



ACTUARIAL SOCIETY
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Actuarial Society of Hong Kong's Newsletter

Hong Kong Actuaries

AUG 2023 | VOLUME 02

Council & Committee Updates

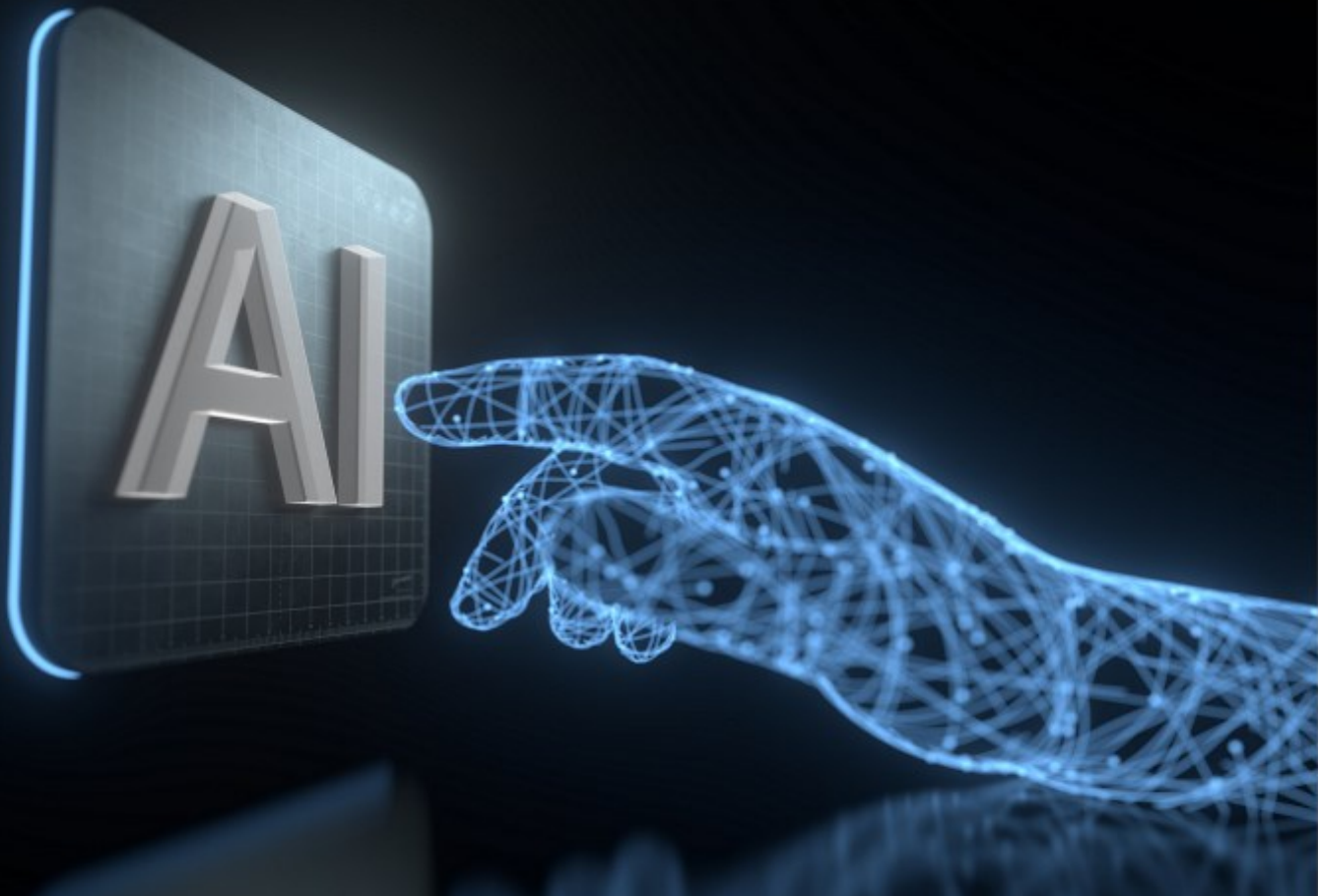
- General Insurance Conference 2023
- Health Insurance Conference 2023
- Professionalism Webinar

Feature Articles

- AI Ethics & Actuarial Tech
 - ◆ The Latest Trends in Actuarial Tech and Automation
 - ◆ Machine Learning and AI are Very Effective at Predicting & Explaining L&H Underwriting Decisions
 - ◆ Actuarial Intelligence in AI: Managing Ethical Risks
- Actuary Interview

Call for Articles or Views for the next issue of Newsletter!

While all articles are welcome, we would especially like to receive articles for the Feature Articles and Knowledge Sharing sections. If you have written any inspiring articles or have read any interesting articles from other actuarial organisation(s), please feel free to let us know. We will try to reprint them in our newsletter. Welcome to email your articles or views at info@actuaries.org.hk.





Message from the editor

Dear Readers,

Welcome to the second ASHK newsletter for 2023.

On behalf of the Membership and Communication Committee, it is with great pride and sincerity that I am honoured to introduce the second issue of the ASHK Newsletter for 2023. This new release would not have been possible without tremendous and selfless voluntary contributions of our Committee members.

In this issue, we will focus on the hottest topic “Artificial Intelligence Ethics & Actuarial Tech”. We’re happy to share three articles on this topic with you.

In addition, we’re thrilled to share the third issue of “Actuary Interview” with you. We will talk about their actuarial journey and discover their “secrets of success”. In this issue, we’re very honoured to interview Ms. Iris Lun. Iris currently serves on the ASHK Council. She will share her experiences with the ASHK and her amazing career journey from a well-established company to a start up. Also, she will share practical advices for actuaries in Hong Kong.

Last but not least, you are strongly encouraged to register for the upcoming events: the Actuaries Networking Event 2023 (31 August), Actuarial Innovation Conference (21 Sep) and & IFRS Conference (25 Oct) – all our events details are nicely summarized with the latest updates in the ASHK website. We intend to bring the experts to you so that you can benefit from their insights while fulfilling your CPD requirement, whether virtually, hybrid or in-person.

Happy reading!

Best Regards,
Timothy Wong
EDITOR

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Actuarial Innovation Committee - Iris Lun



Actuarial Innovation Conference 2023 – Register Now!

For the first time, the Actuarial Innovation Committee is excited to host an in-person event on 21 September 2023 at the Mira Hotel in Hong Kong. After successful virtual conferences in the last three years, this one-day event will explore the most cutting-edge innovations shaping the actuarial profession, under the theme of "Actuaries of the Future: Navigating Disruption with Innovation".

Conference Highlights

Join us to exchange ideas and connect with the most innovative actuaries and experts in the APAC Region. With a diverse lineup of speakers and panellists, the conference agenda will cover the most pressing topics and latest innovation trends, including Artificial Intelligence, emerging risks, InsurTech solutions, and the future of actuaries.

Don't miss out on this exciting opportunity! Register now and get ready to navigate disruption with innovation at the Actuarial Innovation Conference 2023. [<here>](#).

Professional Matters Committee - Chris Hancorn and Ronald Tse

ASHK Professionalism Webinar, 21 June 2023

The Professionalism webinar provides members with an opportunity to reflect on what it means to be a professional. It is designed to enhance members' awareness of the professional standards that should guide their conduct as actuaries. In the webinar two case studies that actuaries may face will be presented for members to discuss. We're thrilled that more than 200 participants attended the webinar. A big thank you to Ronald Tse (panel moderator), Roddy Anderson (panellist) and William Man (panellist) for leading the discussions.



