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Insurance Innovation and Implications for Actuarial

By Simon Phipps and Valerie du Preez

Note from the author: A few months ago I was presenting on disruptive forces in the insurance industry as part of a review of emerging risks across the sector, and was subsequently approached to write this article. It is clear that much of the innovation transforming our industry will, in one way or another, impact the work done by actuaries.

At this point I need to declare something upfront; I am not an actuary! Though, having spent much of my time working alongside actuaries around the world over the years, I have developed an immense respect for the work they do. I have asked one of my global colleagues at KPMG in the U.K., who IS an actuary, and a fellow at that, to co-author this piece. I am delighted that Valerie has kindly accepted. This should help ensure the article is relevant and interesting to readers, and perhaps more importantly, that I am kept on track!

-Simon Phipps

As consumers, we are constantly faced with the impacts of digital transformation and technological advancements in society, whether this be in relation to omnichannel connectivity (e.g., the Starbucks Rewards app), social media (e.g., WeChat), and online retailers (e.g., Amazon), or simple user experiences sitting on top of even more complicated products and services (e.g., Apple). We are increasingly touched and enthused by these experiences in our personal lives.

> ## 66 percent of insurance CEOs said they are concerned that new entrants are disrupting their business models ...

The reality is that this disruption is sparing no industry. Insurers must transform fast or risk falling behind new competitors. In fact, in our recent 2016 Global CEO Outlook survey, 66 percent of insurance CEOs said they are concerned that new entrants are disrupting their business models, and 83 percent are concerned about their competitors' ability to take business away

from them.[1] It is predicted that four of the top 10 global financial services providers will be displaced from the top 10 in the next five years.[2]

Unlike the dot-com boom-and-bust period of the late 1990s, the current wave of technological innovation is here to stay, and if anything, will continue to build over the next few years. We are at the early stages of the fourth industrial revolution. We would go as far as to predict that the insurance industry will likely see more innovation in the next five years than it has seen in the last 50 years. According to our research, CEOs from some of the largest insurers worldwide agree, with 70 percent saying "the next three years will be more critical for the industry than the last 50."[3]

Rapid technological advances and unprecedented access to data are impacting all aspects of an insurer's business, and go straight to the heart of the actuarial department and what actuaries do. In this article we provide a nonexhaustive list of some of the many developments we are seeing across the sector, and some brief reflections on the potential implications of these for the actuarial profession.

Telematics: This technology has been running for some time now in the U.S. and U.K., mainly in the context of pricing car insurance more accurately based on the driver's specific driving style. It started to get real traction when it became easier and cheaper to record and analyse the vast amount of generated data and subsequently predict the level of risk involved. What is most interesting about telematics for many is not the ability to more accurately price risk, but the ability of the technology to change consumer behaviours and actually reduce risk.

Early results at Discovery Insure in South Africa have found, for example, that their customers drive more carefully and experience one-third of the level of fatalities of the South African average,[4] hence their marketing tagline "we save lives." Interestingly their customers are not incentivised by cheaper insurance, but rather the prospect of value-added services through their Vitalitydrive programme. Early-stage developments are now underway to adapt the technology to other areas, such as sensors in the home. **For actuaries,** *assessing changing behaviours and the effect on pooling of risk are our bread and butter. We expect to see the ongoing evolution of this technology requiring continual recalibration of actuarial models. Tailoring an actuarial model to more accurately reflect the expected cost of claims for individual policies will give an insurer a competitive advantage in claims and risk management. The implementation of such technologies will also likely require the users of the data (actuaries, IT departments, etc.) to be involved in the system, product and pricing design. For more information, listen to a recent webinar[5] on telematics hosted by The Digital Insurer.*

