actuarial REVIEW

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PUBLISHED BY THE **CASUALTY ACTUARIAL SOCIETY**

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Property & Casualty Actuarial Job Opportunities

RETAINED - Specialty Lines Actuary (Northeast, USA)
National insurance company seeks an FCAS to serve in a specialty lines pricing role. The position will be responsible for providing rate indication and profitability analysis to the product management team. Work will involve predictive modeling and various analytic functions. Huge growth potential and company support for Actuaries. (#42780)

RETAINED - Actuarial Leader (Midwest, USA)
Midwestern property and casualty insurance company is looking to hire an FCAS at the executive-level with several years of experience. Position responsibilities will include loss reserving, product pricing and modeling activities. Must have previous actuarial pricing and reserving experience. (#41274)

Sr. Actuarial Analyst (Southeast USA)
International insurer is seeking a mid-level P&C Actuary to assist in pricing, technical modeling and mentorship of junior analysts. This role will collaborate with a variety of internal departments and communication skills are very important. This person should have passed Exam 5 and be progressing toward designation. Experience with SAS and SQL a plus. (#43335)

Actuary (Northeast USA)
Large regulatory organization seeks senior P&C Actuary with strong financial reporting and insurance regulation background to assist with Solvency II, STAT, GAAP and IFRS work. Limited travel required. (#43436)

Actuarial Consultant (Canada)
Top carrier in the greater Toronto area seeks experienced Fellows and Associates to join staff. Solid background in pricing of commercial lines or personal lines with strong analytics and communication skills. Great opportunity to grow with fast growing carrier. (#43466)

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January/February 2015

actuarial REVIEW

departments

FSC LOGO

on the cover

32

The *Actuarial Review* captures the insights and perspectives of a handful of attendees of the CAS Centennial Celebration — a truly one in one hundred year event!

The Risks Around the Corner

BY STEVEN SULLIVAN

Hackers, driverless cars and drones! These three risks promise to challenge actuaries in the future.

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actuarialREVIEW

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The CAS 50th Anniversary Banquet was held on November 19, 1964, at the Plaza Hotel in New York City. Photo credit: D'Arlene Studio.

Kicking Off a Year of Celebration

Our cover photo, taken at the CAS Centennial Gala Dinner, and the one above — uphold a photographic tradition dating back to the very first meeting of the Casualty Actuarial and Statistical Society in 1914. Though taken 50 years apart, these photos represent the CAS's rich history and show how much the CAS has evolved.

A record number of participants attended the CAS Centennial Celebration. Our cover story chronicles the experiences of various attendees as well as of those who worked behind the scenes. Also included are excerpts from the Presidential Address and Address to New Members, as well as extensive coverage of Annual Meeting sessions.

Not surprisingly, emerging risks and big data figure heavily in this *AR*, as they are increasingly becoming part of actuarial work. Incidentally, author Steven Sullivan wrote our second feature story on emerging risks weeks before the hacking of Sony Corporation. Special thanks go to Alex Krutov, FCAS, who helped with the article. *AR* readers can also learn about conquering one of life's greatest fears, and a remarkable book to add to their reading lists.

We hope you enjoy this issue devoted to the CAS Centennial. It truly was a once-in-a-lifetime event!

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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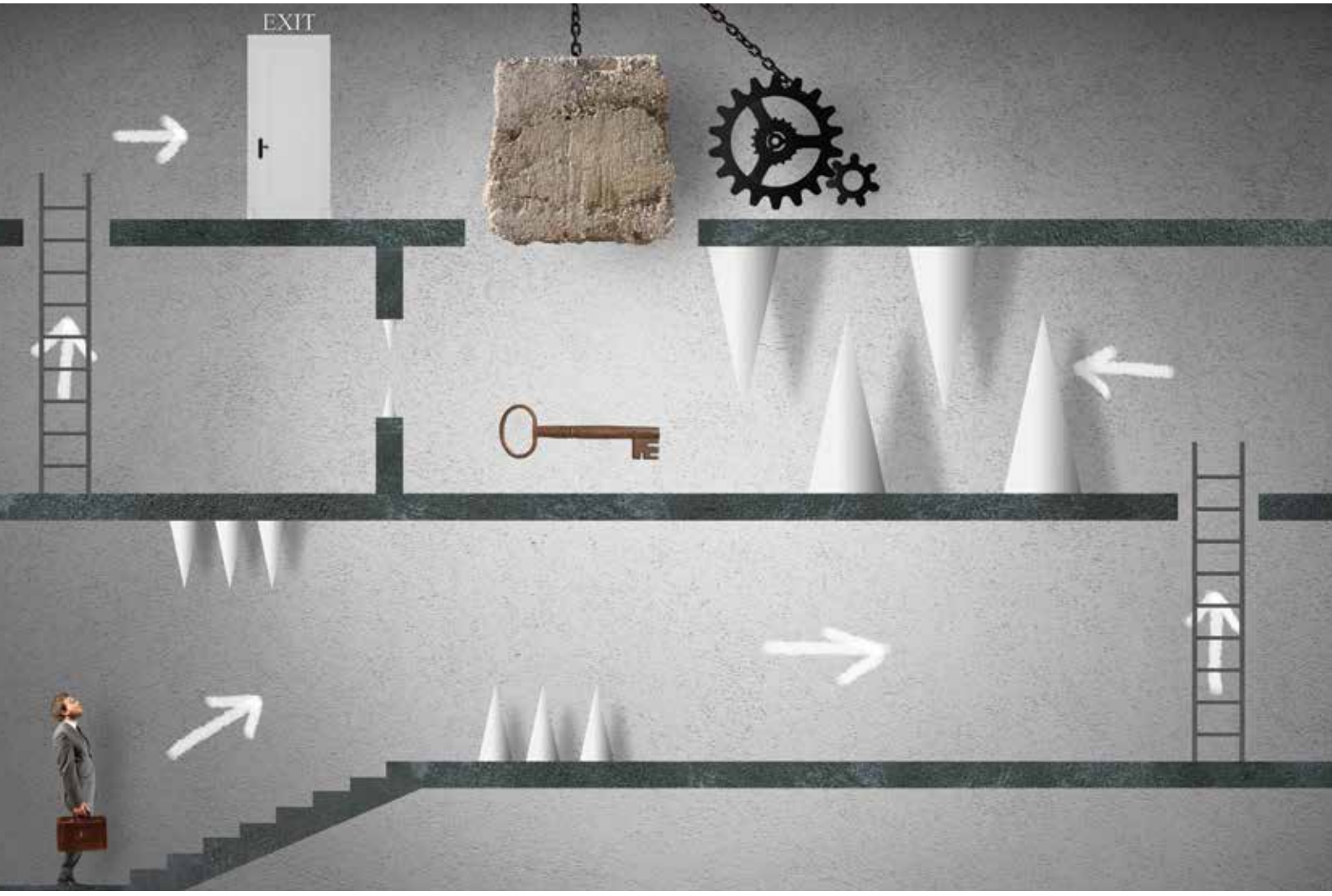