Panellists from L to R: William Man, General Manager of Life, Hong Kong & Taiwan, Munich Re; Roddy Anderson, PMI member; Ronald Tse, Chief Actuary, Generali Hong Kong

General Insurance Committee - Trinity Pong

General Insurance Conference 2023**General Insurance Conference - Moving To The Next Era, 8 June 2023**

We would like to thank, Joseph Chan, Under Secretary of Financial Services and the Treasury Bureau for delivering the keynote at the conference. Mr Chan remarked, *“The future of Hong Kong’s general insurance market is closely tied to our overall growth and development, and as such, it is vital that we examine the big picture and explore emerging opportunities as we move to the next era”*. He also acknowledged ASHK’s role *“I would like to thank ASHK for its continuous effort in promoting the professional standards of actuaries in Hong Kong and providing the profession’s opinion to the Government.”*

After his address, Mr Chan joined a panel, which included Jonathon Ko from KPMG, Martin Noble from Zurich and Clarence Wong from Peak Re, to discuss Hong Kong’s general insurance future, in particular looking into the growth and opportunities that the GBA region may bring. The GI IFRS 17 panel include Jenny Lai from BOCGI, Justine Poon from WTW, Delvin Cai from PwC and Raphael from WTW, shared some insights about the lessons learnt through the implementation from the perspective of the insurance company and their auditor. There were also other insightful topics presented on the day, including the introduction to ILS, the insurer’s perspective on electric vehicles, Incorporating ESG and Climate into P&C underwriting, the ups and downs of COVID policies and how telematics is transforming motor insurance.

The conference was wrapped up with evening drinks at the sky bar, enjoying the moment with fellow GI actuaries, a panoramic view of Hong Kong and the success of the conference.

Lastly, we would like to express our appreciation to the sponsors, [Casualty Actuarial Society](#), [Society of Actuaries](#) and [WTW Insurance Consulting and Technology](#) for their great support of the conference.

More pictures of the GI conference can be found at <https://lnkd.in/gRk5CFNg>



Panellist on GBA development

(L to R: Trinity Pong, Clarence Wong, Joseph HL Chan, Jonathon Ko, Martin Noble)



Panellists on IFRS17 on General Insurers

(L to R: Xavier Lo, Justine Poon, Jenny Lai, Raphael Pak Ho Li, Delvin Cai)

Health Insurance Conference 2023

Sustainable Health Insurance — Hong Kong and Beyond, 10 May 2023

With the healthcare landscape undergoing significant changes in the wake of the pandemic, insurers are looking towards innovation and sustainability to address emerging challenges. The Financial Services and the Treasury Bureau (FSTB) has recently published the "Development Roadmap for the Insurance Sector", emphasizing that the Greater Bay Area (GBA) as a key entry point to connect the insurance markets of Hong Kong and Mainland China. It is against this backdrop, that the theme of this year's conference is "Sustainable Health Insurance - Hong Kong and Beyond" was held.

The Health Insurance Conference 2023 was successfully held on 10 May 2023, attracting more than 80 participants. We would like to thank our keynote speaker Mr. Joseph HL Chan, JP, Under Secretary for FSTB, the three panel CEOs (Edward Moncreiffe, CEO of HSBC Life; Mankit Ip, CEO of FTLife; Sally YW Wan, CEO of AXA) from different insurance companies and Orchis Li (panel moderator) for sharing their deep insight and groundbreaking views on the strategy of GBA. Also, thanks to Jamie Zuo for her insightful sharing on the China Healthcare system. Lastly, to the four panellists (Bob Charles, Cole Gu, Dr. Chan Chi Yuen, Flora Shao, Louis Lee) from different areas of expertise for their discussion on how to realize the GBA opportunity happen in the real world.

Last but not least, a big appreciation to the Conference sponsors China Reinsurance, Deloitte, HSBC Life and Qantev for their generous support. Votes of thanks must be extended to all delegates who attended contributing to the success of this year's Health Insurance Conference! We look forward to seeing you at the upcoming ASHK events!

Pictures of the conference can be found at <https://lnkd.in/gJyPcxet>



Photo from Left to Right: Edward Moncreiffe, CEO of HSBC Life; Kevin Lee, Chairperson of Health Committee; Sally Wan, CEO of AXA; Mr. Joseph HL Chan, JP, Under Secretary for Financial Services and the Treasury, The Government of Hong Kong SAR; Mankit Ip, CEO of FTLife; Orchis Li, panel moderator; Sam Yeung, Vice-chairperson of Health Committee)



Organising Committee from L to R: Bob Charles, Head of Actuarial of Coherent; Kevin Lee, CEO of i-Brilli Holdings; Orchis Li, General Manager of Gen Re HK; Sam Yeung, Head of CS Case Management & Underwriting - Corporate Solutions of AIA; Ben Ng, Director of Unit Linked Business of AIA

THE LATEST TRENDS IN ACTUARIAL TECH AND AUTOMATION

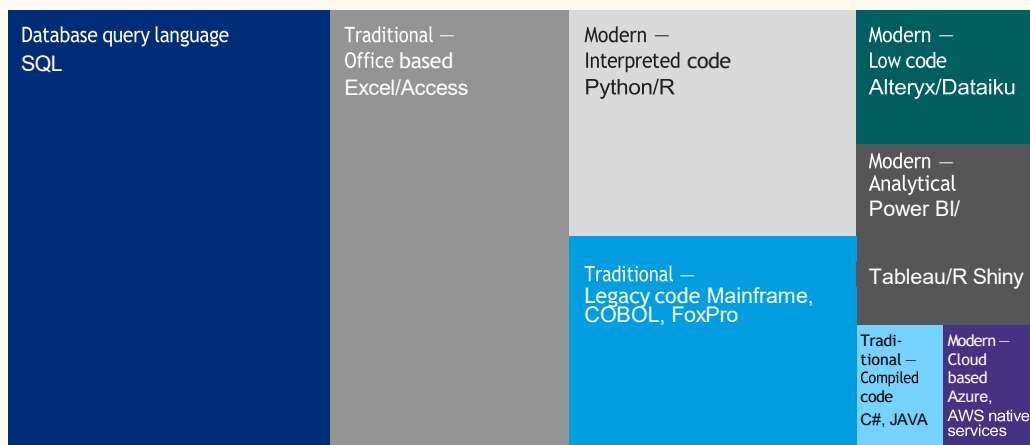
A snapshot of the landscape today and hypotheses for the future

SECTION 1: SOFTWARE LANDSCAPE FOR PRE-MODEL AND POST-MODEL

In the past five years, most insurance companies have made significant investments in the “pre-model” and the “post-model” environments surrounding actuarial core models where data is enriched, transformed, and analyzed. Companies usually have more than one goal for these investments, such as better analytics, faster financial close, decreased dependence on IT, or fewer iterations on the data provided by other

