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AROUND THE WORLD WITH Mary Frances MILLER

Back row (l to r): Steven Frost, Jennifer Hart, Jill Grayson, Claudine Cox, Lauren Lee, Jesse West,
Front row (l to r): Bonnie Ten-Pow, Barbara Roman, Aimee Kaye, Ted Jackness, Robyn Taylor, Patty Kent.

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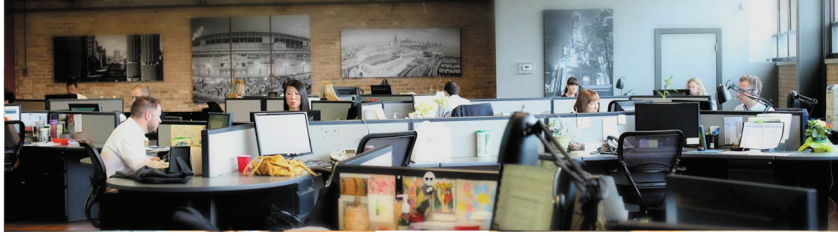

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Jill Perlstein rejoins DW Simpson as Senior Director, Retained Search Services division (RSS).

Perlstein will be responsible for identifying new opportunities that highlight RSS' competitive advantage in the placement of actuarial and other insurance analytics professionals.

She brings to the role more than 17 years of talent acquisition and management experience within the insurance and financial services industry.

Jill initially joined DW Simpson in 1998 as an assistant recruiter to CEO and Founder, Patty Simpson. After six successful years at DW Simpson, Jill went on to take progressively more responsible positions in talent acquisition at Hartford Life Insurance, Travelers and Marsh & McLennan companies.

Perlstein is happy to be back on the DW Simpson team and looks forward to bringing her expertise in the industry to this new opportunity. Jill earned her bachelor's degree in Psychology from the University of Illinois.

RETAINED Chief Actuary, Pricing (California): Northern California P&C super-regional, employee-owned insurance company is looking to hire an Chief Actuary to lead the actuarial function and set the direction of the company's risk strategy. This position reports directly to the President and CEO, is a key member of the executive team. Role involves product development, pricing, reserving, reinsurance, risk abatement and financial management. (#46357)

RETAINED P&C Actuary (Wisconsin): Mutual financial services company in Madison seeks FCAS or exam-taking ACAS with about 6 years of experience to accept significant freedom in reserving analyses and solutions for actuarial problems. PL experience highly desired. Role is an important part of the department's succession-planning. Will manage a small staff. (#45105)

Chief Actuary, Strategic Initiatives / Reserves (Canada): International insurance and underwriting company seeks FCAS/FCIA to serve as a leader with executive presence to oversee the actuarial department and drive & develop strategic initiatives. Position requires 10 years of experience, preferably in Commercial Lines/Specialty Lines. (#45074)

Mortgage Segment Actuary (Bermuda): Large Bermuda based insurer seeks Actuary to assist in all facets of their mortgage segment. Candidate should have exposure to insurance, credit risk, mortgage credit risk, corporate credit risk, and financial banking. Our client has flexibility on exact background and may consider non-actuarial backgrounds and CFAs. Ideally this individual will have some exposure to programming and data mining. (#46511)

Reserving Actuary (New York): Insurance company in New York City seeks recent FCAS with strong reserving experience. Will report to Chief Reserving Officer and be charged with leading projects. Competitive base salary and annual bonus package included. (#46562)

Pricing Actuary & Vice President (New Jersey): National insurance company in the Northeast seeks skilled VP and Pricing Actuary to provide actuarial support for business segments in casualty lines and workers compensation. Work will involve monitoring pricing performance and procuring new clientele. You will ensure profitability with reviews and analyze business segment expansion. Ideal candidate will have ACAS/FCAS designation along with strong analytics and communication skills. (#45729)

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actuarial REVIEW
May/June 2016

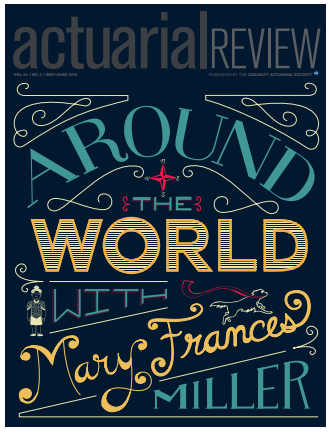
departments

FSC LOGO

on the cover

Around the World with Mary Frances Miller

BY LAURIE MCCLELLAN



Traveling is a truly symbiotic relationship for Mary Frances Miller: She imparts her knowledge and gains new found wisdom through the course of her journeys.

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Russia: Transforming the Actuarial Profession Amidst Economic, Political Woes

BY GREGORY BABUSHKIN AND NICKOLAY KUZNETZOV

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Moscow never sleeps, they say, and it seems that for more than 300 actuarial professionals currently working in insurance and pensions in Russia, this was a painful yet welcome reality over the last two years.

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actuarialREVIEW
The magazine of the
Casualty Actuarial Society

Be Like Mary Frances

Feel like you need an adventure? Want to give back in a big way? Want to expand your world and interests and use your mind outside of work? If you're looking for someone to emulate, look no further than the CAS's own Mary Frances Miller.

Many of you know Mary Frances Miller — for those who don't, here's a brief run down. She began volunteering at the CAS as a member of the CAS Examinations Committee and gradually went on to embrace larger leadership roles within the organization. She served as vice president-admissions from 1999-2001 during the era of the "transition rules" when the CAS exams went from 10 to 9 — a very controversial time. In 2003 she was elected CAS president and was elected president of the American Academy of Actuaries in 2011.

Her volunteer work with the CAS has run the gamut from international issues such as mutual recognition to strategic ones such as education policy and long-range planning. She has delivered the Address to New Members a time or two; is a frequent speaker at meetings for the CAS, Academy, Risk Management Society and Professional Risk Managers' International Meeting Association; and is an honorary Fellow of the Institute of Actuaries (U.K.). She is also an entrepreneur, small business owner, educator, leader, dog lover, actuary, Nashvillian and global citizen.

That's just a small part of who Mary Frances Miller is. Our cover story features Miller's work on behalf of the actuarial profession. I hope that you enjoy it and find some inspiration in this story of a dedicated CAS volunteer leader.

(By the way, I love our cover design this issue! I want to acknowledge the excellent work of our designer, Graphek.)

Your Opinions Wanted

Actuarial Review is interested in learning our readers' opinions. We have two columns in our View Point department devoted to reader opinions: "In My Opinion" and "Random Sampler." "In My Opinion" deals with issues facing the insurance business and actuarial profession. "Random Sampler" aims for more of a work-life balance with subjects geared to everyday life outside of the office.

We'd love to see your proposals for submissions. Please email us at ar@casact.org.

Actuarial Review always welcomes story ideas from our readers. Please specify which department you intend for your item: Member News, Solve This, Professional Insight, Actuarial Expertise, etc.

SEND YOUR COMMENTS AND SUGGESTIONS TO:
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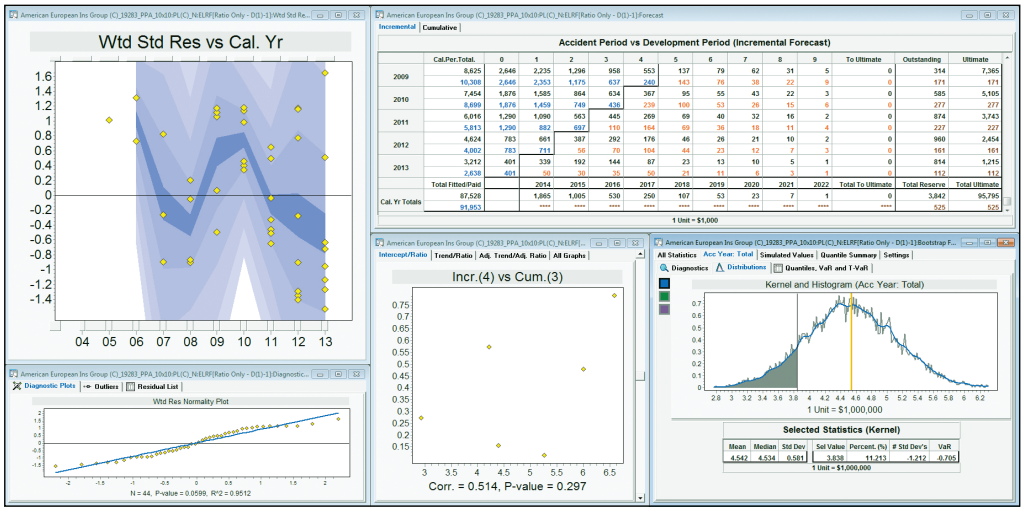

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Why We Exist Redux — Volunteer Benefits

Volunteerism is critical to the CAS. While the CAS has a great staff, it is the volunteers who make and grade our exams, plan and deliver the programs at our meetings, write papers and articles reflecting our research, and manage our relationships with universities and other organizations. Volunteers strategize about our organizational needs and direction, determine CAS policies, award scholarships, build budgets and govern; in short, volunteers set the destination and chart the course in all aspects of CAS operations.

Each year, about one in three CAS members serve as volunteers. This level of member participation has remained constant for years, and it is a source of strength and pride for the organization. CAS leadership monitors the level of volunteerism and would certainly be concerned if it were to decline for any reason.

The CAS obviously benefits directly from all of this volunteerism. However, equally important, our dedicated volunteer workforce benefits our individual members and their employers. Here are five reasons volunteerism is good for all stakeholders.

1 Volunteerism creates community.

The collective effort and work of CAS members in the U.S., Canada and all over the world is a key element of our culture and knits us all together. Joining a committee or task force affords members the opportunity to meet and work with others outside of their immediate sphere. And, contributing time and energy to an organization gives one a sense of ownership in it, ultimately leading to a strong sense of commitment to it. This sense of community may start slowly with new members (although I certainly didn't feel it when I attended my first CAS meeting), but it usually builds over time and over the course of one's career. While some may feel that our strong sense of community is a pretty intangible benefit, it should not be underestimated as a force that sustains the CAS. Our volunteerism is core to our society. Other actuarial organizations have told me how much they envy this aspect of the CAS.

2 Volunteers help develop the profession.

We all benefit when the actuarial profession is recognized and respected by our audiences. To maintain recognition and respect, the profession needs to be seen as continuously improving and developing, keeping up with changes in society, regulation and technology. The profession is advanced through continuing education, research and strategic planning, through which new ideas and approaches are developed and brought into the mainstream of actuarial practice. Members benefit from the ongoing and new opportunities that are created, and employers benefit when we contribute to them in valuable ways. The ongoing development of the profession would not happen without the volunteer efforts of our members.

Our greatest and earliest example is the creation of the Society itself, in which a group of early actuaries came together and devoted themselves to developing a constitution and membership criteria. Once established, volunteers took it upon themselves to write and present *Proceedings* papers, and still other volunteers dug deeper into the subjects, deciding to write discussions of these papers — and sometimes even discussions of the discussions! Volunteers wrote study notes, monographs and textbooks. Our contributions to the development of important new areas, such as risk-based capital and ERM have been significant, as have our contributions to predictive modeling. Today we are contributing to development in areas as diverse as climate change and automated vehicles.

3 Volunteering is a development opportunity.

Opportunities for advancing important professional skills abound in the volunteer's life: Volunteers have the opportunity to develop speaking skills, people skills, team skills and leadership skills. While presenting at one of our meetings can be daunting to the novice, it affords a low-key environment in which one can hone one's skills, starting as a panelist at a small meeting and progressing from there. Similar points could be made about chairing a committee or leading a task force, where teamwork and leadership skills can be developed. These opportunities for professional development are valuable, both to the individual and to their employer, as they can be transferred from the CAS environment to the workplace.

4 Volunteers build networks.

Working as a volunteer provides the opportunity to develop new relationships with fellow actuaries,

President's Message, page 10

How effectively and efficiently is your company implementing ISO loss costs, rules, and forms updates?

Consider the following:

75+ ISO circulars
are issued each week on average

10+ people
on average are involved in analyzing an ISO update

70+ work days
average time spent manually processing an ISO update

30%
of the time spent analyzing and interpreting the change

40%
of the time spent implementing system changes

As pressure to reduce expenses and improve underwriting profitability mounts, the limitations of manual processes are more apparent than ever. Some insurers are seeing dramatic improvements in their efficiency by automating their processes.

In fact, by using ISO content in electronic format, insurers have realized on average:

A 39% reduction
in overall work hours

A 58% decrease
in work time for IT modifications

A 35% decrease
in overall cost

A 7-month improvement
in being current with ISO

The reduced work-time benefit of using ISO content in electronic format enables insurers to implement critical coverage and rule updates more quickly and easily. As ISO makes policy language updates in direct response to legislative or regulatory changes, insurers benefit greatly from speedy implementation: they may be first to market with new offerings; and they can quickly make updates that relate to coverage intent, which may lead to fewer claim implications.

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Source: Novarica Research Partners Program Report,
ISO Support: A Comparison of Manual and Electronic Practices

President's Message

from page 8

beyond one's co-workers. Over time, the CAS volunteer builds a strong network of lasting relationships. In addition to benefitting from the broader perspective offered by newfound friends, the network can contribute to a successful career. This has certainly been my personal experience. For example, early in my career, I volunteered to work on an actuarial task force that was supporting the National Association of Insurance Commissioners' efforts to develop and implement risk-based capital requirements. Over two years, I worked closely with about 20 others, most of whom I had never met before, on what was a very cutting-edge area at the time. Twenty-five years later, I still count many of the members of that task force as friends, whom I look forward to seeing at CAS meetings.

Over time, the CAS volunteer builds a strong network of lasting relationships.

5 Volunteers get to shape the direction of the CAS.

What better sense of accomplishment could one wish for than to actively steer our professional organization and keep it on the cutting edge of actuarial practice? Volunteers contribute in their own ways to shaping the direction of the CAS; sometimes the contribution is small, and other times it is quite large. Obviously the CAS Board of Directors and Executive Council play a major role in setting the course for the organization. Others contribute by reworking statements of principles, revisiting the learning objectives for the syllabus, investigating alternative methods for testing knowledge, contributing to university engagement, developing relationships with other actuarial organizations around the world, and contributing to a working party. Rather than leaving the choice of direction to others, volunteers have a say, small or large, in setting the future direction of the CAS.

A Personal Choice

In conversations with employers, it is evident that they see the benefits of volunteerism. Actuarial leadership at most employers regularly give a gentle nudge of encouragement to volunteer. I recall vividly when Bill Wieder first congratulated me on becoming a Fellow, his second sentence was "Now it's time to get on an exam committee and see it from the other side!"

Volunteerism is a personal choice, in both the type and level of contribution. Volunteering for the CAS is not a requirement, and it would not be reasonable to expect everyone to volunteer. However, I am hoping that this article might cause some who are not currently volunteering to reconsider and, perhaps, others to consider upping their game. I, for one, have reaped immense benefits from volunteering — in all of the areas noted above — and I would therefore encourage everyone to volunteer at some point in their career.

Brothers in Arms

To the "It's a Puzzlement" Editor:

Unfortunately, I'm not smart enough to solve the January/February 2016 puzzle ("DNA Sequencing" by Jon Evans), but I did figure out the last name of the brothers in the puzzle: The Venters!

—Bruce R. Spidell, FCAS, MAAA, AIAF, ARC, CCP

ACTUARIAL REVIEW *LETTERS POLICIES*

Letters to the editor may be sent to ar@casact.org or the CAS Office address. Include a telephone number with all letters. Actuarial Review reserves the right to edit all letters for length and clarity and cannot assure the publication of any letter. Please limit letters to 250 words. Under special circumstances, writers may request anonymity, but no letter will be printed if the author's identity is unknown to the editors. Announcement of events will not be printed.

VOLUNTEERS WANTED!

Please complete the 2016 CAS Participation Survey when it is available online this July. If you have questions about volunteering please email Matt Caruso, the CAS Membership & Volunteer Manager, at volunteer@casact.org.

COMINGS AND GOINGS

Arthur R. Randolph II, FCAS, MAAA, CPCU, ARM, ARe, has been promoted to principal with Pinnacle Actuarial Resources, Inc. Randolph is based in Pinnacle's Atlanta office and has been a senior consulting actuary with the firm since July 2012. He previously worked for Towers Watson in Atlanta.

Allison Carp, FCAS, has been named assistant vice president at GEICO, where she is responsible for pricing, product and reserving. She began a career with GEICO in 1994. While serving as director of pricing and product management, Carp was instrumental in GEICOs reentry into the Massachusetts market. She previously served as director and assistant actuary in reserving.

