

# THE Actuary

VOLUME 16 ISSUE 3

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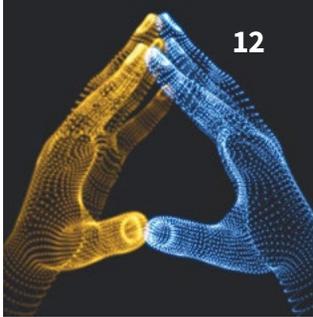
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12

# THE Actuary

VOLUME 16 ISSUE 3

JUN  
19  
JUL



26



42

## CONTENTS

### FEATURES

#### 12 UNDENIABLE SYNERGY

A case for the chief modeling officer  
By Van Beach

#### 20 RISK AROUND THE INDUSTRY

An introduction to some lesser-known emerging risks within the actuarial realm

#### 26 HUNGRY FOR RISK?

Practical applications of a risk appetite framework  
By Rebecca B. Scotchie and Christopher H. Murphy

#### 34 FORCE OF NATURE

Why and how to include climate change in the risk management framework  
By Fei Xie

#### 42 SHARPEN YOUR SKILLS

Actuaries have the opportunity to extend their technical skills to all aspects of health care  
By Kurt J. Wrobel

#### 46 BUILDING ERM BUY-IN

Switching to a value-based approach can result in better decision-making for organizations  
Interview by Martin Snow

#### 52 TAKE THE LEAP

Q&A with Bill Rearden, ASA, MSc, MA, co-founder and CEO of Ironbound Consulting Group

#### ONLINE EXCLUSIVE!

Read this issue's online exclusive, "Risk is Opportunity," at [TheActuaryMagazine.org/Risk-Opportunity](http://TheActuaryMagazine.org/Risk-Opportunity).

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56



58



# CONTENTS

## DEPARTMENTS

- 6 **FROM THE PRESIDENT**  
Volunteering to Advance the Profession
- 8 **EDITORIAL**  
A Step Ahead of Crisis
- 10 **NEW + NOTEWORTHY**  
Your Source for International Happenings,  
Industry Briefings and SOA News
- 54 **INCLUSIVE IDEAS**  
Challenge: Accepted
- 56 **EDUCATION**  
Different Perspectives on Volunteering
- 58 **RESEARCH**  
Expanding Research Projects in New Ways:  
Q&A with R. Dale Hall
- 60 **DISCOVER**  
On Trend
- 62 **TIMELESS**  
The Past, Present and Future of the SOA

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# Volunteering to Advance the Profession



**JAMES M. GLICKMAN**, FSA, MAAA, CLU, is president of the Society of Actuaries. He can be reached at [jglickman@soa.org](mailto:jglickman@soa.org).

PHOTO: HYON SMITH

***Whether you have volunteered in the past or have been meaning to volunteer, I encourage you to consider participating in one of the many opportunities to help make your profession even better.***

**W**hen I took office as Society of Actuaries (SOA) president, I announced one of my biggest priorities for the year ahead would be to enhance each member's experiences with the SOA and, to the extent possible, get more actuaries actively involved in volunteer activities. There are so many volunteer opportunities to consider, from education and research, to professional development and section-focused efforts.

Let's look at why volunteering is so valuable, both for you and the actuarial profession. We are a volunteer-driven organization: from exam grading, to the development and implementation of our Strategic Plan, to speaking opportunities at professional development events and participation in actuarial research—all of these activities move the profession forward thanks to the efforts of members like you. Without volunteers serving on professional interest section councils, we wouldn't have the expert-driven newsletters, podcasts, research nor professional development events. Meetings such as the Life & Annuity Symposium, the Enterprise Risk Management Symposium, the Health Meeting, the Valuation Actuary Symposium and the SOA Annual Meeting & Exhibit could not exist without the volunteer efforts of our sections and their members.

For example, you don't have to be an educator to participate as an exam grader or help to create new exam questions. Likewise, you don't have to be a researcher to join a research project oversight group (POG) and guide the accuracy and objectivity of a research project or experience study. These groups are vital to the actuarial profession, regardless of topic. By serving on POGs, you're helping to complete research that will benefit the profession.

I've been an FSA for 35 years and have served as a volunteer for nearly 40 years. I've found my volunteer experiences to be among the most rewarding activities of

my professional career. I'm especially proud of the work creating and watching the SOA Long Term Care Insurance Section grow. For those of you who don't know, I have worked closely within the long-term care insurance industry for the last 30 of my 47 years in the actuarial profession. I encourage you to take the time to engage with one or more of the sections that fit your particular areas of interest. A little bit of your time and effort will go a long way toward enhancing your area of practice, and I am sure you will find it personally rewarding.

The SOA seeks to get all members involved, especially those members who now make up nearly half of all our FSAs—the millennial generation. The SOA Board has identified as one of our most important strategic projects the development of new ways to engage with members and encourage all to participate. Two recent examples include a digital initiative now underway to better engage with our youngest members and a Member Recognition Program, which provides annual thank-you gifts to our members who earn the most participation points. Please review the program at [recognition.SOA.org](http://recognition.SOA.org) to see how you can qualify.

Whether you have volunteered in the past or have been meaning to volunteer, I encourage you to consider participating in one of the many opportunities to help make your profession even better. ■

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# A Step Ahead of Crisis

BY KELLY HENNIGAN AND MARTIN SNOW

*Risk management is most important prior to a crisis. Once the crisis starts, there are few levers we have to manage the balance sheet until markets stabilize.*

—Doug Caldwell, FSA, CERA, MAAA, executive vice president, Investment Risk, Model Risk, Governance & Reporting, and U.S. chief risk officer, MetLife

**WHILE MORE THAN 10 YEARS HAVE PASSED SINCE THE SEPT. 15, 2008, COLLAPSE OF LEHMAN BROTHERS AND THE LAST FULL-BLOWN INTERNATIONAL BANKING CRISIS**, the qualitative and quantitative risks affecting our industry and the way we work have never been greater. The pace of regulatory, technological, operational and environmental change is quicker than ever before. Innovation is moving forward and affecting us in ways we would not have imagined a few years ago. In this issue of *The Actuary*, the collection of feature articles explores how to identify and manage emerging risks—both those that are evident and

those that are unseen—to prepare for the future.

A fundamental question around enterprise risk management (ERM) is how to achieve senior leadership support for a risk management program. In an article based on their Outstanding Session Award from the 2018 ERM Symposium, Sim Segal, FSA, CERA, and Philip Sherrill, CPA, CIA, CHIE, walk us through how to identify an ERM program that lacks this buy-in, what the typical causes are and what to do about it (see page 46). Other challenges faced in the risk field include the considerations on how actuarial results are achieved, what they represent and how to utilize them. To address

these concerns, Van Beach, FSA, MAAA, proposes the establishment of the chief modeling officer (see article on page 12).

Looking toward the future, several articles in this issue contemplate impending risks and how to prepare for them. Kurt Wrobel, FSA, MAAA, focuses on the health insurance market (page 42). Fei Xie, FSA, FCIA, presents what happens when a new risk such as climate change emerges (page 34). She reflects on the devastation caused by the recent wildfires in California and how to manage climate risk. To round out our features in this issue, Rebecca B. Scotchie, FSA, MAAA, and Christopher H. Murphy,

ASA, articulate how to set up an actuarial risk appetite (see page 26).

While we recognize that this issue cannot capture every risk facing our industry, we wanted to include as many topics as possible for our readers. A few mini-articles outlining key emerging risks are also included (starting on page 20), covering the emergence and adoption (or nonadoption) of FinTech and InsurTech, the interdependence of risk and strategic risk management.

We hope you find this issue informative in sharing key topics from which we can learn and do what is needed to stay one step ahead of emerging changes and risks. ■



#### ABOUT THE WRITER

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#### ONLINE EXCLUSIVE!

To take us to the next level, we asked chief risk officers to share insights with us. In the online only article, “Risk is Opportunity,” Suzette L. Huovinen, FSA, CERA, CFA, MAAA, chief actuary and chief risk officer at Securian, states: “Risk management is a great way to get a broad perspective on an organization. You have to understand all aspects of the business to truly identify and manage the risks.”

Visit [TheActuaryMagazine.org/Risk-Opportunity](http://TheActuaryMagazine.org/Risk-Opportunity) to read more important insights from chief risk officers.

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## Investment Section Update

In addition to keeping up with the developments in the capital markets, we've been busy at the Investment Section Council. The goal of the Investment Section is always to provide our members with accessible and relevant investment content.

Our flagship publication, *Risks and Rewards*, was published in February and will be published again in August. The newsletter is available in both print and an easy-to-use electronic format that can be accessed on computers and mobile devices.

Our 2019 asset allocation contest is underway, with prizes awarded to portfolios with the best performance between April 1 and Sept. 30. The winners will be recognized at the Investment Section breakfast at the 2019 Society of Actuaries (SOA) Annual Meeting & Exhibit. Also underway is our 2019 Redington Prize contest, where we recognize the best investment paper written by an actuary. Entries were due June 2, and the winner of this contest will be announced in September.

We have a number of webcasts planned in 2019, including an Investment Boot Camp, a series on economic scenario generators and an overview of pension cash balance plans. We also produced a series of "How I Became an Investment Actuary" podcasts.

Planning for the 2019 Investment Seminar is also in progress. This seminar will take place in Toronto on the Sunday preceding the 2019 SOA Annual Meeting & Exhibit. This year's seminar is being coordinated with the CFA Institute and will have sessions to interest both chartered financial analysts (CFAs) and investment actuaries.

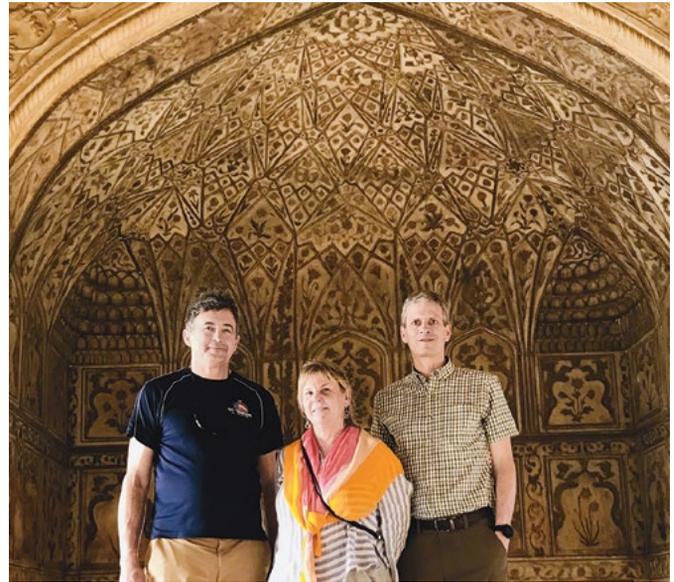
For details on all of our activities, please check out our section webpage at [bit.ly/SOA-Investment](http://bit.ly/SOA-Investment). As always, if there are any suggestions to improve our content, please let me or any of our council members know.

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## The SOA in India

The Society of Actuaries (SOA) sent a delegation to India in March to explore and learn more about the Indian actuarial community. The SOA delegation included Dave Sandberg, FSA, CERA, FCA, MAAA, SOA Board and International Committee member; Andy Peterson, FSA, EA, FCA, MAAA, SOA senior director, International; and Ann Henstrand, SOA senior global strategy advisor.



Dave Sandberg, FSA, CERA, FCA, MAAA; Ann Henstrand; and Andy Peterson, FSA, EA, FCA, MAAA; visited the palace at Agra Fort (top) and the Taj Mahal (above) during their time in India.

PHOTOS COURTESY OF ANDY PETERSON

During the first part of their trip, the SOA delegation attended the Institute of Actuaries of India's (IAI's) 20th Global Conference of Actuaries (GCA) in Mumbai, where both Sandberg and Peterson served as session leaders. More than 700 attendees gathered for the GCA, which was preceded by an IAI gala ceremony to recognize volunteers, award recipients and the new class of IAI qualifiers. The gala ceremony included a number of Bollywood-style dance acts put together by GCA attendees and was truly a cultural event. While at the GCA, the delegation had positive meetings with representatives of the IAI and other individuals working in the actuarial profession in India.

The SOA delegation then visited Delhi, where they held additional meetings and briefings with associations, educational institutions, and employers and individuals familiar with the market in India. The SOA delegation met representatives from Amity University, MetLife Global Services Center, PwC, the Risk Management Association of India, Mercer Consulting (India), Deloitte

India, Birla Institute of Management Technology and AON Services India Private Ltd.

Throughout the meetings, the SOA delegation found there was significant interest in the Indian market to learn about the SOA's educational and research offerings. The delegation learned that actuarial teams at global employers, global consultancies and domestic outsourcers are interested in providing their staff with additional training in global and U.S./Canadian skill sets, including valuation, product design, accounting, financial reporting frameworks, solvency oversight systems and reserving.

The SOA delegation also discovered there may be interest in collaborative research projects with the SOA in topics such as micro-insurance, private pension markets, mortality, catastrophe modeling and sustainability, enterprise risk management (ERM), climate index modeling, and general insurance and health topics.

Looking forward, the SOA will evaluate possible options for future engagement. The International Committee will discuss these possibilities and bring them to the SOA Board.



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Undeniable

SYNERGY

BY VAN BEACH

## A case for the chief modeling officer



Actuarial practice and technology have undeniable synergy. With the introduction of mainframe computers, actuaries gained a tool to improve the speed and accuracy of their work along with greater access to data. Personal computers unshackled actuaries, enabling them to build models that provide greater insights into actuarial risks and the financial operations of insurance companies around the globe. As computing capabilities continue to become less expensive and more powerful, the applications and analysis of actuarial models continue to expand. Regulation and financial reporting, once founded on factor-based or formulaic approaches, migrated to principle-based (read, “model-supported”) regimes—Solvency II, International Financial Reporting Standards (IFRS) 17, principle-based reserves (PBR), Actuarial Guideline 43, and Financial Accounting Standards Board (FASB) Targeted Improvements for Long Duration Contracts (LDTI) are all examples. Economic capital, asset liability management (ALM), cash-flow testing and a wide array of other actuarial analyses all have models at their foundation.

In fact, we should take the opening sentence of this article one step further: Actuarial practice and modeling, enabled through technology, have undeniable synergy. Modeling has become the foundation of actuarial practice, but something else also happened. Modeling has changed the actuarial organization. Modeling has introduced an array of activities necessary to produce model results, many of which are not truly actuarial. Modeling has created significant dependencies outside of the actuarial department, including broadening the range of technical skills necessary to build, maintain and evolve models to provide the requisite information for today’s reporting requirements. And now, as the technology that brings together massive data, computational power and algorithms moves forward, actuarial practice will also advance, with even more processes, technologies and skills being introduced.

While the pace of technology innovation is driving change and disruption, it is not the only source of pressure for actuarial organizations and their reliance upon models. Regulatory requirements continue to expand and evolve with increased expectations for accuracy, disclosure, transparency and speed. Shareholders demand greater returns and reduced expense, even while the economic and competitive environment becomes more complex. Within an insurance company, executives rely on actuaries and models to provide timely insights regarding acquisitions, capital and reinsurance strategies, investment approaches, risk management and other key decisions. Actuarial organizations are being asked to be both more strategic and more operationally efficient during a period of rapid change. This is a real challenge.

And yet as rapidly as modeling has reshaped actuarial practice, the actuarial organization has lagged in its evolution. A wide range of nonactuarial tasks—data preparation and management; model setup, execution and monitoring; maintenance of the computational grid; assembly of results; and so on—are often being done manually by actuaries. Core modeling activities around model development, input data design, validation—activities critical to having high-quality, reliable, maintainable models—are often delegated to entry-level actuarial students. Resources with modeling talent are not retained because there is no career path for a technical modeling actuary. In short, even though models are the foundation for actuarial practice, modeling roles are not well-understood and are too often undervalued.

