



**SOCIETY OF
ACTUARIES**

Article from

CompAct

April 2019

Issue 59

Actuaries, Are You Paying Attention?

Global megatrends in technology are disrupting the life insurance industry

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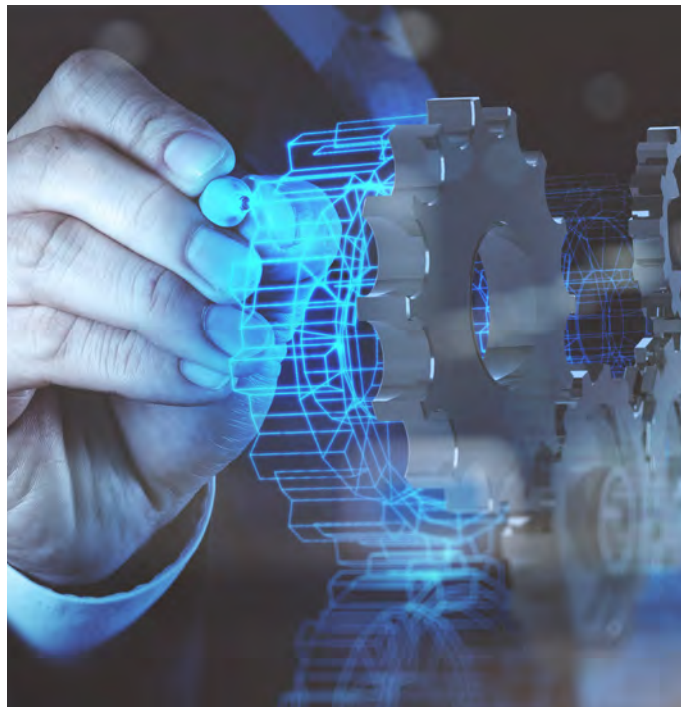
Technological advances in just the last five years have been incredible. Certain sectors such as online retail and social media, even personal banking, are embracing the turmoil and have positioned themselves as leaders in developing and applying new methodologies.

Perhaps the most tremendous aspect of these advances is the sheer scale of the data created by their use. Many industries have already been successful in putting these huge volumes of data to work in real time by using new data architectures, open-source tools and the cloud.

Although data is at the heart of the life actuarial space, ironically, we have yet to see this sector adopt these kinds of technological advances. Other insurance sectors, however, are pushing forward. For example, InsurTech groups are working on solutions to a wide variety of problems, including:

- Automating claims handling and underwriting.
- Testing nonlinear pricing models.
- Testing vast external data sets as a source of signals.
- Scaling up complex calculations using cloud computing.
- Building entirely new technology platforms to handle volumes of data.
- Building chatbots as well as using other complex natural language processing modeling.

At their core, these are massive data-collection exercises. They will need real-time functionality, the cloud, predictive modeling and analytics, and data science. These ongoing innovations



show that the life insurance business model is about to change rapidly. To stay in the game, life actuaries had better take note.

GLOBAL MEGATRENDS

As we look at the revolutions in technology occurring across industry borders, we have identified a number of what we call “global megatrends”—technological and societal changes that are expected to affect everyone.

As life insurance actuaries, we can’t stay on the sidelines and watch as these changes unfold. Rather, it is our duty to understand these megatrends and prepare ourselves to meet the challenges of harnessing these changes to the benefit of all of our stakeholders.

Wearable Technology

Wearable technology is becoming very popular, with Fitbit-style devices leading the pack. In 2016, 55.2 million fitness trackers were sold worldwide; this figure is expected to increase to 105 million in 2022.¹ Wearables enable users to instantly track and share personal information, such as blood pressure, heart rate, geographic location and sleeping patterns. Active monitoring of these indicators allows individuals to proactively manage their health and time and to take essential and timely measures to live healthier and happier lives. The exponential growth in wearable technology means that **a huge proportion of the insured population not only has access to vital, longitudinal health information, but they are also actively monitoring it themselves.**

The Internet of Things

When your refrigerator reminds you to buy more milk, you'll know you've arrived at the internet of things (IoT). IoT essentially involves connecting everyday items—be it your watch, your toaster or your car—to the internet, allowing everything we interact with to be online and monitoring us. In 2020, it is expected that there will be 24 billion IoT devices (according to *BI Intelligence*), and by 2021, IoT is expected to be an industry worth \$1.4 trillion.² The primary use here is that connected devices will be able to share and receive data in real time.

Trusted Digital Identities

In the past, you managed your own identity and proved who you were. Now, your online trusted identity vouches for you. Rather than carrying around a driver's license with your photo, your personal information can be stored in an efficient, secure and transparent IT ecosystem. Estonia is leading the way with a transnational digital identity, and e-residents (just like citizens) receive government-issued digital ID and full access to Estonia's public e-services.

