

actuarialREVIEW

VOL 44 / NO 5 / SEPTEMBER-OCTOBER 2017

PUBLISHED BY THE CASUALTY ACTUARIAL SOCIETY 

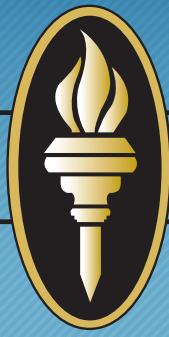
THE OTHERS

Part 1

**CAS members are
taking career paths
less traveled.**



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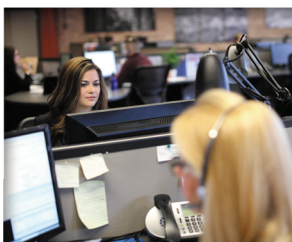
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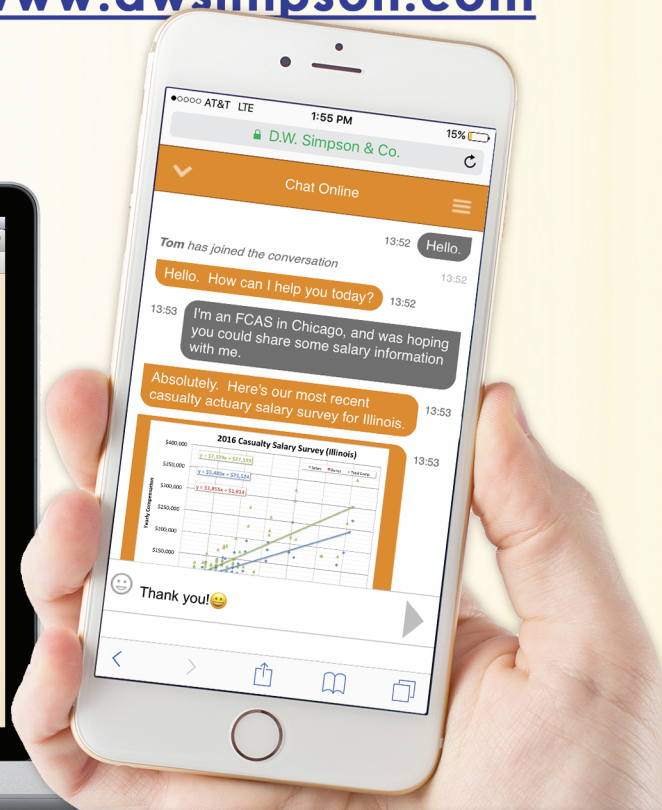
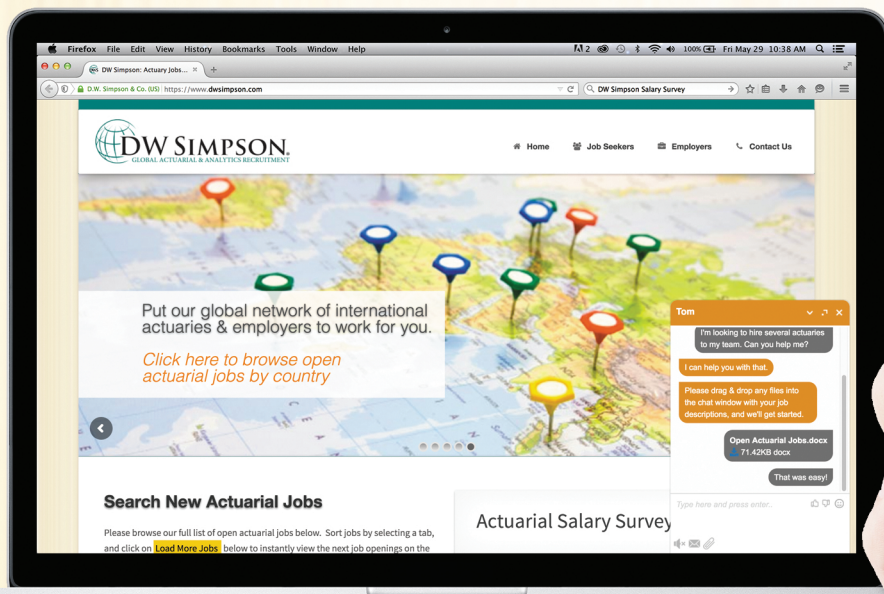
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The Others: Part 1

BY ANNMARIE GEDDES BARIBEAU

CAS members are taking career paths less traveled.

Actuarial Review (ISSN 10465081) is published bimonthly by the Casualty Actuarial Society, 4350 Fairfax Drive, Suite 250, Arlington, VA 22203. Telephone: (703) 276-3100; Fax: (703) 276-3108; Email: ar@casact.org. Presorted standard postage is paid in Lutherville, MD. Publications Mail Agreement No. 40035891. Return Undeliverable Canadian Addresses to PO Box 503, RPO West Beaver Creek, Richmond Hill, ON L4B 4R6.

The amount of dues applied toward each subscription of *Actuarial Review* is \$10. Subscriptions to nonmembers are \$10 per year. Postmaster: Send address changes to *Actuarial Review*, 4350 North Fairfax Drive, Suite 250, Arlington, Virginia 22203.

actuarialREVIEW

The magazine of the
Casualty Actuarial Society

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editor'sNOTE By GROVER EDIE, AR EDITOR IN CHIEF

From Our Differences Come Our Strengths

In the early 1900s, problems in the United States requiring actuarial treatment were emerging in sickness, disability and casualty insurance — particularly the newly emergent field known as workmen's compensation which was introduced by laws enacted in 1911. The differences between the new problems and those of traditional life insurance led to the founding in 1914 of the Casualty Actuarial and Statistical Society of America.

—*100 Years of Expertise, Insight and Solutions: A History of The Casualty Actuarial Society*

The CAS was created out of diversity — new and different problems required new and different solutions. Today, understanding how to implement sound cyber insurance policy is reminiscent of the issues our CAS founders must have encountered with workers' compensation, the cyber insurance of its time.

This issue examines how our members are using their skills in new and different ways to keep up with the ever-changing world of technology and the needs of society.

Some of our members are branch-

ing out into a variety of new applications for their skills, as evidenced in our cover story "The Others." The subjects of this two-part series show how they have applied their actuarial skills in new and different professional fields. Their stories are testaments to the curiosity and problem-solving inherent in our profession.

CAS President Nancy Braithwaite challenges us to think of the diverse skills other professionals can bring in solving today's problems. She espouses a sort of "reverse diversity" that brings the skills of others to us.

Within our association, we have sought out new and different ways to operate and relate to the world. We have expanded our magazine to include in-depth reporting, feature articles, advertising — and even full color. We also have a strong social media presence and have won awards for social media marketing. All of this was new to us just a few short years ago. I wonder what will be next.

I wonder the same for our profession. Stay tuned! ●

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.

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Diversity as an Advantage in a Changing World

Continuing on my theme of change, let's talk about the strategic advantages that come with diversity. These strategic advantages benefit our employers, the actuarial profession, and each of us personally.

We are all more comfortable being with people who are similar to us. It's natural, and sometimes it can be easy. It's not always easy to communicate with people from different backgrounds — think of the old saying that Britain and America are two nations separated by a common language.

But there's great value in pushing our boundaries and trying to appreciate how others think.

We are already extremely aware that other professionals are ahead of us in adopting some skill sets. We work side by side, and sometimes compete, with data analysts and other professionals. These other professionals bring perspectives to our organizations that we might never have imagined. Being able to understand and communicate with these professionals is essential to our success. This diversity in skill set is just one aspect of diversity.

We operate in a complex world. No one can be in tune with all of the things that are changing around us. The more diverse perspectives and ideas we are exposed to, the more prepared we can be for changes in our industry, as well as changes in our daily lives that will affect our industry. After all, our organizations seek to provide financial stability to those who own cars and houses, as well as to those with complex business problems. Cultural changes in the desire to own homes and cars, as we have seen

with some ownership-averse millennials, might come as a surprise. These changes, if unforeseen, might be a threat to our ability to adapt our products and services to the needs of our customers. For instance, it took our industry some time to catch up with the sharing economy when ride-sharing services first developed.

The more diverse perspectives and ideas we are exposed to, the more prepared we can be for changes in our industry, as well as changes in our daily lives that will affect our industry.

Teams that are diverse have the opportunity to share and build on the creativity of their members. Our products can incorporate new features that a homogeneous team might not imagine. We might be able to anticipate claim scenarios that a homogeneous team would not consider important. Imagine the savings to the industry in relation to asbestos and other latent injuries that would have been realized if we had anticipated the continuous exposure theory in either our policy language or in our pricing.

Without a diversity of cultures in our profession, we might miss developing trends. We might miss the needs of potential market segments that are different from what we have seen in the past. How many of us are thinking about microinsurance or peer-to-peer insurance? Should we be? And what about identifying trends in our traditional areas of insurance? As more and more workers are self-employed or contract workers, we need to think about what that means for workers' compensation

insurance.

Different people and cultures think about solving problems in different ways. Different approaches and perspectives can only enhance our ability to meet new problems head on. They also can open up opportunities for actuaries outside of insurance. Those special individuals who are trained as actuaries and

take the leap into another business can showcase our training and create a demand for actuarial skills outside of our traditional fields. For evidence of this, see the cover story by Annmarie Geddes Baribeau in this *Actuarial Review*.

As a global organization, the CAS has recognized the value of diversity and inclusion, as articulated in our Diversity Statement adopted by the CAS Board of Directors in March 2015:

In principle and in practice, the CAS values and seeks diverse participation within the property and casualty actuarial profession. In support of those values, the CAS encourages an inclusive community where differences are celebrated and all have the opportunity to participate to their fullest potential in the CAS's success. The CAS commits time and resources to accomplish this objective.

Our experience can be richer when it is broader and open to new perspectives. We, our profession, and our employers can only be made more valuable by embracing diversity. ●

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COMINGS AND GOINGS

Willis Towers Watson has appointed **Alice Underwood, FCAS**, as the global head of its Risk Consulting and Software (RCS) business. Underwood joins the RCS team from Willis Re, Willis Towers Watson's reinsurance business, where she led the North America analytics team and was a member of the Willis Re global leadership team. Before joining Willis Towers Watson in 2006, Underwood led a team of actuaries and catastrophe modelers at Guy Carpenter.

Tricia English, ACAS, was hired by Western General Insurance Company as the company's chief actuary. English's responsibilities will include managing the company's pricing and reserving for all states and all products. Before joining Western General, English was a consulting actuary with Perr & Knight for over 15 years. Prior to that she was with Amwest Insurance Group as their associate actuary.

Julie Parsons, FCAS, was promoted to executive vice president of product operations at Allstate Insurance Company. Previously, Parsons served as senior vice president for the Allstate brand's auto insurance business. She started with the Northbrook-based insurer in 1993 as an actuarial analyst after graduating from Purdue University with a degree in actuarial science.

Guy Carpenter & Co. appointed **Tom Hettinger, ACAS**, to lead its advisory services in the U.S. and Canada. Most recently, Hettinger was responsible for underwriting and developing capital management and predictive modeling solutions at Arch Reinsurance Co. Prior to joining Arch, he served as the Americas Property and Casualty Sales and Practice Leader for Towers Watson. ●

EMAIL "COMINGS AND GOINGS"
ITEMS TO [AR@CASACT.ORG](mailto:ar@casact.org).

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.

