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A mysterious profession

BY CHRISTINE HOFBECK

Christine Hofbeck, FSA, MAAA, is vice president & actuary at Prudential Group Insurance in Roseland, New Jersey.

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"*You're like an accountant, right?*"

As actuaries, we've all probably heard the above question at least once in our lives, and probably many times more. No matter how often this question is posed to me, it's still decidedly bothersome that actuaries are so often confused with Certified Public Accountants (CPAs). Yes, we both can add and our professions start with the letters "AC," but an actuary is definitely not an accountant. CPAs attest to the accuracy of disclosures of what happened in the past, while actuaries mitigate financial risk by calculating probabilities of what will likely happen in the future. Please don't ask me for tax advice.

So why is the actuarial profession such a mystery?

One would think that *Forbes*' reporting of "actuary" as the No. 1 job of 2015 might have given us a popularity boost. In fact, "actuary" has been ranked as one of the top jobs consistently (ranked fourth or better in each of the last five years). Despite this seeming popularity, many people really *don't* know what an actuary does.

"Tell me when I'm going to die." No, that's a doctor … or a psychic.

"Actuaries work for insurance companies, right?" Getting warmer. But let's not forget about the thousands of actuaries who work for consulting firms, the U.S. government (think Social Security Administration) or individual businesses.

"You're like Ben Stiller in *Along Came Polly*!" Hmmm. Neurotic, regimented, awkward, socially backward introverts. "You're Ethan Hawke in *Boyhood*!" Aimless and deadbeat. No, we most definitely are not.

We actuaries actually have a rich history of strong analytical skills, innovation and business expertise. In 1662, John Graunt created our first pooled risk mortality table based on census data he obtained on the Black Plague. Thirty years later, Edmond Halley, a mathematician and geophysicist, demonstrated a method to calculate a life-annuity premium using a later version of this mortality table, along with the idea of compound interest. Halley's work is often credited as strongly influencing the development of actuarial science. Both of these men used their mathematical acumen and outside-of-the-box thinking to develop groundbreaking and valuable concepts that completely changed the economic and financial landscape.

In 1762, we were officially named "actuaries" by the founder of Equitable Life, the first life insurance company to use mathematical calculations to derive premiums for multiyear policies. Throughout the next 200 years, innovative advancements in actuarial methodology such as commutation functions were developed to simplify exceedingly complex manual calculations. Additional life insurance companies were established, and by

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the end of the 19th century, about 100 actuaries were practicing in the United States and Canada. In 1889, 38 charter members were deemed fellows in the first actuarial organization—the Actuarial Society of America. (Perhaps this is the origin of the "40 percent pass rate" rumor!)

We actuaries have developed extensive mathematical approaches to determine the probability of risk and mitigate the financial impact of certain events. Our skills enable us to design new insurance products, accurately calculate premiums and reserves, skillfully forecast asset growth and longevity risk, appropriately determine pension liabilities and required plan contributions, and solve many other financially uncertain business problems. In fact, with dedication and determination, our skills make many opportunities possible. We should all be consistently pushing the boundaries of actuarial science to improve and enhance not just our work, but ourselves.

We must endeavor to share our value, promote our work and celebrate our capabilities. If we want to ensure future growth of our profession, guarantee our seat at the table in the most valuable business decisions, and have our expertise requested and heard, we will *all* need to concentrate on thoughtfully and appropriately communicating who we are and what we do.

There is a clear opportunity for us today. Key buzzwords right now are "data scientist," "big data" and "analytics." Actuaries fit well into each of those buckets—but can we convince everyone else of that? The Society of Actuaries (SOA) is currently exploring the role of actuaries in predictive modeling; at one time this was tentatively labeled an "alternative profession." I would challenge that, as a professional who builds predictive modeling capabilities within insurance organizations, I am proud to call myself an actuary, and would not choose to be labeled as working in an alternative profession.

Then again, I have often been told, "You don't seem like an actuary." Really? A colleague of mine considers this comment equal parts compliment and insult. And what exactly does it even mean? I have been an actuary for over two decades. One would think that I am *exactly* like an actuary.

Recently, I was working a table at a local high school career fair when a student approached to ask me what an actuary does. I mistakenly thought he was interested in pursuing the profession. Instead he said, "My dad is an actuary, but when I ask him what he does, he tells me it's too complicated to explain. Can you please tell me?"

Given our depth of skill and span of expertise, why do we have so much trouble articulating our value, work and capabilities? Perhaps the onus to put the truth out there rests squarely on our own shoulders. There are 20 times as many accountants as actuaries; it is up to us to promote our value.

I encourage you to take some time to think about exactly what it is that you do. Write it down and refine your thoughts, if that is helpful. Think about how the description of your role and your value proposition would differ depending on your audience. Then, tell your business partners and professional contacts what you really do. Tell your children. Tell your neighbors. Tell your spouse! Yes, the wording will change depending on your audience, but hopefully your message will resonate.

And one day people will approach our most innovative, creative and successful mathematicians, statisticians, data scientists and financial business leaders and say, "*You're like an actuary, right?*" ■

There are 20 times as many accountants as actuaries; it is up to us to promote our value.


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from the PRESIDENT

End-of-term report

BY ERROL CRAMER

Errol Cramer, FSA, MAAA, is president of the Society of Actuaries.

errol.cramer@soa.org

I'm frequently asked whether one year is sufficient time to make a meaningful impact as president of the Society of Actuaries (SOA). Approaching the end of my term, I'm pleasantly surprised how much I've been able to influence the course of events within a year. Of course, the one year was not in isolation—I served two prior terms on the SOA Board of Directors and a year as president-elect, and had the counsel and assistance of the Leadership Team, Board and staff—which provided me the deep understanding to formulate an agenda.

My priorities were: 1) strengthen member communications, 2) fortify partner relationships, and 3) execute on key strategic and operational initiatives.

STRENGTHENING MEMBER COMMUNICATIONS

Going in, I heard from members who were unclear about the SOA's priorities and unsure about its direction. I felt we could do better in communicating with members and winning their trust, and efforts were undertaken this past year to better inform members and listen to their voices.

The SOA Listening Tour (*http://bit.ly/1PTVewL*) was introduced as a pilot program to inform members of the SOA's key strategic and operational activities, to provide contextual background, and to give them an opportunity to express their views. I was assisted by several current and former board members, each delivering a consistent message in their respective localities in the United States, Canada and Asia, to a variety of groups, big and small. We were careful to facilitate dialogue and let members talk.

Key themes emerging from these meetings were:

- The SOA should find ways to work collegially with the other U.S. actuarial organizations (as perceived conflicts and difficult relationships, regardless of cause, could harm the profession).
- Concern was expressed regarding the future of the profession and how actuaries might be valued in the marketplace.
- More news about the SOA and transparency in communications.
- The SOA should do more to promote the value of the profession to employers.

The Listening Tour received enthusiastic support and we plan to keep hosting these events in 2016 and beyond. The themes we've heard are being carefully weighed and reflected in a variety of ways in our ongoing work. On a positive note, members were supportive of the SOA's current strategic and key operational initiatives once these were clearly discussed.

The Plain Talk letters from the President (*http://bit.ly/1MUWIZ3*) launched as a forum to speak forthrightly on topical issues regarding the SOA, and covered topics about international strategy, competition among actuarial organizations and proposed bylaw amendments. Direct and to the point, these were well received and engendered both appreciative comments and constructive counterpoints, resulting in healthy dialogue.

LET'S FACE THE UNEXPECTED TOGETHER

The past 50 years have seen extensive research into the key concepts at the heart of the taking, transferring and pooling of risk. Thanks to this, we now have a better understanding of risk behaviour, risk markets and risk sharing. At SCOR, we have explored the scientific foundations of our industry to ensure that the unexpected does not faze us.

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FORTIFYING PARTNER RELATIONSHIPS

As previously noted, foremost on the minds of our members was the need to strengthen relationships with other actuarial organizations and ease friction points. Managing relationships is complicated. The fact is, our U.S.-based organizations do compete in many areas. While our entry into a complete curriculum, including general insurance, created new competition with the Casualty Actuarial Society (CAS), in reality the actuarial organizations have always competed in a variety of ways. I introduced the notion of collegial competition whereby we compete in a professional and respectful way, but collaborate wherever possible to benefit the overall profession.

We have done much to address this issue over the past year. The SOA Board's Relationship Task Force has sponsored a series of in-depth discussions between leaders of other organizations and our Board. Through this program, we had discussions with leaders of the Institute and Faculty of Actuaries (IFoA), the Canadian Institute of Actuaries (CIA), the International Actuarial Association (IAA) and the China Association of Actuaries (CAA). We identified new areas in which we can work together, and signed a new Mutual Recognition Agreement (MRA) with the IFoA and a Memorandum of Understanding (MOU) with the CAA.

> "I've been privileged to serve as your president and feel we've achieved a great deal together."

We launched a variety of joint research programs and opportunities for joint professional development (PD) events. We co-marketed each other's PD events, even where they competed. Our view is that "competing" educational events are not a "zero-sum" game, but "additive," allowing us to bring more to the table for members.

EXECUTING STRATEGIC AND OPERATIONAL INITIATIVES

Finally, I spoke last year about focusing on three key aspects of our strategic and operational activities—three goals, if you will.

Stay current and relevant …

We directed our efforts this year on increasing actuaries' presence in the field of predictive analytics and modeling, an area of utmost importance where we must establish our value. We approved a new Learning Strategy, which includes bringing predictive analytics into our curriculum in a big way—preliminary and fellowship exams, and PD. Work is underway on this and other predictive analytics programs including increased research funding, a pilot program for actuarial internships outside the insurance industry, additional SOA staff, and a marketing campaign directed at employers.

Be prepared for a global role …

We continued developing our global role. As noted, we signed an MOU with the CAA, which is a big accomplishment in cementing our mutual respect and cooperation. We're working on a possible pilot exchange program for young actuaries, a joint research program on retirement systems in China, and we're taking steps to open and staff an office in Beijing.

We're completing a review and assessment of opportunities to support the profession's growth in Latin America, in partnership with actuarial organizations, universities and employers in the region. And we're beginning work to develop our approach to "Greater Asia" (*http://SOA.org/Asia*) outside of China where we have many members and candidates currently. That assessment will take time, but we know there is a great opportunity for long-term growth of the profession in this region, and we're anxious to serve.

Be responsive to societal issues …

Finally, we're responsive to societal issues. The SOA does this mostly through our research. This year, we've released important projects on pent-up demand for health care after the Affordable Care Act (ACA), retirement mortality tables, measuring the financial health of multiemployer retirement plans, the health impact of major weather events and others. We've continued developing the new Actuaries Climate Index, which is another example of collaborative efforts with the CAS, CIA and the American Academy of Actuaries (the Academy). We have projects where we are beginning to gather data for a new mortality table for public employee pension plans, and we're exploring how we can assist the sponsors of the Human Mortality Database at the University of California and the United Nations to expand the reach and impact of that project around the world.

It's been a very fast year, but a highly productive one for the SOA. I've been privileged to serve as your president and feel we've achieved a great deal together. I'm looking forward to continuing to serve members during my remaining two years on the Board and to helping my very capable successor, Craig Reynolds, have a wonderful year as president, too. ■

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Whether you travel the world or never leave the borders of your home country, you are affected by global organizations, international requirements and the increasingly international nature of the actuarial profession itself. Here is some news from around the world.

ANNUAL MEETING OF THE CHINA ASSOCIATION OF ACTUARIES

Representatives from the Society of Actuaries (SOA) attended this year's annual meeting of the China Association of Actuaries, which took place Sept. 22–23 in Beijing, China. SOA President-Elect Craig Reynolds (president-elect at the time of this printing, September 2015) participated in the opening session as a presidential officer representing the SOA.

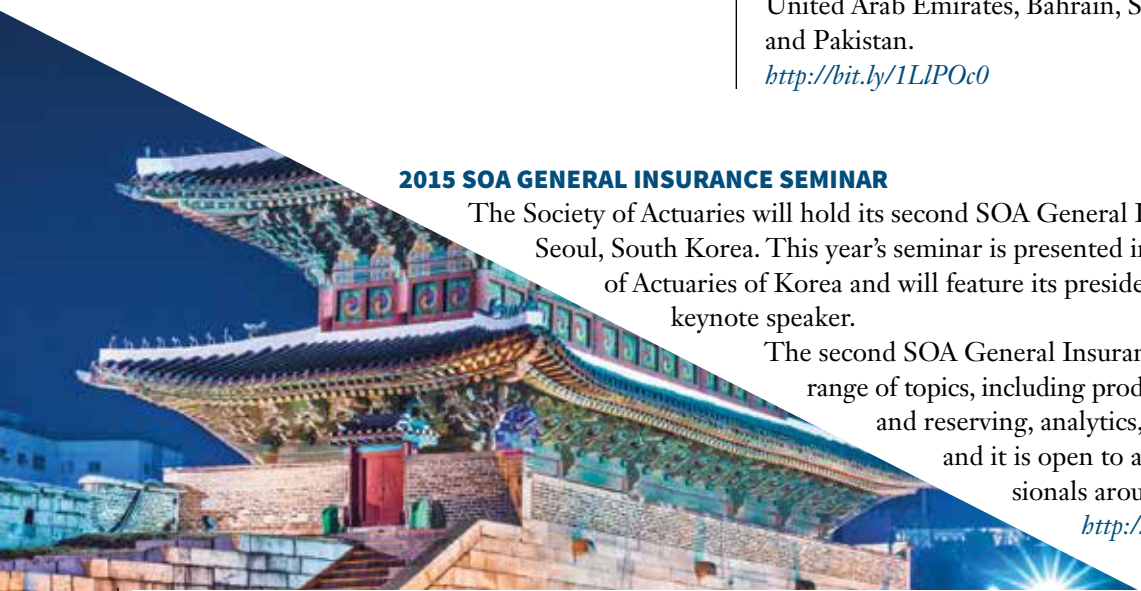
19TH ASIAN ACTUARIAL CONFERENCE

The Society of Actuaries will be a platinum sponsor at the 19th Asian Actuarial Conference, which will take place Nov. 3–5 in Bangkok, Thailand.

This year's conference, under the theme "Innovation: Creating Sustainable Value," will cover topics on life insurance, general insurance, health insurance and health management.

Approximately 700 industry experts from Thailand, Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore and Chinese Taipei will gather in Bangkok for this year's event. New member countries welcomed this year include the United Arab Emirates, Bahrain, Saudi Arabia and Pakistan.

http://bit.ly/1LlPOc0



2015 SOA GENERAL INSURANCE SEMINAR

The Society of Actuaries will hold its second SOA General Insurance Seminar Nov. 16 in Seoul, South Korea. This year's seminar is presented in cooperation with The Institute of Actuaries of Korea and will feature its president, Sang Rae Park, as the opening keynote speaker.

The second SOA General Insurance Seminar will cover a wide range of topics, including product design, reinsurance, ratemaking and reserving, analytics, modeling and professionalism, and it is open to all levels of actuaries and professionals around the world.

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TAKE NOTE

Here's your source for industry briefings and SOA news. Important headline information, section highlights and current stories—in short, news to note.