PRE-MODEL

Exhibit 1: Prevalence of key data management software for pre-model processes



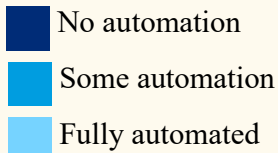
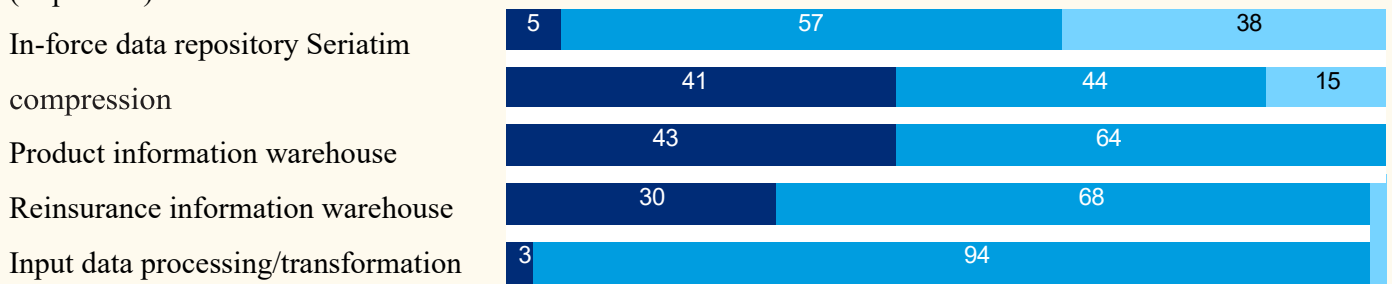
Source: Oliver Wyman

functions. Rising to the top, as the most frequently stated goal, is the desire to minimize the time actuaries spend manually adjusting data.

However, automation has remained an elusive goal for most firms. Below, we share results from Oliver Wyman’s 2022 US Modeling Survey (with 40 respondents), which visualize the platforms used and level of automation achieved.

Exhibit 2: Level of automation across pre-model processes

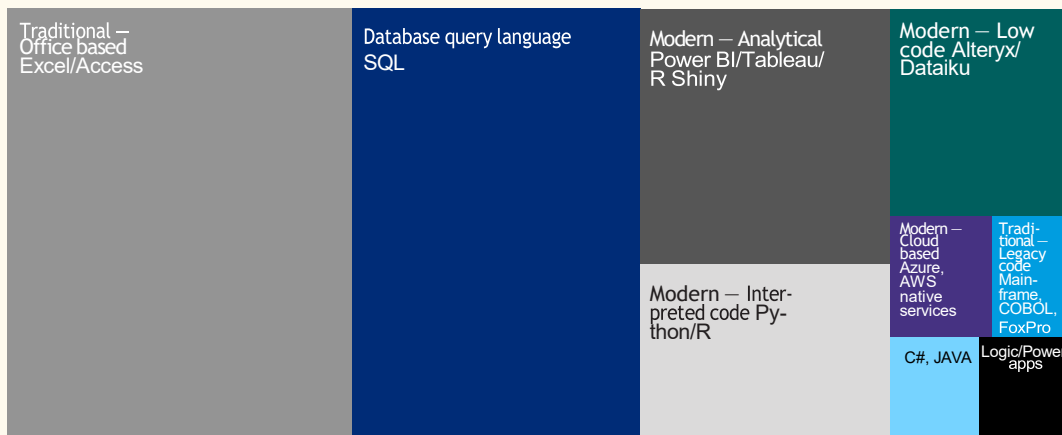
(In percent)



Source: Oliver Wyman

POST-MODEL

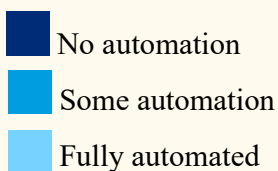
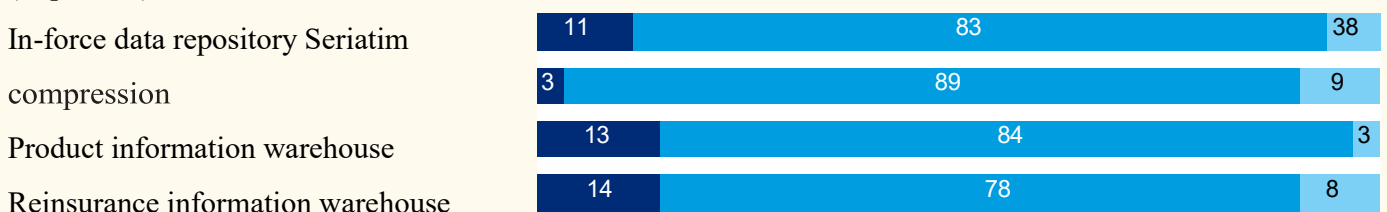
Exhibit 3: Prevalence of key data management software for post-model processes



Source: Oliver Wyman

Exhibit 4: Level of automation across post-model processes

(In percent)



Source: Oliver Wyman

Enhancing actuarial modelling processes, or also referred to as transformation, is more top-of mind these days with insurers in Hong Kong and across Asia. IFRS17 and HK RBC implementations are drawing to a close and while some have integrated these new reporting processes well, much more is to be done to streamline reporting, reduce manual efforts, improve controls, and add automation allowing teams to spend more time analyzing the results.

SECTION 2: THE ROLE OF SOFTWARE FOR THE CORE MODEL VS FOR THE PRE- AND POST-MODEL

Core model software as a one-stop-shop

For the most common core model platforms (AXIS and Prophet), the actuarial software acts as a one-stop-shop. Those platforms are typically used for:

Valuation and projections for various basis and use cases: Stat, GAAP, IFRS17, HK RBC, BMA, economic value, embedded value, etc.

- Pricing
- Sensitivities
- Storage and update of assumptions
- Run scheduling

The implication of this is that most companies are moving to consolidate onto a single actuarial core modeling platform. While they may not always spend the money to convert legacy business onto the primary platform, they are typically selecting a single platform for go-forward modeling across lines of business and financial reporting bases.

Much less consolidation among the pre-model and post-model software options

However, companies are not finding that they can serve all the needs of the pre-model and post-model processes with a single software. For each function (for example, data pipelines, data storage, reference data management, workflow approvals, data transformation and financial system integration), there are a handful of software options that can be a good fit, though it isn't a simple one-to-one relationship.

- For example, Cloud based platforms such as Databricks or Snowflake can be used workflow, data storage, transformations, but generally are not as useful for visualization (and are generally paired with Power BI/Tableau)
- A low code platform like Alteryx is a popular choice amongst actuaries who want flexibility in designing their own processes, however it does not have its own data storage. Companies often connect Alteryx to their data lakes (for example, SQL server, AWS Redshift, etc.)
- The data in section one notes that the average company is using four different software for the pre-model and three for the post-model for data management (excluding governance tools)

The landscape of options is complex enough that no one person knows it all. When we perform projects to select the best software stack for a company, a small team of experts is required to summarize the capabilities and pros and cons of each software. Examples include:

- Data transformation (options include Alteryx, SQL, DBT, python)
- Data storage (options include SQL Server, AWS S3/Redshift)
- Workflow orchestration (options include Apache airflow, Control M)
- Dashboards and analytics (options include Tableau, PowerBI, Quicksight)
- Subledger (options include Aptitude, Moody's Risk Integrity, SAP products)

Note that some software related to functions such as data governance, security and deployment have not been mentioned above but also add to the software stack as well.

It's worth noting as well that some core model software vendors have begun to offer add-on services related to data transformation, orchestration, and dashboards. However, they have not significantly displaced the platforms listed above for pre-model and post-model functions.