Ryan A. Michel, FCAS, MAAA, has been appointed president and CEO of Allstate Insurance Company of Canada and subsidiary companies. Michel has reporting responsibility for the Allstate Corporation's entities in Canada, which include the Allstate Insurance Company of Canada, Pembridge Insurance Company, Pafco Insurance Company and Ivantage Insurance Brokers. He originally joined Allstate Corporation in 1996 and moved to Allstate Canada's leadership team in 2011, when he was appointed vice president and CRO of enterprise risk management.

Michael G. Kerner, FCAS, MAAA, has joined the Everest Re Group, Ltd. as EVP and head of strategy and risk management. He is the former CEO–general insurance for Zurich Insurance Group. He spent 24 years with Zurich in various roles, including CEO–global corporate in North America, global head of group reinsurance, general insurance CUO and group head of strategy.

EMAIL "COMINGS AND GOINGS" ITEMS TO AR@CASACT.ORG.

IN REMEMBRANCE

In Remembrance is an occasional column featuring short obituaries of CAS members who have recently died. Longer versions of these obituaries are posted on the CAS website at http://bit.ly/1qMk5vu.

Edward Paul Lester (FCAS 1974)
1941-2014

Edward Lester of Jamesville, New York, passed away December 1, 2014, in Syracuse. The son of the late Nathan and Marcia Lester, he was raised in Laurelton, New York.

He was a graduate of the University of Rochester. He received a master's degree in math from Washington University and a master's in computer science from Syracuse University. He worked as a programming analyst for Syracuse University.

Lester had wide-ranging interests and enjoyed sharing good conversation, food and wine with friends.

He is survived by his wife, Miriam; his sister, Vivian Fields; his in-laws, nieces, nephews and cousins. Memorial contributions may be made to the Brain and Behavior Research Foundation or the Multiple Sclerosis Society.

CALENDAR OF EVENTS

Interactive Online Courses
"Understanding CAS Discipline Wherever You Practice"
"Introduction to Predictive Modeling"
"Statistics for Reserve Variability Series"
www.casact.org/education/interactive/

May 15-18, 2016
CAS Spring Meeting
Sheraton Seattle Hotel
Seattle, WA

June 6-7, 2016
Seminar on Reinsurance
Hyatt Regency Boston
Boston, MA

September 18-20, 2016
Casualty Loss Reserve Seminar (CLRS) & Workshops
Hyatt Regency O'Hare
Rosemont, IL

October 6-7, 2016
Enterprise Risk Management for the P&C Actuary
Hotel Sofitel Philadelphia
Philadelphia, PA

October 27-28, 2016
In Focus: The Gathering Storm — Digital and Climate Disruptors
Marriott Montréal Chateau Champlain
Montréal, Québec

TWENTY-FIVE YEARS AGO IN THE *AR* BY WALTER WRIGHT

Into the Futures

We don't know what prompted Irwin Kent, in May 1991, to submit this letter about professional etiquette, but his advice still holds.

Professional Etiquette

To The *Actuarial Review:*

Many of our leaders work hard to establish good working relationships between our profession and the IRS, Treasury Department, DOL and PBGC [Pension Benefit Guaranty Corporation].

It is unfortunate that at some of our meetings, derogatory comments are made about these organizations and members of these organizations.

While we disagree many times with what is done and with the rules we have to work with and live under, name-calling is unnecessary. It is in particular bad taste at an annual meeting of any of the actuarial organizations where many members of the government are in attendance.

I sincerely hope that all planning committee members will instruct their speakers that comments and discussions should be limited to facts and not chastisement or name-calling.

Irwin I. Kent
Past President
Conference of Actuaries in Public Practice

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CAS STAFF SPOTLIGHT

Meet Rick Gorvett, FCAS, Staff Actuary

Welcome to the CAS Staff Spotlight, a column featuring members of the CAS staff. For this spotlight, we are proud to introduce you to Rick Gorvett.

- **What do you do at the CAS?**
  I'm the CAS's first-ever staff actuary. This may simply mean that it took the CAS over 100 years to find someone crazy enough to take the job, but it's a real privilege and joy to be here! The position is still evolving, but I am taking on roles associated with research, education and exams, and am a spokesperson for the CAS and the casualty actuarial profession. It's an honor to get involved with so many projects and issues affecting our future, such as The CAS Institute, basic and continuing education offerings, and future actuarial skill needs.
- **What do you enjoy most about your job?**
  Working with wonderful fellow-staff members and interacting with incredibly talented CAS members. I also enjoy the variety of things that I've had a chance to get involved in. I love having the opportunity to contribute to the actuarial profession — I felt like I had a chance to do so as a teacher and a professor, and I *really* feel that there are opportunities to do so working at the CAS.
- **Hometown:**
  I was born in Elmhurst, Illinois, and grew up in another western Chicago suburb, West Chicago. Actually, I've lived all but one year of my life in Illinois — probably because I admire our politicians so much....

The Gorvett family. Rick is the tall one.

- **College and degree:**
  I have a bachelor's of science in math from the University of Illinois at Chicago, an MBA from the University of Chicago and a Ph.D. in finance from the University of Illinois at Urbana-Champaign. (I *told* you that I was somewhat Illinois-centric!)
- **First job out of college:**
  Actuarial analyst at Allstate Reinsurance.
- **Describe yourself in three words:**
  Witty, fun-loving, and (as my six-year-old son suggested) awesome! (I won't mention the words that my 12-year-old and 15-year-old suggested.)
- **Favorite weekend activity:**
  Anything, as long as my family (and preferably food and cabernet) is involved.
- **Favorite travel destination:**
  Disney World. My family belongs to the Disney Vacation Club, and we go there nearly every year. I know it doesn't sound sexy, like visiting Machu Picchu or something, but the whole family loves it — the planning, the visit and the memories. What more could someone ask for?
- **One interesting or fun fact about you:**
  Several years ago, after my very first CAS Board of Directors meeting, I was outside walking back to the hotel, when I tripped over a lizard and broke a tooth (my tooth, not the lizard's). When I got back home, I went to my dentist and explained how my tooth predicament came about. I think she and her assistant are still laughing.


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MEMBER PROFILE

Marcela Granados Lavoie Makes Her Mark

When Marcela Granados Lavoie, FCAS, speaks of her chosen field, her voice is alive with enthusiasm. It's evident that she is deeply committed to the actuarial profession and fully enjoys her work as a consultant. After years of hard work to achieve mastery in the field, Granados Lavoie today serves as a manager in the advisory practice of Ernst & Young LLP (EY), focusing on the insurance sector. She is engaged in strengthening the EY brand and in building her own.

Granados Lavoie is Mexican, but she was born in the United States while her father was working on his doctorate there. She was raised in Mexico City and earned a B.S. in actuarial science. Recognizing that her opportunities in her country could be limited, she decided to move to the U.S. to progress in her career. Once in the U.S., she met her first big challenge: The stringent actuarial exams required for certification and employment obliged her to continue her studies while holding down a stopgap job.

Once over that hurdle, however, Granados Lavoie began her career with Liberty Mutual in Boston, where she served as an actuarial analyst in personal and commercial lines, broadening her experience in research, reserving and financial reporting. From there she moved on to AIG, soon becoming an actuarial manager and senior actuary, where she was chiefly involved in predictive modeling and pricing, her particular areas of expertise.

In fall 2014, she joined EY, where she provides actuarial solutions and advice. Granados Lavoie serves as lead manager on predictive analytics and lead reserve actuary for large global insurance companies, many in Latin America, including those operating in high-inflation environments. Her clients are both small and large insurers, reinsurers and run-off companies, in locations around the globe.

"EY is great at helping people build their own brand," says Granados Lavoie. "As a huge firm with an extended global footprint, it does a lot of reserving and reviews for global clients," which enables her to gratify her passion for travel and deploy her skills in places as far-flung as Europe, India and Latin America. Proficient in three languages — Spanish, English and French — she is also expert at adapting to and working within different cultures, applying the "high-quality standards" she has gained in the U.S.

Beyond her consulting and client service with EY, Granados Lavoie looks to the CAS as a platform for further expanding her career. She is an active member of the CAS Committee on Reserves, assisting authors and reviewing their papers, which she describes as providing a window into "the practical implementation of methodologies related to the actuarial world." Working with the authors benefits her and EY as well, ultimately because the papers offer insights into the latest technologies and practices.

Marcela Granados Lavoie

Granados Lavoie is also a member of the CAS Committee on Diversity, a post that holds special significance for her. She firmly believes in a culture of inclusion but observes that, although the actuarial profession appears quite diverse, certain groups remain underrepresented. Diversity is a positive force for both the profession and for the individuals in it, she notes, adding that isolation hampers people and makes it difficult for them to respond to the demands of a competitive global environment and progress in their careers.

Granados Lavoie is making efforts of her own to attract Latinos to the profession and help advance the careers of those already in it. Her agenda includes forming a society of Latino actuaries, along the lines of the International Association of Black Actuaries, which has had noteworthy success in helping to increase the number of black actuaries entering the field.

Granados Lavoie is also busy preparing presentations for upcoming conferences. She will present at the CAS Spring Meeting in Seattle on California workers' compensation reforms and discuss books of business under changing economic conditions and differing degrees of inflation, an area she views as challenging for actuaries. In London this July, she will also present a times series model for the Cass Business School conference, "R in Insurance," which deals with innovative technology applications in insurance and actuarial science.

With her impressive background, there is no doubt that Granados Lavoie will continue to succeed and to establish her mark in the profession.

HUMOR ME BY URI KORN

Actuarial Thriller

Television and books are filled with police thrillers, medical dramas and legal thrillers, but surprisingly, I've never seen an actuarial thriller. I wondered why this is the case. I also wondered what an actuarial thriller would look like…

Eric Malone stood in Pat Goldstein, the chief actuary's, office.

"Ten points?! What do you mean the loss ratio is up 10 points?!" Pat's faced turned bright red as he pounded his fist on the wall.

Malone sat down on Pat's desk. "Hey, I don't make the numbers, chief."

"That's it!" Pat pointed a big finger at Malone's chest. "I'm through with you, Malone. I want your pencil and your calculator on my desk, now!"

Malone looked Pat in the eye. "It's not a mistake, chief. Loss emergence is through the roof this quarter."

"Is that so?" Pat sat down and stared at his computer thoughtfully. "I want you to get to the bottom of this, Malone. Track down what caused this. And don't rest until you find it."

Malone stood upright. His 5-foot-6-inch frame towered over Pat's desk. "You can count on me."

"Oh, and Malone."

"Yeah, chief."

"I'll be watching you. You screw this one up and you'll be back to scrubbing rate change data until you retire!"

Malone turned abruptly and exited the chief actuary's office thinking over his next move.

Malone thought about the problem before him. Nothing was making sense like the LDFs in the first duration of a long-tailed line triangle. He needed some help. He thought of Sammy Chen. He was still taking his exams and the material would still be fresh in his mind. Malone walked up a flight of stairs and into an empty office where Sammy was studying.

"I'll be watching you. You screw this one up and you'll be back to scrubbing rate change data until you retire!"

"Hey, Sammy. How's tricks?"

"Not great, Malone. Kid was up half the night. All of this studying with no sleep." Sammy looked back down at the study materials and started drifting off to sleep.

Malone shook him. "Stay with me, Sammy!"

Sammy opened his eyes. He looked terrible. "Too much studying."

"Listen to me, Sammy!" Malone put his hand on Sammy's shoulder. "You got to tell me. How can I analyze and pres-

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Humor Me

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ent results at a very fine level of detail. Concentrate Sammy!"

"You need to use creda... creda..." Sammy started drifting off to sleep again.

"Darn it, Sammy! Stay with me." Malone shook him. "Somebody get this man some coffee!" But it was too late. Sammy was fast asleep. Malone thought it over. What could Sammy have meant?

Malone was back at his desk thinking. His search felt futile like performing a rate study on a runoff book. His phone rang.

"This Malone?" a scratchy voice said into the phone.

"Listen, I'm not looking to make a switch now."

"I'm not a headhunter, I have some info. I may be able to help you with the reserve numbers."

"Who is this?" Malone shouted into the phone.

"Never mind that. Meet me at the actuarial bar on 8th in five minutes."

Malone signaled to the bartender. "I'll have a whiskey and a BA-II Plus."

"How do I know this isn't a trap?"

"What do you have to lose? The numbers are due in under an hour."

Malone heard a click and the phone went silent. He ran out of his cube over to the elevator bank and punched the button. He waited a couple of minutes and pressed the button again. Finally, a door opened, but the car was going up. He waited a couple more minutes. Eventually, another car arrived going down. He got out at the lobby and ran down to 8th where the actuarial bar stood on the corner and went in.

Malone looked around. The bar was filled with a shady cast of characters. There were actuaries studying while listening to loud music and while watching sports games. There were also some who were not even studying, reviewing papers not even on the syllabus.

Malone signaled to the bartender. "I'll have a whiskey and a BA-II Plus."

A short man walked across the bar to where Malone was standing. "Hey, you interested in some photocopied TIA notes? Real cheap."

"Get lost, punk," Malone told him as the short man scurried away.

The man sitting next to him spoke while looking down at his TI-87. From his choice of calculators, Malone could tell that this man didn't belong here. "Don't look over. I can help you."

"Talk," said Malone.

"We started writing some more business in California a couple of years ago. We knew it was a bad idea, but we couldn't resist it. It looks like it's finally catching up with us."

"Why you telling me this?"

"Let's just say bonuses weren't too great this year." The man turned off his TI-87 and turned to leave the bar. "You never saw me."

Malone was retelling the story to his wife, a lawyer, that night. "Wow, my job is so boring," she said. "I should have become an actuary." ●

Uri Korn, FCAS, is an AVP, actuary R&D for Axis Insurance in New York City. He is eagerly awaiting the call from AMC, HBO and NBC.

CAS Leaders Address Actuarial Science Programs at Drake, UConn BY ARNULFO MORENO, CAS COMMUNICATIONS AND MARKETING COORDINATOR

As part of their on-going university engagement efforts, CAS leaders traveled to Iowa and Connecticut earlier this year to meet with actuarial students and faculty.

CAS President Steve Lowe visited Drake University on February 24 to discuss the CAS's strategic initiatives and highlight the resources the CAS has to support students interested in pursuing a property-casualty industry career.

"Drake students enjoyed hearing about the opportunities available as a casualty actuary both inside and outside the insurance industry, said Susan Watson, interim assistant director of Drake's School of Actuarial Science and Risk Management. "Steve used an example of vehicle data assisting in claim investigation that was very interesting to the students. They also appreciated hearing about various roles and projects that Steve had worked on in his career, as well as ways that Steve felt his job had made a meaningful difference."

On February 29, CAS Immediate Past President Bob Miccolis visited the campus of the University of Connecticut, speaking to actuarial science students and professors about the CAS and the many resources offered to students through CAS Student Central, the organization's free membership program for students.

Miccolis also shared insights about his career and the property-casualty industry. "This is an exciting time in the insurance industry, with evolving technologies creating new professional opportunities. Young professionals also have more resources at their fingertips than ever before," Miccolis said.

The CAS Student Central program was launched over two years ago with the goal of guiding students through the maze of curricula and rigorous exams that ultimately lead to a challenging and rewarding careers as property-casualty actuaries. The program currently has over 4,000 members and recently launched a pilot initiative, the CAS Student Central Ambassador program, at 12 universities to identify and cultivate leaders at the student level.

"The visit from Bob was a huge success. Not only did we get to learn about the CAS, we also heard insights from his career that were valuable to all in attendance," said Rob Tavernier, actuarial student, and CAS Student Central Ambassador at the University of Connecticut.

Both Drake University and the University of Connecticut are participants in the CAS University Liaison program, which matches CAS members with academics and students to provide direct support from a practicing actuary. The program also helps facilitate the partnership between the academic community and the actuarial profession.

Bob Miccolis, left, spoke with students at the University of Connecticut. In the background, Pat Teufel sits amongst the students.

Employers See Value in New CAS Institute Credentials

BY MIKE BOA, CAS CHIEF COMMUNICATIONS OFFICER

As development of The CAS Institute (iCAS) continues towards its fall 2016 launch, various aspects of the new credentialing program are being explored to best position the program to potential credential holders and those who will employ them.

The CAS Institute will offer its first specialty credential in data science and predictive analytics to meet the growing demand among insurance professionals for resources to develop and demonstrate their expertise in that area. Other iCAS credentials for specialty practice areas will also be developed. While the CAS is gathering input from many sources, one key group — employers — will be a critical determinant of the credentialing program's success. If employers welcome and support building staff knowledge and competencies as certified experts in data science and predictive analytics, then the program will flourish.

Recognizing the importance of understanding employers' views, and with a desire to build credentialing programs that will meet their needs, The CAS Institute was the focus of a recent discussion of the CAS Employer Advisory Council (EAC). The discussion focused on the first planned offering in the area of data science and predictive analytics.

The Employer Advisory Council Feedback

Formed in early 2014, the EAC's mission is to understand employers' expectations for their CAS-credentialed professionals and assess the CAS's performance in delivering on those expectations. The EAC meets quarterly, including one in-person each year, and its meetings are facilitated by CAS Past President Pat Teufel, chair of the Employer Outreach Committee. The Council is made up of 12 members, representing a range of employers from large consulting firms to small insurance companies.

