is unfortunately a closed source and restrictive to change. The mathematics and theory are widely and freely available. The education is also easily obtainable, albeit lengthy and challenging. We also widely publish discussion documents and standards to govern our work. However, the practical implementations and actual software used to do our work are closed off.

Proprietary actuarial software carries hefty restrictive license fees and complex training and implementation. Large firms protect their intellectual property and only share discussions around what they are doing with little substance to entice sales. Even our Excel models are password protected and kept within the confines of our corporate servers.

It is important to protect intellectual property, specifically the trade secrets used, model calibrations, and especially the data. However, the manner in which we work often means that the intellectual property and data cannot be separated from the mechanical implementations, and this unfortunately hinders progress.

If we look at the data science, software development, and particularly web development communities, we see the opposite. Technologies are widely open-sourced and collaboratively developed. Most importantly, the workflows used allow the data and intellectual property to be separated from the tool, and thus protected. The architectures and code implementations of the most powerful and cutting-edge neural networks are widely known. It is the data they were trained on, and the weights that were found that are protected as these are the valuable elements.

Tools like Git, Visual Studio, Docker, TensorFlow, React, scikit-learn, pandas, databases tools, and even most of the operating systems that run the internet, almost all these technologies are open-source and collaboratively developed. If you need a new feature, you simply add it. If you find a bug, you simply fix it. It is all free, and anyone around the world can contribute their knowledge and ideas. Large tech giants like Facebook, Microsoft, and Apple, all open-source their technologies and use open-source technologies. This has led to rapid development, progression, transformation, and disruption in the software development space.

Without realising it, you interact with open-source technologies all day, every day. The software world would be several years, or even decades behind, had it not been for advances driven by open-source development.

Domain Knowledge and Professionalism

Last, but most certainly not least, actuaries are members of a governed profession that work within a specific domain. This is probably the biggest difference between actuaries and data scientists, and one of the most important differentiators.

As actuaries, we are trained to understand insurance, and most of our methods are built to tackle insurance specific problems. This makes us second to none in the insurance modelling space. Insurance companies hire actuaries because along with strong mathematical and statistical modelling capabilities comes a deep

understanding of how insurance works. Thus, we can make sound financial decisions for insurance companies. Although it is not unheard of to find actuaries in non-financial areas, such as telecoms, it is not at all common.

Data scientists are not trained in a specific domain and will need to learn any industry they are employed in. Thus, data scientists will have strong modelling capabilities, but typically with no domain knowledge. Further, training and certification of data scientists is still not standardised and well developed, unlike with actuaries.

More importantly, actuaries are members of a profession that holds their members to a certain standard across all areas. This includes training and certification, the work they perform, how they conduct themselves in the public eye, and the decisions they make. Actuaries are bound by their profession to meet a certain standard and protect those they are making decisions for. Currently, there is no equivalent for data scientists.

Let's Recap: Four Key Areas Where Actuarial Science and Data Science Differ

Actuarial science and data science have a lot in common. They both deal with data and apply mathematics to data to make decisions. However:

- **The modelling paradigm** differs. Actuaries' approach to modelling focusses more on selecting models that are easy to interpret and infer information about the risk exposure to companies in a financial manner. Data scientists' approach is focused on optimising objective functions to maximise predictive accuracy, allowing companies to make optimal decisions quickly based on large amounts of structured and unstructured data.
- **Adoption of computational advancements differ.** Our methods are powerful and useful but born

in a time of computational limits. These days, this is less of an issue for our work. We should embrace new methods and bring computational advancements to old ones.

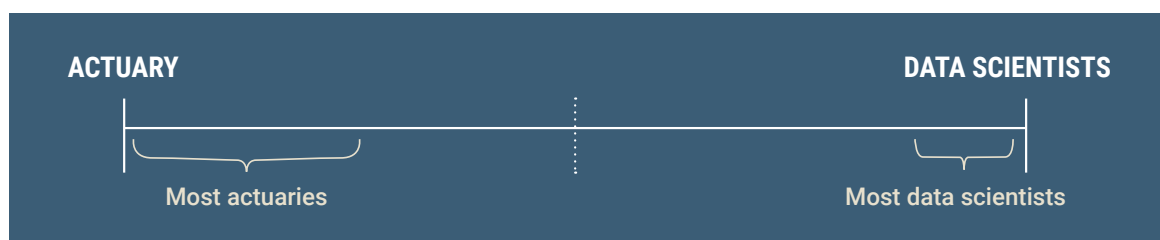
- **Open source and collaboration are still low for actuaries.** Actuaries restrict themselves by gatekeeping software and implementations intentionally, or unintentionally. We share knowledge and theory, but not practicality. A more collaborative and open approach to work can drive momentous change and advancement.
- **Actuaries are part of a profession.** As actuaries, we are part of a profession that governs us and the work that we do. Further, we are also trained in a specific domain, whereas data scientists have no equivalent structure.

The Impact of Data Science on Actuarial Science

Considering the differences highlighted above and our understanding of our profession, we can now theorise about what the impact of data science and artificial intelligence will be on the actuarial profession, and how we can manage the risk it poses.

If, while reading the above differences, you felt the differences didn't necessarily apply to you, you'd most likely be correct. Like most things in life, one size does not fit all, and we are all different. One may consider a spectrum, where at the two extremes are the actuaries and the data scientists. Most actuaries will lie in the first quadrant of the spectrum. These actuaries are traditional, and through natural change, are slowly picking up some of the data science skills.

On the other end, most data scientists will lie probably on the utmost tenth of the scale on the right (indeed there may be some imbalance, as most data scientists won't typically pick up actuarial skills). Personally, I would place myself roughly in the middle, if not slightly to the right of the middle.



What Does the Future of Actuarial Science Look Like?

Hence, the modern actuary will be much like the actuary today, but with a few key adaptations that will push them toward the middle of the spectrum above.

The Modern Actuary Will Embrace Modern Technologies into Their Toolset and Enhance Their Skillset

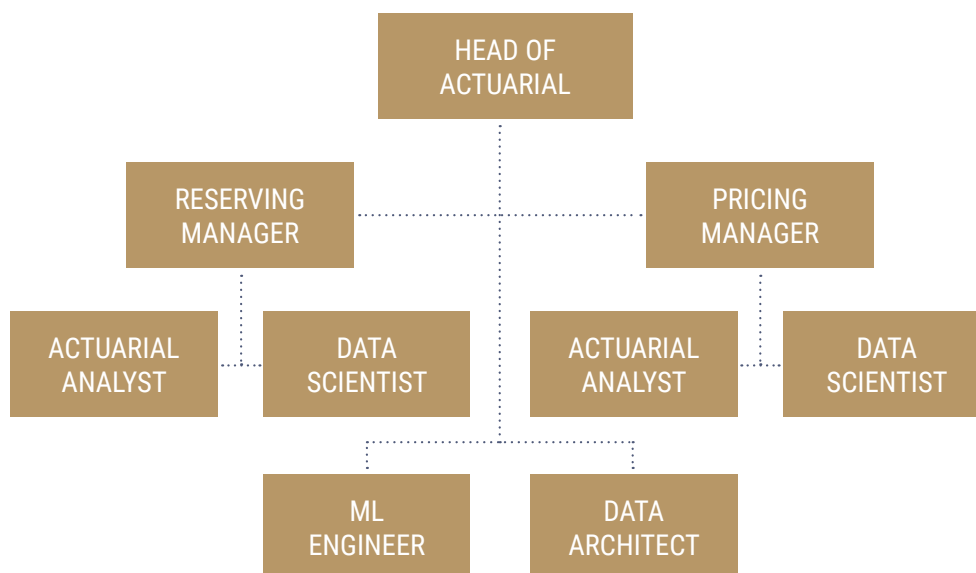
Actuaries should quickly embrace modern technologies in their way of work. This does not mean that actuarial training needs to be changed to include the skills of data scientists, nor should actuaries necessarily perform data science work. But we should be able to engage with data scientists and their technologies and understand how they fit into the core work we do: managing risk.

We need to understand what a neural network is, its use cases, and how it can help us. Similarly for other

more traditional machine learning algorithms such as tree-based methods, support vector machines, and even unsupervised methods such as clustering. We don't necessarily need to be able to implement them, although certainly some actuaries will acquire and use those skills, but we do need to understand them, and how they fit into our world.

Going wider, we don't need to know wider technologies such as Git for version control, Docker for containerisation, or be able to spin up a virtual machine and run stochastic simulations in the cloud. Yes, certainly some actuaries will acquire and use these skills, but we don't need to be trained in them. However, we must be aware of them and how they help us, and where necessary, be willing and able to use them.

This means that the actuarial function within insurers, banks, or consultancies will transform to include these skills. This means that data scientists and other machine learning and data-based roles will form part of our teams. A future actuarial team may look something like this:



In this arrangement, skills are shared within the actuarial function. Data scientists may sit within specific functions such as reserving. Other roles, such as the data architect, may sit across all teams within the function and ensure data consistency. A machine learning (ML) engineer may also be needed for larger organisations to manage and deploy pipelines produced by teams. The actuarial staff will bring their expertise in managing risk and combine it with the expertise offered by data scientists.

Here the actuarial resources don't need to know how to implement neural networks or deploy pipelines to the cloud; the data scientist resources exist for that. The actuarial resources will however be aware of and appreciate those technologies and be comfortable speaking to the data scientist and communicating to other stakeholders.

The Modern Actuary Will Expand Workflows to Remove Computational Restrictions and Research Novel Approaches

Research and failing fast to learn fast will become core because the modern actuary will have access to modern technologies and vast computing power that will allow rapid experimentation and learning.

The immediate concern will be the risks posed by such an approach: if we fail fast, we put our companies at risk fast. However, with the new skills introduced by embracing data science resources, we will have methods and tools available to allow us to isolate our experimentation and testing until such a time that it can be safely introduced. This will not mean years of industry-wide engagement; this will mean weeks or months of trials and experimentation, followed by phased rollouts and exhaustive testing and monitoring.

We may decide to introduce a new reserving approach, perhaps a new method to select parameters. How can we be sure this new method performs well and fits in with our data and process? Borrowing from the software development and data science worlds, we create a separate branch (or copy) of our current reserving software, introduce the changes, and run them on a development copy of our data that replicates exactly our live reserving process.

Sounds like a lot of work? We have data scientists and data architects skilled in these tasks. Our data scientist forks the code and makes the required changes, then runs our actuarial analyst through the changes to ensure the actuarial elements are sound. The data architect launches a development copy of our claims data and supplies access details to our ML engineer. The ML engineer runs a docker container which builds up our reserving pipeline, accesses the development database, uses the new reserving process, and outputs a dashboard of results with added diagnostics. Our actuarial analyst reviews alongside the reserving manager, and any strange results are explained, fixed, or noted.

Because this process is so lightweight, this happens several times a week until the head of actuarial is ready to review and deploy or discard. All the time, our original process runs, and when we are ready to go live on any changes, we have exhaustively experimented and failed, and the transition should be seamless.



With new skills and tools, our actuaries are free to focus on risk.

The Modern Actuary Will Use Open-Source Software and Collaborate Widely

Finally, actuaries will need to collaborate and embrace open source to keep up the pace, quality, and collectively evolve. Yes, there will be IP to protect, but there will also be a lot of boilerplate implementation that can be shared to the benefit of all.

Consider a regulatory capital framework. These are collectively discussed and developed over years in lengthy discussion documents, exhaustive industry-wide consultation, and prolonged periods of quiet implementation. Once finalised, enhancements or fixes are rare because of the time-consuming process to run it through all the ranks and issue updated workbooks or documents.

The modern actuary will have fewer limits on innovation. Consider our team once again. This time completing a regulatory capital calculation. The team uses an open-sourced python package collaboratively built for this task. Our company notices an error in the package, quickly makes the fix and requests the changes be pulled in. After some collaborative review by maintainers of the package, the fix is brought in, and the entire industry has the corrected version.

Further, our company uses a niche reinsurance structure not supported in the open-source package. We simply fork (or copy) the main package, and add on top the pieces we need, without losing the link to the original package and its changes.

In the future, any enhancements to the regulatory framework are suggested openly and collaboratively, and the industry can timeously and easily discuss, review, and implement the changes. Any unclear areas are openly questioned, discussed, interpreted, and decided on, without each company individually contacting the regulator and keeping their response (which may differ from another company's response) a secret.

Going further, audit season arrives. An audit process that once took months because the auditor had to painstakingly review new Excel workbooks is drastically simplified, as our team relies on a widely reviewed and

audited open-source reserving package. Our auditors can skip the detailed review of how we mechanically derived loss development factors, and spend more time focusing on what matters. They save time, and we save time and money. The benefits are numerous, too numerous to mention here, but I trust the message is clear.

In Closing... All the Above, With Professionalism

To remain relevant, and to further enhance and drive what we do, we, as modern actuaries, need to **embrace modern technologies, collaborate widely and openly, and research and push the boundaries within the governance of our profession.**

Going back to the spectrum above, actuaries will naturally begin to extend to the mid-point, with most actuaries falling in the first half. Further, data scientists working in actuarial areas will also extend to the middle. The combination of these skills within teams will unlock the most benefit to both industries.

Most importantly, in going through this transition, we should hold on to what makes us most valuable: being a respected and trusted professional that protects the public interest. ⚠️



Caesar Balona FASSA
Head of Data Science
QED Actuaries & Consultants

Caesar is a qualified actuary and heads up the data science team at QED Actuaries & Consultants. Caesar also runs modernactuary.co.za where he writes about the skills and tools needed for the modern actuary.

YOUR ACTUARIAL TRAINING IS NOT ENOUGH:

How IT education can help actuaries stay relevant and support digital transformation - Faheem Suban and Pamela Hellig

“If you want your actuarial digital transformation projects to succeed,” says Faheem Suban, CTO of Insight Actuaries and Consultants, “your actuaries need to become more comfortable with technology.”

And Suban should know. As an actuary turned digital solutions architect, he has witnessed first-hand that the road to digital transformation failure is paved with good intentions and littered with buzz words. “Future-proof, synergies, digitisation, automation...these are all great concepts,” he says, “but why are most insurers still so far away from that holy grail that is the ‘one-click valuation’?”

Darwinism and digital disruption

The conversation around transforming systems and processes to free up actuaries’ time and enable them to focus on value-adding analysis has been circulating – often actually going in circles – for years. A thousand transformation projects have been launched based on recognition of the need to streamline clunky models and modernise legacy systems, spurred on by waves of regulatory and accounting reform. But transformation projects – actuarial and other – notoriously fail more often than they succeed.¹ Examining the reasons for this is a research field on its own, but Suban is convinced that the secret to transforming actuarial teams in a sustainable way is for actuaries to better understand technology.

Improved technology skills will allow actuaries, and hence insurance companies, to compete in an industry that is ripe for disruption. This view is bolstered by the findings of McKinsey’s **Digital disruption in insurance: Cutting through the noise** report: “With competitive landscapes changing fast, it can be hard to know just how digital technology will play out, and hence where to place big bets. Yet hesitation is not an option. In insurance, as in other industries that have felt the force of digital disruption, those that move fastest to adapt are likely to take a disproportionate share of the profits.”

Embracing technology and digitisation is not just good for profits and projects, it may even be the key to ensuring that actuaries remain relevant in a digital world. Quoting Charles Darwin, Suban believes that “It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.”

The faster horse fallacy

There is a famous quote (somewhat dubiously) attributed to Henry Ford: “If I had asked people what they wanted, they would have said faster horses.” Customers can easily describe a challenge they’re facing – in the case of the horse, wanting to get somewhere faster – but not the best solution: a car. We don’t know how to ask for solutions that are beyond the realms of our current knowledge and understanding. Suban applies this scenario to actuaries seeking transformation in a world where keeping up with technological progress is a full-time job. What distinguishes this case from the

1 John P Kotter’s paper, Leading Change: Why Transformation Efforts Fail, in the 1995 Harvard Business Review is still a respected exploration of this topic. There are numerous more recent papers looking at transformation failure in the contexts of digital transformation, lean transformation and other angles.

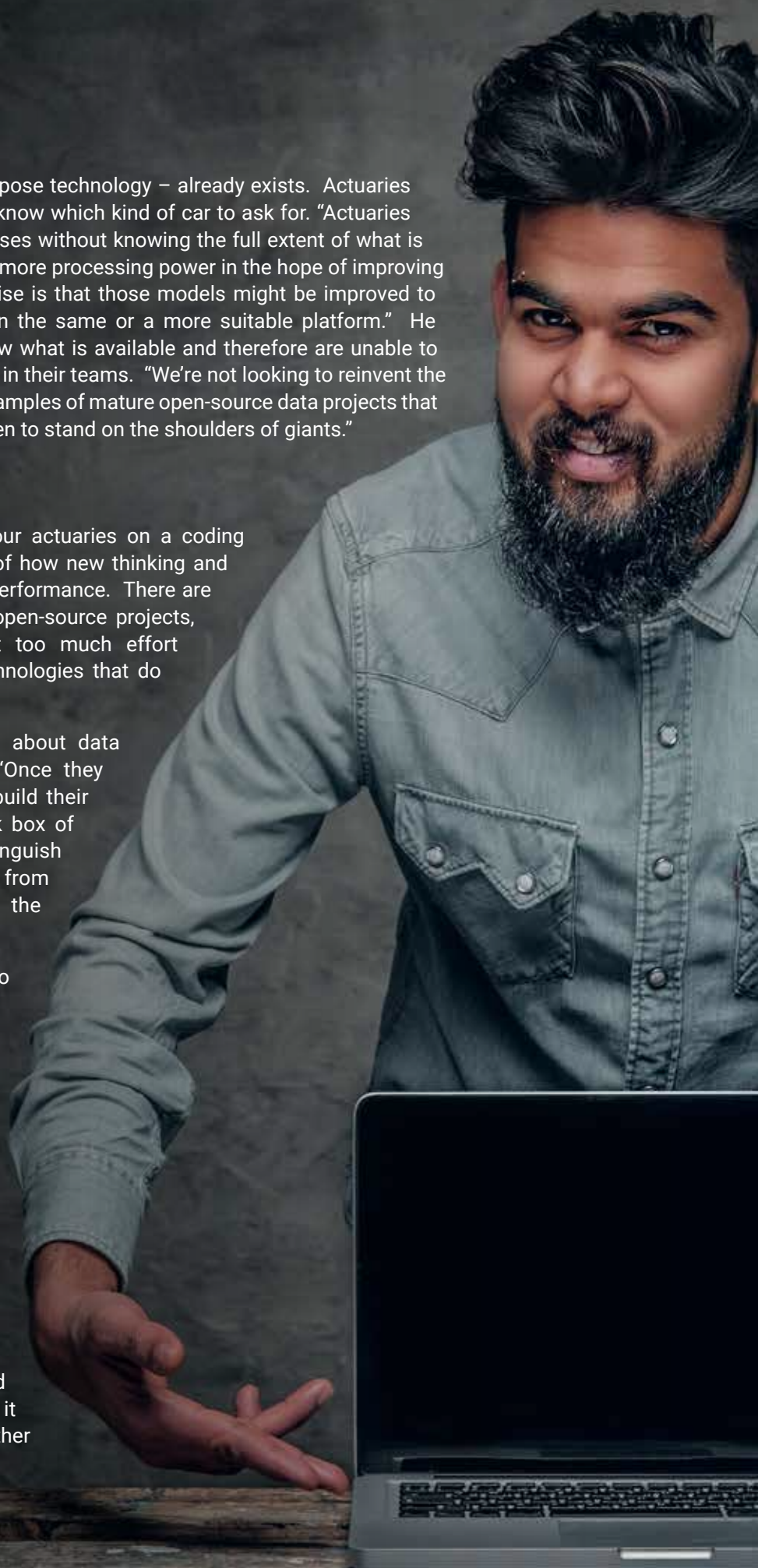
horse analogy is that the car – fit-for-purpose technology – already exists. Actuaries just need to be made aware of that and know which kind of car to ask for. “Actuaries want better systems, models and processes without knowing the full extent of what is possible. They may, for example, ask for more processing power in the hope of improving model runtime. What they may not realise is that those models might be improved to function much more efficiently, either on the same or a more suitable platform.” He believes that many actuaries do not know what is available and therefore are unable to articulate what changes they want to see in their teams. “We’re not looking to reinvent the wheel,” he continues. “There are many examples of mature open-source data projects that can be looked to for guidance. Know when to stand on the shoulders of giants.”

The art of the possible

“Start small,” Suban advises. “Send your actuaries on a coding course and work through case studies of how new thinking and technology have been used to improve performance. There are countless affordable resources online: open-source projects, free courses, YouTube videos...without too much effort you can enable yourself to use the technologies that do everything you need.”

He also advocates teaching actuaries about data analytics and business intelligence. “Once they know how to code, empower them to build their own dashboards and destroy the black box of financial reporting. The only way to extinguish the mystery around where results come from is to build the reports yourself, from the ground up.”

In this way, actuaries will start to understand what is possible and how to fix processes themselves instead of having to rely on other people to advise and implement. “And choose a general-purpose language that can be applied to other products, practice areas, even industries,” he continues. “Only having expertise in a system that exclusively models life insurance cash flows, for example, really restricts one’s way of thinking and career options.” The benefit of learning a high-level or general-purpose language, such as Python, Java or C++, is that, architecturally, they are all very similar. Once the general logic and programming paradigm is understood, it can, relatively easily, be transferred to other languages.



"An actuary who is only an actuary is not an actuary."

- Frank Redington

In addition, actuaries will no longer need to push Excel to solve problems it was not designed to handle. "When all you have is a hammer," Suban says, "every problem looks like a nail. Excel is a revolutionary tool with countless applications. Processing and analysing large volumes of data is not one of them."

Actuaries: the original data scientists

Suban feels that actuaries should not have to rely on data scientists to produce reports because actuaries are the original data scientists. "Data has been the bread and butter of actuarial work since Edmond Halley compiled the first life table – actuaries have always been data scientists and good technical actuaries thoroughly know their data."

What has changed though, is the volume, variety and velocity of data and the availability of technology platforms to handle it. "This recognition of the value of data has given rise to the label 'data scientist': someone who harnesses technology to derive insights from unprecedented volumes of data. Actuaries can do that work – no-one has better knowledge of the life, health and other insurance domains than they do. They just need to keep up to date with technological developments and become familiar with data tools and platforms so that they no longer need to rely on first principles and Excel alone." Not doing this, Suban cautions, may result in actuaries losing their status as experts in data analysis. "On a personal level, I have had to hire applied mathematicians and engineers because I struggle to find actuaries with the skills I need."

When asked why actuaries are reluctant to lean into the data science domain even though they have the skills required to do so, Suban is stumped. "Perhaps it's a comfort zone thing, a fear of the (perceived) unknown... Or maybe they just don't have the time. Ironically

the lack of time is often due to the use of inefficient technologies." A lack of time caused by unsuitable tech, but no capacity to improve the tech because there's not time. And so, the cycle continues.

How to make the time

Actuarial managers may lament that the reason we need transformation in the first place is that actuaries do not have time to focus on the things that matter. How, then, will they find the time to learn and implement these new skills?

Suban urges teams to see the cost as an investment. "Whichever way you look at it," he says, "transformation programmes are expensive. Why not invest in your team and its future? Actuaries have always been self-taught coders to some extent: the knowledge required to build complex cash flow models in purpose-built modelling software or even Excel is often learnt on the job. Buy time for your actuaries to learn about the latest technology and technological thinking, instil some IT rigour and good habits and then have them go through the exercise of applying their learnings to their own products."