IN MEMORIAM

Howard R. Hardy (FCAS 1974)
1941-2016

Jerry A. Hillhouse (FCAS 1966)
1934-2017

James R. Nikstad (FCAS 1983)
1949-2017

Professionalism Defined

(Following are excerpts from an article that appeared in the August 1992 issue of Actuarial Review. That article itself was excerpted from a luncheon address given by Charles McClenahan at a CAS Course on Professionalism.)

When you become a member of the Casualty Actuarial Society you accept the mantle of professionalism woven of over 75 years of tradition, expertise, and dedication.

You have each demonstrated a high degree of technical competence in completing some of the CAS examinations. And membership in the CAS allows you to put some neat initials after your name, and to call yourself an actu-

diminished by unprofessional conduct. Nevertheless, there will come a time in your career when you will be tempted to place what you perceive as your self-interest over the dictates of professionalism...

But remember that you did not create the actuarial profession by passing the examinations. It is the ethical decision you make, along with those made by your predecessors, which represent the moral foundation of actuarial profes-

If you are a true professional you owe a debt to the profession.

ary. But calling yourself an actuary is not enough. You want to be regarded as an actuary by those who have helped to define the meaning of the word. You want to be called an actuary by actuaries.

If you want recognition as an actuary by your peers you must conduct yourself in such a way that you will enhance and not diminish our professional reputation...

If you are a true professional you owe a debt to the profession — the repayment of which must take precedence over your own self-interest. Now, in general, I believe that your self-interest is totally consistent with the requirements of professionalism. Your economic and psychological well-being will be enhanced by professional conduct and

sionalism...

Actuaries who use the complexity of our calling as a weapon, who use cleverness to the detriment of honesty, or who knowingly adopt unreasonable assumptions without comment, are doing a disservice to the profession...

Instead let us strive for the ideal.

Let us take complex ideas and make them simple, not the converse.

Let us spend as much time on clarity as we do on precision.

Let us disclose more than we disclaim.

Let us provide more answers than questions.

And, let us be not simply correct, but right as well. ●

CALENDAR OF EVENTS

November 5-8, 2017

Annual Meeting
Anaheim, CA

March 19-21, 2018

Rate-making, Product and
Modeling Seminar & Workshops
Fairmont Chicago, Millennium Park
Chicago, IL

May 13-16, 2018

Spring Meeting
Boston Marriott Copley Place
Boston, MA

June 4-5, 2018

Seminar on Reinsurance
New York Marriott at the
Brooklyn Bridge
New York, NY

September 5-7, 2018

Casualty Loss Reserve Seminar
(CLRS) & Workshops
Anaheim Marriott
Anaheim, CA

November 11-14, 2018

Annual Meeting
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CAS STAFF SPOTLIGHT

Meet Mallory Peebles, CAS Data Specialist

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

Peebles.

- **What do you do at the CAS?**

I have the ongoing task of maintaining the quality and consistency of data in the CAS association management software. I also assist with data queries and infographics for various CAS departments and committees.

- **What do you enjoy most about your job?**

I'm pretty extroverted, so any chance I have to communicate with my coworkers or CAS members is a plus. I also enjoy learning new ways of data analysis and presentation.

- **What's your hometown?**

I moved around a lot, but since high school my hometown has been Yorktown, Virginia.

- **Where'd you go to college and what's your degree?**

University of Mary Washington. BS in economics.

- **What was your first job out of college?**

I worked as a nursing assistant at a hospital.

- **Describe yourself in three words:**

Random, athletic, ENTP.*

- **What's your favorite weekend activity?**

Definitely sleeping in ... Though I'd hate to waste the weekend. Brunch,



Mallory Peebles

sports and live music are usual activities during my weekends.

- **What's your favorite travel destination?**

Ireland. My family lives on a farm outside Galway so that's our usual summer vacation.

- **Name one interesting or fun fact about you.**

I am going to Burning Man 2017. I'll actually be volunteering as a Lab Host and Random Sampler for the Black Rock City census team.

*ENTP is one of 16 distinctive personality types in the Myers-Briggs Type Indicator® personality inventory. Peebles is an Extroverted, Intuitive, Thinking and Perceiving type. Some famous ENTPs are Catherine the Great, Thomas Edison, Socrates and Weird Al Yankovic. ●



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DOWNTIME BY STEVEN SULLIVAN

Words and Music (and Numbers) By Tom Toce

Tom Toce is a man of many parts. You might even call him a polymath. The “poly” part is a songwriter, performer, producer, puzzle master and *Jeopardy!* champion.

And the “math?” He’s an actuary.

“The curse and the joy of my existence is that I’m a little bit good at most things, but I don’t know that I’m very good at anything,” says Toce, a consulting actuary living in New York City. “I’m a little bit good as a performer, but I’d like to think I’m really good as a songwriter and an actuary. It seems like a weird combination, but it’s natural to me.”

Like many people of his generation, Toce fell in love with the music of the Beatles, Simon & Garfunkel, Bob Dylan and others. He learned to play guitar at age 11, joined a rock band in high school and sang folk music in bars and coffee houses in college. It was the age of the singer-songwriter, when performers weren’t taken seriously unless they wrote their own stuff. Somewhere along the way he realized that, as much as he liked performing, he might not be “good enough at it to make it or try to live that kind of life.”

But there was still songwriting. In college at Yale, he began to explore theater and the music it generated. Fifty years ago, most popular music came from the theater. The songs of Cole Porter, George and Ira Gershwin,

Irving Berlin, Frank Loesser, Jerome Kern, Johnny Mercer, Rodgers and Hart or Hammerstein all first appeared in Broadway shows. The shows themselves may or may not have been memorable, but the songs became hits through the voices of Bing Crosby, Frank Sinatra, Ella Fitzgerald and others. And those songs became the enduring pages in what has become known as the Great American Songbook.

So Toce immersed himself in those songs, studying how they were put together and what made them tick. At Yale he took a special seminar in theater songwriting that was life-changing. “It made me realize that there were people dreaming of being the next Rodgers and Hammerstein.”

This schism — between the Tin Pan Alley songsmiths of the ’20s through the ’40s who wrote for other singers, and the singer-songwriters of the ’50s to the present who sing only their own material — is mirrored in Toce’s own musical career.

“I usually write both the music and the lyrics. What I’ve found over the years is that I was going to have to sing them myself if anybody was going to hear them. But the natural performers of my songs — people like maybe Lyle Lovett or John Prine — are all writing their own stuff. It’s very hard to place anything with people like that because your song has to be way better than anything they can do themselves. A couple years ago



Tom Toce

I put my singer-songwriter songs into a show and made a CD because I wanted the songs to be heard and I knew nobody else would do it.”

So for the past 40 years, Toce has followed another path, one leading into the increasingly rarified world of writing for theater and for small cabarets in New York City. That’s where just a singer, with an accompanist on piano, performs his songs for a small, attentive audience, often made up of friends and family.

It helps to have a lucrative day job. “The trouble with theater songwriting is that I know people who make \$10 million a year from their songs and people who make \$1,000 a year and hardly anybody in between. It’s either boom or bust. There are a lot of people out there who are in the bust phase looking for the boom. And every now and then it happens.”

Just waiting for it to happen isn’t going to cut it. Part of the job is producing the shows and vehicles that can showcase his work. This means auditioning and hiring the singers, finding the accompanist and booking the venue from a dwindling supply that now includes small, intimate clubs like New York’s the Metropolitan Room, 54 Below, Don’t Tell Mama and the Laurie Beechman Theater.

Though he often writes both words and music himself, about a quarter of the time he writes lyrics for an existing tune. Half of the time he writes the lyrics

Singing Grubs

Tom Toce also creates cryptic puzzles, for *Contingencies* magazine six times a year. Tom explains how it works:

"Writing a cryptic puzzle is about finding the right combination of words to work a certain way. With a song, I know that I've got to say something in 14 syllables and the stresses have to be on syllables 2, 5, 7, 11, and 13. It's a lot like a puzzle, working within a constrained area to say something.

"A crossword puzzle is pretty direct. It provides a clue and you provide the answer. There may be humor or puns or misdirection, but it's basically straightforward. Every cryptic clue gives you two ways to get an answer. One side is a crossword puzzle-like clue; the other side is a play on words that leads to the same answer. The solver has to decide where the breaking point is.

"For example, here's a cryptic

clue: 'Singing grubs; they sang yesterday.'

"The answer to that is the Beatles. The straight definition, 'they sang yesterday,' is Beatles. But the other side is trickier. 'Singing' is a homophone indicator. Grubs are a kind of 'beetle' that, when you factor in 'singing,' become 'Beatles.' There are homophones and anagrams and puns, and it can become total lunacy. But like any kind of puzzle, there are people who like that sort of thing."

Not unlike a "croissant moon," a bit of word play that appears in a lyric from Toce's song "The Night I Fell in Love With Paris." Or when he rhymes "like a helpless baby" with "to your deep dismay, be."

"And in a way, it's that kind of stuff that relegates my songs to the noncommercial realm. Some would say it's just too smartass for its own good."

first, and the other quarter is a mixture of the two.

"What I'm trying to do when I write words first is to set them down in a way that I suspect music will be able to accommodate. I try not to make it too square. I don't want the lyric to be obviously metrical because that tends to limit the composer. Sometimes it's better to write staccato phrases, varying the meter, varying the number of syllables in a line, trying to give the composer some ideas about how to write music that's more fun than every line just being the same length."

Toce estimates he's produced maybe 10 or 12 shows in the last five

years. Among them is a musical written for children called *A Charles Dickens Christmas*, for which he wrote the lyrics. The concept of the show was that Charles Dickens, the most prolific author of the Victorian age, couldn't write a happy Christmas story because he had had such a miserable childhood. During the course of the play, he comes to terms with his upbringing and frees himself to be able to write A Christmas Carol. But the concept proved a little too sophisticated for its intended audience. Efforts to attract a more general audience have run up against the ubiquitous productions of the original all over the country. "You'd think they might want

to do something different like our show," says Toce, "but so far they haven't."

In 2015, Toce co-produced a show called *The Harvard-Yale Cantata* with a young Harvard grad. The title is a lyricist's word play on the more famous regatta of that name. So many great songwriters were forged in those institutions that Toce and his collaborator wanted to make sure the young ones who are emerging now can showcase their talent through the Cantata. A second was produced last year, and he's working on the third for a September opening at 54 Below in New York.

Toce and another collaborator are also in negotiations to secure the rights to a series of books that could serve as the basis for a humorous stage review or collection of songs and sketches. If it goes through, it could constitute his biggest writing project to date, a goal he feels has been too long delayed.

"The hardest thing for me has been finding the Rodgers to my Hammerstein or the Loewe to my Lerner," he says. "Writing individual songs is very gratifying, but it doesn't lead anywhere. I could write 10 wonderful cabaret songs in the next month and maybe some singers would sing them, but it doesn't change your life. I think I need to be thinking bigger and working on a show that might actually get produced and make a splash. That's what I'm aiming for, anyway."

Listen to some of Tom Toce's work on his website, www.tomtocemusic.com, and you'll see that the odds are definitely in his favor. ●

Steven Sullivan is a freelance writer/editor and president of High Concept Communications in Baltimore.

HUMOR ME BY URI KORN

Actuarial Thriller: Part Two

The first two chapters of this actuarial thriller can be found in the July-August 2017 issue of AR. Keaton, who works in the Reserving department, uncovers a secret Pricing operation to make the loss ratios appear profitable! His informant has revealed that they have enlisted the help of Predictive Modeling. Harris, a hardened Reserving actuary, arms Keaton with a fake “Senior Predictive Modeler” ID and instructs him to find out more information and to put a stop to the plan.