The evolution of modeling is demanding an evolution of the actuarial operating model.<sup>1</sup> The interplay of data, technology and methodology has expanded the end-to-end modeling process and requisite activities, and thus has diversified the skills required to complete actuarial analyses. The use of models for financial reporting and other mission-critical applications has

necessitated a rigor in deployment and use of models to recognize and enforce distinct development and production stages within the modeling life cycle. Maybe most critical, actuarial organizations also are becoming cognizant of the difference between the business aspects of the modeling process and the operational aspects of modeling.

The operational side of modeling—selecting, building, maintaining and executing the end-to-end modeling process—needs to be explicitly recognized as a critical partner to the business side of modeling, which defines the assumptions, requests the projections, and then consumes, synthesizes and acts on the model results. This partnership can enable the actuarial organization to become more strategic through better use of models and the insights they provide. It also can increase operational efficiency and the effectiveness of an organization through optimized development and execution of the end-to-end modeling process. The organization will be better positioned to take advantage of rapidly emerging technologies such as cognitive models and analytics. In short, insurers need to create a role that can be a partner to the chief actuary to take responsibility for modeling operations; develop relationships with IT and other areas outside of the actuarial function; put a focus on the end-to-end modeling process across the breadth of the company; and signal to talented modelers, engineers, data scientists and other technicians both inside and outside of the organization that their skills are recognized and valued. The time has come for the chief modeling officer to enter the stage.

### **The Sum is Greater Than the Parts**

Understanding the business versus the operational skills and activities related to modeling holds the key to the new actuarial operating model. When these differences are recognized and each function is empowered to focus on what it does best, the resulting sum of the two



**Modeling has introduced an array of activities necessary to produce model results, many of which are not truly actuarial.**



*The skills and expertise required to be an exceptional “business” modeler are not the same skills and expertise necessary to be an exceptional “operational” modeler.*

parallel functions is greater than the original comingled model.

What is different between the business and operational modelers? Business modelers are responsible for the “what” questions:

- ❶ | What products are most capital intensive?
- ❷ | What is the impact to generally accepted accounting principles (GAAP) earnings if we consistently realize better-than-expected mortality improvements?
- ❸ | What is the financial impact of choosing a given historical transition date for LDTI?

The operational modelers solve the “how” questions:

- ❶ | How do we make the model run optimally to reduce cost?
- ❷ | How are the assumptions structured so they are easy to maintain and use for attribution analysis?
- ❸ | How do we implement changes for LDTI to be consistent across all business units while still recognizing the unique requirements of each product line?
- ❹ | How will we implement machine learning to improve anomaly detection?

To be clear, this is not to say an operational modeler does not need business expertise or the business modeler does not need technical skills—clearly they do. The point is the depth of expertise differs between the two, so that the roles are complementary. The skills and expertise required to be an exceptional “business” modeler are not the same skills and expertise necessary to be an exceptional “operational” modeler.

The operational modeling organization will look very different from the business organization. The operational modeling organization will have a broad range of actuarial and nonactuarial resources. The operational modeling team will have a heavy focus on technology and tools to streamline and enhance processes. The actuaries on the team will be more technical with deeper skills in modeling, analytics and other areas. Data scientists and other advanced technical resources will work alongside actuaries, and their roles and responsibilities likely will blur. Both development and production roles will exist, with development roles focused on building new capabilities and production roles focused on execution—both periodic (e.g., quarterly) and ad hoc. The operational modeling organization will be a service organization to the business users with a



**Even though models are the foundation for actuarial practice, modeling roles are not well-understood and are too often undervalued.**



## A CHIEF ACTUARY'S PERSPECTIVE

Andy Rallis, FSA, MAAA, EVP and global chief actuary at MetLife, has experienced firsthand the increased focus on modeling as part of actuarial practice, and he has taken bold steps to centralize the modeling function. “The modeling organization was created to address Solvency II,” says Rallis. “With 46 countries, we had to have standard approaches—if everyone was left on their own, it would have been really messy.”

But Rallis did not stop there. Recognizing the strength of the diverse group that had been assembled—with teams focused on development, production, execution and quality assurance—he expanded beyond financial reporting. “Once we had the organization in place, we moved many of our other actuarial applications to this group—embedded value, cash-flow testing, asset liability management (ALM)— anything that resembled a production process” and immediately benefitted from “greater efficiency and quality.”

Rallis continues: “It’s made the actuarial team stronger. The modeling organization serves the business users and provides the technical skills to support the modeling needs of MetLife.”

When asked about the impact outside of the actuarial team, Rallis says: “The relationship with IT has greatly improved. The modeling organization is an advocate for the business users when making IT requests. They also help communicate the IT challenges and constraints in a way the business users understand. The modeling organization also has improved the relationship with risk management and audit.”

Some modeling applications continue to exist outside of the modeling organization. Rallis says MetLife chose to “draw the line with production modeling applications” and leave “creative modeling functions with the business users.” Rallis readily

acknowledges: “In other situations where a company wants to benefit from standard approaches and leverage a specialized skill set like predictive modeling, putting those roles inside the modeling organization absolutely makes sense.”

Talent is a critical aspect of the evolution of the modeling organization. Rallis notes the benefits of separating the operational modeling skills from the business skills when creating the modeling organization. Predictive analytics and data science are areas that will pose a challenge for companies to address organizationally. In fact, Rallis sees that “actuaries are being provided with opportunities to learn a wide range of skills, and many of these are highly technical and very specialized.” Companies will need a strategy for acquiring, developing and retaining these skills. MetLife “has benefitted tremendously from having a dedicated modeling organization,” says Rallis, who recognizes the positive impact of creating a technical career path that leads to very senior levels within an organization.

Just how high? A diverse team with critical responsibilities, like that which exists with the modeling organization, requires leadership. At MetLife, the modeling team is led by the global head of Actuarial Modeling, and that role is a peer to the four regional chief actuaries at MetLife. While the role is not a “chief” in title, they are seated at the table with chiefs. So, will MetLife ever have a chief modeling officer? Rallis chuckles and says, “We already do—I just chose a different title.”

### ABOUT THE INTERVIEWEE

**ANDY RALLIS**, FSA, MAAA, is EVP and global chief actuary at MetLife. He is also president-elect of the Society of Actuaries. He can be reached at [arallis@metlife.com](mailto:arallis@metlife.com).

focus on high-quality, timely, cost-efficient production of analytical information that meets all applicable compliance and audit requirements.

The business organization is the driver of the modeling analysis, so business actuaries are focused on insights—enabled by the efficient modeling chassis provided by their operational modeling counterparts. During development cycles, the business actuaries define the requirements for the changes and are responsible for validating the results. During the production process, the business actuaries define the analyses required, set the assumptions and focus on analyzing the results. Enhancement requests are noted for the next development and model release cycle.

### **Elevating the Actuarial Function**

There have been many articles written on the desire for actuaries to become more strategic, typically also referencing the “mundane” tasks that consume disproportionate amounts of time and need to be automated or eliminated. More recently, cognitive technologies and robotics have been raised as tools that actuaries can leverage in order to again become more strategic.<sup>2</sup> The unstated issue is how to actually implement and achieve these advantages. It often seems implied that all actuaries should be educated and trained to use emerging technologies and tools. While actuaries should have the opportunity to pursue continuing education and training, it makes sense to separate the technical skills from the business expertise and perspectives within an actuarial organization to make the insights actionable.

Enabling actuaries who are focused on business applications to have technical partners rather than firsthand technical expertise is a powerful source of leverage. Especially as the modeling tools and methodologies applicable to actuarial practice become more diverse, it will equally take a diversity of resources to harness these approaches. When done effectively, the insights available to the actuaries focused

on the business applications will be broader, allowing for more strategic conversations within the organization.

The stature of the modeling operations team is also elevated. With the team now centralized and owning key modeling responsibilities, the productivity of the modeling operations team becomes very visible. Modeling roles are better understood, and the impact of the team responsible for the development and delivery of modeling results becomes readily apparent. With a visible, defined organization focused on modeling operations, a career path is established for actuaries with modeling talent and interest. Like-minded individuals can be paired with peers who become mentors and internal resources to further develop modeling skills. Modeling no longer is a job that entry-level actuarial students are asked to perform until they can be promoted to a “real” actuarial role—modeling is a critical actuarial function.

### **Why a Chief?**

Driven by changes in regulation, risk management and the competitive landscape, modeling has had an increasing role and impact within the actuarial organization. The reliance on models for quantification of insurance risks and opportunities has expanded the breadth of internal stakeholders beyond the chief actuary to include other C-suite executives including the chief risk officer, the chief financial officer and the chief executive officer.

Modeling is critical to the insurance organization, serves many stakeholders, is unique in its role in the organization and is driven by highly skilled talent. It drives competitive advantage, is necessary for compliance and is an area where cost-containment and efficiency are at a premium.

Becoming efficient and effective at modeling requires a broad array of talents and specialized skills and expertise. Modeling roles have operational components that require a continual focus on process and optimization. As technology changes,



**With a visible, defined organization focused on modeling operations, a career path is established for actuaries with modeling talent and interest.**

best practices will need to be continually reevaluated. The modeling process is at the intersection of data, technology, risk, compliance, finance and actuarial. It is a distinct function that originated as part of the actuarial function, but it has evolved to have unique characteristics. In many respects, it most closely aligns with the information technology (IT) organization in terms of the role it plays in the organization, the processes it must follow and the skill sets on the team. However, it is distinctly different given the analytical tools and methodologies it utilizes. Further, the talent in this analytical component is what drives the value—it is more than simply procedural. “Operations” encompasses highly technical business analytics in addition to all supporting processes around the analytics.

The trend of appointing a modeling leader has begun and is picking up steam. Modeling resources are being consolidated into centers of excellence, shared service centers and corporate modeling teams. Titles such as director of modeling and controls, vice president of corporate actuarial model services, and modeling transformation and modernization lead are becoming more common. Companies recognize that consolidating all modeling responsibilities facilitates consistency in approaches, rationalization of technologies, wider use of tools, elimination of redundancies and a wide array of other operational efficiencies.

Establishing a chief modeling officer role with the responsibility for modeling operations is a natural evolution and has several tangible benefits.

- » **Attract and retain talent.** The role recognizes the strategic importance of the modeling function, signaling this importance both internally and externally. Recognizing the function in this way is critical for attracting and retaining modeling talent, providing a career path and internal parity with their business-focused counterparts.
- » **Clout to deliver.** Seating a chief at the executive table alongside the chief actuary, chief financial officer, chief information officer, chief technology officer and chief risk officer provides the internal clout to both partner with and serve internal clients.
- » **Focus.** Providing the modeling organization with senior leadership not only puts focus on the modeling process, it also enables the chief actuary to focus on truly actuarial issues and allows the IT organization to relinquish some of the actuarial modeling support burden.
- » **Invest for return.** With the operational aspects of modeling isolated, the company can make more explicit decisions on investment in modeling capabilities and evaluate return. The company also can manage costs

- associated with modeling operations more effectively, with the chief modeling officer having final authority.
- » **Capitalize on change.** Technology is changing rapidly, and the impact to financial modeling will continue to evolve. A chief modeling officer will provide the leadership and focus to navigate the changing landscape.
- » **Identify opportunity.** With a seat at the table during executive discussions, the chief modeling officer, armed with a deep understanding of modeling capabilities, can spur ideas and offer solutions to drive new products, new markets and new opportunities through modeling-enabled insights.
- » **Competitive advantage.** Finally, with an internal champion for modeling, the organization is positioned to move beyond cost reduction and compliance to achieving competitive advantage.

## Conclusion

While the use of models has become more strategic, the operational environment required to support the models has become more diverse and complex. New responsibilities and activities are required for actuarial analyses, many of which are not purely actuarial. It is now increasingly recognized that the complexity and breadth of models require a unique operational modeling skill set to effectively develop, maintain and execute these models. Technology, the fundamental enabler of modeling capabilities, is advancing at an exponential pace that will put even greater emphasis and pressure on modeling operations. How should an insurer respond given the potential implications on costs, compliance and competitive advantage? Understanding the business versus the operational skills and activities related to modeling holds the key to the new actuarial operating model. Given today’s environment, the trajectory of modeling technologies and applications, and the mission-critical nature of modeling within insurance organizations, the time has come for the chief modeling officer. ■

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## References

- <sup>1</sup> Wagner, Darryl, Tony Johnson, Nate Pohle, and James Dunseth. More Than Machines. *The Actuary*, October/November 2018, <https://theactuarymagazine.org/more-than-machines/> (accessed March 5, 2019).
- <sup>2</sup> Hughes, Mike, Ian Sterling, and Raju Saxena. Robots Join the Team—Automation, Transformation, and the Future of Actuarial Work. *Contingencies, Actuarial Software Now Special Section*, Winter 2018, <http://contingencies.org/robots-join-team/> (accessed February 28, 2019).

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# RISK

## around the industry

An introduction to some lesser-known emerging risks within the actuarial realm



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Chief risk officer of Venerable Holdings Inc., Charles Schwartz, says: “The insurance risk profession is adept at capturing and assessing the risk of ‘known unknowns,’ less so the ‘unknown unknowns.’” To help us think about risks that may be perceived as less common or less likely—but may very well be the next major risk—here are four pieces on key emerging topics across InsurTech, FinTech, risk interdependence and strategic risk management.

Let’s start with InsurTech. As recently as three years ago, few had heard of it. Yet by the end of 2016, it was top-of-mind for many, and *ITA PRO* magazine named it “word of the year.” Martin Snow, FSA, MAAA, and Theresa Rollin, PMP, describe artificial intelligence (AI) and the risks the InsurTech industry faces. The broader category of FinTech, which applies to all financial services and is more developed than InsurTech, has its own unique risks. Michael Leibrock discusses the balancing of FinTech opportunities with the risks.

The interdependence of risk surrounds us and is easily forgettable when things are going well. April Shen, FSA, CFA, CERA, MAAA, encourages us to consider these risks even when all seems to be in order, as

that is precisely the time to prepare. The final piece by Tricia Matson, FSA, MAAA, focuses on employing strategic risk management—how can risk management be done consistently and in advance to improve corporate decision-making?

We hope this content inspires you to think about other risks around the industry that may not always be top of mind—the “unknown unknowns.”

As Clayton Christensen and Scott Anthony point out in their book, *Seeing What's Next: Using the Theories of Innovation to Predict Industry Change*, established firms successfully tackle opportunities based on the sources of today's revenue, where they have resources to succeed, what their existing processes facilitate, and how their values suggest prioritization in the context of all other resource demands. Although predictive analytics can help a company's most valued customers today, it requires new resources, processes and values. Current processes are not enabling companies to consider what tomorrow's values will be, from where revenue will be derived in the future and how new entrants enter the market.

Innovators succeed by finding niche areas to enter the market and continue to improve their processes while established players continue to prioritize investments in their existing processes that generate more revenue in the near term. By the time the established players realize a new technology is a threat, the innovators are well ahead of the previously established players. Consider what Amazon and its partners are doing with Haven. Companies risk a new entrant such as Amazon or Google building products and processes designed around the new technology, as well as others embracing these technologies to better manage balance sheet risk and variability.

We recommend that insurers consider if they are prepared to allow this to happen while they continue to consider the best approach. Insurers will want to look closely at what predictive analytics can offer and update their resources, processes and values (culture)—including decision-making, organization and strategic planning—to get ahead of the emerging predictive analytics revolution. These are not easy changes to make, and they may require augmenting, training or adding personnel; leveraging third parties; and extensive cultural change management.

Core changes are required for insurers to succeed and reap the major strategic benefits that will accrue for early adopters. How are you going to change the thinking at your company? Will you continue to invest in products like Kodak film and Blockbuster videos that will soon become obsolete? Or will you move to the future?