Self-drive and car-share: Much has been said about Google's self-driving car and the pros and cons of self-drive vs drive-assist business models. Whichever way you look at it, there is a growing trend to improve car safety. At the same time there is an increasing movement towards car-sharing and/or leasing directly from manufacturers as society becomes more conscious of the need for capital efficiency and to reduce our carbon footprints. Companies such as Uber and carshare.hk are cases in point. Less accidents mean lower risk pools; shift of ownership to manufacturers will mean less retail and more commercial insurance; and car-sharing will mean people will require less traditional annual motor insurance and more flexible, mobility-based insurance schemes, with fewer cars on the road. **For actuaries,** *these innovations will challenge traditional actuarial product teams to develop more flexible products, with more accurate pricing, across a different range of policyholders to the traditional retail customer base, including manufacturers and fleet managers. This will be a challenging area for actuaries to think about. These developments have the potential to converge with telematics, resulting in a very different car insurance landscape to the one we have today.*

Aggregators: In the U.K., first-generation aggregator models (largely price comparison sites) introduced in the early 2000s have grabbed an increasing share of the personal lines market, and now reflect an estimated 70 percent of new motor business.[6] Resultant commoditisation has proved good news for consumers but challenging for many insurers, faced with aggressive margin compression. This is just the beginning. While still early days in Asia, the next generation of Aggregator 2.0 models, such as *gobear.com,* are set to leapfrog into new markets, incorporating social analytics (think *tripadvisor.com*). This will provide an even broader view for consumers to help inform their buying behaviour.

Research shows that most of us trust recommendations from friends and family over anything else, so community-based feedback is extremely influential. Insurers may try to disengage from working directly with aggregators, but they cannot afford to fight the tide of consumerism. For example, they cannot stop aggregators running consumer ratings on their products and services, even if they do try to make direct price comparisons difficult. We are likely to see the extension of aggregator models to more complex products and services, including more of those found within the life and health markets over the next few years. **For actuaries,** *the development of next-generation aggregator models has the potential to make actuarial jobs very challenging. Imagine full transparency on reduction-in-yields for savings products, or our personal favourite, aggregator-enabled, dynamically-priced personal lines insurance which switches to the best insurer not just each year, but each day—or better still, by the hour! For more information, listen to a recent webinar[7] on aggregators hosted by The Digital Insurer.*

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Big data and predictive analytics: Google's former CEO, Eric Schmidt, commented in 2010 that we now create as much information in two days as humans did from the beginning of time to 2003. Even though there is no widely accepted definition for "big data" (and in fact it is constantly evolving), it loosely describes large amounts of structured and unstructured data that has the potential to be used for information.

This, more than any other technological development, is the key that opens up all the other technological advances highlighted in this article and beyond. **For actuaries,** *what we are able to do with this "big data" is paramount. By nature, actuarial jobs involve analysing data for potential patterns in order to predict the future. This is what actuaries have been doing for years. The key is to utilise the power of technology in order to continually improve this process, both in speed and potential accuracy. High-level examples include modelling mortality, modelling trends in morbidity and evaluating longevity improvements. The key question is, to what extent can much of this be automated, and how quickly?*

Internet of Things (IOT): While the growth in demand for items such as computers, tablets and even smartphones is forecast to be fairly benign over the next five years, demand for internet-connected devices such as refrigerators, home automation and security sensors (resulting in smart homes), as well as health monitoring devices, is set to soar.

Enabling enhanced connectivity of consumers with their homes and lives, we should all be able to benefit from more personalised premiums and richer insights into our daily lives, and hence the creation of better quality products and services. A good example, *beam.com*, enables dentists to monitor the effectiveness of patients' teeth cleaning through smart toothbrushes—and friends and family can compare against each other if they so desire. Another great example of IOT is *heartisans.com*, a start-up initially incubated through AIA's Healthtech 1.0 accelerator, powered by Nest VC and mentored by KPMG in 2015. The team has developed algorithms to predict a heart attack and alert emergency services and next of kin, 10 minutes before the heart attack actually happens.[8] **For actuaries,** *particularly those working in general insurance, getting access to IOT real-time monitoring devices in commercial machinery and homes will be key. Insurers can then be alerted if a critical part requires servicing or may fail, causing larger losses. These developments may require actuaries (and their underwriters) to rethink how the cost of claims will look given these real-time risk management devices. Understanding the impacts on longevity will also be a big challenge. Scenario analysis and forward thinking will be key, most likely supported by the use of additional technological advances in the field of predictive modelling and big data.*