The EAC has been engaged for feedback on a wide variety of CAS initiatives, such as "travel time" for candidates (they think that five to seven years to Fellowship is just about right) and the affordability of CAS continuing education seminars (they've pushed the CAS to offer more lower cost options like webinars and live web-streaming from in-person events). But it is the new iCAS credentialing program that has garnered the most interest among the company representatives, given the importance of building a strong predictive analytics capability in an increasingly competitive marketplace.

Following are some of the highlights of the EAC's discussion on the first iCAS credential.

Will non-actuarial professionals in your organization be interested in obtaining the iCAS credentials?

Many non-actuaries doing data science work in insurance have post-graduate degrees in statistics, but they don't have a lot of knowledge of the insurance business. Several employers said that non-actuaries would be interested in a curriculum offering a foundation of insurance knowledge, which would help them in working with their actuarial colleagues.

Would your organization support and encourage employees to pursue these credentials?

Employers are generally supportive of professional development for their employees, and EAC members offered positive comments of support.

Taking it one step further, would you recommend that your organization support The CAS Institute credentials by providing study time or completion bonuses or both?

This level of support will likely depend on the demand for the skill set. Since the demand for data science and predictive analytics skills currently outstrips the supply, the support that a company provides to those pursuing iCAS credentials is likely to match the support that the company currently gives to those pursuing CAS and CPCU credentials.

What are the primary benefits to you as an employer for your employees to obtain specialty credentials?

According to several employers, having a program available to certify expertise in the field will be helpful — especially as companies build their data science departments "from the ground up."

Many companies develop professional education opportunities for staff in-house. One primary benefit of The CAS Institute is that it will provide another avenue for professional development, perhaps reducing the need to rely on in-house development programs.

EAC member were in general agreement on the usefulness of iCAS credentials in talent management. When employers are recruiting for specialty technical areas, there are unknowns about the skills of new hires. Therefore, the iCAS credentials can serve as a baseline for specialty expertise.

While iCAS credentials are geared to non-actuaries, how would your company benefit from having your credentialed actuaries earn specialty credentials?

Employers agreed that predictive modeling has become a core skill for actuaries. Actuaries need to understand the basics regardless of how much they plan to focus on predictive modeling during their careers. For those actuaries who work in specialized practice areas, earning an iCAS credential will provide a deeper coverage of the area than can be obtained through the actuarial exams.

Small to mid-size companies that don't necessarily have the scale to hire a separate team of data scientists would also likely benefit. The CAS Institute could help those companies' actuarial teams develop skills that might be covered by data scientists at larger organizations.

Continuing to Assess the Market Demand

The CAS Institute will look to confirm the qualitative feedback provided by the EAC as it examines the results of the comprehensive market research survey conducted for iCAS, which included a dedicated set of questions for employers.

A summary of the survey results will be shared in a future issue of *Actuarial Review*.

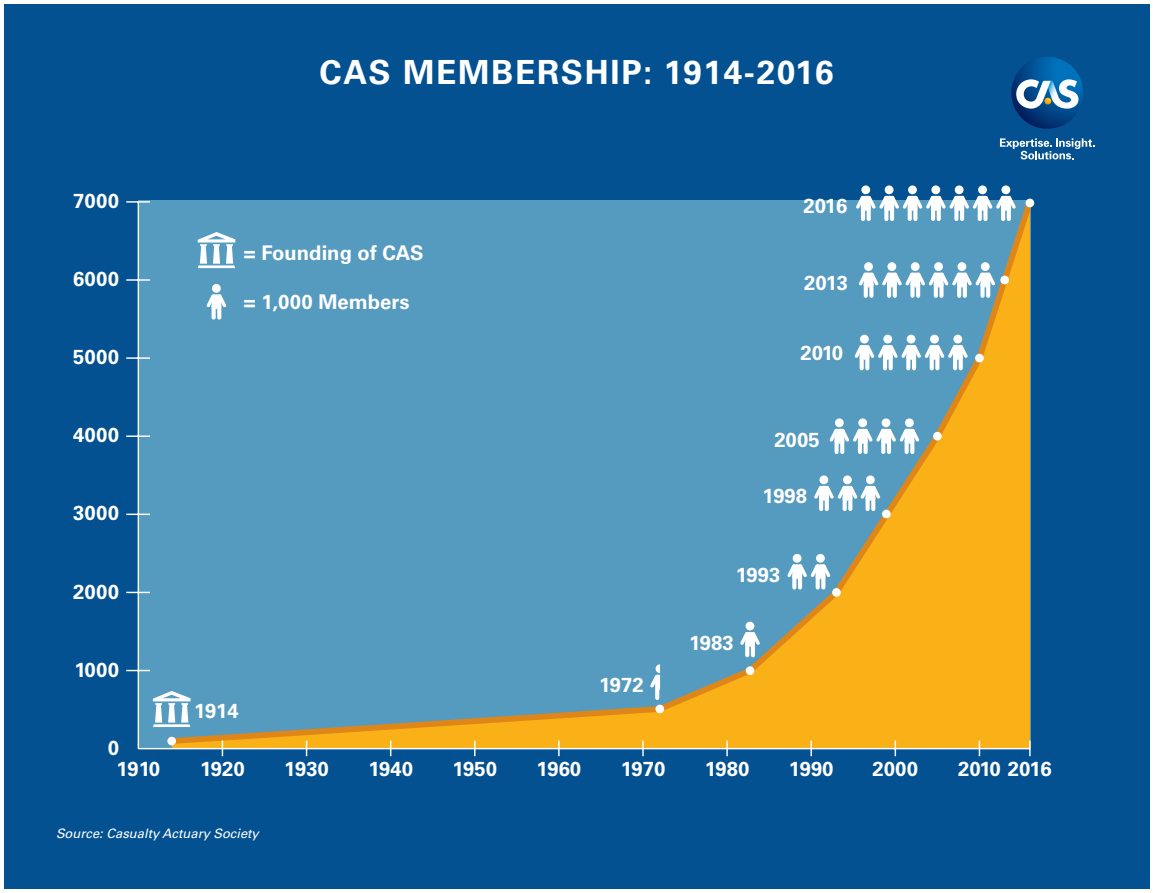
The CAS Membership Surpasses 7,000

BY ARNULFO MORENO, CAS COMMUNICATIONS AND MARKETING COORDINATOR

With its newest class of Fellows and Associates, the CAS has reached a 7,000 member milestone this year. Membership now stands at 4,942 Fellows, 2,235 Associates and 20 Affiliate members, for a total of 7,197 active members. From international seminars to regional meetings, the CAS fuels continued growth by providing more than 100 continuing education opportunities each year. Also contributing to this growth are newly developed programs for members to pursue opportunities created by technological advancements and emerging fields.

Over the past 100 years, the CAS has been at the forefront of actuarial innovation in the property-casualty field, supporting the profession as it expands to tackle new and emerging issues such as climate change, automated vehicles and cyber liability. CAS members are using their capabilities with skills such as predictive modeling to deliver business value in a wide range of areas, including underwriting, pricing, claims management, sales and marketing, and financial forecasting.

Originally named the Casualty Actuarial and Statistical Society of America in 1914, the charter class totaled 97 Fellows — the only classification for members at the time. In 1921 the organization adopted its current name, the Casualty Actuarial Society, and by 1972 the CAS had more than 500 members. The 1980s saw CAS membership double, reaching 1,000 members in 1983. By 1993 membership had doubled again to 2,000. Greater awareness of the profession through consistently high ratings in the *Jobs Rated Almanac* in the 1990s through the 2000s fed membership growth as the CAS doubled again to 4,000 members in 2005, then reached 5,000 in 2010 and 6,000 in 2013, until achieving the 7,000 member mark this year.



JOIN THE CAS SOCIETY PARTNER PROGRAM

Join nearly 20 organizations who are already members of the award-winning CAS Society Partner program. Designed to help your organization build relationships and increase visibility among CAS members and risk management professionals, the program offers our Partners an array of benefits — **including 20% off marketing, exhibiting and advertising opportunities.**

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Learn how to become a CAS Society Partner at casact.org/societypartners

CAS Student Central Ambassador Program Cultivates Actuarial Student Leaders

BY TAMAR GERTNER, CAS UNIVERSITY ENGAGEMENT MANAGER

Have you noticed that today's population of actuarial students is knowledgeable, driven and overall extremely impressive? We have too, which is why the CAS University Engagement Committee developed the CAS Student Central Ambassador Program, which was piloted at 12 colleges and universities this past academic year. The program cultivates student leaders among the 4,200 students who have signed up for the CAS Student Central membership program since its start in January 2014.

Last spring the CAS invited select schools to participate in the program's inaugural year. Twelve exceptional actuarial students were nominated by their professors to fulfill this student leadership position on campus. (See our lineup of students and their universities on the next page.) The program kicked off at the beginning of the fall semester with an orientation, including introductions to the CAS University Liaisons supporting each school.

Throughout the academic year, the CAS Student Central Ambassadors have been working closely with the University Liaisons and Academic Central members at their schools to champion the CAS and the property-casualty actuarial profession to their classmates. They have planned actuarial club presentations and career panels with P&C industry professionals, and they have facilitated special events, including CAS participation in actuarial career fairs and speaking engagements by CAS leaders. Representing the University of Toronto, Student Central Ambassador Eunice Zhang reported that her school hosted three events in total and that three more are in the works. "The first event was an introduction to the CAS and the P&C insurance industry, the second was a mock case competition, and the third was a conference call with an actuary working in the P&C industry," said Zhang.

Through their efforts, the ambassadors have helped to increase student awareness of the resources and opportunities available through CAS Student Central. They have also assisted with developing CAS Student Central with valuable feedback on the program and its resources. These students now represent the youngest cohort of CAS volunteers, thus building on the tradition of CAS volunteerism that permeates the organization.

Ambassador Alice Chi sees the ambassador's role as bridging the gap between students and the CAS. Together, the CAS and CAS Student Central Ambassadors have reaped many mutual benefits. The students' active leadership involvement and feedback not only builds their resumes, but also helps the CAS improve its resources for actuarial students. Students have also been able to jumpstart their careers through op-

The Big Three of University Engagement

The CAS Student Central Ambassador Program is an enhancement to the CAS's three main university engagement programs.

CAS University Liaison Program

Developed in 1999, the University Liaison Program offers colleges and universities direct access to a practicing actuary by matching CAS members as University Liaisons. Currently 350 University Liaison volunteers support 330 schools.

CAS Academic Central Program

A free membership program for professors who teach actuarial science and related courses. The program, formerly called the CAS Academic Correspondent Program, offers academics exclusive access to CAS resources and events. There are 335 academics participating in the program.

CAS Student Central Program

Launched in January 2014, this free membership program was developed to support university students pursuing actuarial careers. It offers numerous benefits to its members, including resources such as study aids and skill-building tips, free webinars and invitations to networking events with casualty actuarial professionals. CAS Student Central currently serves more than 4,000 members at 375 colleges and universities.

STUDENT CAS CENTRAL AMBASSADOR

portunities to network and work closely with CAS members. "I am grateful for the opportunity to act as the CAS Student Central Ambassador at the University of Illinois at Urbana-Champaign," said Chi.

Ambassador at Ohio State University, Michelle Aminov, credits the ambassador program as an effective and efficient way of communicating with students. "Through collaboration with members of the CAS like our University Liaison, Chuck Bryan, this role has opened my eyes to what the CAS has to offer," said Aminov.

Based on the success of the pilot year program, the CAS Student Central Ambassador Program will be expanding in fall 2016, with the goal of doubling the number of schools.

The CAS appreciates the hard work of our Student Ambassadors and all of their efforts in promoting the CAS at their schools. As we engage the next generation of actuarial students to become volunteer leaders, we can't help but to look at this impressive group of students and think about their CAS leadership potential — one or more of them could one day be a CAS president!

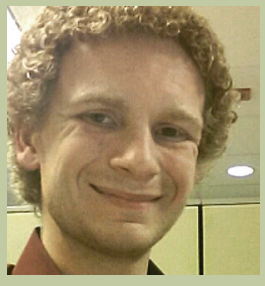
CAS Student Central Ambassadors

Carson Leiting
University of Nebraska-Lincoln

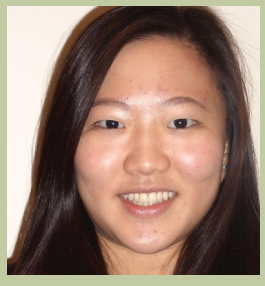
Rob Tavernier
University of Connecticut

Joseph Malle
University of Michigan

Lu Xiao
University of Texas at Austin



Tim Hoblin
Ball State University

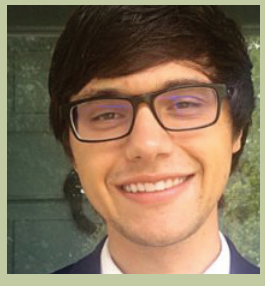


Alice Chi
University of Illinois at Urbana-Champaign

Rachel Neuville
University of Wisconsin-Madison

Anthony Lucero
St. John's University

Timothy Ellis
Temple University



Tyler Yancey
Illinois State University

Eunice Zhang
University of Toronto

Michelle Aminov
Ohio State University

AROUND THE WORLD WITH Mary Frances MILLER

Traveling is a truly symbiotic relationship for Mary Frances Miller: She imparts her knowledge and gains new found wisdom through the course of her journeys.

BY LAURIE MCCLELLAN

She has snacked on fried crickets in Mexico, haggled over silk in India and reviewed Emperor Qin's terra cotta troops in China. Mary Frances Miller has visited more than 30 countries, many while working or volunteering as an actuary. Along the way, she has gained a front row seat to global trends in the business. And in March 2015, her volunteer trips to Uganda, Malaysia and Thailand yielded not just a few more stamps in her passport, but a batch of fresh insights on emerging markets as well.

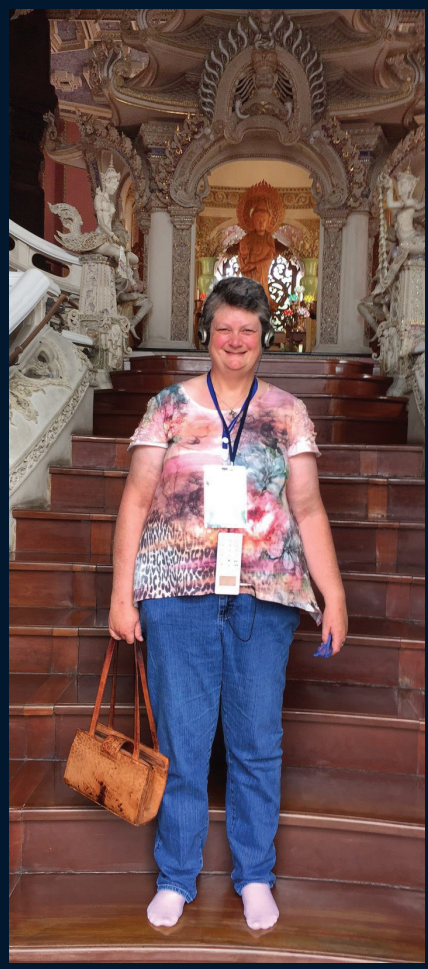
At home, Miller cheers on the Nashville Predators hockey team at every home game and races sighthounds, counting two whippets, two Salukis and a greyhound as part of the family. She cofounded Select Actuarial Services in 1999 and continues to work there as a senior consulting actuary, specializing in risk management consulting. "Our clients tend to be Fortune 1000 companies that only buy insurance for catastrophes," says Miller. With clients ranging from hospitals dealing with medical malpractice claims to the school district pool of the state of Colorado, Miller explains, "We're a little bit of a niche player. We get to touch a lot of different things that way."

It was actuarial work that turned Miller into an international traveler. In the early 1990s she began working on the liquidation of a consortium of small insurance companies in London that had gone bankrupt. "If there was a risk you could write in the '80s and '90s that was bound to lose money, and a lot of it," she recalls, "they would write it." One of Miller's clients suffered huge product liability losses in the bankruptcy, and she began traveling to London several times a year to resolve the financial issues. But what began as a series of business trips turned into a romance.

"I really fell in love with the city," Miller says. "Then I started to get involved internationally for the CAS. It all grew from there."

Postcard from Uganda

In March, Miller volunteered for Actuaries Without Borders, a section of the International Actuarial Association that provides training for actuaries and actuarial technicians in countries where the profession is just getting off the ground.



Miller visits Thailand's Erawan Museum in Samut Prakan. Photo courtesy of Mary Frances Miller.

Students from the three-day seminar in Kampala, Uganda. The seminar was conducted by Actuaries Without Borders and The Actuarial Association of Uganda. Photo credit: Mary Frances Miller.