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## The Predictive Analytics Revolution: What You Need to Do

BY MARTIN SNOW AND THERESA ROLLIN

One of the biggest risks facing the insurance industry today is that companies do not fully embrace how data and the tools to analyze it will completely change the insurance paradigm. Data enabled Netflix to make Blockbuster obsolete, and the mobile phone is starting to make bank tellers obsolete with the mobile depositing of checks via the phone's camera and internet connection. Likewise, we believe predictive analytics, artificial intelligence (AI) and machine learning will create a massive revolution in the insurance industry—equal in scale and scope to digital cameras overtaking film and mobile phones making all of your data portable. The determinant of future success for established insurers will be how well they embrace new technologies.

We see some insurers making investments in predictive analytics, such as automated underwriting and data science teams. But this is taking place on a smaller scale than is necessary to reap the full rewards of the technology. For example, most companies are not using existing capabilities to:



- 1 | Identify and reach out to the millions of people who do not have sufficient insurance.



- 2 | Proactively manage health insurance claims to benefit both the customer and the insurer.



- 3 | Assess and manage significant risks with more precision and reduced variability.

## The Future of FinTech

BY MICHAEL LEIBROCK

The rapid emergence of new FinTech applications is one of the most promising developments affecting the financial services industry today, yet it has the potential to drive increased risk as adoption increases. As a result, it is critical for firms to ensure implementation decisions balance business value with the potential risk of adopting emerging FinTech.

Some key factors firms should evaluate when considering FinTech adoption are:<sup>1</sup>

- 1 | **The provision of core banking functions by FinTech firms.** FinTech companies that provide core banking functions could enhance financial stability through diversification of credit and liquidity risk. However, given the short track record of these companies, this could also create systemic vulnerabilities.
- 2 | **The level of FinTech-related fragmentation.** The unbundling of financial services associated with the rise of FinTech has the potential to fragment the creation and delivery of financial services across additional providers and platforms.
- 3 | **The impact of FinTech on concentration risk.** The rise of FinTech could reduce concentration risk by allowing nontraditional service providers to compete with incumbent firms. Conversely, it also could create new pockets of risk should a small cluster of FinTech companies become dominant in any given area.
- 4 | **The degree of reliance on automated decision-making processes.** Overreliance on purely data-driven algorithms could lead to errors that might not have occurred in an environment that requires additional human judgment. In addition, due to the inherent complexity of decision-making algorithms, their opaque nature also could hide biases that may be hard to identify.
- 5 | **The sustained growth and adoption of FinTech services.** The impact of FinTech depends on the extent to which it becomes a mainstream component of the financial ecosystem and how it will ultimately be used for delivering critical financial services.

By gaining a better understanding of systemic risks, firms can ensure the continued safety of the industry. Given the rapid pace of FinTech adoption, it is imperative that firms begin to establish an appropriate internal

assessment framework now, before potential risks emerge and create real financial losses or operational incidents.

### Reference

<sup>1</sup> Gray, Andrew, and Michael Leibrock. FinTech and Financial Stability: Exploring How Technological Innovations Could Impact the Safety & Security of Global Markets. *Depository Trust & Clearing Corporation*, October 2017, <http://www.dtcc.com/-/media/Files/PDFs/Fintech%20and%20Financial%20Stability.pdf> (accessed April 5, 2019).

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## Bread and Butter: The Interdependence of Risks

BY APRIL SHEN

*The chance of the bread falling with the buttered side down is directly proportional to the cost of the carpet.*

—Murphy's Law

Actuaries are experts in quantifying and managing risks, including analyzing risks on a stand-alone basis as well as integrating and stressing risks simultaneously. The interdependence of different types of risks is relevant to an actuary's risk management strategy.

The interdependence of risks could be triggered by the causality between risk A and risk B, which is relatively more predominant. However, there's more subtle interdependence when risk A and risk B are merely associated or caused by a mutual risk C, which may not be analyzed directly. For example, the International Swaps and Derivatives Association (ISDA) defines "wrong-way risk" as the risk that occurs when "exposure to a counterparty is adversely correlated with the credit quality of that counterparty." Essentially, this risk emerges when default risk and credit exposure increase simultaneously, which may be caused by macroeconomic factors.

Wrong-way risk exemplifies interdependence of risks that actuaries can incorporate in their models by making mitigating assumptions. It might lead to changes in the overall risk management strategy or risk budget in stress scenarios when the credit risk is high—for example, the incentive to purchase a credit default swap (CDS) instrument from an independent counterparty to break the dependence. Another example of interdependence is the

interaction of modeling risk and market risk. While companies use complicated simulations to model market risks, the complexity of the models poses additional risk, such as the boundaries and limitations associated with the model itself.

When “Murphy’s Law” is invoked, it means everything that can go wrong will go wrong. This is symbolic of the correlation and interdependencies of risks. Looking back at the economic crisis and the mortgage market in 2007–2008, Murphy’s Law rang true. One of the reasons so few people predicted anything like the financial crisis was the common knowledge that housing markets in different parts of the United States moved independently of one another, and there was very little interdependence between the change of housing prices in one region with that in other regions.<sup>1</sup> However, as Andy Laperriere of ISI Group said in November 2007, “As an old pro in the mortgage business told us yesterday, the developments in the housing and mortgage finance market have been consistent with the most pessimistic scenario one could have imagined.”<sup>2</sup>

There are many ways to model interdependent risks, such as simulation, copula, integrated testing and stress testing. Actuaries should contemplate the impacts of interdependence in their risk management decision-making process and overall organizational strategy. The bread can fall with the buttered side down when it matters most.

#### References

<sup>1</sup> Underwood, Alice. Guide to ERM: Interdependence of Risks. *Willis Towers Watson Wire*, March 3, 2014, <https://blog.willis.com/2014/03/guide-to-erm-interdependence-of-risks> (accessed April 5, 2019).

<sup>2</sup> *The Wall Street Journal*. Murphy’s Law of Mortgage Meltdowns. *The Wall Street Journal*, November 21, 2007, <https://blogs.wsj.com/economics/2007/11/21/murphys-law-of-mortgage-meltdowns> (accessed April 5, 2019).

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## Improving Performance Through Strategic Risk Management

BY TRICIA MATSON

As the U.S. insurance industry continues to develop more mature enterprise risk management (ERM) programs, there is increased focus on strategic risk management. In other words, the industry is using these ERM processes and supporting analyses to make better strategic decisions

across the enterprise. Historically, many insurers have made decisions with a focus on accounting metrics and within individual business lines or functional areas. For example, new product pricing is often focused on internal rates of return. Enterprise hedging or reinsurance decisions may be focused on reducing U.S. generally accepted accounting principles (GAAP) earnings volatility or statutory capital management. While some have looked at this through more of an economic lens (for example, for purposes of asset liability management), it has not typically been on an enterprisewide basis. Diversification across risks may have been considered in a qualitative way, but historically it has not been part of what drives the metrics considered in strategic decision-making.

This is changing for a variety of reasons, including:

- 1 | Better and faster enterprisewide risk and return metrics, often developed by the ERM function
- 2 | Continued focus on strategic risk management by rating agencies, most notably S&P
- 3 | Increased competition and reduced margins in insurance products

Strategic risk management involves evaluating decisions through a consistent and robust risk-and-reward lens before they are undertaken. Exactly how a company defines risk and reward will and should depend on its individual facts and circumstances. For example, a company may be very focused on GAAP earnings and therefore uses that as the reward metric. Critical to the process, however, is the inclusion of a risk metric that consistently captures all material risks across the enterprise, including diversification benefits. Since many organizations haven’t historically had such a metric, strategic risk management in its complete sense has been very challenging. But now many organizations have an internal risk capital metric (such as economic capital) that can be used.

Companies that have a robust and consistent way to evaluate risk and reward—and use that information regularly as part of the strategic decision process—will, over time, outperform their peers that do not use strategic risk management (assuming all else is equal). While many organizations may focus on strategic risk management due to a push from external stakeholders (such as rating agencies), its use is potentially the best way to unlock the value of a mature ERM function. ■

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# Hungry for Risk?

Practical applications of a risk appetite framework

BY REBECCA B. SCOTCHIE AND CHRISTOPHER H. MURPHY



**R**

risk appetite, risk exposure, risk tolerance, risk limit dashboard—these are all buzzwords used by your organization’s enterprise risk management (ERM) program, right? While they may seem like high-level academic concepts that do not apply to your actuarial existence, the reality is many of your daily activities support key initiatives of your organization that help it operate within its risk appetite. So, what are these concepts all about, and how do they apply to you?

Assumption of risk is essential for insurers. Whether risk is knocking at or proactively welcomed through the door, it underpins your organization’s objectives, strategy and value proposition. As actuaries, we manage risk daily. The actions we take often feel intuitive, merely what is expected to properly manage the business. What is sometimes lost is a realization that we are—or should be—actively considering our organization’s appetite for certain risks.

Risk appetite is not only focused on the risks themselves, but also on achievement of organizational objectives. A well-run company summarizes how its stomach feels about risk via a risk appetite statement, and foundational to an insurer’s ERM program is its risk appetite framework. Think of risk appetite akin to the North Star or a point on a compass, and a risk appetite statement like a country’s constitution. Figure 1 illustrates sample excerpts of what a risk appetite statement might articulate.

**Figure 1** Risk Appetite Statement



This article expands on the components of a risk appetite framework and suggests an approach for developing and implementing it within your organization. The sometimes-intangible concepts of ERM are connected to how we as actuaries apply and adhere to our organizations' risk appetites daily. As you read, you will gain understanding regarding how your organization empowers you to act in its best interest.

### Risk Appetite Framework

A risk appetite framework comprises all activities utilized to determine risk appetite, monitor actual risk taking

and manage risk exposures to remain within risk tolerances. An organization's risk appetite framework aids decision-making, holds staff accountable and supports the organization's culture. Representative principles<sup>1</sup> upon which it is developed are shown in Figure 2.

A best practice framework is not only defensive, but also opportunistic. The board of directors, C-suite and senior management share responsibility for the development and governance of the risk appetite framework. The framework is reinforced by strategic and operational policies, guidelines, statements, processes and governance. Monitoring adherence to the organization's risk appetite is a responsibility shared by all staff.

**Figure 2** Principles of a Risk Appetite Framework



### Refining an Organization's Risk Appetite

Once guiding principles have been determined, one effective approach to further refine risk appetite is to leverage a questionnaire,<sup>2</sup> using variations of these questions:

- 1 | What are our objectives?
  - » Objectives likely will be aligned with protecting and growing **franchise value**, maintaining adequate and efficient levels of **capital**, maintaining **liquidity** to satisfy obligations and achieving **target performance**.
- 2 | What are our risk categories, and what is the tolerance for each?
  - » Common risk categories are **strategic, credit, market, insurance, operational** and **reputational**. Tolerance will be high for some, such that they are sought out and appropriately managed, while low for others, such that exposures are kept to a minimum.
- 3 | What is our attitude regarding uncertainty in achieving our objectives?
- 4 | When faced with decision-making, how willing are we to put achievement of each objective at risk?

The process, demonstrated in Figure 3, will drive focused discussions, ultimately resulting in content for a risk appetite statement.

**Figure 3** Development Process



As Figure 4 illustrates, a rating scale can be used for certain questions whereby, for example, “1—Averse” would indicate zero or near-zero tolerance and avoidance of the risk at all costs, and “5—Tolerant” would indicate a high level of tolerance and acceptance of the risk in order to exploit associated gains.<sup>3</sup>

The questionnaire should be sent to senior leadership for completion. Answers should then be aggregated, summarized and shared for reactions. They can be shared and discussed both one-on-one and in small groups, which lend themselves to robust discussion.

Information gathered through the questionnaire process and subsequent discussions provides content for an initial draft of the risk appetite statement, which can be iterated to completion with senior leadership. The final risk appetite statement contains the overarching sentiment of senior leadership for risk preferences and tolerances, and it serves as a guide for the rest of the organization. As denoted by Figure 5 on page 30, risk appetite is cascaded to different organizational areas and

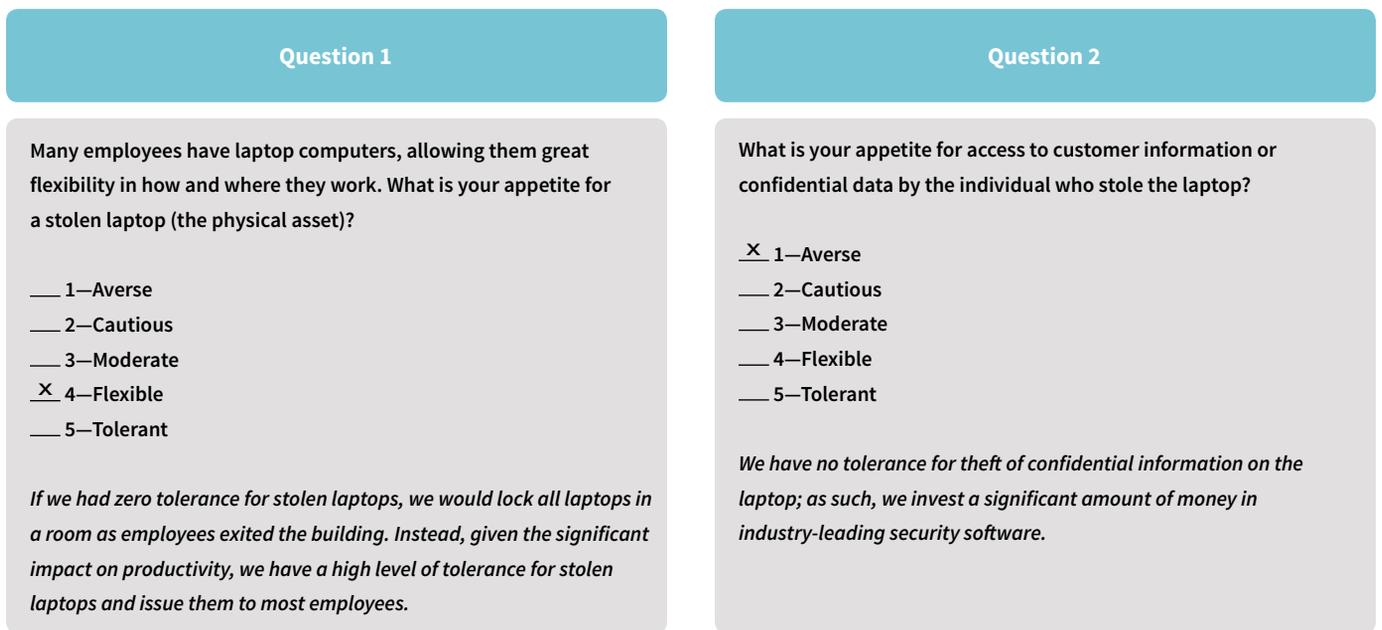
levels by confirming existing policies, procedures, monitoring and metrics, and by expanding linkages to risk appetite.

### Rooting Risk Appetite in Culture

The organization’s risk and other management committees have oversight responsibility for assuring risk appetite is cascaded to all areas and levels of the organization and that appropriate monitoring occurs. These committees also are responsible for making sure business lines have action plans if risk exposures breach certain tolerances or limits, and for assuring decisions are consistent with risk appetite. Business units, in turn, are responsible for determining risk limits, and utilizing and refining existing policies, procedures, monitoring and metrics.

Risk limits<sup>4</sup> are operational controls established at the level of the organization that manages risk on a day-to-day basis and should be relatively easy to measure and monitor. They serve a dual purpose: to ensure enough risk is being assumed while also limiting excessive risk taking. Some risk limits are “hard limits” for which action must be

**Figure 4** Risk Appetite Questionnaire



We, the people,  
of ABC Insurance Company ...

taken immediately to remediate a breach. Other risk limits are “soft limits” for which monitoring is intended to drive discussion, heighten awareness and influence decision-making—immediate remedial action is not necessary.