Suban quotes Eskom CEO, Andre de Ruyter's bicycle analogy: "we're a bit like a cyclist running next to the bicycle with the chain off, and when asked why we say, well we're too busy to put the chain back on. So, we do need to slow down, put the chain back on, so that we can get back into the saddle and start pedalling again."

And what about the business as usual (BAU) tasks that still need to get done?

"Bring in consultants to guide the transformation process or just to create some spare capacity. Or both," he suggests.

The role of the IT team

It is important to make the distinction between the IT department and actuarial teams; the former still have a crucial role to play. Actuaries should be solving business problems; they do not need to be network administrators, infrastructure experts or cyber security gurus. But they need to become solutions architects to solve the business problems they face. To get there, all they need, as a start, is a solid understanding of



high-level coding languages and data management systems. The approximate manifestation of Moore's Law (that the number of transistors on a microchip doubles about every two years, though the cost of computers is halved) has meant that the technology now allows anyone with a solid understanding of high-level languages to work with big data. This ability will allow actuaries, themselves, to help their companies meet their strategic objectives, without having to rely on the IT department to work with the data.

So, what is the role of an insurer's IT department? "Actuaries will not need to be involved in the administration of an IT environment," Suban believes. They will have a better understanding of the elements thereof, but the IT department will still manage the functional aspects of policyholder administration systems, cloud services and other non-end-user applications." In fact, empowering actuaries to understand and own their models and systems may

assist in improving the relationship between the two departments. "Actuaries will understand the IT world and be able to better communicate with the IT team. The latter will enjoy the release of capacity that will result from fewer requests from the business. And we'll be able to eliminate that layer of cost that exists due to the need for interpreters between the two. The business analysts can go."

Back to Redington

The idea of upskilling actuaries to maintain relevance is nothing new: Frank Redington himself famously said that "An actuary who is only an actuary is not an actuary." In an environment that increasingly values data expertise and IT skills, it is in actuaries' best interests to proactively combine the solid base of their traditional actuarial training with the power of technology. ⚠️

CREATING STRATEGIC OPTIONS

- Dr. John Young FFA and Iain Allan FFA

History shows us the value of strategic options developed by armies, companies and individuals. The concept of strategic options may help actuaries to take advantage of varied career opportunities which arise in the 21st century.

General Helmuth von Moltke masterminded Prussia's stunning victories in the Prussia v Austria war of 1866 and again in the Prussia v France war of 1870-71. He is credited with the idea that "No plan survives contact with the enemy". His military success arose from flexibility, based on a series of options for a battle, rather than a single strategy.

Similar ideas can be seen in some corporate strategies. In the 1990s, the Scottish bank RBS, under Sir George Mathewson, succeeded by following a strategy that was described as "not to have a strategy" - in the sense of market share targets and Gantt charts. Rather than starting with a target end-state, Sir George started with a small set of strategic themes, including achieving growth by building on the bank's areas of competitive advantage and limiting the volatility of the bank's earnings, while ensuring that the bank retained flexibility to take advantage of opportunities that arose to create strategic options for additional growth in future. Justifying this approach, Sir George said that "My job is not to predict the future. My job is to ensure that the bank can be successful, whatever future lies ahead." Sir George's strategy was successful, and it enabled RBS to acquire the much larger English bank NatWest in 2000.

However, the desire to create strategic options is not the same as a free for all. Strategic options should be in related areas, and individuals, firms or nations should have the resources to exploit them. Resources, either for warfare, creating a business or developing a career, are limited. Hard choices need to be made.

Helmuth von Moltke (the elder) understood how well-chosen options could become self-reinforcing. Prussia's advantages included mass mobilisation, superior armaments and speed of movement via railways and speed of communications via the telegraph. These became mutually supportive thanks to the superb logistical skills developed by von Moltke as chief of staff of the Prussian army. Moltke could move vast forces, concentrate them at a point of battle and overwhelm the enemy's forces. Good strategic options, well chosen, can become 'force multipliers' a military expression that indicates that a well-prepared army can operate with the same strength as a larger force of men. Their combined effect is greater than the sum of their parts.

His nephew, Helmuth von Moltke (the younger) was less successful when he was chief of staff of the German army at the start of the Great War. Moltke (the younger) implemented the Schlieffen plan, which fell apart after first contact with the enemy. This plan, developed to win a war on two fronts, aimed to knock France out of the war early with a rapid invasion of France through Belgium. The plan offered few strategic options - it was a gamble for total success or total failure. Worse, strategic overreach compromised its success. The plan assumed the Russians would take six weeks to mobilise, but in fact it took them only ten days. Worried about an invasion from the East, Moltke the Younger panicked and diverted 180,000 men to the Russian front. These troops helped to win a stunning victory over the Russians at the battle of Tannenberg. However, they were unavailable when the German 'right hook' to Paris stalled at the battle of the Marne in September 1914. Von Moltke is rumoured to have told the Kaiser, "Your Majesty, we have lost the war". Trying to do too much gave way to trench warfare and eventual defeat.

Strategic options for unprecedented and unpredictable events

The benefits of well-chosen strategic options become increasingly important when events are unprecedented and unpredictable, as they are for each of Covid-19, climate change and new technologies.

Covid-19 offers a concrete example. In the face of the dangerous virus, different countries followed different strategies. Some aimed for zero Covid-19, with severe lockdowns, tightly controlled testing and tracing and monitoring of their populations. Others imposed strict border controls and quarantines. One country persisted with a 'do nothing' strategy, while another was said to have flirted with herd immunity. As the virus mutated, no single strategy remained effective. Countries which seem to have done best include those which established strategic options to offer national vaccination programmes, sometimes before the vaccinations had been developed and tested, and those which have achieved high rates of vaccine take-up.

Another challenge is climate change. No silver bullets exist to cut CO₂ emissions. A successful transition to a sustainable, low carbon future will require multiple strategic options to be developed and tested at scale. Carbon pricing can create a price gradient to enable Adam Smith's invisible hand to work its magic. To encourage financial markets to follow, governments need to invest directly in new industries and infrastructure. Solutions must include green finance initiatives that allow pension funds and individuals to identify and choose to invest in sustainable options. Implicit or explicit government subsidies must be withdrawn from CO₂ emitting industries. Success will come from exploring many options and following up those that work best.

Technology has progressed over the last fifty years from mainframe computers that filled a room to Apple watches. Who knows how much further progress will be made over the next fifty years, and who knows how



TO ENCOURAGE FINANCIAL MARKETS TO FOLLOW, GOVERNMENTS NEED TO INVEST DIRECTLY IN NEW INDUSTRIES AND INFRASTRUCTURE.

many jobs will be replaced by automation? While it's not possible to predict the future, it seems reasonable to suggest that, within financial services, the best prospects lie with firms that have large amounts of data, to which machine learning techniques can be applied. Banking is well-placed for this: banks have large amounts of data about their customers from products such as current accounts and credit cards. In addition, Open Banking APIs (interfaces built to a common standard) are enabling banks to gather large databases, and to use the data to develop innovative products and services that meet the needs of consumers.

Strategic options for career progression

Moving from corporate to personal strategies. Fifty years ago, there was an expectation that a job would be 'for life'. Employees moved between departments during their career, often at the direction of the management rather than the choice of the employee. Some employees

ended up in the right place at the right time to get a senior position, although possibly not until quite late in their career. But the use of strategic options was rare: career planning was more like Helmuth von Moltke (the younger) than Sir George Mathewson.

Today, many students show awareness of strategic options in their career, even if they don't use these words. They don't expect their first job to be 'for life'. Ambitious students may not have a clear view of their career path, but they want to be successful and want to get to a senior position long before their retirement. Consistent with Sir George Mathewson's flexible strategy, they are willing to enhance and broaden their skills, and are willing to take advantage of opportunities when they arise. But they will not move to positions which might limit their future options. And moving too often might be regarded as showing lack of commitment and might limit future options.

Within banking, the establishment of new banks, including fintechs, creates strategic options. Some students, aspiring to move to a senior role in banking, ask whether it is better to start in a large established bank or a small fintech bank, how easy it is likely to be to switch from one type of bank to another, and when such a switch might be made. Some students aspiring to move to a senior role recognise that their prospects will be enhanced if their experience is not limited to risk management - or that, if they are in risk management, they should seek to get involved in 'hot' topics such as, at present, non-financial risk (e.g. IT, cyber, conduct) and climate change stress testing.

Experience of the authors in strategic options

The authors of this article, John Young and Iain Allan, are both actuaries, and both from Edinburgh. They started their careers, almost thirty years apart, in the same mutual insurance company, Scottish Life. They both subsequently worked for the Scottish bank RBS. However, in their careers, their use of strategic options has been quite different.

John had strategic options thrust upon him. After joining Scottish Life in 1996, John enjoyed his work, liked and respected his colleagues and valued the company's mutual ethos. He recognised that the majority of the senior actuaries at Scottish Life had spent their whole careers there, developing broad skills and becoming

DATA SCIENCE, BANKING AND CLIMATE CHANGE PROVIDE THREE OPPORTUNITIES FOR ACTUARIES TO BROADEN THEIR EXISTING SKILLS AND TO CREATE SIGNIFICANT STRATEGIC OPTIONS

talented general managers. John hoped to do the same. However, he did not like the change in direction or culture after Scottish Life was acquired by Royal London in 2001.

John thought that, if he was going to move jobs, he would like to do something new and interesting, in a related area within financial services where he could use his actuarial skills and experience. In Edinburgh, banking was an obvious possibility. Through an intermediary, John met Iain and, after due process, he got a job in Group Strategy at RBS. Working with an older actuary made the conversion from insurance to banking easier, and enabled John to understand how valuable his actuarial training could be in banking. Working in Group Strategy gave John a good understanding of banking as a whole, and gave him a range of strategic options for the next stage in his career at RBS.

After a period in Group Strategy, John chose to move to Retail Banking, where he created several new teams. He led the development of pricing models, using techniques which he had learned at Scottish Life. Then he developed customer value models for personal customers and subsequently for small business lending and private banking. The challenge of handling large data sets took him into Data and Analytics, where the metrics he developed were used to inform tactical and strategic business decisions.



Iain's career shows some intuitive awareness of creating and exercising strategic options. Soon after he joined Scottish Life in 1969, a young actuary left and Iain, although still an actuarial student, was assigned to replace him as bond fund manager, a role which Iain enjoyed and in which he learned a lot about markets and economics. Iain declined the normal rotation to other departments because he thought that his role gave him more options for his future career, including the option of moving to London.

In 1979, when the UK government led by Margaret Thatcher abolished exchange controls, Iain approached the stockbroker Phillips & Drew with a view to developing their business outside the UK. In this role, Iain got experience in 'sell side' as well as 'buy side', and got international experience through contact with central banks and large financial institutions in many countries, including Japan.

After UBS bought Phillips & Drew in 1985, ahead of 'Big Bang', Iain recognised that his role, as head of Phillips & Drew's international business, did not make sense within a large international bank. He also recognised that, as he approached the age of 40, he should be looking for options to move into a management role within the bank. He therefore offered to go to Tokyo for a period, to obtain the securities branch licence which UBS wanted, to complement their other activities in Japan. After two

years in Japan, he returned to London to lead the integration of the bond activities of UBS and Phillips & Drew in London.

After his contact with UBS business units in Tokyo, Iain saw many interesting opportunities in banking, but did not want to be limited to investment banking. He therefore approached George Mathewson, the recently appointed CEO of RBS, with a view to working for RBS in Group Strategy. Iain was able to point to his successful leadership of various strategic initiatives at Philips & Drew and UBS, and to explain that, as an actuary, he understood enterprise-wide risks.

As Group Director, Strategy, at RBS, Iain worked with George Mathewson on the bank's strategic options strategy. A key part of this strategy was the multi-brand multiple channel strategy in retail banking. For example, RBS

established a supermarket banking joint venture with Tesco (to take advantage of its customer footfall) and a credit card joint venture with the US bank Advanta (which was more advanced in data analytics), but kept these operations separate and allowed them to compete with RBS's own retail banking and credit card activities. After RBS bought NatWest, the retention of separate brands enabled RBS to offer different customer propositions. Internationally, RBS acquired knowledge and strategic options through a strategic alliance with Banco Santander (until Santander bought Abbey National in the UK) and subsequently, as Asia became more important, through a strategic partnership with Bank of China.

Conclusion

Data Science, Banking and Climate Change provide three opportunities for actuaries to broaden their existing skills and to create significant strategic options. Skills in Data Science create options for actuaries to move into industries with large amounts of data, inclining banking. Knowledge of banking, as well as insurance, creates wider opportunities for actuaries to move into senior positions in financial services, in the UK and internationally. Understanding of financial risks associated with climate change creates opportunities for actuaries to move into key roles in both banks and insurance companies, as they work on their climate change stress testing exercises, capital requirements and pricing strategies. ⚠️

THE CASE FOR AN ACTUARIAL FUNCTION IN BANKS

- Iain Allan & Michael Tichareva

Since the banking crisis of 2008, the Basel regulations, which apply to banks in many countries, have been strengthened in a number of ways. For example, minimum requirements for equity capital, which can be used to absorb losses, have been increased, capital buffers have been added and liquidity requirements have been introduced.¹ As a result of these changes, banks were much better positioned in 2020, ahead of the Covid-19 pandemic, than they were in 2007, ahead of the banking crisis.

There does not appear to have been equivalent progress in the framework for the control of risks in banks. Concerns have been expressed by various leading bodies about the authority of the risk management function and about the effectiveness of the three lines of defence model. In this article, we set out these concerns and consider how the establishment of a new function in banks, broadly equivalent to the actuarial function in insurance companies, could help to address them.

BACKGROUND

In a paper that was issued as a draft in 2018 and subsequently published in July 2021,² the International Actuarial Association (IAA) Banking Forum highlighted an important difference in the system of governance between banks and insurance companies. Banks

operate under the three lines of defence model that was developed by the Institute of Internal Auditors (IIA),³ under which the first line is revenue-generating business units, the second line is control functions such as risk management and compliance, and the third line is internal audit. Insurance companies operating under Solvency II must have an actuarial function as well as a risk management function and an internal audit function.⁴

In October 2019, speaking at an ASSA Convention, Michael Tichareva, Chair of the IAA Banking Forum, made the case for an “actuarial function” in banks, and suggested what its responsibilities might be.⁵ A few years ago, this idea may have sounded far-fetched. However, the need for understanding and judgement in evaluating a range of stress scenarios, as suggested by Sam Woods, Deputy Governor of the Bank of England in a recent speech,⁶ supports the case for a new function in banks with responsibilities similar to those suggested by Michael Tichareva.

THREE LINES OF DEFENCE MODEL

For the three lines of defence model to be effective, the risk management function must be able to challenge and control risk activities in revenue-generating business units. However, in June 2010, soon after the banking crisis, a European Commission (EC) Green Paper identified, as one of a number of shortcomings in risk management in financial institutions, a lack of authority on the part of the risk management function⁷. Over ten years later, in December 2021, a Dear CEO letter issued by the Bank of England and the Financial Conduct Authority (FCA) said that the independent risk function lacked standing⁸.

In a 2015 paper, the Financial Stability Institute (FSI), which is closely related to the Basel Committee on Banking Supervision, identified a number of broader weaknesses and past failures in the three lines of defence model, including a lack of organisational independence of functions in the second line of defence. The FSI also pointed out that financial institutions are different from other sectors and considered the extent to which, because of their distinctive characteristics, they need a more effective internal control model. The FSI paper proposed that there should be a fourth line of defence, comprised of the bank’s regulatory supervisor and external auditor working together with its internal audit function⁹.

The new function would have strong capabilities in understanding and judgement, going beyond compliance with relevant regulations.

Two reservations may be expressed about the FSI's proposal. Firstly, the involvement of the regulatory supervisor and the external auditor in a fourth line of defence might cause them to lose some of their independence and objectivity. Secondly, tripartite responsibilities are difficult, as may be seen from the UK in the period ahead of the banking crisis, when HM Treasury, the Bank of England and the FSA had a Memorandum of Understanding for Financial Stability¹⁰ which, with the benefit of hindsight, was not seen as successful in averting the banking crisis in the UK.

In a paper published by the Institute of Internal Auditors (IIA) in July 2020, it said that second line roles are part of management's responsibilities and are never fully independent from management, but that a defining characteristic of third line roles is independence from management. In this paper, the IIA updated its three lines of defence model. In doing so, it did not adopt the FSI's proposal for a fourth line of defence, nor did it suggest specific arrangements for financial institutions. In its updated model, the IIA dropped the word "defence" saying that risk management should also contribute to value creation, and that first and second line roles might be blended or separated¹¹.

These changes do not seem appropriate for banking, because of its centrality to the economy, its exposure to systemic risk and its potential to contribute to booms and busts. Indeed, these characteristics, along with experience of the banking crisis, suggest that it is in the public interest to have a strengthened version of the three lines model in place for banks.

NEW FUNCTION IN BANKS

To address the concerns that have been expressed, consideration might be given to the establishment in banks, within the existing three lines model, of a new function broadly equivalent to the Solvency II actuarial function in insurance companies. The new function would have strong capabilities in understanding and judgement, going beyond compliance with relevant regulations.

As under Solvency II, the new function would be separate from the risk management function, but would work closely with it. For example, the new function would review regulatory submissions, including Internal Capital Adequacy Assessment Processes (ICAAPs) and Internal Liquidity

Adequacy Assessment Processes (ILAAPs), prepared by the risk management function, with input from revenue-generating business units. The new function would also work closely with the internal audit function on specific issues, and could be regarded as part of the third line of defence.

To avoid overlap or underlap, the responsibilities of the risk function, the new function, and the internal audit function might be set out in the same way that they are, under Solvency II, in Articles 44, 48 and 47 respectively. For the new function, responsibilities might include not only technical matters but also behavioural matters such as the need for integrity, the need for competence and care, the need for appropriate communications and the need to speak up - as under a professional code such as The IFoA Actuaries' Code¹².

As well as being independent of the risk management function, the new function would have to be free from influence by management. It would report to the chair of the board risk committee and to the CEO as chair of the management committee. Giving that speaking up is not always easy in banking, or in many other industries, the new function might be required to prepare an annual paper for the board (and for the bank's regulator) setting out any concerns that it has about the bank's risk management activities and making recommendations as to how they should be addressed.

The new function would be staffed by people with demonstrable competence in banking risk management, evidenced by academic or professional qualifications and/or by adequate experience in banking. Staff members would be likely to come from different backgrounds and to bring complementary skills and experience. Within such teams, it would be useful to have some actuaries who have worked in an actuarial function in an insurance company, or have passed the Banking Fellowship exams, or are working in risk management in banking.

The new function would be given authority by its independence and by its stated responsibilities, including the responsibility to set out any concerns that it has. The new function would gain authority by demonstrating its capabilities in understanding and judgement and by its ability to make constructive challenge and to control risks effectively. Its ability to do these things would be enhanced by the fact that it would be free from day-to-day bureaucracy and able to concentrate on matters such as independent reviews of risk models and regulatory submissions and the identification and evaluation of emerging risks.

Given the risks associated with an approach based on understanding and judgement, the new function would itself have to be policed, in an appropriate way by an appropriate body. As for members of a profession, senior members on the new function would be liable to sanctions not only for allowing breaches of banking regulations but also for failing to meet expected standards. For example, they might be liable to sanctions for failing to speak up about concerns or for making inexcusably poor judgments. The policing body would itself have to have deep understanding of banking risks, be able to make judgements and be free from conflicts of interest.

The establishment in banks of a new function broadly equivalent to the Solvency II actuarial function would not imply that other aspects of Solvency II should be adopted in banks. There are important differences between banking and insurance. The assets and liabilities of banks are different from those of insurance companies. Banks are vulnerable to higher losses in recessions, and correlations between banking risks are likely to increase in periods of stress, as happened in 2008. Banks are vulnerable to systemic risk, and their lending activities can lead to feedback loops, which amplify expansions and contractions.

Given the extent to which banks can be affected by economic downturns and economic shocks, setting capital buffers in the light of banks' stress testing exercises is an important activity in banking, as was highlighted recently by Sam Woods, Deputy Governor of the Bank of England. The new function could make an important contribution to this activity by making judgements about the base case and stress scenarios, both

system-wide and bank-specific, to be evaluated by the bank, and about the appropriate size of the bank's capital buffer in the light of the evaluations of the scenarios.

CONCLUSION

We, as authors of this article, believe that the establishment of an "actuarial function" in banks would address the concerns that have been expressed about the authority of the risk management function and the effectiveness of the three lines of defence model, and that it could be implemented without significant disruption to current activities. 

References

- 1 *Basel III: A global regulatory framework for more resilient banks and banking systems*, BCBS, December 2010 (rev June 2011).
- 2 *Opportunities for Applying Actuarial Techniques in Banking*, IAA Banking Forum, July 2021.
- 3 *The Three Lines of Defence in Effective Risk Management and Control*, IIA, January 2013.
- 4 *Solvency II Directive*, Section 2.
- 5 *Application of Actuarial Techniques in Banking*, Michael T. Tichareva, ASSA 2019 Convention, October 2019.
- 6 *Bufferati*, Speech by Sam Woods, Bank of England, April 2022.
- 7 *Corporate governance in financial institutions and remuneration policies*, Green Paper, EU, June 2010.
- 8 *Dear CEO letter*, Bank of England and FCA, December 2021.
- 9 *The "four lines of defence model" for financial institutions*, Occasional Paper No 11, Financial Stability Institute, December 2015.
- 10 *Memorandum of Understanding for Financial Stability*, News release, Bank of England, March 2006.
- 11 *The IIA's Three Lines Model, An update on the Three Lines of Defence*, IIA, July 2020.
- 12 *The Actuaries' Code*, Institute and Faculty of Actuaries, May 2019.



Iain Allan FFA, Deputy Chair of the IAA Banking Virtual Forum



Michael Tichareva FASSA, FIA, Chair of the IAA Banking Virtual Forum



LIFE ASSURANCE

SEMINAR 2022 - By Kadene Gibbs and Maseeha Rawat,
Business Development at Hannover Re South Africa (Life & Health).

We were excited to attend the Life Assurance Seminar on May 10th at the Radison Blu hotel in Johannesburg, and to re-connect with industry colleagues in person, after the last two editions being virtual. This year's seminar was hosted as a hybrid event with both virtual and in-person options, and the speakers were split between the venues in Johannesburg and Cape Town. Here are our key takeaways from each session:

1 Funeral insurance and burial societies: Impact of the pandemic and lessons learnt

| Panel discussion led by Melusi Baloyi

- **Experience:** The liquidity of funeral providers was strained due to increases in claims. Death counts in the funeral space increased by 36% over the pandemic and reported margins are now 5-7%. Funeral parlours/burial societies were significantly impacted.
- **Sales and premium collections:** The industry needed to move from a physical to digital format over lockdown, which was challenging as a significant number of policyholders and applicants in the target market trust the cash system. Innovation came by way of online funerals and social media marketing.

- **Price impact:** Increases of ~60% are seen in the market. Preferential rates are sometimes offered based on vaccination policy.
- **Lapses:** Significant increases which were expected - especially in light of the price increase - did not materialise.