GOOGLE'S ANSWERS TO AGING

Internet search and technology company Google has received increased attention lately for its involvement with aging and life extension. Check out these *Modern Healthcare* (*http://bit.ly/1UbnWK0*) and *Wired* (*http://wrd.cm/1NEtAlK*) articles, for instance. As part of Google's new formation of parent company Alphabet, there will be other life science projects addressing chronic disease. Founded in 2013, the Google-funded startup Calico Life Sciences LLC, also known as Calico, focuses on aging research. Calico also partners with several different companies on technological advancements for living longer, including on genome research (*http://on.recode.net/1IASGnw*). By the way, Calico's senior staff includes scientist Cynthia Kenyon, a past presenter at the SOA-sponsored Living to 100 Symposium (*http://livingto100.soa.org/*), which gathers together academics, researchers, actuaries and other experts on the topic of living longer.

CMS DELAYS AND RISK CORRIDORS

Recently, the Centers for Medicare & Medicaid Services (CMS) made the decision (*http://bit.ly/1JtVRrx*) to delay insurance payout data from the Affordable Care Act (ACA) risk corridors. The program provides credits to insurance companies with enrollees who are part of the newly insured population. CMS noted that the delay was due to discrepancies with risk corridors data (*http://go.cms.gov/1IEpwP2*). CMS originally planned to release the estimated payments information in August 2015, and a new time frame has not yet been announced.

CYBERSECURITY FOR CARS

While new automotive technologies, including self-driving cars, are much talked about topics, there is a new discussion brewing around cybersecurity for cars. Read *The Wall Street Journal's* blog post (*http://on.wsj.com/1EgFWR8*) on how someone hacked into a car's software, and the potential risks for both consumers and automakers. This conversation also carries into the possibility of the Internet of Things (*http://bit.ly/1OLYxom*), such as drones, smart homes and medical devices, being at risk from cyber-attack, and the potential impact on companies and society.

RELATED LINKS

Can Your Car Really Be Hacked?
http://yhoo.it/1NgjgT9

Warning After Security Experts Hack Tesla Car
http://bbc.in/1IrsXL0

REACHING THE MIDDLE-MARKET CONSUMER

An update from the Marketing & Distribution Section

The Marketing & Distribution Section (MaD) recently published an article in its newsletter, *NewsDirect*, in which the authors explore why "the distributor (not the product) is king" in the voluntary worksite marketplace. The authors explain the intricacies of this market that lead to this conclusion. They discuss their work on segmentation of distributors and provide statistics for the market share held by each distribution type. The authors also provide insight on differing approaches and unique needs for different distribution types, and why one product and one approach might not suit each type of distribution.

Of course, the voluntary worksite sale is one major point of entry to reaching the middle-market consumer. MaD is focused on providing research and access to experts so members may better understand distribution approaches and consumer analytics. Our work has frequently centered on the elusive middle market.

Recently, MaD has produced research reports examining segmentation approaches for younger middle-market consumers—both in the United States and China. The research pursues buyers' attitudes toward life insurance and why they purchase. This segmentation approach could lead to tailored sales approaches for specific types of consumers, which could result in more efficient distribution organizations.

Currently, MaD is conducting interviews with sales and marketing leaders at insurance companies and agency groups, probing common barriers and pitfalls of reaching the middle market, and gathering insights as to what changes to distribution these experts believe are necessary to really find success in the middle market. We expect to publish a report of our findings later in the year.

Through *NewsDirect*, webinars, LinkedIn discussions, research and meeting sessions, we are attempting to advance the dialogue on current major points of interest in the insurance industry. If you have interest in joining the conversation, I encourage you to become a member of MaD. For further details, please visit our section page on the SOA website, or reach out to me or Jill Klibanov (*J.Klibanov@banklife.com*).

By Scott Sheefel

Scott Sheefel, FSA, MAAA, is vice president at Wilton Re and the chairperson of the Marketing & Distribution Section.

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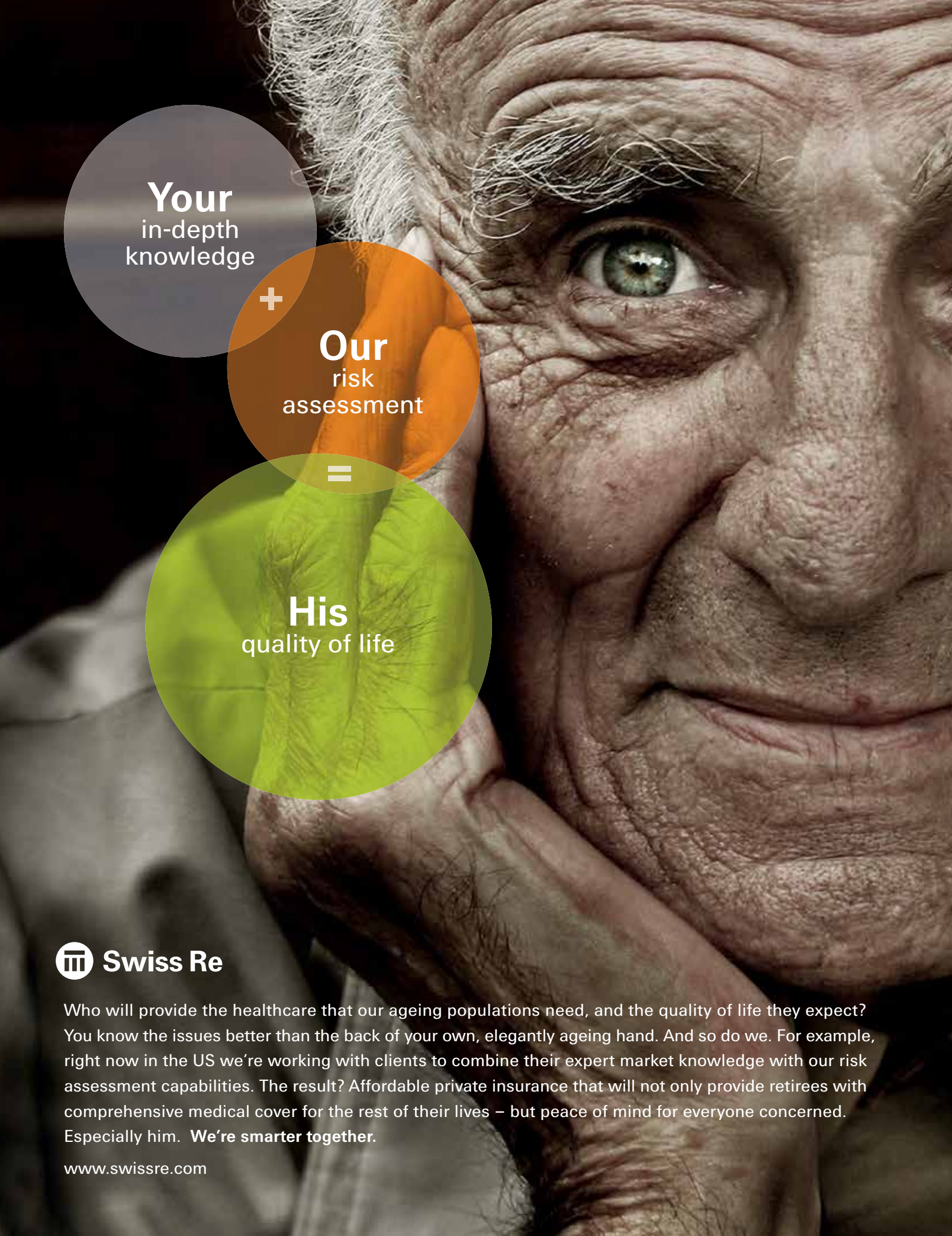

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From Actuary to… Anything You Like

WITH A LITTLE INGENUITY, ACTUARIES CAN USE THEIR ANALYTICAL MINDS TO BE SUCCESSFUL IN MANY AREAS

BY JEFFREY A. BIRD

Browsing through the Society of Actuaries' (SOA's) actuarial directory, you may notice something peculiar; its members have more than 150 non-actuarial professional designations. You will find professors, entrepreneurs, wealth advisers, board members and other actuaries who have moved out of the traditional actuarial space to do something new.

We invited five actuaries to share their stories of how they changed course in their careers by thinking outside of the box, how they applied their actuarial skills and experience in a new area, and how this ultimately benefited them, both personally and professionally. These five profiles demonstrate that with a little ingenuity, an actuary's analytical mind facilitates success in any endeavor. We invite you to consider how you can develop or expand your interests into innovative new areas and ideas, and how you can continuously strive for excellence.

“Broadly defined, an actuary is a problem solver.”

—W. Paul McCrossan, FCIA

W. PAUL McCROSSAN, FCIA

FROM ACTUARY TO ... POLITICIAN

W. PAUL McCROSSAN, FCIA, obtained his fellowship of the Canadian Institute of Actuaries (FCIA) in 1969; just three years later, he was chairperson of the new SOA Education and Examination Part 9 Committee covering social insurance and taxation. In helping design the course for the exam, he became knowledgeable about Canadian social security systems. He felt the programs were poorly designed and largely responsible for Canada’s deficit, so in response, he wrote a letter to suggest changes to the Leader of the Opposition who was opposing the prime minister at the time.

“Two weeks after I met with the leader of the progressive conservative party to discuss how he might react to government proposals, the leader was interviewed on a news program about the proposals and he responded as I had suggested,” said McCrossan. “Soon after, I got a call back from the national director of the party and he asked, ‘Would you be interested in helping the party develop immigration policy?’ (About which I knew nothing.) He also suggested I consider joining my constituency executive to see if a political career appealed to me.”

After winning a by-election in 1978 to become a Member of Parliament in the House of Commons for York-Scarborough, the most populous riding in Canada at the time, McCrossan secured a leave of absence from his actuarial role at Canada Life. The transition into politics involved applying his actuarial skills on pensions and unemployment insurance from the get-go.

“I leapt into an unknown field by applying what I knew, which was actuarial science,” said McCrossan. During his third term, McCrossan had political responsibility for the sections of the Canadian federal budget on the reform of public and private pensions.

In 2001, McCrossan almost turned down an opportunity from the Inter-American Development Bank (IDB) to work in South America to help prevent the collapse of social programs spreading to Peru after the Argentinean government defaulted on its debt. After the IDB disclosed that McCrossan would have to go through a request for tender process, he turned them down.

“They said: ‘Hold on, can we ask you three questions? Are you a qualified actuary? Did you serve in a national parliament? Have you designed national social security plans?’” McCrossan described. “‘Well, as far as

we know, you're the only person in the world who can say 'yes' to those three questions, so if you say yes then we just completed the tender process.'"

McCrossan later said that the IDB viewed the pension reform in Peru as one of its most successful projects ever.

As an actuary, McCrossan learned how to ask probing questions. "I knew nothing about South American social programs; what I knew was how to ask the questions and help the public servants think about possible answers," said McCrossan. "We didn't design the solutions. We just helped them understand the underlying problems and design solutions to deal with them."

Professionally, from 1993 to 1996, he helped create the International Forum of Actuarial Associations (IFAA), which ultimately became the new International Actuarial Association (IAA).

McCrossan's actuarial background later enabled him to develop risk management analysis and stress testing of countries' financial institutions for the International Monetary Fund (IMF) in 2006, in addition to successfully redesigning a Canadian province's pension regulation and its public service pension plans in 2010.

"Broadly defined, an actuary is a problem solver, and that's what I've been doing in the field of public policy."

STEVE VERNON, FSA, MAAA, worked in pension consulting for 31 years "doing what defined-benefit actuaries do … actuarial valuations and consulting on plan design." After retiring at age 53, he used his actuarial skills to succeed in his second career—as a writer, publisher, retirement educator and researcher.

"For 20 years I studied how to be financially secure in an age of longevity … and I came across research that showed if you keep working in your later years … you're engaged in life and that's important to your health and longevity. I decided to do something new."

Vernon used his actuarial experience to become a writer—in a way that you might not expect.

"The hardest part about breaking into nontraditional writing was getting published in the first place," Vernon said. He wrote his first book, *Don't Work Forever*, in 1995 but did not get a bite from a publisher. Instead, one publisher approached him to write a technical book on actuarial valuation and benefit programs. After his technical book was published, he recirculated the original proposal for *Don't Work Forever* and received two offers. By writing the technical actuarial book, he had established credibility as an author.

Vernon has published three more books and even formed his own publishing company, which also holds retirement workshops for people preparing for retirement. Today, he combines his actuarial knowledge with behavioral economics as a research scholar at the Stanford Center on Longevity, studying how the public can use personal savings to generate retirement income and how much money someone needs to retire successfully.

"It's commonly assumed that people make logical decisions, but behavioral economics tells us that emotions often override logic. So how do you design financial products or benefit plans knowing about this phenomenon?" asked Vernon. "Most working in behavioral economics are psychologists, social scientists or economists. They're smart in their field, but they don't have the depth in life contingencies that actuaries have, particularly in retirement plans."

Vernon is also a columnist for *CBS MoneyWatch*. In his column, "Money for Life," he shares the results of his research at the Stanford Center on Longevity. "The interaction with readers and employees who attend my retirement planning workshops informs my research. I get to hear directly what is on people's minds and understand where they are coming from." Vernon views the transition to writing and researching as a great personal achievement.

STEVE VERNON, FSA, MAAA

FROM ACTUARY TO … WRITER AND RESEARCHER

"I'm now age 62 and I'm just trying to help people, and in the process, make enough money to cover my living expenses so I can delay tapping my retirement resources until age 70. It's fun to be able to do things for pure societal motives. When you're in your 50s or 60s, if you're in the financial position to be able to make less money and just help society, then that feels good, and it has been invigorating to try something new."

PAULINE REIMER, ASA, MAAA, knows that as actuaries, we don't usually mind explaining to people what it is we do. When you are looking for

a new position or career, however, spending the bulk of your time defining what actuarial work entails to a recruiter is probably not an efficient use of your time or energy. After experiencing this problem, Reimer came up with a solution.

"While working as an actuary, I often received calls from actuarial recruiters, some of whom truly did not even know what an actuary did," said Reimer. "I realized that the profession had many talented actuaries, but few knowledgeable recruiters to represent them. It became obvious to me that my skills were needed more as an actuarial recruiter than as a traditional actuary."

While Reimer's earlier actuarial career included stints at a pension consulting firm and two life insurance companies, she is now managing director for an executive search firm, Pryor Associates.

"It was actually really easy to transition to this field," said Reimer. "The only irony is the number of hours that it entails. I thought I would work two or three days a week, and then it turns out you can't be a good recruiter part time. You have to be on call all the time, and now I literally work over 80 hours each week, every week."

Although she didn't get the part-time experience she was seeking after having her first child, the change of career was ultimately gratifying. Reimer added: "It's so rewarding to feel I play a role in helping actuaries obtain jobs. Most recruiters are happy when people keep changing employers. I get a thrill when somebody stays in a job and becomes successful in that role. That makes me very proud."

Reimer is now involved with the actuarial field more than ever. As a recruiter, "you're involved in hundreds of lines of business and multiple types of companies. I love that I deal with insurance, reinsurance, brokers, consultants, banks and hedge funds."

PAULINE REIMER, ASA, MAAA

FROM ACTUARY TO … RECRUITER

She has placed actuaries in careers in life, annuity, health, pension, and property and casualty (P&C)—and in all functionalities including pricing, reserving, enterprise risk management (ERM), predictive modeling and catastrophe modeling. Reimer holds numerous leadership roles in various actuarial societies, and serves on advisory boards for the actuarial science programs at two universities.