SECTION 3: WHAT DOES THIS MEAN AS COMPANIES LOOK TO INCREASE AUTOMATION AND ADVANCE THEIR TECHNOLOGY?

Most insurance companies report that actuaries are spending up to 50% of their time on manual work surrounding the pre-model, core model, and post-model. We have a pressing need to automate the end-to-end workflow so that actuaries can spend their time adding strategic value for the company. However, as shown in section one, 90% of companies have not been able to do this, and the continued fragmentation of the pre-model and the post-model across several technologies is a contributing factor.

A few hypotheses about how the landscape will evolve over the next five years:

1	Companies that have a single end-to-end software stack will progress faster on automation	<ul style="list-style-type: none"> • It takes time and effort to define and implement an approach to automation, and so companies that have several different software platforms (for example, RAFM for Europe and Prophet or RNA for Asian entities, or AXIS for Life, ALFA for annuities, and Prophet for LTC) will need to do this multiple times • Companies that can define one approach to automation, and use a consistent team to drive deployment across the org, will progress faster
2	Software vendors that can satisfy all or most of the functions of pre- and post-model processes in a single package will gain a larger market share	<ul style="list-style-type: none"> • For example, broader data engineering platforms that provide transformation, storage, workflow and governance all in one solution, for example, Databricks, Snowflake are gaining market share • Another example is where we the entire stack based on Microsoft tools that work well with each other: Azure data lake, PowerBI, Azure Data factory, Office 365, Azure Devops
3	With increasing volumes of data, generative AI, and a frequently changing universe of software we see a trend towards using more cloud based and portable/open-source solutions. The following would make a transition to a new solution easier in the future	<ul style="list-style-type: none"> • For example, companies can manage their code in master repos using git, while only executing them on the cloud (such as in Databricks) • Companies can also abstract their query-able data models within their data lake and only minimally transform any data within the analytical/ dashboarding tool

Source: Oliver Wyman

In conclusion, we see that companies have a significant array of choices to draw from, and new breakthrough software that have a specific niche come online very frequently. Also, internally companies may have certain lines of segregation leading to different choices of software across these segregated functions. Thus, companies looking to drive long lasting automation will need to review their internal operating model and select software that can bring scale, provide a whole host of functions, have open-source features, and align with their future state operating model. 

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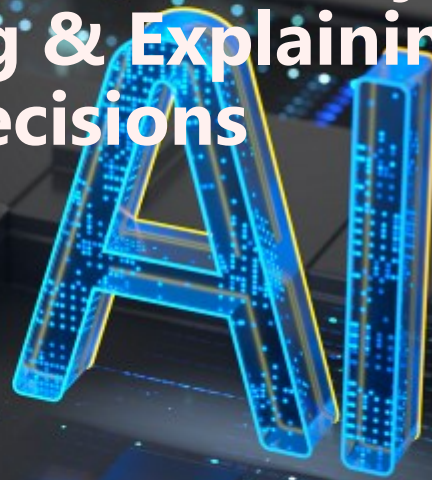
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Machine Learning and AI are Very Effective at Predicting & Explaining L&H Underwriting Decisions



ChatGPT has thrown AI advances into the spotlight, and while LLMs (large language models) feel new and exciting, actuaries have already been using AI and machine learning to great effect, for some time now.

In this article, we focus on proven enhancements to insurance analytics, with a focus on medical underwriting – an essential risk management and risk classification process.

We have the Data and the Tools

Advances in machine learning, and an explosion of non-structured data, have created huge scope for the application of models in the life & health sector, including predictive underwriting. Using real-world reinsurance data, this article examines how practically machine learning models can help to automate and enhance the underwriting process, and how explanatory AI can be applied to explain and validate the underlying model predictions, as well as draw additional underwriting insights.

The Current Process and Why We Need AI

The dominant process at the moment for automating medical underwriting insurance applications, starts with a rule-based engine which is essentially a box of encoded underwriting rules, similar to a survey that takes you to a different next page depending on the answers provided. It is deterministic, so only a finite number of rules can be encoded into these engines, which means many cases need additional intervention. The Straight-through Rate (STR) is the proportion of cases that can be processed automatically, which can be fairly low, especially

for more comprehensive covers. Those applications that fall outside the scope of the encoded rules are then passed to human underwriters at the insurer. If those reviewing underwriters still can't make a decision, usually due to complicated or multiple medical and lifestyle risk factors, the cases are then referred to reinsurers' underwriters, who provide their opinions.

The first value of machine learning models and explanatory AI is that they can be trained on the pool of referral cases which required manual review, in order to implement machine learning models to improve the STR, shorten the processing time, and prevent loss of sales due to long waiting period.

Secondly, the current automation tool is deterministic, so there is a finite number of rules encoded into the rule engine, each of which will need manual updating over time, and then number of new rules require further updates. Machine learning models, on the other hand, are predictive, meaning they are designed to learn the patterns and rules embedded in the data, so well-trained and highly accurate models do not require constant updating of a huge collection of rules encoded into the box.

Lastly, explanatory AI can be used to explain the model predictions and help insurers to draw underwriting insights that may not be immediately obvious. Indeed, this might be used to inform human underwriters, to help improve their own contribution in future.

Model Performance

This table shows the performances of ten different algorithms and models, including regression which most actuaries should be quite familiar with. Of the over 11,000 cases, about 8800 were used for training the models (approximately 80%), and the remaining 2200 cases were used for the testing dataset. The performances on the training dataset are generally better because of overfitting, but the testing dataset is more important since it indicates how the model is likely to perform with future data, once deployed.

The extreme gradient boost model (“XGB”) performs the best across various metrics, in particular achieving 99.5% accuracy on the training set and 81.1% on the testing dataset. This is not surprising since XGB models are designed to cope with sparse data and sets with lots of noise, which is the case with medical underwriting data.

Model_Name	Precision Train	Recall Train	F1 Score Train	Train Accuracy	Precision Test	Recall Test	F1 Score Test	Test Accuracy
XGBClassifier	0.997	0.993	0.995	0.995	0.799	0.72	0.754	0.811
BaggingClassifier	0.996	0.994	0.995	0.995	0.703	0.612	0.647	0.775
RandomForestClassifier	0.996	0.994	0.995	0.995	0.703	0.615	0.65	0.774
GradientBoostingClassifier	0.997	0.994	0.995	0.995	0.662	0.636	0.645	0.757
DecisionTreeClassifier	0.995	0.995	0.995	0.995	0.55	0.556	0.55	0.691
KNeighborsClassifier	0.581	0.501	0.534	0.66	0.375	0.293	0.312	0.471
AdaBoostClassifier	0.072	0.09	0.072	0.442	0.066	0.089	0.071	0.438
LogisticRegression	0.021	0.053	0.03	0.39	0.02	0.053	0.029	0.388
SVC	0.073	0.053	0.03	0.39	0.073	0.053	0.03	0.388
SGDClassifier	0.003	0.053	0.006	0.056	0.003	0.053	0.006	0.061

Table 2: Performances of all models

Below, we focus on XGB, the best-performing model shown above.

Zooming in on Performance

In the table 3, we look at how the model performs specifically for medically standard (unloaded) cases, and then for each level of additional mortality loading up to cases being declined. Note that “loaded 25”, for example, means that case was deemed to exhibit +25% higher mortality.