Chapter 3

Predictive Modeling sat five floors up from Reserving. Keaton took a long detour around the floor to make sure he wasn’t being followed. As a further precaution, he ducked into a restroom stall and proceeded to change his appear-

ance by flipping over his study materials so that the outside binder now showed “Exam 5” instead of “Exam 7” and by exchanging his BA-II Plus with the TI-87 hidden in his pocket. He then exited the restroom and climbed the steps, glancing back to make sure that no actuarial agents were on his tail.

Keaton approached the door at the top of the stairs. He listened to the drippings coming from the coffee dispensers on the other side of the door as he took out the newly printed ID and waved it in front of the sensor. He pushed the door open and noted the dull, dark carpet as a cold wind hit him in his face — the air conditioning was set too high on this floor — causing him to pull up his collar.

Before him was a long, narrow hallway. As he neared the hallway, two Predictive Modeling agents approached

and asked to see his documentation. Trying to act calm, Keaton took out his new ID and handed it to them. One of them looked it over carefully while the other eyed him suspiciously. “How about the news last night?” the former asked him.

“What news?” Keaton responded, too smart to fall for their trap. The asker nodded and handed back his ID.

Keaton reached the corner of the floor, which he knew to be a bad area. Here, actuaries would develop over-fitted models and choose Tweedie powers carelessly without bothering to check residuals. He clutched his study notes tightly to his chest as he passed by the thin, beige cubicles. “Psst,” he heard a sickly looking, blonde-haired modeler call out to him with a raised mug of coffee. “How would you like to learn about



advanced genetic algorithms?" Keaton turned his head and quickly headed to the end of the hallway.

Seeing a conference room in front of him, Keaton swiftly looked both ways before ducking in. This room was the frequent meeting place for Predictive Modeling. It was from here that they would plot and devise new and clever schemes to bewilder and confuse. Keaton approached the front of the room and looked carefully at the whiteboard. He could see that a series of complicated equations scribbled on the board had been erased. What had they been trying to hide, he asked himself. It's not like someone would just erase the board as a courtesy. His answer came after the equations. He could make out a word, "Trend," which was followed by a downward arrow! So that was it, he thought. They must be planning on lowering the trends to make the book look profitable!

As he thought about it, it all made sense. All the pieces came together! Just then, he heard some noise from outside of the conference room!

"Do you have this room reserved? Because we booked it from three o'clock," said one of three modelers who appeared at the door.

Keaton watched as three modelers burst in, arguing passionately over which type of Pareto was superior.

"That's okay," Keaton said as he exited the room. He snuck along the hallway past the ERM quadrant to the office that belonged to Alec, the head of the Profitability operation. He knocked on the door, calling out, "You can come out now, Harris!"

He could hear soft murmuring from behind the door. After a long pause, the door opened. Alec sat behind a large desk, a look of hatred on his face

directed at Keaton. In front of him was Harris!

Harris turned to face Keaton. "How did you know it was me who gave them the idea?" he asked, a note of embarrassment in his voice.

"I admit that I didn't realize until later," Keaton said stepping into Alec's large office. "When you were studying, I saw you highlight the word, 'conservatism.' Any true Reserving actuary wouldn't need to highlight that word!" Keaton paused for dramatic effect. "Clearly, you must have been talking to someone outside of Reserving!"

Alec rose abruptly from his chair. "There's nothing you can do about it now!" he thundered. "The trend code is running as we speak. It's due to complete in exactly one hour. One server is in a secret location in South America that only I know. The building containing it is heavily fortified, guarded by 40 Modeling agents — all with Ph.D.s in statistics! Its backup is on a volcanic island in the Pacific, heavily guarded as well! It'll just be a matter of time now!" Alec turned and pointed to a large red display on the wall that was counting down the time as Keaton couldn't help but wonder why these people always made everything much more complicated than necessary.

Harris turned to face Keaton. "The best part is that you'll be blamed for the defection. That Predictive Modeling ID in your pocket will be used as evidence that you were collaborating with them."

"But can't I just discard the ID?" asked Keaton.

"And lose access to the brand new coffee machine installed on this floor?" Harris responded. "I don't think you'll be doing that. I'm going down to speak with the head of Reserving now."

Harris exited the office, rushing to the elevators. Keaton followed close behind. Harris made off in an elevator car going down to the Reserving floor. Keaton took pursuit and quickly jumped into the next car.

The two cars zoomed downwards, Harris' car slightly ahead. Keaton slammed repeatedly on the door close button as two employees slowly entered on the floor below. Harris' car stopped on the next floor and a beverage cart was wheeled in, allowing Keaton to close the gap! It was a high-speed elevator chase down to Reserving! Keaton swore on the next floor when a polite man held the door open for others to enter! Harris' car edged back in front and was the first to arrive on Reserving.

Harris ran to the head of Reserving's office and began explaining how Keaton was the one behind the profitability issue.

Keaton slunk into the head of Reserving's office. When she saw Keaton, she stepped over to face him.

"Thanks for a job well done!" she said, taking Keaton's hand and vigorously shaking it. "The department owes you a debt of gratitude!"

"But ... I don't understand," Harris said. "How can you *thank* him for making the loss ratios *profitable*?"

"Profitable?" said the head of Reserving. "They've never been more unprofitable! Thanks to the revised risk-adjusted profit loads from ERM, the business has already been discontinued!"

The End ●

Uri Korn, FCAS, works for AIG in New York City.

MEET THE VEEP

Meet CAS Vice President-Marketing and Communications Shane Barnes

Our Meet the Veep column introduces our members and candidates to the CAS vice presidents who serve on the Executive Council. The EC is the governance arm of the CAS that oversees the operations of the organization. It consists of the president, president-elect, executive director and six vice presidents in charge of different functional areas. In this installment, we are pleased to introduce CAS Vice President-Marketing and Communications Shane Barnes.

What is your day-to-day job?

I'm the lead data scientist for our small commercial and specialty segments at The Hartford, where I've worked for 11 years.

What is your role as the CAS Vice President-Marketing and Communications?

My role is to set the overall direction of the marketing and communications efforts of the CAS, which are both internal and external-facing.

The marketing and communication committees focus on outreach. The internal outreach is our support for our members and future members. Each committee is vital to the success of the CAS and will focus on varying constituents. Other services are provided to our members such as unconscious bias training led by the Diversity Committee.

I also give my insights to the Execu-

tive Council as to whom the CAS should be engaging with in our external outreach efforts. I encourage the leadership to be forward-thinking in how actuaries can be perceived outside the profession through our public relations work.

What volunteer work had you done for the CAS that led to your appointment as VP?

My CAS volunteer work began when I was a candidate, as a representative to the Candidate Liaison Committee. This gave me great exposure to the CAS and what it did as an organization. It got me excited about continuing as a volunteer as I earned my credentials. I've served on the Exam Committee, the CAS Brand Task Force and the New Members Committee, which I chaired. I also served on the board of CANE (Casualty Actuaries of New England), which gave me a good perspective of the role of our Regional Affiliates.

Volunteering has been a great way for me to network and meet members, and for me to interact with CAS leadership. Professionally, volunteering has taught me how to influence various stakeholders. The ability to effectively influence is a core competency in my job.

What are your goals as VP-Marketing and Communications?

The CAS engages with a lot of different audiences, and my over-arching goal is to enhance the outreach to our various



Shane Barnes

stakeholders — university students, candidates, new members and the membership at-large.

I want to stress to our new members that you are not only part of an organization, but you're part of a community of professionals that you can learn from and can help you in your professional journey. I want our outreach efforts to bring people together.

I also want to help our leadership to understand how the CAS is perceived. We need to be open-minded about how the future is unfolding, so we can position ourselves to continue to be relevant. More specifically, we need to understand where things are heading with predictive analytics. Actuaries were among the first predictive modelers, and we need to be proactive to maintain our leadership position in that space. I think the creation of the new CSPA (Certified Specialist in Predictive Analytics) credential, which I just earned, is a good example of how we can be proactive.

Could you share an interesting fact about yourself?

I grew up in the Midwest and earned my mathematics degree from Doane

University, a small school in Crete, Nebraska. That environment let me be active in the university, which instilled in me the idea of volunteering and giving back. After graduation, I decided it was time for a change, so I moved to the East Coast and have been in Hartford since I graduated college.

My wife and I have four children (three boys and a girl). When I'm not

chasing the kids around, I love to play board games in my spare time.

When you meet new Associates and Fellows at the Spring and Annual Meetings, what information or advice do you try to impart to them?

I always encourage our new members to try something new. Be open to volun-

teering and serving on committees, and contribute — don't be dead weight. Meet new people — don't always stick with people who are familiar. Be curious and open-minded that the world is changing. We need new members to invoke their curiosity and embrace innovation to move the profession forward. ●

2018 Individual Grants Competition Underway

The Casualty Actuarial Society and the Society of Actuaries' Committee on Knowledge Extension Research announce the 2018 Individual Grant Competition to support the advancement of knowledge in actuarial science.

The project may be either theoretic-

cal or empirical in nature. A key criterion is that the project should have the potential to contribute significantly to the advancement of knowledge in actuarial science.

You are encouraged to submit a brief letter of intent (no more than two pages) to Erika Schulty at eschulty@soa.

org by October 20, 2017. Application forms will be distributed by November 17, 2017, to researchers being invited to submit full proposals for funding consideration.

Please visit bit.ly/18IndieGrants for more information on the 2018 Individual Grant Competition. ●

The CAS Institutes Announces New CSPAs

Twenty-four predictive analytics professionals have earned The CAS Institutes [Certified Specialist in Predictive Analytics \(CSPA\)](#) credential. New CSPAs will be

formally recognized during the CAS Ratemaking and Product Management meeting in Chicago, March 19-21, 2018.

The CAS Institute is still accepting applications for the CSPA from experi-

enced practitioners through November 30, 2017. More information about the Experienced Practitioner Pathway (EPP) application process can be found on [The CAS Institute website](#). ●

Certified Specialist in Predictive Analytics (CSPA) Designees (as of August 7, 2017)

Terry J. Alfuth, FCAS, FCA, CSPA, Actuarial Property & Casualty Consulting LLC

Steven L. Berman, FCAS, CSPA, Deloitte Consulting, LLP

Donald Brockmeier, ACAS, CSPA, Great American Insurance Group

Linda K. Brobeck, FCAS, CSPA, Pinnacle Actuarial Resources, Inc.

Kin Yee Chan, CSPA, Allstate Insurance Company

W. Scott Farris, CSPA, State Farm Insurance Companies

Patrick Ford, FCAS, CSPA, Liberty Mutual Insurance Company

Carol Frigo, CSPA, State Farm Insurance Companies

Christopher Hurst, FCAS, CSPA, Midwest Employers Casualty Company

Alan Kessler, FCAS, CSPA, State Farm Insurance Companies

James Andrew Kirtland, FCAS, CSPA, Munich Re America, Inc.

Joseph Lee, FCAS, CSPA, QBE North America

Hua Lin, FCAS, CSPA, Deloitte Consulting, LLP

Douglas W. Morrison, CSPA, Penn National Insurance

Vinh Nguyen, CSPA, QBE North America

Edward Reddick, CSPA, RSA Canada

Christopher Schumacher, FCAS, CSPA, Church Mutual Insurance Company

Sheri Lee Scott, FCAS, CSPA, Milliman, Inc.