Making the link between existing practices and risk appetite encourages a culture that operates with a risk management mindset and empowers staff. Employees are accountable for identifying and enhancing programs to keep risk exposures within the organization’s risk appetite, leveraging risk limits and action triggers as needed. With support from oversight committees, frontline staff are responsible for developing and assuring an escalation process exists to ensure appropriate actions are taken commensurate with each breach. In a mature state, staff proactively anticipate potential risk limit breaches rather than react to them.

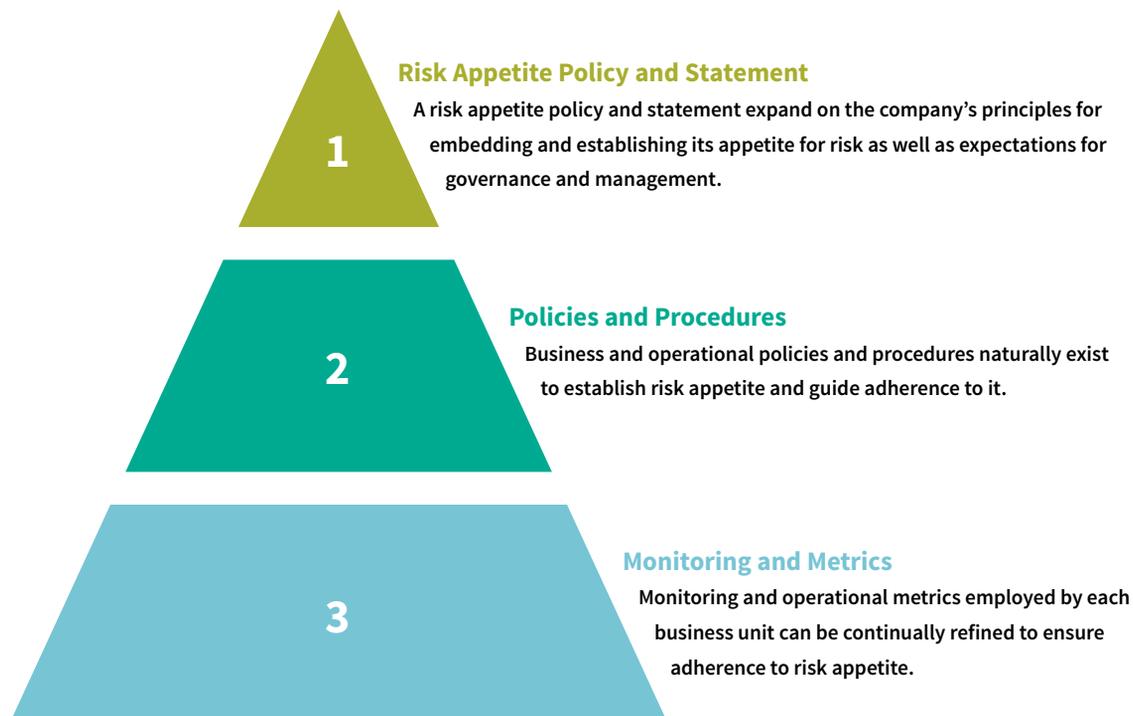
**Practical Applications: Bringing It All Together**

So, how do actuaries consider risk appetite each day? Perhaps not always explicitly, but they inherently understand uncertainty in achieving objectives and naturally consider alternatives. The following examples summarize ways in which actuaries consider risk appetite, risk tolerances and necessary trade-offs in their day-to-day work.



For certain organizations, these examples may represent current activities to actively manage risks and monitor risk profiles, while for others they may represent opportunities to impact the organization’s financial positioning

**Figure 5** Risk Appetite Framework





against its risk appetite. Regardless, all examples serve as useful tools to drive discussion, strategy considerations and decision-making.

**Example 1: New Business Pricing**

Many actuaries focus on new product development and pricing, with the goal of achieving an expected financial return. In doing so, assumptions are made, such as expected business mix (gender, age, etc.). In reality, actual business mix always varies from expectations. What are the reactions to an unanticipated mix of business? What if the greatest proportion of business sold is in the most unprofitable sectors?

As new business is obtained, actual characteristics are compared to pricing assumptions to determine the impact on expected future returns. Variances are assessed, and adjustments are made. Voilà! Monitoring and managing against risk appetite is achieved.

To address new business variances, consider potential actions for altering new business sales and profitability. Can underwriting guidelines or premium rates be adjusted? Can commission scales be altered? Does the company need to stop selling the product? Potential actions fall along a broad spectrum from less severe to more severe.

**Example 2: Risk Profile Assessment/Dashboard**

A risk profile assessment is a point-in-time review of the organization’s risk exposures measured against its risk tolerances and limits. The assessment can be either

quantitative or qualitative, and it may be performed at various levels of granularity.

A simple example of a quantitative risk profile assessment is the National Association of Insurance Commissioners (NAIC) risk-based capital (RBC) ratio. This ratio can provide a sense of overall risk exposure, with implications if the ratio is too high or too low. Capital usually is managed to be within a certain range. The range is reflective of risk appetite, and the bookends constitute the risk limits. Monitoring against risk appetite leads to decision-making and actions such as increasing diversification (to improve the capital ratio) or investing in a new product line (putting excess capital at risk to fulfill the fundamental purpose of an insurance organization).

A more detailed quantitative assessment might take the form of a risk limit dashboard. Risk limits should be developed for each major driver of risk, such as mortality, persistency or business mix (see Figure 6 for a basic representation). Color and arrow indicators measure against each stated risk limit (within, watching, outside) and express trend (improving, unchanged, deteriorating) based on the recent past and expectations regarding the future. The dashboard should also drive discussion and action taking—each hard or soft risk limit should have an associated set of actions should a breach occur.

Management may request a more qualitative risk profile assessment for a specific business line. It would ideally consider risk exposures, concern level (high, medium, low) and recent movement (improved, minimal change, worsened). Management actions (actual or expected) could be summarized, along with their expected impact. Such an assessment empowers ownership and accountability.

**Figure 6 Risk Limit Dashboard**

Risk	Limit	Assessment	Outlook
Mortality A/E	No greater than 110%	99% (within)	► Unchanged
Persistency A/E	No less than 90%	91% (watching)	▲ Improving
Business mix (% male)	No greater than 60%	65% (outside)	▼ Deteriorating

**Figure 7** Sensitivity Testing



The dials represent the impact of sensitivity tests for mortality, claims incidence and persistency on expected results. Sensitivity tests have been calibrated to one-in-20 year events. The relationship of the impact to risk appetite is represented with colors—green (within), yellow (watching) and red (outside).

**Example 3: Sensitivity Testing**

Sensitivity testing is used to understand potential volatility of future results and to inform and monitor risk appetite and risk limits. Individual sensitivity tests can be created for key risk exposures calibrated to a similar likelihood. For example, a sensitivity test on mortality reflecting a one-in-20 year occurrence (i.e., 5% likelihood in a given year), could be applied to understand impact on expected results, reserves and/or capital. After applying similarly calibrated sensitivity tests for all key risk exposures, management can use this information to define risk appetite. After risk appetite has been identified, sensitivity testing can then be used to determine if expected volatility falls within risk appetite. Figure 7 illustrates the impact of sensitivity results and their relationship to risk appetite.

**Example 4: Economic Capital**

A frequently used metric for risk appetite is economic capital. Determining economic capital requires considering the entire organization’s balance sheet and indicates the total level of assets needed to assure solvency through extreme yet plausible events. The calculation builds on sensitivity testing for individual risks and aggregates results with consideration for diversification. Measuring and managing economic capital within a certain range is how many organizations understand and manage their risk appetite.

**Conclusion**

The concept of risk appetite may not be in all actuaries’ vocabulary; however, it is inherent in their practice.

Establishing a clear link between what actuaries do and the importance of helping our organizations operate within their risk appetite increases the likelihood of fulfilling organizational objectives, strategy, vision and values. The value to our profession and our industry lies in shifting from a reactive approach to a proactive one with respect to risk appetite and potential breaches. ■

**References**

- <sup>1</sup> CRO Council and CRO Forum. Establishing and Embedding Risk Appetite: Practitioners’ View. *CRO Council and CRO Forum*, December 2013, [http://cro council.org/images/CRO\\_Forum-Council\\_Risk\\_Appetite\\_FINAL.pdf](http://cro council.org/images/CRO_Forum-Council_Risk_Appetite_FINAL.pdf) (accessed March 21, 2019).
- <sup>2</sup> Acknowledgment to the Gartner Risk Management Council for guidance.
- <sup>3</sup> Ibid.
- <sup>4</sup> Supra note 1.

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The views or opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of Oliver Wyman.

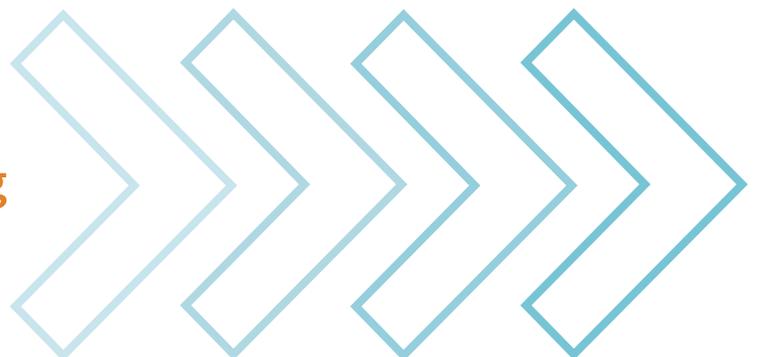


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# FORCE OF NATURE

BY FEI XIE

Why and how to include climate change in the risk management framework



## T

he boards of directors for many corporations received an alarming and surprising note in their quarterly management update reports: California's largest utility and one of the United States' largest investor-owned electric utilities, Pacific Gas and Electric (PG&E), was filing for bankruptcy. Many companies have financial exposures to PG&E through investments, accounts receivable or secondary exposure, and the risk analysis would include credit analysis and scenario testing to measure potential exposures. For such a large and stable organization to declare bankruptcy would shock many. However, a January 2019 headline in *The Washington Post* summarized the story well: "Pacific Gas and Electric is a company that was just bankrupted by climate change. It won't be the last."

Risk management related to climate change can broadly be broken down into two categories:

- 1 | Disclosure
- 2 | Managing financial impacts from climate change

Disclosure is a powerful tool to evaluate how a corporation assesses, prices and manages climate-related risks. Most companies are focusing on disclosure now, as it is the key to address investor and customer awareness, and demand for more information related to the impacts of climate change.

While the full financial risks from climate change may crystallize over longer time horizons, they are becoming ever more apparent. Global insured losses from natural disaster events in 2017 were the highest ever recorded.<sup>1</sup> The financial impact from climate change is not unique to the property and casualty (P&C) insurance industry—it potentially can affect all financial institutions on the asset side.

Insurance companies, pension funds, banks, asset management and other financial institutions are all involved with a wide range of financing and investment

activities. These activities span across many sectors of the economy, including those that are carbon intensive, making these investment assets susceptible to climate-related risks. The physical impacts of climate change pose a direct risk to the insurance company or pension fund's own operations. Climate change also poses indirect risk to the insurance company or pension fund's assets as we transition to a low-carbon economy, which can lead to a combination of higher credit risk from potential asset impairment/write down (e.g., reduced repayment capacity or credit downgrade) and higher market risk (e.g., depreciation of company or security valuations or reduced value of collateral). Assets in real estate, infrastructure, agricultural and brown energy businesses are particularly at risk. Potential financial impacts could also stem from reputational risk as a result of negative publicity as well as regulatory fines.

To maintain financial health and protect the interests of policyholders and shareholders, companies must assess their exposure and maintain a high degree of resilience to climate-related risks.

This article focuses on insurance companies and pension funds, although many of the concepts also apply to financial institutions in general. It does not intend to address specific insurance risks as a result of climate-related events stemming from P&C insurance coverage or pandemic risks. The discussion focuses on the general concepts of how climate change can impact insurance companies and pension funds, in particular on the asset side.

### Climate Change Background

Climate change refers to changes in weather severity, weather patterns, heating/cooling of the planet, migration of species and vector-borne illnesses. Sustainability risk is another term generally used in a broader sense that can also include societal aspects such as reducing poverty, increasing diversity and equality, and so on. See Figure 1 on page 36 for more details.

**Figure 1** Climate Change Versus Sustainability Risk and Everything in Between

**Sustainability risk** refers to the uncertainty in being able to maintain business operations and sustain the growth of the corporation due to negative externalities such as environmental degradation, social risk issues and climate change.

**Environmental and social risk** is the risk of loss from an environmental or social issue. Environmental and social risk issues include site contamination, waste management, land and resource use, biodiversity, water quality and availability, climate change, environmental regulation, human rights, indigenous peoples' rights and consultation, and community engagement.

**Environmental risk** is the risk of loss from direct or indirect negative impacts of environmental events, including those related to physical impacts of climate change and the shift toward a lower-carbon economy. These events may include increased frequency and severity of natural or human-made environmental disasters, and emerging regulatory and public policy developments.

**Climate change risk** is the risk of loss resulting from adverse impacts of climate change.

Financial risks from climate change arise through two primary channels or “risk factors”: physical and transition (see Figure 2). These factors manifest, for example, as increasing underwriting, reserving, credit or market risk for firms.

Physical risks from climate change can be related to specific weather events (such as heat waves, floods, wildfires and storms) and longer-term shifts in climate (such as changes in precipitation and extreme weather variability, rising sea levels and rising mean temperatures).

Physical risk is generally better understood compared to transition risk. Transition risks can arise from the process of adjustment toward a low-carbon economy. This adjustment is influenced by a range of factors, including:

- » Climate-related developments in policy and regulation
- » The emergence of disruptive technology or business models
- » Shifting sentiment and societal preferences
- » Evolving evidence, frameworks and legal interpretations

This could prompt a reassessment of the value of a large range of assets and create credit exposures for banks and other lenders as costs and opportunities become apparent.

Climate change also has a third risk that is not a focus of this article: liability. Liability risk<sup>2</sup> is related to the important question: “If future generations suffer from severe climate change, who will they hold responsible?”