The model performed extremely well for the standard class, with an accuracy score of 93.8% on the testing dataset (against the decision of the human underwriters). As we deviate away from standard, the performance does worsen, partly because of the limited amount of data in those classes.

There are over 110 “features” in the dataset, selectively reduced to 77 in the final model. Since the general rule of thumb is that at least 10 data

points are required per feature for training, each class here would need at least around 1000 datapoints to prevent the model learning randomness, or merely reflecting the majority outcome.

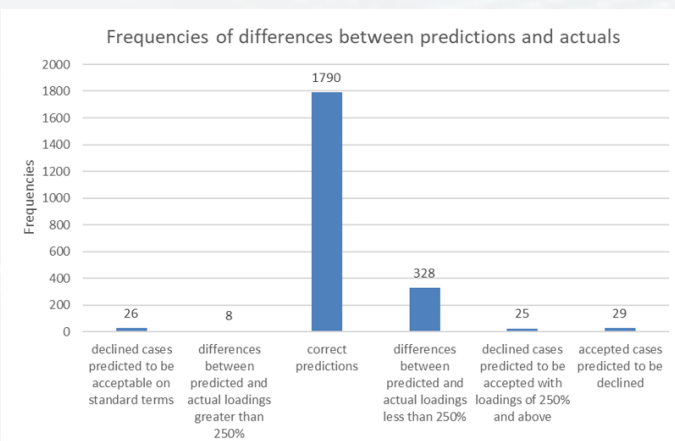
The optimistic amongst you will immediately recognise how quickly the accuracy of these models will improve as we continue to accumulate relevant data.

Class label	Class Description	Precision Test	Recall Test	Accuracy Test	Count Test	Precision Train	Recall Train	Accuracy Train	Count Train
0	Standard	0.853	0.938	0.938	855	0.997	0.996	0.996	3436
1	Loaded 25	0.821	0.696	0.696	46	0.996	0.996	0.996	235
2	Loaded 50	0.713	0.771	0.771	345	0.988	0.996	0.996	1370
3	Loaded 75	0.852	0.687	0.687	134	0.992	0.986	0.986	496
4	Loaded 100	0.741	0.76	0.76	200	0.997	0.994	0.994	870
5	Loaded 125	0.953	0.788	0.788	52	0.995	0.986	0.986	216
6	Loaded 150	0.814	0.731	0.731	108	0.993	0.998	0.998	448
7	Loaded 175	0.833	0.667	0.667	15	1	0.987	0.987	78
8	Loaded 200	0.794	0.617	0.617	81	1	0.996	0.996	279
9	Loaded 225	1	0.75	0.75	8	1	1	1	26
10	Loaded 250	0.821	0.667	0.667	69	1	0.988	0.988	252
11	Loaded 275	1	0.909	0.909	11	1	0.964	0.964	28
12	Loaded 300	0.711	0.73	0.73	37	0.994	0.989	0.989	177
13	Loaded 325	0	0	0	2	1	1	1	3
14	Loaded 350	0.818	0.6	0.6	15	1	1	1	54
15	Loaded 375	1	1	1	1	1	1	1	1
16	Loaded 400	0.864	0.76	0.76	25	1	1	1	93
20	Loaded 400+	0.773	0.895	0.895	19	1	1	1	122
100	Decline	0.819	0.716	0.716	183	0.989	0.995	0.995	637
Overall	All Classes	0.799	0.72	0.811	2206	0.997	0.993	0.995	8821

Table 3: XGB Prediction Accuracy By Class

Unlike your actuarial exams, some failures of this model are actually not so bad.

For example, the model might classify a case as +250, whereas the underwriting might determine +250. Our analysis marks this a fail, but in economic terms it's not necessarily a large deviation. In practical terms, we have produced the histogram below to show that the majority of cases are correctly classified, and indeed the majority of 'failures' are not large deviations from a correct assessment.



We can use various explanatory AI techniques to investigate what drives of these 55 failed cases that may potentially have material impact.

(a) LIME (Local Interpretable Model agonistic Explanation), a popular method, can approximate how XGB arrived at its prediction.

For example, we used this method to review one particular case that was predicted to be standard, but observed to be declined. A comparison was made between the top 20 features for standard and decline classes, and how much each feature contributed to the prediction. That individual had a healthy BMI of 22 and no apparent medical condition or family history, which explains why the model prediction appears more appropriate.

However, in consultation with expert

underwriters, they revealed that in practice, when a case is declined, the medical conditions are often not recorded, since no policy will be sold. While it appears that they are a healthy person in the data fed into the models, the reality is they had pre-existing conditions which were simply not noted in the data. This is easy to fix, by implementing data capture standards in order to enhance model performance.

(b) SHAP is another popular explanatory AI technique that allows us to look at the model behaviour at global, cohort and individual levels. The technique is based on game theory and in this context, the “game” is the model output of the extreme gradient boost and the players are the features.

Using this model-agnostic approach, we show a graph used to identify the most influential features (by the magnitudes of contribution). For this discussion, the details of the factors are not as important as the visual sense you get of being able to understand why the model is making the predictions it is. In this dataset, BMI is the most influential feature across the board (from standard to decline), followed by Face Amount (the sum assured), and then on to various medical conditions. Interestingly, cancer is not in the top 5 medical conditions – which suggests that, contrary to news headlines, taking mitigation steps for long-term manageable conditions (metabolic syndrome is a potential common underlying issue) would be more beneficial for getting healthier, and thus changing one’s underwriting loadings. This is particularly interesting, since this dataset contains mortality, CI and Income protection.

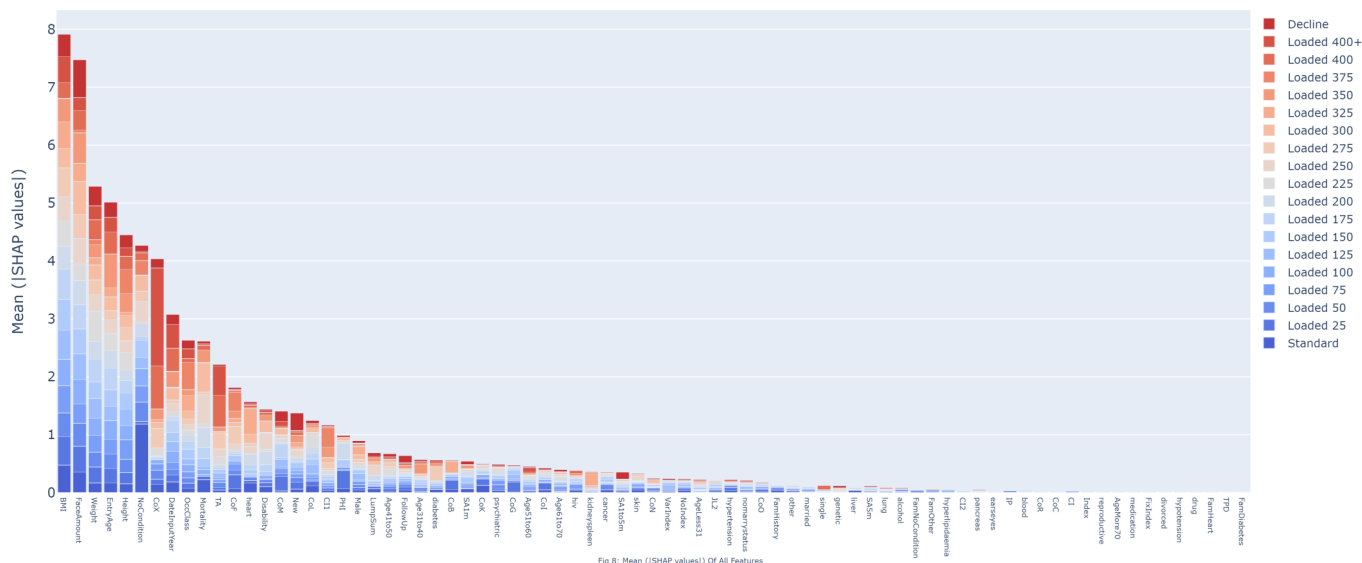


Fig 6: Mean (SHAP values) Of All Features

SHAP feature ranking can also be done on a cohort level, providing different levels of insight.

