

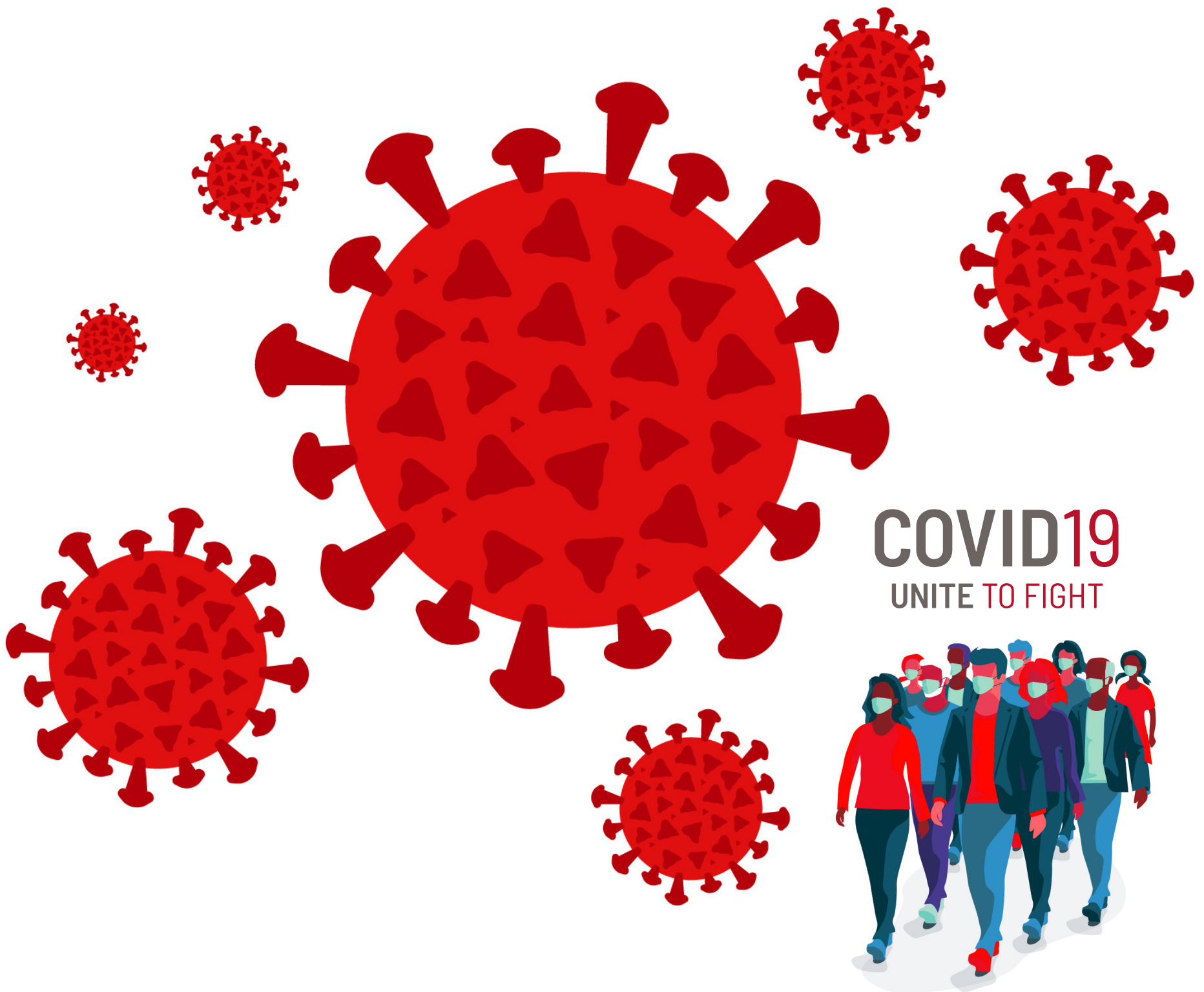
South African ACTUARY

Volume 4 Number 1

APRIL 2020

www.actuarialsociety.org.za

E-magazine of the Actuarial Society of South Africa



COVID19
UNITE TO FIGHT



Lusani Mulaudzi
President, 2019-20

Presidential PERSPECTIVE

It is not so easy to keep up to date with all the changes in our world, but it is critical to keep in touch with developments in one's profession. In this edition of *South African Actuary*, the stories covered are not only informative from a professional development perspective but also inspirational. The Actuarial Society of South Africa has a diverse membership profile of which a majority are still on their journeys to becoming Actuaries. It is important for us to celebrate the milestones that our wide variety of members are achieving on this journey. Those that overcame serious personal challenges; to obtain their actuarial degrees, to find their first jobs (at times becoming the only fully employed person in their families), to qualify as actuaries, to venture into new areas of practice, starting innovative business ventures and many other significant milestones. The Actuarial Society aims to meaningfully engage with all its members and this publication will go a long way in assisting us to achieve this objective.

In my presidential address at the end of 2019 I mentioned that one of the key focus areas for the Society during my term is to position the Actuarial Society as a global

The Actuarial Society aims to meaningfully engage with all its members and this publication will go a long way in assisting us to achieve this objective.

leader in context-based solutions. I am excited to see the different kinds of activities that are supportive of this objective and several of them are featured in this edition. The Society is sponsoring research into the prevalence of non-communicable diseases (NCDs) in South Africa. The researchers recently published their first report, in which they discuss the various data limitations, the initial NCD profile, NCD burden on health system, and other interesting aspects of progression of NCDs in South Africa. A better understanding of NCDs in South Africa will enable policymakers to plan better and this is in the public interest. Future publication of this work will be covered in future editions and in other international publications.



Several of the articles in this edition tackle one of the key opportunities for the profession. The way in which insurance solutions are created, marketed and administered is changing rapidly and most of these changes are technologically driven. For the profession to remain relevant in the future, we need to adapt. The growth in the number of Fintechs in South Africa promotes innovation in Insurance but as actuaries we need to develop our capacity to assist our clients to

manage risks associated with innovative solutions and novel modelling tools. With an increasing number of data jobs all the way to the C-suite level, it is important for the Society to create numerous CPD opportunities for the members to upskill themselves.

The CPD events for the year covered in this edition will be affected by COVID-19 but this has created an opportunity to deliver more CPD events virtually. Enjoy reading! 

Contents

► Presidential Perspective	2
► Editorial	5
► COVID19- A white swan, a long time in the making	6
► The Treasure House of the Mind	12
► Staring into the Abyss: The Current State of Knowledge about the Non-communicable Disease Burden in South Africa	13
► Looking Back, Thinking Ahead: Convention 2019/20	19
► Fintech Scoping in South Africa	21
► I had this Perfect Dream ...	22
► Climate Change: The Earth is a Fine Place and Worth Living For	25
► IDSC Africa	27
► Routes to the Top - Data Science & Analytics	30
► Believing the Bot - Model Risk in the Era of Machine Learning and Deep Learning	37
► Can South Africa Leapfrog to Value?	40
► Students' Section	43
► Book Review	45

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 or staff.

Patron : Lusani Mulaudzi
Editor : Mike McDougall
Pictures Editor : Jo Coetzee
Student News : Stephanie da Silva & Kholeka Mdluli
Design & Layout: Vegiah Design

ACTUARIAL
SOCIETY
 OF SOUTH AFRICA

Editorial



Mike McDougall (Chief Executive)

It has been said that a week in politics is a long time. In the life of a rapidly spreading pandemic, a day can be a very long time. Less than four months after Corona Virus 19 (CV) was first identified in Wuhan and less than three months after the World Health Organisation (WHO) was still insisting that it could not be transmitted between humans, citizens from many of the world's democracies (including South Africa) are, with little protest, accepting the need to go into lock down/ quarantine, isolation/ house arrest. These are extraordinary times, where people who fought so passionately for freedom, accept the need for a temporary curtailment of their liberty for the greater good.

While for many people this will be a time of financial hardship when they cannot go about their daily business (you cannot paint someone's house while confined to your own), for actuaries and related professions it can be an opportunity for increased analysis and reflection. More specifically, it provides members of the profession an opportunity to serve the public good by analysing and modelling the pandemic and for real live testing of our risk

management techniques and capital adequacy provisions. In this edition, Andries Schutte provides some information on early CV specific ERM work that has been done in the profession.

However, while CV remains front and centre of the national and global debate, it does not detract from the other challenges we face. CV could serve to compound the fall-out from many of our other challenges – adding a further toxic ingredient to our HIV and TB challenges while reducing economic and food security for many poorer citizens. While CV, TB and HIV have tended to hog the headlines over recent years when considering fatal diseases, there has been less publicity for the equally deadly but less trendy killers – diabetes, heart disease, cancer and high blood pressure. These non-communicable diseases, which are influenced by genetic, environmental, dietary, exercise and other lifestyle factors, are systematically marauding through many of our communities leaving a trail of disability and death. As the country moves towards a comprehensive national health insurance system, it is critical that we get an understanding of the long-term human and financial cost of these killers. Work done by Precept that is shared in this edition gives some insight into the possible impact.

A day might be a long time in the life of a pandemic, but what happens during that day compounded with the full range of other factors and challenges, can have consequences for families, communities, the country and the world that last generations. There has never been a more apt time for actuaries to grasp our public interest responsibilities and use our skills to analyse and model the pandemic and its impact and then to advise decision-makers at all levels as they make decisions that will have generational consequences. 

COVID-19

A white swan, a long time in the making

- Andries Schutte

“We are quick to forget that just being alive is an extraordinary piece of good luck, a remote event, a chance occurrence of monstrous proportions.” - Nassim Taleb , author of Black Swan

Black Swans – completely unexpected events – have featured widely in risk management publications and discussions in the decade after the financial crisis of 2007-08. Nassim Taleb points out that a global pandemic, like COVID-19, is in fact not a Black Swan, but a “White Swan” – an event that is certain to happen at some point.

Indeed, the World Health Organisation (WHO), amongst other organisations, has had Influenza on its watch lists for some time. And for good reason. Respiratory diseases have been on the top 10 killer list globally, and in low income countries, the biggest killer according to the WHO. The rapid onset and spreading of the COVID-19 virus was reported, flagged, and on all the right agendas very rapidly.

However, this novel micro-organism’s infection rate caught many off guards, and unfortunately it is more lethal than many of its predecessors. Neither the infection rate nor the incremental mortality gets the disease separately on the top priority list, but the combination is devastating. The mathematics of the virus is both fascinating and horrifying.

What has transpired since the first line of defence failed, to use risk management language, is the sad realisation that our second and third line of defence is weak (speaking from a global perspective). We are not prepared for White Swans.

South Africa

I want to focus on societies in South Africa in this article. President Ramaphosa acted decisively early on in the local outbreak of the disease. From his “lockdown” speech on 23 March 2020: “This is extremely dangerous for a population like ours, with a large number of people with suppressed immunity because of HIV and TB, and high levels of poverty and malnutrition.”

How big is the problem, and where are these communities? At Riskscape we have spent years building granular data on addresses, houses, demographics, remotely calculated property sizes, property values, property ownership, etc. Our main lines of business include KYC, risk, and capital planning and pricing for banks and insurers, but we did, however, perform the geospatial analytics for the Competition Commission in their Health Market Inquiry, a vast and complex health study. So let us try to demystify local society a little, and unpack vulnerability in the context of the current pandemic.

Who is at risk of becoming seriously ill?

Looking beyond what President Ramaphosa identified as important risk groups, the US Center for Disease Control indicates that this

is a new disease and there is still limited information on who is at more risk than others for becoming seriously ill. Currently their definition of risky population subgroups include older people, over 65 or 70, immunocompromised people such as people with HIV, and people with lung impairments (e.g. due to Tuberculosis) and heart conditions.

In terms of the spreading of the disease it is worth noting from a recent London Business School study that the young may be more active carriers of the disease. For this reason there is a lot of value in extensive and wide testing.

How are the forecasts of infection rates performed?

There are currently a wide range of models used to predict infection rates. Some simpler models like the SIR model have little descriptive appeal since its only based on a few parameters, is potentially overfitted to positive cases (which is more pronounced early in the curve development), predicts a

single infection rate peak, and does not produce reliable point estimates in my view early in the curve development. Models such as those developed by Imperial college are seemingly very sophisticated and caters for constraints such as ICU bed availability etc. Critically however, most of the models referred to in the media and used by high level government do not adjust for geospatial risk groups.

Is this important in South Africa?

Where will the virus go?

South Africa has around 16 million residences, of which 6 million are formal structures. What I mean by formal is that these residences are recorded in the surveyor general records, and ownership is recorded in the deeds office records. How do I know? We have various databases of granular information, but the two main sources are 1) the deeds records, and 2) we digitise every structure using photogrammetry on satellite images. The graph below shows how this looks in a structured informal area:

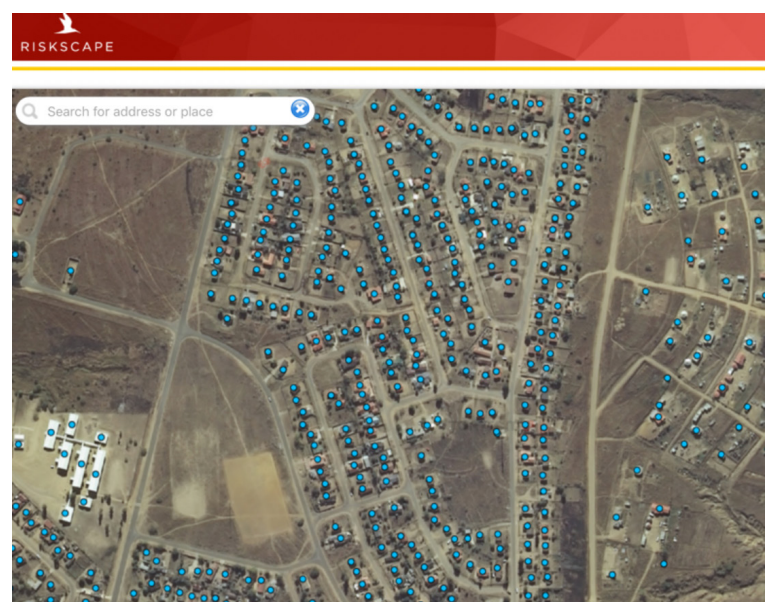
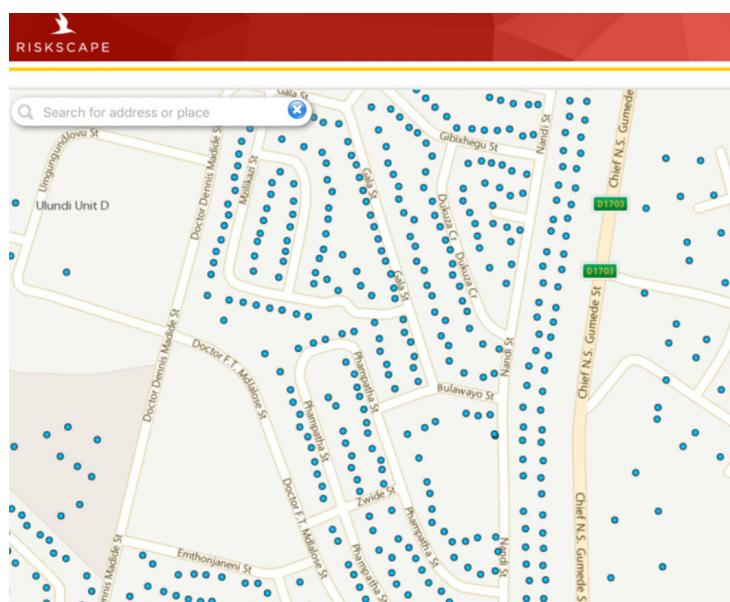


Figure 1 Digitised building points

These residences do not have deeds records or street addresses.

When we zoom out and look at South Africa as a whole, the denser populations can clearly be seen in the graph below. Obviously, the number of people per household is not the same everywhere, with informal housing having more people per house on average than formal housing. However even taking into account sectional title residences, informal settlements have a higher density in any event and therefore the residence count method is a sound method for prioritising dense populations.