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Celebrating Our Past, Focused on Our Future

Over the past year as CAS president-elect, my agenda has been focused on the future of the CAS. I want our organization to live up to the aspirations of our members as well as our various supporters and constituents. We definitely have the momentum to launch into our next century.

Every year thousands of college and university students focus their career searches on the *Jobs Rated Almanac*, where actuary is rated the top job (or very nearly) year after year. Those looking for internship and entry-level actuarial positions can find themselves competing with 50 to 100 other qualified candidates. Competition like that should be great for the profession, but is it really? How are we expanding the job opportunities for those large numbers of young people whose career interests align with the CAS? And is it not in our best interests to meet the needs of this constituency?

As an actuarial organization in a dynamic world, competition and other challenges are all around us. "Meeting the needs" only opens the door and maybe not for that long. As a profession and a professional society, we are faced with table stakes that reflect the race for relevance. How can CAS members adapt their skills to the changing business models, spurred by changes driven by tech companies like Google, Amazon, Apple, Uber and Tesla Motors? Are we up to the challenges from disruptive technology innovations? I say we are, evidenced by actuarial pioneers like Dr. Frank Chang, FCAS, who is chief actuary at Uber and was formerly at Google. However, should we be educating actuaries for jobs beyond traditional actuarial roles? If not, will we be foregoing opportunities to expand the applications of our actuarial skills into the new business models, even in the traditional industries we serve?

As an actuarial organization in a dynamic world, competition and other challenges are all around us. "Meeting the needs" only opens the door and maybe not for that long.

Our CAS Board and leadership strongly support looking ahead in several areas. We are improving the relevance of our exams by increasing the emphasis on the statistics underlying predictive modeling and advanced analytics. We are updating our strategies — particularly those that address our opportunities to merge actuarial skills within multidisciplinary teams. We are revising our Statements of Principles. We are also promoting the CAS brand in new ways. For example, you can now show your pride in the CAS by getting a professional dress shirt you can now order through the CAS website. We are increasing the external focus on the CAS via a public relations initiative. Our goals are aimed at growing our community to be known as innovative, insightful, progressive, confident, professional and highly valued.

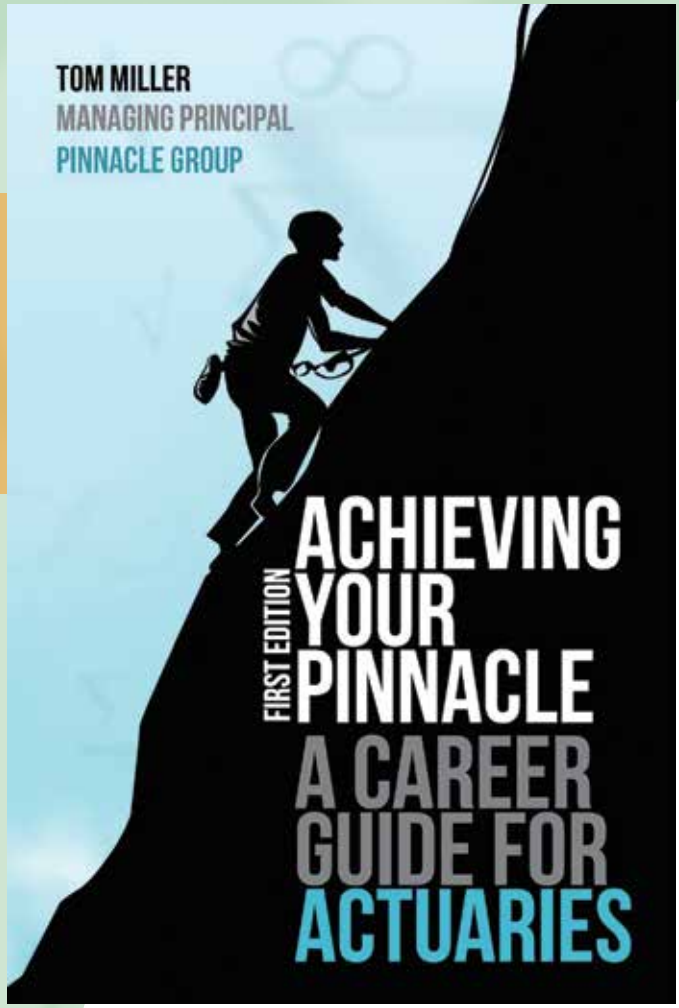
Despite economic recessions and serious conflicts around the globe, rapid changes in technology have fueled many transformations in business and society. We have launched several programs to give the CAS more focus on our ingenuity, creativity and inventiveness as leaders in applying our skill sets to these innovations, such as vehicle accident avoidance technology, self-driving vehicles, prescriptive analytics, embedded and wearable technology, to name a few.