She left the spring of Nashville behind and embarked on a two-day journey to reach Uganda, where the dry season was just ending. The unpaved streets of Kampala were coated in red dust and motorcycle taxis zoomed around the roundabouts as Miller toured the capital city. She was there to teach a three-day seminar on ratemaking and reserving to college graduates who were working for insurance companies and starting the exam process.

"My idea was to provide some really practical training on how to figure out whether you're collecting the right amount of money on the ratemaking side," she says. "And on the reserving side, how to tell what your ultimate costs are going to be, not just what's been reported so far."

When she met her students, Miller discovered that some had travelled from as far away as Kenya to attend the seminar. Much of the buzz in class centered on sweeping changes to auto insurance in Uganda — changes that could provide new opportunities for actuaries. While auto insurance is required in the country, Miller says, "It's like a sticker that you buy to stick on your car. It's really cheap, but the benefits are really minimal." However, in the next three to five years, insurance limits will increase dramatically, and companies will be allowed to set their own rates.

On the last day of class, Miller was surprised to find that her class had become hot business news in Uganda. The professor who organized her seminar was asked to appear on TV. Then at the end of the day, she discovered she was giving a speech at a public event. Once she got over her shock, Miller says, "One of my suggestions was be very, very cautious … I said your results may look really good in the beginning because your citizens don't understand insurance … but once they figure out that they can file claims and that it's worth something, then your experience is going to get much worse, very fast."

Although Makerere University in Kampala offers an actuarial science degree, Miller found that many of her students from Uganda were still struggling professionally. "It's a chicken or the egg question," she says. "There isn't a lot

of demand for actuaries in the industry, because the industry doesn't really know yet what to do with an actuary. There's no way for the new graduates to ever get beyond beginner status. So breaking the cycle can be very difficult."

The students from Kenya, on the other hand, seemed to have more opportunities. "Health insurance has really taken off there," she says. "It took off and was a disaster for a number of companies, because they had that 'we're bringing in a lot of cash, so we must be making a profit' approach to things … but the companies that actually got some actuaries involved have remained solvent and done much better. There are some real examples of how actuaries can contribute."

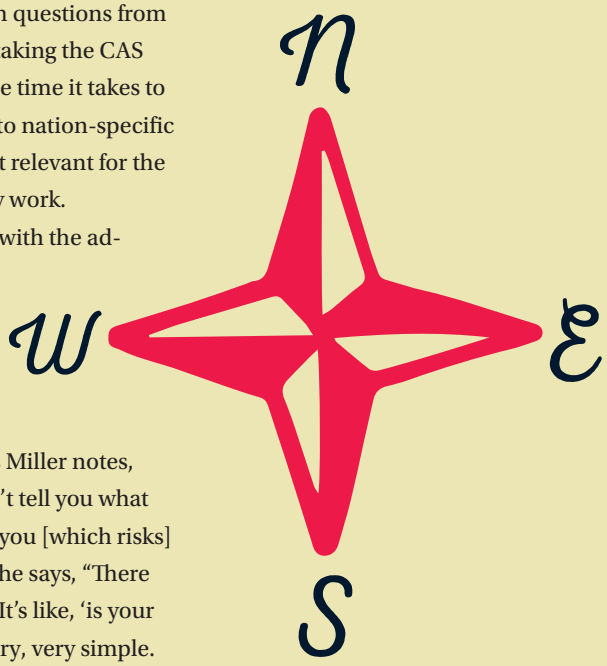
Meetings in Malaysia

In Malaysia, a similar story is now unfolding. Although the Malaysian government has set auto insurance rates in the past, the country is on the cusp of letting insurance companies set their own rates. The changing scene led the CAS to join with the Actuarial Society of Malaysia and the Australian Institute of Actuaries to offer a two-day seminar on ratemaking in Kuala Lumpur. The seminar, slated for September 2015 (see story in *AR*, January/February 2016), needed an additional instructor, and as Miller admits, "It doesn't take much to get me on an airplane." She packed up her PowerPoints based on the CAS Exam 5 textbook and headed off to the airport.

Miller describes the business environment in Malaysia as "a mix — the regulation is British-based, but the actuaries there mostly take the U.S. exams." And while her students learned during class time, Miller picked up a lot of interesting information while chatting during the lunch breaks. She also fielded some tough questions from students who are now taking the CAS exams, ranging from the time it takes to get the CAS credential to nation-specific exam material that isn't relevant for the countries in which they work.

Another hot topic with the advanced students in Malaysia was finding a business niche in a tariffed environment where the government sets insurance rates. As Miller notes, "Even if [actuaries] can't tell you what to charge, they can tell you [which risks] to write." In Malaysia, she says, "There aren't that many rates. It's like, 'is your car big or small?' It's very, very simple. So if you can focus on particular parts of the country, or particular kinds of drivers, you can probably make a lot more money than your competitors. And that's what actuaries are really good at."

"Even if [actuaries] can't tell you what to charge, they can tell you [which risks] to write."



Doing Business in Bangkok

With the year 2015 winding down, Miller packed her bags yet again — this time, because of a coincidence concerning

Below: Miller's whippet, Lucy, in her winning run when she won the American Sighthound Field Association's Best in International Invitational in April 2013. She competed against about 150 dogs. Photo courtesy of Mary Frances Miller. ©2013 Big Paw Prints

Above: The Erawan Museum in Samut Prakan, Thailand. The three-headed elephant structure houses three floors of antiquities and priceless religious artifacts. Photo credit: Mike Behnken, Bangkok, Thailand.

Above right: A confluence of overhead electrical wires seemingly graces nearly every street corner in Bangkok. Photo credit: Mary Frances Miller.

At right: A classic Thai tug-of-war art installation greets visitors at the Bangkok's Suvarnabhumi International Airport. Photo credit: Al Pavangkanan, Van Nuys, California, USA.

Opposite page: Miller's view of Bangkok from her hotel room. Photo credit: Mary Frances Miller.

crop insurance. Not many American actuaries work with agricultural insurance, but Miller has, and the CAS decided to focus on the topic for its panel at the Asian Actuarial Conference in Bangkok, Thailand in November 2015.

According to Miller, "Agricultural insurance is one of the biggest lines of business in East Asia because they have huge flooding issues." Miller joined CAS President Bob Miccolis and CAS member Rade Musulin in the panel discussion. After the presentation, Miller says, "I got a lot of questions about things like adverse selection. It was obvious to me that the people who stopped me afterward were very knowledgeable actuaries and were putting a great deal of thought into what I had presented and whether they could use it elsewhere."

Because it was Miller's first trip to Bangkok, she made time to catch a water taxi down the Chao Phraya River to one of the city's famous night markets, where shoppers can buy everything from traditional Thai puppets to fried oysters.

Have Suitcase, Will Volunteer

Miller loves to travel, but she's equally passionate about volunteering for the CAS. "My view of the world — not just of actuaries, but of the world in general — is so much broader than it ever would have been had I not gotten involved

in the CAS," she says. Miller began volunteering as soon as she became a Fellow, partly because it was required for her job. "That meant that I started interacting with actuaries from outside my company right away, very early on in my career," she says. According to Miller, volunteering has made a big difference in her professional growth. "I'm a much, much better actuary," she says, "for all of the people that I know through this organization."

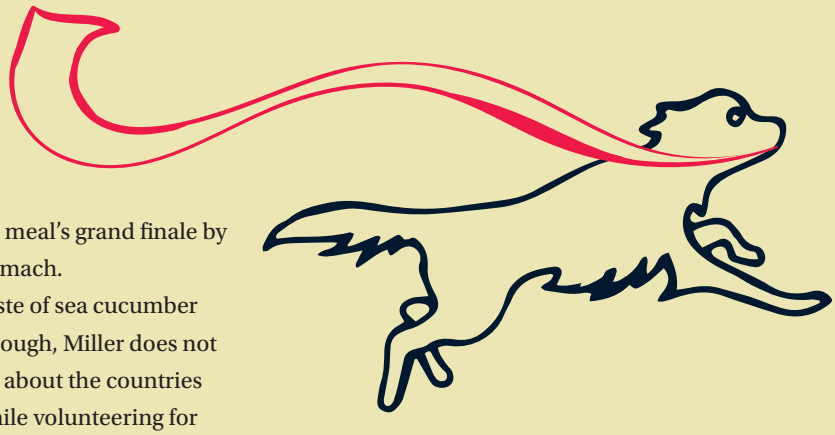
Volunteering outside of the United States has also given her a fresh perspective on the profession. "Our view toward the proper way to regulate insurance tends to be very biased toward how we do it in the U.S.," she says. "Which isn't to say that it's right or wrong, it's just not necessarily the only way." On the other hand, she's found that Europeans can be equally biased about doing things the EU way. In the end, she says, "What you discover is neither way is exactly right … when we get to the International Actuarial Association, and we're trying to work on something that needs to be international, you kind of have to find a compromise."

That difference in perspective was driven home to her a few years ago while she was touring World War II sites on the island of Singapore. "We're on the bus," she recalls, "and we're coming up to the first stop, and the tour guide says, 'early on the morning of December 8, 1941, the Japanese bombed the American base at Pearl Harbor in Hawaii.' And I wanted to put my hand up and say, 'I think it was December 7!'" Miller realized that in Singapore, located across the International Date Line from Hawaii, the attack happened on their December 8, which is how they tend to remember it. "I've learned a great deal about the fact that there are different perspectives on everything," she says.

As valuable as that insight was, Miller has found that there are some differences that can't be overcome — and for her, one of those differences is sea cucumber, a delicacy she encountered at a banquet in China. ("I will eat almost anything," she says. "But it was slimy and rubbery.") Fortunately, the dinner was almost at an end, and Miller was able to avoid taking a second bite of the meal's grand finale by pleading a full stomach.

While one taste of sea cucumber was more than enough, Miller does not feel the same way about the countries she has visited while volunteering for the CAS. "I've been to these places," she says, "but I never end up having more than a few days to be a tourist. So my bucket list of places where I'd like to go back just keeps growing."

"Our view toward the proper way to regulate insurance tends to be very biased toward how we do it in the U.S. which isn't to say that it's right or wrong, it's just not necessarily the only way."



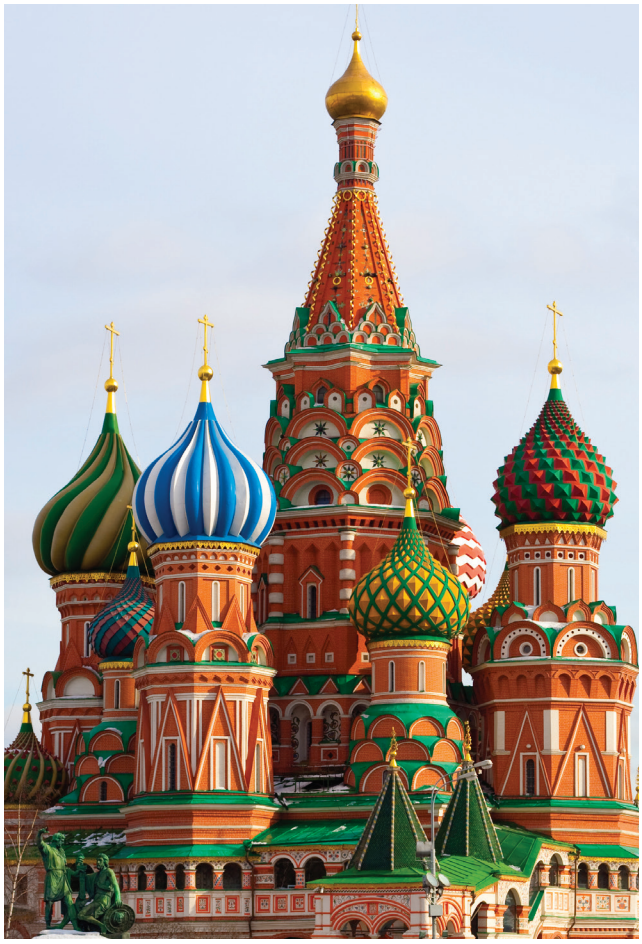
Laurie McClellan is a freelance writer and photographer living in Arlington, Virginia. She is on the faculty of Johns Hopkins University, where she teaches in the M.A. in Science Writing program.

Russia: Transforming the Actuarial Profession

Amidst Economic, Political Woes

BY GREGORY BABUSHKIN AND NICKOLAY KUZNETZOV

Moscow never sleeps, they say, and it seems that for more than 300 actuarial professionals currently working in insurance and pensions in Russia, this was a painful yet welcome reality over the last two years.



On November 2, 2013, President Putin had signed a federal law governing actuarial activity in the Russian Federation, with many changes and implied challenges for the profession that would follow in 2014 and 2015. The entirety of 2014 was spent accurately interpreting the federal law and understanding the actual requirements, leading to a road map for how actuaries and their employers or clients would function under the new regulations. In the following year, the industry saw many "firsts," from standardized actuarial examinations and the required development of practice standards to the introduction of the role of the Appointed Actuary and issuance of the first actuarial opinions. This pivotal moment in the maturation of the actuarial profession in Russia coincided with an economic anxiety that Russians have not seen since the late 1990s, primarily driven by the plummeting price of oil and increasingly weaker ruble as a result, in addition to added pressures from the Ukrainian crisis and the sanctions from the U.S. and the European Union.

With the collapse of the Soviet Union in 1991 and the preceding years of Glasnost and Perestroika, enormous changes were observed in the financial sector, including the

insurance industry. The first insurance regulations were signed into law in 1992, with numerous developments following. The insurance industry grew from basically nil to 374 billion rubles (at today's foreign exchange rates, a little under $6 billion) in written premiums in 2004, and almost tripled a decade later, reaching 1 trillion rubles in 2015. Early post-Soviet years saw the creation of many new companies and, often, defaults that subsequently resulted from undercapitalization and lack of experience. In some instances, defaults were deliberate: Companies quickly grew the premiums and extracted the cash, consequently leaving the policyholder without protection. Actuaries had little say in the affairs, with very few exceptions. While insurance penetration in today's Russia continues to be far below that of more mature economies, Russian businesses and consumers are now used to insurance as a path to financial stability. This is largely driven by a consumer boom over the last 15 years and a dramatic increase in auto ownership together with the introduction of OSAGO (compulsory personal auto third-party liability insurance).

The passage of the federal law governing actuarial activity is probably the most momentous event for practicing actuaries in Russia over the last two decades. It not only brings accountability and structure to the profession, but also recognition that gives actuaries a definitive voice in the industry.

The insurance industry has seen significant growth in the last decade in both life and P&C segments. (Like in many parts of the world, health insurance is included in the definition of non-life, with many P&C companies also writing health.) Life insurance continues to comprise a relatively small piece of the pie, but P&C represented close to 90 percent of total written premiums at the end of 2015. Ironically, an average Russian actuary is likely to be more versed in life actuarial matters rather than P&C; this familiarity with life insurance is a testament to a strong academic influence and reflects earlier regulations for non-state pension funds that require actuaries with life and pension expertise.

Currently there are 326 insurance companies in the Russian Federation, which is a third of the number of companies operating a decade earlier. The top ten insurers accounted for a little over 60 percent of the market by premium volume in 2015, and the concentration is likely to grow as smaller companies will have an increasingly difficult time staying competitive in a struggling economy while simultaneously satisfying progressively stricter regulatory requirements. The P&C sector is dominated by personal auto with 45 percent of P&C written premiums coming from CASCO (comprehensive and collision insurance) and OSAGO.

The passage of the federal law governing actuarial activity is probably the most momentous event for practicing actuaries in Russia over the last two decades. It not only brings accountability and structure to the profession, but also recognition that gives actuaries a definitive voice in the industry. Other contributing factors have also helped raise awareness around the profession and emphasize the value of actuaries. The continued implementation of International Financial Reporting Standards, with an implied requirement to apply liability adequacy tests when evaluating reserves, has motivated insurers to employ and develop actuaries with proper skills and knowledge. Deteriorating underwriting results in personal auto added further pressure on reserving and highlighted needed refinement in pricing and risk classification. Transfer of insurance regulatory authority in 2013 to the Central Bank of Russia, a "mega-regulator," not only strengthened and centralized the insurance industry oversight, but also allowed for a robust dialogue around actuarial input that continues today.