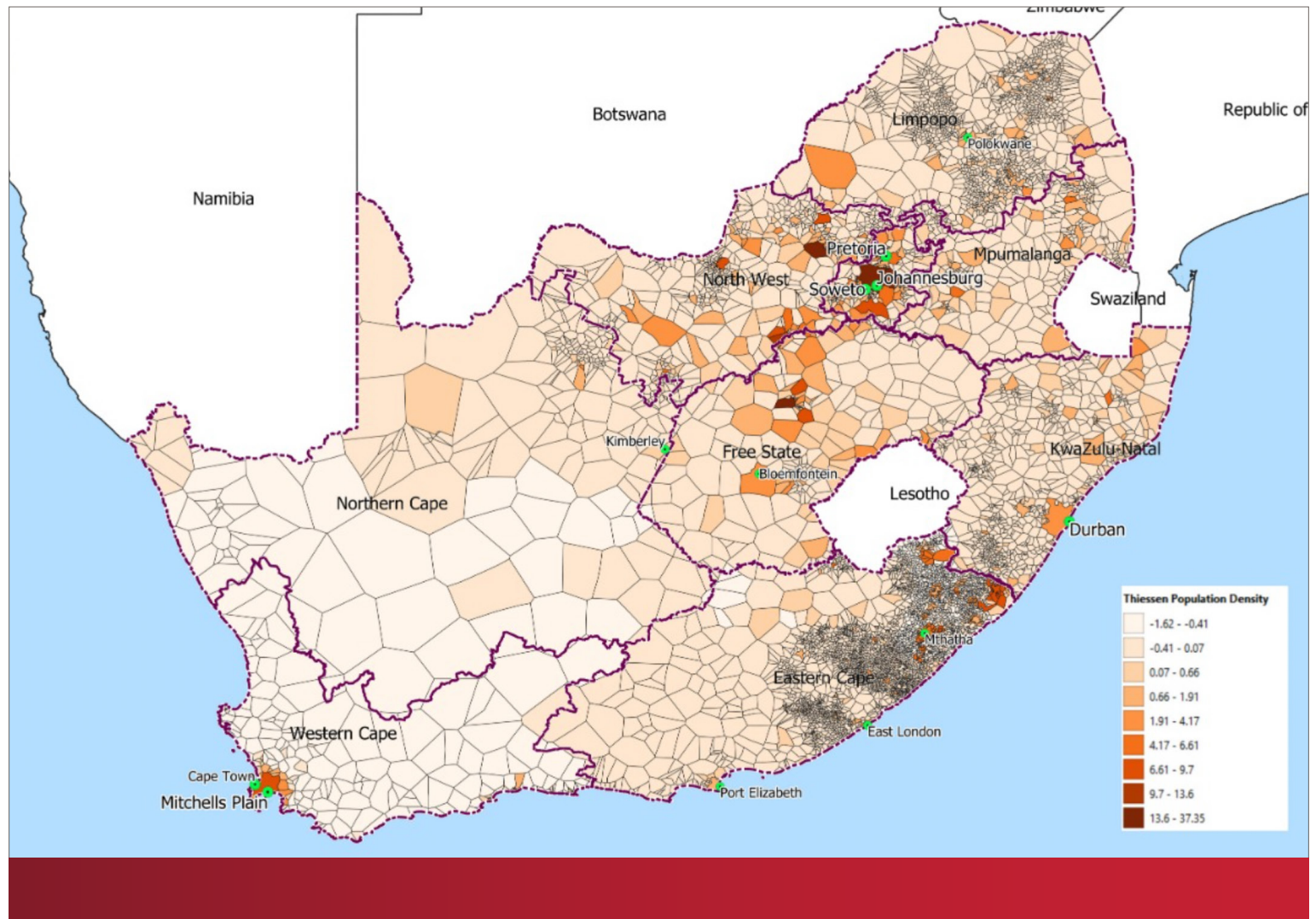


Figure 2 National housing density

If a rather granular level for display is chosen, such as the enumerator areas (EA's) which corresponds to the Stats SA reference definition, then at national level density cannot be appreciated visually. An EA typically contains around 150 to 200 households, and there are about 103 000 of these areas nationally. So to enhance the visual interpretation in the map above we have used Thiessen polygons defined by population density. Darker areas are denser. The weight of Gauteng in national density can be seen more clearly. What is also noticeable is the number of small dense areas in the Eastern Cape.

At the timing of writing this article, around half of the positive cases were in Gauteng. It is still early days in the disease outbreak, and numbers are likely to change significantly. But Gauteng is severely at risk. Gauteng is highly dense, and the prevalence of the outbreak high. Using more recent data (2018) the below map shows EA-level population density.

"It feels unreal, like something out of a Hollywood blockbuster."

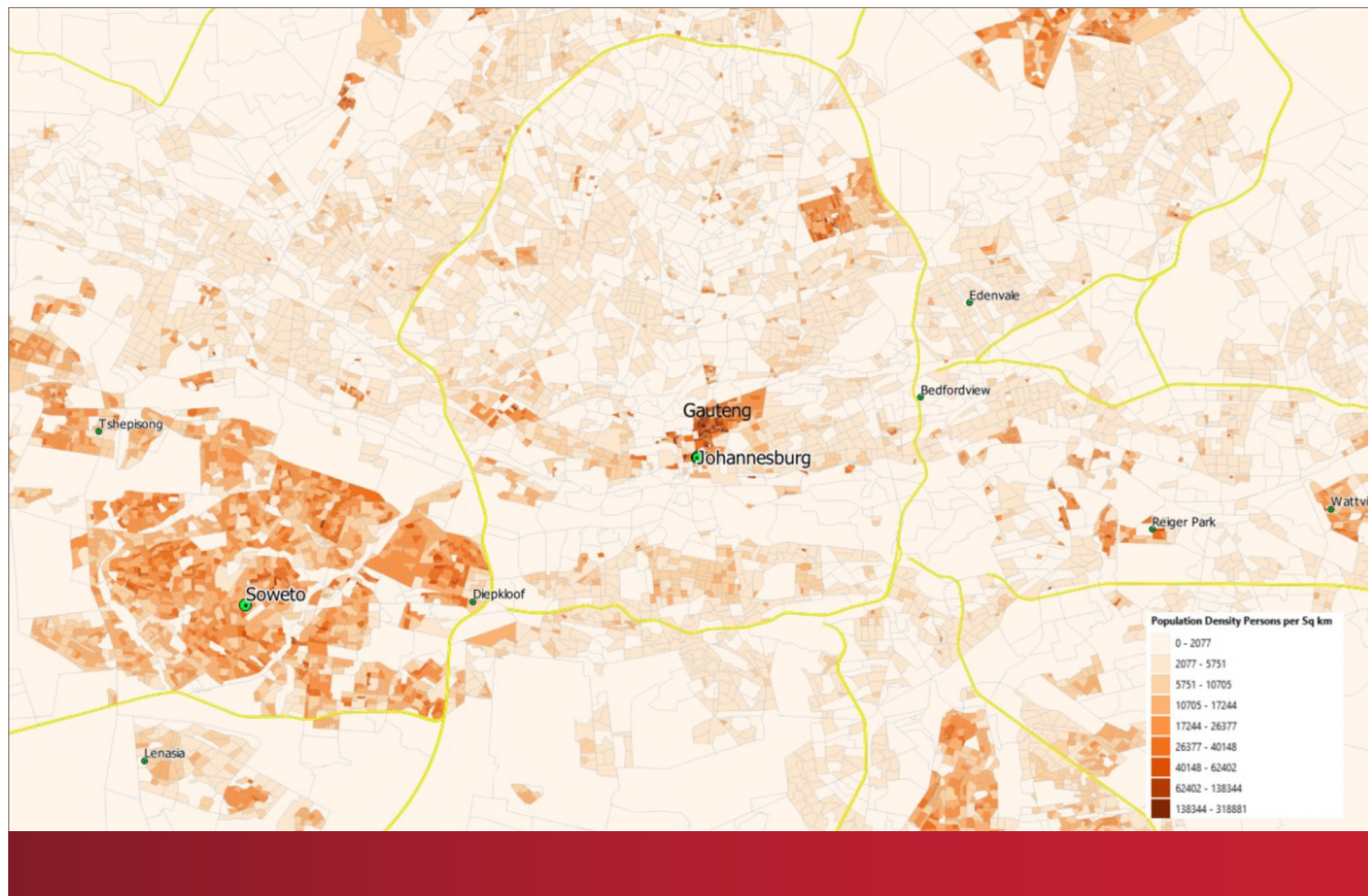


Figure 3 Gauteng province population density by EA, focussing on Johannesburg and the south of Johannesburg

The prominence of Soweto in this figure is obvious. Focussing now on building points, how does Gauteng look when we display only informal housing? The map below shows informal housing building points, styled as a heat map for ease of visual interpretation.

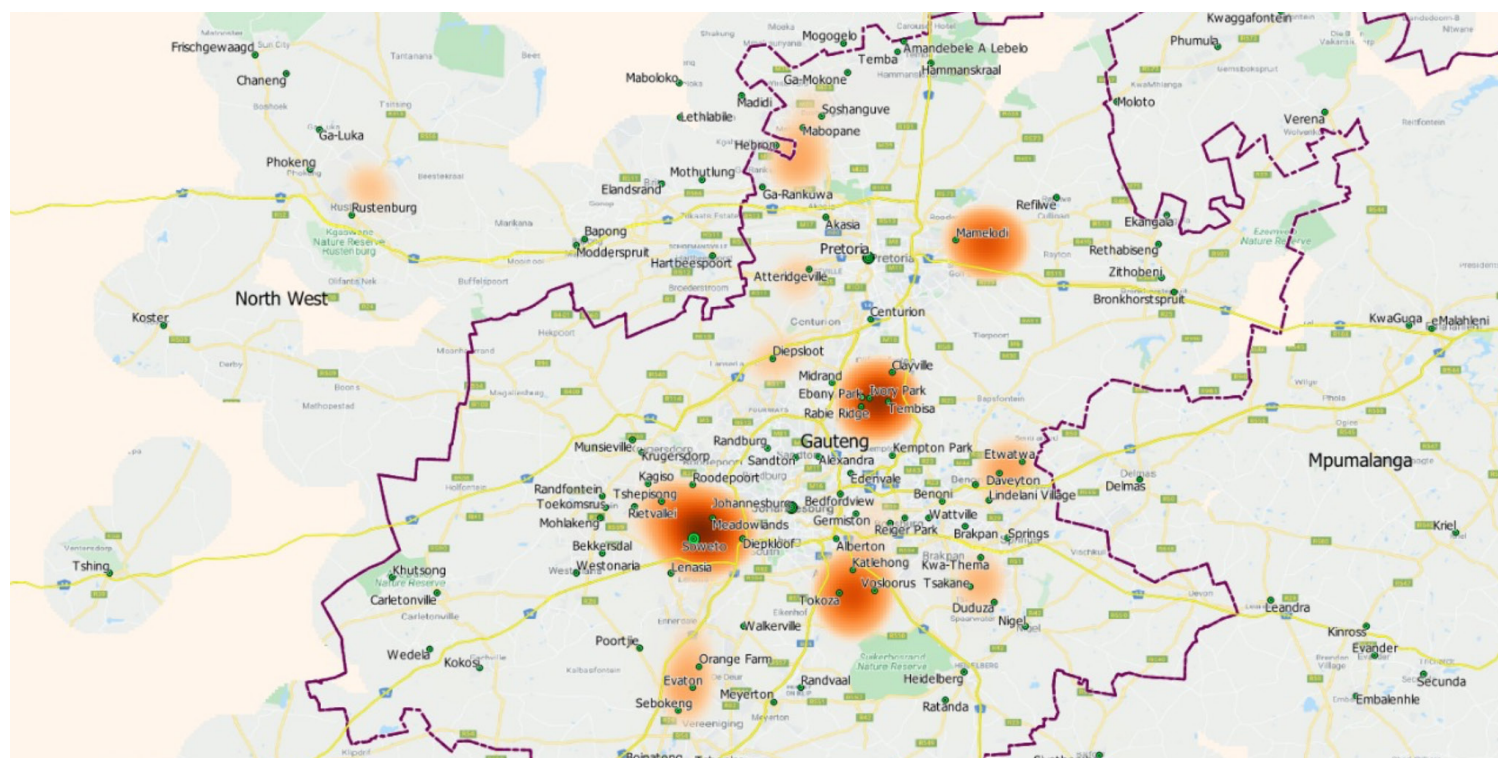


Figure 4 Gauteng province building points heat map – Informal Housing

Looking at informal housing where more vulnerabilities may coincide – the focus areas for the management of the disease is clear. Soweto, Thembisa, Mamelodi, Thokoza, and the areas covering Garankuwa to Soshanguwe represents millions of people. The appeal of using Thiessen polygons or EA level definitions is that spread modelling can be dealt with easier. As stated above however, there are over 103 000 EA's in South Africa, so this can become a bit clumsy.

Enhancing the population density view to focus on vulnerable subgroups, the map below shows such an example – people aged over 70 in Gauteng. Also included in this map is the public and private hospitals, and the main roads, for context.

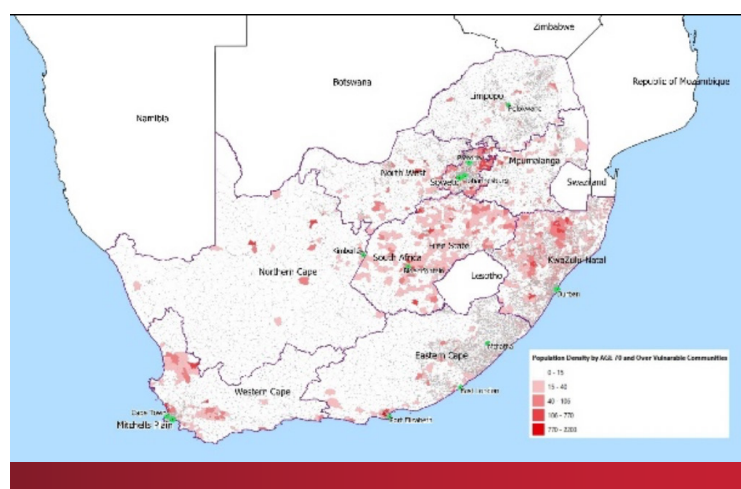
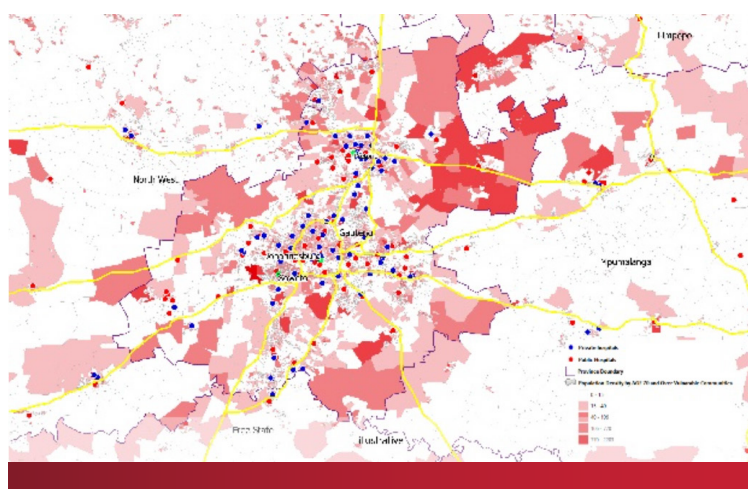


Figure 5 Gauteng Province/ National Vulnerable people older than 70

What should the government do, statistically speaking?

The data can be packaged and used in many different ways in the context of the COVID-19 virus, including geospatial spread forecasting, operational management (e.g. field testing and mobile clinics), and even to understand economic impact and policy responses. Within the context of Government managing the effect of the virus and for the moment focussing on saving lives, it seems that adjusting the epidemiological models to cater for spread to vulnerable communities and enhancing the severe case load forecasts appears doable. This will also allow for a more optimised strategy in managing the COVID-19 disease within realistic resource and capacity constraints, whilst having a better grasp on what the salient consequences might be.

Actions to take (amongst others) according to Professors Paolo Surico and Andrea Galeotti of the Department of Economics at London Business School, in their recent publication

“The economics of a pandemic: the case of COVID-19”:

1. Test a representative sample of the population (independently of symptoms), recording socio, economical, demographic and locational characteristics at the household level.
2. Use standard statistical methods to infer the household characteristics most likely to predict whether someone is infected or not in the whole population.
3. Develop surveillance strategies based on the information revealed in (2): nation-wide contact tracing, targeted social distancing.

They argue that the goal should not only be to flatten the contagion curve, but also to prevent the second outbreak. This appears to be possible with the data discussed above, amongst other things. It also enables a response from our Government that can move beyond the compelling immediate focus of saving lives, to the imminent problem of saving the economy (and lives).

What should we be thinking about as actuaries?

The data and analysis can also be useful for business, and indeed for the corporations actuaries serve. Stress-testing and scenario analysis can be enriched, corporate social responsibility can be focussed, and the impact on customers in their communities could be assessed. Aside from the shock effect on financial markets, the duration of the dislocation is likely to have a significant impact on financial institutions due to:

- **Uncertainty about the spread and duration of operational disruptions.**
- **Extensive stats being available but being backward looking; projections are static and meant for research or governmental policy making (e.g. which policy actions are more or less effective on a relative basis).**
- **There being large variation in the experiences of different countries making learnings from abroad difficult.**
- **It being difficult to separate out insights from the massive amount of media coverage and panic.**

As a result, financial institutions and markets authorities are finding it difficult to form a view on:

- **How long could remote working and other drastic measures last?**
- **How long and severe is the impact likely to be on financial markets and the economy?**
- **How severe could the impact at a macro-economic level be?**
- **Which borrowers (both companies and consumers) are likely to not be able to withstand the potential duration of stress?**
- **What would the impact on financial institutions and financial stability?**

Having a framework of analysis that can be synchronised with Government's policies, will prove very valuable to business.