A few months ago, we kicked off the CAS Innovation Council, a group with a definite focus on our future that includes two non-actuary members with innovation backgrounds. Innovation was the theme of the 2014 CAS Leadership Summit, a meeting of the volunteer leaders of CAS committees, and the work of the Innovation Council was a featured presentation. Council members and an outside expert from Doblin helped lead the summit attendees to explore our CAS orthodoxies — the protocols and entrenched practices that foster resistance to change and can cause blind spots in decision-making. In breakout sessions, attendees worked on how to "flip" those orthodoxies to reveal our capabilities to innovate.

Since last spring, the CAS has reached out to chief actuaries individually and through a new CAS Employers Advisory Council (EAC). The goal of the EAC is to connect better with chief actu-

President's Message, page 8

The Career Resource for Actuaries Has Arrived...



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President's Message

from page 6

aries (and the CAS members who work for them) and explore where they see the necessary skills sets for actuaries of the future working for large and diverse employers. While there was clearly a focus on making sure the CAS education stays relevant to future actuaries, the EAC also recognized in their discussion with chief actuaries that other disciplines, particularly predictive modeling, data science and analytics, are changing the environment in which actuaries operate. The main question is how does the actuarial profession adapt to these developments? Do actuaries need to become data scientists and business intelligence experts? If not, will casualty actuarial skills rapidly become obsolete?

If we cannot adapt to the changing environment, others may accelerate past us. Could something like a new Casualty Risk Analytics and Statistical Society (CRASS) emerge? Is that really such a farfetched idea? Let's make sure the actuarial profession stays relevant and avoids a CRASS-like competitor that can challenge our relevance. Let's stay focused on the future, for the profession, for the CAS and for ourselves. I ask you to help make it happen by submitting ideas and supporting suggestions that can help the CAS to remain relevant to you and your career.

In closing, the 2014 CAS Centennial Celebration and Annual Meeting was truly a fantastic event — and a big part of its theme will be mine: focused on the future. ●

How Laughable is this?

I appreciated reading the thoughts of some veteran casualty actuaries ("President's Message" by Wayne Fisher and "In My Opinion" by C.K. "Stan" Khury, *Actuarial Review*, November-December 2014) who have survived a few hostile takeover bids over the decades by our larger cousins. As a geographically challenged practitioner, it is reassuring that the majority of our members are on the same page. I also immensely enjoyed our recent centennial celebration. However, it dawned on me during the concurrent session "History of Property/Casualty Actuarial Work — Ratemaking (1914 - 2014)" that the only other acronym we have ever gone by is CASSOA!

— Brant Wipperman, FCAS, FCIA

Mandate Insurance to Cover All Victims

Dear Editor:

The article "Can Insurance Curtail Gun Violence?" (*Actuarial Review*, November-December 2014) is one of the best presentations of the situation for gun violence and the purposes of potential insurance to address it that I have seen in the last two years. Unfortunately, the final more prescriptive portion of the article is misleading.

Apparently, insurance industry informants have given the author the same information that they always distribute. The claim that insurance cannot cover intentional acts is simply false. Mandatory insurance and insurance that is designed to protect third parties often covers intentional acts by the purchaser of the insurance. It pays victims directly and not the wrongdoers. For example:

Fire insurance has a mortgage clause that pays lenders when homeowners commit arson on their own houses; motor vehicle insurance pays pedestrians intentionally hit by drivers in some but not all states; workers' compensation insurance pays workers intentionally injured by employers; many kinds of commercial bonds cover intentional acts by the bond purchasers.

It is possible to mandate insurance that would cover all victims. The insurance would have to be mandated and the policies drafted for that purpose. Simply mandating liability insurance designed to protect insurance policy holders would not suffice. It's normal for insurance terms to be tailored to cover a specific situation.

A well-designed system of mandatory insurance for guns would compensate all victims, encourage safe practices and not be a burden or excessive expense to responsible gun owners.

— Tom Harvey, Rockville, Maryland
Mr. Harvey is a gun insurance advocate who writes on the subject at http://guninsuranceblog.com. ●

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.

COMINGS AND GOINGS

Bob Conger, FCAS, MAAA, has been honored with the Society of Actuaries' Presidential Award, an award presented each year to individuals who have accomplished outstanding work during the current SOA presidential term. Conger was selected in recognition of the success of the 2014 International Congress of Actuaries (ICA 2014). Conger chaired the ICA 2014 Organizing Committee. ICA 2014 marked the first time in 50 years that the Congress was hosted in the United States.

United Services Automobile Association (USAA) senior vice president and actuary **Alice H. Gannon, FCAS, MAAA, CPCU**, announced her intention to retire in January 2015 after 36 years of service. Upon Gannon's retirement, **Dan Pickens, FCAS**, vice president of P&C portfolio management, will become USAA's chief actuary. Gannon served as CAS president from 1999 to 2000. She has also served as vice president-programs and communications of the CAS and as a member of its board of directors. Gannon also served on the board of the Insurance Institute for Highway Safety (IIHS), where she became the second woman to serve as IIHS chair. Gannon first joined USAA in 1976.

James B. Gilbert, ACAS, MAAA, will succeed John K. Goldwater as president of BerkleyNet Underwriters. Gilbert has nearly 25 years of experience in property and casualty insurance. He served alongside Goldwater as BerkleyNet's senior vice president of actuarial and operations since its 2006 founding, and he held senior actuarial positions at other workers' compensation insurance organizations prior to joining BerkleyNet. Gilbert holds the Associate in Risk Management (ARM) and Certified Workers' Compensation Professional (CWCP) designations.