And when the SHAP method is applied to individual cases, we can produce a waterfall plot for any single case. For this application, the exact influence of each factor in the prediction is highlighted, allowing us to see that the model is indeed working as intended.

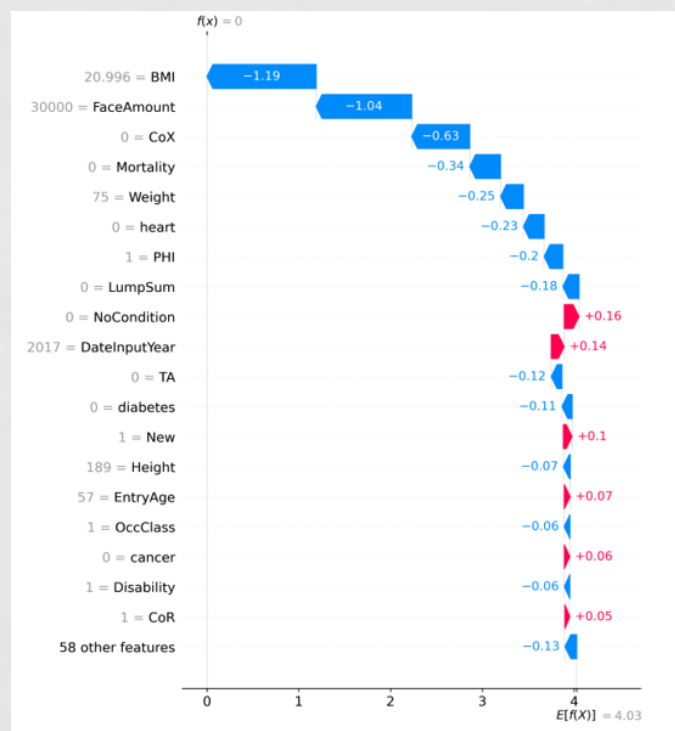
This is a significant tool for addressing the criticism against machine learning being deemed to be a “black box” with unknowable and unpredictable outcomes.

Machine learning models can be used in insurance for many purposes. Creating medical underwriting models is shown to be particularly effective, with a growing ability to improve the automation of cases which have traditionally been left to humans to get “right”.



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Zooming in on Performance





Actuarial Intelligence in AI: Managing Ethical Risks

We can't just assume it's OK

The use of advanced analytics techniques and machine learning models has increased significantly over the last few years. It is an exciting time for actuaries and an opportunity to innovate as they deploy and tailor these models to insurance use cases. With the help of these models, leading insurers are driving better insights and increased predictive powers, ultimately resulting into better performance of the business.

However, with every new technology comes new risks. With AI, the implications of such risks could be material. In this article, we discuss some of these risks arising out of data and model bias, particularly focusing on the ethical considerations and how an actuary should address these.

Data bias: When AI sees the world through a distorted lens, it's time to focus on the bigger picture

Ethical risks associated with data bias are not particular to just AI models, but these are more important to consider and address in AI models because of the following reasons:

AI models make predictions based on patterns in the data. Since these models learn from historical data, any biases present in the training data are more likely to be perpetuated by the AI systems. This can lead to biased outcomes and unfair treatment for certain groups or individuals.

For instance, a tech giant had to abandon the trial of a recruitment AI system when it was found to discriminate against women for technical roles. This

turned out to be the result of training the model with a dataset spanning a number of years and since historically, majority of these roles were held by males, the algorithm undervalued applications from women.

Furthermore, AI models can inadvertently reinforce existing biases present in society or in existing practices. For example, if historical data reflects biased decisions made by humans, the AI model may learn and perpetuate those biases. This creates a feedback loop where biased AI outcomes further reinforce the existing biases. Non-AI models may be less susceptible to this feedback loop as they typically do not have the ability to learn and adapt over time.

AI models can process vast amounts of data at a fast rate, enabling them to make decisions and predictions on a large scale and in real-time. This amplifies the potential impact of biases present in the data if human oversight is missing or reduced.

AI models can be highly complex and opaque, making it challenging to understand how they arrive at their decisions. This lack of transparency can make it difficult to detect and address biases within the models. In contrast, non-AI models, are often more transparent, allowing humans to directly inspect and understand the decision-making process.

Given these factors, data bias is more of a concern in AI models and therefore, addressing and mitigating data bias is crucial to ensure fair and ethical outcomes.

Mitigating data bias

To mitigate the risks associated with data bias, an actuary should gain a thorough understanding of the data collection methods used and identify any potential sources of bias in the data collection process. Actuaries often have control over data quality improvement processes where they are involved in data cleaning, removing outliers, and addressing missing values. By applying rigorous data cleaning techniques, biases which are introduced by data quality issues, can be reduced. For example, if a particular demographic group has disproportionately missing data, inputting missing values in a manner that preserves fairness and avoids bias can help mitigate bias in the analysis. If the training data contains imbalanced representations of different demographic groups, resampling techniques can be employed to address the imbalance and give equal, or representative, weight to all groups, reducing potential bias.

Internal data can also be supplemented with external data sources that provide a broader and more representative perspective. However, caution need to be taken about the potential biases in external data sources. The applicability and relevance of the external data to the analysis should also be carefully considered.

Actuaries also need to consider and test any assumptions made during the process to avoid introducing additional areas of bias.

Model bias and model governance

As well as mitigating data biases, actuaries should also design a robust model governance framework, something they should already have been doing with their traditional models. This should include regular monitoring, evaluation of the model outputs against emerging experience, consideration and understanding of the tail ends of the model output distribution in relation to consistently getting significantly high or low predictions, for example.

As part of the continuous monitoring process, fairness metrics should be developed, allowing potential bias to be flagged and rectified. Any legal or regulatory requirements should be part of these metrics, where possible.

It can be challenging to collect the data needed for a fully robust analysis of fairness when it is not

typically collected by an insurer. There may therefore be a need for the use of proxies or allocation methods that use data that may be unavailable to the model, to assess fairness.

It is vital to gain a deep understanding of the algorithm and features of the model. Ensuring a model is explainable is essential in building the trust of the management, regulator and the customer. Models that are explainable can more easily reveal bias and identify areas for improvement. Gaining a deeper understanding on the drivers of the output also facilitates actions of intervention. Explainability metrics such as SHAP values, ICE plots and partial dependency plots should be part of the model governance framework. Apart from performing reasonability checks on values of these metrics across variables, it might be worth comparing these against similar and comparable metrics (e.g., PDP vs GLM relativities) based on traditional algorithms. This should highlight any significant deviation and a conscious decision could then be taken whether to apply any control or correction.