Some of the key provisions of the federal law governing actuarial activity include:

- Defining an actuary and actuarial activity.
- Establishing requirements for "qualified" actuaries (qualified to work as an actuary) including a mandatory qualification examination administered by the Central Bank of Russia.
- Defining the role and requirements of the Appointed

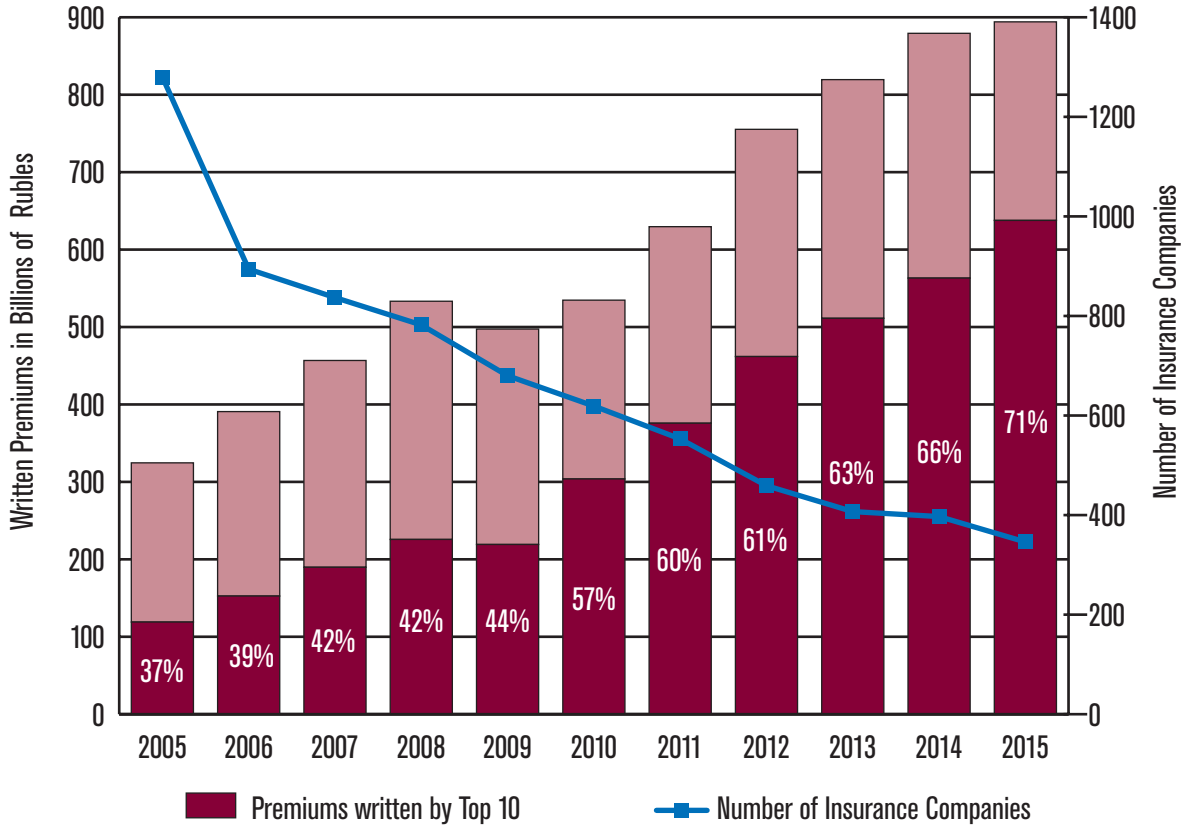
Actuary, with the right to prepare and sign an actuarial opinion.

- Introducing mandatory annual actuarial opinions and reports for insurance companies, self-insured organizations, non-state pension funds and organizations responsible for compulsory insurance rate studies.
- Establishing the frameworks for developing actuarial standards of practice and recognizing self-regulating actuarial organizations, as well as creating an actuarial advisory board.

The profession is currently served by two, arguably competing, self-regulating actuarial organizations: the Russian Guild of Actuaries and the Association of the Professional Actuaries. Created in 2002, the Russian Guild of Actuaries is a member of the International Actuarial Association (IAA) and has a prominent P&C presence among its 145 full members. Initially sponsored by the actuaries representing the national association of non-state pension funds, the Association of the Professional Actuaries was created in 2013 and has 97 full members. Both organizations are represented on the actuarial advisory board, work closely with the Central Bank of Russia, and actively administer actuarial examinations. As of early 2016, the Central Bank of Russia recognizes a total of 99 Appointed Actuaries who service the entire insurance industry, over 300 companies and around 100 non-state pension funds. Most companies had to produce and publish their first actuarial opinion by July 1, 2015 — with little guidance and an apparent shortage of Appointed Actuaries — while anticipating subsequent inquiries from the regulator and potential disciplinary actions from the two self-regulating actuarial organizations. (Before the end of 2015, two members had lost their Appointed Actuary status and a number of members had been fined.)

While Russian actuaries are still adapting to the new requirements, their continued dialogue with the industry will be critical — especially since the Central Bank is aggressively

Russian P&C Written Premium and Number of Insurance Companies by Year

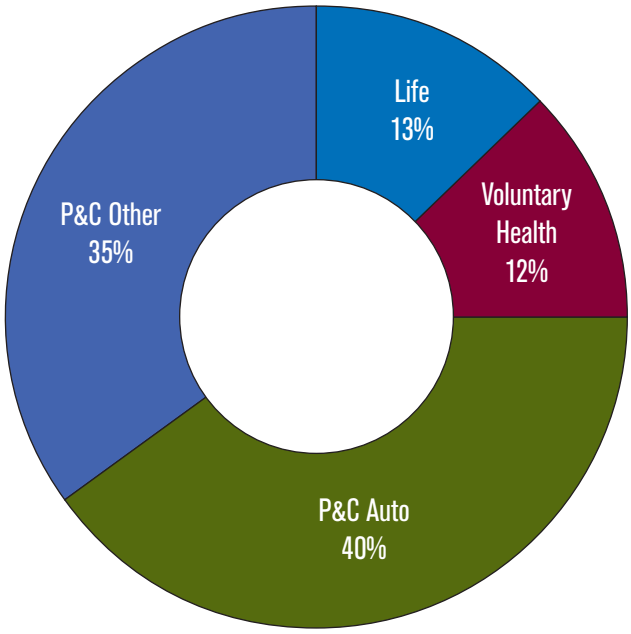


eyeing a more robust approach to solvency regulation and is actively deliberating the concept of rate regulation.

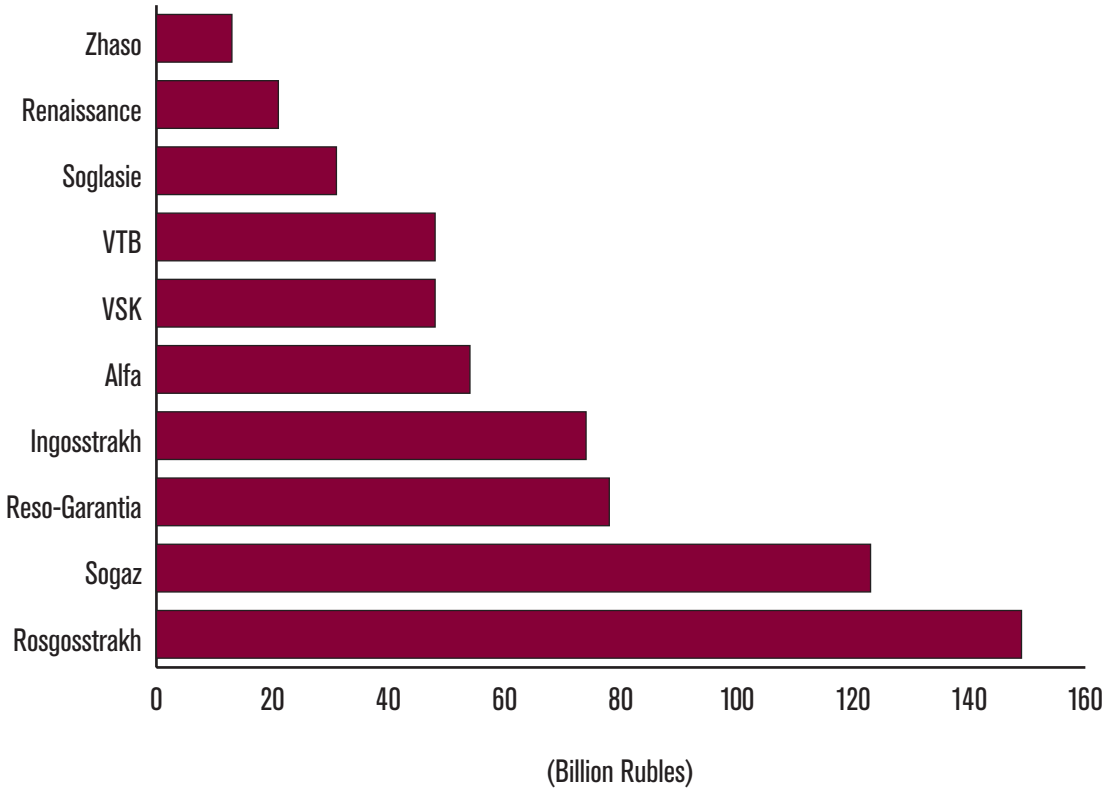
Overall, the changes are undoubtedly positive, albeit with a hands-on regulatory oversight not unfamiliar to Russians. Under the right circumstances, the changes provide the profession with a renewed vision and growth opportunity in a structured environment. As if to recognize the apparent progress and welcome the changes, the IAA Council and Committee meetings will be held in Saint Petersburg at the end of May 2016. This is the first time in over a century such an event is taking place in Russia. Before this an International Congress of Actuaries was organized in 1915, also in Saint Petersburg, but was not held because of the onset of World War I. ●

Gregory Babushkin, FCAS, is a former actuarial practice leader for PwC Central Eastern Europe and is now second vice president & senior actuary at Travelers Companies in Hartford, Connecticut. Nickolay Kuznetzov is an Appointed Actuary and chief actuary for SOGAZ Insurance Group in Moscow, Russia.

Russian 2015 Written Premium Distribution by Insurance Type



Russian 2015 Written Premiums for Top 10 P&C Insurance Companies



ETHICAL ISSUES

Cross-Selling

Ethical Issues is written by members of the CAS Committee on Professionalism Education (COPE). The column's intent is to stimulate discussion among CAS members. Therefore, positions are sometimes stated in such a way as to provoke reactions and thoughtful responses on the part of the reader. Responses are welcomed. The opinions expressed by readers and authors are for discussion purposes only and should not be used to prejudge the disposition of any actual case or to modify published professional standards as they may apply in real-life situations.

Natalie is a senior partner at Actuaries For Hire (AFH). Beau is a consulting actuary at AFH who spends most of his time performing reserve opinions. Natalie is an Associate of the Casualty Actuarial Society, and Beau is a Fellow.

AFH has been developing iClaims Turbo™, a complex claims-management system, for several years. The iClaims Turbo system helps insurers track claims from the time they receive notice through settlement. It uses predictive modeling to help insurers set case reserves based on claim characteristics and flag certain claims that may require particular attention. Extensive time and money has been spent developing iClaims Turbo, but sales have been slow, and Natalie is getting pressure to get more clients signed up for the system.

Beau is working on a reserve opinion for Skinflint Assurance Company (SAC). Natalie has been in discussion with SAC management about buying iClaims Turbo. Though SAC was initially hesitant to pay the high price for iClaims Turbo, Natalie believes they are close to signing.

Beau recently completed his analysis of SAC's reserves, which shows that SAC's held reserves are deficient by a relatively small, but material, amount. He sends his analysis to Natalie for review and includes a proposed recommendation to SAC that they increase their reserves.

Natalie schedules a meeting with Beau to discuss his reserve opinion. At the meeting, Natalie seems upset and frustrated. She begins by pointing out that SAC has had a strong reserve position for many years, and that she is in disbelief that their reserves would suddenly become deficient. Beau explains that, according to his analysis, the primary reason for the deficiency is adverse development on claims in older accident years. SAC writes a lot of general liability business and, in Beau's opinion, has done a poor job of reserving for tail events. In the past year, SAC has seen considerable development on claims from over 20 years ago, but they have virtually no case reserves for these claims and little IBNR in those accident years.

Extensive time and money has been spent developing iClaims Turbo, but sales have been slow, and Natalie is getting pressure to get more clients signed up for the system.

Upon hearing Beau's explanation, Natalie's mood quickly improves. She begins listing all of the ways in which iClaims Turbo can help SAC. In particular, she argues that if SAC was using the system, it would have settled the large liability claims earlier and would not have had to deal with the current adverse tail development. Though Beau is not particularly familiar with the functionality of iClaims Turbo, he nods politely at Natalie's suggestions.

Natalie says to Beau: "What we have here is the opportunity to do good! SAC is close to buying iClaims Turbo, and, if I explain to them that their prior year adverse development is due to poor claims management, they will probably close the deal. But we need to sign off on their current reserves before that happens. I've been meeting with SAC's management for months trying to make this sale, and I know how those cheapskates think. If we tell them they have deficient reserves, they will back away from the sale, even though iClaims Turbo will save them money by helping them manage their claims process. Do you follow me?"

Beau cannot believe Natalie's argument and thinks to himself, "Is she *really* asking me to sign off on deficient reserves?" He explains to Natalie that he is uncomfortable signing off on reserves

that he believes are inadequate, but Natalie responds that doing so would be in SAC's best interest because iClaims Turbo will help them solve their structural claims management problems. She further argues that, by informing SAC that their reserves are deficient, AFH will definitely lose the sale and potentially lose a client; however, by Beau signing off on the reserves, AFH can make a large sale *and* help a client. It's a win-win!

Beau replies, "Look, I'm not going to risk my credentials by signing off on deficient reserves. And please stop acting like selling the iClaims Turbo is an act of altruism. You're only concerned with the bonus you'll get from this big sale."

Natalie responds by saying that she is interested in making the sale, not just for her sake, but also for the entire office. "If sales don't pick up soon," she says, "my bosses will force me to cut costs. I don't want to have to let anyone go and the best way to avoid that is to make this sale."

What are Beau's professional obligations? Among the alternatives, consider these options:

Option 1

Beau complies with Natalie's request but feels he needs to review some of his assumptions. Since the reserve deficiency is a relatively small amount, he may be able to modify some of his assumptions so that the carried reserves make it into the bottom end of his range of reasonable estimates. With the new claims system, perhaps SAC will be more aware of its potential loss development issues. This will make Natalie happy and maybe even keep Beau from losing his job. Additionally, iClaims Turbo may well help SAC better manage claims and, over time, correct its deficient reserves.

Option 2

Beau should inform Natalie that he cannot sign off on deficient reserves under any circumstances. Beau turns to the CAS Code of Conduct for guidance, and several of the precepts seem applicable to the situation:

- 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 7 — An Actuary shall not knowingly perform Actuarial Services involving an actual or potential conflict of interest.
- Precept 8 — An Actuary who performs Actuarial Services shall take reasonable steps to ensure that such services are not used to mislead other parties.

It seems clear to Beau that Natalie has a conflict of interest and that she is trying to drag him into that conflict.

If Natalie does not back down on her insistence that Beau sign off on SAC's reserves, then Beau should inform others at the company, such as Natalie's boss or AFH's legal department or both, that Natalie is asking him to violate his professional integrity. He can also inform Natalie that he will report her to the Actuarial Board for Counseling and Discipline unless she accepts that he will not sign off on deficient reserves.

Wellness Data: The New P&C Frontier? BY JIM LYNCH

Here's a formula for actuaries:

Take the amount of money a person spends on TV and accoutrements like cable fees and recording devices. Divide that number by disposable income. What do you get?

A marker for diabetes, according to Chris Stehno, a director for Deloitte.

Actuaries have become adroit at finding surprising correlations in big data. The connection between credit scores and driving experience may be the most famous, and the use of telematics devices in cars to divine driving patterns may be one of the fastest growing.

But property-casualty actuaries' search for correlations could increasingly extend into the world of health, as a pair of speakers explored at the CAS Ratemaking and Product Management Seminar in Orlando. Their presentations showed how actuaries and other quantitative researchers are finding innovative ways to use emerging data.

The presenters, Stehno and Lin Xing, FCAS, who works at Verisk Analytics, took different approaches to the subject. Stehno showed how commonplace data — buying TV equipment — can signal a high potential for disease. Xing showed how health data might potentially be useful in providing discounts for homeowners' or auto insurance.

Stehno tapped a database that gave him facts about 230 million adult Americans —their ages, their shopping patterns, where they live — information culled from public and private sources.

"I know their buying patterns," he said. "That data isn't just good for marketing; it actually has strong ties to health."

The health records were accumulated with the consent of consumers, often given as part of an exam for a life insurance policy.

Electronic health records became widely available after the American Recovery and Reinvestment Act helped pay for doctors to make records electronic. Consumers control their own records, Stehno said, and they often make them available to third parties, which is how his database was formed.

The records are most revealing for people older than 50, he said. Younger people do not see the doctor as often.

When he pairs the medical information with shopping and other information, he learns interesting things:

- People with shorter commutes are generally healthier.
- People who have been through bankruptcy are generally less healthy.
- People who watch a lot of television are generally less healthy.

For an extended example, Stehno used himself. He applied an algorithm he developed using medical claims data to try to find people who are at greatest risk for depression.