Conclusion

The COVID-19 virus came out of nowhere. It overtook our lives, and changed what seems to be everything, overnight. It might have been a White Swan, but it was not widely expected. And we were not ready for it. It is different from the last global Black Swan crisis in 2007/8. Its effects are not felt gradually and then suddenly. It was just suddenly. The pace of change will not slow down, and business visibility is at an all time low.

People have described this as our generation's world war. It feels unreal, like something out of a Hollywood blockbuster. Managing the effects of the outbreak is hard because it is so fundamentally uncertain. But we have to act.

First of all, lives can be saved. This starts with understanding our population, customers, staff and communities better – data is available. Analysis can assist in the prioritisation of interventions, both for Government and private business. We are in uncharted territory, but actuaries are familiar with the dimensions of the problem and we have the tools to help navigate the crisis.

The time to act is now. It is vital for focus to be able to shift from saving lives to saving the economy, which inevitably is going to be our next major challenge. Perhaps we can still convince Prof Taleb that staying alive is not an extraordinary piece of good luck. 

Andries Schutte FASSA CERA

Director: Riskscape, and Partner at True North Partners LLP

andries@riskscape.pro
andries.schutte@tnp.eu

THE TREASURE HOUSE OF THE MIND



South African Actuary: Tell us a bit about your early years – where you grew up, and so on.

Memory Zimba: I was born in Kasama Zambia, Kapata Village, and grew up in Polokwane, Limpopo. I worked hard in my studies, joined the choir, played chess and every sport my height and strength would allow. My proudest accomplishment is forming a Rotary Interact Club with my friends. I was President. Also taking a group of Grade 11s to Australia to add our voices to the outrage of the violence against women and children. It is very sad that the outrage continues, but I remain hopeful about the future because the spotlight will remain on this issue until there is substantial change.

Memory, according to Thomas Fuller, is the treasure house of the mind, wherein the monuments thereof are kept and preserved. Memory (Zimba) is also the President of the Association of Black Actuarial Professionals (ASABA).

SAA: How did you become aware of the actuarial profession?

MZ: In Grade 11, one of the MTN sisters (Memory, Tumi, Nthabeleng) mentioned actuarial science as a possible career choice. Apparently, only the smartest people studied actuarial science.

SAA: What made you decide to become an actuary?

MZ: Vanity. I decided to study actuarial science to prove I was the smartest of the MTN sisters.

SAA: What do you enjoy most about being an actuary?

MZ: Everything we work on truly makes a difference to society. We enable individuals to financially future-proof themselves against risks. Insurance companies reporting to the Prudential Authority, for example, help maintain the stability of the insurance industry so that funds are available when people face catastrophic events.

SAA: Did you run into any major obstacles on your road to qualification and, if so, how did you deal with them?

MZ: I was diagnosed with clinical depression in 2006 and was on medication until the end of 2008. This destroyed my confidence and it was exacerbated by the perception of being regarded as lazy by some of my lecturers. When I failed my 3rd year in 2008, I decided I needed a blank canvas to redefine myself, free

from external influence. In 2009, I took a gap year and I went to Dubai for about a year, working at Armani Cafe. Dubai exposed me to extremely successful and wealthy individuals. There, actuarial science became the foundation for my legacy. Success, wealth and acceptance became less important to me. I focused rather on demonstrating that it is possible to achieve anything you put your mind on irrespective of the cards life has dealt you.

SAA: Now, to your role as President of ASABA. Do you have any specific objectives for your two-year term?

MZ: Above all, I want to put the spotlight on the members of ASABA to expose the excellence of the individuals that make ASABA. I believe by focusing on some of the psychosocial issues that hold us back through, for example, dialogue and collaboration with organisations similar to ASABA, there is potential to find lasting solutions to the inequality and inequity that has necessitated transformation.

SAA: And any special projects?

MZ: ASABA Excellence Academy, starting with ASABA Exco becoming a formal Leadership Development Programme.

SAA: And career-wise, where would you like to be five years from now?

MZ: My only new year's resolution for 2020 is to have a concrete answer to this question rephrased; "where does your career need to be in 5 years to facilitate your passion for empowering and developing others?". I focused so much on qualifying that it defined everything I did to a large extent. I do not want my career to define me, I want it to enable me. 

STARING INTO THE ABYSS

- THE CURRENT STATE OF KNOWLEDGE ABOUT THE NON-COMMUNICABLE DISEASE BURDEN IN SOUTH AFRICA

AUTHORS: Emma Finestone, Kwezana Matanga, Yageshree Moodley, Shivani Ranchod, Anja Smith, Ursula Torr, Beth Vale, Jodi Wishnia (all Percept)

Non-communicable disease (NCD) is a catch all term for diseases that are not infectious - which means that an affected person generally cannot transmit the illness to anyone else. It is widely accepted that NCDs are borne out of a complex mix of environmental, socio-economic and lifestyle factors. The five main groups of NCDs include: cardiovascular (heart) diseases; diabetes; cancer; chronic respiratory diseases (including asthma); and mental disorders and other mental health conditions.

The addition of mental health disorders as an NCD is a recent development and reflects the growing recognition of the underlying burden of mental health conditions.



Historically, this group of diseases were referred to as ‘diseases of lifestyle’, given the way that these conditions are contracted – through the foods we eat, whether we choose to use tobacco products, our weight, physical activity or general living circumstances. However, this punitive naming was quickly recognised as unhelpful and devoid of the complexity and inter-relationship between humans and their environments, including the systemic factors that shape their environments. There is a recognition that there are many systemic factors beyond the control of the individual, which are often correlated with socio-economic status, that have given rise to the growth of NCDs in low- and middle-income countries (LMICs).

Importantly, a person can have more than one NCD – in fact, this is increasingly becoming the norm in LMICs given the shared risk factors for many of the diseases – such as cardiovascular and diabetes.

How should we think about the drivers of NCDs?

A combination of both individual and system-level factors give rise to NCDs.

NCDs are driven mainly by four individual risk-related factors: tobacco use, harmful alcohol use, unhealthy diets and physical inactivity. Some global health research and official policy documents mention also environmental risks factors, e.g. air pollutants and plastics, as a fifth factor. There has more recently, given the increasing recognition of mental health disorders as a group of NCDs, also been a call to include childhood adversity as a risk factor.

However, this approach on its own reflects a largely individualistic view – the idea that the individual is responsible for his/her own health and is able to address the circumstances that may result in him/her engaging in these ‘unhealthy’ habits. There

are multiple systemic factors at play that go beyond the individual. Factors such as poverty, access to healthy food options, employment opportunities and standards are some of the examples. These factors don’t only impact on NCDs, meaning that these efforts need to come from a collaborative inter-governmental approach rather from the health sector alone. This is the crux of what makes these types of illnesses so difficult to control and manage.

What do we know about NCDs in South Africa?

The first thing to know about determining the state of NCDs in South Africa is that the data sources are fragmented. One of the reasons that it is so tough to find data on NCDs is that the conditions are generally not notifiable (i.e. there is no public health regulation enforcing data capturing, like there is, for example, for Tuberculosis). Another reason has been the historical domination of communicable diseases and the urgent response these conditions have required. The most obvious example is HIV, where data was crucial to case finding, disease prevention and adherence.

Given the absence of comprehensive data, it is necessary to use several datasets in order to get a picture of the burden of NCDs – no one data set fully explains the picture for the entire country.

While data from nationally representative household surveys like the General Household Survey (GHS), the National Income Dynamics Study (NiDS) and the Demographic and Health Survey (DHS) capture rich individual and household-level data on geographic and socio-economic characteristics, the self-reported disease data in the surveys have limitations. Clinical data, i.e. data from the health system (whether public or private) are thus the preferred data source for understanding how many people actually have a disease. But these data do not always contain indicators on the socio-economic conditions or behaviours which may have helped to give rise to the NCD in the first instance, or data are only reported on in an aggregated way and not available at an individual level, masking the many individual underlying dynamics.

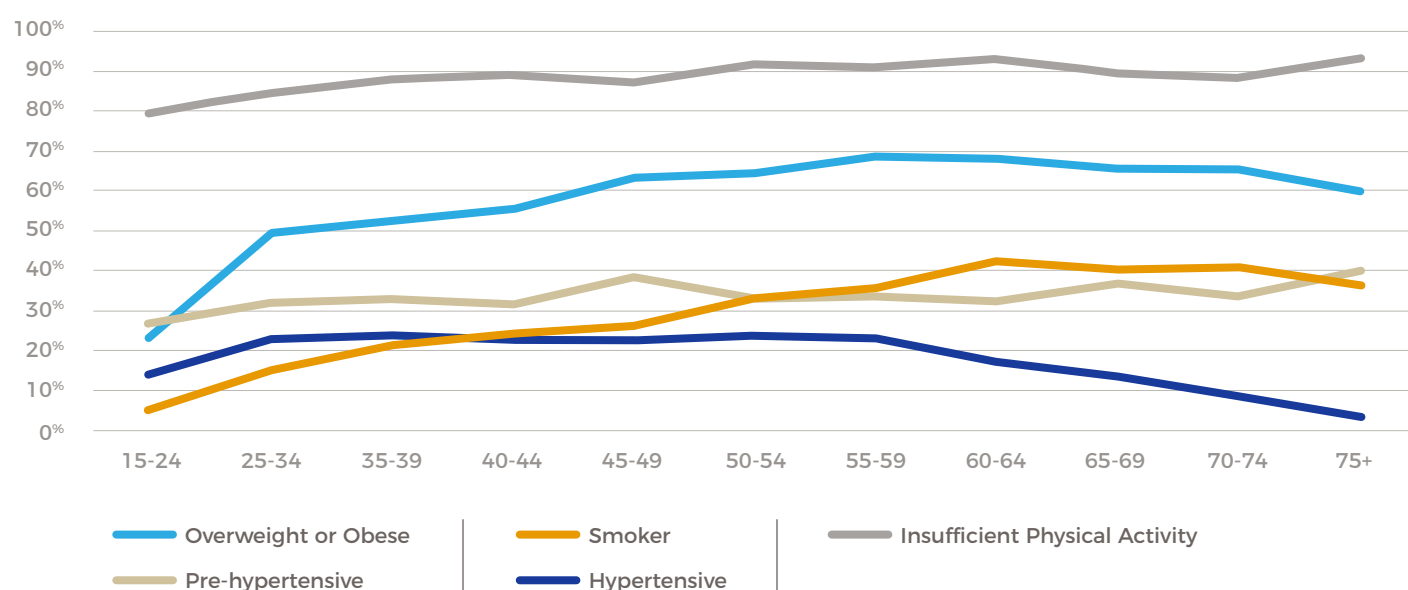
Putting together various data sources allow us to understand the context in which these diseases have developed and their overall incidence and prevalence much better. We can also identify who suffers most from these diseases by looking at socio-demographic (age, sex, income) and geographic data. In the remainder of the article we use data from two South African household surveys and some international epidemiological data.

South African living conditions lend themselves to the development of NCDs. South Africa is one of the most inequitable countries in the world. The gap between the rich and poor is large, and growing, and the unemployment rate is exceptionally high. Even more so when you look at unemployment within the 15-24 year age group, which has continued to grow at an alarming rate. Access to early childhood development centres is patchy and our basic education system is failing. Although there have been some improvements in labour conditions through the introduction of a basic minimum wage for some informal

sector jobs, like domestic work, people are still forced to work long hours, travel long distances and find ways to make a small income stretch further.

As a result of these factors, survey data and other datapoints show a worrying trend in NCD risk factors. A very high proportion of South African adults report insufficient levels of physical activity. There is a clear growth in individuals being overweight or obese as they age, with more than half of adults being overweight or obese based on objective measures in the age band 35-50. Research has found a link between childhood malnutrition and obesity in adulthood which again reminds us of the systemic factors that influence NCD incidence. While only 5% of individuals are hypertensive (using objective measures) in the age group 15-24, by the ages of 50-55 a third (33%) have developed hypertension. Smoking is the only risk factor that has a decreased prevalence as a person grows older.

Figure 1: Risk factor prevalence in South Africa (Own analysis, NiDS 2017)

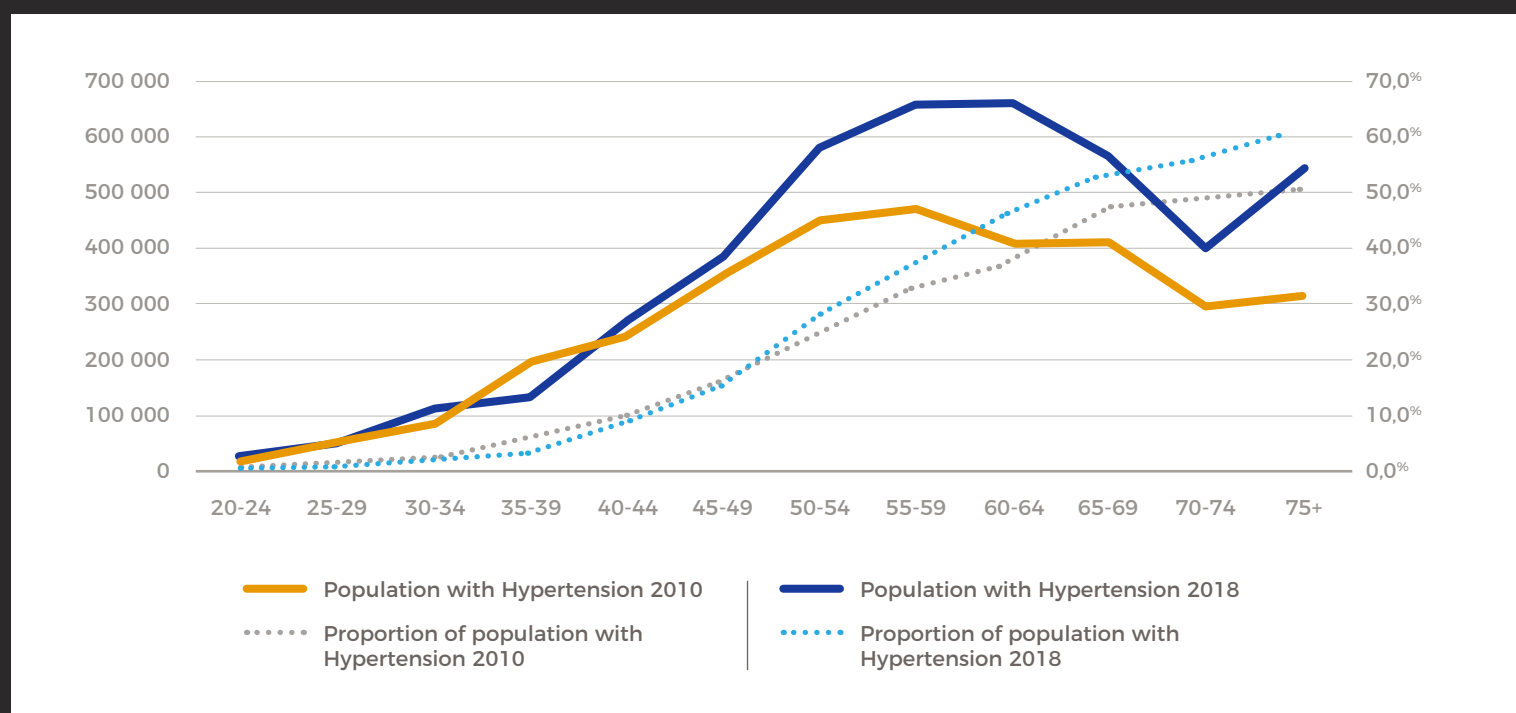


Mental health reporting was not included in the above figure but is critical in terms of the NCD prevalence. South Africa's mix of a high burden of disease, huge financial stressors both for those employed and not, and the high levels of violence and traumatic injury all create a breeding ground for mental health problems.

There has been a large growth in recent years in the incidence, and by implication the overall prevalence, of the population who report having been diagnosed with NCDs. The complex interactions described above have helped to give rise to a high and growing number of people affected by NCDs.

While this conclusion applies to most NCDs, here we use data on the proportion of the adult population who report having been diagnosed with hypertension as an example. Between 2010 and 2018 there has been a large increase in both the absolute number and the proportion of the population who report having been diagnosed with hypertension by a clinician (Figure 2). The increases are seen more sharply from age 50, which aligns to the notion that NCDs are intimately related to ageing. For individuals aged 60-64, self-reported hypertension increased from about 32% to about 40% between 2010 and 2018.