XL Group's North America Property & Casualty (NAPC) insurance business has promoted **Donna M. Nadeau, FCAS, MAAA**, to chief operating officer. In this role, she will manage the operational functions supporting XL Group's NAPC businesses. Nadeau's responsibilities also include developing the business' support and strategic resources and directing its expense, performance and IT management. Since joining XL Group in 2003, Nadeau has held progressively more senior actuarial and management positions. Prior to her tenure with XL, she worked for Kemper Insurance Companies and Liberty Mutual. ●

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

IN MEMORIAM

Arthur Copestakes
(ACAS 1959) 1922-2007

Martin W. Deede
(FCAS 1987) 1957-2014

Theresa Giunta
(FCAS 2001) 1967-2014

Edward Paul Lester
(FCAS 1974) 1941-2014

Charles P. Neeson
(ACAS 1997) 1949-2014

Dale Ogden
(ACAS 1983) 1951-2014

CALENDAR OF EVENTS

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

March 9-11, 2015
Ratemaking and Product Management (RPM) Seminar
Intercontinental Dallas
Dallas, TX

May 17-20, 2015
CAS Spring Meeting
The Broadmoor
Colorado Springs, CO

June 1-2, 2015
Seminar on Reinsurance
Hyatt Regency Philadelphia at Penn's Landing
Philadelphia, PA

June 11-12, 2015
Enterprise Risk Management Symposium
Gaylord National Resort & Convention Center
National Harbor, MD

September 9-11, 2015
Casualty Loss Reserve Seminar (CLRS) & Workshops
Omni Hotel at CNN Center
Atlanta, GA

The CAS Continuing Education Review: A Survival Guide

BY G. CHRIS NYCE, CAS VICE PRESIDENT-ADMINISTRATION

Uh oh. You got the email. You're in the random sample to have your continuing education (CE) documentation reviewed!

Every year, the Continuing Education Review Committee selects approximately 90 CAS members from around the world for a review of CE documentation. This doesn't have to be stressful — if you've prepared appropriately.

Reviewing CE records is an important component of the CAS professionalism policy, and the CAS is the only U.S. actuarial organization that conducts such reviews. The review helps establish, both in fact and appearance, that CAS members exercise the highest level of professionalism.

The review of CAS records went very well in 2013. All members reviewed were found in substantial compliance. Just about all members got feedback on how to improve their documentation, and the reviews did entail quite a few requests for additional information to verify all aspects of the policy.

The CE Compliance Top 10 List

So what are the most important things to remember to be confident that your CE compliance is beyond question? Based on the review of 2013 records, the top 10 things to keep in mind as you accumulate credits are as follows:

1. **Choose your standard carefully.** CAS members have several potential paths they can choose, such as approved national standards in the U.S., U.K., Australia and Canada, but they must choose the appropriate standards that apply to them. For U.S. members, you are safe if you choose the Academy of Actuaries U.S. Qualification Standard, as it applies to almost all of us in the U.S. CAS members practicing in the U.K., Australia and Canada almost always should follow their national standards as well.
2. **Read the standard over.** There are quite a few details to watch for, such as minimum professionalism credits or maximum general business credits. And remember, strangely enough, the time it takes to upgrade your knowledge on CE requirements could count as professionalism CE!
3. **Prepare your record-keeping approach.** Organize your documentation method at the start of the year, whether it is a mandated employer's record system, a spreadsheet following the format in the U.S. Qualification Standard, or the Academy of Actuaries TRACE system. That way keeping the records up to date is a snap.
4. **Maintain records throughout the year.** Why test your memory at the end of the year? As you take that webinar, read that paper or attend that meeting, take a minute or two and tap the information into your records. The running tabulation will bring confidence and avoid any chance of a scramble at year end.
5. **Make sure it's relevant.** The time it takes to pick the lunch menu for the local actuarial club meeting does not automatically count as CE. Definitions may vary, but the activity must meet the requirements of relevant learning that "broadens and deepens your understanding," as articulated in the U.S. Qualification Standard.

   A great source of CE credits is volunteer work. Whether you are putting together educational panels for meetings, reviewing papers for *Variance* or evaluating new regulations as part of an Academy panel, this work can be fulfilling and good CE as well. Just be sure you document what you are counting. Generally, a sentence will do.

Imagine if your doctor spent less than 30 hours a year to keep up with changing medical techniques and treatments. You wouldn't likely stick with that doctor for long.

6. **Document carefully.** Remember a reviewer may need to review and agree with how it counts, so document in enough detail so it's clear whether the activity is organized/structured or general, and whether it will count as specific qualification, general business, professionalism and so forth.
7. **For meetings, document which sessions you attended.** An entry

in your log of "16 hours, annual CAS meeting" is not sufficient to document how this counts under the specific standard and other categories of CE. Keeping a record of which sessions you attend is important. (A special note regarding CAS meetings held in Orlando: Sorry, any session attended by Disney characters would most likely not count as CE. That may change once Mickey finishes his exams.)

8. **Document a few extra hours.** You may disagree on whether or not that CAS session on unveiling the new logo qualifies as a general business skill credit, but it's a much more comfortable situation if such a session doesn't make or break the compliance determination.
9. **If reviewed, be responsive to questions.** Remember, Continuing Education Compliance Committee members are volunteers whose goal is to help. They have your best interests at heart.
10. **Have fun!** Especially for the educational sessions you attend in person, the CAS provides great opportunities to not only learn, but also network and broaden your contacts. Contrary to popular perceptions, time spent on CE activities can still count toward your requirements, even if you enjoy them.