**Figure 2** Details on Climate Change Risk Types

Risk Type	Potential Impacts				
Physical	<ul style="list-style-type: none"> <li>» Impact on insurance liabilities</li> <li>» Damage to physical assets</li> <li>» Disruption to business operations, transportation and supply chains</li> <li>» Increase in health-related costs</li> </ul>				
	<table border="1"> <tr> <td rowspan="4">Transition</td> <td> <b>Markets</b> <ul style="list-style-type: none"> <li>» Depreciation of company or security valuations</li> <li>» Viability of business models</li> <li>» Credit rating implications</li> <li>» Asset depreciation</li> </ul> </td> </tr> <tr> <td> <b>Technology</b> <ul style="list-style-type: none"> <li>» Write-offs for investments in disrupted technologies</li> <li>» Increasing need to invest in new, cleaner technologies</li> <li>» Business process change costs to accommodate new technologies</li> </ul> </td> </tr> <tr> <td> <b>Policy and legal</b> <ul style="list-style-type: none"> <li>» Compliance costs</li> <li>» Obligation due to cap-and-trade/carbon tax programs</li> <li>» Restrictions and limitations on carbon intensive assets</li> </ul> </td> </tr> <tr> <td> <b>Reputation</b> <ul style="list-style-type: none"> <li>» Damage to brand value or reputation resulting in lost revenue</li> <li>» Additional expenditure (e.g., corporate affairs, litigation, etc.)</li> <li>» Positioning with investor coalitions demanding greater disclosure</li> </ul> </td> </tr> </table>	Transition	<b>Markets</b> <ul style="list-style-type: none"> <li>» Depreciation of company or security valuations</li> <li>» Viability of business models</li> <li>» Credit rating implications</li> <li>» Asset depreciation</li> </ul>	<b>Technology</b> <ul style="list-style-type: none"> <li>» Write-offs for investments in disrupted technologies</li> <li>» Increasing need to invest in new, cleaner technologies</li> <li>» Business process change costs to accommodate new technologies</li> </ul>	<b>Policy and legal</b> <ul style="list-style-type: none"> <li>» Compliance costs</li> <li>» Obligation due to cap-and-trade/carbon tax programs</li> <li>» Restrictions and limitations on carbon intensive assets</li> </ul>
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Liability	<ul style="list-style-type: none"> <li>» Impacts that could arise in the future as parties who have suffered a loss from the effects of climate change seek compensation from those they hold responsible</li> </ul>				

### Climate-related Disclosure

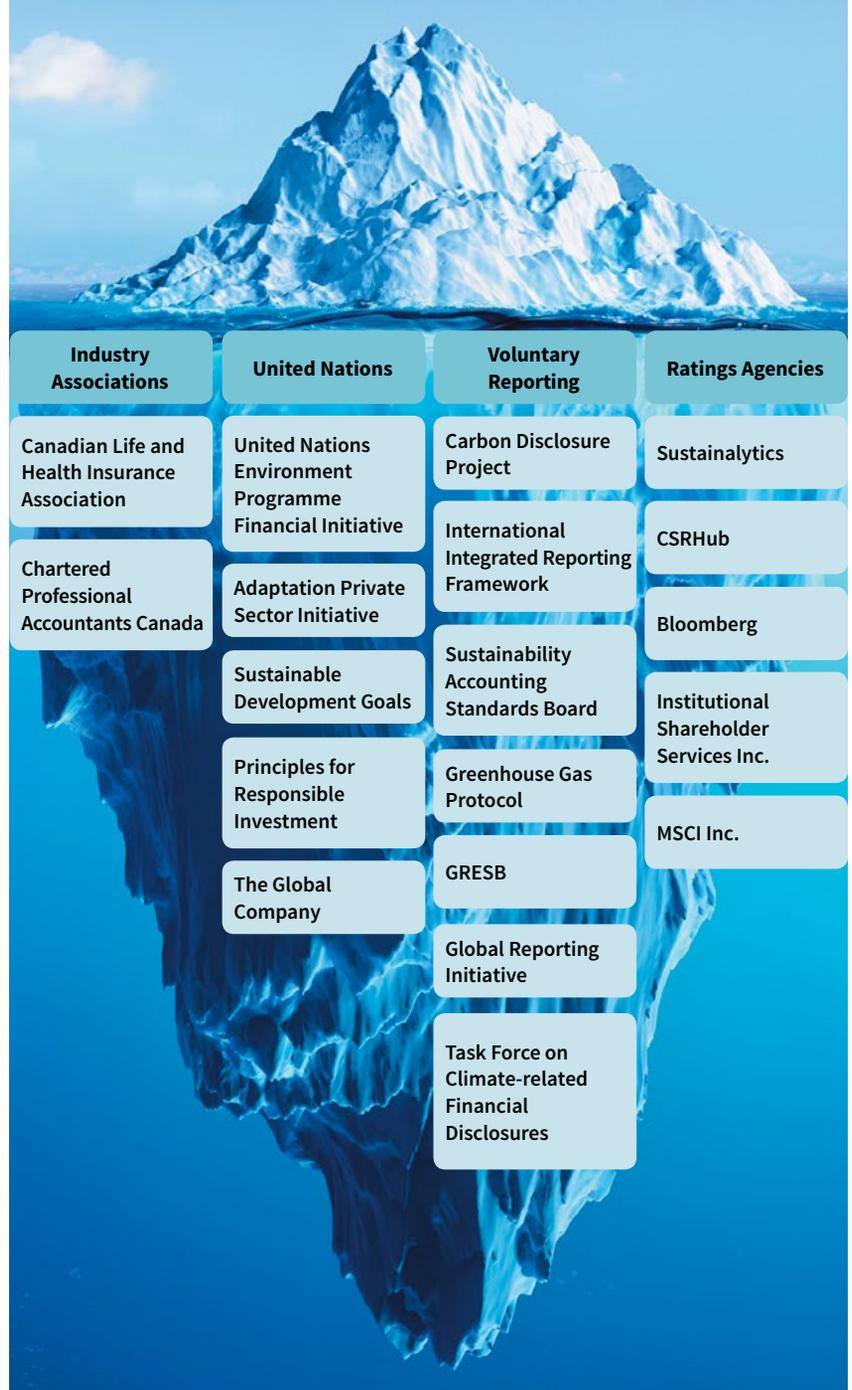
Investor, regulatory and stakeholder expectations continue to evolve around climate change risk management. For climate change risk, disclosure is the key. Although carbon emission and climate-related disclosures began in early 2000 among some corporations, they were initially considered a “nice-to-have.” The focus when the disclosure of these risks started was to mitigate potential climate-related reputational risk.

One of the major milestones for climate change disclosure occurred in December 2015, when the Financial Stability Board (FSB) established the Task Force on Climate-related Financial Disclosures (TCFD) to develop voluntary, consistent climate-related financial risk disclosures for companies to use when providing information to investors, lenders, insurers and other stakeholders. The TCFD recommendations released in June 2017 focused on enhancing market transparency and enabling the efficient allocation of capital in the transition to a low-carbon economy as envisioned by the Paris Climate Agreement. More than 580 organizations are supporting the TCFD as of February 2019, with new supporters being added on a continuous basis.

Mandatory greenhouse gas (GHG) reporting, also known as mandatory carbon reporting, is the law in 40 countries across the world, including the United Kingdom, many EU member states, Canada, the United States, Mexico, Australia, Japan and South Africa (as of 2018). In the United Kingdom, publicly listed companies are required to account for their GHG emissions as part of their annual financial reporting, while EU GHG reporting is included within nonfinancial reporting. However, the GHG reporting qualification varies across jurisdictions.

Examples of the global landscape of climate and sustainability reporting and disclosure are shown in Figure 3, and the list is expanding fast.

**Figure 3 Stakeholder Expectations and Requirements for Climate and Sustainability Reporting and Disclosure**



### Regulatory Requirements to Manage Financial Impacts From Climate Change

The requirements of managing climate-related risks are evolving rapidly, with increasing expectations from regulators that insurance companies

have a strategy for the management of the financial risks associated with climate change.

In the United States, the California insurance commissioner released the results of a new analysis of the climate risk exposure faced by investments held by the insurance industry. The California Department of Insurance is the first financial regulator to undertake an analysis of both climate-related physical risks and transition risks faced by insurers' assets.

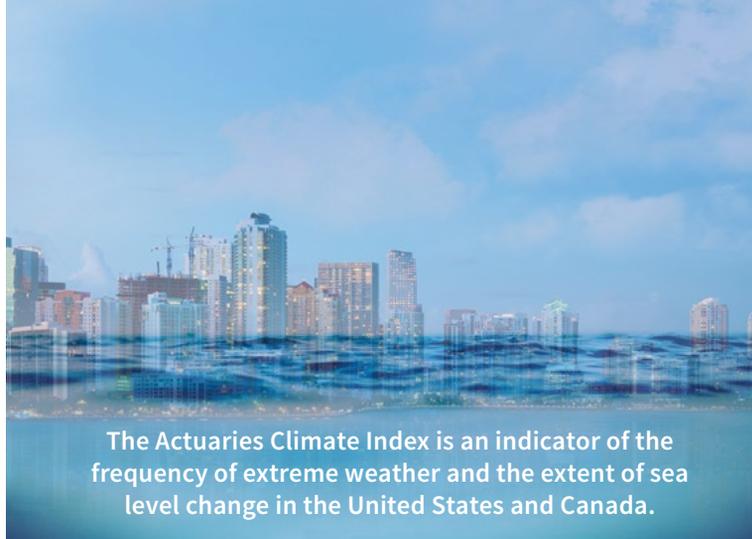
In the United Kingdom, the Prudential Regulatory Authority recently released a consultation paper on climate change risk on four main areas: governance, risk management, scenario analysis and disclosure.

In Canada, the Canadian Securities Administrators (CSA) is developing guidance and considering new disclosure requirements relating to climate-related risks, and the Office of the Superintendent of Financial Institutions (OSFI) expects insurers to develop a strategy for managing climate change risk.

In summary, with increasing focus from stakeholders and regulators on formalizing requirements for disclosures and the measurement of climate change, the insurance industry and pension funds should review their current practices and consider adopting a more holistic approach, incorporating climate-related risk into their risk management frameworks.

### Determining Level of Exposure

The velocity of change and potential exposure magnitude should be considered in addition to each company's specific system of risk management in addressing climate-related risk. The scientific community continues to point to growing evidence of the likelihood and severity of significant warming of the planet. The Actuaries Climate Index—sponsored by the Society of Actuaries (SOA), Canadian Institute of Actuaries (CIA), Casualty Actuarial Society (CAS) and the American Academy of Actuaries



(the Academy)—is an indicator of the frequency of extreme weather and the extent of sea level change in the United States and Canada. It shows the five-year moving average of climate extremes and sea level across the United States and Canada reached

a new high with data released for winter 2017–2018. Increasing values in the index point to increased occurrences of extreme climate events.

Climate change risk is no longer something on the horizon—it is arriving. Failure to properly plan for and react to climate change could lead to more incidents similar to the PG&E event. There is a real urgency to address climate-related risk within a company's risk framework.

To effectively manage climate change risk, a company needs to establish a holistic view of how climate-related events may have impacts across the enterprise (e.g., by business segment, product line, investment portfolio, geography, local regulatory requirements, risk type, etc.) and identify plausible mitigation actions. This also facilitates the development of appropriate climate change stress scenarios for scenario analysis that can be used to assess a company's resilience and vulnerabilities to potential climate change events.

Effective management of climate change risks requires integration across all elements in the risk management framework, tailored to an individual company's system of risk management (see Figure 4).

### Integrating Climate Change Into a Risk Management Framework

Climate change can be integrated into a risk management framework in three ways. These potential routes mainly focus on climate change, but they could be extended for the broader sustainability risk:

- » **Option 1.** Recognize climate change risk is a key risk similar to insurance, market and credit risks.
- » **Option 2.** Recognize climate change affects financial risks as well as nonfinancial risks such as operational risk.
- » **Option 3.** Recognize climate change could fit into a company's risk management framework as a new sub-risk category under an existing key risk category.



See Figure 5 on page 40 for a visual representation of these three options.

**Figure 4** Example of a Risk Management Framework



**Option 1: Climate Change Risk as a Stand-alone and Separate Key Risk**

For companies with a relatively mature risk management framework, this is a fairly straightforward approach to leverage the existing infrastructure already in place for financial and other key risks. It involves establishing appropriate policies and standards, as well as risk appetite and limits associated with climate change risk. One of the biggest benefits of this approach is that there will be clear governance as well as roles and responsibilities associated with the management of climate change risk.

On the other hand, climate change itself is less likely to cause direct financial losses for insurance companies or pension funds. Rather, it is more likely to be experienced through interactions with other key risks. This could create challenges in establishing and implementing a specific risk identification related to climate change and an identification, measurement, management, monitoring and reporting (IMMMR) process. It also may not be the best approach for identifying potential impacts to the other risk types within the existing risk processes.

**Option 2: Climate Change Risk Embedded Within Existing Risks**

This option addresses and embeds climate change risk within the existing risk processes, reflecting the close interaction among climate risk and existing key risk types (e.g., credit, market, insurance, operational and reputational risk). Under this option, a company can establish credit limits associated with any carbon-intensive industries or minimize investing assets in real estate located in areas exposed to rising sea levels for a given asset portfolio. The monitoring and reporting of

**Figure 5** Three Options to Integrate Climate Change Into a Company’s Risk Universe

Credit	Market	Insurance	Operational	Other Key Risks	Climate Change (Option 1)
Fixed income investments risk	Interest rate risk	Mortality risk	Fraud risk		
Reinsurance and derivative counterparty risk	Equity risk	Lapse risk	Process risk		
Other subcategories as applicable	Other subcategories as applicable	Other subcategories as applicable	Other subcategories as applicable		
Climate Change (Option 2)					

such limits also can become part of the existing risk processes.

However, this approach could potentially mean a very large number of existing processes or procedures will need to be updated or enhanced to reflect the inclusion of climate-related risk. The governance and monitoring of the climate-related risks also could become fragmented, and it could become challenging to maintain consistency between the risk limits and the overall risk appetite and strategy around climate change risk.

**Option 3: Climate Change Risk Embedded Within an Existing Risk Type**

For companies with a relatively lower material or a narrower potential exposure to climate-related risks, it might be sufficient and more efficient to address the risk by creating a new subcategory under existing key risks. Strategic risks, insurance risks and operational risks could be some of the potential options. This is probably the least “onerous” option compared to the other two options. However, there could be the potential limitation of the comprehensiveness and lack of clarity on the definition of the risk itself, as well as the effectiveness of the underlying risk processes.

**Final Considerations—Efficiency and Optimization**

Financial institutions are undergoing major disruption. Insurance business models have been relatively insulated, but the pace of change is accelerating and not expected to slow down. Advanced technology, data and digital capabilities are growing exponentially, driving lower costs and enhancing customer experiences. But at the same time, nonfinancial risks stemming from the pace of change,

use of emerging technology, agile business practices and increasing reliance on suppliers are also growing. The overall universe of emerging risks is expanding (e.g., cyber, technology, supplier, fraud), and regulatory requirements continue to grow around conduct risk, privacy legislation, customer-focused outcomes and so on.

These risks have similar characteristics to climate change risk and bring similar challenges to a corporation. In developing its risk management framework for climate-related risk, each corporation also should consider how it can effectively incorporate new risks, evolving risks and new regulatory requirements in a broader sense. The adopted approach should be a balance of offering offensive capability while ensuring increased alignment with the business’ strategy to aid in better decision-making and create more value. ■

**References**

- <sup>1</sup> Bevere, Lucia, Marla Schwartz Pourrabani, and Rajeev Sharan. Sigma 1/2018: Natural Catastrophes and Man-made Disasters in 2017: A Year of Record-breaking Losses. *Swiss Re Institute*, April 11, 2018, <https://www.swissre.com/institute/research/sigma-research/sigma-2018-01.html> (accessed April 5, 2019).
- <sup>2</sup> An example of liability risk is when investors back a business that goes on to suffer a loss due to climate-related events. There may then be a question as to whether the business had provided enough information about its exposure to these climate-related financial risks. If investors feel this information had not been provided, they might make a claim against the business. Liability cases could also include people who have suffered from physical events, such as flooding, making claims against companies they argue are, at least in part, responsible.