Figure 2: Number and share of population who self-reported having been diagnosed with hypertension - 2010 vs. 2018 (Own analysis, GHS 2010 and 2018)



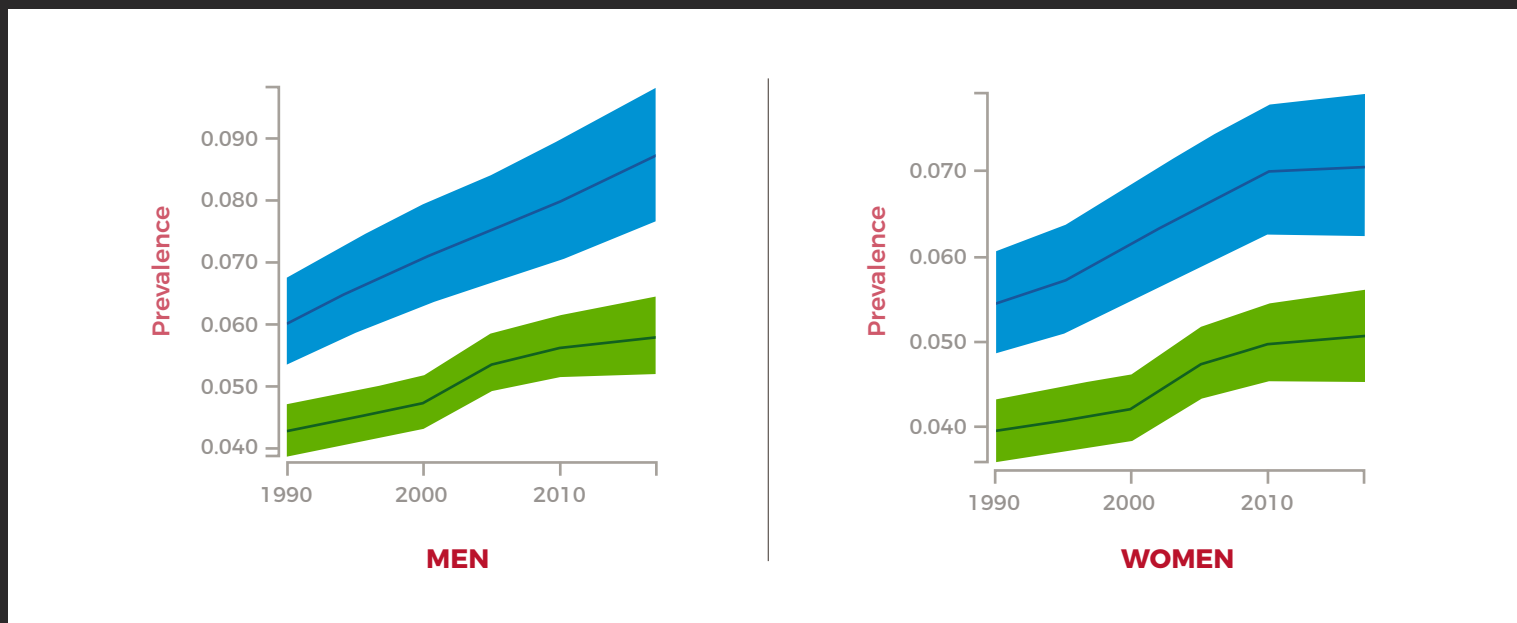
What are the implications for the health system, insurers and the economy?

NCDs have moved high on the global health agenda. Most NCDs require chronic medication and life-long interaction with the curative and rehabilitative health system. This places a severe burden on health systems, and more specifically public health

systems, which have the added constraint of delivering free at point of care services with limited budget. Because of the increasing importance and growth of NCDs, this group of diseases can now be considered a public health emergency.

In South Africa, particularly, the trend is worse. In Figure 3 we compare the global data (green), with South Africa's data (blue) on Type II Diabetes. What the figures show clearly is that South Africa's burden far surpasses the global burden.

Figure 3: Global Type II Diabetes total population prevalence (%) trend (green) vs South Africa trends (Blue) (Institute for Health Metrics and Evaluation 2018)



NCDs place a large burden on the health system. These clients require ongoing care and management, which further places pressure on public health systems struggling to meet the demand for care. Therefore, ways to manage stable clients outside of the health facilities become a pressing issue.

The cost of the growing burden is substantial. Not only do these clients require medication and regular consultation with healthcare professionals, but this population also represents a riskier one. The confluence of NCDs with age, morbidity and secondary illnesses is significant. This means that the potential cost of these clients to the health system could be much larger than costs posed by clients without NCDs. However, the good news is that the strong HIV orientation in the public system means that the capability for dealing with people living with a disease on a long-term basis is already there – it just needs to be better oriented towards multi-morbidity, and other diseases need to be better measured and integrated. This implies medium-term adjustment costs for the health system but these should not be insurmountable.

These individuals also pose large costs to insurers and an inability to correctly

measure and price their risk can have large implications. Cancer is already roughly 30% of overall claims cause in most retail insurance books. Another approximately 25% of claims are due to cardiac and cardiovascular causes, with a further 10% due to stroke and respiratory disorders together. The huge burden and cost of these diseases is crucial to robust and sustainable financial protection in death, disability as well as critical illness insurance products. Understanding the human impact and ensuring relevant cover, given the changing risks at play as well as pricing these risks, is fundamental to successful insurance protection to deal with family and business security.

NCDs generate clear knock-on effects on the economy: people missing work because they are ill, or in queues to receive chronic medication. NCDs can also have a very large impact on quality of life and can result in a massive deterioration in everyday functionality through, for example, amputations necessitated by diabetes complications, or the untreated symptoms of depression. This, in turn, can also have negative economic effects. It can aggravate the stress on both the individual and society through the need for caregiving and having to cope with chronic illness.

Conclusion:

The growing burden of NCDs globally, but more specifically also in South Africa, poses a very large and potentially destabilising burden to health systems and countries' economies. It can have a very large negative impact on the everyday wellbeing of individuals, their family and society as a whole. It is therefore important that we understand and address the origins and risk factors (individual and systemic) of these diseases, be able to identify who is most affected and continue to monitor and explore the interaction between different NCDs, and NCDs and other diseases. Putting together various data sources allows us to grapple at a deeper level for what NCDs mean for the South African health system, for insurers, for the economy and our society.

On Percept's larger NCD project:

Percept Actuaries and Consultants ("Percept") is embarking on a journey to understand South Africa's Non-Communicable Disease (NCD) burden. We are in the midst of a dramatic epidemiological "collision" with far-reaching human, social, health system, policy and business implications. The context-specific research to support effective strategies to adapt to this new disease

landscape is severely lacking and ways have to be found to make the health system and insurance issues brought up by the growing burden more accessible.

Percept has secured funding from the Actuarial Society of South Africa (ASSA) and the RGA Reinsurance Company of South Africa Limited for two research pieces on NCDs. The first piece is a series of twelve research briefs that aim to strengthen the public discourse and understanding of NCDs. The briefs will address the dearth of publicly available, authoritative single-source data on patterns and incidence of NCDs by triangulating data and estimates from multiple sources in order to produce a quantitative picture of the country's NCD burden, as well as that in different sub-populations. The brief themes will address a variety of issues, from the socio-demographic dimensions of NCDs, to disease deep dives and the cost and other implications for insurers. The briefs will also contain qualitative data presented in the form of vignettes, which has been collected by Dr Beth Vale through in-depth ethnographic research. The second piece will be a model that estimates the trajectory for key NCDs in South Africa. Both these pieces will be completed during the coming year. Both the briefs and the model will be made publicly available to inform the public and for use in planning and research. 

KEY REFERENCES FOR THIS ARTICLE:

Institute for Health Metrics and Evaluation. 2018. "Epi Visualization." <http://vizhub.healthdata.org/epi>.

Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2017, Wave 5 [dataset]. Version 1.0.0 Pretoria: Department of Planning, Monitoring, and Evaluation [funding agency]. Cape Town: Southern Africa Labour and Development Research Unit [implementer], 2018. Cape Town: DataFirst [distributor], 2018. <https://doi.org/10.25828/fw3h-v708>

Statistics South Africa. General Household Survey 2018 [dataset]. Version 1. Pretoria: Statistics SA [producer], 2019. Cape Town: DataFirst [distributor], 2019.

Statistics South Africa. General Household Survey 2010 [dataset]. Pretoria: Statistics South Africa [producer], 2011. Cape Town: DataFirst [distributor], 2011.

Stein, Dan J., Corina Benjet, Oye Gureje, Crick Lund, Kate M. Scott, Vladimir Poznyak, and Mark Van Ommeren. 2019. "Integrating Mental Health with Other Non-Communicable Diseases." *BMJ* (Online) 364: 13–16. <https://doi.org/10.1136/bmj.l295>.

Symington, E. A., G. J. Gericke, J. H. Nel, and D. Labadarios. 2016. "The Relationship between Stunting and Overweight among Children from South Africa: Secondary Analysis of the National Food Consumption Survey - Fortification Baseline I." *South African Medical Journal* 106 (1): 65–69. <https://doi.org/10.7196/SAMJ.2016.v106i1.9839>.

World Health Organization. 2018a. "Heads of State Commit to Lead Response to Beat Noncommunicable Diseases, Promote Mental Health." Newsroom. 2018. <https://www.who.int/news-room/detail/27-09-2018-heads-of-state-commit-to-lead-response-to-beat-noncommunicable-diseases-promote-mental-health>.

—. 2018b. "Report of the WHO Independent High-Level Commission on Noncommunicable Diseases." Geneva. <http://apps.who.int/>.



LOOKING BACK, THINKING AHEAD: CONVENTION 2019/20

- Marcé Marx, Chair: Organising Committee

I'd like to start by thanking last year's organising committee, the team's dedication and determination being central to pulling off a very successful Convention. Conventions hosted in Johannesburg have been less popular in the past. We also faced some stellar competition from the IAA Colloquium that took place earlier in 2019. **But despite these challenges, the team pulled together and executed a Convention with record attendance. Thank you to everyone who helped to put it together and to everyone who attended!**

Looking back, we decided to try a few new things and will continue to evolve the plan for 2020 based on the constructive feedback we received. We had some new in-depth discussion sessions, we opened with the National Anthem and we had more sessions covering 'softer' industry-topical issues. We kept the workshops that, once again, proved to be a hit and had three instead of the usual two keynote speakers. We worked hard to ensure the right balance between the different types of sessions and topics on the programme, while at the same time maintaining the high standards of the presentations. Transformation was also one of our focus areas and this was consistent throughout, including a number of discussion sessions.

The cocktail function was, as always, very well attended and enjoyed. Sadly, I was not part of the energetic group that was the last to leave the function but the feedback we received was overwhelmingly positive. Special thanks to the team that went out of their way to host an incredibly fun and well-catered function.

Turning to our plans for the 2020 Convention, I can say that the committee is already hard at work. As part of our work during this important

foundational phase, we will aim to incorporate the feedback and suggestions from the previous year where possible. Although it is not always possible to cater to all requests all the time, we will do our best to continue evolving the Convention to maximise value for participants.

Our priorities in this regard are, firstly, to maintain the quality and standard of the sessions. Secondly, we will look at the split between the different types of sessions. (i.e. keeping the in-depth discussions



as well as the mix of practice areas that the sessions represent – from the feedback received, we realise that there were not enough short-term sessions, and this is something that we will look at improving this year.) Naturally, however, the selection of topics depends on the submissions that we receive. We strongly encourage participants to continue submitting on topics that interest them.

Thirdly, we will work to secure a good variety of keynote speakers. We take the comments from last year on board in selection for 2020 and we aim to have a good variety of speakers present as well as insightful, relevant and practical content – I believe that the team working on this will strike the right balance.

Finally, there are a few other areas that we will look at in terms of changes or new ideas, with the Convention app being the most important of these areas. The app is a great tool not only for the delegates to navigate the Convention and have information available easily, but also for us to collect feedback. We need to ensure that it is value-adding and used properly.

As always, in putting all of this together, we will try to align with the overall objectives of the Society and President to ensure consistency in the message that is delivered. There is a great team behind the scenes, and we trust that the 2020 Convention will not disappoint! 🍷

FINTECH SCOPING IN SOUTH AFRICA

In October 2019, the FSCA published Fintech Scoping in South Africa. Dino Lazaridis explains why the research was done, emphasises key findings and identifies planned next steps for innovators and regulators.

Fintech is technology-enabled financial innovation leading to new business models, applications, processes and products. This financial innovation is transforming the financial services sector globally. Fintech has the potential to reduce costs and friction, increase efficiency and competition, narrow information asymmetry, as well as broaden access and be an enabler for financial inclusion.

To understand the kind of impact fintech is having in the South African context, in 2019 the Intergovernmental Fintech Working Group (IFWG) conducted landscaping research policymakers and regulators to better manage risk and enable innovation. This balance between innovation and risk is critical to enable fintech to deliver on access and responsible growth.

The report identified over 220 fintech start-ups. The identified fintech start-ups were founded from 2008 and all have a physical presence in South Africa. The report also divided the fintech start-ups into activity-based segments such as payment, insurtech, lending, savings and deposits, investments, capital raising, financial planning and advisory and business-to-business technology providers.

There has been a rise in the establishment of fintechs since 2008 owing to the Global Financial Crisis, which led to regulators around the world shifting their approach from light-touch to more intrusive regulation. To avoid this new approach, nimble fintech start-ups deliberately set themselves up to play outside the ambit of existing financial regulations. Additionally, the exponential growth of data being created every second, coupled with the drastic cost

reduction in computer power, created an opportune time to monetize this environment.

The report revealed that the largest and most mature of fintech segment is payments, making up 30% of all fintechs (68 entities). The second-largest segment is Business to Business technology providers, making up 20% of fintechs (48 entities). This segment offers business to business technology solutions to financial service providers that they leverage to build customer solutions. The third-largest segment is lending at 12% of the fintech market (28 entities). Within Lending, the online lending space has grown rapidly and is equally split between offering services to SMEs and individual lenders.

Stemming from the Report it is clear fintech activity in South Africa is vibrant and continues to grow in volume and sophistication. Given the growing prominence of fintech in South Africa, and in response to greater demand for information on fintech activity, in 2020 the IFWG will introduce an online portal of the landscape data to make it more interactive and readily available to all stakeholders.

Furthermore, in 2020, building on the findings of the landscape report regulators will launch a Fintech Innovation Hub that will provide information and clarity regarding financial services regulation, test innovative products and services, and look to ultimately evolve existing regulations in order to enable innovation whilst managing risk. On that note, 2020 promises to be an exciting year in terms of fintech innovation coming out of the market and increased collaboration between regulators and innovators. 



I HAD THIS PERFECT DREAM ...

PLEASE NOTE: This was written before COVID-19 has started to have an impact on our lives. We rewrote the article to accommodate that. And then reverted to the original.

You may have recognised the opening line of *Barcelona*, the duet by Freddie Mercury and Montserrat Caballé that became the signature song for the 1992 Summer Olympics.

While working for, shall we say (no advertising) one major life insurer, Antonio Gambino ran the Soweto Marathon and won a trip to Barcelona, sponsored by, shall we say, another major life insurer (see “Now My Dream Is Slowly Coming True” in the box). Try as he might, though, he could not outrun *South African Actuary*.

South African Actuary: Give us some background – where you grew up and so on.

Antonio Gambino: I was born on the Cape Flats – Hanover Park in 1993. I grew up in Ocean View from 1995. I attended Marine Primary School and Ocean View Secondary School. Both schools are situated in Ocean View. In 2012, I studied BSc in Mathematics and Computer Science in the extended Science faculty programme, having been rejected from entering the accounting stream in the Commerce faculty at UCT. In 2013, I studied Business Science Finance with Accounting (CA stream). In 2014, I started studying Actuarial Science and graduated with a 3-year BCom degree in 2017.

SAA: Tell us what you are doing currently (at the office).

AG: I started working at Sanlam Sky in Johannesburg in 2018, focusing on experience investigations. I moved to Independent Actuaries & Consultants in 2020 to start doing client-focused work back in Cape Town. This has a lot to do with valuations of different clients in the life space, coding in Mo.net and a bit of short-term experience.

SAA: How did you become aware of the actuarial profession?

AG: The first time I heard about actuarial science was on a camp back in Grade 11. A lady asked me why I didn't study actuarial science since I'm the "brainy one". The first time I heard about the profession was at an information session from Deloitte where Peter Tripe gave a speech about what actuarial consulting was like back in 2012 – I wasn't interested in the profession at that point since I still wanted to become a CA.

SAA: What attracted you to the profession?

AG: I wanted to become a CA but once I studied accounting back in 2013 for the first time, I knew that I wanted something more mathematical in the finance industry. That's when I started studying courses in line with actuarial science and got accepted in the stream a year later.

SAA: What did you find particularly challenging at university?