The Benefits of Compliance

The actuarial field is changing at a faster pace than ever, and being a seasoned practitioner is no longer enough. Imagine if your doctor spent less than 30 hours a year to keep up with changing medical techniques and treatments. You wouldn't likely stick with that doctor for long. For the same reasons, spending the time it takes to keep up with changing techniques, regulations, reforms, technology, guidance and analytics benefits the actuary, as well as the actuary's employer or client.

Remember, the biggest beneficiary of "bulletproof" compliance is you! In the event you need to defend your qualifications for any reason, questioners could be looking for holes to exploit. If you follow these simple rules, and take the time to understand the requirements, you won't have to worry even if the review email comes!

Chris Nyce is a principle with KPMG in Radnor, Pennsylvania.

CAS Revises Continuing Education (CE) Policy

The Casualty Actuarial Society Board of Directors approved a revised version of the CAS Continuing Education (CE) Policy at its November 9, 2014 meeting.

For the majority of CAS members, the revised policy represents little or no change from the requirements of the current policy. Most CAS members are required to follow the CE requirements of the U.S. Qualification Standard, with many remaining members required to follow other national standards in Australia, the United Kingdom or Canada, which fulfill the CAS CE Policy requirements. Very few CAS members utilized the alternative compliance provisions (ACP) of the former policy. The revised policy discontinues the ACP and in its place requires CAS members that provide actuarial services to use one of the four recognized national standards mentioned above that is most relevant.

In short, complying with the CAS CE Policy is as straightforward as following one of the recognized national standards. This change remedies an aspect of the CAS CE Policy that was found to be frequently misunderstood.

Note that other provisions of the CAS CE Policy remain unchanged. These include:

- The review of a sample of members' CE documentation
- Documentation requirements for member compliance
- Transition rules and first application for new members
- The recognized national standards
- The requirement to attest compliance annually

Members should follow this new standard for credits earned in 2015 and attested to at the end of 2015. Due to some recognized national standards and the ACP involving 60-month rolling periods, members have the option to defer and follow the existing CAS Policy for one additional year. If so elected, members should then follow the revised policy for credits earned in 2016 and attested to at the end of 2016.

The revised CAS CE Policy is available for review on the CAS website in the Professional Education section.

CAS STAFF SPOTLIGHT

Meet Matt Caruso, Membership and Volunteer Manager

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

Matt Caruso and his wife, Jennie.

- **What do you do at the CAS?** I recruit and place volunteers in all CAS need areas with the help of my invaluable coordinator, Catie Amsden, and support from the Committee on Volunteer Resources. Other assorted hats I wear include supporting the CAS Regional Affiliates, working with the New Members Committee to integrate new Fellows and Associates into the Society, assisting the Leadership Development Committee in its many endeavors, and making sure every event and reception at the Spring and Annual Meetings goes as planned.
- **What do you enjoy most about your job?** I love meeting members in person whom I have gotten to know through email and teleconferences. I spend much of my work day on the phone with committee members, chairs and Regional Affiliate officers, so it is genuinely fun to make in-person connections at a meeting, especially if they are happy to meet *me*!
- **Hometown:** The Carusos hail from the south end of Hartford, Connecticut. Before working at the CAS, people would often ask, "Are you in insurance?" I would respond that just because I am from Hartford does not mean I have anything to do with insurance. Oh, the irony.
- **College and degree:** Arizona State University, B.A. in history (awarded outstanding graduating senior); and Arizona State University, B.A. in political science.
- **First job out of college:** I was an intern at a political nonprofit looking to eliminate corruption in politics. It was an uphill battle.
- **Describe yourself in three words:** Gregarious, dedicated, fervent.
- **Favorite weekend activity:** My favorite thing to do is to throw on a backpack and hike into the mountains. I grew up hiking the Berkshires of Connecticut and Massachusetts. While in Arizona, I hiked through the Sonoran Desert, ponderosa pine forests and red rock canyons. Now that I live in Washington, D.C., I hike in the Blue Ridge Mountains of Virginia. Along the trail I have encountered bears, rattlesnakes, moose, a javalina, a badger and too many people wearing really expensive REI gear.
- **Favorite travel destination:** I love southeastern Alaska. There is something special about a place where bald eagles are as prevalent as pigeons in New York. In 2004 I spent a dream week in the town of Sitka on Baranof Island watching sea otters and humpback whales; I even caught a 35-pound king salmon that local fishermen still talk about. But the highlight was climbing Mt. Edgecumbe, an ancient volcanic island right out of a James Bond movie. Since I was the only man in the group, I was asked to carry the shotgun in case of a grizzly bear attack. It's a good thing that nary a bear was to be seen, as the sight of me with a shotgun is so ridiculous and unintimidating that a bear would've found it hilarious. ●

MEMBER PROFILE BY MATT CARUSO

James Stergiou: A Grateful Son Gives Back

At its annual gala on June 26, 2014, the City College of New York (CCNY) honored E. James Stergiou, FCAS, with its Presidential Award. The award recognizes outstanding leadership in fundraising for CCNY and the New York student community. Stergiou is in good company; previous CCNY Presidential Award winners include General Colin Powell and former New York Mayor Edward Koch.

An outstanding leader often learns from example. And Stergiou credits his parents for his good fortune, life and career.

Stergiou grew up on New York City's Upper West Side, the only child of Greek immigrants. He attended CCNY, graduating in 1971 with a degree in mathematics. When Stergiou was looking to turn math into a career, a CCNY placement officer recommended the actuarial profession. Stergiou began taking actuarial exams in pursuit of a property-casualty credential. "I was intrigued with the fact that I could use more of my judgment in the casualty area, rather than relying on life/pension tables," he said.

After achieving his FCAS, Stergiou founded the consulting firm E. James Stergiou Risk Consultants, which, in time, grew into SGRisk, LLC.