2 Feedback on Tax implications of IFRS17 LAC Tax subcommittee

| Riaan Van Reenen & Christiaan Nel

- **Engagement with Treasury:** The LAC Tax subcommittee commissioned a report by PWC, on an anonymised basis, to gain feedback from the industry, and presented their findings to Treasury.
- **Key findings:** There is a need for zeroisation of IFRS 17 negative reserves, and for a long transition period for reporting. Insurers are encouraged to submit further feedback to Treasury.

3 South Africa Sovereign credit risk Industry practices

| Idelia Hohberg

- **Solvency:** To what extent do insurers allow for SA government credit risk in calculations?
- High debt to GDP ratio is a likely indicator of default. Avoiding a default can have detrimental impacts.
- 90% of current government debt is denominated in rands, so there is some flexibility to repay. There is increased pressure from SOEs with guarantee from government.
- South African banks and insurance companies have high exposure to government debt. The presenter questions if this debt is truly risk free?
- **Reinsurers with parental guarantees:** A key question is the extent to which this can be relied on in a sovereign credit event. One suggestion is to consider using a separate internal structure that focuses on this risk.

4 Climate Change and Life Insurance actuaries

| Nan Paramanathan & Matthew Cann

- More work has been done on the topic in the savings & investments space than in the risk products space.
- A key question under discussion is whether we should be holding regulatory capital for climate risk.
- There is a focus on investing in companies based on ESG policies. It is unclear if there is a difference in investment returns achieved based on ESG policy.

5 Aiding professionals to accelerate their learning journeys through the support of reflective coaching interventions

| Jerry van Niekerk & Danie Kritzinger

- ASSA is running a pilot to move from ASSA's CPD process to a cycle of personal development, based on reflective coaching.

- It is not intended to involve evaluation, counselling and mentoring. It is rather intended to enable reflection and increase self-awareness, allow you to draw learnings together and plan for the next learning cycle.

6 Draft Professional Guidance on Reviews Conducted on Universal Life Insurance Policies | LAC Market Conduct Subcommittee

| Jason Lakey & Kudzai Mtebule

- Universal Life policies were sold in SA in the 80's – early 2000's, and are no longer sold in SA. They offer risk and savings benefits under the same policy, with limited, but sometimes long, guarantee periods (20 – 30 years).
- Challenges exist around premium reviews (where there is no original pricing basis available), managing reasonable benefit expectations and ensuring fairness between different cohorts of policyholders.
- An APN has been drafted to provide guidance around market conduct considerations in conducting policy reviews.

7 Living with COVID, a panel discussion | Panel led by Anne Livingstone

- **Pricing:** Insurers cannot price to recoup past losses, and there aren't many in-force increases seen in the market. There are questions on whether the cost of capital pricing approach is sufficient. Pandemics are occurring more frequently than we previously expected. The industry is discussing how to price for future pandemics, but there is no clear answer.
- **Solvency:** Big insurers saw stable solvency position throughout the pandemic, which is likely due to having well-diversified portfolios. This is not the case for small – medium sized insurers. It is important to monitor factors that influence solvency ratio and not just solvency ratio itself.
- **IFRS 17:** The 2023 implementation makes transitional calculations challenging given the COVID experience in base years. 

FUNERAL INSURANCE AND BURIAL SOCIETIES:

Impact of the pandemic and lessons learnt

- by **Melusi Baloyi**, *Partner, (Xivoni Actuaries and Consultants)*, **Alvin Ngugi**, *Senior Manager (Xivoni Actuaries and Consultants)*, **Vhusi Phiri**, *Executive Director (21st Century Life & COO| NAFUICO)*, and **Anelang Kakudi**, *CEO (Everest Life)*.



Introduction

This article reflects on the last three years in the funeral insurance and burial services space; how COVID-19 impacted operations within the sector, and the approaches adopted to stay afloat.

The advent of COVID-19 has brought operational challenges, changes and pressures which small operators in the funeral industry have had to find innovative ways to stay afloat. These approaches are explored taking into consideration that premiums are low, margins are small (profit margins on funeral insurance are estimated to be between 3% and 7%), and the battle for business is fierce. A perspective on the simplified solvency approach for micro-insurers in the context of the pandemic and the liquidity pressures in the face of increasing claims is given. Finally, the article delves into the lessons learnt and what these imply for the future.

Reports published by the South African Medical Research Council (SAMRC) and the University of Cape Town (UCT) during February 2021, estimated that between 85% and 95% of all excess mortality observed in 2020 could be attributed to COVID-19. This phenomenon translated into the life industry, which saw total number of claims increasing. The funeral life space saw a 36% year-on-year increase in claim numbers for the 12 months to the end of March 2021.

Some businesses noted huge spikes in lapse rates in Q1 2020, as much as eight times their long-term average. This, according to Vhusi Phiri, CFO of National Funeral Undertakers Investment Company (NAFUICO), has had a huge impact on the parlour business, particularly those operating under the cell-captive business model. He further notes most of these players incurred huge debts in order to finance the large claims. He further notes that the regulatory model used to deliver the services may need to be reviewed in order to ensure sustainability of the sector.

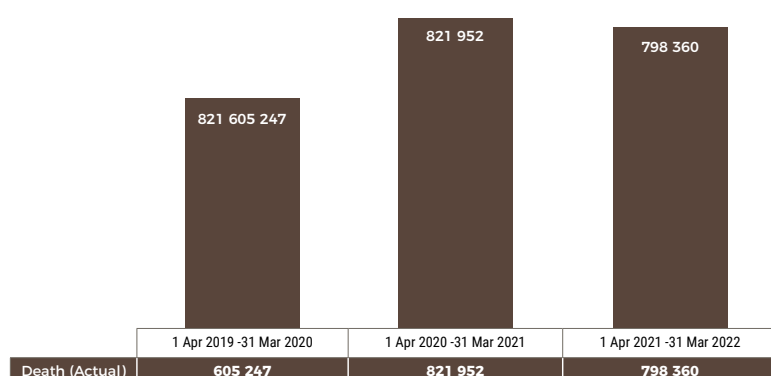
The Industry at a Glance

By volume, the claims that the South African life insurance sector pays sits largely within the funeral sector.

In the last two years, the funeral space operators were paying 75%-80% of the total claims in the life insurance sector, by volume. This impact is massive and the vital role of the sector in the lives of the policyholders' and their dependants cannot be underestimated.

The graph below shows the funeral insurance claims by volume pre- and post-COVID-19 as reported by the Association for Savings and Investment South Africa (ASISA).

Figure 1. Deaths in the Funeral Insurance space (April 2019 - March 2022)

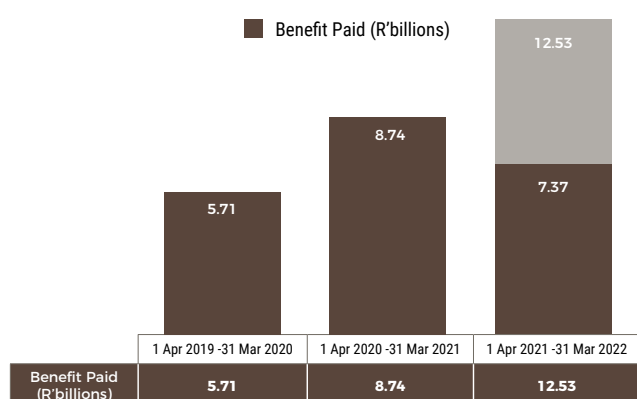


The total death claims recorded by life insurers were 1 023K for the year to March 2021, of which funeral constituted 80% with the proportion falling to 75% for the year to March 2022.

ASISA reported that the death claims attributable to funeral insurance were 821K for the year to March 2021, compared to 605K in the preceding year signalling a 36% increase.

Death claims were 424K between 1 April and 30 September 2021 and projected to have reached 800K for the 12 months ending March 2022, representing a 3% year-on-year decrease.

Figure 2. Benefits Paid Out (in billion Rands) (April 2019 - March 2022)



The body further reported that in the funeral insurance industry, the claims and benefit payments reached R8.7 billion for the year up to 31 March 2021 (R5.71 billion as at 31 March 2020), which represents a 53% increase (see Figure 2. above).

Similarly, claims and benefit payments were R7.37 billion for the half-year from 1 April 2021 to 30 September 2021. The projected figures for the year up to 31 March 2022 is around R12.53 billion this representing a 43% increase largely driven by the impact of the third wave.

Impact

On life insurance as a whole

The South African life insurance industry held assets of R3.7 trillion as at end of 2021 (R3.23 trillion at the end of 2020), while liabilities amounted to R3.4 trillion (R2.89 trillion at the end of 2020). This left the industry with free assets of R351 billion (R333.5 billion at end of 2020). This translates to a coverage that is twice the required solvency coverage ratio as per ASISA.

The industry body noted that the ratio of free assets to the SCR reduced only marginally from 2019 to 2021 despite the significant impact of the COVID pandemic on life insurers, pointing to the resilience of the South African long-term insurance industry and, by implication, the funeral sector space.

Industry experts concur that solvency across the industry has not been significantly impacted by the pandemic. However, liquidity was immensely impacted for new (upcoming) businesses, or those funeral insurers that had large negative reserves to boost solvency. This came from the industry facing more claims, having changes to the claims incurred pattern due to prescribed pandemic protocols, and a huge fall in business volumes.

For the policyholders

For most funeral insurers, the general sense is that policyholders now view funeral cover as vital, as shown by improved lapse rates in their books. There have also been improved customer experiences through digital sales and claims processing which has reduced the need for branch visits.

Funeral insurers are, however, increasing premium rates by as much as 60% at annual renewals due to poor claims experience, considering the claims experience at industry level, and in their overall books of business.

The insurers' aim is to ensure sustainability and deal with future negative claims experience as higher claims experience leave insurers with little choice but to adjust premiums in line with the higher risk.

In some instances, the industry players have implemented mandatory vaccination policies wherein vaccinated clients are starting to benefit from preferential premium rates.

Industry experts concur that solvency across the industry has not been significantly impacted by the pandemic.

A view from the captains of industry

Vhusi Phiri, Director at 21st Century Life and COO of NAFUICO, whose entity assists funeral parlours in getting better rates from underwriters, notes that following the first wave, and subsequent lockdown, sales fell as much as 70% driven by closure of physical channels, roadshows and the door-to-doors sales. As the pandemic persisted, there was a need to digitise using tablets as people became wary of physical contact. Other tools like the traditional application forms became irrelevant and had to be scrapped by some players.

The biggest impact according to Vhusi, was in the way premiums were received; with cash receipts falling drastically as walk-in numbers fell due to the lockdown measures put in place by Government. As a result, premium collections fell by 50% in April 2020. A few months later, however, there was a huge improvement as the customers' perceived value of the policies increased. Though the funeral insurer space has not extensively adopted debit orders, moving forward there is a plan to fully digitise the premium collections as a learning from the pandemic.

In the COO's reflections, though the pandemic led to increased overheads such as personal protective equipment (PPE) for COVID-19 safety precautions, the general approach was to not pass these costs to the clients given the strain of the pandemic on them.

Everest Life, a micro insurer that entered the market during the 4th wave has had a nascent experience though the holding company has been in the industry for many years. Anelang Kakudi, the CEO recalls how they had to close down some branches as business volumes dropped with the onset of the first lockdown.



As part of the adaptations in the funeral parlour business, they started offering online funerals. These, more often than not, were upsold by clients. Clients now wanted more flamboyant funerals with more ornate decorations, flashy motorcades, naturally becoming a big marketing avenue.

In terms of claims, Anelang notes that their burial society's offerings only started to show marked changes in the claims coming in after the second wave. Similar to NAFUICO, it is also his view that parlours suffered more than the underwriters as burial costs increased. Most of

the players failed to recover the costs through premium increases as the Financial Sector Conduct Authority (FSCA) stepped in. Vhusi added, some underwriters passed the cost of increased claims to Parlours, in the form of a Covid Claims Reserve, which was general felt as unfair by Funeral Parlours.

Other issues included the need to modify the parlours, to allow the last body-view while limiting the risk of spreading risk. Huge sums of money were poured into such infrastructure changes resulting in increased liquidity strain on the funeral insurers.

The Road Ahead

The COVID-19 pandemic has brought numerous challenges but also opportunities for innovation in the funeral insurance space.

The players that will survive are likely to be those that adapt to the digital progress that has been made in the industry whilst ensuring they are well covered from a liquidity and solvency point of view. Experience monitoring will also remain a crucial aspect in the next few years if the players are to be sustainable. 

HEALTH WARNING: Education can be a poverty trap!

**Help us help more children
to escape the poverty trap.**

Contact Paper Video (Chris Mills, 072 347 6154, chris@papervideo.co.za) or the Actuarial Society Educational Trust (Mike McDougall, 087 073 8952, mmcdougall@actuarialsociety.org.za) and make education a powerful catalyst for change in more children's lives.



**ACTUARIAL
SOCIETY**
OF SOUTH AFRICA



HIRE AN ACTUARY

– says the **Zambian Insurance Act No 38 of 2021 Sections 69-70**



The Insurance Act No 38 of 2021 of Zambia is set to repeal the Insurance Act No 27 of 1997, once the Minister of Finance issues a Statutory Instrument for the new Act to take effect.

The Pensions and Insurance Authority (PIA) has praised the much-anticipated Act as a forward-thinking piece of legislature that is aligning the industry to global trends in best practice.

This article focuses on some immediate benefits in the Actuarial Sector as well as shedding light on specific sections of the Act relevant to the actuarial profession. In particular, Section 69 of the Act requires a licensed insurer to appoint an actuary in the following terms:

1. A licensed insurer shall appoint a qualified actuary who shall be accredited as a Fellow by the Zambia Qualifications Authority to carry out the duties imposed or conferred on the actuary under this Act before commencing insurance business.
2. A licensed insurer shall, within seven days of appointing an actuary under subsection (1), notify the Registrar, in writing, of the appointment.
3. The Registrar shall, where a licensed insurer fails to appoint an actuary, under subsection (1), appoint an actuary for the licensed insurer who shall be considered to be appointed by the licensed insurer.

INDUSTRY BACKGROUND

PwC carried out a survey in 2019 that highlighted the top five issues affecting the Zambian Insurance industry. The survey was based on information obtained from a questionnaire sent to 33 insurance companies currently operating in Zambia, of which 19 responded. Based on the PwC survey, the following five main issues were affecting all the insurance companies that were surveyed, regardless of whether their business was non-life, life or reinsurance.

- Recovery of premium debtors
- Economic environment
- Regulatory environment
- Understanding the role/benefits of insurance among the Zambian population
- Availability of skilled resources

As highlighted above, the fifth most pressing issue confronting Zambian insurance companies is a lack of skilled resources and personnel, with a shortage of highly skilled professionals such as actuaries. Nearly half of the 19 respondents surveyed believed that the lack of skilled personnel was due to a lack of a comprehensive insurance curriculum at local higher learning institutions.

CURRENT BUSINESS PRACTICE IN ZAMBIA

The previous Insurance Act of 1997 was heavily focused on regulating the operations of companies within the insurance industry.

As the industry grew, stakeholders realised that insurers providing long-term products needed to account for reserves, statutory funds, solvency, and the company's surplus or deficit. This requires insurance companies to engage actuarial professionals to undertake these assignments.

In recent years, insurance companies have largely chosen to outsource their valuations to external actuaries. These actuaries are mostly non-Zambians who work remotely from outside of Zambia.

The Zambian market understands an actuary as a business professional who studies the financial implications of risk and uncertainty. Actuaries are commonly associated with the insurance industry. Insurance and reinsurance companies must be aware of the potential risks associated with insuring an individual or a business. This requires these companies to hire actuaries.

Insurance companies rely on actuaries to determine risk for many types of insurance across life, property, liability, auto, home, as well as other plans.

An insurance Actuary analyses financial risk. This analysis helps insurance companies design insurance policies that meet client requirements.

REQUIREMENTS OF THE NEW INSURANCE ACT, NO 30 OF 2021

A licensed insurer must appoint a qualified actuary, who is accredited as a Fellow by the Zambia Qualifications Authority, to carry out the duties imposed or conferred on the actuary by this Act.

The actuary will investigate and prepare a report on the financial condition of the licensed insurer's long-term insurance business, at the end of each third fiscal year, in order to determine any surplus for distribution.

They will also estimate the present value of the long-term licensed insurer's liabilities using methods and assumptions based on generally accepted actuarial principles and practice.

IMPACT ON THE ACTUARIAL PROFESSION

With this Act, Actuaries will be able to properly define and carefully evaluate the risks for respective companies. They will, thus, assist the insurance companies in making informed decisions on pricing commensurate with the risk assumed.

In addition, the Act explicitly outlines a schedule of regulatory reports to be presented on the financial conditions of the licensed insurer for supervision purposes.

Actuaries will benefit the company by:

- Improving the risk assessments;
- Increasing insurance companies' investment portfolios;
- Managing the financial reserves of the company.

The Act is a breath of fresh air for aspiring actuaries in Zambia. In the past, prospective candidates tended to have reservations about pursuing the actuarial qualification, as they had questions such as:

- Is it a worthwhile profession in the Zambian economy?
- What job opportunities exist?
- Are there any qualified Actuaries in Zambia?
- Is this the right path for me?

All these concerns are valid. However, the new Act will directly, or indirectly, address some of these concerns by potentially providing the following benefits for actuarial students:

- Job creation/demand;
- Better career prospects;
- Mentorship Programs;
- Study support (enabling them to not only hold academic certificates but professional certificates as well).

Until 2015, Zambia did not have any institutions that offered a degree in Actuarial Science. There were also very few local professionals who could give guidance on the profession.

Today the University of Zambia and University of Lusaka offer Actuarial Science programs at both undergraduate and post graduate level. The Actuarial Students of Zambia society also provides a platform for actuarial students to learn from and exchange ideas with each other. Students and professionals can also become members of the Actuarial Society of Zambia which will enable them to expand their network.

This indicates that there has been a significant growth in the knowledge and understanding of the Actuarial Profession in Zambia and with the enactment of the Act, institutions will have a wider talent pool from which to source staff. 🇱🇲

Raiza Sibongile Mtamira

CAA Global Candidate

Treasury Officer Klaption Reinsurance Limited

LESSONS LEARNED

from 4 decades of life assurance product development

- Paul Truyens

Introduction and Relevance

As I reflect on my 40 years involvement in life assurance product design, development, pricing and distribution, I would like to highlight areas where we can learn from some of the actuarial and industry practices of the time. We will also touch on other aspects of service delivery meant to meet policyholder expectations.

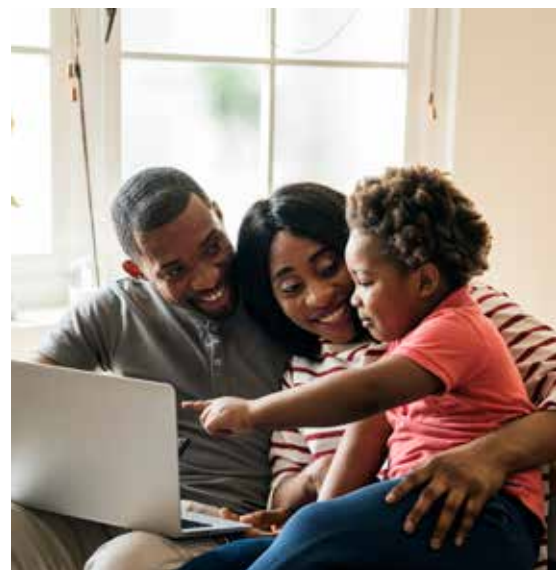
In this second article I discuss a further series of areas /case studies illustrating where we could have done things differently to more effectively meet policyholder expectations.

Relevance

The cases I am sharing are of great educational and professional development interest and relevance to those working in the area.

While some of these practices were widespread across the industry, others were restricted to one company. With the exception of a few instances where consequences were catastrophic for companies (e.g. Equitable Life in the UK), these issues did not get extensive coverage in the financial or popular press and had limited exposure in actuarial conventions and sessional meetings.

This article is written to stimulate debate in the profession and to encourage us to take a more systemic and customer focused approach when dealing with the challenges we face today. Let us learn from the errors and blind spots of a previous generation of actuaries and not repeat them in a different form in today's context.



Case study 2: Interest free (unit-linked) loans on unit-linked policies

Company B, a well-established South African company offering both conventional and unit-linked policies, was persuaded, possibly by a broker, to convert 5-year recurring premium unit-linked policies to effective single premium policies by granting interest free loans to the policyholder to fund the second to fifth premiums.

The policy in question was the so-called "5 by 5" pure endowment. This was a 10 year term, 5 year premium payment, minimum life cover, unit-linked savings policy. This was the shortest term version that was still deemed to be "standard" in terms of the Income Tax Act. Shorter terms and shorter premium paying terms would have made the policy non-standard and subject to additional tax penalties on maturity or surrender.

The idea was that the policyholder would sign up for 5 premiums and, in reality, only pay one, with the second to fifth being funded by taking out policy loans. The loan would attract an interest rate equal to the net growth rate of the units allocated to those premiums. The balance of the loan

at maturity would exactly equal the maturity value of the four premiums funded by the loan and the policy would mature for a net maturity value equal to the first premium plus its accumulated unit growth.

The policyholder was only required to invest one premium. There was an additional benefit to the broker other than having a happy client: he received the standard recurring premium initial commission of 16.25% of the premium, and renewal commission of a third of that - a total of over 20%.

When asked to offer the same facility, I investigated the construct of Company B's offering. I realised that by having the loan only bear interest at the net unit growth rate (and not at the gross growth rate), the offering had effectively only one premium to earn management fees on, yet was required to cover the costs of a five year recurring premium contract. I pointed this out to Company B and the facility was immediately withdrawn. By my estimation, the loss would have been substantial and I didn't find out how many of these policies had been sold.

Case study 3: The Fenton Scheme

This was a case in which the inherent volatility of the stock exchange was overlooked.

Prior to the crash of 1987, the JSE had enjoyed spectacularly high returns for some 10 years. Other than a near zero return in 1981, the lowest other year was 1984 with just less than 8%, 1985 yielded over 40%, and 1986 produced 55%. Against this backdrop, bank brokers considered advising their clients to borrow from the banks at the then prevailing rates of 12.5% and invest their borrowings in unit-linked policies. The policies would then be pledged as security to the bank for the loan. Company C, an ex- South African subsidiary of an established English company, decided to partner with the brokers in this endeavour.

The risk was that the investments might not repeat the recent high performance and the banks, being conservative, wanted more security than the traditional unit-linked policies would offer. The normal security value that a bank accepted for shares and unit trusts was 50%, and that was what they were willing to lend against a standard linked policy. This meant that clients had to fund the other 50% themselves. Brokers sought to get the life office to provide a guarantee. While the average annual return over the 10 years of the policy was then 4%, they were looking for an annual guarantee, i.e. that the policy value would not reduce at any stage below the initial investment. The banks were willing to take a risk on the client for the difference between the 12.5% loan interest rate and the zero percent guarantee, looking at other sources of comfort.

Company C provided that guarantee, and new business poured in. Brokers and loan officers were earning well on commission. The new book started swamping the total in-force book, raising doubts within the company, and they warned brokers that they would be closing the offering soon. Brokers rushed around to other companies, including the company at which I was employed as a Product Actuary, Southern Life. I won't anonymise the name of this company as readers can find this out from online searches. I was urged by multiple internal stakeholders to take over from Company C and I refused, after assessing the risks to be unacceptable.