Reimer's unique role in the recruiting industry is best described by her tagline, "It Takes One to Know One … An Actuary Placing Actuaries." It is this philosophy, she says, that has contributed to so much of her professional success.

"I wasn't looking to change out of the actuarial profession—I just thought I wanted a part-time actuarial job. I still feel like I'm in the industry, just from a different perspective … I really don't want to do anything else because I simply love working with actuaries in this capacity."

STEVE MIRANTE, FSA, FCA, MAAA, had a unique start to his actuarial career. He had just started a Ph.D. program in physical inorganic chemistry at Columbia University when he decided to pursue a career in actuarial science.

Fast-forward 20 years, and Mirante had a unique end to his actuarial career. He is now head of human resources (HR) for a major telecommunications company, overseeing all HR operations within the company including compensation, benefits, HR information systems, equity administration and HR generalist operations.

Mirante built his career in the traditional defined-benefit actuarial consulting space, advancing his career while working for several consulting and insurance companies. When a former actuarial client asked if he would consider coming to the corporate side to learn about compensation

STEVE MIRANTE, FSA, FCA, MAAA

FROM ACTUARY TO … HEAD OF HUMAN RESOURCES

and executive compensation, Mirante accepted the challenge to expand his skill set.

"What's nice about working on the company side is you address issues from start to finish," said Mirante. "It is not just a technical issue and you walk away. You have to look at the people implications, the communication plan, as well as any systems or processes that support it."

Because of the nature of his work, Mirante could not share many details about his current HR leadership role, but he could share his experience and provide advice for other actuaries who may wish to continue to grow beyond the traditional actuarial space.

"I started in a very narrow space (pensions), so I tried to expand those skills. I felt I had a good sense of working with people, leading people, running teams, and just tried to do that in an ever-expanding environment," Mirante said. "It's really good to be a mile deep in something, but you also need to be able to apply it horizontally. It's good to have deep functional expertise but you need to try new things. Learn across new areas, and don't be afraid to expand what you do."

Looking back to his actuarial education and certification as an FSA, Mirante reflected on how his actuarial skills apply to work he is doing today.

"I'm not doing IRS tax forms anymore, but I'm using the skill sets in a different context. There aren't too many heads of HR that are FSAs," said Mirante. "The benefit for me is the analytical and the math skills directly have an impact on understanding the compensation and benefit programs. The applications come in all of the experiences that you have, and what you choose to do with it."

DAVE SNELL, ASA, MAAA, managed actuarial technology in a reinsurance firm until retiring in 2007. However, he did not let retirement prevent him from continuing to innovate in his field.

Snell's LinkedIn profile reads, "I recommend or invent technology tools that enable automation of tasks that otherwise would impede the progress of actuaries and other financial professionals."

His technological advancements help bridge the gap between underwriters, actuaries and information technology (IT) professionals. "The IT department often views actuaries as wild cards with bad data security practices, and actuaries sometimes become frustrated with long turnaround times for requests," said Snell.

Snell's involvement with complexity sciences—a branch of mathematics that investigates how relationships between parts give rise to the collective behaviors of a system—led to a project that revolutionizes data collection and the utilization of data in life insurance underwriting.

"The project takes information from e-medical records, credit scores and prescription histories to assist risk assessment, but it's a large volume of data for someone to assimilate into an assessment strategy," explained Snell. He discovered a way to incorporate machine-learning techniques to accumulate the information most relevant to longevity. The algorithm will "identify what is and is not important to underwriters" to maximize efficiency and quality.

Besides pushing the boundaries to innovate beyond the traditional actuarial IT role, Snell has continued to push his own capability. As a young actuary, Snell did not foresee himself learning Chinese, but while working in Taiwan, he realized that not knowing Chinese

DAVE SNELL, ASA, MAAA

FROM ACTUARY TO ... IT PROFESSIONAL

prevented him from easily completing simple office tasks, such as using the fax machine or the copier. He began learning Mandarin at the age of 50, as a hobby. Snell claims that although Chinese characters are difficult to learn, "they fall into groupings and I can often piece together their meaning," which he attributes to the analytical mind of an actuary.

"Thirty years ago, I never imagined Mandarin would be useful to me as an actuary," said Snell. He added that exploring your hobbies is a simple way to remain innovative and can be instrumental in your future success. ■

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THE USE OF PREDICTIVE ANALYTICS IN THE DEVELOPMENT OF EXPERIENCE STUDIES

Recently, predictive analytics has drawn a lot of attention in the North American life insurance industry. In fact, many life insurers are already applying predictive modeling techniques, and it appears there are several promising new areas for the life insurance business. We are also seeing predictive analytics emerging across health insurance, pensions, annuities and group insurance settings. This growing interest in the potential of predictive analytics follows extensive use over the past decade in the North American property and casualty (P&C) business.

This article will focus on the use of predictive analytics in one specific area: the development of experience studies. We will also explore the pros and cons of using predictive analytics versus traditional techniques, and the implications for setting assumptions and improving profitability. While we focus here on examples for life insurance and variable annuities, the methods, ideas and conclusions may be applied across other insurance types as well.

A TRADITIONAL APPROACH FOR DEVELOPING EXPERIENCE STUDIES

Historically, the typical approach used to develop experience studies in the North American life industry—which we define as individual life fully underwritten mortality, but also generally comparable for assumption for other major underwriting types—is as follows:

1. Determine appropriate experience period—often five years (but could vary).
2. Gather applicable data for this period:
   - Factors that impact mortality
   - Exposures and deaths, based on count and face amount.
3. Determine if certain records should be excluded (e.g., conversions and substandard policies).
4. Determine an appropriate basis for expected mortality:
   - This is often expressed as an industry table (e.g., 2008 VBT RR 100)
   - Or possibly a company-specific table (e.g., Acme Life's 2012 mortality table).

S

BY JOHN FENTON AND KENDRICK LOMBARDO

5. Calculate actual results and display the actual-to-expected (A/E) ratios for the business.
6. Determine appropriate splits for displaying the A/E results:
   - Males vs. females
   - Issue age groupings (e.g., decennial)
   - Durations or durational groupings (e.g., quinquennial for select period, then ultimate period)
   - Face amount bands (e.g., $0–$99K, $100–$249K, $250–$499K, $500–$999K, $1M+)
   - Risk class (e.g., best preferred nonsmoker (NS), second best preferred NS, standard NS, smoker).
7. Companies also often differentiate their experience by relevant underwriting eras (e.g., issues of 2011 and later, 2002 to 2010, and pre-2002), where there were significant differences in underwriting practice.
8. Other splits are sometimes examined, such as product type and distribution channel. Results by calendar year are often shown—generally at an aggregate level.
9. Companies typically summarize the overall A/E for main components of their business (e.g., best preferred NS = 70%), as well as for various splits of the business (males, best preferred NS, face amount of $500–$999K, durations 1–5).
10. Ideally, companies undertake a more detailed study once a year, but then more frequently provide summary A/Es on an aggregate basis—typically quarterly.
11. The results from the experience studies are then considered, along with comparable industry tables/assumptions, to set assumptions. The credibility of company data is a consideration here.

PREDICTIVE ANALYTICS—A NEW APPROACH

With predictive analytics, many of the core components of the traditional approach are also used—seriatim data over the past *n* years, and inclusion of factors that are believed to drive mortality. A company could choose to stop there and not expand its experience data; however, predictive analytics allows a company to leverage much more data. A predictive analytics approach allows the examination of the relationships between the variables that are being examined on an all-else-equal basis. This cannot be done with traditional techniques without distorting factors and results. A description of a typical predictive analytics project process is shown in the sidebar below.

how-to

KEY STEPS IN A PREDICTIVE ANALYTICS PROJECT

PROJECT SCOPE: Determine your target variable (that which you are trying to predict), block of business (i.e., products, riders, issue years, etc.), timelines, budget and resources. It is also helpful to assemble the core team involved in the project, including predictive analytics as well as product and functional experts from across the company. Having both technical and business experts is critical to having a successful project.

DATA COLLECTION AND VALIDATION: The most critical step in the process—without clean data a model can be worthless and/or totally misleading. Consider both the number of years of historical data and the breadth of variables. It is important not to limit the variable inclusion to only those you think may be predictive. The best models are those that reveal "aha!" moments through creative data inclusion.

INITIAL FACTOR ANALYSIS: Typically univariate analysis to determine the factors that appear to be driving the results. "Univariate" analysis means that you look at each variable on its own to see if it may be predictive of your target. Note: Variables that look promising during the univariate analysis could drop out in the next stage due to correlations (two or more variables that are highly correlated, e.g., attained age and duration).

MODEL BUILDING: This step involves selecting the form of the model (e.g., multiplicative vs. additive); determining the factors to be included using a range of tests, including statistical tests and business knowledge; and determining which interactions should be included and what simplifications (groups and curves) are appropriate.

MODEL VALIDATION: Use techniques such as comparing A/E values on hold-out samples to validate the model. Hold-out samples could either reflect the most recent data or a random subset of all data.

FINAL CALIBRATION: This step includes refitting the model on all data, and taking into account any adjustments and final smoothing.

IMPLEMENTATION: This step involves taking the results of the project and incorporating them into the business purpose, often a model of the expected financial results (i.e., an underwriting program, a pricing model or valuation model). This could take one of several forms—a scoring engine might be developed for underwriting or another indicative risk selection process, or an enhanced calculation engine for other assumptions. Another consideration is how reports or results from the model will be used on an ongoing basis, as well as the planned update cycle for updating for new experience data.

A sample outcome from using predictive analytics to perform an experience study on the same block of individual life fully underwritten business noted in the traditional analysis is shown below. Note that in order to keep it comparable with the traditional approach, we are expressing the results as a percentage of an industry table (2008 VBT RR 100). However, we could also have expressed these results as a percentage of a new base table that we created as part of the process.

EXPERIENCE FOR CALENDAR YEARS 2009 TO 2013

Base table: M/F, NS/SM version of 2008 VBT RR 100
Predictive factors included in the model:

1. Gender
2. Issue age bands
3. Policy durational groupings
4. Risk classes
   - Non-substandard classes
5. Face amount bands
6. Product type
   - Variable universal life (VUL), universal life (UL), term, other life
7. Type of underwriting tests employed
   - Non-medical
   - Medical with bodily fluids
   - Above with pharmacy check added
   - Above with attending physician's statement (APS) added
8. Distribution channel
   - Property and casualty (P&C) sales force
   - Career life sales force
   - Independent life agents
   - Financial advisers
9. Geo-demographic information
   - Based on ZIP/postal code

The results for each factor (or combination of factors) would generally be displayed as a multiplier to the base table. (Alternatively, they could also be expressed as an addition rather than a multiplier, although this is not typical.) The multipliers can take one of several forms: scalar, vector, matrix or via a formula (e.g., cubic).

Some of the above factors have historically not been used much in traditional experience studies. Here is more background on a couple of them:

Type of underwriting test

Generally speaking, companies have not used the type of underwriting test as a factor in setting the mortality

assumption. Rather, this is reflected indirectly in the face amount band and possibly risk class (i.e., only possible for individuals aged 50 and up to obtain an average of $500K by undergoing extensive underwriting). We believe the type of underwriting test employed could offer further predictive value.

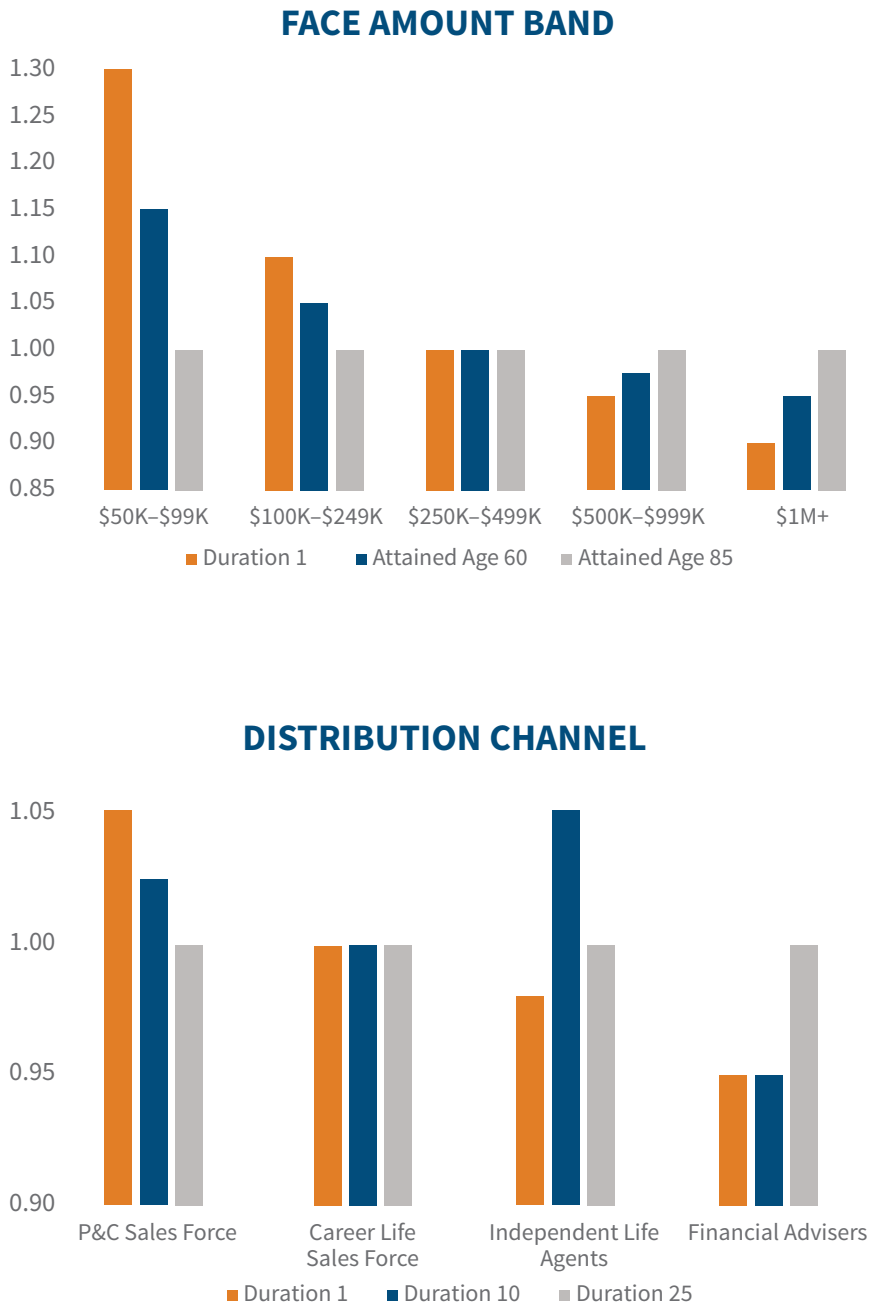
An extension of this would be to move beyond the type of test and examine the specific underwriting results (e.g., blood pressure of 140/85, LDL of 110, BMI of 31). However, availability of this underwriting data is often limited, which limits use of this technique. To the extent that it can be added, it would likely be a powerful predictor.