When he considered his success, he would always point to his parents' lasting influence and the educational opportunities afforded to him. "I know I cannot ever repay my folks for their guidance and help, but I can try to help others in tribute to them and also to the actuarial profession," he said. And so at his alma maters CCNY and Stuyvesant High School, Stergiou annually funds the William and Anita Stergiou Scholarships for Actuarial Studies, honoring his parents and his career.

Suprita Datta, E. James Stergiou and Roseanne Stergiou.

CCNY chose Stergiou for its Presidential Award because he supports education. The award presentation was all the more poignant because the award was presented by Suprita Datta, a CCNY sophomore and a past winner of the William and Anita Stergiou Scholarship for Actuarial Studies when she attended Stuyvesant. Present at the ceremony were his wife of 41 years, Roseanne Stergiou, and his two children, Bill Stergiou and Andy Stergiou, both of whom work in the insurance business.

Stergiou volunteered for the CAS Centennial Commemorative Subcommittee and attended the Centennial Celebration. "The Centennial means a lot to me," he said. "It symbolizes and personifies the lasting nature and influence our Society has had on casualty actuarial work around the world."

In concluding his acceptance speech at CCNY, Stergiou asked the audience to remember three principal takeaways from his life. He said, "Always remember where you came from, honor those who helped you along the way, and always give back." ●

Matt Caruso is the membership and volunteer manager for the CAS.

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

In November 1989 President Michael Fusco wrote a Random Sampler titled "The Next Twenty-Five Years." Wow! What a perfect title he selected to be remembered in this column! Mike kindly agreed to self-grade his 25-year-old predictions, and his critique follows. (His original forecast can be found at http://www.casact.org/pubs/actrev/historic/nov89.pdf).

25-Year Forecast of the CAS — Revisited BY MICHAEL FUSCO

Thanks, Walt, for the opportunity to score my predictions. I will report using the same categories I started with 25 years ago.

Membership

I forecast a very high growth in number of members (the actual growth was over 300% in the ensuing 25 years) and that the FCAS/ACAS split would shift to more Fellows (it went from 60/40 to 70/30). I also forecast that CAS members would propagate more CAS members — and we have witnessed several father-son, father-daughter and mother-son pairs. I had predicted a mother-daughter FCAS team, and we do have a mother (FCAS)-daughter (FCAS) pair, so please give me credit on that one!

Laura Dembiec Jordan (left) poses with her mother, CAS Fellow Linda Dembiec, in 2004, the year Jordan became a Fellow.

Demand

I forecast a higher than average growth percentage in "Consultants" and "Other" by type of employment; as it happens, we are greatly expanding our employment footprint in "Brokers" and "Reinsurance." This in turn fueled the pinpoint accuracy of my prediction of geographic movement outside the U.S. We see dramatic quarter-centennial growth of the CAS, with our Regional Affiliates being established in Canada (two there), Bermuda, Europe and the Far East!

Sadly, the television series Hartford Actuary *never materialized.*

Image

I said that for actuaries to really improve our public image we needed to have a TV show, and speculated that maybe someday *Hartford Actuary* would replace *LA Law*. That has not materialized. But go see the recent epic movie, *Boyhood*, and spot the actuary there! I expressed the hope that our members would become better golfers, but, boo hoo, we no longer even fill up a golf tournament at CAS meetings! But I was right in predicting more disciplinary actions — we had one CAS expulsion and a few other public disciplinary actions. It is good for the profession that we are policing ourselves.

CAS Structure

I made an accurate forecast that there would be at least five female CAS presidents in the 25-year period; there were six (see how quickly you can name them!). But I did write, "There will be no takeover attempts and no mergers" of actuarial societies. I was close on no takeover attempts (made it through about 23 of the 25 years), and I still hope I am right on no mergers. Time will tell.

All in all, the Amazing Kreskin has little to fear, but it sure was fun to look back. Bob Miccolis, it's your turn to look ahead!

CAS Launches Monograph Series

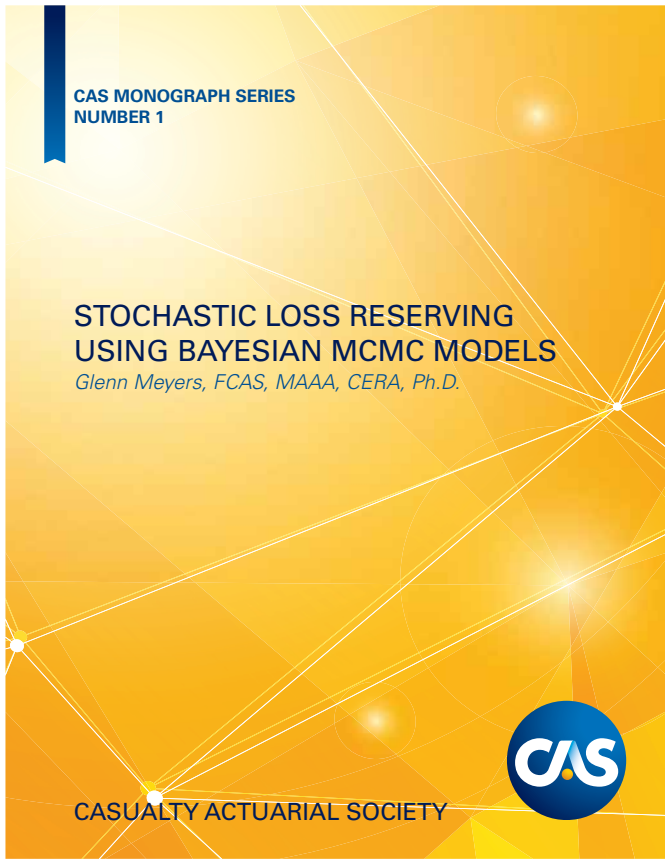
BY C. K. "STAN" KHURY, CHAIR, MONOGRAPH EDITORIAL BOARD

This January witnessed the publication of the inaugural volume of the new CAS Monograph Series (www.casact.org/pubs/index.cfm?Fa=monographs-new).