Scott Stelljes, ACAS, CSPA, Country Financial

William Stergiou, CSPA, CNA Insurance Companies

Christian Twietmeyer, ACAS, CSPA, American Family Insurance Group

James R. Weiss, FCAS, CSPA, ISO

Jun Ya, CSPA, Deloitte Consulting, LLP

Yousheng Xu, CSPA, Greater New York Insurance Companies

Three Schools Win Second Annual CAS University Award

BY KATE NISWANDER, CAS MANAGER OF MARKETING AND COMMUNICATIONS

In June 2017, the CAS chose Ball State University, St. John's University and University of Wisconsin–Madison to receive the second annual CAS University Award. The CAS University Award Program was created to facilitate the promotion and sharing of ideas for property-casualty curricula and research within academic communities. These schools were selected for their achievements in exposing students to the property-casualty insurance industry through their curricula, research, engagement and innovation.

The competitive selection process involved 17 schools throughout North America and Asia that responded to a call for nominations.

"We continue to receive impressive applications for the CAS University Award Program from schools in North America and around the world," said Chris Coleianne, FCAS, who chaired the program in 2016 and 2017. "We are excited to see the activities taking place within universities to prepare the future members of the CAS."

Meet the 2017 CAS University Award winners in the following brief descriptions.

Ball State University

Professor Gary Dean, FCAS, heads up the actuarial science program at Ball State University, which consists of four faculty members and 150 actuarial students. The university was recognized for its development of materials and coursework that support the broader property-casualty community (including work published by Professor Dean,



Professor Gary Dean, FCAS, conducts a lecture for actuarial science students at Ball State.

who has written and co-written CAS syllabus materials), as well as its risk management classes that use insurance company simulation software. Ball State



**BALL STATE
UNIVERSITY**

also offers courses supporting evolving actuarial practices, including generalized linear modeling and the R programming language. The Ball State capstone course applies

St. John's University

these practices as teams design private passenger automobile rating plans, develop reports supporting the plans and peer review the work of other teams. With 11 full-time faculty members and 166 students, the actuarial science program at St. John's University includes two CAS Fellows, both of whom have been awarded the CAS Woodward-Fondiller Research Prize. St. John's program faculty recognize the importance of

property-casualty actuarial education and research; they have made significant efforts to introduce actuarial students to interesting and relevant property-casualty issues. An example is an insurance exercise run by the program that centers on replacing students' multipurpose identification card; the exercise illustrates property-casualty principles and exposes students to pricing, parameter risk and morale hazard in a relatable way. St. John's maintains strong connections within the insurance industry, hosting its Executive Speaker Series that provides regular opportunities for students to interact with experts from the property-casualty industry.

The school has the support of a highly influential board of overseers, which provides students with numerous and valuable opportunities to enhance their actuarial careers through internships and full-time positions.



**ST. JOHN'S
UNIVERSITY**



Actuarial science students from St. John's University.



DEPARTMENT OF
RISK & INSURANCE

University of Wisconsin-Madison

The actuarial science program at University of Wisconsin-Madison, led by Professors Jed Frees, Margie Rosenberg, and

Peng Shi, consists of 11 faculty members and 421 actuarial students. UW-Madison is recognized for providing students with numerous support systems, one of which is its Technology Enhanced Learning Program that includes web-based videos produced by students that are available online. Per UW's estimates,

they have garnered more than 90,000 views. Students in the UW-Madison program also have opportunities to meet with many property-casualty companies in a variety of settings, from formal presentations to "real-world" insurance company simulations. In addition, faculty members serve as editors for various insurance journals and have published a number of recognized papers focused on property-casualty issues, thus extending the program's reach beyond the campus.

The three winning schools will each receive a grant of \$5,000, and will be honored at the 2017 CAS Annual Meeting in Anaheim, California, on November 5-8, 2017. The CAS is excited to have completed its second successful year of the award program and is pleased to recognize the work of these honorees in preparing the next generation of CAS property-casualty actuaries! ●

University of Wisconsin-Madison Actuarial Club graduates, Spring 2017.



CAS Wins Industry Award for Social Media Marketing

BY KATE NISWANDER, CAS MARKETING AND COMMUNICATIONS MANAGER

The Casualty Actuarial Society (CAS) has been honored by Association Media & Publishing's EXCEL Awards for the social media campaign surrounding the 2016 CAS Annual Meeting in Orlando, Florida. The EXCEL Awards, which recognize excellence in nonprofit association marketing and communications, acknowledged the CAS in the category of Social Media Campaign – Event/Convention. The winning #CASAnnual campaign appeared on a variety of social media platforms before, during and after the meeting last November and included elements such as:

- The creation of a social media toolkit, given in advance to Annual Meeting speakers, containing a wealth of ready-to-go social media posts and tips, including custom graphics and sample content for speakers to share on Facebook, LinkedIn and Twitter using the hashtag #CASAnnual.

- A daily Twitter contest that invited attendees to post a picture from the meeting with the #CASAnnual hashtag for the chance to win a \$100 gift card. One day, attendees were challenged to post pictures with the CAS logo from somewhere at the meeting; on another day, attendees were asked to snap pictures with their favorite Marvel superheroes at the CAS evening reception at Universal's Islands of Adventure.
- The launch of the first-ever custom CAS Snapchat filter, which was available during the reception at Universal's Islands of Adventure.

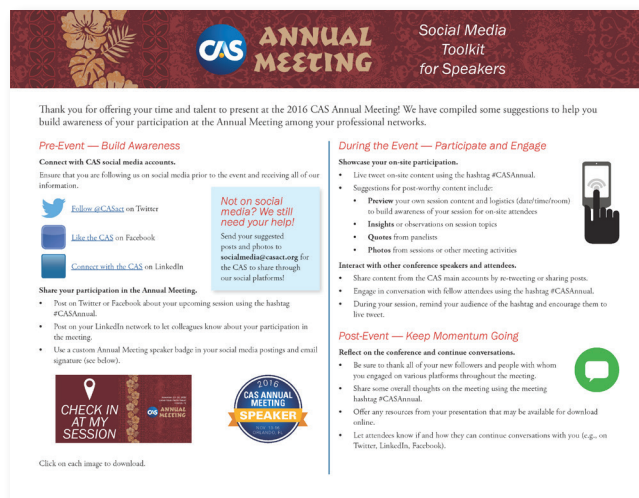


munications officer. "It is gratifying to see our work recognized with an EXCEL Award and held up as an example for other association marketers to emulate."

Winners of the highly competitive EXCEL Awards were honored at the EXCEL Awards Gala on June 26 in Washington, D.C. The CAS received a Bronze Award in its category.

This is the fourth consecutive year that CAS marketing and communications programs have been recognized with EXCEL Awards. Past recognition includes:

- Silver Award for Best Video-Membership in 2016 for the CAS New Member Video on attending your first CAS meeting.
- Silver Award for General Excellence in Web Publishing-Event/Convention and Bronze Award for Integrated Mixed-Media Campaign in 2015 for Centennial Celebration projects.
- Silver Award for Feature Article-Magazine for the "The Great Trade-Off," cover story of *Actuarial Review* in March/April 2014.
- Silver Award in the Newsletter Redesign in 2014 for AR. ●



Above right, examples of the CAS Snapchat filter. Directly above, the CAS Social Media Toolkit for Speakers.

The filter had over 1,300 views.

"Our social media staff team put in a lot of effort and creative energy to find ways to build connections between our in-person Annual Meeting attendees and our virtual social media communities," said Mike Boa, CAS chief com-

2017 *November 5-8, 2017*
Hilton Anaheim
Anaheim, CA



Annual Meeting







THE OTHERS

Part 1

By ANNMARIE GEDDES BARIBEAU

*CAS members are taking
career paths less traveled.*

Editor's note: This article is part I of a series that highlights the careers of eight actuaries who work in organizations that the CAS categorizes as, for lack of a better word, "other." The successes of these actuaries show what it takes to venture into uncharted territory. This article features four actuaries. Part 2, to be published in the November/December AR, will feature the remaining four.

Most members of the Casualty Actuarial Society work for property-casualty insurers or serve as actuarial consultants. This makes sense, as they learn their craft in the context of property-casualty insurance.

However, fewer than three percent of members work in "other" types of organizations. Taking a look at the work these actuaries are doing provides insight into the growing need for actuaries in nontraditional roles or industries.

While each actuary has his or her own story, they all share two attributes in common. First, they possess a willingness to charter the actuarial road less taken. Second, each one mentions the role of family as part of his or her career decisions. They also offer advice to actuaries who either want to broaden their career horizons or be more successful in their current careers, or both.

Improving Hospital Care and Efficiency



Sharon Carroll, Analytics Director, Clinical Intelligence

Sharon Carroll's interest in business analytics and desire to improve her work-life balance led her to a new field: health care analytics.

As the director of analytics for Clinical Intelligence, she exercises her actuarial skills to help hospital administrators improve quality of care, business processes and revenue potential by reducing unnecessary clinical variation and costs. In her current position, she deploys analytical skills quite differently than she did as a property-casualty actuary.

"It's very similar in approach to actuarial consulting work, but the majority of actuarial work was usually reserving-based," she explains. As in her former property-casualty actuarial positions, she determines the appropriate analytics to

measure a problem in order to find and implement a solution.

Carroll began her actuarial career at Everest Reinsurance, where she worked for 13 years. As a mother of three children, she continued her actuarial career part-time, working for various actuarial consulting firms including KPMG LLP. Traveling, however, made the work-life balance difficult.

She found that balance when the president of Clinical Intelligence, whom she knew through her network, was looking to expand her firm's analytics capabilities. "It was being at the right place at the right time," she says.

Being an actuary makes a difference to the hospital executives she serves. Because they respect the profession, "it carries some weight and recognition when I tell them I am an actuary. That has helped as well," she says.

Carroll most enjoys the challenge of exploring a "pile of data" to find answers to challenges that hospital executives face. "There is a lot of data," she says, and "there are many small-to-medium-sized hospitals that don't have the time or staff to analyze it thoroughly."

There is a multitude of applications for hospital data. For example, she looks at what hospitals can do when patients have gaps between recommended treatments and actual received care in areas such as immunization or diabetic control. Closing gaps in care can significantly improve quality scores for hospitals. Analytics, combined with a focused approach for addressing the gaps, improves health care while also providing strategic advantages for hospitals.

Carroll also analyzes clinical variation, which is the difference in cost or treatments for patients with the same diagnosis. "We built analytics and metrics and a framework of analysis to help hospitals find the variations so that the hospital executives can improve consistency and quality of care."

Another example considers hospital readmission rates by diagnosis and cause. Beyond the many reasons why hospital executives want to avoid unnecessary hospital readmissions, the Affordable Care Act imposes penalties if readmission rates are too high.

Further, Medicare will not cover a full hospital stay if the length of that stay is above the geometric mean for that diagnosis. By deploying data analytics, "we help the hospital executives see what is driving up their length of stay costs," Carroll says. Often, it is as simple as finding that many hospitals do not discharge on weekends, which unnecessarily drives up length-of-stay costs. "You just need the right data in the right graph," she adds.



Acquiring New Skills

Applying her analytics capabilities outside the property-casualty realm meant acquiring new skills and adapting to different terminology. “There’s much more programming than what I did as an actuary before,” Carroll says. Part of her role is to embed analytics into Clinical Intelligence’s cloud-based software program, which enables hospital executives to quickly access analytical results and address problems sooner.