Geo-demographic

Other parts of the insurance industry have realized that where one lives can be a significant predictor of risk. This can be analyzed by accessing ZIP/postal code and associated geo-demographic information. The latter is information available from many sources, including the U.S. Census Bureau. It allows one to categorize key aspects of the socio-economic composition of a particular ZIP code (e.g., per capita income, percent with a bachelor's degree, homeownership, and residency in same house over past five years). The ZIP codes are mapped to the geo-demographic variables. Then each geo-demographic variable is grouped into a "sensible" number of levels that can be analyzed in the model. Advanced techniques are available to analyze residual effects.

Multipliers for some sample factors are provided as an example of how this might look. (See Figure 1.) These are not intended to be a full list and are shown as a scalar for simplicity, but more typically take another form.

FIGURE 1: MULTIPLIERS FOR SAMPLE FACTORS



Hopefully, this provides a perspective on how experience studies could be undertaken for a block of individual life business using a predictive analytics approach. The sidebar below shows comparable results for a block of variable annuity (VA) business—studying policyholder behavior.

findings

THE IMPACT OF PREDICTIVE ANALYTICS ON VA EXPERIENCE STUDIES

VA designs have become increasingly complex, with faster evolutions, as companies try to respond to changing market conditions and increasingly sophisticated buyers and agents. We estimate that more than half of the top VA writers are using some type of predictive analytics techniques to project living benefit dynamic lapses. Predictive analytics techniques can also solve the dilemma of the interplay between base lapses and dynamic lapses. With traditional techniques, base lapses are required to estimate dynamic lapses, while dynamic lapses are required to estimate base lapses. With predictive analytics techniques, it is possible to solve for both simultaneously. Predictive analytics techniques have allowed companies to add increased sophistication to their models, with the necessary statistical rigor.

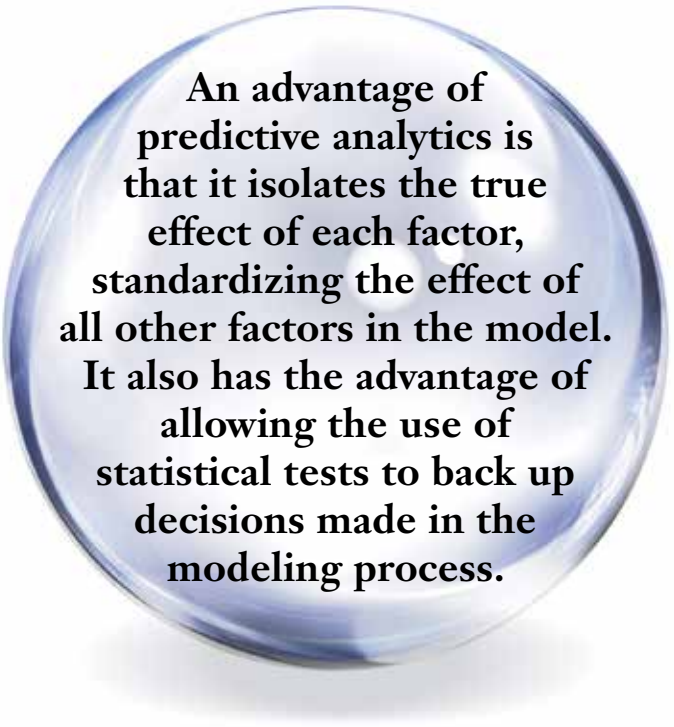
Predictive models have developed factors for the following:

- Base and dynamic lapses simultaneously
- Living and death benefits
- Rate/cap competitiveness
- Surrender changes and market value adjustment (MVA)
- Dynamic lapse sensitivity that varies by policy size
- Monthly lapse skew
- Factors for attained age, gender, tax status
- Benefit richness
- Interest-sensitive in-the-moneyness factors
- Distribution channel and product effects

PROS AND CONS

There are, naturally, pros and cons for each approach. One advantage of the traditional approach is that it is widely used in the life insurance business and is commonly accepted. The processes used to support it are well-established; thus, it is relatively easy to produce new results. Also, management is presumably used to seeing the results and is able to determine how to apply the findings to undertake management action.

A primary advantage of using predictive analytics in developing experience studies is that it provides better insight into the interaction of various factors and allows for the better use of available data. For example, suppose one wanted to analyze the appropriate assumption for the male best preferred NS risk class (which represents 20 percent of the face amount in total) at face amounts of $1M+ (which represent 10 percent of the face amount in total). In this situation, it is likely a small portion of the business in total (the combination of male best preferred NS risk class at face amounts of $1M+ is likely higher than 2 percent due to the intersection of better risk classes at high face amounts, but still unlikely to exceed 4 to 5 percent) would be examined. This is also before considering other splits that one would like to examine, such as issue age band and durational grouping. Predictive analytics allows one to examine all of the data for male best preferred NS and for $1M+ face amount band, and determine what impact these factors have on experience.



An advantage of predictive analytics is that it isolates the true effect of each factor, standardizing the effect of all other factors in the model. It also has the advantage of allowing the use of statistical tests to back up decisions made in the modeling process.

As such, use of predictive analytics allows one to introduce new factors (e.g., geo-demographic, type of underwriting) and evaluate their impacts without having to rely on traditional A/E results for increasingly smaller blocks of business—which would not be credible.

We should acknowledge that predictive analytics is a relatively recent introduction to the North American life insurance space, but it also requires specific expertise to implement. As such, there are dangers that data could be misinterpreted and models could be built with flaws. That said, any increase in sophistication brings risks that can be managed with the appropriate level of expertise and experience.

Under either the traditional or predictive analytics approach, there are some areas that cannot be fixed/addressed:

Lack of data: If experience data does not exist past attained age 85, it is difficult to solve the often-discussed issue: What is an appropriate mortality assumption at older ages? Predictive analytics enables the development of a trend line at older ages, including extrapolating past age 85, which arguably leads to better data than traditional analysis. However, it still requires judgment. Predictive analytics techniques can also make it easier to apply industry data to a company without significant data by adjusting the standard model based on the factors developed from the larger dataset.

Not doing the study: One of the primary areas where we see companies fall short is not doing an experience study, or not on a routine basis ("we don't have the resources right now"). One has to devote the time and resources to do the work. Correspondingly, an initial experience study using predictive analytics will likely take more time. This may be a consideration in undertaking a predictive analysis.

Another issue to consider is whether your models can support the more refined assumptions that come out of the predictive analytics approach. This is likely to be more of an issue for valuation models, as opposed to pricing models, which are smaller in size. Having the greatest factors in the world won't necessarily help if the more refined assumptions in the applicable model are not reflected.

IMPLICATIONS FOR SETTING ASSUMPTIONS

A predictive analytics approach to experience studies leads to more refined assumptions, reflecting more granularity. The benefits of this are fairly evident: It allows one to better assess value—either value created from new business sales or value created from management of one's in-force block of business. A simple example that draws on a VA block of business can help explain this. The current lapse assumption varies by product type (i.e., share type) and duration. However, it does not distinguish between the following factors:

- Age
- Size of policy
- Richness of living benefit feature.

The following chart shows the present value (PV) of illustrative profits at issue for selected cells (reflecting a new lapse formula by age is not shown directly below; rather, it is implicitly reflected in changes in the profit levels for the cells shown in Figure 2):

FIGURE 2: PRESENT VALUE OF PROFITS AT ISSUE

PV of Profits

	Revised Assumptions		
	Benefit A		Benefit B
	Small Policy	Large Policy	Small Policy
IA 60—No Wait	0.30	-0.10	0.15
IA 60—10 Yr. Wait	1.30	0.60	1.05
IA 70—No Wait	0.90	0.40	0.70
IA 70—10 Yr. Wait	1.70	1.00	1.45
Total	1.05	0.48	0.84

Thus, when the new assumption is reflected, there is a small increase in profitability from 0.63 percent to 0.73 percent. However, the key aspect is the management information embedded in the new profit pattern. Certain cells show significantly higher profitability than others. Based on this, management should take action—either to revise the benefit offerings at cells with adverse profitability (including possibly raising fees) or use other techniques to shift the mix of business (e.g., wholesaler incentives).

THE CLEAR IMPLICATIONS OF PREDICTIVE ANALYTICS

The implications of using predictive analytics to undertake experience studies for setting assumptions are fairly clear.

- The P&C industry has used predictive analytics for over a decade. Companies that don't use this face a serious disadvantage in the marketplace and the risk of anti-selection.

		Original Assumption
Large Policy	Total	Total
-0.10	0.06	0.00
0.70	0.91	0.80
0.45	0.61	0.50
1.10	1.31	1.20
0.54	0.73	0.63

Predictive analytics can offer a new approach to experience studies that refine assumptions, are more granular, and ultimately create more clarity around the value of new and existing business.

- Many companies have started to use predictive analytics techniques for experience studies and/or have also built big data teams to leverage predictive analytics across their organizations in other ways.
- Regulators are requesting increased sophistication in assumption setting, especially for principle-based reserves and capital techniques.
- Insurance company products are complex and evolve quickly. That makes it difficult to get a large dataset of homogeneous experience data. Predictive analytics can help leverage experience across a variety of designs and market conditions.
- There is more external data available than ever before, and companies are starting to explore how they can leverage it.

Traditional techniques can make it difficult to isolate the true effect of individual factors and to determine interactions or analyze the effect of changes in the mix of business (e.g., changes corresponding to changes in distribution). Predictive analytics, however, can offer a new approach to experience studies that refine assumptions, are more granular, and ultimately create more clarity around the value of new and existing business. ■

Companies that don't use predictive analytics could face a serious disadvantage in the marketplace.

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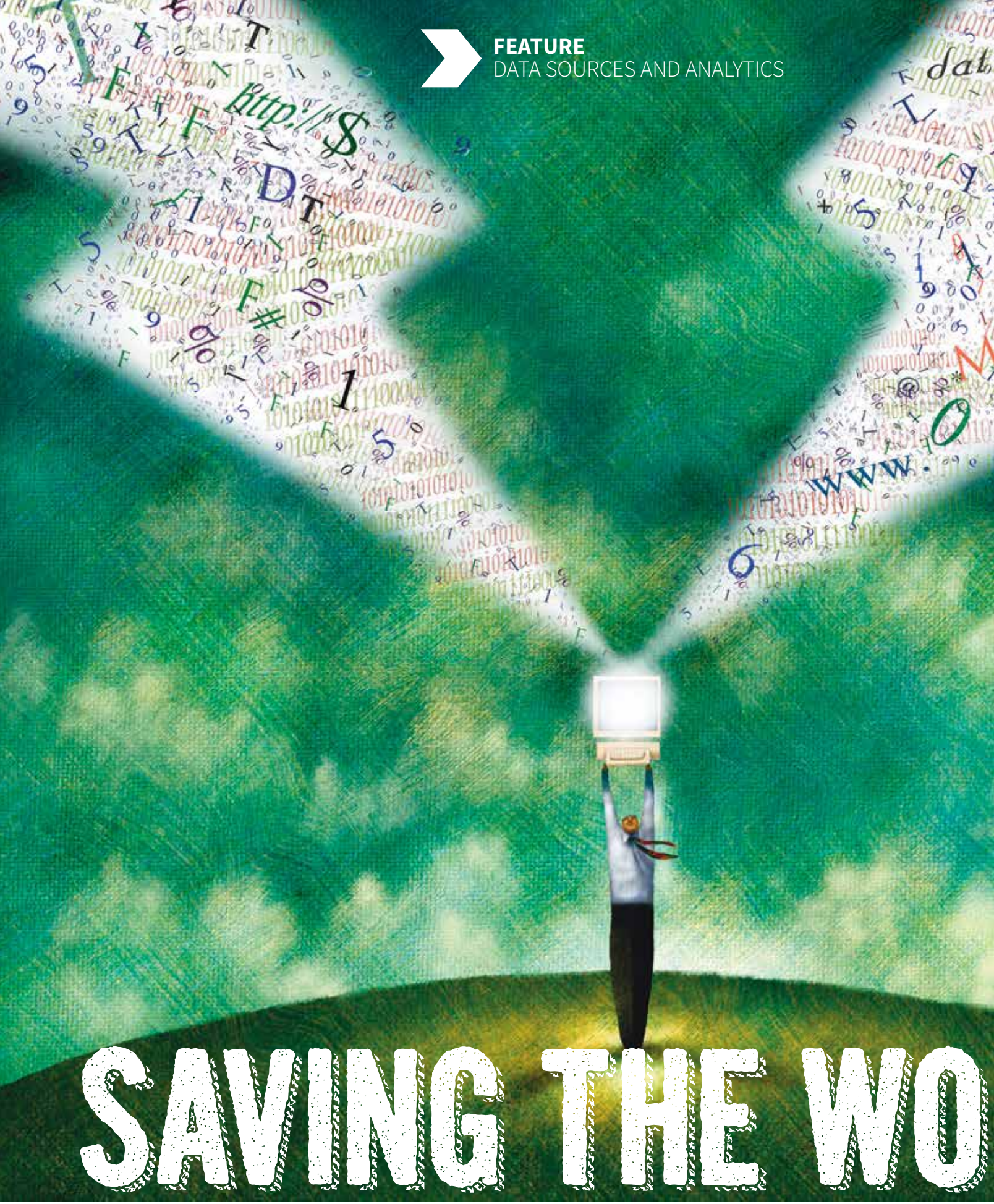

SAVING THE WO

NEW DATA SOURCES AND MODELING TECHNIQUES ARE CHANGING THE WAY ACTUARIES ANALYZE RISK

BY CHRIS STEHNO

It feels like every time you read a newspaper, glance at the cover of a magazine, or turn on the evening news you see or hear the words "big data" and "data scientists." Long gone are the days of terabytes and petabytes. We now live in the world of exabytes (10^{18}) and zettabytes (10^{21}). In fact, the world is currently producing over five exabytes of data every two days.[1]

After several up-and-down years on the top-200 chart, the job of an actuary has once again reached the No. 1 spot as the best job in America.[2] However, other recent articles and surveys—such as one in the *Harvard Business Review*—now call data scientist the sexiest job in America.[3] In fact, the article was so bold as to declare data scientist the sexiest job of the 21st century. Can you believe that? An entire century of sexiness? To be completely transparent, I was not able to find a single source where an actuary was referred to as a "sexy" job, so this is not exactly an apples-to-apples comparison! However, I hope you get the point; there appears to be a new contender for the coolest math kid on the block.

Consider this a call to arms for actuaries to take back what once was theirs, and once again be known as the original data scientists and the originators of working with really big data. In the remainder of this article, I am going to highlight several examples of projects led by actuaries who are working to push mathematical dominance by applying advanced data analytics and big data to solve industry-specific business problems. In many cases, these actuaries are not just focusing on business results, but also working to improve the lives of our fellow citizens at the same time.

NO. 1

THE JOB OF AN ACTUARY HAS ONCE AGAIN REACHED THE NO. 1 SPOT AS THE BEST JOB IN AMERICA.

MORTALITY FOR THE MICRO-MASSES

How many times has it been repeated that the life insurance industry has not changed the way it does business for the last 50 years? I am not sure I completely agree with that statement, and I can definitively state certain innovative life insurance companies and the actuaries working within them are now proving this notion false.

“Although the payout for a $10 million life policy is 100-fold the payout for a $100,000 policy, the process a consumer goes through to purchase either of the two policies is nearly identical.”