Several years ago a CAS publications task force recommended that the CAS embark on the path of producing a new publication of a series of monographs. The efforts of many people spanning a period of more than five years culminated at the end of 2014 with the publication of the inaugural volume of the new series.

Broadly defined, a monograph is an authoritative work on an important topic in the property and casualty actuarial field. A monograph is like a *Variance* article in that it is an authoritative, peer-reviewed work relevant to P&C actuaries. It is unlike *Variance* in that there is no length limitation and monographs will be published on an irregular schedule keyed to when monographs are produced. Submission guidelines can be found on the CAS website.

The first monograph, *Stochastic Loss Reserving Using Bayesian MCMC Models*, was written by Glenn Meyers, a regular contributor to CAS publications. Posted on the CAS website, the volume very briefly examines two popular loss reserving methods, develops an innovative validation methodology, uses the CAS database of loss development triangles to test the predictive power of these methods, identifies some unexpected tendencies and proposes ways to overcome those limitations using Bayesian Markov Chain Monte Carlo methods. Supporting software, designed to enable users to apply the methodologies described in the monograph proper, is also posted on the CAS website.



The monograph publication process is managed by the Monograph Editorial Board (MEB) in close coordination with the CAS publications staff. At present the monograph pipeline is very well populated by several high-quality submissions in various stages of production on a variety of important topics. Moreover, the MEB, in conjunction with the Syllabus Committee, recently announced a call for Monographs on subject of "Predictive Modeling in P&C Insurance Ratemaking and Pricing." This call is expected to generate several quality monographs on this important topic to supplement the CAS literature in this area.

The Monograph Series initiative fulfills the goal of creating an important addition to the existing body of CAS literature. Each monograph will enable the comprehensive treatment of a single subject. Monographs will also provide for the systematic archiving of the results produced by various CAS working parties and research groups. It is one of many new initiatives the CAS will be implementing as it enters its second 100 years.

* * *

Note: As the level of monograph activity increases, there is a greater need for interested volunteers. If interested in exploring these opportunities, contact the author or Donna Royston (droyston@cas.org).

Stan Khury is principal for Bass & Khury in Las Vegas.

NEW FELLOWS ADMITTED IN 2014

Row 1, left to right: *Bryan Richard Takvorian, Stephane Provost, Rebecca R. Bertagnoli, Adina Erdfarb,* **CAS President Wayne Fisher**, *Rebecca Lyn Pettingell, Laura Michelle Stromberg, Sylvia Sze Wai Wong, Matthew Randall Willms.*
Row 2, left to right: *Trevor Jon Soupir, Kai-Ting Neo, Brendan P. Barrett, Geoffrey David Purvis, William F. Morrissey, Alex Joseph Morton, Mathieu Bellemare, Adam Joseph Kinson, Petya Svilenova Petrova.*
Row 3, left to right: *Lee W. Knepler, Rebecca Barbara Reich, Shui Man Sherman Tang, Stephen Eugene Roll, Jason Lee Rohlfs, Nicholas Alton Pipitone, Nathan C. Rugge, Bryan M. Stewart, Robert Nickolas Kaskovich.*

Row 1, left to right: *Jonathan Richard Fulop, Zachary T. Brogadir, Andrew Kenton Somers, Brett Lawrence Stocks,* **CAS President Wayne Fisher**, *Sean M. Smith, Kirsten J. Boyd, Doug A. Summerson, Edward G. Bradford.*
Row 2, left to right: *Steven M. Caluori, Jingli Tang, Kasi Joelle Golden, Jared A. Helms, Dorothy Ann Leemhuis, Kimberly Roseline Myers, Jonathan David Sanders, Carolyn A. Pfeffer, Matthew B. Elliott.*
Row 3, left to right: *Alison N. Handschke, Wilfred John Edwards, Nathan Lance, Mark R. Doucette, Mark Travis Chamberlain, David Chibing Chen, Daniel Karl Bardo, Whitney Billerman, Andrew Michael Lewis, Nino Joseph Ibo Paz.*

Row 1, left to right: *Diego Fernando Antonio, Mathieu Giguere, Mathieu Alarie, Pierre Charles Tiani Keou,* **CAS President Wayne Fisher**, *Yoram S. Gilboa, Paul Aaron Taylor Carcasole, Jeremiah J. Parranto, Lee W. Mathewson.*
Row 2, left to right: *Anthony Joseph Bierke, You-Im Sim, Patrick K. Curtis, Heidi Kathryn Givens, Jennifer Bouchard, Julie Laverdiere, Carl Roy Gullans Jr., Songphol Arrewijit, Vadim Ricimonov.*
Row 3, left to right: *Richard Garvin Day, Alden Penn, Maxime Lafleur-Forcier, Michael H. Miniaci, Philip James Brodeur, Marcus M. Yamashiro, Jeffrey David Baer, Sean Michael Bailey, Patrick John Ford.*

Row 1, left to right: *Xin Chen, Dawn Morelli, Tetteh Otuteye, Edwin David Lopez,* **CAS President Wayne Fisher**, *Julie Ann Lederer, Yocheved Ephrathi, Sophia Zhonghua Lee, Weiyi Cui.*
Row 2, left to right: *Neal James Anderson, Sara J. Hemmingson, Michael Thomas Atkinson, Jonathan David Peters, Julie A. Hagerstrand, Elchanan Y. Levy, Elizabeth G. Beslow, Shengli Huang.*
Row 3, left to right: *Melissa Anne Elke Villnow, Lucas R. Burlingame, Justin Joseph Falzone, Kevin James Hanson, Christopher V. Mackeprang, Jason L. Morgan, Jason Jonathan Robert Bakker, Justin Mah.*