AG: I had my fair share of challenges my whole life through. I had to tutor in order to get some cash flow to put bread on my study desk as well as to look after my family. My dad was unemployed since 2008 and my mom was unemployed since 2014. When I did Models (CT4) in 2015, I struggled immensely because I couldn't focus 100% on my studies because I had to tutor to put money on the table. It was a very challenging course for me. I got the exemption in 2016 after repeating the course a year later, thankfully. Contingencies (CT5) was also challenging for me but I never really focused on it as much as I would have liked. I only managed to get this exemption in 2018 through the board exam.

Fourth year was incredibly difficult because not only did I struggle to get some cash flow, I struggled to get accommodation. I couldn't focus on fourth year so I ended up getting a BCom degree after 6 years at university, but I'm happy to be a first-generation graduate.

SAA: How hard was it to adjust from being a full-time student to being a full-time employee and part-time student? Do you have any advice in this regard for people currently in this process?

AG: It's actually quite challenging because I always wanted to get a stable salary like most of us do (if not everyone) but because I still have so many exams outstanding, it can be difficult to find the motivation to continue studying after varsity. I value my eight hours of sleep because when I'm sleep deprived, I'm not productive at work. Work can be quite stressful at times when there's pressure to deliver, especially in a consulting environment. Work can also be energy-depriving and cause tiredness at the end of a day.

My advice would be to not rush the exam process (I'm still in this process). Don't take more exams than you can handle. The road to qualifying is a long one. There's no need to take on too much because it also comes at an expense. This expense is from

most employers the very first time around and if there is failure involved, the employer might stop paying in accordance with the study policy.

Getting a study plan in place is crucial to ensure that whatever exams are taken are done in a reasonable time frame.

SAA: If you could do one thing differently, what would it be?

AG: I would definitely not take on so many exams as I have done in my first year of work. I was very confident and I didn't back it up with exam passes

for all my attempts. It's not always possible to pass every exam attempt but at the very least, it's important not to be over-confident.

SAA: Where do you see yourself five years from now?

AG: For me, I see myself at the Associate level attempting to fully qualify. I want to do the Life Fellowship exam and only time will tell when I will manage to finish this. 

Now My Dream Is SLOWLY COMING TRUE

Never did I realise that running can take me places. It all started on 12 May 2018 with a Parkrun. I ran 1km, walked 1km, ran 1km, walked 1km and finally ran the last km. I asked myself, will I ever be able to run a parkrun without stopping? Little did I know I would get to a point of becoming a marathon runner.

Running clears my mind. It is a time for me to de-stress from the stresses of life. It teaches me perseverance. It is not only physical but mental. What keeps me going is having training and race goals. I have an opportunity to improve and do even better. Running is exercise but I don't even think about that because it is so enjoyable. There are times where I think of giving up. It's very common. It happens almost all the time. That is where my mentality is being put to the test and I always get through those times.

My first 21km was the Soweto Half Marathon in 2018. That was when I knew I wanted to join a running crew. I then joined Braamfie Runners based in Braamfontein. This is when I started engaging with runners and started understanding what it takes to become a runner. My first marathon was the Soweto Marathon 2019. It was exhausting because of the heat. I finished in a time of 5:40. I made a few mistakes but I have learnt from this experience. On the same day, I won the prize to Barcelona through Move The Nation, partnered by Old Mutual.

I learnt about Move The Nation through Braamfie Runners. Move The Nation aims to inspire the country to get active and healthier through running activities that are fun, educative and all inclusive. Over 1 000 runners participated in the sessions with only 2 people who could win the prize. I was one of them.

This means a lot to me because it will be my first trip overseas. What it also means to me is that I get to see Camp Nou, Football Club Barcelona's facilities. I became a Barcelona supporter in 2006 because I fell in love with Ronaldinho's style of football. I have been supporting FC Barcelona ever since. I wrote letters in high school to the directors of football at Barcelona to get autographs and photos with the hope of seeing Messi one day. Going on this trip is a dream come true.

Not only will I be training for the Barcelona marathon, I will be training for the Two Oceans Ultra Marathon as well as the Comrades Marathon. In order to qualify for Two Oceans and Comrades, one must run a marathon under 5 hours and 4 hours 50 minutes respectively. I ran the Johnson Crane marathon in 4 hours 45 minutes in January; therefore I have qualified! I will be running my first Two Oceans ultra and Comrades marathon this year, so lots of training coming up!

I enjoy inspiring others with my running. It's been an incredible journey! I get my daily dose of inspiration in the office from the actuarial running legend himself – Caspar Greeff. His advice and guidance is a big plus! 

CLIMATE CHANGE: The Earth is a Fine Place and Worth Living For -

- Nicky Holtzhausen



Extreme weather conditions are increasing in frequency. This is evidenced by the Actuaries Climate Index jointly released in November 2016 by the actuarial professional organisations in the USA and Canada. The Australian Actuaries Climate Index was released in November 2018. These indices measure extreme weather patterns for each of the seasons for various regions which have similar weather patterns. The measurements are relative to a base period and are updated every quarter. The main objective of the indices is to provide an indicator of increasing frequency and severity of potential weather-related insurance claims.

In South Africa, heat waves, lengthening dry spell durations and increasing rainfall intensity are being experienced. Climate zones are also showing signs of a shift.

Causes of climate change

Natural sun cycle impact on climate has been established. Furthermore, the influence of sunspots is being researched. Anthropogenic impact on climate from industrial and transport greenhouse gas emissions is being addressed in academic research.

Impacts on actuarial disciplines

Actuaries across the world are increasingly becoming “carbon literate” through the activity of climate change working groups. The Actuarial Society of South Africa has recently established a Climate Change Working Group as part of its Enterprise Risk Management Committee.

Changing weather patterns may impact many aspects of actuarial work. The following are examples which may affect general, life and health insurance and which in the extreme may become uninsurable:

- Increasing frequency and severity of property and casualty claims.
- Changing incidence of known and previously unknown diseases.
- Increasing frequency and severity of business disruption from floods.
- Increasing incidence of liability claims.

Responsible investing

Society is making its voice heard by means of lobbying with investment managers. The lobbying ensures that investments are being utilised to positively impact the broader initiative on climate change. There is a growing focus on environmental, social and governance factors in the investment field. These are also increasingly incorporated into sovereign credit ratings.

The inability of countries to deal adequately with potential disasters may impact the economy and limit the ability to meet financial obligations. These may also lead to sovereign rating downgrades.

Mitigation strategies - disclosure and emission reduction

Significant initiatives are underway to ensure that listed corporations disclose climate change risk resilience and mitigation strategies to their shareholders. Disclosures include carbon emission reductions. The Financial

Stability Board established a Task Force on Climate-related Financial Disclosures to develop recommendations for more effective disclosures that would promote more informed investment, credit, and insurance underwriting decision and in turn would enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector.

Some developed countries are directing funds to developing countries to assist with emission reduction initiatives. As a participant of the United Nations Framework Convention on Climate Change, South Africa was a signatory to the 2016 Paris Agreement. As a result, it has committed to a Nationally Determined Contribution for emission reduction. The main objective of the Paris Agreement is to limit the global temperature increase to well below 2 degrees Celsius. The objective also extends to pursuing efforts to limit the increase to 1.5 degrees.

South African climate change activity

The Department of Environment Affairs, Department of Mineral Resources and Energy, Treasury and SARS are considering and taking measures to ensure that appropriate climate change policy is instituted. Many central banks internationally have included sustainability in addition to their main economic objectives. South Africa introduced a carbon tax in June 2019 as one of its mitigation strategies. This tax is expected to be used towards incentives provided to companies where energy savings are implemented and where capital expenditure on renewable energy installations is allowed to be written off.

The future South African transition pathway to balance a reduction in carbon emissions while pursuing economic growth is unlikely to be easy. Increasing economic growth has been a major societal imperative.

South Africa's future energy plans include renewable energy sources. Storage technologies are actively being developed and could increase the efficiency of these sources. Consideration is being given to introducing more gas-related options into the country's energy mix.

Scenario planning

Scenario planning is useful for every area of actuarial work which may be impacted by climate change. The scenarios considered in pension fund investment analyses conducted in Canada and the UK focused on the Intergovernmental Panel on Climate Change scenarios. These relate to possible trajectories of global temperature increases. Government policy, industry and society emission reductions impact these potential temperature pathways.

Fundamental theories of economics are being re-examined. Models integrating climate and the economy are being utilised in scenario planning.

Collaboration

Disaster fund management, particularly where insurance does not cover the entire spectrum of losses has become increasingly important. Underinsurance due to lack of affordability may potentially be an issue. The actuarial profession could collaborate with government in the setting up of disaster funds. Collaboration across every field of actuarial expertise is required. Learnings specific

to one area can be transferred and utilised where necessary in other areas. Collaboration between business, government, the actuarial profession and society is pivotal to ensure a positive and sustainable outcome for the environment, society and the economy. 



IDSC Africa

- Ronald Richman FIA FASSA CERA

The first African instalment of the Insurance Data Science Conference (IDSC) would have been held in Johannesburg on 20 April 2020. COVID-19 has suspended plans for this one-day conference, which aims to bring together industry and academic experts from the fields of insurance, data science and computer science, and business leaders whose success depends on the use of data in their environment. The conference will be held at a later stage, probably still at the Sandton Convention Centre, and the event will open to everyone who is interested in applications of data science, machine learning and artificial intelligence in insurance and actuarial science.

What remains relevant and unchanged is the discussion, in this article, why we decided to host this conference and the benefits we hope to achieve for the African insurance industry.

Setting the Scene

Mirroring changes in the wider business environment, the past several years have seen an explosion of interest in the application of new techniques and methodologies within insurance and actuarial work, as well as the digitalization of, and integration of technology into insurer's core business models. At the same time that new avenues of opportunity have opened for the insurance industry, incumbents (whether those in traditional companies or in traditional roles) are challenged to adapt to and synthesize these new developments. Looking at the broader industry, most large insurers appear to have at least some interest in Insurtech projects, whether built within their internal organisations, or as investments into start-ups, and there is wide interest in data-intensive products built on new sources of real-time data from telematics to wearables.

From a professional perspective, some actuarial organisations have already reframed the role of the actuary to include data and computer science as core competencies. For example, the Swiss Actuarial Association has a working party looking to define the new discipline of Actuarial Data Science for its members, the outputs of which can be seen here: <https://www.actuarialdatascience.org/>. Another example is the initiative taken by the Actuarial Society of South Africa to co-organise IDSC – Africa.

Bringing the industry together

“The Insurance Data Science conference is a great opportunity to bring together academic and industry leaders, who will explore new developments and applications of cutting-edge techniques in insurance, as well as the bigger picture of how statistical and business practice is transformed with the wide adoption and embedding of digital technologies” – Professor Andreas Tsanakas, Cass Business School

Against this background of change in the industry, the international version of the IDSC has been held in European cities for the past 7 years, organised by Professor Andreas Tsanakas of Cass Business School and Markus Gesmann, co-founder of Insurance Capital Markets Research. During its first iteration, the official name of the conference was R in Insurance, after the title of the popular statistical and data science programming language R. Recognizing that data science has evolved within insurance beyond its implementation in particular programming languages, the organisers of the event widened the remit in 2018 to cover all aspects of Insurance Data Science. This rebranding has been a remarkable success: at the 2019 event held at ETH Zürich, the audience was comprised of business people and academics, and practitioner actuaries and data scientists, considering all aspects of insurance data science.

Some of the themes at the event were the evolution of insurance modelling from applying traditional statistical methods to approaches based on machine and deep learning, the risks involved with advanced modelling techniques from the view point of senior leaders in the European insurance industry, and the software platforms and packages that are becoming increasingly relevant for data science in insurance.

Coming home

At the conference dinner in 2019, an interesting question was raised – would the organisers be open to an international leg of the conference? Thanks to their positive answer, and the commitment of time and resources to this idea by ASSA, QED Actuaries and Consultants and the University of the Witwatersrand, we have been able to organise the first IDSC – Africa event. Our vision for the event is:

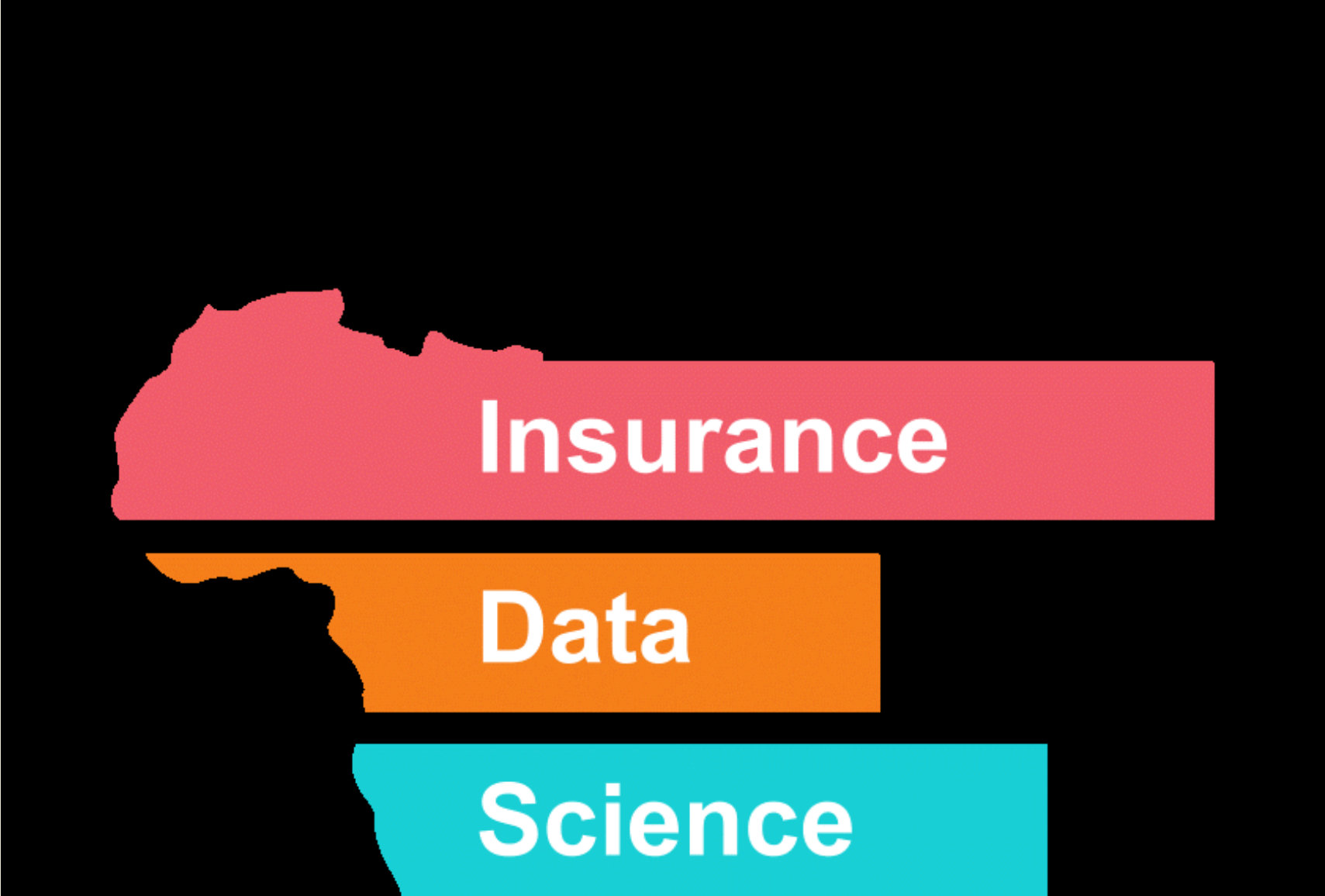
Bring the Insurance Data Science Conference (IDSC) concept to Africa in early 2020 to drive forward the state of the art in applying data science and machine learning within insurance in the African market and build a bridge between research and industry.

Within our African context, we have expressed the hope that as data science techniques become embedded in insurance practice, risks that have not been previously addressed by the industry will become more insurable leading to more inclusive insurance markets in the developing economies within Africa.

As the conference data draws nearer, we are excited at the quality of the conference speakers from industry and academia. We are privileged to have Professor Mario Wüthrich (RiskLab, ETH Zürich) (via video link) and Marjorie Ngwenya (ALU School of Insurance, past President of the Institute and Faculty of Actuaries) as the keynote speakers of the conference. For more on Mario’s talk, see the graphic. Invited talks will be given by two speakers with a long history of contributing to insurance data science: Markus Gesmann (Insurance Capital Markets Research) and Kevin Kuo (RStudio). Our panel discussion will be with Emile Stipp, Chief Actuary of Discovery Health, Rene Otto, CEO of MiWay, and Thys Nieuwoudt, CEO of Swiss Re Africa. Finally, the rest of the conference day will be focused on talks proposed by participants in the industry, with a large number of proposed talks received by the conference organisers.

If the themes discussed in this article are of interest, then attending the IDSC – Africa event on 20 April 2020 should be on your agenda! Book now by following the instructions at:

<https://www.insurancedatascience.org.za/#registration>. 