Another way of addressing model bias is to incorporate fairness considerations directly into the model training process by using techniques that explicitly account for fairness. For example, fairness-aware learning algorithms, like equalised odds, can be used to enhance fairness during the training process.

The most progressive insurers are already developing frameworks which include clearly defined steps such as (1) defining fairness including trade-offs and prioritisation of different fairness criteria, (2) measuring fairness using metrics, and investigating data and models for potential sources of bias, and (3) implementing the modelling process by addressing potential harm where intervention may be necessary in a proportionate and effective manner.

Conclusion

The application of advanced analytics techniques, when used appropriately, can create opportunities for insurers to offer customers greater access to more targeted products at equitable prices, promoting safer behaviours and enhancing overall business outcomes. However, it is crucial to recognise the substantial consequences associated with neglecting the risks associated with these models which could affect business viability, regulatory compliance, and reputation. Establishing trust is key to the advancement of model techniques that a business can deploy. Therefore, thoughtful consideration and mitigation of ethical risks should not only ensure a fairer outcome for society but also facilitate the wider adoption of AI models within the insurance industry. 🚫



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Associate Director, WTW



Interview with Iris Lun

Message from Timothy Wong

This is the third edition of our ASHK interview series, which features well-known actuaries in Hong Kong. Our guest Ms. Iris Lun currently serves on the ASHK Council. In this interview, Iris shared her experiences with the ASHK and her amazing career journey from well-established company to a start up. Also, she provided practical advices for actuaries in Hong Kong.

Iris Lun

Iris currently serves as a Council Member of the Actuarial Society of Hong Kong and as the Chairperson of the Actuarial Innovation Committee. She is the Co-founder and Chief Actuary of 10Life, an InsurTech company providing insurance product ratings and intelligence to consumers in Hong Kong.

Iris is passionate about enhancing the actuarial profession through innovation. She is a frequent speaker in the local and online media, advocating for actuaries using data for good and bringing fairness to the insurance industry. She boasts 25 years of international experience in the insurance field, holding actuarial and leadership roles at renowned global insurance and consulting companies such as Prudential, ING and Towers Watson. She recently served as a Non-Executive Director of the Actuaries Institute Australia.

Iris earned a Bachelor of Commerce (Actuarial Studies) and a Bachelor of Arts (Japanese) degree from the University of Melbourne. As a dedicated mother of two energetic children, Iris is also a lifelong learner.



Experience with ASHK



Q ASHK: When did you first join ASHK?

A IL: I joined ASHK for the first time in 2000 when I came back to Hong Kong to work after graduation, and I joined as an associate. I moved to Japan in 2002 and did not come back to Hong Kong until 2008, so I re-stated my membership in 2008.

Q ASHK: Before joining as a council member, which committee did you join?

A IL: When I came back to Hong Kong in 2008, I joined the risk management committee. The risk management committee was quite active for a few years and Ka Man Wong was the leader. We organized the first risk management conference in Macau and it was one of my most memorable moment when serving on the committee. It was very interesting how we stayed in a casino hotel and many actuaries went to the casino at night. Later I joined the Membership and Publications Committee for a few years, managing the quarterly newsletters and finding ways to attract and retain members.

Q ASHK: What is your most memorable moment serving as the ASHK council?

A IL: The risk management conference at Macau was memorable, so were the interviews with renowned actuaries such as Patrick Poon and Fred Rowley for the newsletters. Before COVID started, we used to have the ASHK annual dinner at which people gathered and celebrated the new joiners and fellows. That was always the annual highlight. Recently, I was quite impressed with the volunteer appreciation lunch in March this year. It was the first time we had such an event to recognize the volunteers. People came for lunch, and we could meet face to face again probably for the first time since COVID started. We could

finally interact in person and get to know people from each committee after relying on online interactions in the past 3 years.

Q ASHK: Do you think we have enough presence of female leaders at ASHK? How can we encourage female actuaries to take up more leadership roles?

A IL: This is an interesting question. I think compared to the Institute of Actuaries of Australia (where I served as Council Member in the last 3 years), the leadership at ASHK is not as diverse, especially on gender diversity. We only had one or two council members who are female in the past. Even at the committees, the committee chairs by definition need to be council members. Therefore there are mostly males at the committee leadership level.

At the Institute of Actuaries of Australia and the International Actuarial Association, they have a specific agenda on diversity and inclusion. They make sure that, for each committee or initiative, there is enough diversity. It is not only on gender, but also diversity on age, practice area and culture. For the International Actuarial Association, there is diversity on geographic location and language. For many local bodies, like Australia and Canada, there is a an agenda or task force on diversity. This is not only to promote equality, but it's actually good for business as a lot of research indicates that diversity improves efficiency and business outcomes of organizations.

Q ASHK: How can we encourage female actuaries to take up more leadership roles?

A IL: Based on my experience, it is important that we give everyone, not just female, enough empathy and enough opportunities to contribute in different ways. For example, I think the experience of working online during COVID lockdown was a good example. We learned how to work together on a remote basis. ASHK council and committee meetings are mostly online or hybrid now. I think that this option allows people with family duties to contribute and participate. The physical presence or the location is no longer a barrier.

Personally I will continue to advocate for diversity and inclusion in leadership among the actuarial profession and the wider community.

[Career as an actuary]



Q ASHK: What has inspired you to set up your own company 10Life?

A IL: There are two reasons. One reason is that I always wanted my own business even when I was working in corporate as I was always looking for new challenges. In addition, there was no option to work from home in the past. It was difficult to balance work and family when I was raising two young children. When I had my second child, the idea of starting my own business came out during my maternity leave.

One of my current business partners approached me for advice when he was looking at insurance products. He got all the proposals from different insurance agents, put the insurance products on a spreadsheet and asked me how to compare them. I showed him how to calculate the coverage and returns of the various products and how to understand the terms and conditions. We thought that we should put this kind of information online for the public to get the same benefits. This was how the idea came up, and since then 10Life became like my third baby.

The second reason is the desire to make a difference. In our training as an actuary, we are supposed to balance the triangle of the policyholders, shareholders and distributors. However in my corporate experience, the weight often went to the distributors and shareholders, and sadly the policyholders became the last. This is why having a business for which I can put the balance back to the policyholders is something that I feel really proud of. By doing so, we help to improve the reputation of the industry as well. In Hong Kong, the insurance products are so complex. It's very hard for a layman to understand the products being sold or marketed to them. I want to use my experience in insurance product pricing and development to give back to the policyholders and the industry.

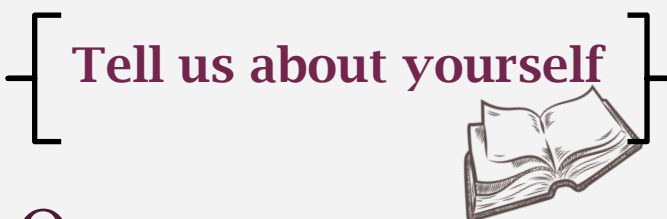
Q ASHK: What are the key differences working in a well-established company vs in a start up?