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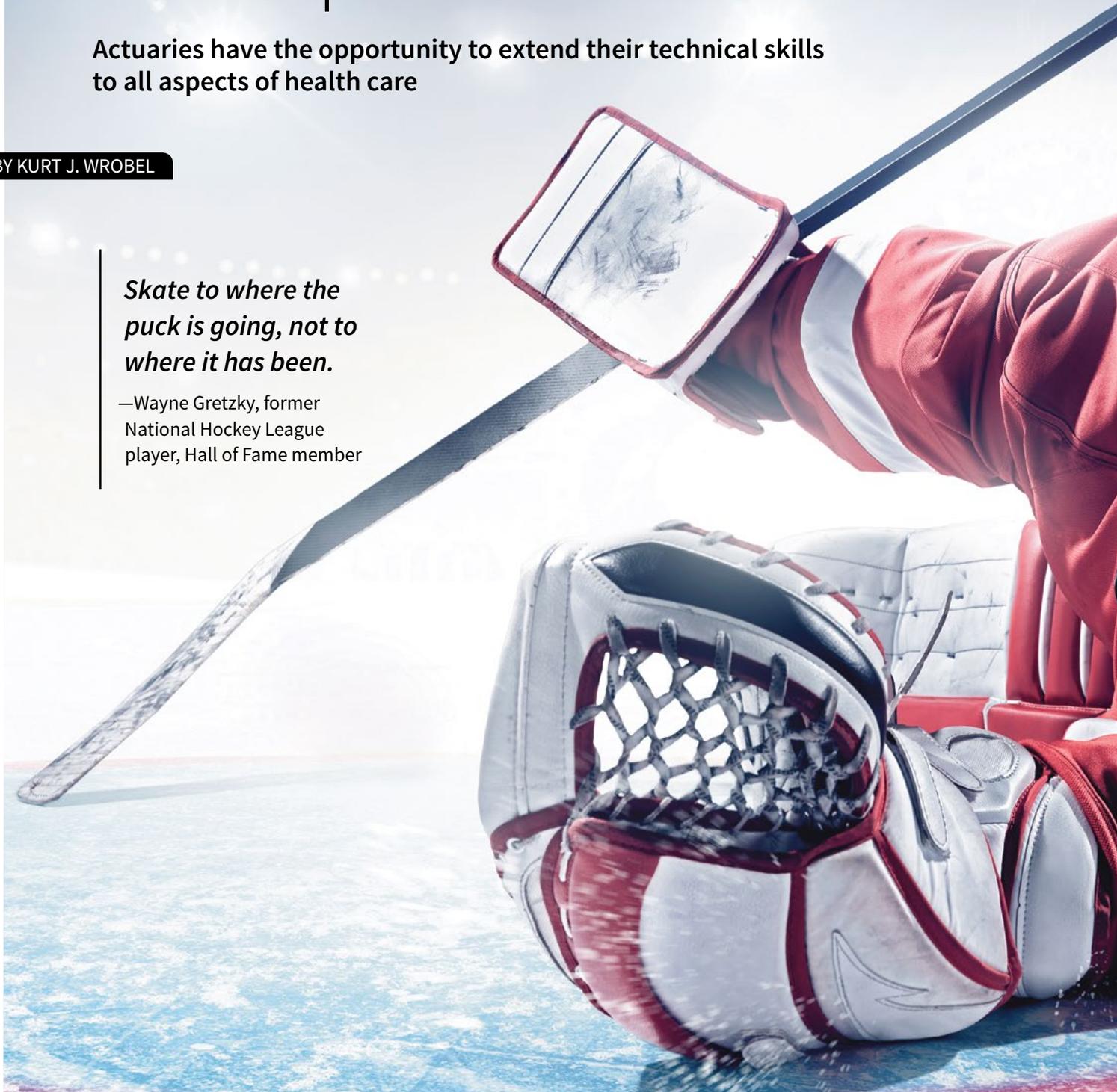
# Sharpen Your Skills

Actuaries have the opportunity to extend their technical skills to all aspects of health care

BY KURT J. WROBEL

*Skate to where the puck is going, not to where it has been.*

—Wayne Gretzky, former National Hockey League player, Hall of Fame member





S

imilar to hockey players who need to understand where the puck is going in order to be successful, actuaries need to understand where the health care industry is headed in order to develop skills that will be needed in the future. While hard work and exam success are prerequisites, the extent of your success is connected to where you place your effort and how those skills will be valued in the market. A focused effort on the most highly sought-after skills of the future is much more likely to produce success than a blind focus on skills that may have been more highly valued in the past.

This article will focus on several broad themes that affect the health insurance market and how these changes will impact the needed skills and career prospects for those in the actuarial profession.

### **The Health Insurance Market: Where the Puck Has Been**

Historically, most health insurers were stand-alone companies where provider discounts, administrative costs and customer service primarily drove an insurer's success. With these capabilities, health insurers provided services similar to insurers in other lines of business—they offered financial protection for people and organizations against higher-than-expected medical claims. In most environments, a competitive market drove down rates and helped ensure relatively modest operating margins for most insurers.

In addition, regulators focused on the application of rating rules to help assure the financial solvency of the organization offering insurance products—all in keeping with their mandate to protect consumers and ensure sufficient financial protection in case of insurer failure.

In this environment, actuaries distinguished themselves as the lead risk managers in health insurance. We help our organizations achieve their expected margins through accurate premium rate and trend development, ensure an accurate accounting of our organizations' financial performance through reserve estimates, and protect the long-term financial sustainability of the insurer.

This has been and will be a major part of our mission as actuaries. We need to be effective risk managers; we need to use our analytic skills to develop accurate premium rates; and we need to base our actuarial opinions on actuarial standards of practice. This professional approach to important financial decisions has helped health insurers, for the most part, remain stable, and provide financial protection for people during the most vulnerable times of their lives.

### **The Health Insurance Market: Where the Puck is Going**

Things are changing, however. Instead of being a stand-alone insurance company, many insurers are becoming increasingly connected to organizations that provide care through all aspects of the delivery system, including hospitals, physicians and pharmacies. Even if there isn't a direct connection, many insurers are developing risk-based arrangements with provider organizations that are blurring the distinction between insurance companies and providers.

Through these combinations and arrangements, organizations are attempting to address the United States' affordability challenge by creating integrated organizations focused on reducing medical costs while providing high-quality care. Unlike the existing fee-for-service system, these organizations have a financial incentive to reduce medical costs because of the risk arrangement inherent in an insurance product.

This change should be exciting for actuaries. We can participate in helping to solve one of the most prevalent problems in our country, while also continuing to maintain our primary role as the lead managers of risk in health insurance.

In addition to the combining of insurance payers and providers, we are seeing more regulatory complexity across all lines of business—including Medicare, Medicaid and the Affordable Care Act (ACA) marketplace—with the very real possibility of more change with the further expansion of Medicare to a broader population. The rules are complex and can have wide-ranging impacts on the financial and operational success of an organization.

Over the last several years, we also have seen a significant increase in computing power and the volume of data available to analyze. More and more people are attempting to analyze this data through a variety of methods ranging from sophisticated modeling techniques employed by data scientists to less sophisticated approaches employed by people attempting to justify a decision. This shift has been accelerated by books and articles that highlight the “big data” success stories from big-name companies like Amazon and Google.

### How to Skate to Where the Puck Will Be

With the inevitable change to a stronger connection between insurers and provider organizations, we also need to think about how our profession can be more effective in driving results in these new organizations, where regulation has become more complex and the data more accessible.

While the following bullet points offer some thoughts on how to think about this environment, it is by no means an exhaustive list. Regardless, as one thinks about career prospects, it is important to have a viewpoint on where the industry is going to help guide career experiences and skill development.

» **A broad knowledge of the health care delivery system will become increasingly important.** The continued focus on reducing medical costs and making

health insurance more affordable is a critical aspect of the changes occurring in the market. With these changes, actuaries have a unique opportunity to help drive change by using analytic skills to find savings opportunities. In order to lead, we will need to develop our knowledge in all aspects of the health care delivery system—including an in-depth knowledge of the how care is delivered, the contracting process with providers, and techniques that can better manage utilization.

» **An ability to drive operational change with analytic findings will become a more important skill.** In many of our historical roles, we focused on risk management, premium rate development and reserve estimates. While these are important activities, in many cases this work focused on estimates where operational change was not required. A premium rate, for example, could be developed and then filed with an insurance department without requiring significant operational changes within an organization. With the increasing focus on health care affordability and improved performance from the health care delivery system, we will need to develop analytic insights—but we also will need to ensure we can drive management change internally by connecting observations with tangible actions that improve performance.

» **Effective communication regarding all aspects of health care, including the health care delivery system and insurance concepts, will be critical for our profession.** With insurance organizations becoming more connected with providers, actuaries will need to improve how they communicate technical topics to these audiences. While this need has long been understood, it will become increasingly important as new people and organizations are introduced to our complex industry.

Beyond clear communication of complex topics, we also need to tell stories that connect the elements of the delivery system with insurance and the final product sold to consumers. Considering the complexity across this entire continuum from the delivery system to insurance, this skill to develop overarching stories that address complex topics (while avoiding needless details) will be important when communicating to a broader audience.

» **Risk management will be different as providers and larger organizations take on insurance risk.** As providers accept more risk through a variety of arrangements, it will be important for them to fully understand the financial implications of the risk deal and then have the ability and willingness to make operational changes based on the results of the risk taking. The ability to draw this connection between understanding the initial



*It is important to have a viewpoint on where the industry is going to help guide career experiences and skill development.*

risk arrangement to making operational change will be particularly important for the actuarial profession.

Risk management will also change for larger organizations that have a delivery system division combined with an insurance company. In many cases, the financial results of the insurance company could serve as a hedge against adverse results in the delivery system. For example, a particularly light flu season could benefit the insurance company (and members), but adversely impact the financial results of the delivery system assets. As we consider the risk implications across the entire enterprise, this natural hedging mechanism must be considered.

» **A detailed knowledge of complex regulatory rules will differentiate actuaries relative to other professions (data scientists and economists) where analytic skills are primarily emphasized.** The trajectory in health insurance is toward more complex regulations, particularly in the lines of business with the greatest growth (Medicare, Medicaid and the ACA marketplace). With this continued complexity, actuaries will be able to differentiate themselves by combining analytic skills with detailed regulatory knowledge critical to addressing important financial decisions. In many cases in health insurance, the ability to use large data sets and complex modeling to answer a financial question is simply inadequate without also having a strong understanding of the regulatory environment.

This knowledge of the regulatory environment will also position actuaries to provide key insights into proposed policy changes. As we have seen with the ACA, our observations can be critical in improving policy.

The future is bright for our profession. We stand at important crossroads for one of the most pressing problems in the United States—high medical costs. While our historic position as risk managers will continue to be important, we also have the opportunity to extend our technical skills to other aspects of health care. This challenge to develop approaches to reduce medical costs most likely will be met by people with a broad knowledge of the regulatory environment, strong analytic skills, an intuitive knowledge of risk, and the ability to execute and drive operational change. While many in our profession will find success in purely technical fields, the changes in the health care industry will allow others in the actuarial profession to succeed as generalists who can apply analytic skills across a broad cross section of challenges. ■

#### ABOUT THE WRITER

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INTERVIEW BY MARTIN SNOW



# Building ERM Buy-in

Switching to a value-based approach can result in better decision-making for organizations



Chief risk officers often describe their main challenge as a lack of buy-in. Without buy-in—from heads of business segments, executive leadership, the board and external stakeholders—the impact of the enterprise risk management (ERM) program cannot achieve its full promise of supporting better risk-reward decision-making at the highest levels, starting with strategic planning. Without proper buy-in, ERM remains useful but limited, often supporting only risk mitigation and capital management decisions. This lack of buy-in is often not the fault of the chief risk officer (CRO), but rather due to inherent flaws in the most popular ERM approach, which is capital-based.

In this interview, Philip Sherrill, CPA, CIA, CHIE, and Sim Segal, FSA, CERA, recipients of Best Session Award for their 2018 ERM Symposium presentation “Building Buy-In: Overcoming the #1 Obstacle to Effective ERM,” share selected insights from their session. They explain how switching to a value-based ERM approach overcomes the limitations of a capital-based approach, achieves buy-in, paves the way for the ERM program to expand its reach and engages the CRO in the organization’s most important decisions.

**Snow: What are some of the symptoms of an ERM program that may be lacking buy-in?**

**Segal:** One sign of a lack of buy-in is when ERM has limited purview, such as not being adopted across all business segments or not being applied across all sources of risk. An example of the latter is that many ERM programs are not really ERM, but rather financial risk management (FRM) because their scope is limited to financial risks. Another indication is when ERM information is not used to inform routine business decisions.

Philip Sherrill, CPA, CIA, CHIE, and Sim Segal, FSA, CERA, recipients of Best Session Award for their 2018 ERM Symposium presentation “Building Buy-In: Overcoming the #1 Obstacle to Effective ERM,” share selected insights from their session in this interview.

**Sherrill:** When the buy-in isn’t there, you probably won’t see management and the board having meaningful discussions about ERM, at least not consistently. It’s not in their line of sight. The performance analytics they monitor may also exclude ERM metrics in favor of tactical results. We typically prefer to focus on things we think we can get our arms around. That’s where the value-based approach comes in.

**Snow: What are some of the causes of this lack of buy-in?**

**Segal:** One of the main causes is a capital-based ERM framework—one that defines risk as an event that results in a decrease in a capital ratio such as risk-based capital (RBC). A capital-based framework results in a disconnect between the ERM program and the strategic plan, incentive compensation and decision-making. To gain buy-in, organizations must adopt a value-based ERM framework, which defines risk as an event causing a deviation from achieving the results expected in the strategic plan.

**Snow: How is value-based ERM better at achieving buy-in?**

**Segal:** A value-based ERM program begins with a focus on achieving the strategic plan goals, which is something everyone in the organization cares about. So, right off the bat, you have buy-in, because your entire focus is helping others increase the likelihood of achieving their goals. Another aspect of value-based ERM that helps with decision-maker buy-in is that it measures both downside

and upside volatility. This allows value-based ERM to support routine business decision-making, because it provides information on both the risk and reward sides of decision-making.

**Sherrill:** For our organization [Arkansas Blue Cross and Blue Shield], ERM is becoming the “golden thread.” It provides the needed discipline to tie together objectives, risks, strategies and tactics. All roads lead to and from the strategy. It forced us to explicitly examine the assumptions in our strategic plan. We had to reach a consensus on what they were and what they meant. That benefit alone strengthened our commitment to the strategy, and it continues to help us mature our ERM culture.

**Snow: If an organization were to employ a value-based ERM framework, how would its approach to risk identification differ, and how would it generate more buy-in?**

**Segal:** The central activity of risk identification is the qualitative risk assessment (QRA), which typically involves surveys to identify key risks. Often, the QRA survey participants are limited to a small group, sometimes even restricted to just the corporate area. This limits the opportunity to advance the organization’s risk culture and gain buy-in, because only a handful of individuals are learning how to think about risk in an advanced way. Instead, QRA interviews should be conducted with a group of two to three dozen participants who have broader inclusion horizontally—corporate, the business segments and key functional areas—and vertically—the C-suite, business segment leaders and their lieutenants, and some mid-level leaders.

**Sherrill:** This was important for our ERM program. We achieved a high level of engagement because we included executive staff, subject-matter experts

and members of the board. We’re in our third year, and I see more enthusiasm and engagement today because we’ve stayed the course and kept them involved. We brought a broad range of disciplines into the process from the start, and we got everyone on the same page in terms of understanding how to think and talk about risk in a consistent way.

**Snow: It’s clear that engaging the right people is critical. What insights would you like to share about the QRA methodology?**

**Segal:** The most common methods for the QRA are:

- » Open small-group facilitated discussions
- » Individual surveys sent to participants to complete

Unfortunately, both methods have inherent problems. The open small-group interviews are often skewed by a single leader in the group. Also, participants often feel uncomfortable revealing certain key risks in a nonconfidential environment. Individual surveys sent to participants can damage relationships, because this method is impersonal. This can be the first interaction with ERM and what do they see? An email in their inbox assigning them a task to complete on their own. Also, the level of effort is inconsistent—some participants give it serious attention while others just rush to get it done—so the results are inconsistent. Finally, the quality is typically low, because there are several tricky aspects to ERM, and written instructions are often misunderstood or not even read.