I was then urged to at least discuss, with the Head of Investments, the possibility of constructing an investment portfolio that might work. On doing so, we determined that if we constructed a portfolio that made the probability of our having to pay out on the guarantee as low as possible, there was very little chance of the policyholders earning the 12.5% net they needed to make the scheme work. If we chose a portfolio that gave them an acceptable chance of achieving the 12.5%, the chance of us being wiped out was much too high. We therefore confirmed our refusal to step in the place of Company C.

There were a few resignations within Southern Life during, and shortly after this period.

Then in October 1987 the world's stock markets crashed: the S&P 500 index dropped by 20%. The JSE was not spared - it dropped 11.7% in one day. Company C ended up insolvent and was closed down and merged with another company.

Conclusion

These past industry and actuarial practices should be taken in the context of the prevailing conditions at the time. It is easy in hindsight to see the failings of these approaches, but they do need to be seen in the context of both the prevailing industry culture at the time and the tools and techniques available to actuaries at the time.

There have been significant changes over the years with regard to increased customer protection, improved disclosure requirements, treating customers fairly, and the development of professionalism training within the actuarial profession. For example, the first professionalism course was in 1992 which the 1991 and 1992 qualifiers were required to attend. The subsequent development of the full normative skills programme has also helped move actuaries from focusing on the mathematically possible to the mathematically possible and ethically acceptable and desirable. 

The fair value of **Life Right Village Properties** - Reg Munro

Executive Summary

The entry of commercial investors into life right retirement villages has highlighted their unusual financial model. A lump sum purchases life rights that secure life-long tenure and a refund on exit. Where refunds are subject to successful resales, there is no requirement for any financial reserve to be held. The net result is the creation of ongoing flows of excess cash, financed by the village taking on additional debt to its residents. Clearly, this has nothing to do with either earnings or profit.

Many consider the value of the real estate to be similar to freehold estates. This ignores the occupation in terms of life rights. The market value lies in the potential cash that can be extracted as defined in the legal contracts.

Early Days of Life Right Housing for the Elderly

The origins of housing for the elderly were largely religious and charitable. Many who retired discovered that their resources were insufficient to provide food, housing and, when needed, extra care. These organizations were developed to provide what was needed and for prices that could be afforded.

Benevolent and charitable villages recognised the limited assets available. They accepted what was available, the bulk of which was often the price obtained for the residents' previous homes. The price of houses set the appropriate price paid for the lifelong care and housing required. A key focus was on providing benefits that could be afforded. Established non-profits used the cash surplus from resales to reduce running costs. Donations played, and in some villages continue to play, a significant role in ensuring village sustainability.

This history of pricing and sharing the benefits of communal living have resulted in these unusual financial structures becoming an accepted global feature of retirement housing.

Property experts predict significant future growth in the numbers of retired people around the world living communally in retirement villages. The facilities and services offered continue to expand, providing what is desired.

Life Right Financing

This article explores some of the South African financial implications of “right to occupy” or life rights. These cannot be operated for a period and then successfully closed because the properties cannot simply be sold off for an alternative use. A failure constitutes a social human disaster. The implications for the elderly residents are unthinkable.

Life right villages have to continue filling vacancies with new residents who pay adequate lump sum fees on entry. Common financial features of these villages include:

- Every resale of a life right produces a cash surplus;
- The surplus is the result of increased debt to existing residents;
- At least part of the resale surplus is applied to reduce the costs of the village;
- There is little appreciation of this important contribution by exiting residents; and
- The market value of the property is significantly less than that of a comparable village where residents own the freehold of their units.

In his article, on the valuation of villages, Pienaar states “Extreme care is to be taken not to value ‘life right’ units using market evidence from the sales of directly owned units”.

An Example of Life Right Related Financial Transactions

One year’s financial transactions in the non-profit village assumed below provide illustrative examples of the life right related financial transactions.

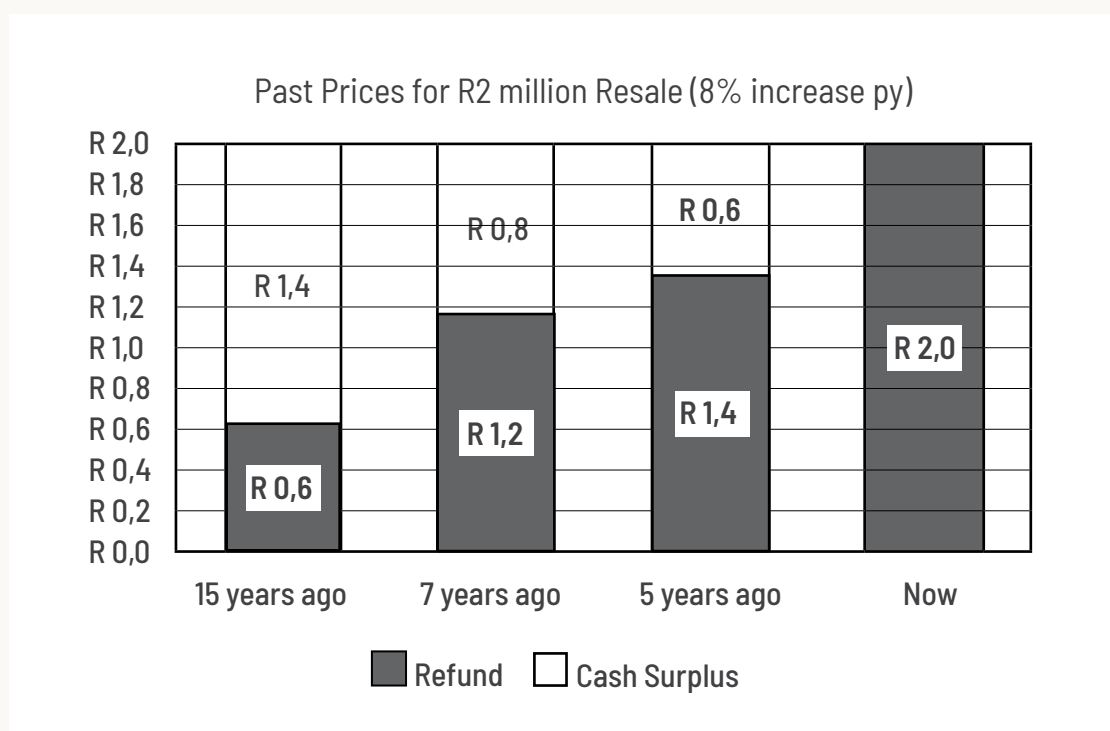
The Community

The village was established to provide affordable accommodation for elderly residents. 500 units are available for occupation in terms of life right contracts.

The Contracts

Residents buy lifelong tenancy in a unit for a lump sum. On exit, a refund becomes due once a replacement contract is bought. The refund is the lesser of the original and resale prices.

Illustrative Numbers for the Current Year





During the year, 60 units were vacated and all were resold. At the end of the year, Life rights had been in force, on average, for 5 years.

Price History Assumed

Purchase price in the year was R2 million per unit. The price increased by 8% per annum from R600 thousand 15 years ago.

Changes Assumed

60 refunds paid were R72 million, bought on average 7 years ago for R1,2 million each. 60 new sales produced income of R120 million.

The financial result for the year from life rights was a cash surplus of R48 million. During the year, the entire excess was used to upgrade the properties and to reduce the residents' cost by R96 000 per unit.

The Financial Reporting

The balance sheet at year end contains only current assets and liabilities. The R48 million surplus is included in the Revenue Statement. The accounts indicated that the total debt to residents had increased by R48 million.

The Market Value of this Village's Real Estate

Residents have a contractual guaranteed tenure that they are unable to sell on the market. A resident who chooses to sell is contractually bound to a predetermined price, i.e. the refund defined in the contract. The operator cannot sell occupied units.

This theoretical non-profit village clearly has no value as property. The 2021 rescue of the Henry Ford Village in the USA from bankruptcy clearly demonstrated this.

This non-profit Village does appear to have what is called an "embedded value" (name given by the Arvida group in New Zealand) of R300 million at year end. The total current resales price of R1 000 million less total refunds of R700 million (500 times R1,4million). While this value is not fungible, it may provide an indication or measure of the potential cash surplus that future resales may generate for the benefit of residents.

Investing in Retirement Villages

Investors have shown an increasing interest in retirement village. Others invest in the village operators, attracted by the prospects of sharing in an ongoing cash surplus generated by inflationary price increases on resales.

In South Africa, some non-profits share these cash surpluses between the departing resident, the village for the benefit of remaining residents, and an overarching owner that uses these benefits to cross-subsidize other villages in a group or finance the development of new villages. There is no limit to the variety of these arrangements, but they are contractually binding.

The extreme example of a village above clearly demonstrates that the surplus cash from resales is not a result of operational excellence, but simply the year's increase in total borrowing from residents.

There is no clear accepted or legal definition of what tenancy claims life right holders have on the owners of villages. As owners define Deferred Management Fees (DMF), the lack of clarity as to what is covered and who of owner, operator or resident is responsible is not always clear.

Developer

Property developers see the short-term returns possible from new village estates.

Developer Owner Operator

The financial arrangements take many forms, most often featuring an owner share in the surpluses on future resales. There is a synergy of interests here, but a big question concerns the anticipated future return on the net zero development investment after the full return of the original capital plus 15% return. (Arvida Group 2021 Annual Report)

These theoretical owners have, in fact, no invested capital at all.

Owner Operator

An owner operator of the above village could have access to operational profits as well as a contractual share of the resale surpluses written into the life right contracts or ancillary legal contracts.

The fungible market value of any share of the "embedded value" would be best assessed in relation to the discounted value of the share of income. This requires consideration of all of timing, volatility and potential future growth of the cash flow.

INVESTORS NEED TO
BE AWARE OF THE
IMPORTANT DOWNSIDE
TO THESE INVESTMENTS.
RETIREMENT VILLAGES
CANNOT BE CLOSED
DOWN

Operator

The value from village operations lies only in the contractual right to share in business profits from supplying services and care.

Investment Cautions

The occupation in terms of life right contracts removes retirement village units from the normal housing property investment market. The above features have not prevented investors from paying exorbitant prices for a share in retirement villages.

The Arvida Group in Australasia and PSG Evergreen in South Africa both based their asset value of villages as the total current resale price of all units less the total interest free loans from the residents.

Investors need to be aware of the important downside to these investments. Retirement villages cannot be closed down! Most are successful as ongoing businesses, but bankrupt if closed down. Exiting from the investment can be very perilous when things do not work out.

A Fair Value for Life Right Occupied Properties

This article suggests that Pienaar has the correct approach to valuing these properties. ⚠️

SLEEP, WEARABLES and the FUTURE OF UNDER- WRITING

Introduction

Insurers worldwide are grappling with the ever-increasing pace and volume of data available in many markets, and how to use these to differentiate their products and practices in increasingly commoditised global environments. Insurance pricing and risk management are examples of such environments. Insurers are quickly appreciating that, in order to achieve greater efficiencies, it is essential to be able to make use of a wider variety of data sources to enhance underwriting and how insurance products are constructed, sold and managed. Automated underwriting and using different (better) rating factors with the potential to accurately track risk and improve mortality and morbidity, if optimised, are at the forefront of many of these emerging changes.

It is estimated that, in the connected world we live in, each of us generates more than half a gigabyte of new data every day across everything from our social media platforms, communication channels, and transactions through our financial institutions, to our healthcare claims, retail purchases, and wearable device activities. The owner of this data (the customer) typically has little sight of this data, has limited ability to collect and store it centrally and cannot make use of it for their own benefit. Financial institutions, and in this case insurers, can facilitate this in order to understand their customers better to move past outdated underwriting and risk management practices and more effectively assess, quantify and monitor insurance risk.

An example of this is the ability to understand an individual's sleep habits. Long has the importance of sleep been known, with researchers highlighting that sleep may not only be one of the three pillars of health but the foundation on which the other two pillars, exercise and healthy eating are built. Ultimately impacting all causes of mortality and have linkages to dread diseases.

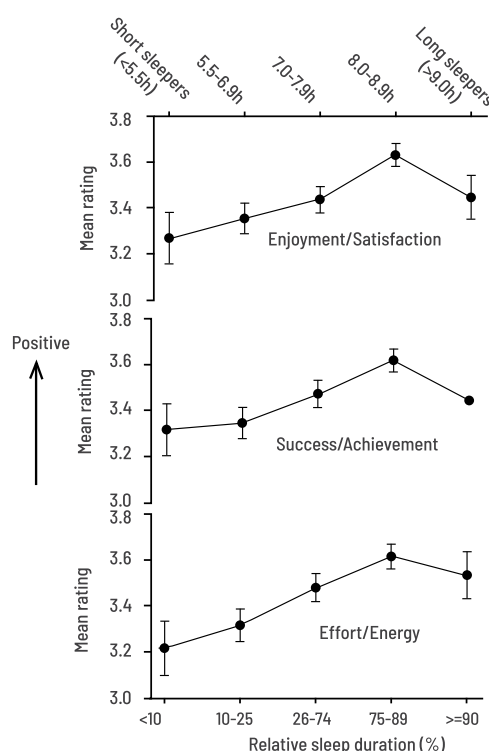
Sleep and biological functions

To understand the extent of this foundational role that sleep plays in one's health, wellness and longevity, a detailed literature review was performed on the impact of sleep on the various body systems. Below is a summary of key findings of this review.

Individuals reporting less than seven hours of sleep a night are almost three times more likely to become infected by a rhinovirus as found by Cohen et al. (2009). Additionally, a sleep shortage can also lead to increases in accidents, more sickness and absences from work (Hafner et al., 2016) as well as an increase in the risk of musculoskeletal injury in athletes sleeping less than 8 hours (Fox et al., 2019).

Further studies completed by Prather et al. (2021), Benedict & Cedernaes (2021) and Czeisler (2015) indicate that sleep plays a role in vaccines and vaccine protocol. Short (too little) sleep lowers vaccine effectiveness regardless of whether the lack of sleep is prior to taking the vaccine, the night after taking it or if the short sleep patterns are observed in the weeks following the administering of the vaccine.

Several nights of just four hours of sleep in otherwise healthy individuals impairs blood sugar regulation to such an extent that they would be classified as pre-diabetic (Czeisler, 2015) and hormonal (endocrine) systems suffer as well. Healthy young males sleeping just four hours a night for four nights will have a level of testosterone equivalent to that of someone 10 years their senior. Women are however also impacted, as studies have shown that women sleeping less than eight hours have a 17% reduction in follicular-stimulating hormone, are 30% more likely to have abnormal menstrual cycles, and may have reduced fertility, relative to those obtaining sufficient sleep (Walker, 2021).



Sleeping patterns outside of what is considered to be healthy ranges also impact mental health and quality of living. The impact of sleep on mental health and quality of life also indicate that it is not only short sleep that may be indicative of underlying conditions but long sleep as well.

A study completed by Groeger et al. (2004) found that quality of life tends to reflect as an upside-down U when considered against increasing sleeping durations. They found that a person's (1) Enjoyment or Satisfaction, (2) Success or Achievements, and (3) Effort and Energy levels all make an upside-down U-shape on a five-point rating scale (with eight hours of sleep a night at the centre) for quality of life.

Today such higher calorie food cravings can lead to an increase in highly processed food intake due to the easy access to takeout or comfort food.



In their 2007 study, Wallander et al. found that different forms of mental illness were much more commonly diagnosed out of cohorts of sleep extremes with clinical depression and suicide being higher with individuals outside of the recommended sleep range. They also suggested that sleeping durations can be an indication of underlying psychological illness and a need for care.

However, it is not always easy to identify where sleep is the underlying cause for a condition or one of the effects from another. The impact of sleeping patterns on weight management can be thought of as a cycle which can help to illustrate this.

Tiredness from short sleep will lead to lower energy levels, less motivation for physical activities and a craving for alternative food energy sources which all contribute to increased obesity risk (Taheri, 2016). Additionally, studies have found that when monitoring the same individuals under normal circumstances and restrictive sleep durations (Broussard et al., 2016) reductions in sleep significantly increase the ghrelin levels in the gut, leading to an increased feeling of hunger and their increase in the consumption of calories.

Al Khatib et al.(2017) concluded that sleep deprivation leads to increased energy intake and will have no effect on energy expenditure – in other words a person will eat more but not use more energy.

Today such higher calorie food cravings can lead to an increase in highly processed food intake due to the easy access to takeout or comfort food. This, combined with no further energy burning, contributes to increases in obesity and struggles with weight maintenance. Increased intake of ultra-processed foods can also lead to lower cognitive performance, learning difficulties and a poorer memory (Noll et al., 2021). There is also a positive dose-response relationship between the consumption of fast food and the risk of depression as well as the ability to deal with stressful situations in a positive manner (Sa'nchez-Villegas et al., 2011).

Highly processed food intake can therefore lead to increased feelings of stress which, in turn, has been highlighted as one of the potential causes of sleep reduction – closing the loop on a potentially negative short sleep cycle.

This highlights the need to be able to assess individuals in a holistic manner which, from an actuarial perspective, can enable life insurers to provide mechanisms to improve their overall quality of sleep, quality of life, and improved health outcomes targeted at the actual cause of the negative spiral. For example,

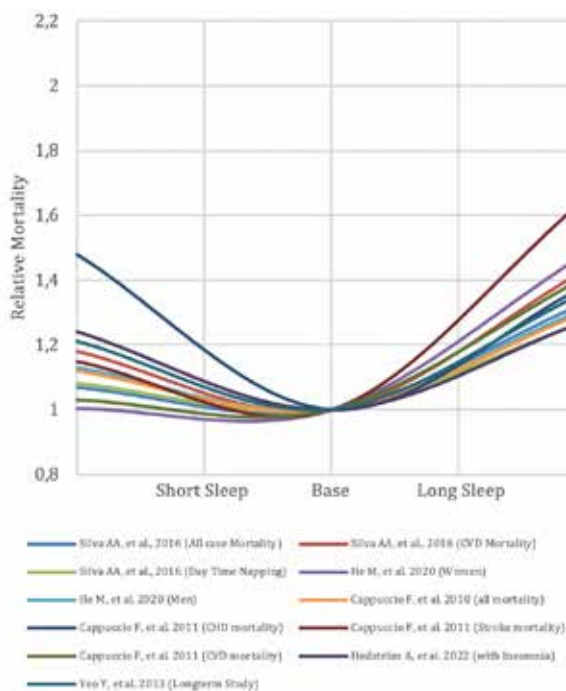
- was the individual originally struggling to deal with high stress levels which led to reductions in sleep and increases in weight; or
- do they not have time to prepare or have access to healthy food choices resulting in the original negative sleep spiral; or
- was poor sleep as a result of poor sleep hygiene the original cause of the poor weight management cycle?

Sleep and mortality

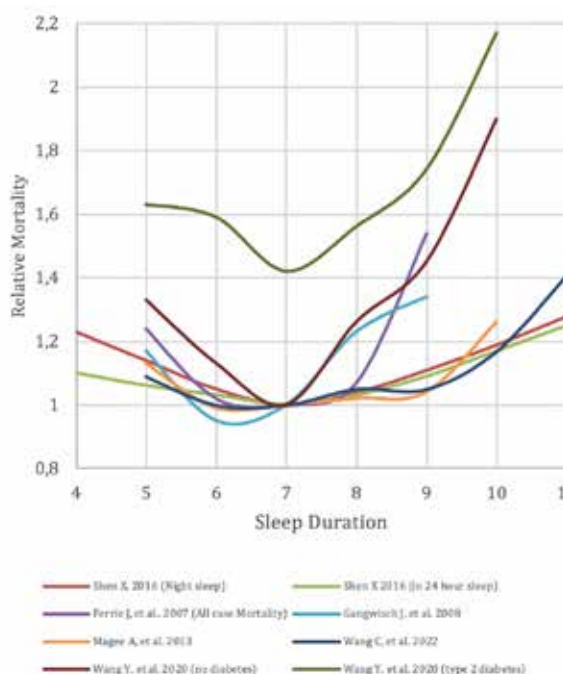
Given the impact of sleep duration on morbidity what is the result on mortality?

Below are the findings from 12 studies on the impact of sleep habits on mortality. The overall impact of sleep on mortality typically presents as a U-shaped or J-shaped curve with seven to eight hours of sleep being the turning point and considered a healthy base. Both sides of this point, whether it be increasing the sleep per day or decreasing it, will increase all-cause mortality and illness.

Mortality's U-Shape to Sleeping Duration (Studies with Grouped Sleep Duration)



Mortality's U-Shape to Sleeping Duration



When considering the impact of sleeping patterns on mortality it is important to appreciate that sleep has a short-term impact as well as longer term consequences. Over short durations the lack of sleep increases the risk of accidents, both vehicular and workplace related. Extended periods of short-sleep negatively impact morbidity resulting in worse health outcomes negatively impacting mortality in the long-run.

Cappuccio (2018) stated that most studies miss the important relationship between ill-health and sleeping durations, namely that short sleep durations can be the cause of ill-health but longer sleeping durations are more likely a consequence of undetected underlying pre-existing ill-health. In the study by Magee et. al.(2013) they attempted to link pre-existing conditions and illnesses before the study commenced. The study concluded that sleep duration does not affect the mortality significantly, but rather identifies poor health at baseline.

Sleep and underwriting

Despite the above-noted importance of sleep as a determinant of morbidity and longevity, accurate data on sleep patterns were historically not available outside of polysomnography (PSG) performed in a clinical setting (Rundo & Downey, 2019). Given the onerousness of undergoing PSG, this meant that there was no widespread commercially viable ability to collect this data. But all this has quickly changed in recent years with sleep data now being readily available and reliable with the improvements to the accuracy and cost-effectiveness of modern wearable wellness tracking devices. This offers insurers access to significant volumes of temporal data of extended periods for individuals which can provide an accurate view on the sleeping patterns of applicants and policyholders over time.

Apart from giving a picture of an individual's current state of wellbeing, sleep is also one of the easier dimensions to improve and could yield significant value in both improvements in absolute longevity and the quality of life through risk management programmes designed to improve sleep quality. This combination of biological importance, general scientific consensus on the impact and importance of sleep, availability and trackability of data as well as the potential benefit to consumers make sleep data analysis one of the most interesting and exciting potential new rating factors and new sources of underwriting information to be considered for use by insurers.

Exploratory Analysis

The findings from the literature review performed illustrate the compelling risk assessment benefits to life insurers of being able to use sleep data in the assessment and management of mortality and morbidity risk. One of the authors, is the Co-founder and CEO of a life company selling fully-underwritten risk cover products. As such, the authors had the access and incentive to undertake the analysis of how sleep data can be used to enhance life insurance underwriting and risk management techniques. This work was first presented at the 2022 All Actuaries Summit in Melbourne.

The research question of focus in the analysis undertaken is set as follows: "Identifying techniques whereby sleep tracker data can be used in life insurance underwriting to generate observable outcomes to improve risk classification/management."

It is important to note that the investigation that the authors chose to perform was an exploratory analysis (Elman et al., 2020). The reason for this is that this type of investigation has not been explored previously in depth and as such there are no existing methodologies or frameworks in place to leverage from. In addition, the research questions to be explored are to be guided by related research as well as being designed to be purposely open-ended and flexible. This allows for the findings of the exploratory analysis to guide further exploration where appropriate (Swedberg, 2020). The goal of such an exploratory analysis is to lay the foundation that will be used to inform the inputs into the models and protocols that will comprise this new way to underwrite and manage mortality and morbidity risk.