Based on his own circumstances, the model said he has about a nine percent chance of suffering from depression, just below the claims dataset average of 9.5 percent. Were he to divorce, that likelihood would rise to 13 percent. If in addition he became a renter, the likelihood would rise to 15 percent. If his income fell substantially, 17 percent.

In his example, he continued to pile woe unto himself. He became a heavy user of mail order; he gave away his pet; his credit card spending surged; he showed no interest in retirement products, and so on. Eventually the model showed he had a 36 percent chance of having a medical claim for depression.

Stehno has created 150 disease and medical condition algorithms like the depression model.

Originally the models were used in financial areas, helping health and life insurers hone their rates. More recently, life insurers used the information to simplify the underwriting process, and health insurers used the information to encourage healthy behaviors.

In the past, health incentives were broad — so broad they were ineffective. If you offer a discount to a health club, Stehno said, you mainly subsidize people who would have bought a membership anyway.

Now an algorithm pinpoints a person likely to get skin cancer. An insurer could send the person a visor and coupons for sunscreen.

Or an algorithm can prompt a doctor's treatment. Families with pets run greater risk of having medical complications associated with asthma. Knowing about the pet, the family doctor can order a spirometry test to assess whether their young children's lungs are healthy.

P&C insurers are kicking the tires on the new data. At least two major insurers have applied for patents to use biometric information to help create a driving score, Xing stated.

In her research, Xing concluded that casualty actuaries could potentially use such data, presumably voluntarily provided by policyholders via smartphones, Fitbits and the like, to help predict auto results.

Xing described several consumer

products that can monitor wellness. An earbud tracks the movements of its wearer, their body temperature, heart rate and blood pressure. Smart contact lenses determine glucose levels. A sweat sensor can tell if the wearer needs a drink of water. Some life and dental insurers are already providing these types of devices to policyholders and offering discounts for greater data sharing.

These products are relatively new, Xing said. To see whether the information they gather could work in P&C insurance, Xing studied data from the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System. The CDC asks more than 400,000 people per year about their health and related behaviors, and they publish data at the county level.

Xing linked 17 health characteristics from the CDC database into auto insurance data from Verisk's ISO subsidiary. She looked at the effects of factors including mental health, weight, smoking and drinking habits of a county's residents. She also looked at the presence of chronic health conditions, like asthma or diabetes. She paired the health data for a county with the loss experience of its residents to evaluate how behavioral incentives by insurers could potentially help improve results.

One surprising result: Smokers appeared to have lower auto liability losses.

Though her results are tentative, Xing has found research from the 1990s that showed smoking makes drivers more alert, hence better drivers.

An ethical question immediately rises: "Should we reduce rates for smokers?" Xing asked. "That is an eye-opening question."

Xing said her wellness model does a good job of predicting losses for the four major auto coverages: bodily injury, property damage, collision and comprehensive.

Issues do remain. For example, as with other new data sources such as vehicle telematics data, regulators would expect insurers to demonstrate proper protections are in place for individual privacy. There may also be cybersecurity concerns about the data.

The next step may be to develop a model that helps provide individuals with the right incentives to improve their wellness. Later, more models could be built around other lines of business such as workers' compensation. Actuaries, Xing said, can help insurers "be on the forefront of innovation, taking advantage of the powerful tools of the wellness industry to create a happier, healthier and more profitable property-casualty book."

James P. Lynch, FCAS, is chief actuary and director of research and information services for the Insurance Information Institute in New York.

Actuaries Explore How Technological Disruptions Will Fragment the Insurance World BY JIM LYNCH

Technological changes such as driverless cars, telematics and the sharing economy are likely to have significant impact on the auto insurance industry, actuaries were told in a presentation at the CAS Ratemaking and Product Management Seminar in Orlando.

The sharing economy, or the use of an app to bring together drivers and people seeking a ride (e.g., Uber, who pioneered ride sharing), will reduce vehicle ownership and private vehicle mileage, thus shrinking insurance premium. It will also introduce new insurance needs and create a greater fragmentation of products.

Uber drivers can plug into the system at any time, essentially creating a class of part-time taxi drivers. When drivers are not plugged into the app, they are covered by personal auto insurance.

When they turn on the app, they become in essence a small business, and their personal auto insurance no longer covers them. Turning on the app creates a waterfall of new insurance needs, said Tammy Chen, a former Willis Towers Watson insurance industry consultant.

Consider the stages of a ride share:

- Drivers turn on their apps, plugging into the system.
- Drivers get a fare and drive to pick up the passenger.
- The driver takes the passenger to where he or she wants to go.

Uber and similar companies typically cover the last two stages. Drivers are usually responsible for the risk in the first stage, but the standard personal auto policy may not cover them, as they are conducting a business at that moment. They need to buy a special endorsement. Since Uber covers the

last two stages, drivers preferably will want a reduced personal auto insurance coverage.

Chen called attention to the pattern. A simple insurance transaction — a driver needs insurance — becomes complicated when the driver switches from a recreational motorist to a commercial enterprise.

Smartphones and similar technology will complicate more and more insurance transactions, Chen said.

Other examples include:

- Zipcar, a service where customers enter a contract that gives them the right to rent a car parked nearby for a short period, from a couple of hours to a day or more. Zipcar provides some insurance, though their customers may want additional "top off" coverages, depending whether they have personal auto policies or not. In addition, many private auto insurance policies will cover rentals, but often with limitations.
- Bla Bla Car, an app that connects two people headed for a common destination. "It's a hitchhiking app," Chen commented. But the car switches between personal use and commercial use. The driver may want additional coverages to protect against picking up strangers in private vehicles. Riders may also want to purchase unique insurance coverages, especially if they don't have a personal auto policy.

Insurers need to watch and respond to this fragmentation of risk, Chen said. For ride-sharing, the industry developed an endorsement that covered the new risk. It will have to respond similarly to new fragmentation.

Insurers have been responding to other critical changes in the marketplace, said Sheri Scott, FCAS, a principal at Milliman.

Scott described the movement insurers have made in marketing their policies online.

Before the internet, she said, companies would advertise to build their brand, and agents would advertise to attract customers to their own agency. But in the 1980s, Britain and Canada began selling insurance direct to customers, bypassing agents. In the U.S., GEICO began an aggressive push with brand marketing and phone sales.

By the 1990s, Scott said, Progressive and other companies began building aggregator sites, which let customers compare rates. Esurance, Homesite, Electric Insurance and others followed with a granular ratemaking approach and internet presence.

Marketing strategies changed as well, following GEICO's model of spending millions to get the customer to shop online or by phone.

All along, companies have faced the challenge of selling in the new medium without alienating the agency network. But all those companies, Scott said, understood that "selling over the internet and over the phone should be very different than face-to-face with an agent."

More recently, she said, companies have automated their underwriting and rating processes, so policies can be bound online. Online binding is common in auto insurance, she said, and predicted that in the next six months home insurers will be binding online as well.

Actuaries have followed the automation trend, too, Scott said. Homeowners insurance is increasingly rated by peril, meaning that each major peril in the policy — fire, theft, water — is rated separately. (In the past those risks were bundled together to develop a rate.)

And new variables are being used, like the age of a roof and its shape, or the distance a property is from the coast.

In the future, Scott said, insurers will likely use connected devices like smartphones to gather information that drives rates. Companies like Nest will be able to monitor all the products in a home. "It can tell me if an alarm is going off, what kind of alarm it is," Scott said. Wallflower tells consumers via smartphone if they left on a gas burner or a curling iron. Liftmaster can tell people if they left their garage door open and lets them close it via smartphone.

All of this information can be used to adjust insurance rates, Scott said. They might even be of more use than the traditional underwriting questions, like whether a home has a deadbolt.

Instead of that question, "You might now ask them if they have a [smart home] monitor."

It is important for insurers and actuaries to respond to these new rating opportunities, Scott commented. If insurers don't respond, she maintained, high-tech disruptors like Google and Apple could be poised to come in and stake a claim in the insurance marketplace. ●

Actuaries Closely Monitoring Ascent of U.S. Drone Market BY JIM LYNCH

The exponential growth of recreational and commercial drone use has raised significant risk management issues that insurers and actuaries are addressing, according to panelists at a Casualty Actuarial Society (CAS) seminar.

Flying into the New World of Drones featured presentations by Anthony Mormino, senior vice president at Swiss Re, and Tim McCarthy, an Associate of the CAS and actuarial product director for Commercial Liability at Verisk Analytics' Insurance Services Office (ISO), Inc. The session was conducted as part of the CAS's Ratemaking and Product Management Seminar & Workshops at Disney's Yacht & Beach Club Resort in Orlando, March 14 to 16.

Mormino said 1.6 million drones were sold in the United States in 2015, a number which may approach 2.8 million in 2016. The Federal Aviation Administration (FAA) has since December 2015 required anyone who owns a recreational drone weighing more than half a pound and less than 55 pounds, also known as a small unmanned aircraft, to register the drone online with the FAA's Unmanned Aircraft System (UAS) registry before flying the drone outdoors. Commercial drone operators must register their drones separately with the FAA. Users of UAS weighing more than 55 pounds must register by means of the FAA's traditional Aircraft Registry process.

"The FAA's biggest concern is reckless drones," Mormino stated, pointing to a 2014 incident in Tallahassee, Florida, in which a drone nearly struck a commercial airplane. He also referred to a falling drone earlier this year that nearly struck a downhill skier during a televised athletic competition. Nonetheless, insurers have found beneficial uses for drones, which can generally operate only during daylight hours and within the operator's line of sight.

"You can use drones to underwrite and visit risks," Mormino continued, noting how the real estate, agriculture and motion picture industries have benefited from the unique and cost-effective views offered by drones. Insurers have also put drones to good use, using them to assess property damage at either remote or dangerous locales without imperiling the health and welfare of insurance adjusters.

While the FAA, a federal agency, has oversight over U.S. air space, which is deemed to be in the public domain, the images captured by drones can cause legal problems for drone operators, who have on occasion been accused of invading a person's privacy by photographing them without their permission.

"The law is catching up to the technology, and it cannot happen fast enough," Mormino stated. There are today 26 U.S. states with laws governing the operation of drones, he added.

Indeed, one of Mormino's key takeaways was that although drones are simple to operate, they have quietly created complicated legal problems for both drone users and their insurance companies.

Over time, some "drones are going to crash," McCarthy said, as is inevitable.

Drone crashes can be caused by many different reasons including a drone operator's error, a drone's low battery or poor maintenance, as well as its inability to operate in severe weather, McCarthy added. The insurer who covers liability exposures associated with a drone may face claims for either property damage or bodily injury liability after a drone crash. Meanwhile, drone manufacturers could potentially be at risk for product liability claims if the drone were to malfunction and cause damages due to the product's design, he added.

"The exposure range for drones could stretch from a nuisance to a catastrophe," McCarthy stated, with claims potentially resulting from trespassing or invasion of privacy or drone collisions with property, people and, in a catastrophe case scenario, another aircraft. Potential coverage today is generally very limited and would depend on the facts related to the incident and the specific policy language at issue, under a commercial general liability (CGL) policy not endorsed to provide such coverage, he said.

ISO has addressed this emerging risk by providing insurers with tools to help develop innovative solutions for businesses that may use drones. Specifically, these options modify coverage under ISO's Commercial General Liability and Commercial Liability Umbrella/Excess programs. Six core options were made available under each program (three optional exclusions and three limited-coverage endorsements) and can be used to address a number of potential exposures with respect to bodily injury, property damage, and other potential liability related to drones, he noted.

"The problem is there's very limited data we have on drones," McCarthy said, noting that, outside of examining how the military deployed drones, insurers have limited information upon which to price coverage for either recreational or commercial drone use. However, actuaries are among the first to have begun gathering data to help price the risk as it emerges in the months and years ahead.

EXPLORATIONS BY GLENN MEYERS

Dependencies in Stochastic Loss Reserve Models – An Update

In my "Explorations" that appeared in the July/August 2015 edition of the *Actuarial Review*, I reported on my progress in working with the bivariate stochastic loss reserve model proposed by Zhang and Dukic.[1] Here is a summary of what they did.

They took a stochastic Bayesian MCMC version of a well-established loss reserve model. Using that model to describe the marginal distribution of outcomes for each of two lines of insurance, they fit a bivariate distribution that allowed for dependencies between the two distributions as described by a copula. Using Bayesian MCMC software, they then generated a predictive distribution for the joint distribution of the two lines. This predictive distribution consisted of the parameters of the model for each line, and the parameters of the copula. A feature of the Zhang/Dukic approach was that there was no guarantee that the parameters of the bivariate model would agree with the parameters of a univariate model fit to a single line's data. As it turned out, this was a problem for my changing settlement rate (CSR) model.[2]

After some thought, I was able to come up with a way to generate a sample from the predictive distribution for a bivariate stochastic loss reserve model that preserved the univariate marginal distributions.[3] Having done that, I then turned to a more interesting question: How does this bivariate model that allows for dependencies compare to an alternative bivariate model that assumes independence between the lines of business?

To answer that question I had to learn more about model selection statistics for predictive distributions. My "Explorations" column in the March/April 2016 issue describes some of what I learned — namely that something called the WAIC statistic allows one to indicate model preference while taking the number of model parameters into account.

I then fit bivariate CSR models to the 102 pairs of within insurer lines of business that I analyzed in my monograph, with the surprising result that the *WAIC statistics favored the independent bivariate model for all 102 pairs of lines!*

In discussing this result with my actuarial colleagues, I found that others were also surprised, or even skeptical of my results. The skeptics pointed to common drivers of dependency such as inflation or the underwriting cycle.

One feature of the CSR model is that it allows the expected loss ratio to vary significantly by accident year. This is in contrast to some favorite models of many actuaries such as the Bornhuetter-Ferguson or Cape Cod models that force the expected loss ratio to be constant across accident years.

With this contrast between the CSR and the current actuarial favorites, I built a model that assumes that the expected loss ratio is constant across accident years. I called this model the "Stochastic Cape Cod" (SCC) model. Proceeding as above, I found several instances where the bivariate SCC model that allowed for dependencies was preferred to the bivariate SCC model that assumed independence.

Insurer #5185 in the CAS Loss Reserve Database provides a good example to examine in detail. If we select a single parameter set from the posterior distribution we can construct a set of 55 standardized residuals

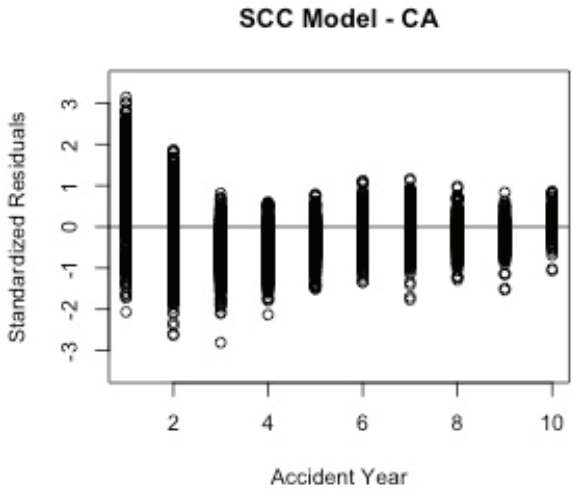
$$\frac{\log(C_{wd})-\mu_{wd}}{\sigma_d}$$

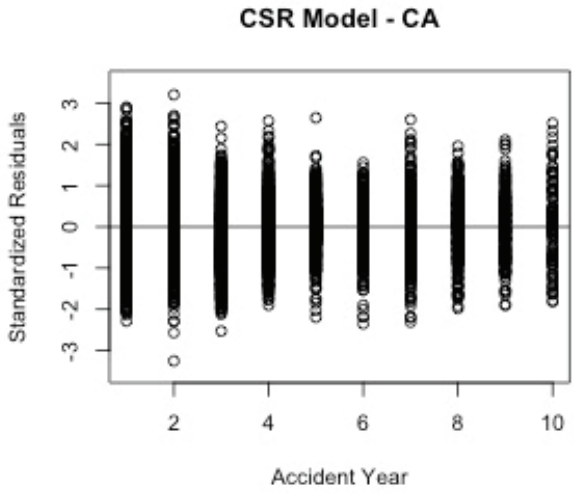
where C_{wd} is the cumulative paid loss for accident year w and development year d in the 10 x 10 data triangle. μ_{wd} and σ_d are the mean and standard deviation calculated from the selected parameter set from the posterior distribution of the model. Repeat this for a sample of 100 parameter sets selected at random from the SCC and CSR models. The exhibit below shows plots of the standardized residuals of the sampled parameter sets (5,500 points in all) for both models for the Commercial Auto

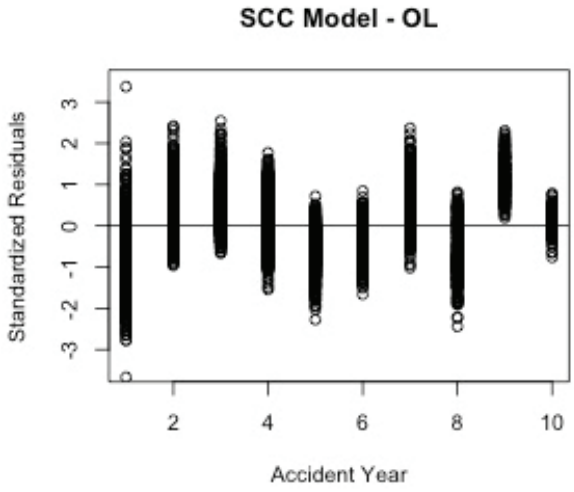
[1] Zhang, Yanwei and Vanja Dukic. 2013. "Predicting Mulitvariate Insurance Loss Payments Under the Bayesian Copula Framework." *The Journal of Risk and Insurance*, Vol. 80, No. 4, 891-919.