Being adaptable and willing to learn more are also important for finding opportunities beyond property-casualty insurance. “There is so much opportunity in different industries and definitely actuarial skills are appreciated,” she adds.

To pursue the business intelligence side of analytics, she recommends considering “whom you know in different industries and listen[ing] to the problems ... A lot of it will mean using volumes of data to understand what is causing the challenges they face and being able to tell a story to help identify and fix them,” she observes, and “actuaries are in such a good position to do that.”

Actuaries should keep up with their networks and the profession through publications, webinars and being involved in actuarial organizations such as the Casualty Actuarial Society, she says. “The opportunity could come from a place where you least expect it.”

Pursuing Diverse Research



Bill Wilt, President, Assured Research, LLC

Bill Wilt began Assured Research, LLC, after taking an unconventional actuarial career path. He worked for five years at Prudential Reinsurance (now Everest Reinsurance), spent five years as a credit analyst at Moody’s Investors Service, earned a

master’s degree in business administration, and worked as an equity analyst at Morgan Stanley.

“I love doing research on diverse topics in insurance and reinsurance,” Wilt says. “I thought there was a market opportunity to pursue and wanted to be my own boss ... and with the support of my family, it was an easy decision,” he explains.

His company offers research and insight via subscription, customized analysis by client request, and insurance education. Wilt started the company in 2011, and it has been growing ever since. Subscribers include insurers, reinsurers, brokers and investors that control \$125 billion in premium. “With the support of our long-standing and new subscribers, Assured Research has been moving forward for five years,” he says. “We aim to reward their trust with every piece of research we publish.”

Just as Wilt’s actuarial career is off the beaten path, so is the firm’s research. The company reaches beyond conventional insurance measures to find actionable insights from different angles, such as other industries, events or social trends.

For example, Assured Research studied the impact of the recent Panama Canal expansion, examining how massive infrastructure spending at ports in the United States could increase demand for marine and property insurance. Recent work also focused on the nationwide trend of deregulating occupational licensing and explored business development opportunities for E&O insurers.

By not being “constrained,” Assured Research can “cast a wide net” to ensure that its studies are unique. The company also avoids topics already well considered. Titles of Assured Research reports for 2017 include: “A Tale of Three Types of Inflation,” “What Insurance Lines Benefit from the Trump Economy?” and “Auto Insurance: The Used Car Market is Crashing.”

Thinking Expansively

Just as Wilt’s company includes nontraditional data sets for its research, he believes actuaries should “think expansively” beyond conventional sources to find more insight. “I am a big believer in marrying data from other sources,” Wilt says. As one example, the company examines the growth of attorney advertising, driven by an emerging asset class called third-party litigation funding, as a social inflation indicator. “Advertising trends for attorneys has grown at the fastest clip for all goods and services,” he observes.

Thinking expansively also applies to considering other roles or industries beyond conventional actuarial responsibilities, such as financial analysis, or joining the Insurtech movement. For actuaries who want to start their own companies, he emphasizes that support from family and friends — and patience — are critical. “It takes time to establish credibility and relevance. Give it time before you declare a new venture successful or not.”

Of course, Wilt adds, “being mindful of competition matters too. If an actuary turns to consulting, they should consider finding a niche where they’re knowledgeable and passionate and can offer something larger competitors can’t.”

Being Open to New Industries



Robert Anderson, Actuarial Manager, The Hertz Corporation

Robert Anderson believes that actuaries should be willing to broaden their career horizons beyond working for an insurance company or being a consultant.

Anderson’s role as the actuarial manager for the rent-a-car company Hertz is vast and diverse. Hertz is a self-insurer for both general and auto liability for its locations in the United States, Canada and Europe. In the United States, Hertz is also self-insured for workers’ compensation.

Besides calculating rates and claims liabilities, Anderson must keep current on the laws and regulations for each state and nation. “Each jurisdiction has its own regulations and particularities with insurance, so our self-insurance strategy might be different in each place,” he says.

In Europe, Hertz has a wholly-owned insurance company that only writes coverage for its rent-a-car business. “This sub-

jects Hertz to regulations and costs associated with managing an insurance company,” he explains. In the United States, Hertz runs a captive and files for self-insured status in each state. Hertz also has a fronting agreement with a commercial insurer in states where self-insured status is not possible due to lower volumes of rental vehicles.

Managing liability at Hertz is complicated because there are different reasons for exposure. Further, the potential liability is larger than it may appear since most drivers have personal auto coverage.

Most of Hertz’s auto liability exposure is from assuming liability. This can happen either from the renter purchasing a fronted insurance policy at the counter or from Hertz engaging in corporate contracts. With corporate contracts, Hertz might agree, for a fee, to either absorb some of the liability up to certain limits or provide the counter insurance product. Also, Anderson says, “when someone rents a car in most states, your own insurance is primary but in some states the insurance follows the vehicle, not the driver.”

There is also potential for vicarious liability. Since the nature of rental vehicle companies is to assure speed of business, confirming drivers have proof of insurance is not always possible. Hertz can also be deemed liable for uninsured motorists. Liability is also possible by virtue of the company owning the car in an accident. However, federal law protects rental car companies from paying out more than the minimum limits in each state in such cases.

Entering a New Industry

Anderson began his career as a life and health actuary for Conesco Financial Group, which includes insurers such as Colonial Penn Life Insurance Company. After two-and-a-half years, he became interested in property-casualty insurance. He worked at Westfield Insurance for 12 years, growing into the position of leading the risk capital modeling function.

While he loved his job, his wife encouraged him to explore other opportunities being offered by actuarial recruiters. Learning a new industry and solving insurance challenges from a different perspective attracted him. “I knew I would be able to make a big impact to a large organization very quickly,” he says.

His actuarial role is now expanding into risk management, where he is active in renewing other lines of commercial insurance, including property, excess, umbrella, directors and

officers, crime and other financial protection coverages. Hertz is also contemplating the issues related to the regulation and insurance of autonomous vehicles if they become part of Hertz's fleet. Anderson sees expanding the actuarial role into business analytics in the future.

Looking Beyond Insurance

Anderson admits having been uncomfortable with moving outside of his former actuarial duties at Westfield, but then he realized that he was limiting his career potential. "If you define yourself by your profession rather than by your skill set, it becomes difficult or uncomfortable to leave a more traditional role within the insurance industry," he observes.

This reluctance to work for a commercial business rather than for an insurance company has made it difficult for him to expand his staff. Actuaries, he says, will typically choose working for an insurance company, he explains. "Many actuaries have very broad and transferable skill sets they can offer to different companies ... Actuaries could benefit from becoming more open to those opportunities."

Exercising Baseball Passion



Mike McMurray, Chairman and CEO, Hillsboro Hops

Mike McMurray applies his actuarial experience as majority owner, chairman and CEO of the Hillsboro Hops, a minor league baseball team serving the Arizona Diamondbacks.

"My wife of 40 years and I have been baseball fanatics from day one ... Outside of family, baseball was our passion," McMurray says.

After starting his actuarial career at Fireman's Fund Insur-



ance Company and later becoming a consultant with Milliman, he retired after 25 years to pursue his baseball passion. He applies his communication skills from his actuarial career to work with major league affiliates, league partners and corporate sponsors. "The thing I did best as an actuary was to convey technical things in a way lay people thought they understood," he says. "In running a minor league baseball team, it is very much the same thing."

His communication skills are also important for working with city leaders. He has owned teams in Missoula, Montana; Yakima, Washington; and now, Hillsboro, Oregon.

Players desiring to play professional baseball generally begin their careers at short-season A-level teams such as the Hops. "We are essentially the kindergarten of player development," he explains. "We get the kids out of school, teaching them professionalism while giving them an opportunity to play."

Drawing from his experience as an actuary, he offers professional advice to the newest baseball players. Many entry-level baseball players and new actuaries tend to be overconfident, which can impede success, he observes. Just as new actuaries need to avoid behaving like the smartest people in the room, he tells his players, "Don't act like you are God's gift to baseball."

This is a tough sell for young baseball players when fans clamor for autographs. He reminds his players that the vast majority of them, around 90 percent, will not make the major leagues and in five years, their autographs will be irrelevant. For actuaries, it means that "no matter how smart you are, if you do not have clients, you don't eat very well."

This approach gave him a competitive advantage when

vying for actuarial projects. “I loved competing with someone who I knew had an inflated ego because I knew I could relate to the client a whole lot better,” he recalls. McMurray explains that actuarial projects are a “necessary evil” for clients, so making the project “a little less painful” by communicating well helped him secure actuarial work.

Actuarial Opportunities in Baseball

McMurray sees great potential for actuaries who want to apply their analytical skills in baseball, but they must start on the ground floor.

“There is a statistical arms race in baseball,” he observes, and “an explosion of data.” Virtually every professional baseball team has its own staff of analysts trying to use data to get a competitive advantage, he adds. The movie *Moneyball*, he explains, “started something really important, looking at numbers in a different way and paying attention to those rather than gut feel. But it is just the first salvo.”

Applying analytics effectively in baseball has plenty of room for growth, McMurray says. Analytics “can be useful if you put it in the proper perspective,” he observes, but “not being able to identify truly useful data is still an issue.” The biggest drawback, he observes, is that people need to understand the limits of analytics.

There are also exciting and new analytical concepts for baseball. One is exit velocity, which is how fast the ball comes off the bat upon impact. While it can be measured quite well, the question becomes how many observations are necessary before determining if a player is better than average. “This is still a work in progress,” he observes.

Another exciting development in baseball analytics is Statcast. It provides a set of tools, including multiple cameras and radar guns, to better analyze player movements. For outfielders, as an example, Statcast helps measure the route efficiency of players trying to reach the ball. By measuring the distance and dividing it by the straight line, an analyst can determine a player’s route efficiency.

Such information is useful for training and placing outfielders in the best defensive field positions. It also provides better data to evaluate where a player is likely to hit a ball, so strategists can compare that with the path outfielders take to reach the baseball.

While statisticians are serving as baseball data analysts, McMurray favors the actuarial approach to interpreting data meaning. Analysts straight out of school, instead of actuaries who understand context, he observes, do not necessarily

have the breadth of experience necessary to draw conclusions and make the analysis as useful as possible.

For example, a data scientist can deploy multiple tools for analyzing baseball statistics. However, there is a tendency to look at only a few observations and draw an absolute conclusion. An actuary “will understand the credibility limitations of small data sets and will seek out additional information.”

By combining actuarial experience with his love for baseball, McMurray’s experience shows that being a good communicator, with a dash of humility, can help baseball players — and actuaries — improve their game. ●

Annmarie Geddes Baribeau has been covering actuarial topics for more than 25 years. Her blog can be found at www.insurancecommunicators.com.





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ON THE SHELF BY JULIE LEDERER

Big Ideas

***Beyond Infinity: An Expedition to the Outer Limits of Mathematics* By Eugenia Cheng, Basic Books, 2017, 304 pp, \$27.**

Eugenia Cheng has a Ph.D. in pure mathematics from the University of Cambridge. She's an honorary fellow of pure mathematics at the University of Sheffield, and her main research interest is higher-dimensional category theory. Given all this, it may seem incongruous that she is currently teaching math to art students at the School of the Art Institute of Chicago. But her aim — in her books and her classroom — is to make mathematical concepts accessible and, as she puts it on her website, “to rid the world of math phobia.”