The analysis in question is designed to use metrics recorded from wearable devices and trackers to measure policyholders' quality of sleep. As a result, it is necessary to evaluate whether sleep data from trackers can provide an accurate measure of sleep quality. To ascertain this, the authors did further literature reviews on (1) how sleep metrics measured by trackers compare to PSG, (2) the intra-device consistency of trackers, and (3) the inter-device reliability between different trackers (Menghini et al., 2021; Jeon et al., 2015). The outcomes of these literature reviews showed that sleep data from trackers do provide an accurate measure of sleep quality (Kolla et al., 2016; Liang & Chapa Martell, 2018). By using their accelerometer and HR, trackers provide strongly

correlated results to those of PSG for the metrics they measure, despite some overestimation of sleep duration and time spent in sleep phases. The consistency of a number of the same tracking devices equipped to the same subject showed no significant recording differences between the devices when investigated over any extended period (Mouritzen et al., 2020). Different wearable tracking devices were observed to show wide variations compared to one another. However, research confirmed that the common devices that most frequently presented among the most accurate were those developed by Fitbit (Chinoy et al. 2021; Liang & Ploderer, 2020).

Before any analysis on the effect of bad sleep could be considered, the authors needed to define what measurable outcomes to analyse that indicate good and bad sleep. The above literature reviews confirmed the following consensus quantitative measurements of sleep quality, namely: duration of nightly sleep between seven and nine hours, good sleep continuity of no more than one wake up per night, and well-timed sleep (consistent wake up and bedtimes) to achieve the optimal time in each sleep phase, i.e. a good circadian rhythm.

Data collection and methodology

The data used in the analysis came from that which the authors' life company captures as part of its rewards programme. Policyholders can share their wellness data (which includes that from wearables and trackers) through the web application (Portal) that all policyholders get access to, and this is used to provide them with monthly wellness goals. If these goals are achieved the policyholder will get monthly cashbacks based on their premium amounts.

All data collected adheres to South Africa's POPIA legislation. Portal users consent to their data being used for benchmarking purposes. All data was fully anonymised so that policyholders could not be identified in any results of this study. The starting cohort considered for analysis was all underwritten policyholders onboarded during the period of 1 April 2021 to 31 March 2022 and who had connected a Fitbit tracker to their Portal. These requirements made 17.2% of all policyholders underwritten admissible for inclusion in the exploratory analysis.

Continuous wearable data post initial underwriting allows for analysis of the use of sleep data in the identification of new diagnoses and ongoing successful management of existing diseases.

Furthermore, all policyholders were excluded who had not automatically tracked sleep data for a continuous period of 60 days or more, pre or post their underwriting during the study period. This reduced the total number of policyholders that could be included in the analysis to 7.8%.

The sleep data collected from the Fitbit devices was then cleaned, and all policyholders were excluded whose Fitbit tracker data did not record sleep data for the following three metrics: (1) sleep duration, (2) sleep start and end times, and (3) number of wakeups. This ensured that the devices generating this data were sufficiently new and tracked all the quantitative key metrics needed to assess sleep quality. This left a final subset of 6.3% of all policyholder's underwritten during the study period.

It should be noted that Fitbit devices provide six months of historical data upon initial syncing. This allows for the analysis of sleep data to be compared to initial underwriting to assess the accuracy of both identification and severity of any disclosures as well as voluntary or involuntary non-disclosures. Continuous wearable data post initial underwriting allows for analysis of the use of sleep data for the identification of new diagnoses and ongoing successful management of existing diseases.

The remaining data collected on each policyholder included the full upfront underwriting information to determine all the disclosures that had an impact on their premium. This included the application form and all medical tests performed. In addition, all other wellness data that was available for the policyholder shared in their Portal was collected and summarised.

The methodology then undertaken to analyse each policyholder included in the study was to prepare a data profile for each. The first step was to identify the period before and/or after the date of the initial underwriting of each policyholder's policy to be considered in the study. This was based on the period of data available on them, meeting the requirements set out in the data collection stage.

The second step of the methodology was to generate a profile for each policyholder of the key metrics to be considered in the analysis by using their initial underwriting information, demographic information, and available sleep data. The first part of generating this summary was to outline for each policyholder their major health disorders, demographics and the mean and standard deviation of sleep duration, sleep start time, and number of wake ups for their identified time period. This was designed to provide the starting point to observe key sleep data averages to compare them against specific health disclosures and demographic characteristics.

The third step of the methodology was to provide further context of each policyholder's profile by plotting each of the sleep metric's point values for their specific time period before and/or after the date of the initial underwriting of their policy. These trends were again compared against the disclosures from their underwriting assessment (and considering their demographic characteristics) to explore the enhanced picture these trends in their sleep metrics could illustrate about their risk profile.

Finally, the profile on each policyholder was expanded to incorporate any other wellness data synced by the policyholder to their Portal in order to identify potential causes of (and/or the effects of) the risk drivers illustrated by their sleep patterns.

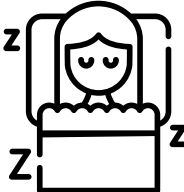
Findings and Discussion

To illustrate the findings of the exploratory analysis, two policyholder profiles prepared using the above methodology were used to illustrate the understanding their sleep habits provide in the initial underwriting stage as well as the ongoing management of their morbidity and mortality risk.

Policyholder #1

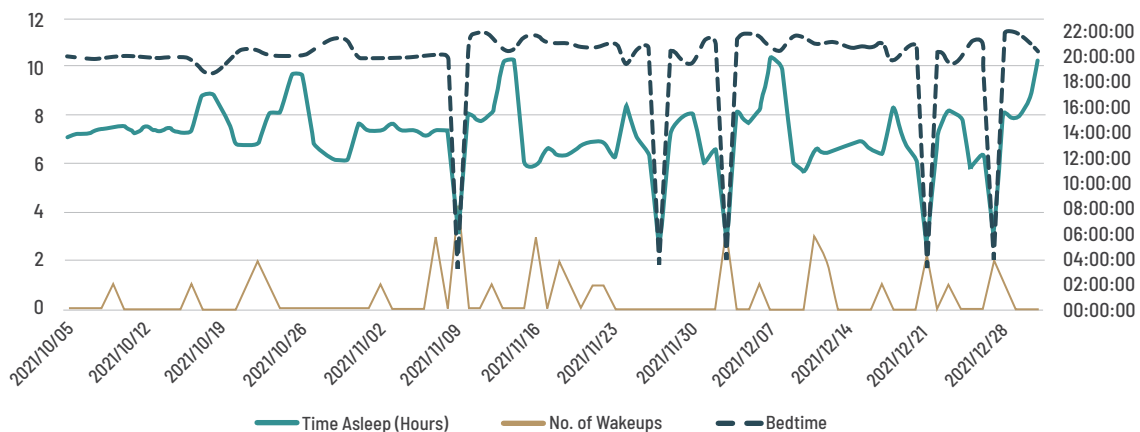
The key metrics of this policyholder are outlined in Figure 1 below. This policyholder's profile shows that she has acute depression and hypothyroidism. While her average sleep duration of 7.15 hours is sufficient, the standard deviation sleep duration of 1.24 hours, which outlines the range in time within which the participant fell asleep, is very large as well as their variation in bedtime and number of wake ups. This immediately points to concerning sleep habits, especially for someone with a mental health disorder.

Figure 1: Summary data profile of Policyholder 1

	7.15 hrs Avg sleep duration	1.24 hrs Std dev sleep duration	
	19.15 Avg sleep start time	3.48 hrs Std sleep start time	
	0.30 Avg wake ups	0.76 Std dev wake ups	
	Sleep study period: 5 October '21 – 31 March '22		
Policyholder_1 @policyholder_1	Acute Depression • Hypothyroidism		
• 43 year old • Female			• Non-smoker • Admin Manager
Underwritten on 4 October 2021			

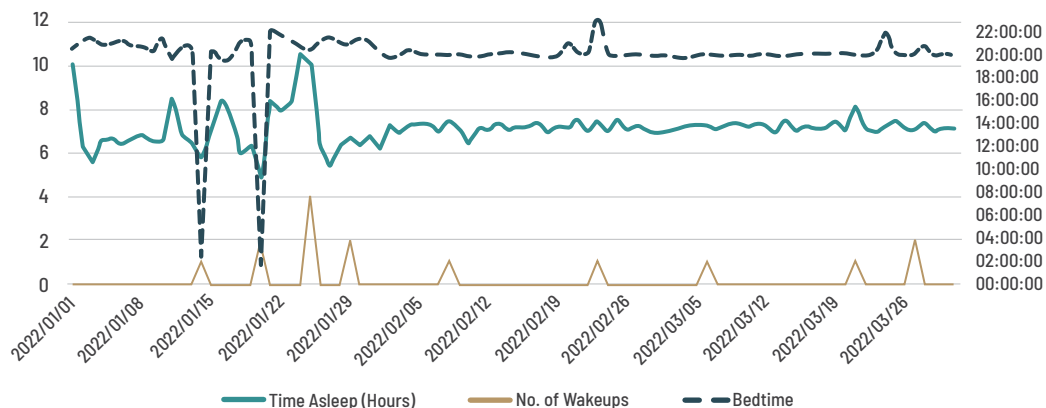
When observing this policyholder's sleep trends for a period of three months immediately following their initial underwriting the above concerns were confirmed by strong evidence of sporadic sleep duration, inconsistency in bedtimes and many nights with more than one wake up during the night as seen in Figure 2.

Figure 2: Sleep duration, bedtimes and number of wake ups for Policyholder 1 between 5 October and 31 December 2021



However, when looking at the three-month period following this from 1 January 2022, there was a marked improvement in this policyholder's sleep patterns. Variation in all sleep measures improved quite suddenly from the end of January 2022 as seen in Figure 3.

Figure 3: Sleep duration, bedtimes and number of wake ups for Policyholder 1 between 1 January and 31 March 2022

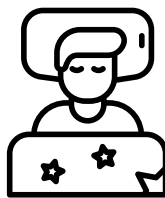


When considering the broader data available on this policyholder shared for these periods through their Portal, it was observed that their medical scheme claims history pointed to sporadic treatment and management of her mental health disorder during the course of 2021. In 2022, her treatment became more regular and consistent. She started to see her physiologist regularly and consistently took medication to treat her disorder. The marked improvement in her sleep being correlated to her improved management of her disorder points to the cause and effect power of considering sleep trends. The poor sleep habits were pointing to an underlying condition that was poorly managed. This is the exact phenomenon as outlined above by Cappuccio (2018). The intervention designed at improving this condition had the effect of improved sleep, showing the effectiveness and success of the intervention to improve her overall wellbeing.

Policyholder #2

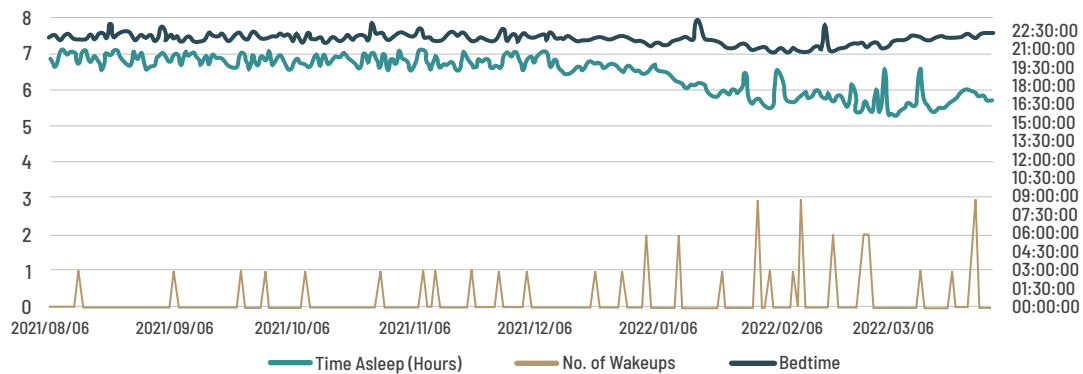
The findings from a second policyholder can be observed in Figure 4 and show that he had back pain but with observed good sleep habits. Sleep duration, consistency and continuity all showed to be at good levels with low volatility for each.

Figure 4: Summary data profile of Policyholder 2

	6.47 hrs Avg sleep duration	31.51 min Std dev sleep duration	
	21.51 Avg sleep start time	21.62 min Std sleep start time	
	0.16 Avg wake ups	0.51 Std dev wake ups	
	Sleep study period: 6 August '21 – 31 March '22		
Policyholder_1 @policyholder_1	Back Pain		
• 31 year old • Male			• Smoker • Actuary
Underwritten on 7 September 2021			

However, over the course of the study period, the quality of sleep was observed to decline for this policyholder. By March 2022, he was sleeping markedly less, more sporadically, and consistently getting to bed later as seen in Figure 5.

Figure 5: Sleep duration, bedtimes and number of wake ups for Policyholder 2 between 6 August 2021 and 31 March 2022



When looking at this policyholder's other data, that formed part of their profile, it was observed that their financial situation significantly worsened during the course of December 2021 and continued through to 2022. This was observed through his credit score dropping considerably during 2022 due to missed payments and multiple requests for more credit from the bank. This policyholder is another example of how looking at an individual from a holistic perspective can provide life insurers the ability to understand more completely policyholder's ongoing level of morbidity and mortality risk.

Conclusion and next steps

The literature reviews and case study performed in this research illustrate the power of using sleep data generated from wearable devices to enhance the risk assessment and management of life insurance policyholders. The steps to be followed by the authors to continue this work include further exploration of sleep data within policyholder profiles, followed by operationalizing these findings by defining the protocols that will be used to assess risk with this new data source and approach. Ongoing monitoring and enhancing the protocols will naturally be essential to ensure refinement and that these techniques can effectively start to replace traditional risk assessment practices.

While sleep data was the focus of this research, the work in this area must be done as part of a broader exercise to more holistically understand policyholders to achieve meaningful improvements in life insurance risk analysis compared to current traditional approaches. The successful move to such a holistic approach will mark a substantial jump forward in actuarial risk management practices and the achievement of improved mortality and morbidity experience in the life insurance industry by making more accurate and less onerous initial underwriting, a better understanding of an insurance book's risk over time as well as the ability to better intervene in risk behaviours to improve policyholder wellbeing. 



Matan Abraham
CEO and Co-founder
of Elevate Life



Nicole Kriek
Consulting Actuary,
Insight: *Life Solutions*

References

- Cohen, S., Doyle, W., Alper, C., Janicki-Deverts, D., & Turner, R. (2009). Sleep Habits and Susceptibility to the Common Cold. *Arch Intern Med.* 2009. 169(1). doi:10.1001/archinternmed.2008.505, 62-67
- Hafner, M., Stepanek, M., Taylor, J., Troxel, W., & van Stolk, C. (2016). Why sleep matters - the economic cost of insufficient sleep. A cross-country comparative analysis. *Rand Europe*
- Fox, J., Scanlan, A., Stanton, R., & Sargent, C. (2019). Insufficient Sleep in Young Athletes? Causes, Consequences, and Potential Treatments. *Sports Medicine*.
- Prather, A., Pressman, S., Miller, G., & Cohen, S. (2021). Temporal Links Between Self-Reported Sleep and Antibody Responses to the Influenza Vaccine. *International Journal of Behavioral Medicine* volume 28, 151–158
- Benedict, C., & Cedernaes, J. (2021). Could a good night's sleep improve COVID-19 vaccine efficacy? *The Lancet Respiratory Medicine*, Volume 9, Issue 5, 447-448
- Czeisler, C. (2015). Duration, timing and quality of sleep are each vital for health, performance and safety. *Sleep Health.* 2015,1, 5-8
- Czeisler, C. (2015). Duration, timing and quality of sleep are each vital for health, performance and safety. *Sleep Health.* 2015,1, 5-8
- Walker, M. P. (2021). Sleep essentialism. *Brain, a Journal of Neurology* 2021: 144, 697-699
- Groeger, J., Zijlstra, F., & Dijk, D. (2004). Sleep quantity, sleep difficulties and their perceived consequences in a representative sample of some 2000 British adults. *J. Sleep Res.* (2004) 13, 359-371
- Wallander, M., Johansson, S., Ruigomez, A., Rodriguez, L., & Jones, R. (2007). Morbidity Associated With Sleep Disorders in Primary Care. *Prime Care Companion J Clin Psychiatry* 2007;9(5), 338-345
- Taheri, S. (2006). The link between short sleep duration and obesity: we should recommend more sleep to prevent obesity. *Arch Dis Child*; 91. doi: 10.1136/adc.2005.093013, 881-884
- Broussard, J., Kilkus, J., Delebecque, F., Abraham, V., Day, A., Whitmore, H., & Tasali, E. (2016). Elevated ghrelin predicts food intake during experimental sleep. *Obesity (Silver Spring)* 24(1), 132-138
- Schmid, S., Hallschmid, M., Jauch-Chara, K., Born, J., & Schultes, B. (2008). A single night of sleep deprivation increases ghrelin levels and feelings of hunger in normal-weight healthy men. *J. Sleep Res.* (2008) 17,, 331-334
- Al Khatib, H., Harding, S., Darzi, J., & Pot, G. (2017). The effects of partial sleep deprivation on energy balance: a systematic review and meta-analysis. *European Journal of Clinical Nutrition* 71, 614-624
- Noll, M., Noll, P., Mendonça, C., Rodrigues, A., & Silveira, E. (2021). Effects of ultra-processed food on cognition and learning of adolescents: a rapid systematic review. *F1000Research*, 1-8
- Sánchez-Villegas, A., Toledo, E., de Irala, J., Ruiz-Canela, M., Pla-Vidal, J., & Martínez-González, M. (2011). Fast-food and commercial baked goods consumption and the risk of depression. *Public Health Nutrition*: 15(3), 424-432
- Silva AA, Mello RB, Schaan CW, Fuchs FD, Redline S, & SC., F. (2016). Sleep duration and mortality in the elderly: a systematic review with meta-analysis. *BMJ Open*;6:e008119. doi:10.1136/bmjopen-2015-008119
- He, M., Deng, X., Zhu, Y., Huan, L., & Niu, W. (2020). The relationship between sleep duration and all-cause mortality in the older people: an updated and dose-response meta-analysis. *BMC Public Health*
- Cappuccio, F., D'Elia, L., Strazzullo, P., & Miller, M. (2010). Sleep duration and all-cause mortality: a systematic review and meta-analysis of prospective studies. *SLEEP* 2010;33(5), 585-592
- Cappuccio, F., Cooper, D., D'Elia, L., Strazzullo, P., & Miller, M. (2011). Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies. *European Heart Journal* (2011) 32, doi:10.1093/eurheartj/ehr007, 1484-1492
- Hedström, A., Bellocco, R., Ye, W., Lagerros, Y., & Åkerstedt, T. (2022). Association Between Insomnia And Mortality Is Only Evident Among Long Sleepers. *Nature and Science of Sleep*, 333-341

- Yeo, Y., Ma, S., Park, S., Chang, S., Shin, H., Kang, D., & Yoo, K. (2013, Sep 30). A Prospective Cohort Study on the Relationship of Sleep Duration With All-cause and Disease-specific Mortality in the Korean Multi-center Cancer Cohort Study. Retrieved from PMC US National Library of Medicine National Institutes of Health: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3796652/>
- Shen X, W. Y. (2016). Nighttime sleep duration, 24-hour sleep duration and risk of all-cause mortality among adults: a meta-analysis of prospective cohort studies. *Sci. Rep.* 6, 21480 doi: 10.1038/srep21480
- Ferrie, J., Shipley, M., Cappuccio, F., E, B., Miller, M., Kumari, M., & Marmot, M. (2007). A prospective study of change in sleep duration; associations with mortality in the whitehall II cohort. *SLEEP* Volume 30(12), pp. 1659-1666
- Gangwisch, J., Heymsfield, S., Boden-Albala, B., Buijs, R., Kreier, F., Opler, M., . . . Malaspina, D. (2008). Sleep 2008;31(8), 1087-1096
- Magee, C. A., Holliday, E. G., Attia, J., Kritharides, L., & Banks, E. (2013). Investigation of the relationship between sleep duration, all-cause mortality, and preexisting disease. *Sleep Medicine*, 14 (7), 591-596
- Wang, C., Bangdiwala, S., Rangarajan, S., Lear, A., AlHabib, K., Mohan, V., . . . Yusuf, S. (2022). Association of estimated sleep duration and naps with mortality and cardiovascular events: a study of 116 632 people from 21 countries. *European Heart Journal* (2019)40, , 1620–1629
- Wang, Y., Huang, W., O'Neil, A., Lan, Y., Aune, D., Wang, W., . . . Chen, X. (2020). Association between sleep duration and mortality risk among adults with type 2 diabetes: a prospective cohort study. Retrieved from *Diabetologia* (2020) 63:2292–2304: <https://doi.org/10.1007/s00125-020-05214-4>
- Cappuccio, F. (2018, December 5). Professor, Chair of Cardiovascular Medicine & Epidemiology, University of Warwick. (S. M. Centre, Interviewer)
- Magee, C. A., Holliday, E. G., Attia, J., Kritharides, L., & Banks, E. (2013). Investigation of the relationship between sleep duration, all-cause mortality, and preexisting disease. *Sleep Medicine*, 14 (7), 591-596
- Rundo, J. V., & Downey III, R. (2019). Polysomnography. *Handbook of clinical neurology*, 160, 381-392.
- Elman, C., Gerring, J., & Mahoney, J. (Eds.). (2020). *The Production of Knowledge: Enhancing Progress in Social Science (Strategies for Social Inquiry)*. Cambridge: Cambridge University Press. doi:10.1017/9781108762519
- Swedberg, R. (2020). Exploratory Research. In C. Elman, J. Gerring, & J. Mahoney (Eds.), *The Production of Knowledge: Enhancing Progress in Social Science (Strategies for Social Inquiry)*, pp. 17-41). Cambridge: Cambridge University Press. doi:10.1017/9781108762519.002
- Mouritzen NJ, Larsen LH, Lauritzen MH, Kjær TW (2020) Assessing the performance of a commercial multisensory sleep tracker. *PLoS ONE* 15(12): e0243214. <https://doi.org/10.1371/journal.pone.0243214>
- Jeon, L., & Finkelstein, J. (2015). Consumer sleep tracking devices: a critical review. *Digital Healthcare Empowering Europeans: Proceedings of MIE2015*, 210, 458.
- Kolla, B. P., Mansukhani, S., & Mansukhani, M. P. (2016). Consumer sleep tracking devices: a review of mechanisms, validity and utility. *Expert review of medical devices*, 13(5), 497-506.
- Chinoy, E. D., Cuellar, J. A., Huwa, K. E., Jameson, J. T., Watson, C. H., Bessman, S. C., ... & Markwald, R. R. (2021). Performance of seven consumer sleep-tracking devices compared with polysomnography. *Sleep*, 44(5), zsaa291.
- Liang, Z., & Chapa Martell, M. A. (2018). Validity of consumer activity wristbands and wearable EEG for measuring overall sleep parameters and sleep structure in free-living conditions. *Journal of Healthcare Informatics Research*, 2(1), 152-178.
- Menghini, L., Cellini, N., Goldstone, A., Baker, F. C., & de Zambotti, M. (2021). A standardized framework for testing the performance of sleep-tracking technology: step-by-step guidelines and open-source code. *Sleep*, 44(2), zsaa170.
- Liang, Z., & Ploderer, B. (2020). How does Fitbit measure brainwaves: a qualitative study into the credibility of sleep-tracking technologies. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 4(1), 1-29.