As an example, although the payout for a $10 million life policy is 100-fold the payout for a $100,000 policy, the process a consumer goes through to purchase either of the two policies is nearly identical. In both cases, the consumer has to fill out a 10-page application; he or she will need to undergo a paramedical exam including a blood draw and urine sample; and then wait 30-plus days to find out what his or her annual premium will be based on the final underwriting categorization.

However, there are several life insurance companies that have questioned this process and are now using advanced predictive analytics and big data to make radical departures from this antiquated application process. One flavor of this is being called "application triage" and quickly is becoming a best practice in the circuitous routing of an application through the traditional underwriting process.

The new process works as follows: When a completed application comes in the door, an automated IT process calls out to a variety of data sources—both internal and external—containing traditional and nontraditional underwriting elements to pull in all of the required data elements. In many cases this process is completed within seconds of being initiated. These elements are then passed through a scoring engine using both predictive algorithms and business rules to determine what requirements will provide meaningful information to the underwriting process. In a large number of cases (more than 40 percent of the time), traditional underwriting processes such as paramedical exams and attending physician statements (APSs) can be passed over, and an applicant can be underwritten within a day or even in real time.

This is all made possible through the blending of modern predictive analytics and traditional actuarial analysis. For those of you not in the life insurance domain, a commonly used business value assessment is known as the protective value study. It can be loosely defined as a cost benefit analysis used to determine the financial worth (in terms of mortality) of a particular underwriting requirement, such as a specific laboratory test or an additional data source like a prescription drug history.

It will not take you too much searching to find dozens and dozens of published protective value studies demonstrating the positive effects of all kinds of underwriting requirements. A result of all of these protective value studies has been a continual increase in the number of requirements or data sources used in the underwriting process over the years. This might be attributable to the companies that sell these services using actuaries to develop these studies for them. When you begin to review these studies, you will generally find that the results are reported in aggregate over a broad applicant population base. This in turn suggests that the laboratory or medical test in question will result in a positive return on investment (ROI) when applied to the entire applicant pool. In only a very few of the published studies will you ever find the results subsegmented across basic factors including age, gender, face amount or any one of the numerous basic medical application questions.

Application triage is changing the protective value study by looking at the ROI results over many subsegments. It works by using predictive algorithms that pre-segment the mortality risks of the population in the absence of the more invasive, costly and time-consuming underwriting requirements (paramedical exam, numerous lab

tests, APS, etc.). Once the population is segmented by the predictive algorithm, individual protective values can be calculated across each of the risk subsegments instead of looking at results across the entire population. The subsegmented protective value studies now reveal that what historically was a positive ROI across the aggregated population base can now be broken out into population groups that show a considerably higher ROI than average, groups of average ROIs, and even groups that show negative ROIs for that particular test.

The result is a move away from the one-size-fits-all approach of underwriting requirements to a new personalized approach with individualized underwriting. This has all been made possible by actuaries blending traditional actuarial principles within the world of big data and advanced predictive modeling techniques.

There are numerous benefits to the consumer, including a new expedited approach to underwriting that eliminates the harsh and invasive medical requirements for a large percentage of applicants. The reduction of these expensive requirements can also lead to cost savings being passed on to the consumer. This makes the most sense today in the often underserved and underpenetrated middle-class marketplace, where underwriting expenses and commissions have made life insurance products out of reach for many people. Actuaries are now working on products, cost-effective risk assessment techniques and new distribution means to bring life insurance products back in line with the middle-marketplace pocketbooks.

THE HEALTH IN HEALTH CARE

Over the decades, many articles have been written about the alignment or rather misalignment of the health care payment structures and population health strategies in the United States. The majority of provider contracts today are still considered fee-for-service, so the providers (doctors, hospitals, pharmaceutical companies, etc.) don't get paid until they provide a medical service or product to you. This arrangement points to the premise that the biggest revenue-generating customers are the unhealthiest populations.

Some have argued that health plans should be leading the population health management charge as many of their contracts are risk-based—hence, one would assume it would make sense for them. However, in their defense, historically it has been difficult to prove an ROI on wellness and preventive services due to the long-term nature of the return of those efforts compared to the relatively short membership duration of the average plan participant.

However, the stage is changing, primarily driven by the surge in individual policies and the new risk structures being set up between providers and the health insurers. As an example, I have had three different health plans in the last 10 years but the same primary care doctor that whole time. As providers take on risk-related payments, they might be in the exact position to profit from a healthy population.

There are two types of people who need to be considered in population health management: the currently sick and those who are not sick at the current time. For the currently sick, the industry as a whole has done a pretty good job calculating the costs associated with the sick and putting into place disease management programs to aid in curtailing those costs. The not-sick population is a completely different story. Very little has been done—by actuaries or the industry as a whole—with or for the seemingly well population.

One technique that is getting some notice is the use of lifestyle-based

BY BLENDING ADVANCED PREDICTIVE MODELING TECHNIQUES AND TRADITIONAL ACTUARIAL PRINCIPLES WITHIN THE WORLD OF BIG DATA, ACTUARIES ARE MOVING AWAY FROM THE ONE-SIZE-FITS-ALL APPROACH OF UNDERWRITING REQUIREMENTS TO A NEW PERSONALIZED APPROACH WITH INDIVIDUALIZED UNDERWRITING.

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analytics (LBA) to segment the seemingly healthy into the truly healthy, the average healthy and those unhealthy who appear to be on the verge of the next medical event. LBA uses non-medical data sources to predict medical events. In short, LBA determines correlations between an individual's lifestyle activities, purchase behaviors and hobbies to specific medical conditions, such as chance of diabetes. For example, if you run, hike or bike you will have a lower cardiovascular risk than someone who spends a great deal of time and money on television or gaming devices.

In recent months, actuaries have really stepped up their game by building LBA algorithms that not only find the at-risk populations, but also look at individuals' behavioral aptitudes. Often referred to as change behavior, these models look at an individual's propensity to be ready for change and often contain a timing component as well. By combining at-risk models with change behavior models, actuaries are now able to identify those individuals on whom they can make a positive impact, resulting in both financial savings for the health plan/provider and, more importantly, the potential prevention of an individual's next major health event.

LBA DETERMINES CORRELATIONS BETWEEN AN INDIVIDUAL'S LIFESTYLE ACTIVITIES, PURCHASE BEHAVIORS AND HOBBIES TO SPECIFIC MEDICAL CONDITIONS.

PROPERTY AND CASUALTY'S (P&C'S) CONTINUED DOMINANCE IN BIG DATA ANALYSIS

I won't spend too much time on this specific area, as it is generally well known that P&C actuaries have been pushing the bounds of big data and risk analytics for many years. The newest example of big data in this domain is the data being collected and analyzed from telematics. Telematics devices can include plug-ins to automobiles' on-board diagnostic computers, the use of the vehicle's OnStar or SYNC devices, and the use of smartphone apps, all of which track metrics like acceleration, maximum traveling speed, braking and even GPS locations.

Obviously, your speed, acceleration and braking make sense as risk metrics for underwriting. However, many of these telematics devices are now providing feedback to help you improve your driving habits. My first telematics report showed my daily driving metrics were in the worst 10 percent of drivers using the device. This took me by surprise, especially because I thought I was taking extra precautions knowing I was being tracked. It only took several weeks of reviewing my daily feedback before I was able to get my metrics within a more acceptable range—still above average, but acceptable nonetheless.

Did you know that with historical P&C underwriting you might have been paying more for living in a neighborhood with a busy intersection known to be hazardous nearby? With the new telematics devices, can you now be rewarded for driving an extra block out of your way to avoid busy intersections? I suspect in the near future your P&C carrier will team up with Google Maps to provide a couple of choices (the quickest route home, or one that takes an extra minute, is twice as safe and knocks $0.50 off of your next insurance premium, for example).

IF YOU RUN, HIKE OR BIKE YOU WILL HAVE A LOWER CARDIOVASCULAR RISK THAN SOMEONE WHO SPENDS A GREAT DEAL OF TIME AND MONEY ON TELEVISION OR GAMING DEVICES.

THE NEWEST OF THE BIG DATA

The Internet of Things, the cloud, Facebook, Twitter. The list goes on for the hottest topics in the world of big data. However, I would suggest that in

the domains of life insurance and health care, the biggest of big data will be the rapid emergence of electronic health records (EHRs). If you are an actuary working in either of these two domains, and if you have not, at a minimum, pulled your own EHR, shame on you!

For life insurance products, EHRs will revolutionize the way we assess risk. In many cases, no longer will paramedical exams be needed, nor the taking of additional fluids and lab work for many applicants; the waiting for APSs will diminish; and prescription data will be readily available.
Our snapshot look at health risks as seen through the paramedical exam can now be extended to years of lab results, body mass indexes (BMIs) and annual exams.

The long-standing approach of mortality regressing to the mean very well could be proven wrong as longitudinal data used for underwriting will become the norm. Applicant A, whose BMI, cholesterol and blood pressure have been increasing each year, will rightly have a different mortality than applicant B, whose BMI, cholesterol and blood pressure have remained flat for the last five years. In fact, with EHRs, simplified issue products (which in the future would include an EHR component) could be priced at similar rates to today's fully underwritten products.

In health care, the addition of lab data, physician and nursing notes, height and weight, and a longitudinal view of all of this information will make the prediction of future health risks and claims much more precise than the current methods, which primarily rely only on medical and/or pharma claims data. Most importantly, this data will allow us to engage the at-risk individuals, get them seeking preventive services, and prevent or deter that major medical event from ever happening.

Many have suggested that it will be another four to five years before EHRs are available and standardized into a commonwealth dataset. However, if you wait until that time, I guarantee you will be far behind the curve as many of your fellow actuaries are already working in this domain. They are finding creative means to collect EHRs from a wide variety of providers by writing and screen scraping direct pull programs. They are working on standardization protocols that use the continuity of care document (CCD) formatted data to identify and translate medical procedures, diagnoses, prescription codes, height and weight, and lab results, plus many other important variables contained within the EHRs into datasets that can be used in statistical analysis and predictive modeling.

POSTPARTUM

The world of the actuary is changing; it may no longer need life tables, compound interest theory or actuarial claims triangles. What is surely needed are statistical software skills, data mining skills, and the thirst or desire for uncovering new data sources and/or modeling techniques to further our expertise in risk analysis and the resulting business implications.

If the above examples have not brought the sexiness into the actuarial profession, I am not sure what will! ■

[1] Gantz and Reinsel, "The Digital Universe Decade—Are You Ready?" May 2010, *http://www.emc.com/collateral/analyst-reports/idc-digital-universe-are-you-ready.pdf*.

[2] Tony Lee, "Jobs Rated Report 2015: Ranking the Top 200 Jobs," April 2015, *http://www.careercast.com/jobs-rated/jobs-rated-report-2015-ranking-top-200-jobs*.

[3] Davenport and Patil, "Data Scientist: The Sexiest Job of the 21st Century," October 2012, Harvard Business Review, *https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century/ar/1*.

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live long and prosper

THE ROLE OF ACTUARIES IN LONGEVITY RISK

BY JEAN-MARC FIX

ONCE UPON A TIME, there was a baby actuary. This baby actuary stumbled, through the vagaries of summer internships and job rotations, into life insurance. It could easily have been property and casualty or pensions.

Fast-forward 25 years and this baby actuary—me, now all grown up—is still in the life insurance business, and to quote one of my favorite TV spies, "and loving it." I don't price life insurance on a daily basis anymore, but I still am fascinated by mortality, its components and its variations—in one word: its complexity. One reassuring thing about mortality was that it kept getting better—no wild ride like interest rates, where once savings accounts earned 12 percent (yes, they did!) and now earn 0.01 percent.

Nonetheless, with experience comes an appreciation for gray—in your hair and in your thinking. Gone are the days of black and white, of certitude, that marked your new student days—where your boss knew all the assumptions for you to plug into your pricing and you believed he *really* knew that lapses for a policy issued today to a male nonsmoker age 45 would be 4 percent 20 years from now, but 3.5 percent if that male nonsmoker were age 46 instead.

So with experience come better questions, and, with questions, doubt creeps in. Mr. Spock's greeting of "live long and prosper" starts to take on a different coloration. Lower mortality is great news for life insurance companies, but is it great news for me as a person? For society as a whole? Living long seems to be a given, but where is the prosperity coming from? And with this question, longevity risk starts to take on a personal dimension.

From a financial and more rigorous perspective, longevity risk is the risk that an entity will outlive its assets because of improving mortality. The entity can be a person like you or me. It can also be a pension plan or the ultimate pension plan: social security.

We, as actuaries, are part of a profession whose mission is to study risk and, especially, mortality risk. I personally understand "profession" at its most expansive: We owe a duty not just to our employers but to society at large. As a life insurance actuary, my job is not just to design and price attractive—or at least useful—life insurance products, but also to make sure that the promises we make to the buyers of our products are kept.

It is but a little, yet crucial, step for actuaries to be the logical actors at the forefront of the longevity risk issue. This is an issue of critical importance not just to our employers but to the whole of our aging society—and no, I am not talking just about the Society of Actuaries (SOA).

> "Lower mortality is great news for life insurance companies, but is it great news for me as a person?"

WHAT IMPACTS LONGEVITY AND MORTALITY

Of course, what drives longevity risk are secular changes in mortality. So let's explore the trends.

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Gala

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In the last 40 years, there has been tremendous improvement in coronary heart disease. What few of us appreciate is the exact magnitude of the change: an over-fourfold drop of the overall population mortality rate despite an aging population! This is mostly due to a combination of surgical improvement in treatment and better follow-up drug regimens.

Later, mortality continued its decrease following the introduction of better algorithms for treatment and even better therapies, including drug-eluting stents and the introduction of statin drugs to lower cholesterol in the 1980s.

Since the 1964 report on smoking by Dr. Luther Terry, the then-U.S. Surgeon General, and due to long-term and concerted efforts from government, education and health professionals, the prevalence of smoking started decreasing. This also contributed to the decrease in cardiovascular deaths, as nicotine is a dangerous toxin for the cardiac system.

Additionally, age-standardized cancer death rates have finally started to decrease since the mid-1990s—after increasing for most of the 1970s and 1980s—despite a very limited decrease in the incidence rates since then. The decrease is driven by strong improvement in mortality rates for lung cancer (due to decreased smoking mostly in men) and prostate cancer.

MORTALITY IN THE FUTURE

In the investment world we are well aware of the warning: "Past performance does not guarantee future results." Is that also true for mortality? This is an area of much debate within the actuarial and demographic communities.

One can look at some of the systemic causes of improvement—mostly lower rates of smoking—and wonder if we have reached a plateau. In addition, rising obesity rates have put a damper on the improvement. Could obesity become high enough to reverse the improvement trend? I personally believe that this is not going to be the case. Increasing obesity has been with us since the early 1980s, and some reports show that there may be a slackening of the increase in the last 10 years. Despite the sharp increase of the 1980s, improvements have continued to this day. Nonetheless, this remains an issue of fiery controversy.

Others, like Dr. James Vaupel of the Max Planck Institute for Demographic Research, insist that predictions of life expectancies have always underestimated the actual outcomes and therefore are "likely" to do so in the future … the flip side of our earlier warning: "Past errors guarantee future errors."