In *Beyond Infinity*, she applies techniques from her Art Institute lectures, using analogies and diagrams to explain

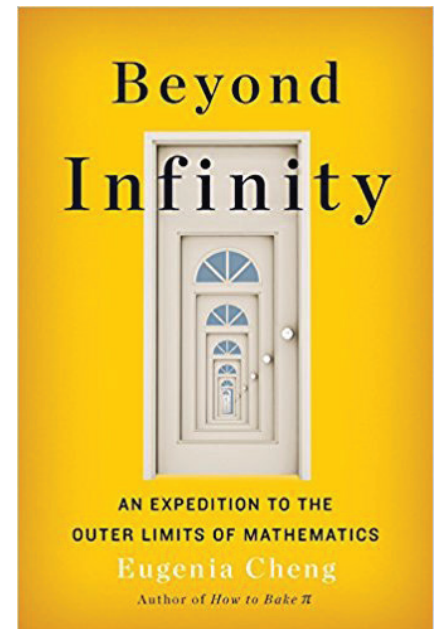
half of the book, Cheng defines infinity, and in the second half, she explores its applications.

Cheng introduces Hilbert's Hotel, based on a thought experiment proposed by German mathematician David Hilbert in a 1924 lecture. Hilbert's Hotel has an infinite number of rooms, with the room numbers coming from the set of natural numbers. There's a room 1, a room 2, a room 3, and so on. It's fully occupied, yet there's always room for one more guest: When someone new shows up, the hotel manager can move the guest in room 1 to room 2, the guest in room 2 to room 3, the guest in room n to room $n+1$, and give room 1 to the newly arrived guest. Since the number of

Hilbert's Hotel is infinite in size and can accommodate an infinite number of new guests, infinitely many times. But there's a “bigger” infinity, and it fits between the numbers 0 and 1.

the complex concept of mathematical infinity in an engaging and understandable way. Those without a background in math will appreciate her gift of explanation, as will those of us who only remember bits and pieces from our college classes in set theory. In the first

rooms is infinite, each n has an $n+1$, and every guest will still have a room. In fact, there's space for an infinite number of new guests: If the current guests all double their room number (that is, the guest in room 1 moves to room 2, the guest in room 2 moves to room 4, and the guest



in room n moves to room $2n$), this leaves all the odd-numbered rooms for the new guests. Beyond showing that an infinite number of new guests can always be accommodated in the fully occupied hotel, this also shows that the set of even numbers has the same size, or cardinality, as the set of natural numbers. Formally, if there exists a bijective function between two sets (for example, mapping room n in the set of natural numbers to room $2n$ in the set of even numbers), then the two sets have equal cardinality.

Hilbert's Hotel is infinite in size and can accommodate an infinite number of new guests, infinitely many times. But there's a “bigger” infinity, and it fits between the numbers 0 and 1. To explain this, Cheng uses a proof by contradiction, combining elements of Hilbert's Hotel and Georg Cantor's diagonal argument.

First, she loosely defines the real numbers as numbers with a decimal representation whose digits are allowed to go on forever, repeating or not repeat-

ing. This includes rational numbers like 0.64 and irrational numbers like the square root of 2.

Then, suppose there's a Hilbert's Real Hotel with all the real numbers between 0 and 1 as the room numbers. There's a room 0.01049..., a room 0.59935..., a room 0.62963..., and so on. Suppose the hotel manager found a way to move all of these guests into the Hilbert's Hotel introduced above, whose room numbers come from the set of natural numbers. That is, suppose the manager discovered a bijective mapping between the room numbers in the real hotel and the room numbers in the natural hotel. Cantor's diagonal argument shows that we can always build a real number that didn't get mapped to

of our new number.) Then go to room 2, and ask that guest what his room number was in Hilbert's Real Hotel. Add a 1 to the number in the second decimal

Cheng's book engenders a sense of appreciation for the creativity needed to tackle big ideas in mathematics.

place of this real number. Use this as the second decimal place of our new real number. The example below shows the creation of the first five decimal places of the new real number.

Once we continue this process throughout the entire Hilbert's Hotel of natural numbers, we've created a real number between 0 and 1 that didn't get

We confined ourselves to a tiny part of the real number line — the space between 0 and 1 — and still found that there are more numbers here than in the

Hilbert's Natural Hotel Room Number	Hilbert's Real Hotel Room Number	Our New Real Number
1	0.01049...	0.1xxxx...
2	0.59935...	0.10xxx...
3	0.62963...	0.100xx...
4	0.67419...	0.1002x...
5	0.72358...	0.10029...

the set of natural numbers. This means there's not a bijection between the natural numbers and the real numbers, and the set of real numbers has greater cardinality than the set of natural numbers.

The proof goes like this: Go to room 1 in Hilbert's Hotel of natural numbers, and ask that guest what his room number was in Hilbert's Real Hotel. Add a 1 to the number in the first decimal place of this real number. Use this as the first decimal place of our new real number. (If the number in the first decimal place was a 9, put a 0 in the first decimal place

mapped to this hotel. In other words, we've found a guest in the real number hotel who didn't get moved to the natural number hotel. He didn't get moved to room 1, because the first decimal place of his real number differs from the first decimal place of the guest in room 1. He didn't get moved to room 2, because the second decimal place of his real number differs from the second decimal place of the guest in room 2. This contradicts the hotel manager's claim that he mapped every guest in the real number hotel to a room in the natural number hotel.

entire set of natural numbers. Our common notions of counting and set sizes break down at the edge of infinity.

Cheng uses analogies involving iPod shuffles, packing for vacation, rolling out puff pastry (her other popular math book is titled *How to Bake Pi*) and other everyday examples to make concepts clear. This approach is reasonable given the book's intended broad readership. There are a few places where math-minded readers might find greater clarity in formulas and definitions than in analogies. I found it easier to spend a few minutes on Wikipedia reminding myself what a bijective function was than to work through Cheng's *Dancing with the Stars* example that entailed matching celebrities to dance professionals. But that's a minor observation and likely won't resonate with much of Cheng's intended audience.

Cheng's book engenders a sense of appreciation for the creativity needed to tackle big ideas in mathematics. *Beyond Infinity* takes us on an entertaining and highly readable tour of one of the subject's most elusive and awe-inspiring concepts. ●

Julie Lederer, FCAS, MAAA, works for the Missouri Department of Insurance, Financial Institutions & Professional Registration.

Cyber Insurance: Growth and Challenges BY JIM LYNCH

Cyber insurance is the fastest growing line of business in years, but its newness and complexity create important challenges for reinsurers. This message

was delivered in a session titled “Cyber Security Meets Reinsurance: Modeling an Evolving Risk Landscape” at the CAS Reinsurance Seminar and the Casualty Actuaries in Reinsurance in June.

There is no question the line is growing; direct premiums written in the United States grew nearly 35 percent in 2016, to \$1.35 billion, according to annual statement data from S&P Global Market Intelligence. Much more is written through Lloyd’s of London and other markets, both in the United States and abroad. Worldwide premium is projected to grow to between \$7.5 billion and \$20 billion in five years, according to Joshua Pyle, senior principal actuary at Symantec Corporation.

“It’s the hottest insurance product in 40 years,” he said. Growth has been driven by continued news of cyberattacks worldwide. Major incidents from the past year include the following:

- A major denial of service attack in October 2016 that temporarily brought down Twitter, Netflix, Reddit, CNN and many other sites. Bots directed heavy web traffic to the sites, overwhelming their ability to catalog and respond.
- A May 2017 ransomware attack that held data hostage at sites in nearly 100 countries. Attackers threatened to destroy the data unless ransom was paid.

The market for cyber insurance is growing as businesses learn about the internet of things, a catch-all term for

the billions of smart devices connecting our world: speakers (personified by Amazon’s Alexa), thermostats, wristwatches and other devices that are connected to the internet.

“We’ve quickly generated an environment in which we want everything connected to everything,” Pyle said. But interconnectedness creates vulnerability.

For reinsurers, the vulnerability can compound as they accumulate exposures via multiple treaties. One virus or attack could impact many companies simultaneously.

Interconnectedness creates vulnerability ... One virus or attack could impact many companies simultaneously.

Reinsurers typically think of accumulation risk regionally. They monitor, for example, hurricane risk in Florida or earthquake risk in Japan. However, cyber risk accumulates across servers. “Now you have servers in Ireland connected to Africa, then connected to San Francisco,” Pyle said.

Accumulation risk is just one of the many challenges that reinsurers face. Pyle also mentioned several other concerns:

- The risk landscape is ever-changing. Ransomware and denial of service have become hot topics recently, but only a couple of years ago credit card theft was the major risk (Target, Home Depot).
- There is a human element to this peril: “As soon as we defend against one threat,” Pyle said, “the actors

have moved on in an attempt to circumvent the defense.”

- There is not much data — thanks to the ever-changing nature of the risk and the reluctance of victims to report. On June 19, for example, *The Wall Street Journal* reported that hospitals do not always report ransomware attacks to the Department of Health and Human Services. Reporting requirements are murky for that sort of attack.
- Insurers are new to cyber exposure, so they lack what Pyle called “domain knowledge.” Today’s cyber

underwriters and actuaries were, in some cases, analyzing different lines just a few years ago.

- Cyber regulation is highly inconsistent. Pyle noted 48 states have statutes regarding reporting events, but fines tend to be meager, in his opinion. This may change as the European Union’s (EU’s) General Data Protection Regulation evolves and sets the pace for other regulators worldwide. The initiative addresses cyber/privacy issues in the EU, and recent proposals would impose significant fines on companies that lose personal customer data via breach.
- Adverse selection is a real issue. Companies that know they are weak in cyber defense are more likely to load up on insurance.

Following Pyle's overview of cyber-risk, Christopher Shafer, an assistant vice president at Guy Carpenter, gave an overview of the current reinsurance market for cyber.

- Most treaties are quota shares, and the number of treaties handling cyber is rising. The coverage is also frequently embedded into directors and officers (D&O) and errors and omissions (E&O) treaties.
 - Treaties covering international exposures are becoming more common.
 - Coverage follows the cedents' original policies, though reinsurers are interested in getting per-event caps. Reinsurers are concerned about business interruption and contingent business interruption as well as bodily injury and property damage.
- Meanwhile, ceding companies

want broader coverage, and of late they have had some success in adding bodily injury coverage to their reinsurance treaties.

Rates are soft in many areas, Shafer said, though hospitality and health care are exceptions. Sublimits are being removed in some cases, and war exclusions are getting some retooling.

Reinsurers emphasize that ceding companies must be able to track and articulate "exactly what is in their portfolio, and what they want reinsured."

Insurers and reinsurers generally manage and price their products using models. Modeling cyberrisk, like the coverage itself, is new and evolving, said Shafer. One major issue involves the difficulty in measuring and monitoring exposures, particularly across industries. This is particularly true with business interruption coverage, Shafer said.

He recommends diversifying across industry groups as a possible starting place. Ultimately, he pointed out, the best means to diversify a portfolio could change as we continue to learn more about the underlying risk.

Other major issues involve models and data. Models, historically, have only addressed claim severity; frequency remains a challenge. There is also a lack of historical data, though some insurers and reinsurers are using third-party vendors and data to support underwriting. Lloyd's is starting to standardize data capture, but that project faces challenges such as establishing minimum data requirements. ●

James P. Lynch, FCAS, is chief actuary and director of research for the Insurance Information Institute.