STUDENT SUB COMMITTEE PROFILES

The Member Engagement Board is responsible for engagement with all members of the Society. One of the key mandates for the Member Engagement Board is to ensure that the gap between the Society and its biggest member population (Student / Technical and newly qualified Associate and Fellow members) is closed and to enhance the value provided to, and highlight the important role of the “young members” of ASSA. This responsibility is given to the Student Sub-Committee (SSC).



MUTETO MUTETO

Muteto is currently a member of the Member Engagement Board (MEB) and the Chairman of the Student-subcommittee of the MEB which puts him in a unique position to understand the issues that student members are currently facing as well as the gaps that the Actuarial Society needs to fill to address them. He is passionate about enabling the young members of ASSA to realise their potential, who in the long term will use their knowledge to impact the society. Being a Zambian national working in South Africa, he also serves as a voice for ASSA Actuarial students who are not of South African origin. He is currently working in the Group Capital Management team at Liberty. Outside of work and Actuarial related issues, he is an avid sports lover, enjoys music, and plays the acoustic guitar.



DAVID NG

I am a member of the Actuarial Society of South Africa with 5 years of experience specialising in short-term insurance commercial pricing and portfolio management at Hollard. Before the student sub-committee, I was Hollard's student representative, where I was able to develop my understanding of actuarial student's experiences and struggles from various backgrounds and circumstances. I have a passion for enabling others to drive positive, sustainable change and reach their potential, which has motivated me to take on the role of Deputy Chairman of the Student sub-committee. In my spare time, I enjoy playing the piano, playing golf, and jogging to keep fit.



NATHAN CHISULO

I currently work in the Risk Projects Actuarial team within Liberty with a focus of assisting Liberty with its IFRS17 solution. My Actuarial Journey is one that has been scary but exciting, challenging but fulfilling, exhausting but inspiring. It has allowed me to learn things about myself, change things about myself, share war stories with others as well as be inspired by the extra-ordinary individuals I have met in the profession. As a member of the SSC, I hope to serve in the best way I possibly can. I hope to play my part in ensuring that the journey to qualifying is worth it. I am a DJ in training who currently can't match a beat but I am getting there.



KWANDA NGWENDUNA

Kwanda's interests span statistics and machine learning which has enabled him to pursue double honours in actuarial science and mathematical statistics as well as an MSc in Data Science. Kwanda is currently enrolled for a PhD in Actuarial Science with UCT. He has over 10 years experience, mostly in reinsurance and predictive analytics, having worked for Munich Re of Africa, Vodacom, ABSA Life and currently at Land Bank Insurance SOC Ltd managing the actuarial function for both the short-term and long-term insurance entities. He is a past Treasurer for ASABA and immediate past Student Representative in the ASSA Council, advocating for the voice of students and transformation in the profession. He is an avid football fanatic with a passionate support for Bafana BaStyle. He is passionate about research and development and is a published researcher. In his spare time, he provides tutorship to postgraduate students on statistics and machine learning. He is also passionate about giving to others and seeing the actuarial profession transforming, especially on adequate representation and contribution of women, black Africans and the younger population. Kwanda advocates for the voice of students to be heard and represented in the actuarial profession and hopes to see the interests of students being at the forefront of the Society's initiatives.



NIDA IBRAHIM

Nida is a qualified actuary currently working in the Short-term Insurance practice of Deloitte Actuarial and Insurance Solutions. Through her previous roles, she has gained extensive experience in the insurance and finance industry. Nida is passionate about mentorship and progression in the Actuarial community. She is part of the Future Fellows support group and Leadership Development Program, both of which are Actuarial Women's Committee Initiatives. She is also a Lecturer for the F103 ASSA course and a marker for the F203 ASSA course. Nida has been appointed as the SSC Student representative at the Education board. With this appointment, she aims to support the transformation goals of the SSC. When Nida is not working or volunteering, she is travelling and spending time with her family.



PABALLO MAKUPU

Paballo Makupu is an experienced manager within the Non-Life Actuarial team at Munich Re with more than 6 years' experience in the short-term and life insurance industry. She holds a Hons B. Sc focused in Actuarial Science from the University of the Free State. She currently manages the financial solutions and innovation team at the biggest reinsurer globally, Munich Re. She and her team explore, drive and pro-actively generate new business opportunities beyond traditional reinsurance with a strong focus on structured reinsurance and corporate finance (e.g capital management, valuation, M&A). In addition, she is an award-winning philanthropist; Ted speaker; published author; Wits Business School Woman in Leadership delegate and was named M&G Top 200 Young South African. She is an IIG Roots & Wings Mentor, Head of Communications for the Short-Term Insurance Committee, Head of Outreach for the Actuarial Women's Committee and published author. As a member of the Student subcommittee my objective is to help create a community for students within the profession where we are able to support one another on our journey to qualification but also build a network where we can share insights and critically debate industry topics. 

Mere conduits of data will not do

By Gregory Whittaker



It follows that South African actuaries providing services in **RAF matters must be familiar with developments in the common law**

The professional promise

The Actuarial Society of South Africa's Code of Conduct requires members to render quality services to their clients through, inter alia, the application of up-to-date actuarial knowledge and expertise. Members are encouraged to consider the public interest when rendering actuarial services but, provided that members meet the requirements of inter alia the applicable Law, they will be deemed by the Actuarial Society to have met the expectations of the profession with respect to the public interest. The vast majority of matters coming before South African courts involve Road Accident Fund (RAF) matters, that are governed by the Road Accident Fund Act. The calculation methodology employed in such matters is derived from the common law. It follows that South African actuaries providing services in RAF matters must be familiar with developments in the common law and study applicable judgments if they are to act in the public interest.

Professional vigilance

Aside from RAF claims handlers and senior litigation managers, if actuaries are to be seen as acting with professionalism, it is important that they study three recent judgments concerning Road Accident Fund claims. Whilst the judiciary has been vigilant in their approach to RAF claims due to the vast amounts of public money at stake, the courts noted the following in *M T v Road Accident Fund* and *H M v Road Accident Fund*:

The courts have, for years, worked tirelessly in their attempts to stem the tide of fraud in the RAF arena. However, the task has always been, and continues to be, an intractable one. The

approach of attorneys and the RAF seeking to avoid the court's jurisdiction by forgoing orders of court in settled matters is just the latest gambit. It comes as part of backlash to concerted attempts by the judiciary to enhance its oversight role where public funds are at stake in personal injury claims. This area is clearly vulnerable to corruption in that people are not litigating with their own money but with a seemingly endless supply of State funds. This can tend to make them less vigilant and more careless, and there is broadened scope for malfeasance.

Actuaries are normally the last expert to be briefed at the end of what can sometimes be an inadequately prepared case in that no objective proof of earnings evidence has been sourced from the claimant. What should our approach be in these circumstances? The following three cases are instructive:

Moshidi v Road Accident Fund

Mr Moshidi was 43 years old when he was involved in a motor vehicle accident. The Fund did not provide a version from the insured driver, so his claim on the merits was accepted. He suffered no fractures, but soft tissue injuries to his right hip, right knee, and right shoulder, and symptoms of post-traumatic stress disorder.

The experts were an orthopaedic surgeon, a psychologist, an occupational therapist and an industrial psychologist. Their findings were that he experienced pain in his leg but that he would be able to continue his work tasks with a good prognosis for his orthopaedic injuries. Though there was mention of post-traumatic stress disorder, it appeared that his cognitive abilities were intact, and the effects should not influence his work ability.

Acting Judge Phahlamohlaka emphasised that for the plaintiff to succeed in a claim for loss of earnings and loss of earning capacity, he must prove that the accident in question resulted in the diminution of his estate. The mere fact that the plaintiff sustained injuries in an accident did not automatically qualify him for an award for damages. Three years after the accident, he was employed as a rubber liner and was more recently employed as a belt splice assistant. The industrial psychologist believed that Mr Moshidi's career path in an uninjured state would most probably have been similar to his post-accident career path to date.

The court found that the accident did not result in the diminution of the plaintiff's patrimony and, therefore, the plaintiff had not sustained a loss of earning capacity. His earnings had increased over the years, and he can find employment at various companies. The court was not satisfied that the plaintiff had proved that he suffered a

past loss of earnings either. The plaintiff's claim for loss of earnings and earning capacity was dismissed.

Many loss of income claims come before the court as so-called capacity loss claims. One common feature of such claims is that no loss of income has occurred from the date of the accident until the date of hearing which, in some instances, can be over five years. On occasion, claimants have received regular increases or promotions from the date of the accident until the date of hearing. Despite this, a claim for future loss of income is still pursued on the basis of factually indeterminable possibilities where it is alleged that the injuries sustained in the accident cause greater vulnerabilities of either demotion or job loss in the future. The evidence presented to the court to establish these claims is that of an expert report procured from an industrial psychologist. A trend is developing where industrial psychologists are used as a tool to argue for a higher post-accident contingency deduction in future, despite the fact that no provable loss has been incurred to date.

Acting Judge Phahlamohlaka is to be applauded for taking a considered and realistic approach to the opinion of the industrial psychologist. At the end of the day, it is the role of the presiding officer to decide whether or not a higher post-accident contingency deduction is warranted. They may only do so based on the evidence that has been put to the court and it is our view that incomplete expert reports, lacking in comprehensive interrogation of the actual work history and probable future of the claimant are just not good enough to justify higher contingency deductions. The only role player positioned to question the conclusions reached by industrial psychologists (largely based on hearsay evidence and anecdotes from the plaintiff rather than actual pay-slips and work site visits) is the Judge because the RAF is not opposing these fantastical views.

A further opportunity for the bleeding of public funds in these unopposed RAF matters is cost orders. In the afore-mentioned case, the plaintiff failed to prove past loss of income and future loss of income. The court, nevertheless, awarded costs against the RAF. It is concerning whether or not the plaintiff will still claim all the expert fees incurred in their failed investigations into proof of loss of income.

The conduct in this matter is akin to the approach documented in Bvuma v Road Accident Fund:

This judgment is yet another example of the 'sausage machine outsourcing' approach to Road Accident Fund litigation. Where there was a claim for 'loss of earnings/loss of earning capacity', there was no attempt by any legal representatives to conduct any enquiry into, or

obtain any information about, the plaintiff's factual situation of employment. Instead, the attorneys for both parties simply referred the plaintiff to a multitude of medical 'experts' resulting in an absence of factual information relevant to the claim for loss of earnings.

To fulfil the expectation of the professional actuary to act in the public interest, the criticisms in the aforementioned judgments must act as a guide to actuaries in setting the precarious boundary between the need to serve their clients and the need to maintain professional standards, in particular, in the current climate of undefended RAF claims and the source of the awards being contentious fuel levies.

Els v Road Accident Fund

Ms Els was aged 30 when she was injured in a motor vehicle accident, where she suffered a moderate brain injury and other injuries. Previously, she was a hairdresser and was then employed as a management safety officer at a mining plant. Although her physical and cognitive abilities were affected, her employer retained her in the same position and assigned her an assistant runner. She could thus meet the current job demands of this sedentary work. The evidence was that physical disabilities and tolerance for pain posed risks to sustained employment and her prospects of promotion in the workplace. She would be disadvantaged in the open labour market.

Acting Judge Hassim noted that there was no appearance for the RAF at the hearing, despite the draft order being over R6 million, and no oral evidence was led at the trial. The plaintiff's evidence was sparse. For loss of earnings, the industrial psychologists recorded that they deferred to the factual information in the joint minutes. Nevertheless, there was no reference to the factual information in either the written or oral submissions, and the court could not find certain supporting documents such as pay-slips on the records before the court.

The actuary, in his revised actuarial report, stated that he had not been provided with the 2019-2020 salary advices when he prepared his earlier reports.. The Judge pointed out that:

It is unsatisfactory that experts are not provided with accurate information from which to draw their conclusions and it is equally unsatisfactory for experts to express opinions without having the correct facts at their disposal.

The courts have been more vocal in their criticism of industrial psychologists' misconduct such as in *Ntombela v Road Accident Fund*:

The industrial psychologists' performance warrant special mention. Their inadequate and superficial conduct has already been alluded to. It appears that persons practising in this field regard themselves as mere conduits of data that they wrap up in jargonised waffle. It is hard to seek out of these reports the aspects in which the expertise they profess is evident. The entire edifice of these reports was built on the say-so of a person who any professional ought to have appreciated was not in a position to express the views that he did, still less that they slavishly and uncritically relied upon such views. They have short-changed their clients. I shall disallow their costs in whole.

Completing reports without all the necessary information is an endemic practice among experts such as industrial psychologists. Instructing attorneys often expect expert actuaries to merely compute whatever is supposedly documented in these incomplete reports. It is incumbent upon actuaries maintaining professional standards to insist on objective evidence of income. This falls within the rights of an actuary preparing calculations that will ultimately be provided on oath and whose reputation falls under the scrutiny of the court.

Gwentshu v Road Accident Fund

The plaintiff, Mr Sibusiso Gwentshu, sued the defendant in his personal capacity for damages allegedly sustained by him due to a motor vehicle collision that occurred on 22 February 2014 in Durban.

A few days before the hearing of the matter, on 26 May 2021, the plaintiff filed an amendment to the pleadings. The amendment effectively inflated the quantum from R 1,000,000 to R 3,176,114.58. The bulk of the claim was for future loss of earnings.

No fewer than 8 experts were briefed by the plaintiff including a clinical psychologist, neurologist, plastic and reconstructive surgeon, occupational therapist, orthopaedic surgeon, pulmonologist, industrial psychologist and actuary.



As noted by the court:

In quantifying such a claim, an actuary is often used to make actuarial calculations based on proven facts and realistic assumptions regarding the future. The role of the actuary is to guide the court in the calculations to be made. Relying on its wide judicial discretion, the court will have the final say regarding the correctness of the assumptions on which these calculations are based. The court should give detailed reasons if any assumptions or parts of the calculations made by the actuary are rejected. It must be borne in mind that the actuary depends on the report of the industrial psychologists, who in turn are dependent on the information provided by the claimant.

The court concluded that:

From the evidence that is placed before me, the injuries sustained from the motor collision did not cause any loss to the plaintiff. The evidence before me, and the fact that there is no deduction for disabilities from which the plaintiff suffers or will suffer in the future in the Actuary report, will not, in my view, impair the plaintiff's capacity to do his work as he did prior to the accident. The Actuary's report on calculation for loss of support was based on a stale report by the Industrial Psychologist, and no explanation is provided as to why this was the position. The Actuary, in his report, indicated that he performed calculations on the reported income but defer to factual comprehensive factual information. This was simply ignored.

This is another example of a matter where incomplete evidence is placed before the court in the hope of finding a sympathetic and substantial judgment for loss of income. This particular attempt was met by an astute and discerning Judge. The claim for loss of income failed. Interestingly, costs were still awarded against the RAF. It is suggested that the courts could consider using creative cost remedies to penalize ill-prepared legal representatives, rather than penalizing the RAF and consequently taxpayers.

Conclusion

In an unprecedented arena of litigation that is rampant with a flagrant disregard for court rules and evidence rules, coupled with limited interrogation of the plaintiff's version by an absent RAF defence, there is a heightened duty on actuaries to protect not only their integrity but the professionalism of expert actuaries as a whole. These recent judgments reflect that the Judiciary is taking a rigorously active role in plugging the holes in the fraudulent and procedural draining of RAF funds. Actuaries need to be aware of both the protection afforded to them and the standards expected of them by the ASSA Code of Conduct to qualify reports where they have any discomfort with regard to evidence on which they are basing their calculations. Failing to do so could incur severe criticism from an already fuelled Judiciary. ⚠️

THE SOUTH AFRICAN LAW REFORM COMMISSION **AND** **MEDICO-LEGAL CLAIMS** **IN HEALTHCARE**

- Gregory Whittaker



INTRODUCTION

The Healthcare Committee hosted their annual sessional on 4 May 2022. The wide-ranging agenda included the work of the South African Law Reform Commission (SALRC) and medico-legal claims in healthcare. It is the purpose of this article to summarize the main aspects of that presentation.

COMMON LAW

The earliest account of a medical malpractice claim in South African courts was the matter of *Lee v Schönberg*. In that matter, the plaintiff alleged that the defendant discharged his professional duties in a careless and negligent manner, resulting in loss of income and additional medical expenditure in order to get cured. The court found that the medical practitioner in this instance brought to bear a reasonable amount of skill and care, with the result that the plaintiff's claim was dismissed with costs.

Almost 145 years later, courts are still grappling with the five elements that must be proven in order for a claim in delict to succeed. These are (1) the existence of a duty of care; (2) breach of that duty; (3) which causes (4) reasonably foreseeable; (5) harm. Importantly in the matter of *MM obo GM v MEC for Health NW Province*, the court made it clear that proof of a breach of duty of care does not axiomatically lead to prove causation of damages. There may well be cases where negligence is established, but that does not lead to liability.

There is no specific medical malpractice legislation in effect in South Africa at present. The claims are governed by the common law and previously decided cases. The law practiced in South Africa that is not written down in legislation, or the common law, is a hybrid legal system. It is based on Roman-Dutch law, but also includes rules and principles from the English law. This is recognized alongside the customary law of South Africa.

The state of medical malpractice against the nine provincial health departments is such that the contingent liability for such claims has increased from R 28.6 billion for the financial year ending 31 March 2015 to R 120.3 billion for the financial year ending 31 March 2021. The government has paid R 10.5 billion in claims from April 2012 to March 2021 – money that is essentially earmarked for public healthcare.

WORK OF THE SALRC

The SALRC is a statutory body established by section 2 of the South African Law Reform Commission Act. The objective of the SALRC is to perform research with reference to all branches of the law of South Africa and to study and to investigate all such branches of the law in order to make recommendations for the development, improvement, modernization or reform of the law.

Following a request by the National Department of Health and Minister of Justice and Correctional Services to investigate medico-legal claims, the SALRC released an issue paper on 17 July 2017 and a discussion paper on 11 November 2021.

The solutions proposed in the SALRC paper were discussed in the South African Actuary in March 2022.

COMMENTARY ON THE SALRC DISCUSSION PAPER

Some of the main features of ASSA's comments on the SALRC discussion paper that were submitted are discussed below:

Lack of representation from the disability sector

ASSA supports the principle of self-representation, being the practice of people being able to articulate their own issues by themselves and for themselves. It refers to people being enabled and allowed to have their own voice in issues that relate to their specific needs and circumstances.

The extent of medical negligence litigation against the state has reached a level where it is adversely and prejudicially impacting in a serious manner on service delivery in the public health sector and endangering the constitutional right to have access to health care services. It is important to bring to the attention of law reform leaders the viewpoints from the disability sector as vulnerable end users of public health care services.

THERE IS NO SPECIFIC MEDICAL MALPRACTICE LEGISLATION IN EFFECT IN SOUTH AFRICA AT PRESENT.

Competing rights

There is a face-off between the right of the individual's common law claim for damages pursuant to harm caused by the negligence of the State against the constitutional rights to health care services of the greater community. There also exists a differentiation between birth-injured children who have had access to legal representation to assumedly prove negligence on the part of their birthers, and those who are living with birth disorders due to genetics or chance, by no fault of man. On the one hand, we have awards being made for over R20 million in respect of one individual. On the other, we have parents of children living with mobility disabilities resorting to using wheelbarrows as wheelchairs are scarce.

If South Africa is to reach anything close to universal health coverage in terms of sustainable development goals, there cannot be a distinction between people living with cerebral palsy who can access healthcare services by way of a medico-legal claim award and people living with cerebral palsy who cannot access healthcare services because they face numerous barriers plus the additional barrier of not having had access to litigious resources.

It is necessary to test the constitutional question of whether or not the common law remedy of the individual may be legitimately limited in terms of the limitations clause in the Bill of Rights when considering the intricate connection and run-on effect of these enormous lump sum payments to individuals and the depletion of public health care budgets for the collective. This is no easy exercise but that does not mean that we should be trying to tweak a system that already exists but doesn't support the principles of fairness.

Feedback loops

A key component missing from the SALRC discussion paper and our general understanding of the medical negligence claim process for birth injury claims is what happens after the award has been made. There is a need to analyse the factual expenditure incurred by the guardians of the child and the actual therapies received by the beneficiaries. Questions to which we have little data include:

- (a) Where are child beneficiaries accessing medical care services in the rural areas?
- (b) Are qualified care-givers being employed?
- (c) Which assistive devices are actually being purchased?
- (d) How long after the award was made did the child begin attending therapies and treatments?
- (e) Are children living with cerebral palsy (in particular

wheelchair users) being accepted on public transport to access their therapies in rural and urban areas?

- (f) How much of the total award is invested in the trust that is supposed to be set up for claimants?

Get the science right

As noted in the discussion paper:

Given the high prevalence of CPLitigation, the detrimental impact of the enormous pay-outs on the fiscus and the knock-on effect on the delivery of health care services, the state will be well-served by getting the science right when defending a matter of this nature.

Causation is not being paid the attention it deserves in the litigation strategy of some defendants. Causation should present a lofty hurdle for litigants to overcome to find success with the merits of a birth defect matter. Preparation and presentation of a defence of causation is as important as the defence of the breach of duty of care in medical malpractice claims. It is important that experts are engaged to discuss issues around causation in birth injury claims and build on the judgment in *MM obo GM v MEC for Health NW Province*.

Get the basics right

Lack of record keeping is a commonly cited failing in written judgments against the various health departments. Manual record keeping systems are open to corruption and manipulation.

The proposal made by the Eastern Cape Department of Health to make use of a "scribbler" to accompany medical teams while doing rounds to take notes as an interim measure to improve medical records is supported. In addition, a process of electronic capturing and uploading of records must be implemented to ensure that records are stored properly and do not go missing.

CONCLUSION

Whether or not our compensation system uses structured settlements or lump sum payments, the compensation envisaged is targeted only at the individual. Until it can be proven that guardians utilize awarded funds and/or payments in kind to actually benefit the birth-injured child, medico-legal litigation remains an exercise in procedure and profits.

It is time to weigh up competing rights. The solution set should also be guided by the availability of non-governmental organizations to be a part of service provision and the establishment of specialist rehabilitation clinics using the funds traditionally earmarked for individual claimants only. 

ENTER THE CORONIALS

When we die, our bodies become the grass, and the antelope eat the grass. And so we are all connected in the great Circle of Life.” – **Mufasa**

In the time since the pandemic started, while most of us were distracted by the end stages of the great Circle of Life – mortality, morbidity, hospitalisation, fatality rates, excess deaths, etc., etc., ad infinitum – a whole new generation sprung to life.

“Coronials” has become a popular label for the babies conceived or born during the COVID-19 pandemic. A generation whose fathers weren’t allowed in the delivery room, who are growing up believing that masks are items of clothing as essential as underwear, and who will regard *The Lion King* (released almost 30 years ago!) as a relic from the olden days.

There is an element of intrigue around these children. At a philosophical level, who are the babies born during these (forgive the cliché) unprecedented times and who are their intrepid parents? At a statistical level, are they part of a boom (perhaps between loadshedding and lockdowns there wasn’t much else to do at home)? Or was there a bust (did sky-high levels of anxiety and uncertainty, as well as the extra time spent at home with existing children wither the urge to procreate)?

There is surprisingly little published research on the impact of COVID-19 on fertility, and what does exist is not relevant to South Africa and/or is out of date. We therefore decided, after looking at studies done elsewhere, to analyse medical scheme data on South African births to uncover whether there was any detectable baby boom or bust and what that might mean for the coronials.