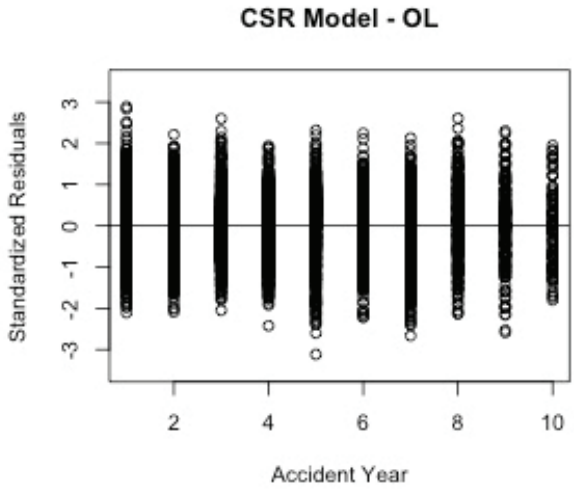
[2] The CSR model is described in my monograph that is available on the CAS website at http://www.casact.org/pubs/monographs/index.cfm?fa=meyers-monograph01

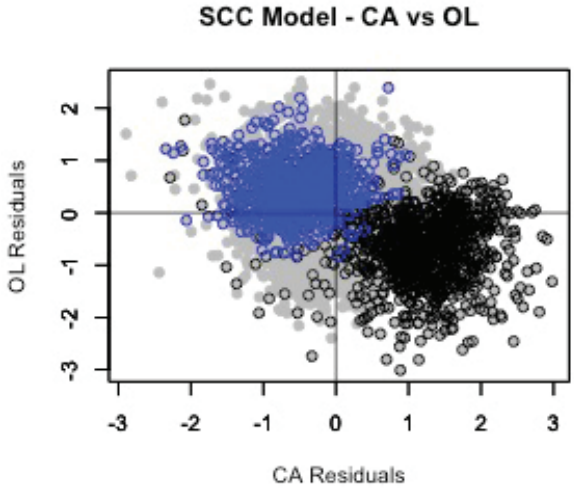
[3] A preliminary version of my paper describing how to do this appears in the CAS *E-Forum*, Winter 2016. I submitted a later version of the paper to a peer-reviewed journal.

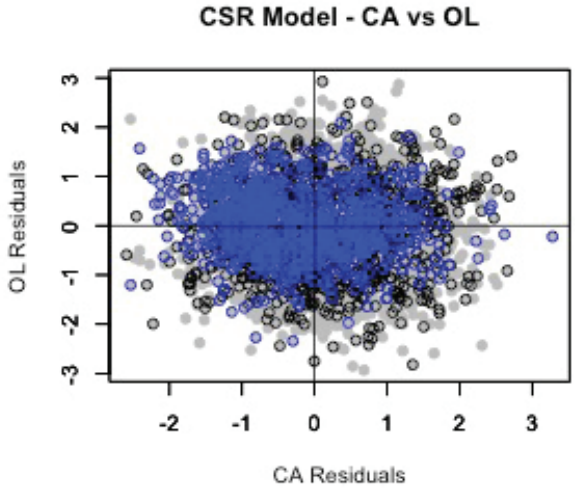

SCC Model - CA
Standardized Residuals
Accident Year


CSR Model - CA
Standardized Residuals
Accident Year


SCC Model - OL
Standardized Residuals
Accident Year


CSR Model - OL
Standardized Residuals
Accident Year


SCC Model - CA vs OL
OL Residuals
CA Residuals


CSR Model - CA vs OL
OL Residuals
CA Residuals

(CA) and the Other Liability (OL) lines of insurance.

- The first row shows plots of the standardized residuals against the accident year for CA.
- The second row shows plots of the standardized residuals against the accident year for OL.
- The third row plots the standardized residuals for CA against the corresponding standardized residuals for OL. The plot for each point consists of a solid gray circle. A black border surrounds the points for accident year one. A blue border surrounds the points for accident year three.[4] The posterior mean of the coefficients of correlation between the $\log(C_{wd})$s are -0.40 for the SCC model and -0.02 for the CSR model. In a well-fitting model, we should expect to see the residuals normally distributed around zero for the accident year plots. This is the case for the CSR model, but is not the case for the SCC model. In this case the bulk of deviations from zero have the opposite signs for the same accident year in the different lines of insurance. This leads to a significant negative correlation for the SCC model.

In examining other pairs of triangles with different insurers, I often see the paired residual plots by accident year occupy distinct regions in the plane. If the regions are mainly in the northwest and southeast quadrants, we will see a negative correlation as we did for insurer #5185. It is also possible for the accident year regions to be mainly in the northeast and southwest quadrants resulting in a positive correlation. Another possibility is for the accident year regions to be in all four quadrants resulting in a near zero correlation.

Since the CSR model allows the expected loss ratio to vary by accident year, there are no distinct accident year regions.

The takeaways that I get from this exercise is that first we can fit a bivariate stochastic loss reserve model that captures any dependencies between two lines of insurance. Second, if we see evidence of some dependency, we should look for a better model.

These results will have a significant impact on the liability risk margin formula put forth in Solvency II, which does not recognize the effect of diversification by line of insurance. I plan to discuss this in a later column.

[4] I chose accident years one and three because they illustrate the point most dramatically.

The CAS Launches Research Committee Wikis

BY KAREN SONNET, CAS RESEARCH COORDINATOR

Over the past several years, two CAS research committees have developed wikis that are open to CAS membership as well as the general public. They were created with the goal of providing content and learning materials to anyone who is interested.

The CAS Open Source Software Committee (OSSC) wiki (http://opensourcesoftware.casact.org/) is the online resource for all things OSSC. The left sidebar lets committee members and visitors navigate to ongoing communication and development work among OSSC members. Here are some highlights:

- Committee Business: See various projects OSSC members are currently working on.
- Forums: Members use forums for online discussions on a variety of topics.
- Blogs: Two works have made it to the blog page, including Greg McNulty's recent helpful and reproducible post "Modeling ALAE Using Copulas." For other works in progress, see Committee Business.

The CAS Health Care Issues Committee (CHCI) wiki (http://healthcare.casact.org/) is intended to be a primer for actuaries on select health care topics. There are currently four active topics:

- Medicare Secondary Payer Act.
- Health Care Reform.
- Medical Professional Liability.
- Health Care in Workers' Compensation.

Five additional archived topics are also available to explore. The individual pages provide important readings, CAS and industry publications and presentations, and links to useful websites. Each page is a living document and is updated periodically as new information becomes available or as current listings become outdated.

CAS members are invited to log into the wikis and learn more about these exciting topics!

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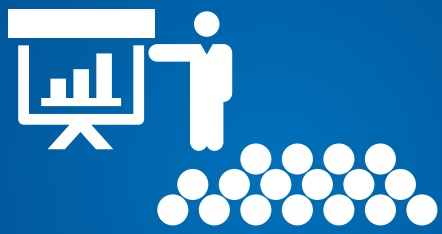

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An Introduction to Lasso Regression for Actuaries

BY KAM HAMIDIEH

The linear and generalized linear models are standard statistical tools for actuaries. However, new improvements over the standard tools have been developed that offer promising results. This article introduces actuaries to the *lasso regression*, a novel tool which effectively controls for overfitting in models with a large number of parameters. Lasso stands for "least absolute shrinkage and selection operator" according to the original academic paper on the method. The lasso regression is first presented in the context of linear modeling, and it is later extended to the generalized linear case.

What are the components of a lasso regression?

The typical regression data consists of n observed response values $y_1,y_2,\ldots,y_n$ and p predictors $x_j,j=1,\ldots,p$ in an $n\times p$ matrix. The goal is to estimate coefficients B_j of p predictors by minimizing the residual sums of squares (RSS):

$$\text{RSS}=\sum_{i=1}^{n}(y_i-(B_1 x_{i1}+\ldots+B_p x_{ip}))^2.$$

The intercept term has been omitted without loss of generality. Also assume the data have been scaled by their means and standard deviations.

In lasso regression, the coefficients are estimated by minimizing:

$$\text{RSS subject to } \sum_{j=1}^{p}|B_j|\le t^2.$$

The term $\sum_{j=1}^{p}|B_j|\le t^2$ is a "budget" term. In statistical literature, the terms "constraint" and "penalty" are also used to describe the budget term. The terms constraint, penalty and budget will be used interchangeably in this article.

The reader may be familiar with ridge regression, an established method in which the budget term takes the form $\sum_{j=1}^{p}B_j^2\le t^2$. Ridge regression is often used to obtain stable estimates of coefficients in the presence of highly correlated predictors (multicollinearity). The lasso budget replaces the squared coefficients with the absolute values of the coefficients.

At first glance, it is not clear at all why the addition of the lasso budget can change anything in the regression, but it turns out to have a profound effect.

Before discussing this effect, one might ask why a budget term is needed. Two major reasons are: (1) to combat overfitting and (2) to obtain a parsimonious and thus more interpretable model. To address these two problems, we can either attempt to eliminate predictors by some sort of variable selection, or we can reduce the predictors' effects by controlling their coefficients' sizes.

The most profound effect of the lasso budget is that lasso regression can shrink the sizes of the coefficients all the way to zero, effectively eliminating predictors and performing automatic variable selection.

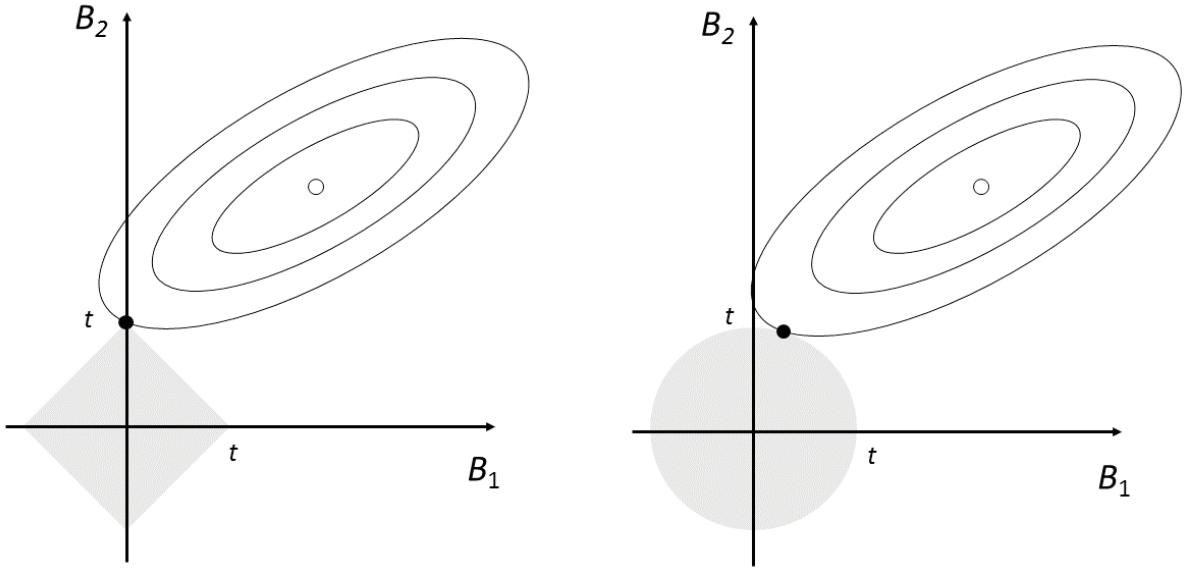
How can we control the coefficients' sizes?

We can put a budget of t^2 on the total size of the coefficients. This budgeting controls the coefficients' sizes by not allowing them to get too big. In fact, lasso and ridge regression are sometimes referred to as shrinkage methods because these methods shrink the coefficients' sizes.

The most profound effect of the lasso budget is that lasso regression can shrink the sizes of the coefficients all the way to zero, effectively eliminating predictors and performing automatic variable selection. Reducing the number of predictors reduces the chances of overfitting. Furthermore, a smaller and more interpretable model is obtained. In view of this important property of lasso regression, the moniker "lasso" is an apt one: A lasso is a rope used by cowboys to snare cattle from a herd. Similarly, lasso regression is a method a statistician uses to pull variables from a larger group of variables.

The impact of the budgets imposed by lasso and ridge regression is shown in Figure 1 when $p=2$ (two predictors). On the right, the small open point represents the unconstrained solution to minimizing RSS. When the ridge budget $B_1^2+B_2^2\le t^2$ (which is a circle of radius t) is used, we have to move away from the open circle until the first contour of RSS intersects the constraint region. This is indicated by a black solid point. Something interesting happens in the lasso case on the left. The lasso constraint $|B_1|+|B_2|\le t^2$ (which is a rhombus) has corners. When the first contour of RSS intersects the lasso constraint region, $B_1=0$ and thus predictor x_1 is eliminated. The argument here also applies to the

Figure 1



case when $p \geq 3$; the lasso constraint will have pointy edges, which increases the chances of eliminating variables.

Why would one prefer lasso over well-established variable selection methods that can combat overfitting and produce a parsimonious model?

In high-dimensional situations (large number of predictors), lasso regression offers substantial computational advantages over many existing variable selection methods. Although lasso was first proposed in the mid-1990s, these computational advantages were not realized until a new implementation of lasso took off in 2008. The new computational implementation uses a fast and efficient coordinate descent algorithm, an optimization algorithm popular in the machine-learning community, to estimate the lasso regression coefficients. The t^2 value is chosen by cross validation as described next.

In cross validation, the data are randomly divided into $G > 1$ groups. Common values for G are 5 and 10. One group is left out as the validation group. The rest of the data in G-1 groups are used for fitting the lasso model across a range of t^2 values. Next, each fitted model with its own t^2 value is used to predict the response values that were in the validation group. The prediction accuracy, typically using mean-squared error, is recorded for each t^2 value. This process is repeated G times, with one of the groups serving as the validation group and the remaining used for fitting the lasso model and predicting the response values in the validation group. This process results in G prediction accuracy measures for each t^2 value. The G prediction accuracies are averaged to give one mean prediction accuracy measure for each t^2 value. Finally, the t^2 value with the best mean prediction accuracy is chosen as the model t^2 value. This process may seem quite time-consuming but the new computational implementation of lasso performs well.

Just as a quick example, it took about 31 minutes to perform a lasso regression on a Dell laptop with 8 GB RAM and 2.2 GHz processor — this was done using R's glmnet package (which is created by the foremost researchers in lasso regression) on simulated data with $n = 500{,}000$ and $p = 500$, of which 100 were noise variables. The data file size was about 4.4 GB in csv format. The software's default settings were used, which included a 10-fold cross validation to determine the best value of t^2. The lasso regression correctly eliminated all 100 noise variables.

The lasso budget can be applied in many situations with similar effects. One important application is the lasso budget in generalized linear models. Here the minimization is:

Negative log-likelihood subject to $\sum_{j=1}^{p}|B_j| \leq t^2$, where B_js are now the parameters of the generalized linear model.

An important variant of the lasso budget, also used in generalized linear modeling, is the elastic net, which is a weighted average of the lasso and ridge budgets:

$(1-\alpha)\sum_{j=1}^{p}B_j^2+(\alpha)\sum_{j=1}^{p}|B_j| \leq t^2$, $0 \leq \alpha \leq 1$.

Note that when α =1, we are back to the lasso, and when α=0, we get the ridge. Like the t^2 term, α is generally determined by cross validation. The elastic net budget is the recommended approach when dealing with many correlated predictors.

What are the disadvantages to using lasso?

There are no closed form solutions for the coefficients in lasso regression. Also, lasso regression tends to produce biased estimates of the coefficients. However, this bias is countered by the reduction in the variance of the coefficient estimates.

Where can you go from here if you need to learn more about lasso?

An excellent clear description of the method (without suffocating equations!) is found in chapter 6 of *An Introduction to Statistical Learning with Applications in R*, published in 2013, by Gareth James, Daniella Witten, Trevor Hastie and Robert Tibshirani. Tibshirani (the original creator of lasso) and Hastie are the leading researchers in lasso regression. The book can be downloaded for free from http://www-bcf.usc.edu/~gareth/ISL/.