To address these issues, leading ERM programs use individual, confidential face-to-face interviews for their QRA. There is no one else present to influence opinions. There is also confidentiality to create a safe space to share all key risks. This method can enhance relationships because it is personal—you are participating



There is no replacement for face-to-face interaction.



along with them. There is a consistent level of effort, because all participants are spending an equal amount of time in the interview with you. Finally, there is a high level of quality, because you are present to guide them interactively—in a Socratic way—through the challenging aspects.

**Sherrill:** There is no replacement for face-to-face interaction. I can't stress that enough. You enhance clarity. You build relationships. You build trust. We created a safe environment for people to offer guesses and opinions, to disagree, to offer alternatives. I really like this about the value-based ERM approach: It's not just about the numbers and how you score the risks and model the dollars. It recognizes the importance of the people participating, building relationships and enhancing the risk culture—which includes creating a consistent risk vocabulary and how we socialize it. We needed a jump-start for our program, which is why it was critical for us to engage the right external ERM partner—seeking out and engaging deep ERM expertise helped us set the right foundation and implement it the right

way from the start. Both leadership and the board valued the guidance and direction.

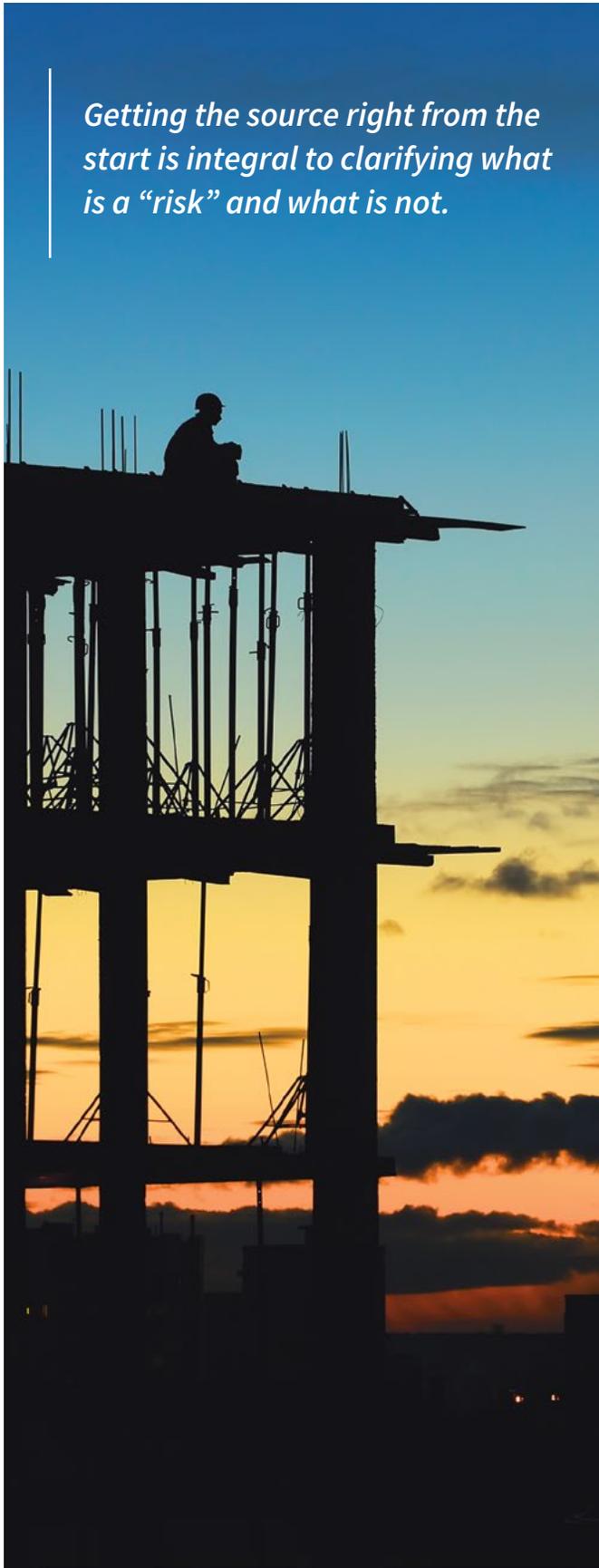
**Snow: You mentioned there are some tricky aspects to defining risk in a value-based ERM context. Can you share an example?**

**Segal:** Unfortunately, in most ERM programs, risks are not always defined by their originating source. This causes confusion in the QRA scoring of likelihood, because there is no consistent context. For example, “reputation risk” is often labeled as a risk and scored in QRA surveys. The problem is that there are many different sources of risk—for example, poor product quality, poor customer service, internal fraud and so on—that can rise to the level where they trigger negative media coverage and then reputational damage, subsequently decreasing revenues and/or increasing expenses and/or cost of capital. Without specifying a single specific risk source, each QRA participant may be imagining a different source and context, and the likelihood scores are then aggregating results that



**When you implement a value-based ERM approach, you become involved in the most important conversations and decisions in the enterprise.**

*Getting the source right from the start is integral to clarifying what is a “risk” and what is not.*



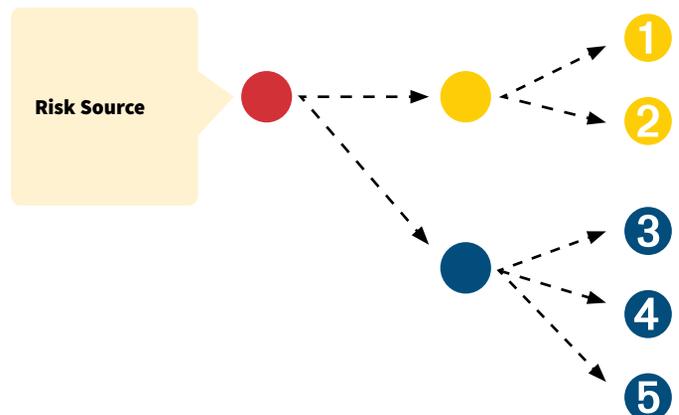
are not scoring the same risk event. In contrast, in a value-based ERM approach, risks are consistently defined by their originating source, allowing all QRA participants to score the likelihood for the same risk event.

**Sherrill:** I agree. Getting the source right from the start is integral to clarifying what is a “risk” and what is not. It’s central to how we think and speak about risk. At one point, we were focused mainly on the outcomes of risk modeling and lost sight of what was driving the scenarios, the sources of risk. It has continued to advance our risk culture and the kinds of risk conversations we have with leadership.

**Segal:** Failure to consistently define risks by source also can cause problems in the QRA scoring of severity, because it can omit another set of impacts downstream from the originating source. The missing set of impacts could be exacerbating or offsetting, but either way, this results in misestimation and suboptimal results. See Figure 1 for an illustration of this concept.

**Sherrill:** This is another aspect of the value-based ERM approach I like. We’re talking about plausible events, real-world possibilities. We focus on creating a complete and holistic real-world scenario of how a risk event might happen and all of its downstream consequences. It’s more realistic and more useful than mere stress tests, which are often hypothetical and rarely happen exactly as predicted in real life. We need to deal with the consequences of the real world, so I need risk scenarios that simulate that. This builds buy-in, because the scenarios are credible. It describes the way things could really happen, and it resonates with decision-makers.

**Figure 1** Identifying Risk Source to Capture All Downstream Impacts



### **Snow: How is buy-in enhanced with value-based risk quantification and risk decision-making?**

**Segal:** One of the themes I return to repeatedly is the importance of practicality in ERM modeling. Many ERM models are overly complex, resulting in an unacceptable level of model risk. Value-based ERM models are robust enough to rely on when making decisions, but they are designed with a clean and nimble structure to minimize model risk. Finally, ERM models often have esoteric constructs that cannot be explained simply and clearly to management. As a result, management is not comfortable enough with the model to use it in major business decisions. Value-based ERM models involve straightforward concepts that are transparent to management, generating trust, buy-in and reliance on the models to support key decisions.

**Sherrill:** For our organization, that translated into a model tailored to our business that aggregated results in a way that was meaningful to our leaders when making decisions. What helped build that level of connection was an ability to socialize the results and to explain the basic workings of the model in a way everyone could understand. The value-based ERM model also demonstrates the power of real-time “what-if” modeling, which is nimble, relevant and responsive to leadership’s needs. This was critical to embedding the methodology into the fabric of the decision-making process.

**Segal:** Another key to gaining buy-in is that the value-based approach goes far beyond just measuring the threats to the capital ratio. It allows us to answer more interesting questions, such as:

- » What obstacles are in the way of achieving the strategic plan?
- » What is the likelihood of achieving our strategic plan goals, and how can we improve our chances?

- » How can we make the business case for doing the things we know need to be done?

**Sherrill:** These were definitely questions our leaders were asking, among others. It allowed us to gain a deeper understanding of our strategic plan and its likelihood of success. It helped us identify and more rigorously evaluate alternate strategic decisions. It adds CROs to the equation. When you implement a value-based ERM approach, you become involved in the most important conversations and decisions in the enterprise. Being able to bring ERM information to the table that truly informs routine business decision-making, from strategic planning on down—that’s exciting.

### **Conclusion**

The lack of buy-in that relegates capital-based ERM programs to supporting only mitigation and capital management decisions can be overcome by switching to a value-based ERM approach. With the right ERM methodology, tactics and implementation, CROs can gain buy-in, broaden their impact and be dealt into the conversations that inform the most powerful risk-reward decisions in the organization, starting with strategic planning. ■



**Value-based ERM models involve straightforward concepts that are transparent to management, generating trust, buy-in and reliance on the models to support key decisions.**

### **ABOUT THE INTERVIEWER**

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**SIM SEGAL**, FSA, CERA, is president of SimErgy Consulting in Manhattan. He can be reached at [sim@simergy.com](mailto:sim@simergy.com).

# EXPERT ADVICE

## Take the Leap

**Q&A with Bill Rearden, ASA, MSc, MA, co-founder and CEO of Ironbound Consulting Group**

**What is the most interesting and rewarding aspect of your job?**

As co-founder and CEO of Ironbound Consulting Group, a boutique strategy consulting firm on Wall Street, we created dream jobs for ourselves and our team. Our company's core mission is to help build a better world, so everything we do generates positive outcomes.

The most rewarding aspects of my job are the life experiences that come with being an entrepreneur. It is beyond my wildest dreams. In just a few years, our organization's brand awareness has grown tremendously. As a result, our network effect has enabled us to work with celebrities, fortune 100 CEOs, and their board members. My advice to actuaries who are curious about entrepreneurship is to take the leap; you won't regret it.

**How have your international travels helped you to grow as an actuary, leader and person in general?**

Traveling has helped me grow as a person by connecting with people from different cultures. Early in my childhood, I traveled extensively internationally. During my formal schooling years, I lived in major cities across North America including Toronto, Washington, D.C., and San Francisco. After graduate school, I spent a year in Taiwan as a research fellow working on solvency validation related to market risk models.

I also gained proficiency in Mandarin Chinese during my time there.

**As a CEO, what is your definition of leadership?**

My driving philosophy in life is: We rise by lifting others. I approach every aspect of leadership with how I can help lift others to achieve the success they desire. For me, leadership is about leveraging access to remove barriers and expedite forward progress. Successful leadership must inspire people to pursue their passions and be the best version of themselves.

**How do you help decision-makers and entrepreneurs take calculated risks?**

Many executives make crucial strategic business decisions based on gut feelings. Much of the information they receive is around expected results enveloped between best and worst case scenarios. When founding Ironbound Consulting Group, we wanted to expand this simple static framework into something more dynamic.

We are innovators, scaling quantitative back-office analysis to a wider spectrum of front-office applications. In the coming decade, artificial intelligence (AI) will play a bigger role in corporate strategy. We are on the forefront of that change, enabling our executive clients to make superior decisions.

**What or who inspires you, and why?**

Walt Disney is my favorite inspirational entrepreneur. He said, "If you can dream it, you can do it." That is my guiding wisdom. I am a big dreamer, and I am not alone. Successful people agree their success boiled down to following their passion and pursuing their dreams. The most important takeaway from this article is: If you believe in something wholeheartedly, have the passion to fuel the needed ambition, then dream big and go for it. You will succeed! ■

*My advice to actuaries who are curious about entrepreneurship is to take the leap; you won't regret it.*

**READ MORE ONLINE!**  
Read the full Q&A at  
[TheActuaryMagazine.org/  
Take-The-Leap](http://TheActuaryMagazine.org/Take-The-Leap).

Bill Rearden can be reached at [bill@ironbcg.com](mailto:bill@ironbcg.com).



# Challenge: Accepted

**Y**ou don't often equate home loans with actuarial science. However, using advanced statistical and machine learning methods, Society of Actuaries (SOA) member Carlos Brioso, FSA, CERA, crafted a data solution that would help low-income consumers secure home loans. That innovative and inclusive solution earned him the coveted distinction of Kaggle Competitions Master.

Through Kaggle competitions, participants compete to produce the best models for predicting and describing data provided by third-party competition hosts. Brioso, who is the director of the Center for Data Science and Artificial Intelligence at New York Life, now ranks in the top 1% of more than 100,000 data scientists and machine learning engineers worldwide in Google's Kaggle community. Reflecting on his participation, Brioso says, "The

real prize comes from the learning experience and [being able to] contribute my code to the community."

The SOA's Kaggle Involvement Program recognizes actuaries for participating in these Kaggle competitions, and it is an opportunity for actuaries to develop and showcase their data modeling skills. Brioso is among the 15 individuals who earned prizes and bragging rights through the SOA's 2018 Kaggle Involvement Program. Individuals or teams are recognized if they place in the top 10% of their competition or achieve Kaggle Competitions Master status.

"It's important for actuaries to get more involved in data science," says Brioso. "Actuaries have business acumen, but we have to combine it with the ability to handle data. Kaggle is a time commitment, but the skills you gain are worth it." ■

## 2018 KAGGLE INVOLVEMENT PROGRAM WINNERS

SOA members participated in data science competitions that challenged them to use cutting-edge technology to build models and find solutions with important societal implications, from preventing environmental accidents at sea to ensuring underserved populations have access to fair lending practices. Congratulations to these members who placed in the top 10% of competitors worldwide in these Kaggle challenges.

### Airbus Ship Detection Challenge

Airbus Group Inc. challenged Kagglers to aid in building a model that detects ships in satellite images as quickly as possible to aid in preventing infractions at sea such as environmentally devastating ship accidents, piracy, illegal fishing, drug trafficking and prohibited cargo movement.

Member	Final Placement (843 competitors)	Percentile Rank
Maria Wellen, ASA	61	7.236%

### Home Credit Default Risk

Home Credit Group’s challenge asked competitors to help unlock the full potential of their data to ensure that clients capable of repayment are not rejected and that loans are given with a principal, maturity and repayment calendar that will empower their clients to be successful.

Members/Teams	Final Placement (7,198 competitors)	Percentile Rank
Carlos Brioso, FSA, CERA	15	0.208%
Nicholas Garcia, ASA	70	0.972%
Joseph Cook-Shugart, FSA	112	1.556%
Matthew Emery, FSA, CERA, MAAA Allen Gonczol, FSA, MAAA Corey Lutz, ASA, MAAA	385	5.349%
Yu Lin, FSA, ACIA Kailan Shang, FSA, ACIA	390	5.418%

*Kaggle is a time commitment, but the skills you gain are worth it.*

—Carlos Brioso, FSA, CERA, director, Center for Data Science and Artificial Intelligence, New York Life

### Santander Value Prediction Challenge

In this competition, Santander Group asked participants to identify the value of transactions in order to anticipate customer needs and provide personalized customer service solutions.

Members	Final Placement (4,484 competitors)	Percentile Rank
Michael Francis, ASA	215	4.795%
Kailan Shang, FSA, ACIA	309	6.869%
Joseph Cook-Shugart, FSA	389	8.675%

### TGS Salt Identification Challenge

Several areas of Earth with large accumulations of oil and gas also have huge deposits of salt below the surface. To assist in avoiding potentially dangerous situations for oil and gas company drillers, TGS asked Kaggle’s machine learning community to build an algorithm that automatically and accurately identifies if a subsurface target on a seismic image also contains salt.