Insurance

Data

Science

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.



ROUTES TO THE TOP - DATA SCIENCE & ANALYTICS

Bradley Shearer, Executive Director of Protagon – Active Career Management

(This is a reprint of the original article, which may be found on https://www.protagon.com/stories/routes-data-analytics?utm_source=saactuary.)

The roles of Chief Data Officer (CDO), Chief Analytics Officer (CAO) and Chief Data & Analytics Officer (CDAO) are relatively new, having grown in adoption significantly over the past decade as data has become ‘the new oil’ and as traditional companies seek to contend with digital competitors. These senior roles are now found within a variety of data-intensive industries, especially within Financial Services and Healthcare, and increasingly in others too.

“...There is a wide-open field in many industries for developing products and services that have data and analytics baked into them.” - TOM DAVENPORT, Information Technology Professor

A 2019 NewVantage Partners survey found that almost 70% of respondents reported having a CDO, significant growth from 12% in 2012 when their first survey was done. While Financial Services firms comprised the majority of respondents (“data-mature firms that maintain high-value customer relationships and invest significant sums to manage their data”), Healthcare firms also shared their views (“businesses that are undergoing rapid transformation – data rich, but often less data-mature”), as did businesses in other industries. The survey highlighted the “creation of a yet newer role [than CDO] – the Chief Data and Analytics Officer – integrating

the data and analytics responsibilities within a single executive.”

As Forbes Insights puts it: “It’s safe to say that a flood of data – 250 billion terabytes created every day – has swept the chief data officer into the C-suite.”

As firms globally strive to harness the power of data and face challenges along the way, the demand for data scientists and analysts continues to increase. This post discusses the **evolution** of data-driven roles, some **challenges** of executive roles in these disciplines, and **key skills** to improve the likelihood of success in these roles, drawing on the insights of Tom Davenport, A. Charles Thomas and others. Read more to explore the nature of data and analytics roles, and their growing executive influence, in this latest entry in our Routes to the Top series ...

C-Suite Data & Analytics roles today

The first known Chief Data Officer in the business world was appointed by Capital One in 2002: Cathryne Clay Doss. Her responsibilities included strategic oversight of IT and supply chain and market analysis. In 2005, Yahoo became the next major company to appoint one.

Fast-forward to today, and the landscape is significantly different. Most business leaders view the CDO role as a critical role, says Forbes Insights, but “no one agrees precisely on what the role entails, including CDOs. How much

technological expertise do they need, how much data governance responsibility should they have and, especially, to whom should they report are all open, and increasingly pressing, organisational issues.”

One of the factors driving companies to appoint senior executives in data and analytics roles has been the **fear of disruption** from nimble data-driven entrants. These emerging digital competitors may not have had the access to proprietary data though, giving established players an advantage if they could attract or develop the skills to analyse and interpret their data. Often, digital garages were set up to experiment with new ideas and technologies, separate from the entrenched processes and culture of the existing business. The NewVantage Partners Executive Survey (2019) describes it like this: “... companies have come to increasingly recognise that they must become more adept at leveraging their data assets if they are to compete successfully against highly-agile data-driven competitors.”

Given the newness of the role compared to other C-suite positions, there is a range of definitions and implementations across industries and companies. For example, some say that the primary responsibility of the role is **setting the data strategy** within the company and owning its results, while others say that responsibility belongs to other C-suite executives or argue that no single role is accountable for data. Less than 15% say that the role should have **revenue responsibility**. A majority of CDOs say they are accountable for data quality, data governance, master data **management**, as well as **information strategy, data science and business analytics**.

Tom Davenport, professor of information technology at Babson College, argues that the shifting role of the Chief Information Officer (CIO) over time accounts for the lack of consensus about the CDO role. Data governance, he says, “was previously the function of the CIO. Many organizations have felt like, despite having somebody



theoretically responsible for it, they were not getting the kinds of outcomes they wanted with data so they created a new role.” Part of this is the increasing importance of fostering a **culture of data-driven decision-making** across the whole business, using data and insights to improve business results, operational efficiency and effectiveness.

Richard Wendell, board member of MIT’s International Society for Chief Data Officers, says that the range of responsibilities may simply reflect the different needs of businesses and how mature they are in their digital culture: “companies have different needs at different stages of their technological evolution” i.e. not one-size-fits-all. To him, a fundamental aspect of the role is leveraging the company’s data as a strategic asset.

Today’s senior data & analytics leaders reflect diverse backgrounds, representing a mixture of company or industry veterans and external change agents, and different histories: data scientists, business executives, or technology experts. This diversity is also likely to be a consequence of the scarcity of these leaders, allowing them to move across industry verticals more easily. It also means that those aspiring to these roles can take different routes to get there.

Evolution of a Data Scientist

While a strong CDAO will have a **blend of skills across data science and analytics, technology, and business savvy**, they are more likely to have started from a quantitative, analytical, or technological background, and added business understanding through work experience or further study (such as an MBA).

An illustrative route someone with strong analytical skills may have taken to reach a CDAO role is:

- Gaining quantitative skills through studying for an analytical, statistics, finance or technology degree
- Work experience building analytical models and solving defined problems for a business area that recognised the commercial value in data analysis, such as a marketing department wanting to determine which customer needs to target or assess the impact of specific marketing initiatives
- Their initial role(s) would have been as an individual contributor / manager of self working with transactional data (e.g. marketing, credit and retail data), and they'd be seen as "the person with the answers"
- Over time, as they built wider relationships, the value of their analysis would have become more widely known, and they'd work on bigger challenges, perhaps reporting into a Customer Experience function
- Those with leadership potential and interest would step up into managing others, steering a team of analysts to

solve problems within their line of business.

Under their guidance as a Manager of Others or Manager of Managers, their team(s) would develop technological solutions that enabled colleagues to run their own reports and search available data for insights i.e. dashboards or self-service business intelligence, partly as a response to increasing demand for the valuable analysis outputs

- As the demand for their teams' data-driven insights grew, an opportunity to take on enterprise accountability for data and analytics may have arisen, including working towards alignment of data, methods, techniques, tools and governance across business-unit teams to improve consistency (for example by providing a singular view of each customer), democratise data access (through a "data warehouse" or "data lake") and manage risk. In this role, they would be impacting every function of the company, ultimately operating as a Manager of Function themselves: the data and analytics function, recognising that this can have varying degrees of centralisation
- In some companies, the data/analytics function can become a business in its own right, when it succeeds in generating its own revenue (i.e. P&L responsibility). In this case, the head of the function operates as a Manager of Business, acting as CEO of a data company within a larger corporate entity.

This evolution very roughly mirrors the career of A. Charles Thomas, General Motors' first-ever Chief Data and Analytics Officer (CDAO), which he describes in his keynote at the Wharton Customer Analytics conference. Charles has also worked for Hewlett Packard (HP), the United Services Automobile Association (USAA) and Wells Fargo, and he discusses his own shift "from back office to front



It's roughly 1 hour long, including a Q&A session for about half of this.

<https://www.youtube.com/watch?v=Xn7sLaA38Kc>

WATCH IT NOW
CLICK HERE

office to running a company” over his career. He explores how analysts more generally began by cranking out the data, before slowly getting into managerial positions, and more recently into the C-suite.

Over my own career, I've seen a similar evolution play out for other major trends too, such as the rise of asset-liability management (including hedging and risk management) within an insurance context as financial economics skills entered established businesses.

Charles describes his early experiences of how data was originally overseen by the IT function, with analysis being done in another area, with little communication between the two. The CDO and CAO functions tended to be separate (especially in Financial Services), with the CDO handling governance and the CAO analytics. As CDAO he now has singular accountability, although he does work closely with the Chief Information Security Officer and the Chief Privacy Officer, especially on matters relating to privacy and hacking. Now, in what he sees as CDAO 2.0, he views himself as CEO of a data company, monetising data-as-a-service.

Interestingly, this iterative evolution of the role of data scientists and analysts is reminiscent of the iterative nature of data science itself. Kanika Bhalla describes it as “an iterative process, with opportunistic improvements being made to data, features, models and visualisations throughout a project’s duration.”

Challenges of the executive-level role

The lack of consensus at the executive table about the precise remit of a CDO, CAO or CDAO can make the role particularly challenging. Different expectations can lead to severe disappointment for many, especially if some believe that data will be a silver bullet that will solve any company problem.

It is crucial to **be clear on expectations** as soon as possible, and **communicate** what

your short-term objectives are as often as you can. For example, you may wish to unlock powerful data for use across the enterprise. But, be careful: in Tom’s words “data is a mess in almost all organisations”, so being seen as the person who will fix it all is a recipe for disillusionment. Along these lines, Charles explains that your job is to retrofit the technology of the company, given there is a myriad of disconnected technologies existing already.

“The CDO role was a good idea, but it very much needs role clarity and the ability to provide rapid value. The fact that data is a mess in almost all organisations would seem to provide some job security for CDOs, but it doesn’t.” - TOM DAVENPORT

Tom also explains that “effectively managing all data across a large organisation is too difficult for anyone to pull off, and the job needs to be more narrowly specified if its incumbents are to succeed.” **Defining the problem(s)** you’re trying to solve is good advice.

As you’re acting as a change agent, it is likely you would need to achieve things by working with existing structures in the company, using **governance and influence mechanisms** to implement improvements, rather than formal reporting relationships. Richard explains: “Being a change agent and a strong communicator is really important. [You must] be able to win the political battles and make data available throughout the organisation. The main reason why companies want a CDO is because people are frustrated about not being able to access the data they need to do their jobs.”

Other techniques to help **change the culture** include:

- multiplying your business impact by shifting power or access into the hands of users by **democratising data** so that everyone can run their own analysis to address their pressing questions through self-service business intelligence – Charles refers to these empowered advocates as “citizen data scientists”
- **winning the confidence** of others who may not have deep technological expertise, including

others at the executive table

- working hard to **change attitudes and behaviours** around data, recognising that internal resistance is normal and change is difficult

Another challenge is the extent of senior support the role may have. For example, it may report into other senior executives rather than the CEO, or may be part of the second tier of the C-suite. Effectiveness depends fundamentally on the CDAO's ability to **wield influence and build support** among decision makers. One potential conflict is with CIOs who often desire to minimise IT costs, rather than invest in new tools to maximise the value of data.

Reaching an appropriate balance for the organisation between the **compliance and commercial** aspects of the role can also be immensely challenging, especially where other functions share some of these responsibilities. A compliance focus is a defensive one, preventing breaches, security and privacy issues and data quality problems, and streamlining data environments. In other words, a governance focus aimed at **avoiding the downside of data**. In contrast, a commercial focus tries to **achieve upside** through better customer understanding and relationships e.g. marketing initiatives, underscoring why analysis frequently begins in marketing, customer experience or other externally-facing functions. Both aspects are important, but require different skill sets and actions.

While cybersecurity and data privacy are essential (and no one wants breaches or errors on their watch), Tom warns that if you only work on improving the internal data environment or preventing problems, "nobody on the business side will find your job, and the associated data models, data governance structures, and data catastrophes supposedly averted, very compelling. They'll mostly become frustrated, as will you, with the slow pace of data improvement."

"If you can improve business decisions or operational performance or customer satisfaction through analytics, machine learning, intelligent agents, and the like, everyone will be much more impressed with your work. Even if all the analysts and data scientists don't all report to you, at least try to own an analytics/AI centre of excellence or something similar. You need to get some credit for the magic that analytics and AI can bring."

- TOM DAVENPORT

I've experienced this compliance vs commercial balance during my career too, along with the opportunities and challenges of a hub approach in a global organisation when I relocated to establish a group function that shared best practice across countries and built new revenue streams (commercial) as well as ensured adherence to group standards (compliance). In my experience, our responsibility for sign-off gave the local businesses a compelling reason to engage with the hub early on, with the resulting collaboration improving the ultimate outcomes.

A related area is **monetisation**: if you can use your company's data to add new revenue streams by creating "data products", the value of data and analytics becomes much more apparent.

Key skills

There is a wide range of skills necessary to be successful over a data or analytics career, stretching from analyst or data scientist to Chief Data & Analytics Officer and beyond. By their nature, they are business roles grounded in quantitative and technological expertise, so some of the skills are technical, and others are broader, helping prepare you to deal with the challenges of an executive-level role.

The technical ones are likely to be impacted by technology and automation, so exact languages or systems can shift reasonably quickly. Some examples of technical skills are:

- **mathematics and statistics**, including key metrics and distributions, Bayesian analysis,

hypothesis testing, differential calculus and linear algebra

- appropriate **data-visualisation** (including enabling others to do this themselves) in order to explore data, as well as summarise and communicate your analysis more easily
- **machine learning**, both non-parametric and semi-parametric
- **computer science** and **information technology**, including the philosophy behind programming, data structures and algorithms, relational database use and management, parallelisation and distribution of large models, and performance analysis of code and processes
- **domain expertise**, to understand the underlying dynamics, forces and trends of the specific industry

These skills are not everything though: Charles calls R, Python and other techniques “the price of admission”. **Communication skill** is vital, including conveying clearly the nature and value of data and analytics. As is explaining your methods, findings and recommendations intuitively to a range of audiences from non-technical managers, to regulators, to end-users of the analysis.

“The person who understands data and can explain it to the business, that’s the unicorn. That’s the hardest skill to hire for... Getting someone who gets the business, gets the operations, and understands insights is a very rare skill.” - A. CHARLES TAYLOR, Chief Data & Analytics Officer at General Motors

Charles emphasises that you can differentiate yourself by mastering communications and storytelling. This includes transforming data for operational purposes into data for insight purposes, and making your messages relevant to the audience in creative ways so that they take action i.e. influencing them. This helps

you to become a trusted advisor, supporting smarter and faster decision-making. Important elements are:

- **framing** the business problem,
- **determining the data** needed,
- assessing what **analysis will answer the question(s)**, and
- **acting** on the results of the analysis.

He says, rather than simply responding to requests, “be out in front, **leading the conversation** about what’s next”. Value arises when you understand the organisational processes (e.g. HR, logistics, facilities management) and plug into them to inject analytics at the right place and time.

The skills of **convincing and influencing others** and leading change become ever more important as you progress in your career. Influencing skill is particularly important in cross-functional roles, and helping others be successful can encourage their ongoing support. Charles makes the case that a blend of analytical skills, bedside manner / EQ, and business-mindedness is needed.

“[Be] strategic about how to obtain a reputation throughout your career. Decide how you want to be known, and work towards that.”

- A. CHARLES TAYLOR

Another piece of advice Charles gives for those in mid-to-senior roles is to ask your seniors to ask questions in the meetings and forums they attend. When they ask you “what can I do to help you?”, Charles advises: don’t ask for money or budget. Instead, he says what will help advance the cause of data and analytics across the organisation is if those leaders ask two questions whenever they see a number: (i) where did you get it? and (ii) are you sure we optimised it? This effectively directs people across the organisation to ask for your input on analysis.

Given that data and analytics can seem a nebulous mystery to many, another important

skill is **delivery** i.e. deliver tangible, measurable and visible value as often as possible. Tom advises that “every project should last no more than a month and produce measurable results, ideally in hard currency”. He also suggests picking a data domain that is particularly important to your company, and working to make it noticeably better – “a domain that is closely aligned to your strategy and organisational mission”.

Richard shares a similar tip for those in a new CDO or CDAO role: “In the **first 90 to 180 days**, a CDO should come in to be a change agent. Win some political battles to get people to stop locking data up in their own territory and make it available to the enterprise. Often just getting data more available can be a good early success metric.”

Charles has advice for managers looking to spot and develop talent too. One of his suggestions is to **rotate** your team members into different business functions so that they can spend time getting to know the people, and seeing their priorities and challenges first-hand. When developing others, he recommends looking at the slope, rather than the intercept i.e. how interested are they in **learning new things**.

“Good people will overcome bad bosses, bad plans, bad data and bad technology. And so I realised that **growing people** in this space was the way to drive the most amount of change. And trying to influence people to make a bigger difference as opposed to who can write the best code. ...Inspiring people to help them see the possibilities of what their career can do.” - A. CHARLES TAYLOR

Data Ethics, Privacy & Duty of Care

While the world of data and analytics has a lot to offer organisations and customers (including

increasing personalisation), there remain a number of questions to address, partly driven by the different incentives and awareness of those involved. They include our nagging questions as we hear some of the ambitions of companies (such as tracking which radio station you’re listening to, or which shopping centres you visit in which order, so that they can sell this information ...)

To guide this long-form post to a conclusion, I would argue that Data & Analytics leaders of the future will need to play an active role in exploring these questions and understanding their implications for all parties. For example, in an insurance context, this includes how far personalisation should extend: at the extreme, price optimisation would lead to no cross-subsidy, effectively excluding certain individuals from insurance coverage.

Some of the areas where acceptable practice is not yet coalesced include:

- Data ethics – what uses of data are ethical?
- Privacy, including opt-ins, opt-outs, and sale of personal data
- Education and awareness of what data is being gathered by devices, including cars, wearables, phones, pacemakers etc ...