An interesting difference between the state of science today and what it was 30 years ago is the maturation of genetics. For many years we have known that some specific populations have produced an extraordinary percentage of extremely long-lived people (e.g., Dr. Michel Poulain's "Blue Zones"[1]). Is that a result of nature or nurture? We now have the tools to investigate the "why."

Another exciting development is that now there is a field of aging research where aging is not considered as just a natural entropic process but as a syndrome that affects multiple organs concurrently. Work on caloric restriction and on roundworms (see Dr. Cynthia Kenyon's TED talk[2]) seems to imply that one (or a very limited number of genes) may accelerate or decelerate the manifestations of aging depending on what mutations are present.

It is but a little, yet critical, step for actuaries to be the logical actors at the forefront of the longevity risk issue. This is an issue of critical importance not just to our employers but to the whole of our aging society.

The advances in robotics and human/machine interface may start to impact mortality like they have disability. Will the mortality of people with robot-assisted elder care fare better than those with no care? We will watch the lessons from Japan closely.

Finally, the possibility of creating artificial yet living organs is in its infancy (see Dr. Anthony Atala's TED talk[3]). What will that bring when it matures?

Despite all the exciting developments, we must keep in mind the warning one can find in French railroad stations: "One train may hide another." Assuming we are able to "cure" a major cause of mortality, the people who were spared—possibly frail and certainly older people—will now be exposed to the other causes of death and may not live that much longer.

MEASURES AND MODELING OF MORTALITY

Since the early 19th century, when the English actuary Benjamin Gompertz came up with the mortality law that bears his name, actuaries and demographers alike have been fascinated with fitting mathematical models to the mortality curve. Developing parametric mathematical models significantly simplifies the modeling of the future state of mortality.

More recently, with the advent of both increased computing power and better data sources, stochastic models came to the forefront, pushed by the seminal work of Ronald Lee and Lawrence Carter in 1992 introducing their eponymous model. In the following years, many others proposed "new and improved" models. For an extensive discussion of the relative merits of a variety of stochastic

models, I would refer you to the article by Andrew Cairns et al. in the January 2009 issue of the *North American Actuarial Journal*.

Two major criticisms, especially of stochastic models, are that they are based exclusively on some statistical version of the past and that they do not reflect the interaction of the different causes of death that may alter the future. A strong proponent of the importance of reflecting this interaction is Dr. Severine Gaille of the University of Lausanne. Indeed, some commercially proprietary models do reflect that interaction and purport to be better predictors of the future.

If you are interested in exploring many of those issues further, I recommend the series of Living to 100 Symposium monographs.

ADDRESSING LONGEVITY RISK CORPORATELY

Because longevity risk is subject to movement in one direction across a broad swath of the population, it is not a risk that can be hedged through diversification alone; it must be actively hedged by identifying asset classes that move in the opposite direction.

One obvious purveyor of such assets is the life insurance industry. While pension actuaries rightfully bemoan longevity as an issue, life insurance companies have been reaping the reward of longer-living customers. Why not then use life insurance product results to offset the longevity risk? There are two issues to the so-called "natural" hedging. The first is that the correlation between life insurance purchasers (usually younger people) and annuity and pension fund participants (usually older people) is not very strong. Second, the pension market needs alone dwarf what could be available from the life insurance industry.

There have been some significant transactions on the so-called "de-risking" of pension plans using reinsurance-type vehicles, not just in Europe but also in the United States—for instance, the $3 billion Motorola risk transfer transaction with Prudential in September 2014. They have been conducted either through professional reinsurers or insurers, or through banks. Those transactions are a challenge to implement, being customized—especially as to exactly what risk is transferred in addition to longevity risk—and private, and only scratch the surface of the potential available demand.

So the next logical step is to approach the capital markets. The advantage of longevity risk for investors is that it is poorly correlated with other risks traditionally borne by the capital markets. It offers a profile that allows further diversification of the investor's portfolio. Unfortunately, challenges have prevented the development of a robust market.

Two key challenges are the lack of fully transparent popular models and the lack of a clear index, like the S&P 500 for stocks, to evaluate the risk. In order for the capital markets to work effectively, one needs an unbiased indicator of the level of mortality that is sufficiently responsive. What would be lost in fit with one's risk profile would be gained in market efficiency and breadth. The development of such an index could be something that the SOA can spearhead, adding relevance and visibility for actuaries in this environment.

ADDRESSING LONGEVITY RISK INDIVIDUALLY

In the end, individuals are the key bearers of their own longevity risk. The magnitude of the problem was highlighted by a 2009 survey from Americans for Secure Retirement and conducted by Ernst & Young: Seven out of 10 middle-market households approaching retirement will outlive their assets. This number jumps up to almost 10 out of 10 for those who do not have defined-benefit (DB) income. In order to minimize this risk, households without

Seven out of 10 middle-market households approaching retirement will outlive their assets. This number jumps up to almost 10 out of 10 for those who do not have DB income.

Source: Americans for Secure Retirement, 2009 survey conducted by Ernst & Young

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DB income should plan for a standard of living that's *half* of their current standard.

A way to mitigate that risk is to include annuities in your retirement portfolio. In the current low-interest environment, annuities with guaranteed lifetime withdrawal benefits are especially attractive. Another product that can be useful, although it may require a greater psychological leap of faith from the customer, is the deferred income annuity that guarantees payment at some time in the distant future. Waiting 20 years before getting this income is a popular option, as it seems to be the sweet spot of enough protection at a reasonable cost.

ADDRESSING LONGEVITY RISK AS A SOCIETY

We are continually reminded of the impact of longevity risk by the discussion on the future viability of Social Security. As workers are now almost exclusively shouldering the investment risk in their retirement asset portfolios, and as the stock market has had a lackluster performance, we can expect significant shortfalls in income for retirees to come as their proportion in the population increases.

The societal problems are complex, poorly understood by the general public and politically touchy. This is not a recipe for fast political action. On the other hand, the demographic forces are irresistible and have been long in motion, and a "solution" will happen. It is likely that the concept of retirement will cease to exist, just like it did in

In the end, individuals are the key bearers of their own longevity risk.

action

SOA LONGEVITY PLANNING

In 2012, the SOA, recognizing the necessity for actuaries to act in the longevity risk space, created the Longevity Strategy Task Force to "consider both what the SOA should do in response to the rapidly changing science and what it could do to be more proactive with public stakeholders."

The task force came up with a number of strategies centering on education; communication, including building a consistent framework to look at the risk; and a timelier and more robust experience-gathering process.

SOA LONGEVITY ADVISORY GROUP

This group, created in 2014, is made up of actuaries involved in studying longevity and longevity risk across practice lines, and is tasked with the implementation of the ideas of the Longevity Strategy Task Force.

Members:
Jean-Marc Fix
George Graziani
Jenny Haid
Tom Jones
Al Klein
Larry Pinzur

SOA staff:
Dale Hall
Andy Peterson
Larry Stern, supporting the SOA staff

the early years of the Industrial Revolution and for millennia before that.

As Pablo Antolin of the OECD Financial Affairs Division mentioned earlier this year at the Longevity Seminar, "Governments should facilitate the measurement of mortality." It is critical to have the proper tools to measure the risk as accurately as we can. Furthermore, regulations should help and not hinder that task, and we are unfortunately seeing the opposite with the reduced access to and reliability of the Social Security Death Master File.

We, as professionals with a responsibility to society at large, and our professional organizations are uniquely qualified to understand this risk and offer solutions. I think that to be fully effective we need to extend the reach of our discussions so that all can appreciate at a gut level the significance of the issues we are facing. (See the sidebar on page 52 for more on the SOA's role in this process.)

The Longevity Seminar in Chicago in February was the first public event organized by the SOA's Longevity Advisory Group. By the time you read this, there should be numerous initiatives in the works, including a number of sessions at the 2015 SOA Annual Meeting & Exhibit. I look forward to seeing you at one of them! ■

[1] *https://en.wikipedia.org/wiki/Blue_Zone*

[2] *http://www.ted.com/talks/cynthia_kenyon_experiments_that_hint_of_longer_lives?language=en*

[3] *http://www.ted.com/talks/anthony_atala_growing_organs_engineering_tissue?language=en*

Jean-Marc Fix, FSA, MAAA, is vice president of Research and Development at Optimum Re. He is a member of both the SOA Longevity Advisory Group and the Living to 100 Symposium. His motto is "Get Smart."

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Author's Note: It is important to keep in mind that this is my perspective on this issue and in no way reflects any official position of the SOA.

TAKE THE LEAD

Looking to be a leader in your workplace or in your profession? Here are some resources that can help you in that quest.

PODCAST

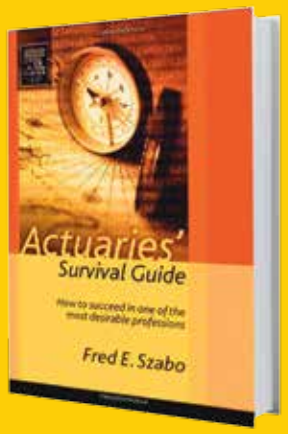
INCLUDE DATA ANALYSIS IN YOUR SURVIVAL KIT

Presented by Christopher Surdak

With data crush, an overwhelming mass of information becomes readily available to individuals and companies. While things we need and want have become increasingly and conveniently available to us, it has also become harder to protect ourselves from deeper analysis of our psyches (re: spending habits). Christopher Surdak, a recognized expert in information security and regulatory compliance, believes that companies must use data analysis in order to survive in this economy.

http://www.amanet.org/training/podcasts/10192.aspx

2 BOOK



ACTUARIES' SURVIVAL GUIDE

By Fred E. Szabo

This unique book is a guide for students and graduates of mathematics, statistics, economics, finance and other number-based disciplines contemplating a career in actuarial science. Given the comprehensive range of the cases that are analyzed in the book, the *Actuaries' Survival Guide* can serve as a companion to existing study material for all courses designed to prepare students for actuarial examinations.

- Based on the curricula and examinations of the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS)
- Presents an overview of career options and details on employment in different industries
- Provides a link between theory and practice; helps readers gain the qualitative and quantitative skills and knowledge required to succeed in actuarial exams
- Includes insights from over 50 actuaries and actuarial students
- Written by Fred Szabo, who has directed the actuarial co-op program at Concordia University for over 10 years

http://toolsforactuaries.org/node/402?c

BUY NEW OR USED

VIDEO

TED TALK WITH MARGARET HEFFERNAN: DARE TO DISAGREE

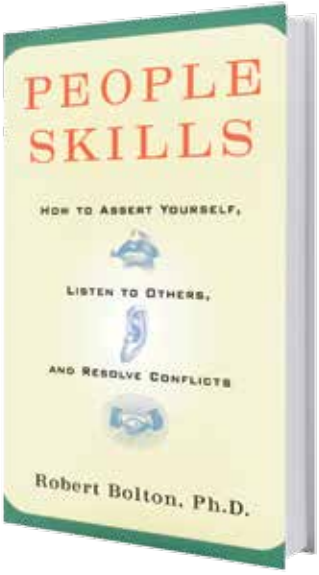
Most people instinctively avoid conflict, but as Margaret Heffernan shows us, good disagreement is central to progress. She illustrates (sometimes counterintuitively) how the best partners aren't echo chambers—and how great research teams, relationships and businesses allow people to deeply disagree.
www.ted.com/talks/margaret_heffernan_dare_to_disagree

BOOK

PEOPLE SKILLS: HOW TO ASSERT YOURSELF, LISTEN TO OTHERS, AND RESOLVE CONFLICTS

By Robert Bolton, Ph.D.

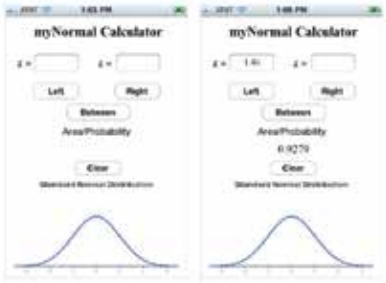
A wall of silent resentment shuts you off from someone you love. ... You listen to an argument in which neither party seems to hear the other. ... Your mind drifts to other matters when people talk to you. ... *People Skills* is a communication-skills handbook that can help you eliminate these and other communication problems. Author Robert Bolton describes the 12 most common communication barriers, showing how these "roadblocks" damage relationships by increasing defensiveness, aggressiveness or dependency. He explains how to acquire the ability to listen, assert yourself, resolve conflicts and work out problems with others. These are skills that will help you communicate calmly, even in stressful, emotionally charged situations.
http://toolsforactuaries.org/node/411?c
BUY NEW OR USED



APP

MYNORMAL CURVE

myNormal Curve helps you calculate the area under the normal curve, eliminating the need of the normal distribution table commonly found at the end of a statistics textbook.
PRICE: $0.99 at the Apple App Store
http://appsforactuaries.org/node/474?c



If you know of a tool that might be beneficial to other actuaries, please let us know by sending an email to ***theactuary@soa.org***.

Target THE LEA

INITIATIVES TO ADVANCE SOA LEARNING

Over the course of the last year, the Society of Actuaries' (SOA's) Learning Strategy Task Force developed a Learning Strategy to direct SOA education programming into the future. The timing was opportune, as other actuarial organizations have been reviewing their curricula (e.g., International Actuarial Association (IAA)). At the SOA June 2015 Board of Directors meeting, the Board approved the Learning Strategy and a set of initiatives. (Some of the initiatives are already underway as set out in the sidebar on page 60.)

The purpose of the Learning Strategy is to articulate an education philosophy and develop a strategy to guide members, candidates, the Education Executive Group and the Professional Development Committee with clearly articulated responsibilities and direction in alignment with the SOA 2013–2016 strategy, particularly with regard to the education and validation objectives.

The Learning Strategy aligns with the SOA's strategy, mission and vision. The strategy is also consistent with the Education Philosophy approved by the Board in March 2014, the Principles for Professional Development (2009), the Principles of Education (2010) and the Learning Strategy Task Force's vision (July 2014). The strategy reflects the education continuum from prequalification education through continuing education, professional development and lifelong learning.