This hypothesis is supported by the fact that birth rates bounced back most strongly for women in their 30s, who might have been reluctant to postpone conception much longer than necessary.

INTERNATIONAL RESEARCH TO DATE

HIGH-INCOME COUNTRIES

Aassve, Cavalli et al. (2021)¹ conducted a study of live birth rate data of 22 high-income countries for the period January 2016 to March 2021. They found a decrease in monthly crude birth rates (CBRs) in all countries except for Denmark, Finland, Germany, and The Netherlands. Statistically significant decreases ranged from 5.2% in Austria to 11.2% in Portugal and Spain.

United States

A separate study on birth rates in the United States by Kearney and Levine (2021)² estimated approximately 60 000 “missing births” between October 2020 and February 2021 attributable to the COVID-19 pandemic. Missing births were calculated as the shortfall between actual births and the number of births predicted based on pre-pandemic trends. Births returned to pre-pandemic trend levels in March 2021, corresponding to June 2020 conceptions.

Their main observations about the nature of the birth rate reduction of the early months of the pandemic were:

1. *States with larger spikes in unemployment rates and higher numbers of COVID-19 cases tended to have larger reductions in birth rates nine months later; and*
2. *Birth rate reductions were largest among highly educated women, women in their late 30s and early 40s, and those who already had at least one child. The authors noted that these were not the groups most affected by job or income losses, suggesting that pandemic-related factors beyond economic challenges were important drivers of the observed reduction in births.*

United Kingdom

A study by Berrington and Ellison (2022)³ on the effect of lockdowns on birth rates in the UK revealed a temporary decline in babies conceived during the first three months of the first lockdown in 2020, but then the fertility rate rebounded to levels above those seen in previous years.

The authors suggest that the recovery might be explained by births taking place where conception had been postponed during the first lockdown. This hypothesis is supported by the fact that birth rates bounced back most strongly for women in their 30s, who might have been reluctant to postpone conception much longer than necessary.

UNFPA Technical Brief

The United Nations Population Fund (UNFPA) collected data from 15 countries up until the third quarter of 2021. Overall, changes in births associated with COVID-19 appeared to be temporary. Apparently declining birth rates could, at least to some extent, be explained by delays in birth registrations during imposed lockdowns.

Across Africa, there were numerous reports of family planning service disruptions due to COVID-19. Data in many African countries, however, remains too incomplete to definitively assess impacts on births.

Analysis of Insight's South African medical scheme data

To determine the impact of the COVID-19 pandemic on South African birth rates, we analysed the data of a representative subset of the Insight medical scheme data universe.

The data

We used monthly live birth data from January 2016 to February 2022, which corresponds to conceptions (carried to term) from April 2015 to May 2021. The schemes under consideration covered, on average, around 1.3 million female lives per month over this period. Monthly CBRs per 1000 female lives per month were computed as: Monthly Live Births/Total Active Female Lives.

We analysed the dataset as a whole, and then split by province, age bands and low-cost, mid-range and top-end scheme options (as a proxy for income⁴).

The declining trend in birth rates of the entire dataset, as illustrated by Figure 1, seems to reflect the pattern of South Africa as a whole⁵.

1 Early assessment of the relationship between the COVID-19 pandemic and births in high-income countries

2 Early evidence of missing births from the COVID-19 baby bust

3 Effect of lockdowns on birth rates in the UK

4 It should be noted that medical scheme membership is representative of higher income South Africans, not the population overall, which may have had different experience.

5 Simple correlation analysis between the Insight data and data obtained from Statistics South Africa and macrotrends.net shows that the Insight data birth rate trends are moderately to highly representative to those of the South African population at a monthly and annual level respectively.

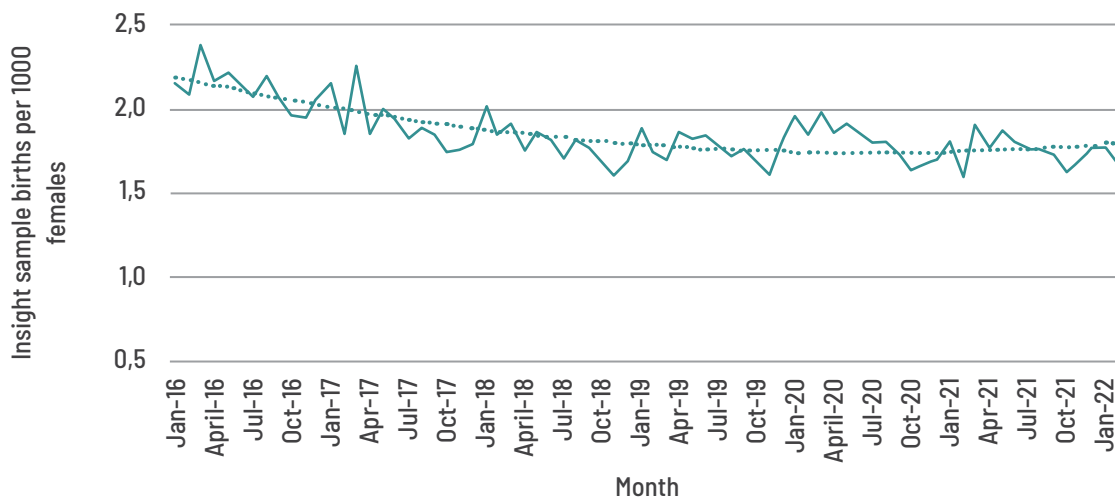


Figure 1: Number of births per 1000 female lives from January 2016 to February 2022
(Source: Insight medical scheme database)

With no obvious trends visible over the pandemic period, we conducted statistical analysis to identify any significant deviations from the mean.

Results

We define the pandemic as having started in February 2020, when the World Health Organization declared the COVID-19 outbreak an international public health emergency. We thus expect to observe effects nine months later, i.e., from November 2020.

Analysis of the pandemic period as a whole

To isolate the impact of the pandemic on birth rates – and remove confounding factors such as long-term trends and seasonality – we calculated coefficients for each population segment from a set of ordinary least squares models. CBRs were regressed from 2016 to 2022 on a dummy variable which took a value of one starting November 2020. Figure 2 below shows the pandemic indicator coefficient within a 95% confidence level for each population segment.

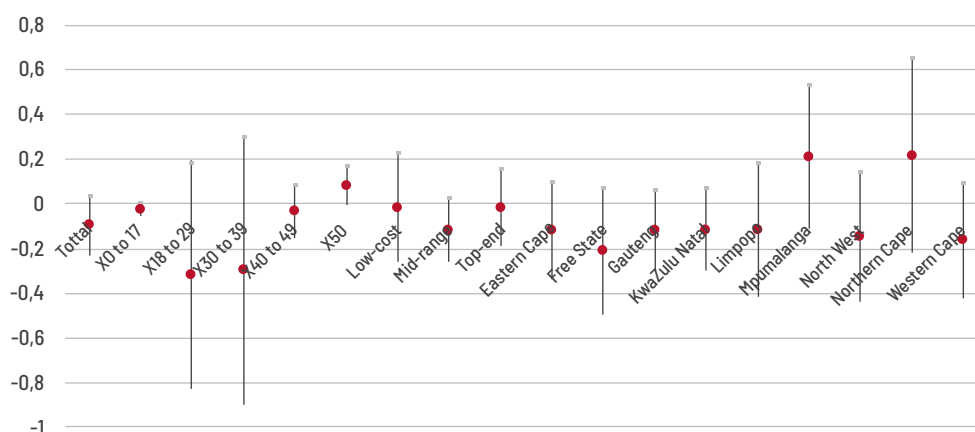


Figure 2: Changes in CBRs by population segment. Shown are point estimates and 95% CIs for segment models.

The confidence intervals of all of the segments overlap 0, suggesting that the pandemic had no significant effect on birth rates for the period.

Month-by-month analysis

To assess whether the pandemic had any temporary impacts on birth rates during the pandemic, we compared CBRs each month from November 2020 onwards to the mean CBR of that month for the years from 2016 to the last instance of that month before November 2020. For example, January 2021 birth rates were compared to the mean of the January CBRs from 2016 to 2020. We assumed that each set of monthly birth rates was distributed normally.

At the 95% confidence level, a handful of significant differences emerged, summarised in Table 1.

Table 1: Months showing significant CBR differences from the birth month mean by population segment

Sample Population Segmentation	Segment	Significantly lower than mean	Significantly higher than mean
NONE	Population as a whole	February 2021 January 2022	
AGE BAND	18-29	January 2021 January 2022 February 2022	
	30-39	February 2021 January 2022	
	40-49		July 2021
OPTION	Low-cost		November 2020 December 2020 May 2021 November 2021 December 2021
	Mid-range	January 2021 February 2021 January 2022 February 2022	
PROVINCE	Eastern Cape	February 2022	
	Free State	February 2022	
	Gauteng	February 2021 January 2022	
	KwaZulu-Natal	February 2021 January 2022	
	Limpopo	January 2021	
	Mpumalanga	June 2021	
	North West	January 2021 February 2021	
	Northern Cape	December 2021 January 2022 February 2022	October 2021
	Western Cape	April 2021	November 2020 March 2021 September 2021

DISCUSSION

More thorough analysis would be required to draw conclusions with a high degree of certainty and causality, but at face level, the following patterns are observed:

Early 2021 and 2022 saw dips in birth rates

For the population as a whole and for several population segments, birth rates were significantly lower than usual in January and February of both 2021 and 2022.

2021

At the corresponding time of conception – April/May 2020 – South Africa was at the tail-end of its hard lockdowns (level 5 ended on 30 April, with level 4 being applicable throughout May). High levels of anxiety about the future, as the impacts of retrenchment and social isolation were being strongly felt, might have contributed to fewer conceptions. The lack of alcohol probably didn't help either...

2022

The decrease in birth rates observed in early 2022 are less straightforward to explain, given that the country was in lockdown level 1 during the corresponding time of conception. It will be worth monitoring birth rates in the coming months to see if these last data points are the beginning of a longer-term baby bust.

Boom months in the lower-income and Western Cape segments

The segment on low-cost medical aid options (representing the lower-income portion of the medical scheme population) experienced significant increases in birth rates towards the ends of both 2020 and 2021, corresponding to conception in February/March of those years.

The Western Cape saw sporadic booms from November 2020 to September 2021.

Given the lack of obvious connection to the trajectory of the pandemic, further analysis would be required to better understand these results.



WHAT IT ALL MEANS

Mirroring findings elsewhere in the world, it seems that significant deviations from the mean of South African birth rates due to COVID-19 have been temporary, indicating that, to quote another 90s classic “life finds a way”. It will be of interest to monitor whether the decreased birth rates observed in early 2022 will continue, reflecting a more cautious post-COVID lifestyle...and, in the long-term, what the coronials will make of this new world, however many or few of them there may be. 



Pamela Hellig
INSIGHT
- Consulting Actuary

RESILIENCE AND FINANCIAL OPTIMIZATION POST- COVID: **key considerations for insurer CFOs** - *Paballo Makupu*



By now, previous year's annual financial statements have been approved and signed-off, and most short-term insurers will have a clearer view of the uncertainties they initially anticipated when the COVID-19 pandemic started.

Some of the larger players in the market will have highlighted concerns over both the resilience in their operations and their financial performance through the pandemic. Today, consensus appears to be that there are vast opportunities for premium growth, investment in environmental, social and governance (ESG) factors, innovation and digitalization as the global economy recovers post-pandemic.

This positive outlook aside, we must remain cognizant of the emerging systemic risks in areas like climate change and increased cyber exposure. Based on our market observations, here are some of the considerations that you should be thinking about presently.

The impact of volatility on the income statement

The motor class of business benefited from government-imposed lockdowns that resulted in premium discounts. Insurers experienced a lower claims frequency as their insureds spent less time on the roads. In addition, the premium holidays enabled insureds to retain their cover despite tough economic conditions. On the negative side, the industry has experienced lower new business volumes and higher lapse rates which has put pressure on premium volumes.

Business Interruption and Income Protection claims have severely impacted on insurer and reinsurer income statements. Some reinsurers have played a critical role in ensuring that they share their expertise with their clients to limit their exposure to unexpected and unpriced risks. Exclusions such as the physical damage provision within reinsurers' cedents wordings is one example of this. Some have, in addition, hosted various workshops regarding the impact of COVID-19 on short-term insurance policy wordings.

The pandemic is not the only elephant in the room. Extreme weather events such as the disastrous April 2022 KwaZulu-Natal floods are becoming more frequent in the context of climate change. These floods have not only led to severe property damage, but sadly resulted in many lives being lost. The role of reinsurers is to assist our cedents with risk mitigation, with exposure to weather-related catastrophe being a key focus area. Beyond traditional reinsurance, some reinsurers are also engaging with their cedents to explore event-driven solutions such as Loss Portfolio Transfers where loss obligations that are already incurred and will ultimately be paid are ceded to a reinsurer, Parametric Solutions that cover the probability of a predefined event happening, and Insurance Linked Securities that are sold to investors in the capital markets and whose value is affected by an insured loss event.

Balance sheet resilience

Short-term insurers' balance sheets have, to a large extent, remained resilient through the pandemic. The most significant impact has, however, been the increase in liabilities due to COVID-19 related reserving.

Commercial players were faced with uncertainty regarding the validity of business interruption claims as well as the ultimate settlement amount for such

claims. We saw increased settlement delays due to time consuming court challenges as well as a shortage of claims assessors to assist with complex claim types. The uncertainties underlying pandemic-related reserving have somewhat stabilized, and we expect to see some of insurers' reserves being released in coming reporting periods.

On the asset side, the financial industry is faced with volatile equity markets, low-interest rates, exposure to currency, and credit risk. Many insurers are now looking for alternative solutions to optimize their balance sheets for today's volatile market movements. These assets are largely protected from this volatility through hedging and asset liability management. From a liability management point of view, reinsurance can offer cedents a combination of prospective as well as retrospective structured solutions, depending on the cedents' needs.

Interrogating the SAM 1-in-200-years' event

Resilience post-COVID 19 has raised many questions regarding the appropriateness of the standard solvency assessment and management formula. According to Prudential Standard GOI 3.1, insurers are required to conduct an own risk and solvency assessment (ORSA) annually or whenever the insurer's risk profile changes materially.

Each cedent will, therefore, have to assess whether there have been changes in their risk profiles consequent the 2020/21 COVID-19 pandemic, exposure to the looting that affected parts of Gauteng and KwaZulu-Natal in July 2021, or the recent KwaZulu-Natal floods, for example. Changes following an environmental, social and governance (ESG) implementation into an organization's strategy would also necessitate a review.

The ORSA assists management in monitoring regulatory capital, refining business planning and strategy, defining capital needs and having a full view of its risk profile, risk tolerance limits and impacts on business strategy. Insurers should also consider the operational risk of working from home and increased reliance on IT systems against the backdrop of cybercrime (hacking of vulnerable systems) and the potential loss of value in assets that impacts the Solvency Capital Requirements (SCR) modules.

Short-term insurers have shown resilience during the COVID-19 pandemic. The industry SCR coverage ratio decreased due to the exposure to volatile market movements, increases in reserves, and lapses together with operational risks. However, we need to note that COVID-19 is not a scenario that qualifies as a 'shock' within the standard formula. In fact, the secondary effects of the pandemic such as volatile equity markets, low-interest rates, exposure to currency, and credit risk do not exhibit a return period that is remotely close to a 1-in-200-years' event.

This creates opportunities for insurer's to truly maximize and optimize their capital. Traditional reinsurance reduces your liabilities, hence offers a reduction in the solvency capital required. To truly release some of the funds trapped in the SCR, some reinsurers' alternative structured reinsurance solutions offer Loss Portfolio Transfer and Adverse Development Covers for insurers who no longer have an appetite to the run-off exposures of a specific line of business.

Some leading aggregate excess of loss treaties enable cedents to limit exposure to increasing catastrophe claims due to deteriorating climate conditions. These treaties also have solvency-based trigger solutions for high growth clients where the cover is triggered once the SCR coverage

ratio is below a certain level. These structured solutions are specific to an insurer's needs and tailor-made on a case-by-case basis.

Reinsurers' aim is to support each insurer in remaining solvent and maintaining its SCR coverage ratios within its risk appetite. This will enable their cedents to expand their insurance operations within the economic growth cycle and improve their return on equity (ROE) without additional capital injections. 

Paballo Makupu is Client Relationship Manager: Munich Re of Africa.

COVID-19:



We have come a long way from our 2020 pandemic experience. We now have vaccines and medications to limit the worst outcomes and provide hope for a time when the pandemic is far behind us.

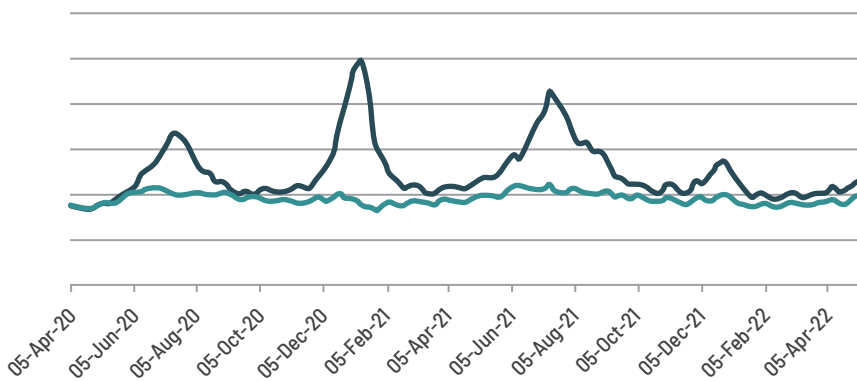
One key development was the discovery and rapid global spread of the Omicron variant. Unlike the fear when Delta originated, Omicron's apparent reduced lethality in the light of widespread vaccinations and treatments, combined with a rapid rate of transmission, seem to have accelerated us towards the pandemic's now inevitable outcome: endemicity.

The definition of an epidemic, pandemic, or endemic disease for COVID-19 varies by individual countries that are still in a state of flux. Many countries have declared themselves as free from the pandemic or having reached a state of endemicity, prior to any international statements by public health bodies, such as the World Health Organization (WHO). On the whole, many European countries, the USA and Australia appear to consider themselves in a state of endemicity based on the public health policies and limited social restrictions we are seeing.

Excess mortality in SA over the last 2 years

The South African Medical Research Council has issued a weekly report on estimated excess deaths. In the report, it is estimated that 85% to 95% of these excess deaths are due to COVID. From April 2020 to 14th May 2022 the total estimated excess deaths from natural causes in South Africa were more than 313 000. Of these more than 229 000 were over the age of 60.

PANDEMIC TO ENDEMIC



Quarterly excess deaths from April 2020 – April 2022

The chart on the left shows the impact of the COVID waves on excess deaths in the country. 2021 was the worst year of the pandemic with 203 000 excess deaths recorded. While 2022 has seen far fewer deaths, we have still seen nearly 25 000 excess deaths.

Commentary on further excess mortality 2022 +

Predictions of future mortality due to COVID have been fraught with peril over the last few years. There are many factors that influence this and each of these is difficult to predict.

However, when we consider all the various factors, it seems that over the next year we may still see the effects of COVID in increased mortality rates. In 12 to 18 months, we may be back to close to pre-pandemic levels with a slight increase to allow for seasonal increase in mortality (most likely in winter during flu season).

This is dependent on immunity (either through vaccine or prior infection) not waning significantly over time and future variants not having significant immune evasion mutations.

Endemic Covid

In an endemic state, there is often the assumption that as we come to live with a disease in our midst, the need for caution decreases. Whilst that may hold true for a healthy adult population, our ongoing experience with influenza (a descendent of the 1918 Spanish flu), tells us that society's eldest and clinically vulnerable remain at risk. What we might expect is that COVID-19 begins to

take on a more predictable pattern with a regular, cyclical form. As more of the global population is exposed to the virus, theoretically, COVID-19 could become less virulent and less transmissible.

Allowing the virus to run through society on a relatively frequent, annual basis, with asymptomatic or mild symptomatic illness for the majority, gives the population the opportunity to top up their antibodies and contribute to the maintenance of some immunity. Healthcare systems could then redirect their resources into purchasing vaccines for the at-risk segments and reinforce hospitals for the fewer numbers of individuals who are likely to fall seriously ill, and perhaps succumb to the disease.

Annual booster shots are likely to be developed and deployed into wider society, on a possibly optional uptake basis. There are, of course, a number of factors upon which this is contingent, including vaccine effectiveness, uptake and the emergence of newer, more lethal variants. Pharmaceutical manufacturers may choose to address the winter respiratory virus crises, by formulating a combination dose to tackle pneumonia, influenza and COVID-19. This may be particularly important in certain regions where the predicted, annual cycle of COVID-19 could occur concurrently with the viruses above, adding pressure to hospitals and increasing the death toll.



The vaccination strategy of 2021, of administering multiple doses a year to the general population appears to be an unsustainable **and perhaps unnecessary measure going forward, particularly with existing variants.**

The vaccination strategy of 2021, of administering multiple doses a year to the general population appears to be an unsustainable and perhaps unnecessary measure going forward, particularly with existing variants. This is especially true where the vaccine take-up has been quite poor with less than 50% of adults vaccinated as of 14th May 2022. As the number of immunologically naïve – those who have never been exposed to the virus or vaccinated – declines, countries may look to increase access to other treatments for symptomatic relief.

Early into their release, wealthier countries stockpiled large volumes of vaccines, for secondary and tertiary doses, with many other countries left waiting for their first doses with reliance on schemes such as COVAX. As a greater number of people get infected or vaccinated, highly vaccinated countries may purchase substantially fewer vaccines in the near future – thereby freeing up doses and accessibility for countries with lower vaccination rates. Additionally, if milder variants circulate, in terms of both lethality and transmissibility, the need for vaccination of the generally healthy population across the world will likely be diminished.

Social mobility

As the world emerges from COVID-19 and societies start to revert to a pre-pandemic way of life, questions remain about how governments are likely to react to potential new variants. Our collective learnings from COVID-19 are perhaps the greatest lessons from this shared, lived experience. For the first time this century, the world now has a blueprint for operating under a pandemic, including testing and tracing practices, the enforcement of lockdowns, and addressing kinks in supply chains for masks, vaccines, and other key therapies. We are

unlikely to see the lockdowns of 2020 return, but should new developments disrupt present stability, there are now pathways to react more effectively and efficiently.

Whilst vaccines have been the key factor in reducing presentations of severe, symptomatic disease and COVID-19 mortality, it is likely that in an endemic state, immunological resilience will be defined by recurrent mild infection and recovery. These assumptions are subject to a substantial change in the current dominant variant, which may render existing vaccines as ineffective and cause a surge in mortality. It is possible that if a potentially severe resurgence in disease is detected, governments may opt for shorter, more localised lockdowns to break the chain of transmission.

As a number of governments adopt the strategy of immunity through infection and exposure, many countries have dropped mask mandates with the emergence of the Omicron variant. Whilst these are no longer enforced by law, it's possible that some citizens may choose to adopt such measures of their own accord, as a result of behavioural changes, residual from the pandemic years.

We have seen continued global monitoring of the COVID-19 landscape and, as such, sporadic travel restrictions remain in place for certain countries. Many countries have discontinued quarantine periods with the existing variants in circulation, but proof of testing or vaccination status on arrival, may be required.