Regulation such as GDPR is helping to protect consumer interests and improve transparency around the use of personal data, and some professional bodies have begun exploring the questions around ethics and privacy. For example, the Royal Statistical Society and the Institute and Faculty of Actuaries recently collaborated on A Guide for Ethical Data Science.

While regulation and standards can help to protect consumers, it is not sufficient for practitioners to wait until legislators set the minimum requirements that must be adhered to. Instead, to earn the trust of customers and the public, I believe that data and analytics leaders will need to **proactively demonstrate a duty of care**, such as a professional responsibility to act in the public interest. Leaders who can act in the interests of both their customers and their organisations will be the ones to look up to, and I encourage you champion this on your own route to the C-suite. 



BELIEVING THE BOT

- MODEL RISK IN THE ERA OF MACHINE LEARNING AND DEEP LEARNING



Ronald Richman

FIA FASSA CERA

Ronald.richman@qedact.com

Ronald is a Fellow of the Actuarial Society of South Africa, holding short-term and life insurance (excluding participating business) practicing certificates, a Fellow of the Institute & Faculty of Actuaries and holds the Chartered Enterprise Risk Actuary designation. He has published several papers on the application of deep learning techniques to actuarial problems.



Nicolai von Rummell

FASSA Aktuar (DAV)

Nicolai.von.rummell@qedact.com

Nicolai is a Fellow of the German Actuarial Society and a Fellow of the Actuarial Society of South Africa. He has more than 14 years' experience in finance, risk management and actuarial roles in Europe and South Africa.

The following article is based on the paper by Ron and Nicolai that won the RGA Prize for the Best Paper at the 2019 Convention, as well as the Swiss Re Prize for the Best Paper on a Risk-related Topic.

The actuarial toolbox is being expanded with new techniques from the fields of machine learning (ML) and deep learning (DL). Recently, several publications have demonstrated applications of these techniques to classical actuarial problems such as pricing, reserving and analysis of mortality experience. Anecdotally, many insurers are beginning to test these techniques, especially in the context of non-life pricing, for example, by using gradient boosted trees as an alternative to generalized linear models (GLMs), or by testing the fit of traditional pricing models by applying ML techniques after GLMs have already been fit. These models have appealing technical advantages over traditional actuarial models, which include the achievement of greater predictive precision, better use of large-scale data, and shorter building times.

While many insurers may already have governance arrangements covering model risk, and specific committees considering actuarial matters (such as Actuarial Governance Committees), governance and risk management of ML and DL models is still in its infancy. Therefore, the risk profile of ML and DL models appears not to have been considered in detail yet by actuaries and risk managers.

In a recent paper (Richman, Von Rummell, & Wüthrich, 2019) we have attempted to begin this discussion, by defining the differences from traditional models, discussing the specific pitfalls that must be kept in mind when using ML and DL techniques, and considering the implications for risk management. We summarise the key highlights of these areas in the following sections.

Defining Machine and Deep Learning Models

How are ML and DL models different from traditional models? To answer this question, we first consider what comprises a model, and narrow down our scope to predictive models (as opposed to other types of models, for example descriptive models which describe historical relationships). In other words, those models that attempt to predict an unknown quantity, such as claims rates, from other variables such as gender, age and type of motor vehicle. Within the paper we have described the key components of a predictive model as consisting of the following components:

- input data;
- a set of transformations of the input data;
- a model specification which is determined by the choice of algorithm for the model (for example GLMs or gradient boosted trees); and
- for some classes of traditional models, such as GLMs, an explicit model specification that is handcrafted by the modeller.

To distinguish between different types of models that are now available, we note that many traditional actuarial models used for pricing and reserving are linear, in that they have an explicitly linear model specification, usually set by the modeller. On the other hand, ML models are distinguished from traditional models by implicitly defining the model by allowing algorithms to formulate the exact model that is used. DL models take this process of making model specification more implicit a step further and derive their own set of transformed variables that are fed into the model. This process performed by DL models is called representation learning, which has allowed these models to achieve high levels of accuracy on many machine learning tasks, such as computer vision and natural language processing, as well as to perform well in insurance modelling tasks.

Model Risk Considerations

Within the paper, our working definition of model risk is as follows: model risk is a particular risk category, defined as the class of all risks that share the event of making a business decision with unintended consequences because of an erroneous, or poorly calibrated, model or the misuse of the model output. We view the risks as manifesting for ML and DL models in the following ways. For both ML and DL models, there are risks arising from implicit model specification, whereas DL models have extra risks arising from the application of representation learning. Our view on these risks is as follows.

Implicit model specification creates risks due to the lack of transparency of machine and deep learning models (which are colloquially called “black-box” models), which means that actuaries may no longer have the professional knowledge and experience to benchmark whether models are working correctly. We recommend two mitigating actions for dealing with these risks, firstly, that a new body of expert

knowledge of working with ML and DL models is required and, secondly, that “toy” models are built to ensure that the aggregate predictions of ML and DL models remain reasonable.

Two additional problems arise due to the representation learning performed by deep neural networks: firstly, the issue of potential model bias, and, secondly, the possibility that the representations learned by deep neural networks become too specialised with respect to a particular dataset, and thus do not generalise well to new data, or become susceptible to adversarial tricks. As solutions, we suggest that organisations test the output of DL models against predefined categories of model bias, for example, by including all variables (including those such as gender, which is illegal to price with in the EU) in a test model, and comparing the outputs of the models to ensure that the outputs of the pricing model do not vary with these variables in the same manner as the test model. To counter the issue of generalisation, we recommend that the representations learned by DL models be inspected to ensure that what models have learned can be justified by experts as reasonable.

Technical Challenges

Several technical challenges may also pose pitfalls to organisations that wish to apply ML and DL models. These include the lack of theoretically justified confidence intervals, the potential instability of models over different training runs and as new information becomes available, and the “multiplicity” of good models that all appear to predict unseen data well but are structurally very different. Although full solutions to these issues have not yet been worked out, we suggest some steps that insurers can take to mitigate these risks, for example, averaging the predictions of several DL models helps to stabilise the results.

We also mention another insidious technical issue that affects these types of models, which is the potential failure of these models to reproduce portfolio averages, which is highly problematic for insurance pricing. This problem is discussed in more detail in Wüthrich (2019), who presents a new method of fitting deep learning models that solves this problem.

Conclusions

Despite some of the issues discussed above leading to elevated model risk for companies implementing ML and DL models, nonetheless, our view is that for particular types of insurance modelling problems, more accuracy can be achieved by departing from traditional actuarial techniques. This boost in accuracy will likely help to mitigate the risk of making sub-optimal business decisions. Furthermore, as expert knowledge on the application of new models accumulates, the model risk posed by these models should decrease.

Should you wish to discuss implementing machine and deep learning models in more detail,

PLEASE REACH OUT TO US

Ronald.richman@qedact.com

Nicolai.von.rummell@qedact.com

QED is the largest independent actuarial consulting firm in Africa. We have been providing actuarial services over the past 25 years from our offices in South Africa. QED is majority black owned through African Rainbow Capital Financial Services Holdings (Pty) Ltd affording QED South Africa (Pty) Ltd level 2 B-BBEE status. QED employs specialist actuaries in General Insurance, Life Insurance, Banking, Analytics, IFRS17, ERM, Employee Benefits and R&D.

References

- Richman, R., Von Rummell, N., & Wüthrich, M. V. (2019). Believing the Bot - Model Risk in the Era of Deep Learning. Presented at the Actuarial Society of South Africa's 2019 Actuarial Convention.
- Wüthrich, M. V. (2019). Bias Regularization in Neural Network Models for General Insurance Pricing. SSRN Manuscript ID 3347177.



CAN SOUTH AFRICA **LEAPFROG TO VALUE?** - Shivani Ranchod

I had the privilege of travelling to Washington in February to be part of a panel discussion¹ on value-based approaches to healthcare in low-and-middle-income countries (LMICs), hosted by the Centre for Global Development. I was invited to be part of this conversation because of my involvement with developing Alignd.Palliative – a value-based approach to delivering palliative care in South Africa².

WHAT IS A VALUE-BASED APPROACH?

A value-based approach to healthcare is one that supports and incentivises quality care. The term “value” encompasses both cost and quality – in other words, doing the best for patients with the resources you have. This may sound like an obvious goal, but most health systems around the world are oriented towards access, not value.

Margaret Kruk, the chair of the Lancet Global Health Commission on High Quality Systems, was also a panel participant. One of the key

findings from the Lancet Quality Commission was that “quality has eclipsed access as a driver of survival ... of the mortality amenable to healthcare, 60% is due to poor quality of care, compared to 40% due to lack of access.”

This is true for South Africa – hence a need to think deeply about how to build value-based approaches into our journey towards universal health coverage. There are some references to value in the NHI Bill, but it is clear that the thinking on how to embed this into our system requires a lot more work, including reforming outdated Health Professions Council (HPCSA) regulations preventing healthcare providers from being paid as a team.

Quality of care in this paradigm is conceptualised as patient outcomes. Examples of patient outcomes are wide-ranging and depend on the type of care you’re thinking about. For example, for a patient who has had a knee replacement, good outcomes would include well-managed pain and good mobility. For Alignd.Palliative we had to think about what good care means for a patient with advanced or metastatic cancer at the end of their lives. Key metrics include the place of death (was the patient able to die where they wanted to?), the extent of invasive care in the last month of life (chemotherapy and surgery). We also ask the patient’s family a range of questions after the patient’s death, including whether they felt supported, whether the patient was treated with dignity and whether the patient’s preferences were paid attention to.

¹ <https://www.cgdev.org/event/toward-value-based-care-what-will-it-take-transform-health-systems>

² www.alignd.co.za

Value-based approaches are strongly dependent on using cost and patient outcome data to support healthcare providers to improve the care delivered – something actuaries are well-suited to helping to develop. In designing a value-based solution it is important to think about what else is necessary to support good-quality care. For Alignd.Palliative this includes enabling palliative care providers to work in teams which include social workers and spiritual counsellors and ensuring that the team remains involved even when a patient is admitted to hospital.

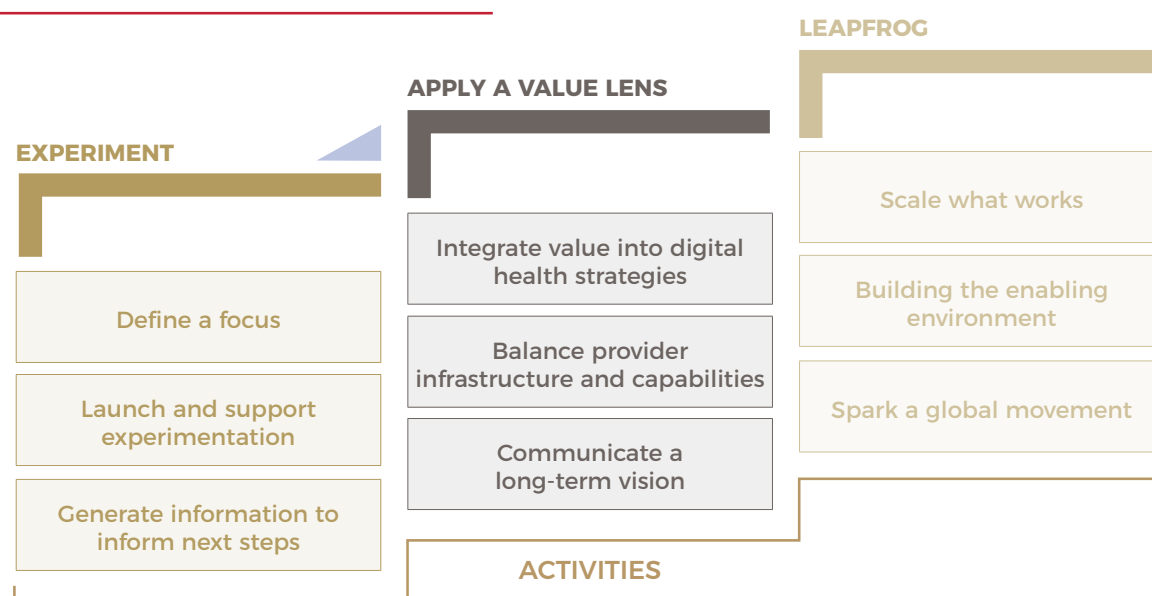
The early development of value-based approaches was strongly oriented towards paying-for-performance – essentially paying healthcare providers more for doing a good job. This approach aligns the incentives of funders, providers and patients. We learnt through our experience with Alignd.Palliative that financial incentives are necessary but not sufficient. It is also important to work closely with providers to build trust and ensure buy-in – paying attention to both culture and structure.

THE LEAPFROG OPPORTUNITY

The panel discussion was hosted by the Centre for Global Development (CDG) and was linked to the release of a report entitled “Leapfrog to Value”³, led by Chintan Maru⁴. The idea behind this is if LMICs go down an access-oriented pathway to strengthening their health systems, they run the risk of facing the same kinds of cost escalations being experienced in the developed world. We can see this in our private health system, where healthcare providers are largely paid on a fee-for-service basis. It makes sense that a health system that doesn’t pay attention to healthcare outcomes has no idea how to prioritise resources and ensuring the best use of scarce resources.

This orientation towards paying for volume instead of value is tricky to reverse out of. Digital technologies make it easier to do the necessary management and support of value-based approaches, meaning that LMICs do not have to follow the same reform pathways that developed countries followed.

THE PATH FORWARD



Both the report and the panel discussion are important inputs into the reform discussions currently underway in South Africa – there is much to be gained from connecting into a global network of people with a similar commitment to patient-centred health systems. The exposure to the Centre for Innovation for Medicare and Medicaid, responsible for scaling value-based approaches, planted a seed about the need for a similar supporting structure in South Africa. It was also affirming of the Alignd. Palliative approach and our ability to contribute both to global discourse but also to the reform of our own health system. 

³ https://www.usaid.gov/sites/default/files/documents/1864/Leapfrog_to_Value_Report.pdf

⁴ <https://twitter.com/chintanmaru>

IT'S EXAM TIME!

The SLC is wishing
everyone writing
exams the very
best of luck ...





STUDENT LIAISON COMMITTEE

page

43

Who are your representatives on ASSA Council:

Newly qualified representative 2020:	Stephanie da Silva
Student representative 2020	Kwanda Ngwenduna

EXAM SCHEDULES

EXAM/COURSE	REGISTRATION PERIOD
A404 N311.07 F304 N411.02	18/12/2019 - 7/01/2020
C100	18/12/2019 - 7/02/2020
A211 A213	20/01/2020 - 21/02/2020
A111 A112 A113 A212 A214 F106	27/01/2020 - 14/02/2020
F100 F200 A311 N211	17/02/2020 - 15/03/2020
Normative Skills Core APP: N311 components	17/02/2020 - 20/03/2020
F200 Mock Exams	24/02/2020 - 22/03/2020

EXAM/COURSE	EXAM DATE - SESSION 1
A111	17 th April 2020 (online) 18 th April 2020 (theory)
A112	27 th April 2020
A113	16 th April 2020
A211	18 th May 2020
A212	21 st April 2020 (online) 22 nd April 2020 (theory)
A213	22 th May 2020
A214	23 rd April 2020 (online) 24 th April 2020 (theory)
A311	14 th May 2020 (Paper 1) 15 th May 2020 (Paper 2)
N211	13 th May 2020

EXAM/COURSE	EXAM DATE - SESSION 1
F101	5 th June 2020
F102	27 th May 2020
F103	29 th May 2020
F104	3 rd June 2020
F105	1 st June 2020
F106	24 th April 2020
F201 - F206	19 th May 2020
N311.03	17 th June 2020 18 th June 2020 19 th June 2020 22 nd June 2020

If you have any questions, comments or concerns don't hesitate to contact the ASSA office and/or the SLC.

NORMATIVE SKILLS WORKSHOP INFO

EXAM/COURSE	REGISTRATION PERIOD
A404 N311.07 F304 N411.02	18/12/2019 - 7/01/2020
C100	18/12/2019 - 7/02/2020
A211 A213	20/01/2020 - 21/02/2020
A111 A112 A113 A212 A214 F106	27/01/2020 - 14/02/2020
F100 F200 A311 N211	17/02/2020 - 15/03/2020
Normative Skills Core APP: N311 components	17/02/2020 - 20/03/2020
F200 Mock Exams	24/02/2020 - 22/03/2020

NS CORE APP WORKSHOPS 1st Semester 2020

COURSE	CAPE TOWN	JOHANNESBURG
N311.02 Module 2: Actuarial Business and Legal Awareness (course)	6 July	7/8/9 July
N311.03 Module 3: Model Documentation Analysis and Reporting (course)	10 June	10/11/12 June
N311.04 Module 4: Presentation Skills and Communications	23/24 June	29/30 June 1 July
N311.06 Module 6: Strategic Thinking and Interpersonal Skills	6/7 July	13/14 July 15/16 July
N311.07 Module 7: Professionalism for Associates	15 April	7/23 April 7 May
N311.02 Module 2: Fellowship Professional Course	11&12 March	18&19 March 26&27 March
C100	6 July	4&5 March

NS CORE APP EXAM DATES 1st Semester 2020

COURSE	CAPE TOWN	JOHANNESBURG
N311.03 Module 3: Model Documentation Analysis and Reporting (exam)	17/18/19 June	17/18/19/23 June
N311.02 Module 2: Actuarial Business and Legal Awareness (exam)	Online exam that is open for 3 months from the date of the course	
N311.05 Module 5: Generic Practice Module	Online exam	

CONTACT US



CLICK HERE

WANTING TO JOIN THE SLC TEAM??