You can grant entities access to your digital identity, and various groups—such as medical offices, grocery stores, banks, etc.—would be able to use your digital identity from anywhere in the world with minimal cost and hassle. A secure digital identity allows for the interaction of previously unrelated data sources, thus encouraging deeper holistic understanding of individual behavior and consumer demand.

Blockchain

While this buzzword was popular when Bitcoin was nearing its peak in 2017, the technology itself has massive possibilities for insurance. The practice of using a collaborative approach to validate and store records and transactions has incredible potential for improving connectivity and linking data sources. **By using blockchain technology to integrate health care, financial and other behavioral records, we can construct a “digital health wallet” that can contain an individual's health, financial and demographic information in one secure location.** Blockchain's growth doesn't show any signs of slowing either. In the first half of 2018, blockchain investment in the U.S. exceeded the total investment seen in 2017, according to a recent analysis from KPMG.³

Healthy Populations Longevity

It's amazing how much life expectancy has increased in the past 100 years as well as our understanding of the drivers of longevity. A far cry from cataloging headstone records in cemeteries, **actuaries today have access to vast data sets that can contribute to predicting life expectancies in a much more precise manner.** This is especially important due to the aging global population and the impact this cohort has on insurance

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contracts' profitability. Ultimately, we are getting better at more precisely predicting longevity as we continue to learn more about key drivers of life expectancy, like wealth, physical activity levels and quality of social interactions.

Open-Source Technology

Open-source technology is gaining widespread acceptance in the corporate world, although most actuaries still prefer Microsoft Office to Apache OpenOffice. In fact, some recent acquisitions by some of the software stalwarts (GitHub to Microsoft and Red Hat to IBM) are demonstrating that open source is being adopted by even the most conservative software vendors. Decentralizing software development will enable life insurance **technology needs to be met by combining community knowledge with agile and cost-effective solutions.**

Cloud Computing

Rather than being dependent on your local machine, access to the cloud's vast array of servers that can handle computing power dynamically will **greatly increase the calculations data analysts can perform.** This is the key component to managing, storing and analyzing the exponentially growing volumes of data generated every instant by all the new sensors tracking every imaginable trackable event and phenomenon possible.

Deep Neural Nets

As statistical models traditionally have revolved around regression analysis, neural nets provide a way to find better fits to data with fewer restrictions around initial hypotheses. According to Carlos Meléndez, co-founder and chief operating officer of artificial intelligence and software engineering services company Wovenware, **“The ability of a computer to learn by just analyzing data without having to let the algorithm know what variables are important is unprecedented.** This form of unsupervised learning is drastically changing the role of technology.”⁴ Taking a life insurance example, actuaries will typically come in with a preconceived idea of what the key factors are when determining mortality (e.g., age, gender, smoking status). This frames our investigations and creates bias in how we consider and group the data. Deep neural nets have the power of being able to analyze all available data and their interdependencies using complex methods/algorithms without this bias, which results in more accuracy.

These megatrends are coming to all industries. Actuaries must take them seriously and begin to think about their impact on the life insurance industry. To help stir some excitement and consideration, we have extrapolated our megatrends through a life insurance lens to generate some predictions on how the industry may develop in the future.

LIFE INSURANCE—SOME PREDICTIONS

Prediction 1: Real-Time Life Insurance

Wearables and improved data processing power will enable more nimble data analysis and monitoring, which in turn will spark demand for a more dynamic life insurance business model. Based on real-time monitoring data, insurance companies can adjust their portfolio-wide reserves dynamically and can, therefore, adjust premiums for customers on a pay-as-you-go wellness score.

Active customer monitoring of customer health and behavior will result in finely tuned longevity predictions and insurance pricing. Could we see best-estimate valuations being derived in real time?

An early iteration of these new models in life insurance can be found in “health nudges,” which use hyperconnected wearable technologies to understand policyholder behavior and more closely track longevity risk factors. The primary implication here is that both reserves and premiums can be dynamically adjusted for customers based on wellness scores, which can vary depending on behavior, circumstance and environment.

We note that consumer attitudes toward wearable tech and the interaction with life insurance are generally favorable. According to a GenRe survey, almost 60 percent of people surveyed were willing to allow an insurance company to track wearable data in return for lower premiums.⁵ Furthermore, life insurers can offer rewards and improve awareness of threats to longevity goals, aligning our interests with those of the customer.

The major implication of this is that the amount of required data to be collected and processed to support such a business model is **immense**. This data will be necessary to recommend timely health advice, and companies must be able to manage high-volume streams of data to execute their pricing and reserving models. Insurers must ask themselves if their current data architecture is prepared for this surge in data.

Prediction 2: Customer Interaction

Meeting customer expectations will be much more demanding. Many studies have shown that millennials prefer personalized service, which historically has been prohibitively expensive for insurers to provide. Compared with previous generations, millennials are more willing to share their personal data with

brands to receive better and more personalized service. They expect you to know all about them whenever they reach out, and the technology will be available to support this expectation based on the trends we are seeing and their expected impact.