Member	Final Placement (3,234 competitors)	Percentile Rank
Kailan Shang, FSA, ACIA	304	9.400%

# Different Perspectives on Volunteering

BY DANIEL S. PRIBE

Shortly after I received my FSA, a friend approached me about volunteering to work on the Society of Actuaries (SOA) exams. The memories of the grueling exam experience were too fresh in my mind, so I declined for several months. I was also admittedly a little peeved with the SOA, as I was on the wrong end of one of the redesigns in the examination system. But after thinking about it more, I reconsidered and decided to join one of the exam committees. There were two primary reasons for my change in heart:

- » The SOA volunteers I knew were friends and people I greatly respected.
- » I was curious about the inner workings of the examination system and wanted to be a part of it rather than sit around and complain about it.

It has been roughly two decades since I made the decision to volunteer with the SOA, and I have been fortunate to work in a variety of roles. I have written a few articles, given a couple of presentations and worked on a couple of project oversight groups (POGs). However, the bulk of my volunteer work has been with the exams and education.

I started my volunteer journey writing exam questions. It was exciting when I saw one of my questions on an exam. I eventually became chair of an exam, Examination General Officer of the Group and Health track, and ultimately general chairperson of the Education Executive Group. I benefitted from all of the important advantages of volunteering, such as earning continuing education credits, developing existing skills and knowledge, and staying active and up-to-date on important topics in my area of practice. However, the most rewarding part of my volunteer experience has been the people.

Working with groups of people who have different experiences and points of view helps us get out of our own heads, so to speak. Additionally, others may have different ideas that can be combined with

yours to create breakthrough ideas. Let's explore these ideas a little further.

## Get Out of Your Own Head

Most of my SOA volunteer experiences have been as a member of a committee such as an exam or research POG. Members of these committees came from different backgrounds, so there was a healthy diversity of thought. This diversity was sometimes a source of friction and forced the group members to defend their individual opinions and try and understand the positions of others—to “get out of our heads,” so to speak. In the case of developing exams, these positions sometimes took the point of view of the candidate or the grader, for example. Heated discussions took place as we determined what was fair yet discriminating enough to demonstrate who had sufficient knowledge and who did not. Similarly, in the case of a research project, discussions were had regarding why the researcher went down one path and not another. While these discussions were sometimes uncomfortable, they were rewarding because we all came away with a broader understanding. Ultimately, the groups came up with a more robust and complete solution than any of the positions each of us held individually.

In short, volunteering for the SOA helps grow our knowledge. The British politician Benjamin Disraeli once said, “The greatest good you can do for another is not just share your riches, but reveal



*The greatest good you can do for another is not just share your riches, but reveal to them their own.*

—Benjamin Disraeli

to them their own.” In an odd way, this gets at what I am trying to convey here.

### **Unusual Combinations Lead to Breakthrough Ideas**

An example of the power of combining ideas is one of the contenders for the greatest invention of all time: the printing press. Before the printing press, writing and drawing were completed by hand, usually in a scriptorium. Scribes would measure the page layout and then copy the texts from another book. An illuminator would follow by adding designs. As a result, books were expensive and usually owned by the wealthy, universities or monasteries.

In the 1300s and 1400s, people had developed the basics of printing by cutting letters and designs into blocks of wood that would then be dipped in ink and pressed on paper. In the mid-1400s, along came Johann Gutenberg. He had experience at a mint and recognized that printing could become more efficient by combining the blocks within a machine. He then built the press that would come to bear his name. This “movable type machine” had metal block letters that could be moved around to create new words and sentences. The invention created relatively unrestricted circulation of information and ideas, resulted in a sharp increase in literacy, threatened the power of political and religious authorities, and ushered in the Renaissance, Reformation and the Age of Enlightenment.

Another example of a powerful combination is when the opera singer Pavarotti collaborated with the Irish rock

band U2 on the rock song “Sarajevo Girl” in 1995. These seemingly disparate forms of music combined to create something quite beautiful.

The volunteer committees I’ve been on have not come up with anything quite like the printing press or a hit song, but my collaborations with people with disparate backgrounds to produce either an exam or research paper have been some of the most gratifying parts of my volunteer career.

### **Volunteer in the Future**

Soon I will be rolling off the Education Executive Group. As I look back on my experiences, the most rewarding have been working with some really great people. Each of them, in their own way, has had a positive impact on the training of future actuaries and in making the SOA a strong and robust organization.

This, however, is not the end of my volunteering with the SOA. I will continue to write questions for the exams, help with research projects and work with other groups in my practice area. The value of volunteering and serving others cannot be understated. As Albert Einstein once said, “Only a life lived for others is a life worthwhile.” ■

### **ABOUT THE WRITER**

**DANIEL S. PRIBE**, FSA, MAAA, is VP and chief actuary at Lumeris. He can be reached at [dpribe@lumeris.com](mailto:dpribe@lumeris.com).



# Expanding Research Projects in New Ways

Q&A with R. Dale Hall

**M**anaging director of Research at the Society of Actuaries (SOA), R. Dale Hall, discusses a variety of projects that stretch beyond traditional research papers and experience studies to advance the profession and serve the public.

### What is the Living to 100 Symposium?

**Hall:** We have hosted the SOA Living to 100 Symposium every three years since 2002. It is a unique event that emphasizes research, and it brings together academics, researchers, actuaries and many others to discuss aging, living longer, mortality improvement and related studies. There's a wealth of papers from our past events, and I encourage you to check out these collections.

We're gearing up for the 2020 SOA Living to 100 Symposium, which will take place January 13–15 in Lake Buena Vista, Florida. At this event, we will have keynote presentations on the modeling of aging, retirement

security and the impact of longevity, and the biology of aging. As a follow-up to this triennial event, we'll develop a monograph highlighting the key discussions, helping to add to the continuing body of research on longevity and aging.

### Can you tell us about the contest involving innovations for living longer?

**Hall:** Last year, the SOA's Mortality and Longevity Research Program Steering Committee created the Workable Innovations for Living Longer (WILL) Contest. It highlights new ideas to help people extend their healthy life expectancy, such as through physical activity, social interactions or other means. For instance, Nate Worrell, FSA, MAAA, received first place in 2018 for his idea to create a longevity assistant—a potential tool to help people track their physical activity and take positive steps toward healthier decisions.

Now in its second year, the WILL contest emphasizes new ways to help society in terms of living longer and how actuaries can be a part of this innovation and thought leadership. Individuals can submit their ideas either by video or written submission, and then the top five entries will pitch their ideas to a panel of actuaries during the 2019 SOA Annual Meeting & Exhibit. Stay tuned for updates on the ideas generated from this contest.

### How are you working with students on research projects?

**Hall:** We created the SOA Student Research Case Study Challenge as a way for actuarial students from colleges and universities around the world to develop their research skills. We ask them to work together in teams to harness data, use models and create a solution to a hypothetical situation. For this year's challenge, there were 63 teams, and each team designed an autonomous vehicle insurance policy and performed actuarial projections of future loss costs. I found it very encouraging to see all of these future actuaries sharing their ideas and, in turn, meeting with SOA members to get a better sense of the actuarial community.

Students from Drake University in Des Moines, Iowa, received first place (and a \$5,000 grant) for their entry idea. Their project focused on a variety of new policyholder behaviors, cybersecurity risks and changes in vehicle-miles exposures that would emerge with the implementation of autonomous vehicles.

## RELATED LINKS

### SOA Living to 100 Symposium

[Livingto100.SOA.org](http://Livingto100.SOA.org)

### Video on Living to 100

[bit.ly/Living-100-Video](http://bit.ly/Living-100-Video)

### Research Competitions and Awards

[bit.ly/Comp-Awards](http://bit.ly/Comp-Awards)

### Student Research Case Study Challenge

[bit.ly/SOA-2019-Student-Research](http://bit.ly/SOA-2019-Student-Research)

### Actuaries Longevity Illustrator

[LongevityIllustrator.org](http://LongevityIllustrator.org)

### What other projects and tools have been developed through SOA research?

**Hall:** In addition to our research papers, experience studies, essays and presentations, the SOA works on a variety of calculators, including the Actuaries Longevity Illustrator, which is a tool developed with the American Academy of Actuaries. This tool helps provide individuals and personal finance experts with a better sense of survival distributions and longevity as they plan for retirement expenses and risks. ■

#### ABOUT THE WRITER

**R. DALE HALL**, FSA, CERA, MAAA, CFA, is managing director of Research at the Society of Actuaries. He can be reached at [dhall@soa.org](mailto:dhall@soa.org).

Visit [SOA.org/research/research-topic-list](http://SOA.org/research/research-topic-list) for the latest updates on new research opportunities, data requests, experience studies and completed research projects.

## RESEARCH READS

### Innovation and Technology

This spring, the SOA launched its Actuarial Innovation & Technology Strategic Research Program, which focuses on research involving the use of new technology and the actuarial profession. One of the new reports highlights technologies whose usage is anticipated to grow the fastest among actuaries in 2019. Data visualization, predictive modeling, cloud computing and storage, and collaborative tools are expected to be used more in the coming year.

[SOA.org/programs/act-innov-tech](http://SOA.org/programs/act-innov-tech)

[bit.ly/Top-Tech-2019](http://bit.ly/Top-Tech-2019)

### Survey of Emerging Risks

The Joint Risk Management Section of the Canadian Institute of Actuaries (CIA), Casualty Actuarial Society (CAS) and the SOA released the 12th Annual Survey of Emerging Risks. Major findings include growing climate concerns and cybersecurity.

[bit.ly/12th-SOA-Risk-Survey](http://bit.ly/12th-SOA-Risk-Survey)

## ON TREND

## Online Exclusive

**Risk is Opportunity: Perspectives  
From Chief Risk Officers**

*The Actuary* asked several chief risk officers to provide perspectives on emerging changes in the risk landscape and the current risk environment, and to reflect on the pursuit of career trajectories in risk. Suzette L. Huovinen, FSA, CERA, CFA, MAAA, chief actuary and chief risk officer at Securian, expressed one thought-provoking idea: “Risk management is a great way to get a broad perspective on an organization. You must understand all aspects of the business to truly identify and manage the risks. It’s critical to be good at asking questions—don’t be afraid, there are no stupid questions!”



Visit [TheActuaryMagazine.org/Risk-Opportunity](http://TheActuaryMagazine.org/Risk-Opportunity) to read the online-only article and get more important insights from chief risk officers.

## Report

**Shaping the Future of Health Care**

The SOA surveyed more than 200 health care executives, and 60% said their organizations use predictive analytics—a 13-point increase from last year. Read our 2019 predictive analytics trend forecast to see how this will shape the future of health care.

[bit.ly/2019-PA-Trends](http://bit.ly/2019-PA-Trends)



## Meetings

**2019 Actuarial Research Conference**

Aug. 14–17

Indianapolis

Designed for both academics and practicing actuaries, the 54th Actuarial Research Conference is hosted by five universities in Indiana, including Indiana University—Purdue University Indianapolis (IUPUI), the University of Notre Dame, Ball State University, Butler University and Purdue University. This event also provides researchers the opportunity to present their work through contributed talks and a poster session.

[bit.ly/ARC-2019](http://bit.ly/ARC-2019)

**2019 Predictive Analytics Symposium**

Sept. 19–20

Philadelphia

It’s never too soon to arm yourself with critical predictive analytics knowledge or to enhance your expertise in this field. Whether you’re interested in predictive models as a manager, implementer or practicing expert, this conference provides information to help you jump to the next level. Anyone interested in the field of predictive analytics and/or how it relates to the actuarial profession should attend.

[bit.ly/SOA-PA-2019](http://bit.ly/SOA-PA-2019)



#### Video

### Learning Through Innovation

Carol McCall, FSA, MAAA, began her actuarial journey at age 9 when she did her first pension valuation. McCall's career path brought her to lead research and development in Humana's Innovation Center. Learn how her actuarial background enabled her to leverage analytics and data to help innovate in the health services space.

[bit.ly/C-McCall](https://bit.ly/C-McCall)

#### Tools and Resources

### The Actuarial Toolkit

The Actuarial Toolkit provides a variety of online resources for actuarial candidates, actuaries and actuarial analysts. The toolkit includes a glossary and R Console in addition to various applications and online tools.

[bit.ly/SOA-Toolkit](https://bit.ly/SOA-Toolkit)

### Actuaries Climate Index

This tool was designed to help inform actuaries, public policymakers and the public about climate trends and some of the potential impacts of a changing climate on the United States and Canada. The index is an objective measure of observed changes in extreme weather and sea levels.

[ActuariesClimateIndex.org](https://ActuariesClimateIndex.org)



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# Timeless

THE PAST, PRESENT AND FUTURE OF THE SOA

1982

1982 was a pivotal year for the Society of Actuaries (SOA) and for Barbara J. Lautzenheiser, FSA, MAAA. She was named the first woman president of the SOA and carved the pathway for other women to carry that title forward.

“Being a speaker and being a leader may sound impossible now, but you do it the way you do almost anything else,” said Lautzenheiser in a 1983 presidential address. “You do it one step at a time, incrementally. Success by the inch is a cinch. Success by the yard is hard. You can do anything if you do it slowly and in small steps.”

Colleagues describe her as intelligent, successful and willing to take risks. “Barbara was a leader in the SOA and in getting the world to understand risk classification,” said Anna Rappaport, FSA, MAAA. “She served as a role model for many young women who needed encouragement to seek leadership roles.”

Lautzenheiser demonstrated that success when she became the first woman to head a major insurance company in the United States (Montgomery Ward Life Insurance Company, in 1986). After years with Montgomery Ward, she returned to Hartford, Connecticut, where she had been a vice president of Phoenix Mutual. She also was the principal of Lautzenheiser and Associates, a consulting firm located in Hartford.

Lautzenheiser’s formula for success was “be visible.” “I was present at every meeting, on every panel, behind every microphone with a question,” she said in an interview. “Whatever committees were relevant, I got on them.”



Barbara J. Lautzenheiser, FSA, MAAA

While serving as president of the SOA and after finishing her term, Lautzenheiser was a member of the Living to 100 Research Symposia, Long-term Care Insurance Actuarial Track, Life Practice Advancement Committee, Actuary of the Future Section Council, *The Actuary* editorial board, Education Task Force, Strategic Planning Committee, Elections Committee, Board of Directors and the North American Actuarial Council. This is just a glimpse into her volunteer activities. She donated her time, talent and expertise when and wherever it was needed for the SOA.

How did Lautzenheiser become SOA president? She so aptly responded in her 1983 presidential address: “About 12 years ago, the chief underwriter of the company I was with at the time walked into my office and said, ‘I had a very interesting luncheon today.’ And I [asked], ‘Why?’ He said, ‘The woman who is head of the Epileptic Foundation ... tried to convince me it wasn’t fair that she had to pay more for her life insurance, because it wasn’t her fault she had epilepsy.’ Lightbulbs went off. I realized that was exactly what was happening with women’s issues [that were] just beginning to percolate at that time.”

She continued: “So, I began to speak out on the issue. I began to stand up for what I believed. That visibility led to The Academy Board. That led to the Society of Actuaries Board. That led to vice president, and that led to being able to be here and share this with you this morning. Power comes in having the fortitude to do what one believes in rather than what is expected.”

Lautzenheiser resides in South Glastonbury, Connecticut.

**Send us information about SOA history that will enlighten everyone about our organization’s past, and serve as a springboard for future growth, as the actuarial profession continues to inspire and evolve. Write to [theactuary@soa.org](mailto:theactuary@soa.org) and share.**

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