The SLC is looking for volunteers – if you are a student member and would like to join the SLC then please email your CV to slc@actuarialsociety.org.za



@ASSASLC



www.actuarialsociety.org.za

BOOK REVIEWS:

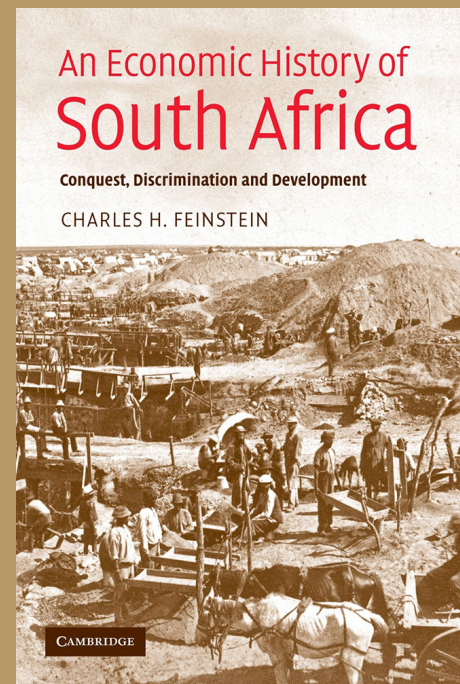
An Economic History of South Africa: Conquest, Discrimination and Development - by Charles H.

Feinstein (Cambridge University Press)

The late Charles H. Feinstein was Emeritus Professor of Economic History at the University of Oxford. In this book he seeks to answer 6 questions regarding the South African economy, namely: (1) Why was initial growth so slow, both before 1652 and from then to the 1870s? (2) What was special about gold and what were the sources of growth following the mineral discoveries? (3) What was the basis for the relatively successful development and structural change during the two world wars and in the years between the wars? (4) Why did South Africa grow more slowly than other countries in the boom years from 1948 to 1973, even though its own performance improved? (5) What explains the transition to negative growth in the last quarter of the twentieth century, and how does this relate to the policies of apartheid? (6) What were the reasons for the exceptionally high degree of inequality between black and white South Africans?

Feinstein pays special attention to the processes by which the various indigenous Southern African populations were deprived of their land, and to the methods by which they were induced to supply labour for white farms, mines and factories. With the advent of the Natives' Land Act of 1913, details of the position revealed that although Africans constituted two-thirds of the population, the sustained programme of dispossession had reduced the land reserved for them to a mere 7.3% of the total. Feinstein notes that many scholars in their writing on South Africa do not explain why land had to be seized from Africans. As long as Africans had abundant land, labour would always be a problem.

He highlights that there was an extremely important dimension to the making of the labour force: the creation of a 'colour bar' that rigorously excluded all Africans from any skilled or semi-skilled work. This colour bar is one of the most distinctive aspects of South Africa's economic history. The author notes

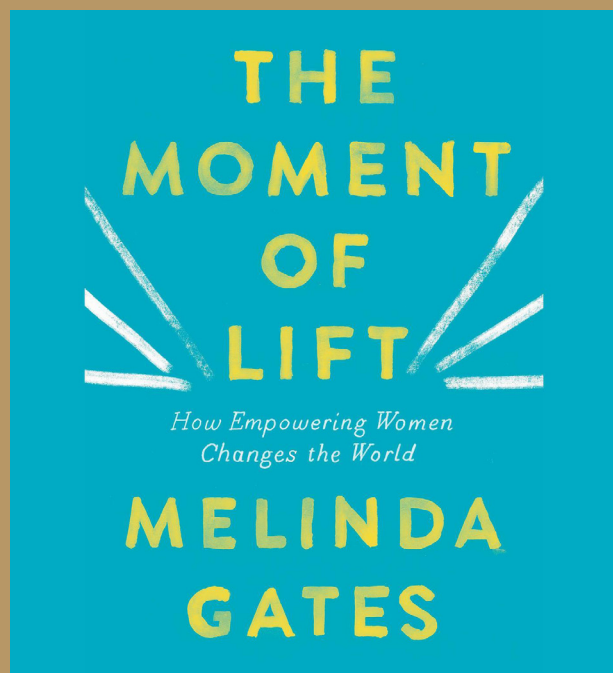


that whilst other countries have similar histories of conquest and dispossession, even if not on the same scale, no other country has used its political and legal system to create and maintain such a comprehensive and formal colour bar.

As Feinstein notes, "low levels of skill, inadequate nutrition, poor health, bad housing, social instability and insecurity, weak motivation, denial of industrial and political rights, the disruptive effects of migrant labour, bureaucratic interference in the allocation of workers – all ensured that 'cheap' black labour was not really cheap. On the contrary, some 80% of South Africa's labour force was compelled by apartheid to live and work under conditions that were profoundly prejudicial to vitally necessary improvements in productivity."

In concluding Feinstein notes that the ANC's challenge lies in resolving apartheid's inheritance. It must create "the vital human capital needed at every level, from rudimentary literacy to the highest ranks of science and technology; to overcome enormous deficiencies in all forms of social infrastructure, including housing, schools, health, and transport; to return land to the black population and restore ravaged rural areas; to expand black ownership of mining, industry, commerce and finance; and to diminish enormous inequalities in income and wealth."

South Africa's past will exert a powerful influence on its present and future for a long time to come, and these huge tasks will not be swiftly or easily accomplished. 



In full disclosure, this is not necessarily a book I would ordinarily have chosen for myself. My wife was reading it and knowing my interest in Professor Hans Rosling, who was a personal mentor of Melinda Gates, shared extracts where Gates describes her interactions with him and insights gained. This led to our discussing a range of the ideas and anecdotes raised in the book and finally, my reading it for myself.

Fellow author Tara Westover calls Gates' book "a lesson in listening". This is indeed an apt summary of the core linkage of the broad spectrum of issues unpacked by Gates in this book.

Unexpectedly, Gates paints her point of departure as one of not having identified with feminism.

Over the succeeding 22 years she became an "ardent feminist" through a process of "many years of listening to women". For Gates, the meaning of being a feminist simply boils down to the belief that "every woman should be able to use her voice and pursue her potential". In order for this to achieve any end, someone needs to be listening to that voice. Feminism for Gates includes the critical component that "women and men should all work together to take down the barriers and end the biases that still hold women back".

The Moment of Lift is constructed out of a career's worth of listening occasions around the world. It is a collection of insights garnered not only from data and statistics but weighted towards the

"Their cup is not empty; you can't just pour your ideas into it. Their cup is already full, so you have to understand what is in their cup."

personal stories and experiences of some of the most marginalized of society.

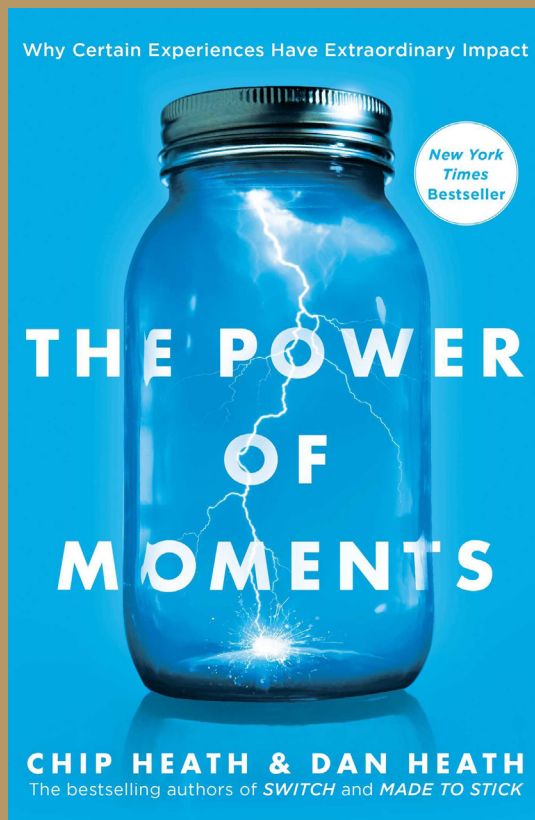
Gates comes across as an excellent listener and her manner in conveying the stories that moved her and shifted her understanding of these barriers and biases comes from a place of humility. She is brave and vulnerable in the extent of her sharing in her book and surprisingly offers intimate and highly personal revelations with the self-awareness that are described from her "vantage point on the problem". It is a vantage point that comes with a compelling message to see our own blind spots, particularly in gender bias.

Gates outlines what motivated her deep pull to listen to the voices of these women and how the Bill & Melinda Gates Foundation is hearing what they have to say and taking action, with the compelling motivation that "gender equity lifts everyone".

Gates listens to others about Maternal and Newborn Health, Family Planning, Girls in School, Child Marriage and Unpaid Work. Included in her discourse are delightful insights (and what she refers to as "candid accounts") into her marriage to Bill Gates and their partnership as Co-chairs of the Bill & Melinda Gates Foundation.

The Moment of Lift also gently reminds those who are in the position to undertake philanthropy to listen. Gates shares the memorable words of Vishwajeet Kumar, a doctor based in one of India's poorest states: "Their cup is not empty; you can't just pour your ideas into it. Their cup is already full, so you have to understand what is in their cup."

As actuaries become more engaged in public interest work, they would do well to listen carefully and do away with preconceived ideas before getting on with their problem solving. 



Since the birth of my children I feel that I have become far more cognisant of the passing of time. I look up and my wife and I are painstakingly setting up the next milestone card photo. Three months, six months, “Today I sat for the first time”. (If you are not familiar with the “Milestone Card” trend, this involves capturing monthly or first-time event photographs of your kids or pets with a descriptive card and then spamming family, friends and Facebook timelines with these images of parental pride overload. It is essentially the “marking your height on the kitchen door frame” of the digital age.) In babyhood and childhood there is an awareness of important moments, of milestones achieved; and these are marked with frequency and fanfare.

The Power of Moments is an uncomplicated read that considers Defining Moments and whether or not one should wait for these to “just happen to us” or go out and create them for ourselves, our employees, our students and our children. The authors identify four elements that are contained in defining moments being Elevation, Insight, Pride and Connection and then provide interesting discussion on each of these elements. Chapter titles are catchy. Examples are practical. Each element is summarised at

the end with a “Whirlwind Review”, making take-home principles easy to share.

The Heath brothers incorporate the consideration that a defining moment may not be a positive one. Low points and wake up calls are framed in the book as moments that are powerful because they hold “the promise of a better future path.” They package these moments as “tripping over the truth” about a problem or harm that manifests as a defining moment that change your world view. The book deals well with how to facilitate others to trip over their truth and utilize mentorship methods to lead to self-insight.

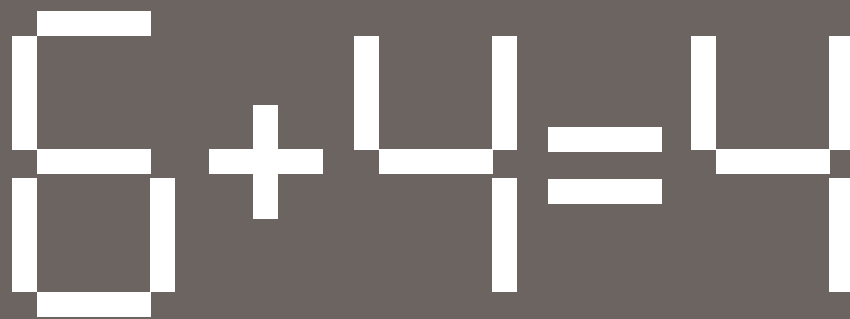
In the discussion of the element of Connection the authors neatly set out some fairly obvious principles in such a way that they make you stop and see them with fresh eyes. They describe Maureen Bisognano’s experience of asking patients and their families to set out “What Matters to Me” instead of merely asking “What is the matter?”, a technique that is now employed in every children’s ward in Scotland. They neatly remind us that “if we want more moments of connection, we need to be more responsive to others”; “relationships don’t deepen naturally” and turn-taking creates intimacy.

I enjoyed the idea that one should mark milestones that tend to be ignored because we are so accustomed to celebrating the standard ones (think 21st, 30th, 40th birthdays, advancing in grades at school etc). Heaths for example urges celebration of “teachers for their 1000th student taught”. My wife and I have taken this on board by for example having cake when our daughter turned 50 months and sponsoring a giraffe at the zoo when she reached 1 metre tall.

On a more serious note, as actuaries become more engaged in the public education and public health care debate, I would recommend Power of Moments podcasts called Defining Moments in Education and Defining Moments in Health Care. 

CAN YOU SOLVE THESE **BRAINTEASERS?**

MOVE JUST ONE STICK TO
FIX THE EQUATION

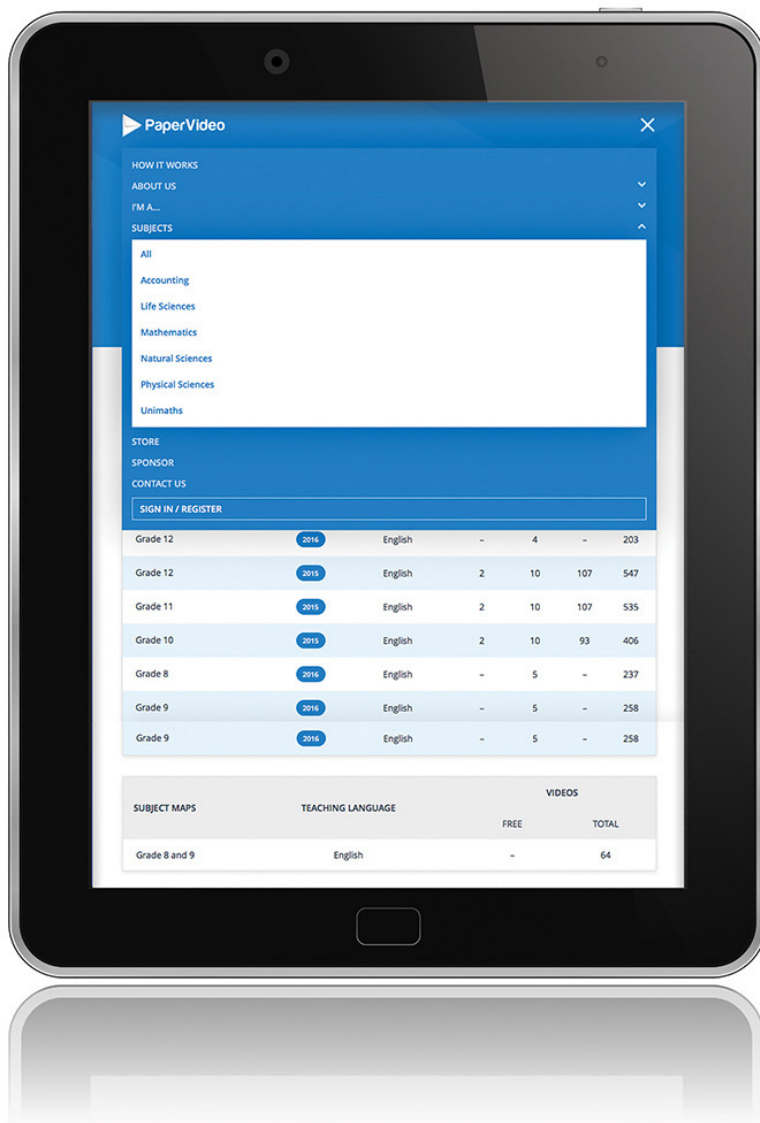

$$5 + 4 = 4$$

$$548102 = 100$$

Add the following mathematical signs to the equation to make it true: $()$, $+$, $-$, $*$, $/$.

IMPROVE YOUR MATHS RESULTS WITH PaperVideo

It's like having your own personal genie on call!



Subject maps help you identify the areas on which you need to work. **Why wait?**

Visit www.papervideo.co.za to register **FREE** of charge & watch your maths marks soar!



www.actuarialsociety.org.za

LET'S ALL BE SAFE

SPREAD THE WORD, NOT THE VIRUS.

www.sacoronavirus.co.za



www.actuarialsociety.org.za



Send us your thoughts
and comments. [Click Here](#)



@ASSASLC