Variants

Novel mutations and variants will remain a global threat with endemic COVID-19. The likelihood of their occurrence increases in densely populated regions, with

little to no immunity from either vaccination or infection, which provides the ideal breeding grounds for mutations capable of widespread transmission. As of May 2022, Omicron and its sub-variants continue to be globally dominant. In order to be displaced, a newer variant would need to possess the capabilities to outcompete Omicron on transmissibility or ability to evade previous immunity. As has been evident with current variants in circulation, there is a drop in effectiveness of the existing vaccines, which were all based on the features of the original virus first discovered in Wuhan, China in 2019. Subsequent variants have had advantages over their predecessor through some combination of increased transmissibility, immune system or vaccine evasion, or change in disease severity.

Mutations are part of a virus' life cycle. Respiratory viruses such as influenzas or coronaviruses tend to favour greater transmissibility at the expense of more severe symptoms. The evolutionary drive of the virus, then, is likely to intrinsically favour more severe symptoms over mortality, spreading to as many people as possible, so that the virus remains active in society.

The pandemic has seen multiple waves of infections, fuelled by more lethal variants, as the native virus evolved into the Alpha, Beta, Gamma, Delta and now the Omicron subvariants. Globally, these variants took hold of countries at different times, spreading to differing degrees. Certain variants such as Gamma mostly stayed on the continent where they originated – in this case, of South America. Other deadly variants spread rapidly and became globally dominant thereafter – Delta, for example.

The arrival of Omicron is a new phase in the potential dampening in the severity of COVID-19. The expert-led, global consensus was that the variant after Delta would likely be a descendent of it. At the time, this seemed most plausible as Delta was globally dominant, had very high transmissibility and escaped immunity from vaccines or previous infections. Omicron, however, was found to be a descendant of Alpha + Beta + new mutations.

Omicron's origin is believed to have roots in South Africa, with likely emergence from an immunocompromised person with untreated HIV. Real world evidence

confirmed that Omicron was spreading rapidly, much faster than any variant we had previously seen, and within a matter of weeks had markedly outcompeted, and then in turn displaced, the dominant Delta variant. Early reports indicated that prevalence was high among the young and unvaccinated populations. Despite the widespread infection rates, hospitalised cases did not appear to surge in the way that they had with previous variants. While the virus remains highly transmissible, this new iteration appeared to be less lethal, aided by a combination of recently obtained recovery immunity and the younger ages of the exposed.



Future Mutations

The BA.2 sub-variant of Omicron, which is more easily transmitted than the original BA.1 Omicron, emerged in northern/western Europe and Australia. Now, other sub-variants BA.4 and BA.5 are continuing to spread, although these remain functionally similar to the rest of Omicron. In the future, viral mutations are to be expected, and some residual risk remains that existing variants threaten global progress against COVID-19.

At present, the world can be optimistic. Compared to two years ago, we now have effective vaccines which pharmaceutical manufacturers are looking to update. Through previous infections, we now have T-cell immunity and near-term antibody protection. We also have medications and treatments to help keep people out of hospital and reduce the burden on healthcare systems. Even if a new, more worrying variant was to arise, we have gained so much knowledge and information on COVID-19 that we would not have to start again from scratch.

Medical treatments & vaccines: an arms race against COVID-19

When the history of this pandemic is written, a key chapter will start with the use of vaccines. Well within a year of COVID-19's spread, a concerted global effort of public and private research came together to prevent the most severe outcomes. With options from America, Western Europe, Russia and China all being announced by the end of 2020, there was a lot of optimism that the pandemic could be controlled, substantially, through the use of vaccines.

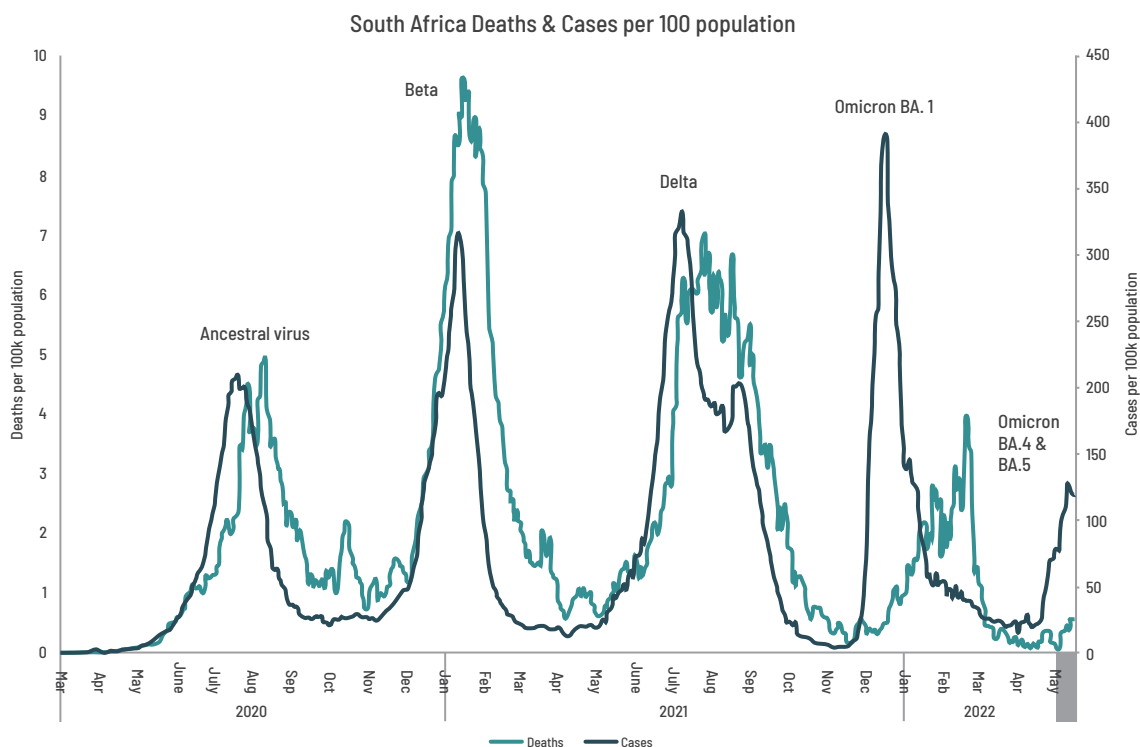
The global rollout of these vaccines was centred on developed nations – although hit hard and with substantial excess mortality, these countries used their considerable economic and bargaining power to obtain access to vaccines ahead of many others. While the rollout of vaccines took many months, even in countries where the populations were willing to receive them, the impact on mortality was significant.

News of the first major variant (later termed Alpha) brought with it concerns that mutations to the virus would bring about changes that threatened our progress.

The Delta variant saw a drop in vaccine effectiveness alongside an increase in disease severity, leading to large numbers of deaths in South Africa, as well as India, Europe and North America. Now, with the sub-variants of Omicron vying for global dominance, medical interest has shifted towards a combined approach combining vaccines, medical treatments, and recovery immunity.

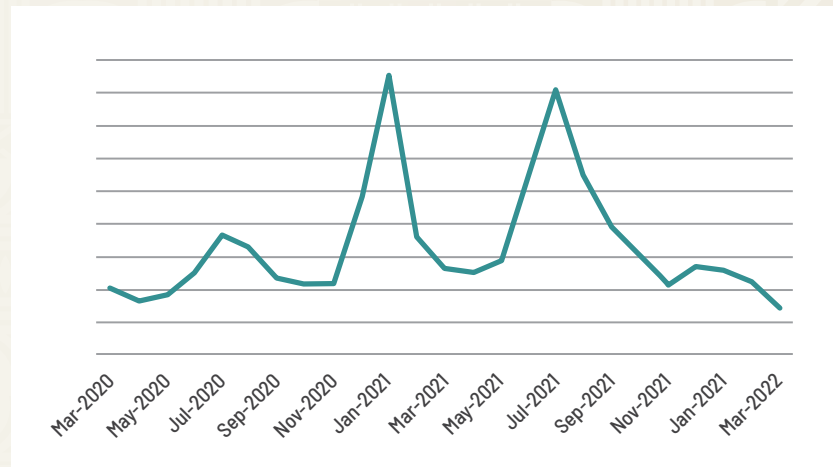
Alongside vaccines, new or repurposed drugs, like antiviral medications or monoclonal antibodies, were also released. Two antiviral treatments, molnupiravir (Merck) and Paxlovid™ (Pfizer), have been used since the second half of 2021 to reduce hospitalisation and death rates around the world. At the time of writing, South Africa and Pfizer have entered into an agreement to acquire Paxlovid™ in the near future. Globally, with many of the at-risk population already having access to vaccines, it could be that the accessibility of antiviral medication is the factor that will drive down death rates throughout 2022 and beyond.

Two years' worth of medical and scientific developments have given us a feasible route out from lockdowns, restrictions and isolations - we are ready to turn the page.



Insured life experience

The Actuarial Society of South Africa CSI committee set up a COVID dashboard that looked at the mortality rate of fully underwritten lives in the local market. The chart below shows the monthly experience from this dashboard. Looking at South Africa, we can see the total claim rate being over 400% of expected deaths in the second and third wave, based on recent, pre-pandemic, data. The experience in the 4th wave (the so-called Omicron wave) was far milder with experience only up to 35% above expected claims. The insured population in South Africa was disproportionately affected compared to the general population. This is largely due to the higher average age in the insured population compared to the general population.



Quarterly excess deaths from April 2020 – April 2022

Conclusion

When COVID-19 is declared to be endemic across the world, that will, finally, bring an end to the pandemic. With so many people across all strata of the global population continuing to get COVID-19, the original hope that the disease could be eliminated seems to be very unlikely. If and when COVID-19 is endemic, deaths could continue for decades to come. However, the number of deaths will become increasingly small, so we will likely return to pre-pandemic levels of mortality, with occasional waves of cases that could be concurrent with seasonal flu – a fact of life for many countries that are considered “acceptable” levels of death.

As restrictions are relaxed globally, it seems that we are past the peak of the pandemic, however, vigilance in terms of variant surveillance is still warranted, particularly in areas that act as reservoirs of disease. A potential new variant, even more transmissible than Omicron, but with new vaccine-evading properties, could lead to breakthrough infections – reversing some of the progress we have made, and posing an ongoing risk to economic recovery and healthcare. Offsetting these risks are developments in therapeutics and vaccines, which remain key in our ongoing, more silent fight against COVID-19. 

© Swiss Re [2022], All rights reserved

A version of this article was originally published by The Actuary, APRIL 2022. © The Institute and Faculty of Actuaries.



Dr Prachi Patkee



Dr Adam Strange



Paul Turner

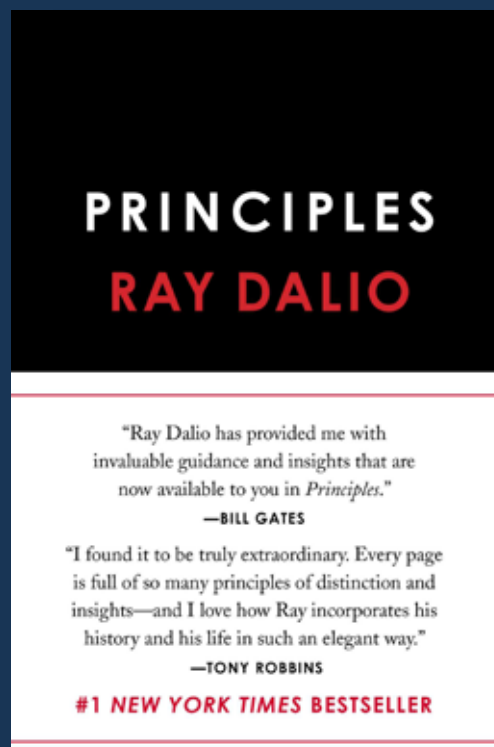
BOOK REVIEW

One of the exam questions I used to find rather intimidating in my first year of studying actuarial science at university had to do with deriving mathematical theories from first principles. However, reading Ray Dalio's *Principles of Life and Work* did help me to warm up to the idea of principles.

If you are looking for some guidance in defining a set of principles that you wish to live by, then this book is for you. You may also draw great insight and inspiration from this book as an actuarial student because it lays out a set of steps and procedures to use as an action plan in different circumstances. Even recruiters may treasure this book as it is well detailed in its descriptions of the hurdles Bridgewater had to overcome in identifying key traits and skills in different persons and ensuring they were a good fit for the team. Whether it is interpersonal skills or parenting skills; exemplified when Dalio encourages readers to embrace tough love or guidelines to apply to one's work and life, this book is a good resource.

In his book, Ray Dalio openheartedly shares a set of principles, embedded within anecdotes or experiences that reveal the value of given principles. The overarching idea is that consistently operating within principles is crucial under high-pressure circumstances because these serve as an anchor when one is presented with many choices.

One of the principles that resonated with me states that it is crucial to do what you set out to do and to understand how reality works. Ray Dalio encourages readers to be open-minded and hyper-realistic because that allows you to dream and to do so wisely, thus increasing the likelihood of achieving the given dream. Furthermore, seeing things from a higher perspective also allows you to consider any obstacles and how to overcome them. Obstacles vary in nature, including your own biases or blind spots or circumstances over which one has no control. It is crucial to see circumstances and oneself from an objective point of view, take inventory of all resources available and determine how to shape the outcome as you desire.



Even some of the difficult moments shared in his book reveal that at times, **pain and failure can stimulate one's growth and evolution in ways that comfort cannot.**

This book is a great read as it takes the reader through the different phases of life that Ray Dalio journeyed through. The highs and lows he experienced in establishing Bridgewater Associates allow the reader to step into his journey and draw parallels to one's own life. This is, of course, due to the modest manner in which he shares his experiences by openly portraying his strengths and weaknesses, as well as victories and mistakes. Even some of the difficult moments shared in his book reveal that at times, pain and failure can stimulate one's growth and evolution in ways that comfort cannot. It is, therefore, necessary to test the limits and keep striving, even amid difficulties, in order to achieve progress. According to Dalio, certain experiences become less difficult or painful as you reflect and go through them several times, thus building inner strength and resistance. 

Reviewed by **Lydia Mutepefa**

The ASISA Classification Standard for Collective Investment Schemes

- Joao Frasco

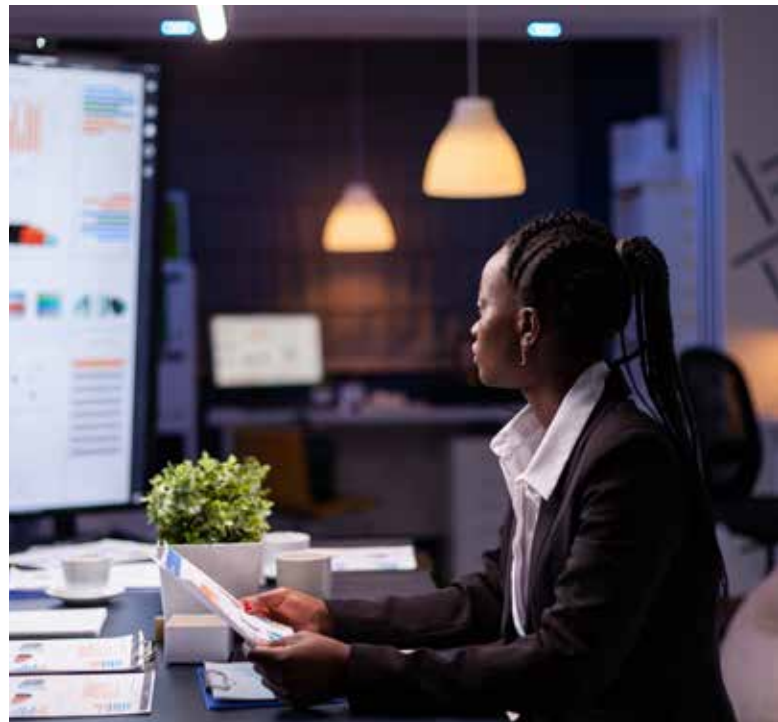
Introduction

Every South African Collective Investment Scheme (CIS, formerly known as Unit Trust) must belong to a single Association for Savings and Investment South Africa (ASISA) category, which typically includes some constraints on how the portfolio should be managed. ASISA has, however, created a standard for the classification of CISs, and this standard has some very specific objectives. An extract from their document is provided in italics below:

The classification of South African regulated collective investment scheme portfolios ("CIS portfolios") provides a framework within which portfolios with comparable investment objectives and investment universes are grouped together. It is a key tool for investors and their advisers in that it provides useful information during the consideration of investment choices.

Given the above, we can assess how well the standard meets the objective of grouping together comparable portfolios, and how useful it is as a tool for investors and their advisers when considering investment choices.

There are many tools that we can use to help with this assessment. Although no single tool will provide a definitive answer to the question, perhaps a combination of tools can provide evidence in support of the assessment, and perhaps highlight some of the potential shortcomings in the standard that could be improved upon.



Actuarial Convention

At the Annual Actuarial Convention to be held in October this year, I will address this question with a comprehensive paper on the subject, so please look out for the paper and the presentation if you are interested in this subject. I would also like to invite ASISA and the FSCA to consider the contents of the paper and the recommendation made therein as possible ways to improve on the current ASISA standard, and Regulation 28 of the Pension Funds Act.

Essentially, the paper assesses the standard, by considering the returns of portfolios within and across ASISA categories, using both traditional investment techniques that are currently extensively used, as well as some of the latest techniques from statistics and machine learning to introduce the reader to alternative ways of understanding portfolio performance. This will be done with the explicit intention of checking how well the standard does in grouping comparable portfolios, which is part of the mission stated above.

Traditional Techniques

Investment professionals in various roles, including advisers, have long considered returns over a given time frame when comparing portfolios. The risk / return scatterplot is one such tool that summarises periodic returns (over a given time frame of 3 or 5 years for example) with two numbers, namely, the annualised return and volatility of the portfolios being analysed. While this is a very useful technique, it is rather limited as much information is lost in the process of deriving just two statistics from a wealth of monthly returns. Could we do better by not throwing away all the information contained in the monthly returns, and how they may relate to each other.

There are many other returns-based analysis tools and techniques that may be used, including style analysis. Other traditional techniques include holdings-based analysis and transaction-based analysis, and although many of these can provide very useful insights into the similarities and differences between portfolios, the techniques are very limited by the quality and completeness of data available.

Machine Learning

Many machine learning techniques will be familiar to actuaries with a statistical major, but many more are used extensively throughout the data science

fraternity, and we can deploy some of these to analyse return data for portfolios. Some of the techniques that will be briefly introduced in the paper and used in the subsequent analysis of portfolios within and across ASISA categories include:

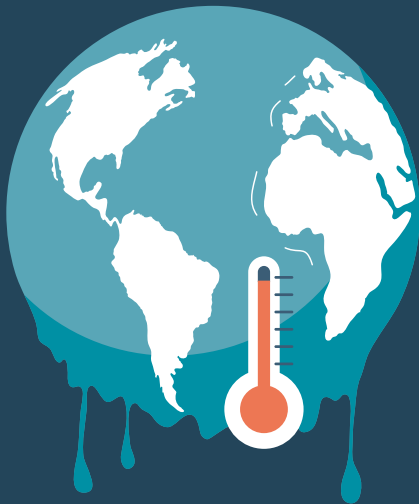
- hierarchical clustering techniques and dendrograms for the visualization of the results;
- correlations, correlation matrices, heat maps, and cluster maps;
- k-means clustering, principal component analysis and singular value decomposition
- k nearest neighbours (knn); and
- decision trees.

Results and Recommendations

The paper will demonstrate how the definition of certain ASISA categories creates issues by allowing different portfolios to sit in the same ASISA category, defeating the objective of grouping portfolios that have similar objectives and investment universes. It will also make recommendations on how some simple changes to these definitions will help to better achieve these objectives.

It is important to note that the recommendations will never go as far as to dictate that asset managers should not have flexibility to manage portfolios as they deem fit, but it will make a strong case that this should be done within a category where no constraints exist and portfolios should not be compared within the category. It does also make some comments about the appropriateness of certain investment mandates and strategies that have had sufficient time to make a case for their existence and have failed to gain substantial traction, which may mean that it may be time to retire these in favour of simplifying the investment landscape for investors and their advisers.

The paper will also extend the recommendations to how listed property should be thought about, as it is currently the cause of one of the biggest areas of concern for how portfolios are managed that make them different to each other within a single ASISA category. It will also extend this to Regulation 28 that could similarly use an update to better reflect the needs of pension scheme members, and to harmonise CISCA (Collective Investment Scheme Control Act) and Regulation 28. 



ACTUARIAL SKILLS

critical in assessing the risks of global climate change

THE ROLE OF THE ACTUARY IS TO QUANTIFY AND MANAGE FUTURE RISK TO ENSURE THAT ORGANISATIONS ARE PREPARED TO MANAGE POTENTIAL CHALLENGES.

Environmental and social risks and their potential effect on a company's bottom line are no exception. For example, global climate change affects life insurers because it influences mortality rates through an accompanying increase in extreme weather events, with resulting effects on vector-driven diseases, water, air and food qualities, migration and civil conflict.

Actuarial skills are therefore increasingly recognised as critical in assessing the risks of global climate change, with actuaries becoming involved in a number of critical projects. In the United States and Canada, for example, the actuarial profession has recently launched the Actuarial Climate Index to measure variability in climate. Work on the extension of this index to cover Europe is already underway.

In the UK, the Institute and Faculty of Actuaries (IFoA) has addressed the issue of claims for damages caused by contributors to climate change. The IFoA has also signed a statement by the Overseas Development Institute (ODI) urging the G20 Governments to honour their long-standing commitment to phase out fossil-fuel subsidies.

A working group of the International Actuarial Association (IAA) is currently researching the effects of global climate change on mortality. A member of this working group has further been selected as part of an expert panel advising the European Commission on policies targeting sustainable finance, specifically within the context of the Capital Markets Union.

The IAA is also involved in the Warsaw International Mechanism, tasked by the United Nations Framework Convention on Climate Change (UNFCCC) with risk-management approaches to loss and damage associated with the adverse effects of climate change, including slow-onset impacts such as sea-level rises.

Both the IAA and the IFoA have submitted responses to the Task Force on Climate-Related Financial Disclosures established by the Financial Stability Board, an international body that monitors and makes recommendations about the global financial system.

Furthermore, the IAA is working on the regulation and pricing of carbon emissions, the effects of climate change on government budgets, and the usefulness and limitations of insurance as it relates to the effects of climate change on vulnerable populations. In light of the Paris Agreement, the IAA has already drafted a paper on the monitoring of progress towards the stabilisation of CO₂ concentration in the atmosphere.

The IAA is additionally collaborating with the United Nations Environmental Programme's Principles for Sustainable Insurance and with the Organisation for Economic Co-operation and Development on disaster recovery.

It is clear that the actuarial profession sees the need to embrace all three domains of the triple bottom line - environmental (or ecological), social and economic. In recognising this, the IAA is also extending its knowledge on ecological economics and on formulating measures that can be used for environmental, social and economic accountability by entities in both the public and private sectors.

ACTUARIAL SOCIETY
OF SOUTH AFRICA



South African
Actuary
Actuarial Society of South Africa's E-magazine

ACTUARIAL
SOCIETY
OF SOUTH AFRICA



SEND US YOUR THOUGHTS AND
COMMENTS. [CLICK HERE](#)



www.actuarialsociety.org.za