The connectivity opportunities of the future will allow longevity professionals to provide health advice to customers, generating a converged customer-centric relationship. Life insurance companies know the drivers behind longevity and can guide customers on ways to achieve their unique life longevity goals. With aligned interests and individualized advice to help them achieve health goals, increased trust between the customer and the life insurer should develop. Life insurance can transition from its traditional role of risk prediction to risk mitigation. By encouraging risk-mitigating behavior for customers and with deep, longitudinal data available to monitor success, life insurance professionals can have much greater influence on the frequency of risks occurring rather than the passive role they currently take in monitoring and prediction.

Prediction 3: Partnership/Adjacencies

Life insurers need to pursue partnerships with data gatherers, distributors and owners. The scope of data availability is changing, and actuaries are no longer necessarily constrained to the policy data they own. More and more avenues are being explored by insurers to try to identify drivers of policyholder behavior outside of traditional underwriting data gathering. The vast amount of data will be too much for life insurers to handle alone.

Many of the new data sources and techniques that will be essential for the future of the life insurance industry will be developed in fields that are totally unrelated to life insurance today. For instance, blockchain was first implemented in cryptocurrency in order to track transactions. Due to the unlimited possibility of new technology sources, in many cases, life insurance companies will be best served by partnering with these new technology firms while they are maturing as opposed to attempting to create tech incubators and develop new technologies themselves.

Life insurers will need to consider who will gather data, who will own the data and who will distribute the data. The increased model complexity to manage multiple personalized risk factors for longevity predictions will be difficult enough for life insurers to take on by themselves. Monitoring various indicators such as physical activity levels, social interactions, opioid use and financial wellness will fall outside a typical life insurer’s core strengths. Data sharing with partners and individuals will prove to be an effective way to tackle this problem.

Prediction 4: Changing Actuary Skill Sets

Today, either actuaries need to retrain into predictive modeling and analytics engineering or insurers must hire a team that



includes predictive modeling and analytics engineers. Although actuaries already are typically very comfortable around data, these megatrends will require actuaries to become familiar with ways to manage volumes of data that were previously unimaginable.

Predictive analytics are not new concepts to the insurance industry; the shift in the market has not been the techniques but rather the technology that supports it. Actuarial techniques are the backbone of most predictive modeling approaches; therefore, insurers are more advanced in this space than is often appreciated (for example, generalized linear models are a widely used actuarial concept and an example of such a model-fitting technique). However, due to advances in technology, the way we go about making predictive models is changing; modern predictive modeling is the science of finding patterns in your data in an automated manner using sophisticated coding algorithms.

Data management maturity across the board will also need to be reviewed in consideration of data protection, data and model validation, governance, and controls. Regulation in a high-velocity actuarial environment will be a challenge that actuaries must spearhead, and they must be proactive in guiding rulemaking to ensure continued innovation while putting data security and risk management first.

Can we expect actuarial engineers and actuarial engineering departments in the future, or will data engineers continue to own predictive modeling and analytics management? These answers are unclear, but we are quite confident that actuaries will need to become more comfortable with massive amounts of data. Failure to do so will result in actuaries finding themselves

replaced by data scientists, software engineers and individuals whose positions do not even yet have names.

Prediction 5: Automated Underwriting

In order to meet millennial expectations for speed of decision, proactive life insurance underwriting will become the norm. Customers will be able to grant insurers access to their blockchain digital health wallets, eliminating time wasted filling out forms. With ready access to personalized data, individualized needs and risk assessments can be made with minimal intrusion. While it is likely that manual intervention will still be needed to review outliers and observe the 80/20 rule, automated and proactive underwriting will be able to deliver quotes in real time.

Trusted digital IDs and deep neural nets will be indispensable for continuous fraud prevention, all while enabling insurers to have a more detailed and precise understanding of individuals' longevity expectations than ever before.

Finally, the underwriting interface will become digital and support self-service decision-making. We are already seeing increased use of artificial intelligence-powered chatbots combined with direct-to-consumer distribution networks as possible solutions to the en masse individualized attention demanded by our customer base.

CONCLUSIONS

Without aligning to the wider technological trends, historic insurance industry approaches will struggle to keep up with modern expectations. The exponential growth in computing power and hyperconnectivity means that companies can now process vast volumes of disparate data sources to draw more insightful conclusions.

With an aging population and improved knowledge of longevity risk drivers, a need for competitive differentiation makes such insight ever more valuable, and the easier-to-use software is making it even more accessible for both statisticians and business analysts. As large quantities of available data are no longer owned by insurance companies and statistical techniques become more accessible to nonstatisticians, the pressure to keep up with technological advancement increases.

We cannot be sure how global megatrends in technology will affect our industry, but ultimately, we can certainly be sure that tomorrow will be nothing like today. We are seeing evidence of that already in our Fitbit devices, targeted Google advertising and heavy blockchain investment. We as life actuaries need to carefully think about what changes we can expect from these trends and how we can position ourselves to continue to serve as leaders in the life insurance industry. ■



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