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Pure digital direct: Someone once said "give me 100 million customers and I'll build you a profitable business." Next-generation companies understand the true value of having access to a customer base and their digital footprint, and the relative drag on value through carrying non-critical infrastructure. China is spearheading the development of next-generation models, with no better example than Zhong An (co-funded by Alibaba, Ping An and Tencent); a pure digital direct model selling, for example, low-premium return-delivery insurance for products bought online. The winner of KPMG's 2015 Fintech 100, Zhong An acquired 150 million new customers and 650 million new policies in its first 18 months.[9]

Traditionalists will ask "where's the value?"—but this misses the point. Like those at Apple, Facebook and Google, the management team is confident that such scale will lead to handsome returns in the long term—achieved through the application of advanced data analytics techniques, enabling targeted campaigns on their customer base, as well as significantly lower costs to serve than traditional models. Time will tell. **For actuaries,** *the increased access to data, the potential for more interactions with policyholders and the unique nature of the insurance arrangement will bring the need for more frequent; potentially real-time assessment of risk. You can learn more about Zhong An at* http://www.the-digital-insurer.com/dia/zhong-chinas-first-online-insurance-company.

Peer-to-Peer: It is somewhat ironic that hundreds of years after the first insurance policies were written by a mutual insurer, there is a resurgence of demand for mutual in the form of a new, technology-enabled version for the 21st century—peer2peer. Early signs are encouraging, with Friendsurance in Germany experiencing 20–40 percent lower claims ratios than traditional insurers,[10] and we all know how hard it is to shave 1 percent off traditional models! All eyes are currently on *lemonade.com* to see how disruptive it can be. Driven largely by the sharing economy and millennials, it is understandable that 87 percent of CEOs expressed concern about how millennials will change their business.[11] **For actuaries,** *this has the potential of going fullcircle back to actuarial roots, rebuilding policies but this time using 21st century technology and focusing on the true need of the end customer. Part of the*

attraction of peer2peer is lower claims (due to better risks) and higher retentions (community/referral dynamics), so actuaries will be called upon to validate and price these models.

Robotics, artificial intelligence (AI) & machine learning: This is really too big a subject to do justice in one paragraph. Suffice to say that the replacement of human activity with machines is on the cusp of reality. We are talking about a paradigm shift in technology which will enable cheaper, more repeatable and ultimately more informed products and services being delivered to customers. There are a few companies already doing this, and in fact, some organizations have developed software that uses machine learning and predictive analytics across the insurance life cycle.

However, what we found in KPMG's survey of insurance CEOs was somewhat disconcerting, with 91 percent saying they are concerned about the integration of basic automated business processes with AI and cognitive processes.[12] **For actuaries,** *and insurance professionals as a whole, our day-to-day jobs will be directly affected by this category of innovation. Automated underwriting is already being used widely. These are good tools to support the work actuaries do but they also require a lot of programming, and statistical and mathematical knowledge. Actuaries can further hone these skills given their mixed skill set and we expect to see greater collaboration between the actuarial/statistics/maths/programming disciplines to best extract value from these new technologies. What will set actuaries apart from their 'automated friends' will be their creative thinking and communication skills; expert judgement ; and ethical behaviour. All of which are much harder to automate—for now. TechCast Global predicts that "there is a 60 percent probability that in the next 10 years, AI will be good enough to replace routine intelligence work." Will computers be able to handle the routine work of actuaries, therefore displacing much of the current work, and freeing teams up to focus on more value-adding work?*