The initiatives have both near-term and long-term influences on SOA education. Some of the near-term influences include:

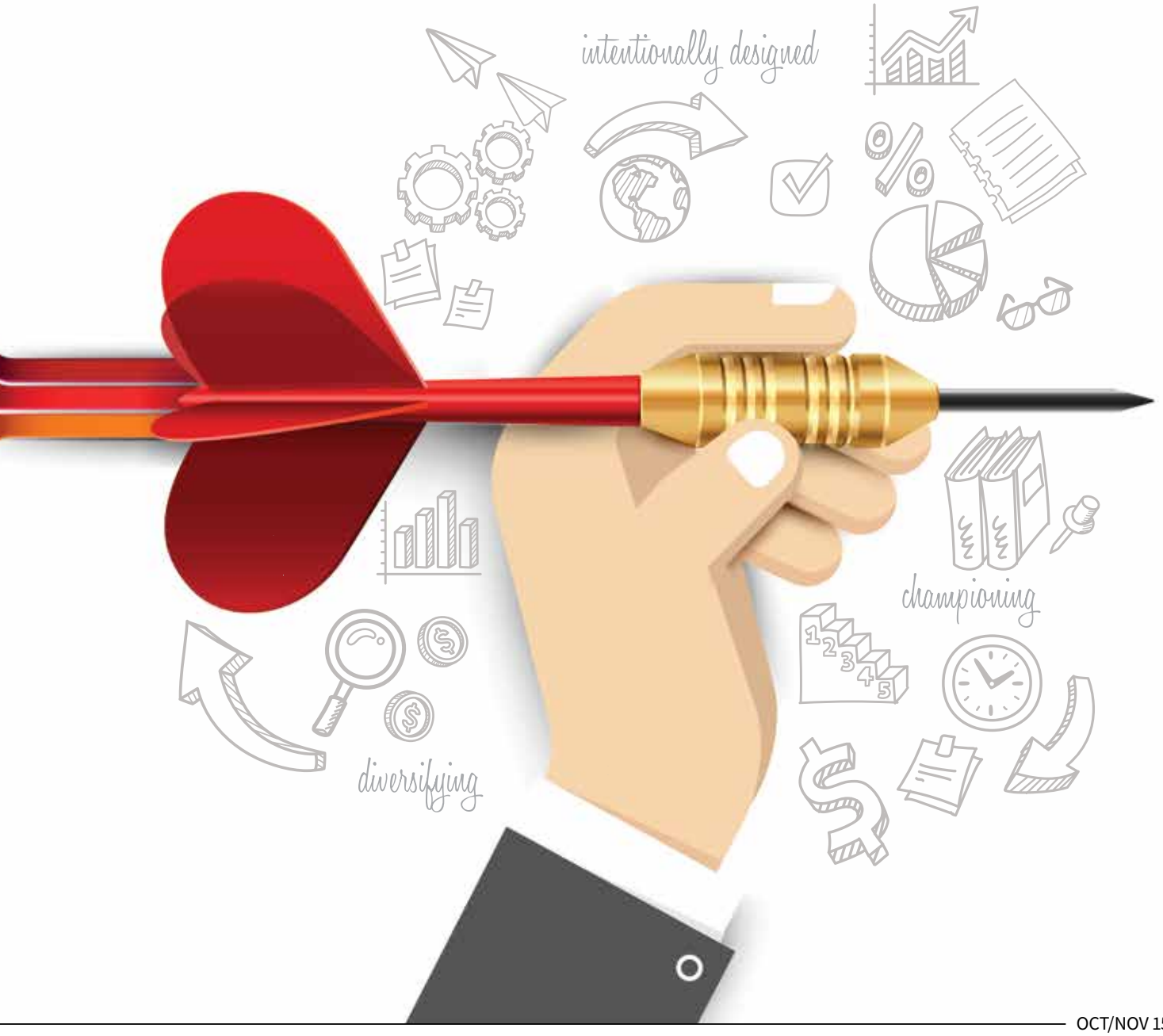
PREQUALIFICATION EDUCATION

The first goal of the Learning Strategy is to "**enhance**, through education and training, the value of the SOA's credentials and the attractiveness of the actuarial profession." The word "enhance" was specifically chosen, as maintaining the value of the credential is not enough.

A task force was formed in June to review the ASA curriculum to ensure that the curriculum covers the learning outcomes that all actuaries should master, both now and into the future. The task force will determine the breadth

RNING STRATEGY

BY JEREMY BROWN AND KORY OLSEN



and depth of the topics covered. It will also align the SOA curriculum with the current revisions to the IAA requirements. One item in the revised IAA requirements that is not sufficiently covered in the current ASA curriculum is modeling. The new ASA curriculum will also include relevant topics in predictive analytics.

Education volunteers will be investigating the availability and feasibility of enhanced/alternative methods for ASA pathway education, assessment and validation. The desire is to use state-of-the-art education and assessment methods, using the best tool for the selected purpose. Some possible outcomes of this investigation could include the addition of seminars, use of spreadsheets in the assessment process and electronic capture of written-answer exams in the SOA education system.

Once the ASA curriculum is revised and the state-of-the-art education and assessment methods are known, the FSA curriculum and testing methods may be affected. Changing the base ASA curriculum may result in changes and enhancements to the FSA curriculum. With the ASA curriculum supporting predictive analytics, the subject can then be appropriately reflected in each FSA track.

The updated ASA curriculum is expected to be implemented by June 2016. The first new course/exam is expected in July 2017. Full implementation of the new curriculum is expected by July 2018. A modeling course may be the first new course/exam. This would support the IAA requirements and provide fundamental education in predictive analytics. This course may use a blended format incorporating e-learning, a seminar and rigorous assessment.

PROFESSIONAL DEVELOPMENT

The second goal of the Learning Strategy is to "promote the evolution of the actuarial profession through **intentionally designed** post-qualification education products and services." Prequalification education is intentionally designed with curriculum, learning objectives and outcomes. Professional development needs to be viewed more in this light.

A curriculum framework will be established for professional development. This will define and implement an intentional curriculum approach to professional development for specific content area(s)—predictive analytics, for example. The curriculum will outline a course of study and define teaching methods for specific and targeted content areas based on need (e.g., emerging areas, bridging practice areas).

Predictive analytics is an area that is viewed as having significant potential for actuaries. As such, it will be the first content area to have a professional development curriculum created. The curriculum will drive enhanced professional development offerings starting by July 2016.

... AND BEYOND

The third goal of the Learning Strategy is to "**expand** the profession's influence by **championing** innovative learning communities and **diversifying** the SOA's products and services." This

LEARNING STRATEGY TASK FORCE VISION

1 **Aspirational:** We hope to work toward the aspirations set forth in the SOA's vision statement. In doing so, we aim to maintain the high value (and improve the perceived value) of the SOA's credentials and the profession.

2 **Future and globally oriented:** We hope to enhance the role of the SOA as educator of and contributor to the body of knowledge for risk professionals and their support workers across various industries. We hope to prepare SOA candidates and members for broader roles, recognizing the global nature of our profession and the wide applicability of the actuarial skill set to support the financial security of individuals, organizations and society.

3 **State-of-the-art:** We hope to deliver quality, pedagogically sound and state-of-the-art teaching, learning and assessing in support of the Education Philosophy with the view of encouraging continuous improvement. We hope to define and maintain a complete actuarial curriculum.

goal pushes us to go beyond what we have typically done, in areas where we have only dabbled in the past or have not been in previously.

This includes determining if other actuarial organizations globally have an interest in SOA education components (prequalification education and professional development) and partnering with the interested actuarial organizations to deliver a product that

The Learning Strategy aligns with the SOA's strategy, mission and vision.

4 **Lifelong learning:** We hope to bring professional development the same level of focus as prequalification education. In doing so, we hope to enable members and others to remain current with respect to actuarial methods and technical knowledge and skills, with focus given to both current and future applications.

5 **Operational excellence:** We hope to deploy the right people, partners and resources in the right roles.

LEARNING STRATEGY TASK FORCE MEMBERS

Kory J. Olsen, Chairperson
Jeremy J. Brown
Ian G. Duncan
Stephen A. Eadie
Edward W. Frees
Ken Guthrie
Stuart Klugman
R. Evan Inglis
Jennifer L. McGinnis
Richard D. Philips
Judy Powills

findings

CURRENT WORK ON LEARNING STRATEGY INITIATIVES

ASA Curriculum Review/Enhancement

The Board established a task force to set the global standard for a complete actuarial curriculum by enhancing the value of the credential and ensuring the curriculum prepares actuaries for current and future responsibilities.

Predictive Analytics Curriculum for Professional Development

The Professional Development Committee (PDC) has established a working group to expand and enhance the predictive analytics curriculum for professional development to build upon the foundational, ASA education learning outcomes for this topical area.

Professional Development Curriculum Framework

The PDC-directed working group is defining and implementing an intentional curriculum approach to professional development for specific content areas (e.g., predictive analytics).

Professional Development Partnerships Framework

The PDC-directed working group is investigating a framework to define appropriate partnerships for education development and delivery to meet the needs of the SOA's professional development curriculum. Best practices identification and benchmarking will be an integral part of the framework.

Market Evaluation—Global Markets

SOA staff are researching whether other global actuarial organizations have an interest in existing SOA education components (prequalification education and professional development) in order to provide globally accessible education and validation.

meets their needs and enhances what we already do. For example, the SOA e-learning course, Fundamentals of Actuarial Practice (FAP), could easily be used by other actuarial organizations. To do so, we would need to de-emphasize the North American focus of the current FAP examples and provide more international examples. This would strengthen the educational experience for all.

CONCLUSION

The Learning Strategy initiatives will influence and guide SOA education in both the near term and long term. These initiatives will move SOA learning forward and equip it with the tools to better serve our candidates, members, employers and the public. ■

Kory Olsen, FSA, CERA, MAAA, is assistant vice president at Pacific Life Insurance Company in Newport Beach, California. He is also the SOA academic board partner.

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Jerry Brown, FSA, EA, MAAA, recently retired from Mutual of America. He was the company's executive vice president and chief actuary. He is the SOA board partner for Education.

jeremybrown2682@gmail.com

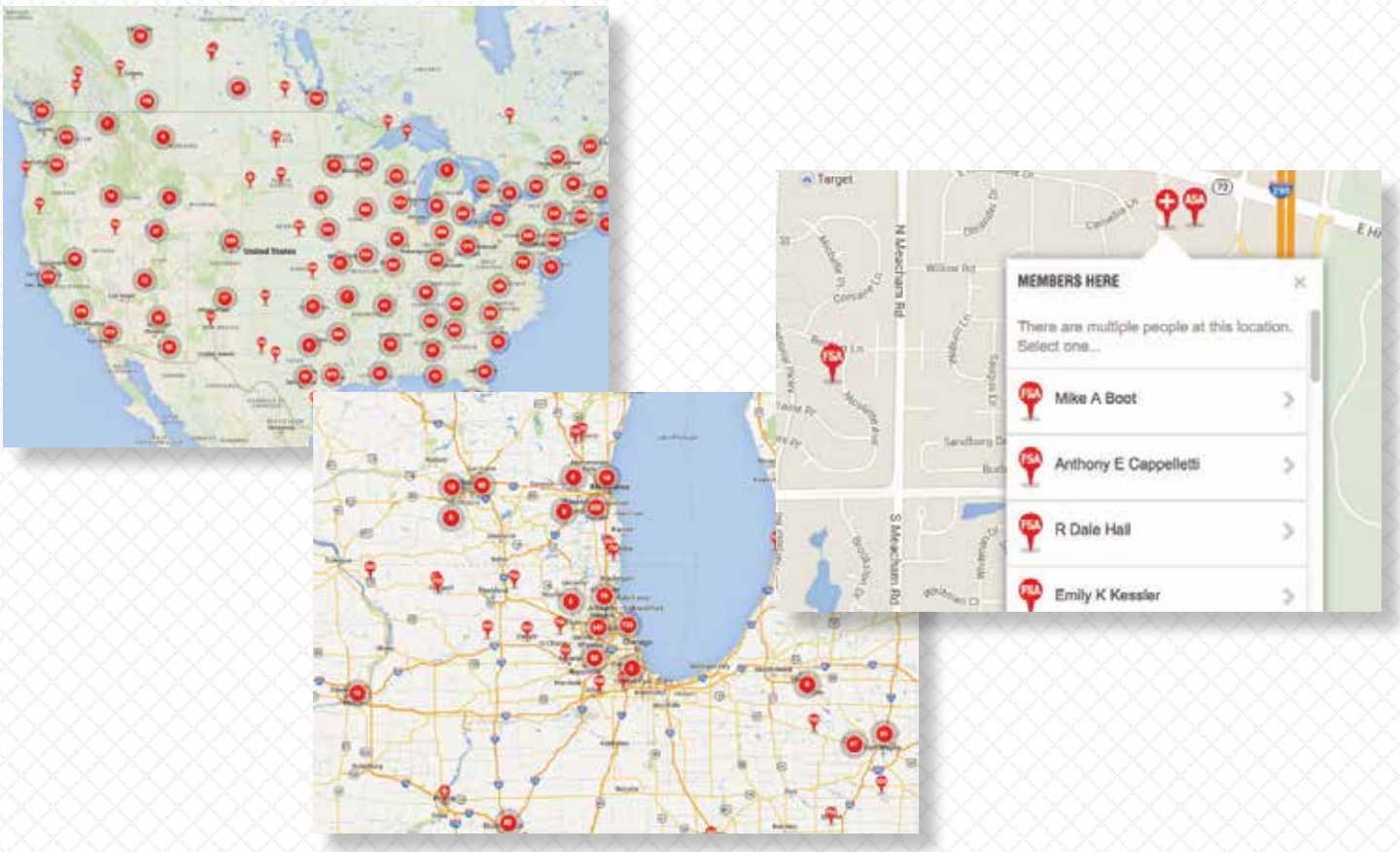
SOCIETY OF ACTUARIES

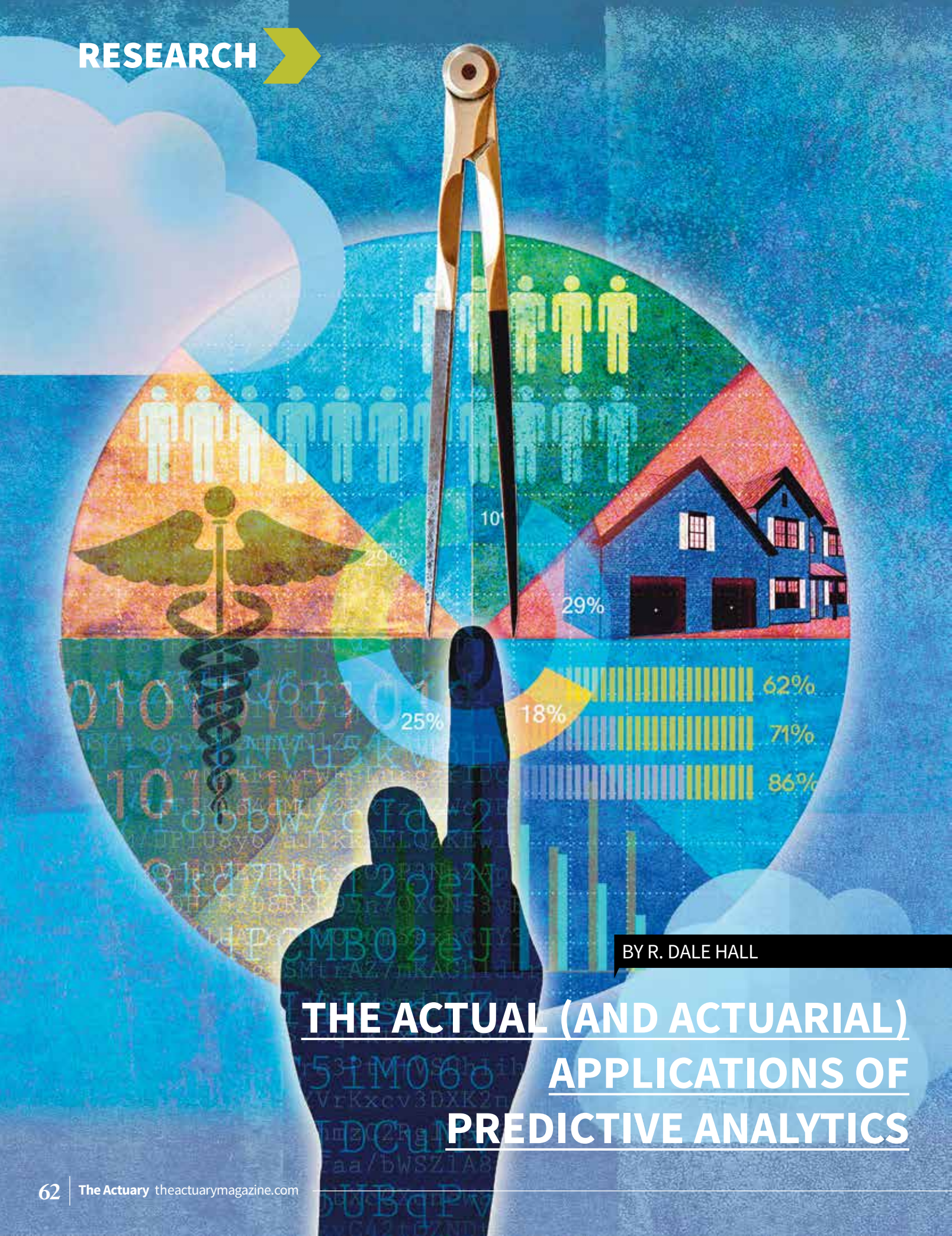
SOA Explorer Tool

Find Fellow Actuaries Around the Block or Around the Globe

The SOA Explorer Tool is a global map showing locations of fellow SOA members and their employers, as well as actuarial universities and clubs.