Those seeking more details and mathematics should download the 2015 book, *Statistical Learning with Sparsity: The Lasso and Generalizations*, by Hastie, Tibshirani and Martin Wainwright from http://web.stanford.edu/~hastie/StatLearnSparsity/. This book is a tour de force of lasso regression.

When I first got the idea to write this article, I had planned on submitting an R tutorial on lasso regression using R's glmnet package. However, I discovered a great tutorial maintained by Trevor Hastie and Junyang Qian at http://web.stanford.edu/~hastie/glmnet/glmnet_beta.html. This comprehensive tutorial shows how to do linear, logistic, multinomial, Poisson, multivariate and Cox hazard lasso regressions using the glmnet package.

For a specific example of a lasso regression using actuarial data and the glmnet package, see pages 189 to 193 of *Computational Actuarial Science with R* (2014), edited by Arthur Charpentier.

Kam Hamidieh, Ph.D., is a lecturer in the department of statistics and Jones Business School at Rice University. He can be reached at kh1@rice.edu.

Joint IFoA/CAS International Pricing Paper Now Available

The CAS and the Institute and Faculty of Actuaries (IFoA) have issued a joint research paper for analyzing international property per risk exposures that is now available for download.

Titled "Analyzing the Disconnect between the Reinsurance Submission and Global Underwriter's Needs," the research aims to fill the void in current actuarial literature related to requirements for primary and reinsurance pricing practitioners.

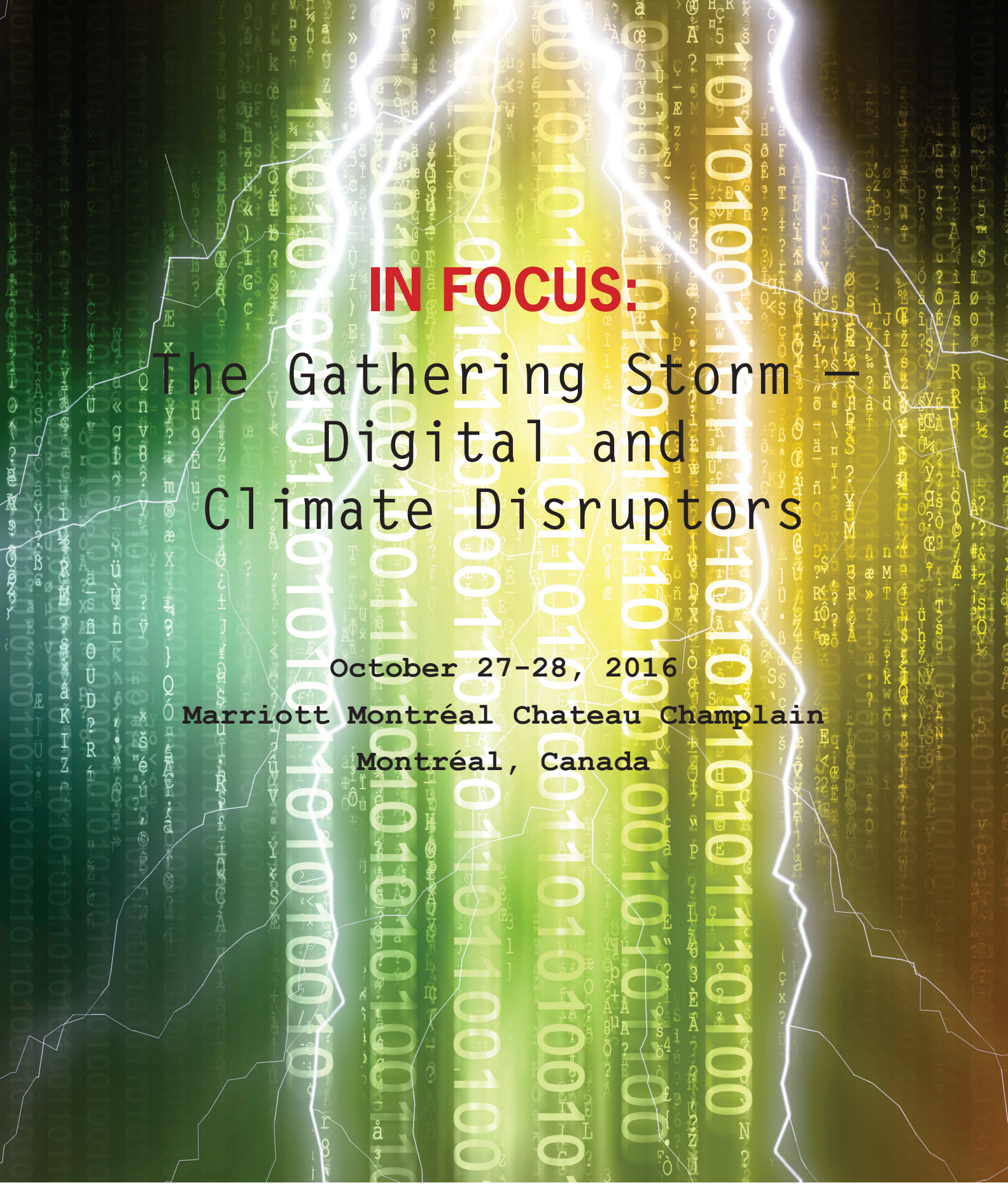
Topics addressed in the paper include:

- Analyzing various "amounts of insurance" definitions typically used worldwide.
- Analyzing the impact of each of the traditional property risk characteristics (standard COPE — construction, occupancy, protection, and exposure).
- Producing robust price monitoring systems.
- Using information typically included in cat model submissions.

The paper's intent is to illustrate the importance of each of these data elements and to be a reference document for all parties to the insuring transaction.

In 2015 the U.K. Institute and Faculty of Actuaries General Insurance Research Organization (IFoA-GIRO) and the Casualty Actuarial Society's Casualty Actuaries in Reinsurance (CAS-CARe) jointly formed a GIRO working party to produce this reference source for use by underwriters, actuaries and other pricing practitioners internationally.

The results of this GIRO Working Party reference document will be presented at the Boston CAS/CARe Seminar on Reinsurance, June 6-7, 2016, by two of the authors: John Buchanan, FCAS, MAAA, and Chris Boggs.



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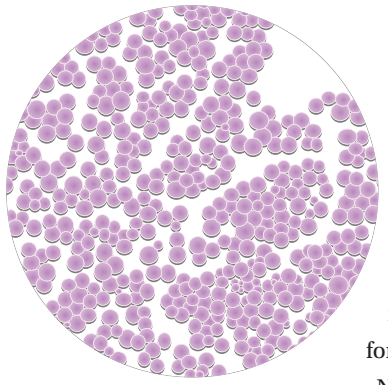

IT'S A PUZZLEMENT BY JON EVANS

Bacterial Population Growth

You are a very talented graduate student in mathematics. You work as a research assistant to Louis, a microbiologist. Louis has determined an "exponential growth model" for a new type of infectious bacterium. If $P(t)$ is the population of the bacterium at discrete time periods (measured in seconds) $t = 0, 1, 2,\ldots$, then $P(t+1) = P(t) + P(0)\,\mathrm{Exp}[-P(t)/P(0)]$. So $P(1) = 137\%\ P(0)$, $P(2) = 162\%\ P(0)$. Although the initial growth is explosive, the growth rate decays downward rapidly: After one minute $P(60) = 416\%P(0)$; after an hour $P(3600) = 819\%P(0)$, which is less than double $P(60)$; after one day $P(86400) = 1137\%\ P(0)$ which is less than 40 percent growth from $P(3600)$. Louis observes that soon the growth rate will be trivial and the population will "level off at an equilibrium level." He asks you to determine several things: (1) the "cap" or "equilibrium level" for the maximum population (as a multiple of $P(0)$); (2) at what time t does the population reach 50 percent of this cap; and (3) hypothetically, what the population (as a multiple of $P(0)$) would be after a trillion (10^{12}) years of growth. What answers do you give Louis?

DNA Sequencing

In this puzzle, Craig is trying to sequence a DNA sample from an ancient dinosaur. Craig consults his brother Gary to determine if the sequencing can be completely finished within a year. Craig's DNA sequencer can read a single linear segment that is 5,000,000 base pairs long for each hour it is running. The sequencer can only match the linear segments together if they overlap by at least 2,000,000 base pairs. Segments are randomly sampled (with replacement) and the DNA strand is circular. Gary says there is a 99 percent chance the sequencer will finish within a year. How many base pairs long is the strand of dinosaur DNA?

The overlap requirement can be ignored by reducing the length of each segment to its central 1,000,000 base pairs, since the first and last 2,000,000 base pairs must always be used for matching together with other segments. The question then becomes effectively what is the circumference of a circle if there is a 99 percent probability that 8,760 (corresponding to the number of hours in a year) random arcs of length 1,000,000 will cover the entire circle.

The key mathematics to efficiently answer this question were developed in the 1939 article by W. L. Stevens, "Solution to a Geometrical Problem in Probability" (*Annals of Eugenics* 9: 315–320). We will only describe key formulas from this paper without detailed derivations.

Let X be the ratio of the arc length to the circumference and n be the number of random arcs. If k is a positive integer less than $1/X$, then the probability, $f(k)$, that there are uncovered "gap" arcs (not necessarily the same length as the randomly selected arcs) on the circle (not covered by any of the arcs and each immediately to the counterclockwise endpoint of one of k-specified random arcs) is $f(k) = (1- kx)^{n-1}$. These k arcs must be disjointed from each other, which gives some intuitive insight into the $(1- kx)$ in the formula for $f(k)$.

Now let $f(k,t)$ be the probability that there are gaps to the counterclockwise of k-specified random arcs, that there are no gaps to the counterclockwise of t other than specified random arcs, and that the n-k-t other random arcs may or may not have counterclockwise gaps. Note that $f(k) = f(k,0)$. Therefore $f(k,t+1) = f(k,t) - f(k+1,t)$. Consequently, by repeated iteration $f(h,t) = f(h,0) - t\,f(h+1,0) + (t(t-1)/2)\,f(h+2,0) - \ldots (-1)^t f(h+t,0)$.

The probability that there will be no gaps between the n random arcs is then $f(0,n) = 1 - n\,(1-x)^{n-1} + (n(n-1)/2)(1-2x)^{n-1} - \ldots (-1)^k\,(n!/(k!\,(n-k)!))\,(1-kx)^{n-1}$, where k is the largest integer not greater than $1/X$.

For the stated problem $n = 8760$ and $f(0, 8760) = 99$ percent. Once we solve for X, the length of circular strand is $1{,}000{,}000/X$. Let $g(X) = f(0, 8760)$ for a given X. We can check some by orders of magnitude for X (using a good numerical calculation program, of course): $g(0.1) = 100\%$, $g(0.01) = 100\%$, $g(0.001) = 25.2\%$. Now, start searching by "bisecting" the values of X from 0.001 to 0.01: $g(0.005) = 100\%$, $g(0.0025) = 100\%$, $g(0.00125) = 86\%,\ldots$, $g(0.0015604) = 99\%$. So, $X = 0.0015604$ and the length of the dinosaur DNA strand is about $1{,}000{,}000/0.0015604 = 640{,}861{,}318$ base pairs.

Bob Conger submitted a solution.

Know the answer? Send your solution to ar@casact.org.

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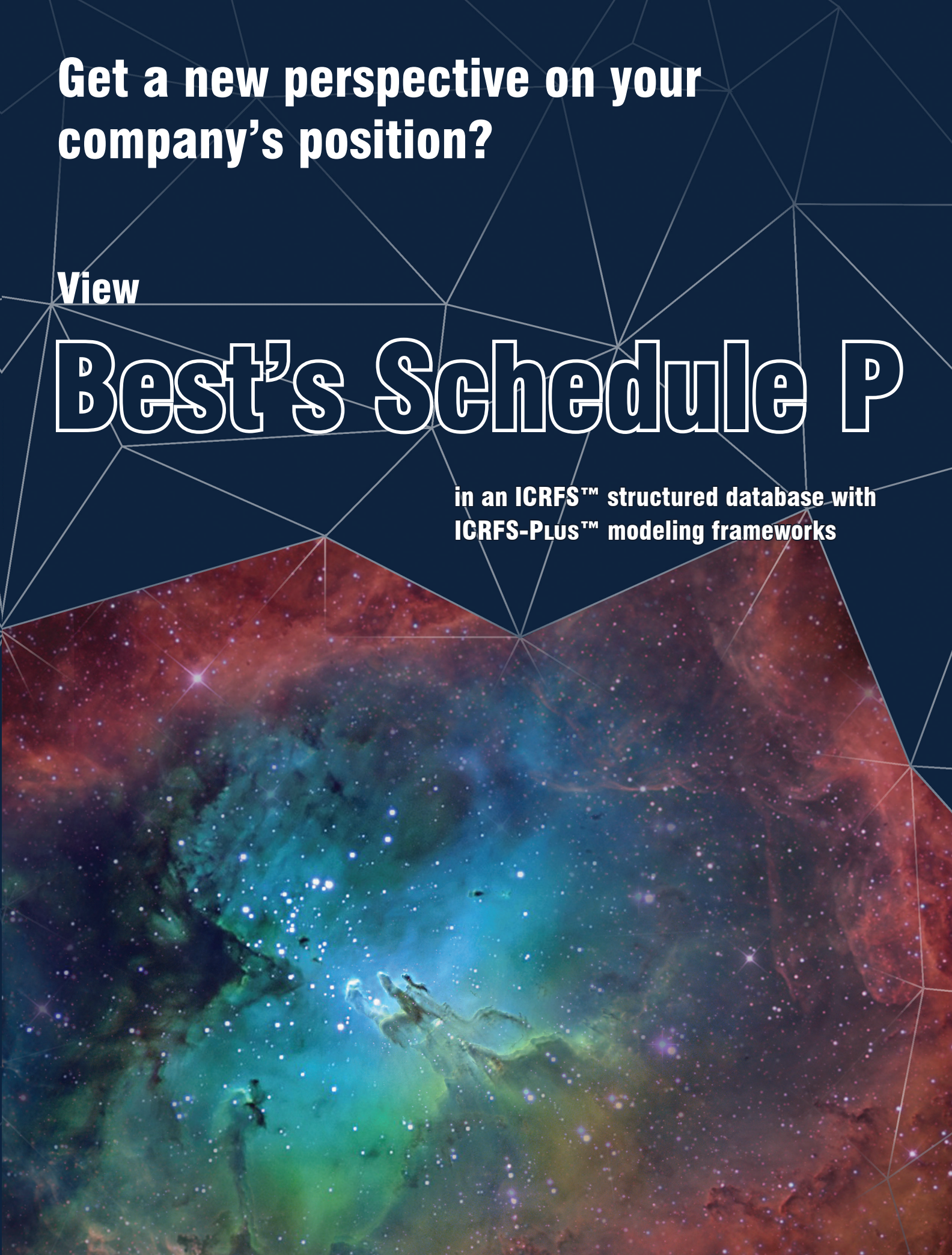

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OHIO – RESERVING ACTUARY
For Position 69850, a commercial lines and personal lines reserving actuary is needed by an Ohio insurer. FCAS or ACAS with 5 to 12 years of property and casualty experience ideal.

WISCONSIN – INSURANCE ANALYTICS PH.D.
For Position 69759, a Madison, Wisconsin property and casualty insurer seeks a mathematics or statistics Ph.D. for Position 69759. Insurance analytics role. Must have 15+ years of business intelligence and predictive analytics experience.

NEW YORK – ACTUARIAL ANALYST
For Position 69670, a New York banking and financial services firm is looking to hire a property and casualty actuarial analyst. Must have at least 1 year of property and casualty actuarial experience, including some modeling and statistical analysis work.

CALIFORNIA – CONSULTING ACTUARY
California consulting group is seeking an FCAS actuarial consultant for Position 69448. Must have 3+ years of personal lines pricing experience.

PENNSYLVANIA – SENIOR ACTUARIAL ASSISTANT
Property and casualty senior actuarial assistant sought by a Philadelphia consulting group for Position 69220. Must have at least three years of property and casualty actuarial experience. Compensation up to $100K.

MIDWEST USA – REINSURANCE ACTUARY
For Position 69394, an FCAS / ACAS reinsurance pricing actuary is needed by our Midwest USA client. Several years of property and casualty reinsurance pricing experience required. Workers compensation pricing experience a plus.

NEW JERSEY – EXCESS CASUALTY ACTUARY
For Position 69732, a New Jersey client is searching for an excess casualty actuary. Leadership role for a Fellow of the Casualty Actuarial Society (FCAS). Must have 10+ years of experience. Manage staff.

MIDWEST USA – FCAS ACTUARY
For Position 68884, an FCAS actuary with advanced statistical training is needed by a Midwest USA client. Client is a top-rated multi-line property and casualty insurer.
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