Predictive Analytics: How Can Reinsurers Get on Board? BY JIM LYNCH

If predictive modeling is the ship that insurers are riding into the future, it has been a bit hard for reinsurers to find a way on board. Predictive models depend on gobs of uniformly arranged data — billions of data points across hundreds, perhaps thousands of variables. Meanwhile, reinsurance deals are bespoke and are analyzed more remotely from the origins of the data.

For the most part, reinsurance actuaries set prices based on aggregated data (catastrophe modeling is an exception). Underwriters and claims analysts monitor their counterparts at the ceding company. An auto insurer, for example, gathers information on millions of potential customers and settles hundreds of thousands of claims, all of which can

feed a predictive model. Its reinsurer has a single client.

Still, reinsurers need to understand predictive models, and the models do have the potential to reshape reinsurance. A pair of actuaries shared their insights into how to proceed at a session titled "What Reinsurers Need to Know about Predictive Modeling" at the CAS Reinsurance Seminar and the Casualty Actuaries in Reinsurance meeting in Washington, D.C., in June.

Thomas Hettinger, ACAS, (then a managing director at Arch Reinsurance, now with Guy Carpenter & Co. LLC) provided ideas about how to evaluate the predictive models that ceding companies use, presuming that the best modeling companies will cede the best

results or will have the highest probability of meeting operating targets.

He spoke of two ways reinsurers need to address models. One is external use: A reinsurer needs to understand the ceding companies' models to properly underwrite. The second is internal use: A reinsurer needs to aggregate submission data to understand trends.

"Everybody is going to tell you they use predictive analytics," Hettinger said. But reinsurers "have to understand where a company is in their journey." In some cases it's a brand new process [for a company]. In others, they've been in the trenches for years."

However, there are insurers who have achieved excellent results without using predictive analytics. Though a

model might not appear to bring much extra value, Hettinger noted, these organizations could be subject to attack when competitors adopt predictive analytics.

Addressing Models: External Use

How should a reinsurer evaluate a cedent's predictive modeling shop? Hettinger suggested developing a benchmark that measures a company's capabilities. It should consider how much experience the modeling team has, how long the company has been using a model, how successful the model has been, and what lessons the company has learned in its endeavors.

And how much credit should you give companies adopting a model? Hettinger cautioned against overcrediting too soon. Results don't shift higher instantly; they move gradually. He suggested comparing results to their peers, both those that model and those that do not.

Another element to consider is what line of business the company writes. A fast-reporting, high-frequency line may show results more quickly than a low-

frequency, high-severity line.

The reinsurer (and the ceding company) should also understand that agents and consumers will find the weak spots that exist in every model. The cedent should have a way to test the model, to try to break it before the marketplace does.

It should also have an enterprise risk management process that monitors whether the model is weakening. Hettinger suggested that the ERM process should monitor distribution of exposures, bind-to-quote ratios and claim frequency.

If the model is being changed, Hettinger said, reinsurers should learn how the changes will affect their treaties. A model change might reduce small claims but not large ones. This would benefit a quota share reinsurer but might not affect results on an excess of loss treaty.

Addressing Models: Internal Use

Reinsurers should also look for ways to model internally, Hettinger said. The business is usually high level, but aggregating submission information could

help a reinsurer understand how business shifts over time.

In a separate presentation, Bret Shroyer, FCAS, a vice president at Valen Technologies, suggested that reinsurers should create a single score for potential cedents. The score would measure the risk's quality, its volatility and its pricing, and would include a factor to account for how well the cedent aligns with the reinsurer's current portfolio. Shroyer remarked that the score can help with the triage of submissions that happens during the January and July renewal seasons.

Any model will need buy-in from underwriters, so simplicity would be key. "The easiest way to fail is to do something way too complex, or something that won't be accepted by underwriters, or something that forces your underwriter's hand," he said.

But, according to Shroyer, a model is worth the effort. "The combination of underwriting and a model will beat either the underwriter or the model every time." ●

Flood Insurance: The Private Sector Wades In BY JIM LYNCH

The private sector is moving into the public market for U.S. flood insurance, and the public sector is welcoming it. But the big question is how to get consumers interested in protecting themselves.

About 200 attendees at the opening session of the CAS Reinsurance Seminar and the Casualty Actuaries in Reinsurance Meeting in June in Washington, D.C., heard about efforts to open the market for flood insurance to the private

sector — currently a virtual monopoly of the federally backed National Flood Insurance Program (NFIP). The session was titled "Public Sector Involvement in Insurance Markets: The Government as Risk-Taker."

Flood insurance is a hot topic in Washington. The NFIP requires reauthorization before September 30, 2017. The last reauthorization took four years and those involved are still smarting from the experience. The resulting legislation

was heavily amended shortly after it was enacted, as an attempt to eliminate heavily discounted rates in flood plains was overturned after violent opposition from those whose rates skyrocketed.

The flood program has two significant issues.

First, not enough people buy it. The Insurance Information Institute polling regularly puts the penetration rate between 10 and 15 percent of homeowners. Federal officials like CARE panelist

Roy Wright, deputy associate administrator for insurance and mitigation at the Federal Emergency Management Agency (FEMA), hope that a private insurance market could raise the take-up rate.

Second, the program bears a \$24.6 billion debt left mainly by claims from Hurricane Katrina and, to a lesser degree, from Superstorm Sandy. If there were another enormous disaster, NFIP could borrow about \$5.8 billion more, but the financial leash might not extend further. The solution? NFIP has begun purchasing reinsurance from the private market to protect its financial position.

The first purchase was last year. It involved tiny amounts and was designed as a proof of concept — that the federal government could work with the private market to place reinsurance. Having done that, a more substantive program was put in place on January 1, 2017. Under it, the private market will reimburse NFIP for 26 percent of the losses above \$4 billion for any single event, up to a

payment of \$1.042 billion. Twenty-five reinsurers took shares, in a structure intended to comfort reinsurance markets.

Computer models for storm surge are more advanced than those for inland flooding, so reinsurers were a bit cautious about protecting against inland flood, said David Priebe, a Guy Carpenter vice chairman. He added that reinsurers are interested in covering inland flood but need better information to price and manage the risk. Hence, the \$4 billion attachment point, well above the probable maximum inland flood loss.

The placement was not worry-free. Educating government stakeholders over several years through development of the Flood Insurance Risk Study was key, said Priebe. They needed to understand what reinsurance was and how it would protect the financial downside of the flood program.

There were, however, unique legal obstacles borne of federal control. For example, reinsurers had to come from countries that were compliant with the

Trade Agreements Act — legislation that governs U.S. trade agreements. One of the major non-compliant states is Bermuda, one of the largest reinsurance markets in the world. Bermudian participants had to write via their U.S. subsidiaries.

Policyholder privacy was also an issue. Reinsurers are used to receiving policy-level information in modeling losses, but such detail would violate federal privacy laws. Instead, NFIP could provide information by ZIP code (now available at <https://www.fema.gov/openfema>). NFIP was also able to indicate where blocks of policies were — X risks within a half-mile of shore, Y risks just beyond that, etc.

What is the future for private markets and NFIP? “I don’t think there’s a walk back” from private capital, Wright said, though that might depend on how this year’s reauthorization turns out. He is interested in other reinsurance structures, particularly quota shares, once the private market gets used to reinsuring



flood.

Reinsurance provides a bit more financial security, but the societal problem remains. Millions of people who need flood insurance fail to purchase it. Flood insurance has always been difficult for private markets to underwrite. There is adverse selection at both ends — people know if they live in flood-prone areas. If they do, they queue up for coverage. If they do not, they do not buy. It is also difficult to diversify the risk. When one house floods, many in the same area also flood, and an insurer whose book is concentrated in the flood zone has a steep challenge, particularly if it also wrote the homeowners coverage.

NFIP was created in the 1960s after flooding from Hurricane Betsy. Wright recounted research at the time, which asserted two things:

1. If people in flood plains knew their true risk, they would move. (As he recounted this, the audience chortled.)
2. Once people in the riskiest areas move, a flood insurer could charge actuarially sound rates.

So the federal flood insurance program set out to make people aware of their risk, and to make flood insurance available if communities adopted building codes that minimized flood risk. “We thought that people were rational,” said panelist Benjamin Collier, assistant professor of risk management at Temple University. He has analyzed the consequences of flood disasters and the flood insurance program. “It turns out we’re not.”

That was 49 years ago. Many remain in those flood-prone areas. Their rates remain heavily discounted. Compounding the problem is that many people

assume FEMA provides free assistance after a flood. And, said Wright, they are correct, but it is meager next to flood insurance. The assistance is means-tested, so not everyone qualifies. Payouts are relatively small. For example, the average FEMA payout for last year’s Louisiana floods was \$9,000. The average insurance payment was \$89,000. “You can’t rebuild your life on \$9,000,” he said.

Like many social programs, said Collier, flood insurance fulfills a social need for the economically disadvantaged. Usually social programs target these poorer populations directly. Flood insurance does so indirectly, as these populations are likely to live in low-lying areas, particularly inland. But NFIP’s discounts do not go only to the low-income populations. The discount follows the property, not the person. Both rich and poor get the discount, as long as their property qualifies. A better program, he said, would charge everyone an actuarial rate, then provide a voucher to those who could not afford it. It is hard to adopt that system now, he said, “because of the politics.”

Wright saw the issue differently; most people with flood insurance have a mortgage. (Federally backed mortgages require it.) That means the issue is not affordability. It is a discretionary issue for most people, and they choose, say, a Disney vacation over paying a flood premium. “Most of the folks we’re talking [about] aren’t ones you would hand vouchers to,” he said. Tax credits for insuring are an alternative to vouchers that could serve a similar objective for many homeowners with high-flood risk. “There is a big gap [for lower income people], but it’s in the rental market. A vast part of the market is left untouched.

Price is a barrier there.”

These days, the private market is better equipped to write flood insurance, said Guy Carpenter’s Priebe. Insurers can get more detailed information than they could five decades ago, and they have far more sophisticated models to handle it. There is also more capital in the marketplace, both among insurers and reinsurers and the larger capital markets, which look upon property-casualty risks as a revenue stream uncorrelated with stock dips and bond defaults — meaning they can use it to build a more robust portfolio. They increasingly insure or reinsure through collateralized reinsurance and investment-linked securities, such as catastrophe bonds.

To grow, said Priebe, the private market needs:

1. A sufficient pool of risks that can be diversified. That means people have to understand that they could be at risk even if they are not in a flood-prone area.
2. A consumer-oriented product that is easy to purchase and coverage that is consistent with other perils homeowners insure.
3. A willingness to pay the proper price along with incentives to mitigate flood risk.

Though he runs the federal program, Wright said he welcomes private competitors. Since the product has such low penetration, there are plenty of risks the private market could write without impinging on NFIP. And if private companies bring more awareness to the need for flood insurance, that knowledge will bring business to him, even if they skim off some of the risks from the federal program. ●



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CAS Research & Development Highlights Three Projects

BY KAREN SONNET, CAS RESEARCH COORDINATOR AND DAVE CORE, CAS DIRECTOR OF PROFESSIONAL EDUCATION AND RESEARCH

Report Modifies Classical CAPM

Recent financial literature offers up theories that incorporate disaster components into the capital asset pricing model (CAPM) in order to reflect economic downturns and other company-specific issues. These theories could be extended for use in property-casualty insurance companies, such as demonstrating the differences between short- and long-tailed lines of business and the effect of natural disasters on company reinsurance programs.