To use the SOA Explorer Tool, visit *SOA.org* and sign in as a member.





BY R. DALE HALL

THE ACTUAL (AND ACTUARIAL) APPLICATIONS OF PREDICTIVE ANALYTICS

VISIT SOA.org

Visit **http://SOA.org/predict** for more SOA resources on predictive analytics.

action

Big data is an often talked about topic, both among the public and our profession. As actuaries, we can serve an important role by using modeling and data analysis techniques on large data sets to discover predictive patterns and relationships. With the emergence of big data use, we also face new challenges.

As businesses look for new ways to mine data, it is important to understand how to gain real meaning through the data analysis and application. *CIO Magazine* referenced how automakers and insurance companies are teaming up to provide mobility solutions that are more than just transportation services. That means there is also a need for actuaries to help provide new insights in addressing these and other future challenges facing our profession and the companies we serve.

The 2015 SOA Annual Meeting & Exhibit featured several sessions on big data, which serves as an example of the pervasive use of predictive analytics across the profession, from life and health to property and casualty. There were sessions on health insurance big data, using predictive analytics in setting actuarial assumptions, machine learning, marketing and distribution, and also on how to build an effective predictive analytics team.

The SOA recently created a report providing educational background on the process of building predictive models, from data preparation to the selection and interpretation of models. This project focuses on insights with post-level predictive modeling within life insurance. The SOA's Committee on Finance Research also issued a new predictive analytics report examining the process of creating models and interpreting results. This report illustrates a case study on applying predictive modeling to long-term disability pricing. Topics include data selection, model development and model validation, among others related to predictive analytics. Also, the SOA is currently conducting a study that will serve as a primer on predictive analytics in health care.

Look for more from us, as the SOA continues its research and highlights the ways predictive analytics and data visualization are being championed by our profession. ■

RELATED LINKS

CIO Magazine article
http://bit.ly/1MlEUGu

Post-level lapse study
http://bit.ly/1NHWAeR

Models case study
http://bit.ly/1U6oOEY

R. Dale Hall, FSA, CERA, MAAA, is managing director of Research at the Society of Actuaries.

dhall@soa.org

GOOD RESEARCH READS

SOA ANNOUNCES MULTIEMPLOYER PLAN STRESS METRICS REPORT

The Society of Actuaries (SOA) released a new report measuring the stress posed by unfunded liabilities and changing demographics across the system. The high stress levels observed in this analysis raise the question of how the system might cope in the future.

http://bit.ly/1fEl0YL

PENSION RISK MANAGEMENT REPORT ON THEORY AND PRACTICE AVAILABLE

The SOA released a new report on bridging the gap between theory and practice in pension risk management. The report examines corporate pension risk and corporate finance.

http://bit.ly/1EgP4Fx

2014 CREDIT DISABILITY STUDY REPORT RELEASED

The Credit Insurance Experience Committee has completed a new report, which serves as an update to the 2004 study. As a part of the Principle-Based Reserve (PBR) effort by the NAIC, the section of the Valuation Manual dealing with credit insurance reserves (VM-26) contains a standard that single premium credit disability reserves will be based on a modified version of the 1985 CIDA table. With the potential adoption date of PBR within the next few years, it is important to ensure the standard remains appropriate. This study examines the experience in 2008 and 2013 in this regard.

http://bit.ly/1NzUVsz

STUDENT RESEARCH COMPETITION

During the Actuarial Research Conference, the SOA unveiled a new case study research competition for colleges and universities. The competition will provide a forum for students to showcase their knowledge, develop new and creative research ideas, and enhance their exposure to the profession. A formal document outlining the competition rules along with the research topic will be issued in February 2016.

http://bit.ly/1Eh11uS

To view a complete listing of Completed Experience Studies and Completed Research Studies, visit **http://SOA.org/Research**.

Notice of Disciplinary Determination

ON MAY 5, 2015, the Joint Disciplinary Council (JDC) convened a Disciplinary Panel to review the actions and testimony of Kenneth P. Shapiro, FSA, MAAA, in connection with his services as an expert witness in 2013. The JDC Disciplinary Panel determined that Mr. Shapiro should be disciplined for material violations of Precepts 1, 2, 3 and 12 of the *Code of Professional Conduct (Code).*[i] Based on the determinations of the JDC Disciplinary Panel, and pursuant to the Society of Actuaries' (SOA) Bylaws, the SOA has suspended Mr. Shapiro's membership in the SOA for a period of one year, effective July 28, 2015.

Precept 1. Mr. Shapiro materially violated Precept 1 of the *Code* when he failed to perform professional services as an expert witness with appropriate skill and care. In his report, Mr. Shapiro incorrectly stated that the only basis allowed by Congress for determining the funded status of a retirement plan was using the segment rates under the Internal Revenue Code § 430, as modified by the Moving Ahead for Progress in the 21st Century (Map 21 rates). Mr. Shapiro's expert report reflected a mistaken understanding of the minimum funding rules.

Precept 2. Mr. Shapiro also materially violated Precept 2 of the *Code.* Mr. Shapiro admitted that he issued statements of actuarial opinion even though he had not met the applicable requirements for continuing education prior to performing such services. Mr. Shapiro incorrectly believed that his retirement status exempted him from meeting the continuing education requirements for issuing statements of actuarial opinion.

Precept 3. Mr. Shapiro materially violated Precept 3 of the *Code*, which requires an actuary to observe applicable Actuarial Standards of Practice (ASOPs). The expert testimony provided by Mr. Shapiro did not conform to ASOP Nos. 4 and 17.

- With respect to ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, Mr. Shapiro incorrectly asserted that the Map 21 rates provided the only appropriate basis for determining the plan's funded status for all purposes, and not just for purposes of determining the minimum required contribution for a year.
- In his testimony, Mr. Shapiro stated that using a methodology other than the one he proposed violated "actuarial practices and actuarial theory." His testimony did not conform to ASOP No. 17, *Expert Testimony by Actuaries*. ("When the actuary testifies concerning other relevant testimony, including opposing testimony, the actuary should testify objectively, focusing on the reasonableness of the other testimony and not solely on whether it agrees or disagrees with the actuary's own opinion.")

Precept 12. In connection with his expert testimony, Mr. Shapiro wrongfully used the membership designations for the American Academy of Actuaries and the Conference of Consulting Actuaries, even though he was not then a current member of those organizations.

All members of the SOA are reminded of their responsibility to follow the *Code of Professional Conduct*.

[i] **Precept 1**: An Actuary shall act honestly, with integrity and competence, and in a manner to fulfill the profession's responsibility to the public and to uphold the reputation of the actuarial profession.

Precept 2: An Actuary shall perform Actuarial Services only when the Actuary is qualified to do so on the basis of basic and continuing education and experience, and only when the Actuary satisfies applicable qualification standards.

Precept 3: An Actuary shall ensure that Actuarial Services performed by or under the direction of the Actuary satisfy applicable standards of practice.

Precept 12: An Actuary shall make use of membership titles and designations of a Recognized Actuarial Organization only in a manner that conforms to the practices authorized by that organization.

CONTACT Ezra Penland AT actuaries@EzraPenland.com

ARIZONA – MEDICAID EXPERIENCE
Health actuary with management experience and Medicaid experience sought by Arizona insurer for Position 66188. FSA or ASA.

ILLINOIS – MEDICARE/MEDICAID EXPERIENCE
Illinois insurer seeks a health actuary at the FSA level with Medicaid and Medicare experience for Position 66161. Requires 10+ years of healthcare actuarial experience. Pricing, business strategy and cost trend analysis role.

MIDWEST USA – OPEB ACTUARY
Midwest consulting firm is looking to hire an OPEB actuary at the FSA or ASA level for Position 64687M. Must have Other Post-Employment Benefits experience. Client is looking for an exceptionally self-motivated actuary.

NORTHEAST USA – FINANCIAL DIRECTOR
Financial director and health actuary role is now open at a Northeast USA insurer for Position 66181. FSA with 10+ years of experience preferred.

TEXAS – GROUP PRICING ACTUARY
Texas insurer seeks a health actuary for a prominent group pricing role for Position 66197. FSA with 10+ years of experience preferred. Ideal candidates will have some supplemental health experience.

USA – VICE PRESIDENT AND LIFE ACTUARY
Vice President FSA life pricing actuary and analytics leader is sought by a USA insurer for Position 66166. Generous compensation package. Leadership experience required. Must have 12+ years of actuarial experience.

NEW JERSEY – FSA/ASA 10+ YRS OF EXP
New Jersey life insurer has asked Ezra Penland to find an ASA or FSA actuary for Position 66349. Requires 10+ years of life actuarial experience. Senior pricing and valuation role.

NORTHEAST USA – LIFE VALUATION ACTUARY
Valuation and financial reporting actuary needed by our Northeast USA client for Position 66222. ASA or FSA with 5 to 12 years of experience ideal.

IOWA – ASSET/LIABILITY MODELING ACTUARY
Asset/liability modeling actuary is immediately sought by an Iowa insurer for Position 65858. ASA or near-ASA with 3+ years of actuarial experience preferred.

MASSACHUSETTS – MODELING / ERM ACTUARY
For Position 66175, a Massachusetts insurer is searching for a Life FSA. Life modeling and ERM opportunity. 5 to 14 years of life actuarial experience preferred.

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4. Make meaningful contributions to your company, your team and the profession.

SEMINAR

Advanced Business Analytics
Chicago
Nov. 10–12, 2015
A blend of theory and practice with theoretical discussion that emphasizes concepts and intuitions rather than mathematical formalism.
http://bit.ly/1hlNbxp

PODCASTS

Introduction to Multiemployer Pension Plan—Part 1
An overview of multiemployer plan design.

Funding for Multiemployer Pension Plan—Part II
Historical funding rules, new fund rules and risks bearing in multiemployer plans are covered.
http://bit.ly/1DuMdD3

E-COURSE

Decision Making and Communications
Learn to make decisions related to complex business problems that require the involvement of many stakeholders and decision makers.
http://bit.ly/1LiZ6bP

Visit **SOA.org/calendar** for the full complement of professional development opportunities.

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SOCIETY OF ACTUARIES

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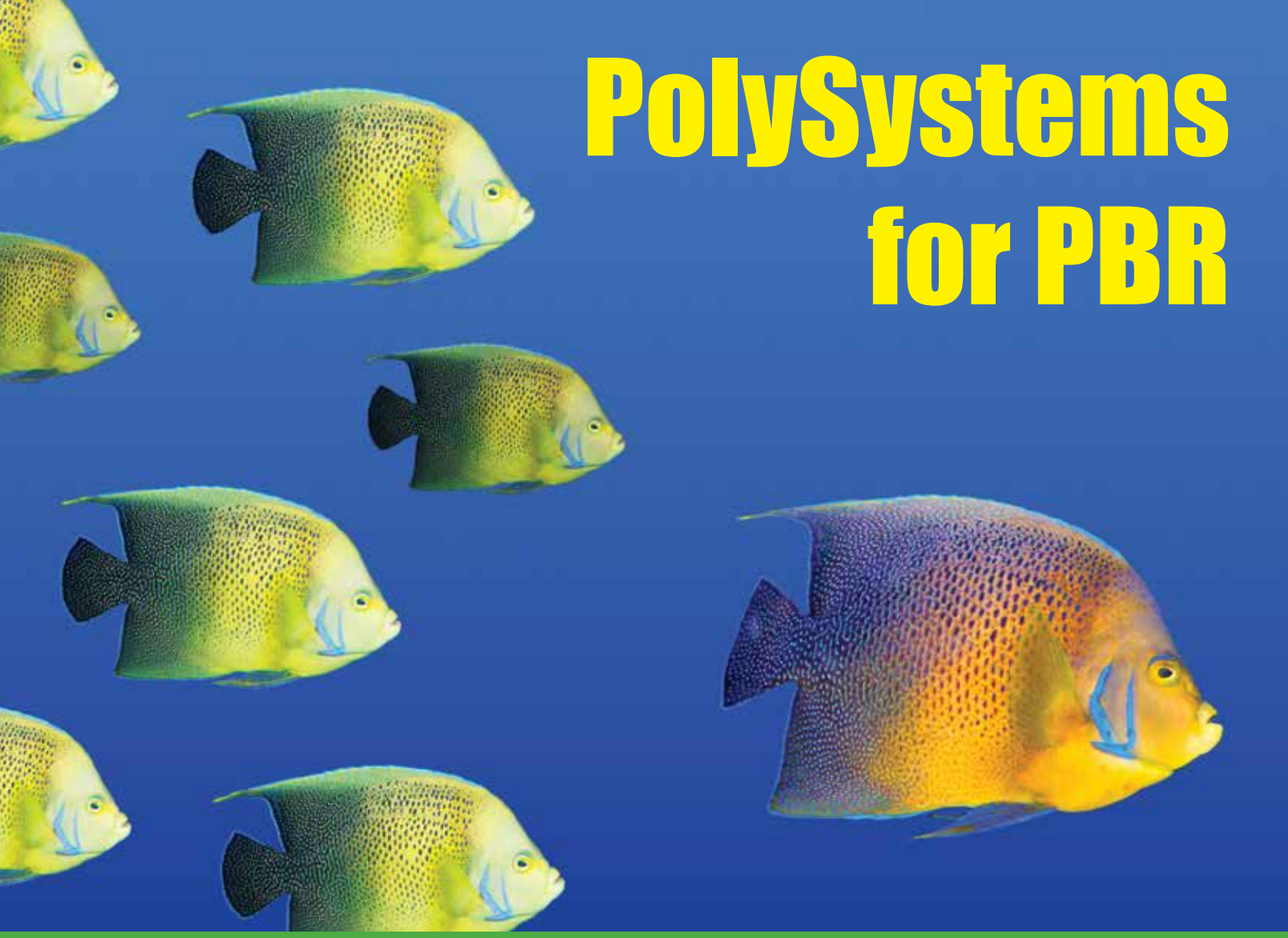

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