A IL: The key difference that I have noticed is the level of bureaucracy. Being in a large corporate can be political and bureaucratic. No matter how great your idea is, you might have to go through many levels committees, departments and management to get approval. By the time you have all the approvals (if you are lucky), the world has moved and the idea may not be valid anymore. This kind of corporate structure kills innovations. Contrast that to a startup, where people can test an idea quickly in the market. If there is a new concept or product idea, we just try it on our platform and see the response from the market. If it works, we continue. If it does not work, we make changes quickly or we do something else. The timeframe from a new idea to actual implementation is a lot shorter, with a lot less resources. Another difference is the spectrum of work involved. In a large corporate, you might be doing the same task for the whole year. In a startup, you are not just the actuary, but may also the CFO, the investor relationship manager, or even pantry supplier and toilet cleaner.

Q ASHK: What were the greatest achievements and challenges you have faced in your career so far?

A IL: I am happy to have done a variety of work before starting my own business. I have not followed a very traditional actuarial career path. After my consulting role in Hong Kong (Towers Watson), I joined a big international group (ING) where I got to work in different areas and countries. I have done pricing, model development, valuation, risk management, investment, even worked on non-actuarial roles. I spent two years in Amsterdam working for the ING Group board on an investor relations and business analytics role. As an actuary, I had no background on marketing, but I was lucky to be able to take on a head of product marketing role at ING Hong Kong when I came back here. I am grateful for the opportunities to experience different roles at different locations, jurisdictions and cultures in a short period of time.

One of the greatest challenges was to get qualified. It is relatively easier to study and get qualified in Australia than in Asia due to better work life balance. For example in Hong Kong I was called back to the office for an urgent client project during my study leave. In Tokyo finding time to study in the vibrant city was also difficult. After getting qualified, the next challenge was to move from being an individual contributor to the manager and leader level. It was also critical to learn to communicate with non-actuaries for their buy-ins. During the financial crisis in 2008, we had to make difficult decisions to de-risk and shelf many of the high-risk products. I had the challenging job of explaining to the agency heads why they had to stop selling those top-selling products.



Q ASHK: How did you become an actuary? What did you study at university?

A IL: I did a double degree in Arts and Commerce at Melbourne University. For Commerce, I majored in actuarial science. For Arts, I studied Japanese and Chinese. Ever since primary school I had liked Mathematics, and I was good at it. In high school, I did the International Baccalaureate diploma and had to at least one humanities subject. I chose Economics which turned out to be my favourite subject. Actuarial Studies is the only program that gives the combination of Mathematics, Economics and Social Science which I'm passionate about. However I have a variety of interests and do not want to focus on one thing only, so I also studied language and culture.

Q ASHK: How many countries have you worked in? Any countries you like most?

A IL: I studied and lived in Australia where I did a few different internships. I started my first full time role in consulting in Hong Kong. Then I moved to ING group, where they kept sending me to different places. I worked in Japan, the Netherlands and Taiwan before coming back to Hong Kong.

In terms of living, Japan is my favourite as I love Japanese culture and food. I also love to travel to different areas within Japan. However the work culture can be unhealthy at times, and there is also not enough cultural diversity.

The Netherland is the complete opposite of Japan. The Dutch are very direct and egalitarian, very strict with time and work life balance. Many people would work four days a week, even though they are employed full time. On their day-off during the week, others are not allowed to reach them.

Australia is a mixed culture. Some people work really hard, but many are quite strict about work life balance. When working remotely, some people would turn off their laptops and work phones at 5pm sharp.

Q ASHK: Can you tell us something interesting about yourself?

A IL: I have been secretly learning how to sing. I did an amateur musical class last year and we had a performance recently. It is always good to learn new skills. The love of learning is one of my key character strengths, so it's important for me to continue to learn. Musical is interesting because it combines singing, acting and dancing skills. I had classes taught by professionals from each of these three fields and at the end we had to put together a public performance. Learning to perform has helped to improve my presentation skills, which I think are very important for all actuaries. These days I do a lot of presentations and media interviews, and I find the acting classes have helped.



Q ASHK: Any advice for Hong Kong actuaries?

A IL: I think communications skills are definitely the most important. Actuaries are good at analyzing and complex problem solving. But unless you can explain and convince people on the results, everything you do is useless. It's also a bit of selling skills so that people buy into your ideas. Many actuaries are quite introverted and sometimes arrogant. They think they know everything, and they are so smart. Sometimes you have to be humble and be aware that you don't know everything. I learnt this especially when I started my own business. There are always people who know more than you. The younger generations are a lot quicker at picking up new technologies and accepting new ideas. They just learn a lot faster than you. You have to trust others especially younger colleagues who can actually help you do your job better.

Q ASHK: Any advice for our young actuaries who want to embark on a non-traditional career path like you?

A IL: I think young people today are luckier than me. 20 years ago, it was very difficult to deviate from the traditional path unless you were willing to give up study leaves and a good salary. These days, especially outside of Hong Kong, actuaries have dived into diverse fields including technology, public policy and climate change. As long as a role involves managing risks and uncertain future events, there is potential for actuaries to contribute. Apart from learning the related technical skills, the ability to learn from and communicate with other people effectively is the key.

Networking is also crucial for finding opportunities in non-traditional careers, as many jobs may not be advertised through conventional channels. To expand your network, consider using platforms like LinkedIn and attending networking events where you can meet professionals from various industries, such as the medical or technology fields. In Hong Kong, organizations like Cyberport and Science Park offer programs to support early-career professionals and startups, providing opportunities for networking and collaborations.

Q ASHK: Any advice for our young female actuaries?

A IL: It's encouraging to see that the younger generation is less likely to be limited by gender differences. However, it's important to acknowledge that gender inequality still exists in some industries, including actuarial science and insurance. My advice would be to focus on your individual strengths and qualities, and see yourself as a leader regardless of gender.

It's important to avoid stereotyping and recognize that individuals have unique strengths and qualities regardless of gender. Embrace your true self and be proud of who you are, whether that means embracing your femininity or taking a different approach to leadership. One important quality that many women (and men) possess is empathy, which can be valuable in communication and sales efforts.

In addition, I encourage young female actuaries to learn something they are passionate about, seek out more information, and expand their network to connect with the right people.

”My final advice for everyone is to be open-minded – i.e. be willing to consider new ideas and perspectives, regardless of age or position. I encourage my fellow council members and everyone else to challenge the status quo and question assumptions. Just because something has been done a certain way for the last 10 years, it doesn't mean that it's the right thing to do. Because the right thing to do is often not the easiest thing to do. Between the right way and the easier way, we should always choose the right way.”

EVENTS HIGHLIGHTS

27 April 2023

Actuaries Networking Evening



UPCOMING EVENTS

31 Aug 2023

Actuaries Networking Event 2023

[Details](#)

21 Sep 2023

Actuarial Innovation Conference

[Details](#)

25 Oct 2023

IFRS Conference

[Details](#)



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Matthew Frederick HUNT	Prudential Hong Kong Ltd	Associate member
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Ka Yin, Kelvin NG	SCOR Reinsurance Com Asia Ltd	Associate member
Elaine TAN	MSIG Asia Pte Ltd	Associate member
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Yik Suen KEUNG	Milliman	Associate
Pui Yuk, Stella KONG	Hannover Re	Associate
Chi Yan, Hugo YEUNG	China Ping An Insurance HK Co. Ltd	Associate

Student

Mei YIN	Prudential Hong Kong Ltd	Ordinary student member
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Membership Advancement

Associate

Hoi Chun Billy LEE	BOCGI	Associate
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