Social and behavioural analytics: Following the rapid adoption of social media in the last few years, there is a wealth of behavioural information being collated on almost everyone each day. For example, Social Intelligence Corp has developed underwriting and risk rating models which use social media and online presence data to underwrite insurance policies. We recently met a company already engaged and working with law enforcement agencies worldwide in light of their ability to access and interpret phenomenal amounts of data from multiple sources, effectively in real-time. They were able to show the precise propensity to buy from a particular insurer for the entire region's online population, including what types of product they are most likely to buy from which channels. Useful indeed! **For actuaries,** *the age-old job of calculating probabilities is set for a radical overhaul with the growth of behavioural science and analytics. Lack of experience in this area will likely be a big challenge for actuarial teams.*

Blockchain: Perhaps saving the best for last, if you have not yet heard about blockchain and its potential, it is time to get up to speed!

The simplest way of describing blockchain is to think of it as Internet 2.0. Internet 1.0 came to life through a desire to connect people through their computers by interlinking the variety of different networks that existed at that time. Over the years this environment has become the cornerstone of the digital evolution, and the adoption and deployment of the IOT and the Internet of Services continues to increase the amount of information which is available and accessible in the environment. The most recent development in Internet 1.0 has been the social network phenomenon, which has more and more people connecting across more and more platforms, enabling them to communicate seamlessly. However, Internet 1.0 has its deficiencies—one being its inherent lack of security and trust, which drove the adoption of encryption protocols such as SSL to provide security and third party platforms such as certificate authorities like Verisign to establish trust.

Now enters Internet 2.0 which is being driven not only from a desire to connect but from a desire to transact, an activity which has the need for security and trust at its core. Internet 2.0 includes encryption in its foundations to ensure security and authenticity. It does away with a need for third parties to establish trust by using a method of consensus to confirm identity and validity through all the individuals who are part of the ecosystem. It can utilise smart contracts to enable multi-step transactions that can be verified at any point to confirm the validity of each step performed. It continues to provide a mechanism for all parties to connect just like Internet 1.0, but its ability to support digital commerce and share trustable transaction information on an open platform without the need for relying on a third party will likely be a game changer for the insurance industry. With use cases, such as verifiable digital identities, validating your customer online and without paper through to claims processing, there is not one part of the operating model which would not be impacted.

Blockchain may be the underlying technology which enables Bitcoin to exist, but the cryptocurrency use case is only the tip of the iceberg for the technology and the real winners in this step-change for digital commerce will be those that do not necessarily know how the technology works, but do understand how it can impact their business. **For actuaries,** *could a truly global currency enabled by a cryptocurrency platform reduce or even eliminate exchange rate risks? Could blockchain enable the greater sharing of information across the industry, allowing actuaries access to data from any and every insurer and reinsurer? Is the platform the solution to calculating reserves and premiums instantaneously and customising propositions to a specific customer's needs?*

As previously said, this is not an exhaustive list. We have not even touched on many other trends such as augmented and virtual reality, internet of services, cybersecurity and regulation as unfortunately we had limited space available. By the time this article is published, new innovations may already have appeared too.

To stay relevant, both insurers and members of the actuarial community are going to need to anticipate and quickly adapt to the changes ahead. Learning from and working together with experts in the areas of these technologies will be key.

As someone once said, "The world is changing very fast. Big will not beat small anymore. It will be the fast beating the slow." ■

Note: All content within this article are the personal views of Simon and Valerie, based on their own experience as well as discussions with clients and colleagues across the international insurance community.

SOME POTENTIAL BLOCKCHAIN USE CASES IN INSURANCE:

- Know your customer
- Identity & verfication services
- Delayed flight claims
- Life maturities
- Health living rewards
- Hazard detection in homes
- Hassle free car repairs
- Dynamic pricing
- Fraud prevention

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ENDNOTES

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2 Global Center for Digital Business

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11 *Supra* note 1.

12 *Supra* note 1.