Intrigued by these theories, the Theory of Risk Committee (COTOR) wanted to learn how modifications could reflect the impact of disasters on CAPM performance. So, in 2015 COTOR issued an RFP on modifying the capital asset pricing model (CAPM) to use in insurance pricing.

Two researchers, Ed Furman and Ricardas Zitikis, developed and wrote the report "An Adaptation of the Classical CAPM to Insurance: The Weighted Insurance Pricing Model," published in the Spring 2017 *E-Forum*. Furman and Zitikis present and discuss an insurance version of the classical CAPM that offers economic pricing and risk capital allocation rules for a large class of risks, including those that are nonsymmetric and heavy-tailed. The report illustrates a number of examples and suggests convenient computational formulas.

Furman and Zitikis presented the report at the 2016 CAS Annual Meeting in Orlando, Florida, and have submitted a version of this report to *The ASTIN Bulletin*.

Risk Assessment Database Update

The Risk Assessment Database (RAD) represents an extensive analysis of the theory and empirics of risk assessment in property-casualty insurance. Formerly known as The Risk Premium Project II (RPP II), RAD was initiated by COTOR in 2000 with RPP I, a review of the actuarial and finance research done to that date. RPP II was undertaken in 2010 by Martin Eling and Hato Schmeiser, faculty at Switzerland's University of St. Gallen, to extend the findings from RPP I with research done in the last decade and to identify challenges for future research.

Eling submitted the 2016 update in May 2017, adding 106 new qualified papers that came from literature searches conducted by University of St. Gallen researchers and from recommendations by CAS and COTOR members.

In the report, Eling notes: "The growth of literature in other emerging risk, insurance risk, and reinsurance and alternative risk transfer is disproportionately strong. This distribution can be partly explained by the fact that the journal *Insurance: Mathematics and Economics* is contributing the most articles to our review, [which] tends to emphasize those subcategories."

Visit the CAS website for more in-depth information on the current update and to access the RAD database.

ACA and Auto Claims Connected

Released in June 2017, "The Effect of Health Insurance Coverage Expansions on Auto Liability Claims and Costs" is the last of two reports from the RAND

Corporation that the CAS has commissioned. Written by Srikanth Kadiyala of RAND and Paul Heaton of the University of Pennsylvania, the report addresses the question of how the Affordable Care Act's insurance coverage expansions will affect payment for medical care provided through liability insurance such as auto insurance.

The authors particularly focused on the impact caused by the 2010 ACA dependent coverage expansion. Prior to 2010, individuals 19 and older were excluded from health insurance coverage under their parental health insurance plan. In September 2010, individuals were allowed under ACA to continue health insurance coverage until age 26. The authors used this policy change and claims data from insurers representing approximately 60 percent of the automobile passenger market to evaluate the effects of expanding health insurance coverage on auto liability claim payments.

Using a difference-in-difference research design, the authors found an approximate 10 percent reduction in the total bodily injury claim count in the policy-affected 19-25 ages when compared to the control group of individuals aged 26-34. Conditional on filing a claim, they also found an approximate nine percent reduction in the mean total auto insurance paid amount in the ages 19-25 compared to ages 26-34.

The report will be available in the last quarter of 2017 on the RAND website. ●

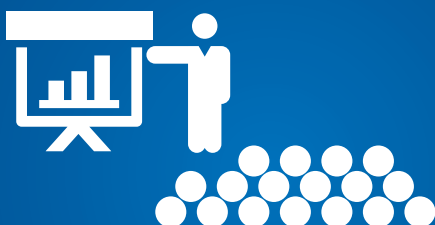


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IN MY OPINION BY GROVER EDIE

How Documentation Saved Me

Before I went on a five-day business trip to the annual RIMS meeting in Philadelphia this past April, my wife, Diane, asked me to check the batteries in the smoke detectors. She didn't want one to "chirp" that its battery was low while I was out of town.

We have learned that these things don't let you know they are low on battery power unless you are sound asleep — usually at about 2:00 in the morning. (I took a small sample and 100 percent of the two people I asked agreed.)

When the 9-volt backup battery is low, our smoke detectors give an annoying chirp that can awaken even the soundest sleeper; and, because they are wired into the house, they won't quit until you replace the battery. They all chirp at the same pitch, so I must go around to every one of the seven detectors until I can guess which has the low battery. Since the alarm is supposed to awaken you in the event of a fire, I guess it thinks that the same volume is appropriate to let you know the battery is low. I am convinced it is a ploy to make sure you replace the batteries in *all* the detectors, since it's really hard to tell which one has the low battery.

There is a second rule of smoke detector batteries: If the home has more than one detector, the smoke detector that is the hardest to reach has the honor, really the obligation, to have its battery fail first. In our case, it is the one on the main floor at the top of the stairs to the basement. As if the 9-foot ceilings

aren't enough of a problem for this "vertically challenged" author, as you approach, the gaping hole of the descending staircase looms like a dragon's open jaws, complete with teeth (steps) willing to gulp me down in the event I fall off the ladder that I must use to reach that device. I can't close the dragon's mouth as the door is at the bottom of the stairs.

On the night before I was to come home from my business trip, I got a call at about 11:00 in the evening from my very frustrated wife. One of the smoke detectors didn't understand the rules and was prematurely chirping at a time some mortals are still awake. I listened over the phone while she not-so-patiently stood under each detector with her cell phone, both of us trying to figure out which was the one that was chirping. It was easier for me to distinguish the volume of the chirping on my end of the call than it was for Diane. I think it must have something to do with the sensitivity of the mic in her cell phone. We identified the offending detector and, true to the rules, it was the one at the top of the basement steps.

No way was she going to drag the ladder upstairs, climb up on it, and change the battery while she was home

alone. (She wouldn't do it with a house full of people, but that's another issue. Climbing ladders and changing batteries is clearly a man's job in our home, and I didn't want her to try for the first time then.)

Now I was in big trouble. The chirping sound was enough to keep Diane awake all night and was highly annoying. And, her annoyance at the sound was quickly becoming annoyance at me for not checking the batteries in the smoke detectors.

Those of you who have done "booth duty" at a convention know it is tiring. I was ready for a good home-cooked meal (Diane is an excellent chef) and a good night's sleep in my own bed — I don't sleep well in hotel rooms. Now it looked like I'd get a cold can of beans for a meal, an even colder shoulder for a reception, and might be sleeping on the couch, another place I don't sleep well.

The next day she called our neigh-



bor, Tim, and he came over, got on a ladder, and changed the battery in the offending device. Diane said it was as if she had quit banging her head against a brick wall. Relief at last. (Thanks, Tim!)

Now I'll let you in on how my documentation saved me from sleeping on the couch — or in the backyard, for that matter.

When I change the battery in the smoke detectors, I write the date on the battery in a felt-tipped pen. Before I left for my trip, I had checked an easy-to-reach detector and found the battery was dated October 2016. Since the trip was in April, it meant the battery had been installed about six months earlier and certainly should have still been good (provided I had replaced them all at the same time, which I usually do.)

Upon descending the ladder, Tim read the date on the battery to her, "October 2016." When she texted the date to me at the airport. I breathed a sigh of relief — I had been saved by my documentation.

It wasn't enough that I had done what was asked of me, which was to verify that the batteries in the smoke detectors had been replaced within a reasonable time. I needed to prove it, and the date of installation written on the battery was my evidence. Even better was the fact that an "independent observer," my neighbor, was the one to read the date to Diane. Diane's anger was now diverted from me to the battery company ("I'll never buy that brand of batteries again.") My documentation enabled me to save face and the battery company to lose a

customer. I had the evidence I needed to prove I had done my job.

I sometimes grouse about documenting my work — the work is done and is correct, so what's the use of documentation? The smoke detector battery incident was a powerful and personal reminder of why documentation is important. I should have kept that battery and put it on my desk to remind me of how documentation once saved me from a lot of grief.

You never know when proper documentation will save you from a lot of trouble — or from sleeping on the couch.

P.S. When was the last time you changed the batteries in your smoke detector? ●

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IT'S A PUZZLEMENT BY JON EVANS

More Refined Pricing

Joey is the founder and owner of Pure Diamonds & Pearls (PDP), a personal services provider referral agency. Joey has hired his cousin Tony as a management consultant. PDP has been charging all clients the same fixed price of \$300. Tony advises Joey to vary his prices because different clients request a variety of different services and providers. Tony designs a new pricing formula $P(m,n) > \$0$, prices always being positive, where the pricing factors m and n can each take on any integer value $\{\dots, -2, -1, 0, 1, 2, \dots\}$ and the base price is $P(0, 0) = \$300$. Tony's formula is designed to obey the constraint $P(m,n) = (P(m+1, n) + P(m-1, n) + P(m, n+1) + P(m, n-1))/4$, so that each price is equal to the average of its nearest neighboring prices. Is there a lower bound on $P(m,n)$ that is higher than \$0? If so, can you determine the greatest lower bound? Is there any upper bound on $P(m,n)$? If so, can you determine the least upper bound?

Extra Credit: If instead of just two

pricing factors there had been three or more pricing factors and an analogous local average constraint, what would your answers be to the previous questions?

Infinity Within Infinity Within Infinity?

This puzzle asks for a set of partitions of the positive integers such that:

- There are infinitely many partitions in the set.
- Any two of the partitions are disjoint.
- Each of the partitions contains infinitely many subsets.
- Every subset of every partition contains infinitely many numbers.

There are many ways to do this.

Here is a construction submitted by Zack Murtha. Partition A_k depends on the k th prime number, p_k . The i th subset of A_k contains all the numbers divisible by $(p_k)^{i-1}$ but no higher power of p_k .

So the first partition, A_1 , has the

following subsets:

$\{1,3,5,7,9,11,\dots\}$ [Divisible by 2^0 , but not 2^1]

$\{2,6,10,14,18,22,\dots\}$ [Divisible by 2^1 but not 2^2]

$\{4,12,20,28,36,44,\dots\}$ [Divisible by 2^2 but not 2^3]

$\{8,24,40,56,72,88,\dots\}$ [Divisible by 2^3 but not 2^4]

etc.

The second partition, A_2 , has the following subsets:

$\{1,2,4,5,7,8,\dots\}$ [Divisible by 3^0 but not 3^1]

$\{3,6,12,15,21,24,\dots\}$ [Divisible by 3^1 but not 3^2]

$\{9,18,36,45,63,72,\dots\}$ [Divisible by 3^2 but not 3^3]

$\{27,54,108,\dots\}$ [Divisible by 3^3 but not 3^4]

etc.

A_3 is the following:

$\{1,2,3,4,6,7,\dots\}$

$\{5,10,15,20,30,35,\dots\}$

$\{25,50,75,100,150,\dots\}$

$\{125,250,375,500,\dots\}$

etc.

The partitions will continue upward with the primes. Continuing in this manner will satisfy the requirements of the problem. Solutions were also submitted by Patrick Allen, Nathan Babcock, Roger Bovard, Daniel Chammas, Bob Conger, Ken Dailey, Blake Eastman, Akshar Gohil, Bruce Hackworth, Bill Hansen, Clive Keatinge, Ziru (James) Li, Robert Lee, David Lozinski, John McNulty, Zack Murtha, Jenni Prior, Brad Rosin, Dave Schofield, Cam Thomas, Geoff Tims, David Uhland and Yuchi Zhang. ●



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