NEW FELLOWS ADMITTED IN 2014

Row 1, left to right: *George Pavlis, Lu Li, Elie Bochner, Jason M. Smith,* **CAS President Wayne Fisher**, *Karim Hobeila, Simon Marchesseault-Groleau, Lin Ju, Ariel Yingting Qiang.*
Row 2, left to right: *Matthew J. Phillips, Kyle Arthur McDermott, Eric Pince, Ao Zhou, Jue Yang, Anna Zilber, Davy Ly, Stefanie M. Zacchera.*
Row 3, left to right: *Amanda Aponte, Peter Hennes, Andrew G. Davies, Derek M. Wong, Matthew James Lange, Andreas Johnson, Brandon D. Gilbert, Priyangsha S. Godha.*

Row 1, left to right: *Simon Jomphe, Jean-Philippe Simon, Jean-Philippe Daigle, Marie-Anne Demers,* **CAS President Wayne Fisher**, *Philippe Desharnais, Etienne Trudel, Jean-Sebastien Nepton, Jung-Ah Kim.*
Row 2, left to right: *Peter James Johnson, Eric P. Krafcheck, Carl Lussier, Juyun Park, Albert Zhou, Frederic Potvin, Sarah Martha Voit, Apundeep Singh Lamba.*
Row 3, left to right: *Andrew Lucien Talarowski, Daniel W. Lupton, David Daniel Evans, Michael R. Bertrand, Katrina E. Smith, Joshua Aaron Kraft, Yening Gu, Kyle B. Reed, Dylan R. Williams.*

Row 1, left to right: *Kristen Leigh Seitz, Anusha Lakshmi Anantharaju, Jamie Marie Garcia, Philippe Gagne,* **CAS President Wayne Fisher**, *Denis Poulin-Lacasse, Guillaume Labrecque, Jin Zhu Zhang, Jennifer Ann Lewis.*
Row 2, left to right: *Young Ho Cho, Jiacheng Wang, Lauren Goldstein, Aditi Baker, Jillian Elise Hagan, Joseph Kenneth Lindner, Randall Boualay Xayachack, Jonathan Frost.*
Row 3, left to right: *Philip B. Natoli, Junkai Xu, Jing Guan Wang, Bernard Provencher, Charles F. Marshall, Gabriel Gaudreau Drolet, Christopher William Laws.*

Row 1, left to right: *Aleksandra V. Orlova, Emily Stone Allen, Amy Qiuxiao Mo, Julie A. Walker,* **CAS President Wayne Fisher**, *Eric J. Lam, Lukasz Tomaszewski, Zhao Zhou, Thomas S. Roth.*
Row 2, left to right: *Jie Cheng, Anthony Hovest, David M. Baldwin, Shze Yeong Ong, Sean Satar, Daniel A. Linton, Rebecca Hoffmann, Shuo Li.*
Row 3, left to right: *Quncai Zou, Bashir Moallim, Feng Dong, Ryan A. Ciaccio, Yikai Huang, Pan Corlos Wong, Jared A. Pursaga, Zheming Deng.*

New Fellows not shown: *Qi An, Daryl S. Atkinson, Marco A. Baratta, Yvan Berthou, Karl Adam Bloch, Sara A. Bryant, Wesley Campbell, Yung-Chih Chen, Cynthia Cheng, Raymond Ioi Meng Chiang, Hui Ying Chin, Brian Yung Man Choi, Derek William Davey, Joshua Jeremiah DeLong, Marcus Ewe, Vadim Filimonov, Paul Michael Giangregorio, Grant Michael Goedde, Tao Tony Gu, Ridhima Handa, Anne M. Kamps, James Andrew Kirtland, Chi Hin Keith Kwan, Hugo Lafortune-Brunet, Garret J. Larson, Lai Na Lei, Chun Wing Li, Anze Liu, Patrick D. Lynch, Eric Mitchell Mann, Hongjian Mao, Samantha Maple McLeod, Eric Mercier, Raoul Jacob Milgraum, Kellen Christopher Miller, Marquis Jacob Moehring, Helen E. Muller, Sameer Singh Nahal, Andrew S. Niehus, Nemanja Odzakovic, Dion Oryzak, Jason A. Paschalides, Rachel Elizabeth Paten, Ashley M. Persson, Michael E. Powers, Yan Ren, Jared F. Rubinstein, Daniel David Schlemmer, Eric J. Schmidt, Holland Sherba, Xiang Shi, Amanda Jean Smith, Michael B. Thompson, Bruno Tremblay, Matthew W. Trost, Ruan van Rensburg, Scott William Wallisch, Fan Wang, Tsz Kit Wong, Xi Wu, Rui Yao, Steve Yun, Zhen Zhong, Jun Zhou, Thomas Anthony Ziniti.*

NEW ASSOCIATES ADMITTED IN 2014

Row 1, left to right: *Carolyn A. Pfeffer, Kristeen Y. Lee, Megan Anne Meier, Emily J. Redder,* **CAS President Wayne Fisher**, *Dana L. Winkler, Rachael J. Christens, Gina R. Badowski, Laura Kathryn Jaroh.*
Row 2, left to right: *Lidia Frattaruolo, Alisa Havens Walch, Keith Sanders, Stewart Brent Guerard, Lauren Rachelle Ford, Jamie Lynn Anderson, Mary Katherine Bernard, Joshua L. Spencer, Michael Salerno, Andrew E. Corzine.*
Row 3, left to right: *Christopher George Turner, Michael B. Lewitter, Virginia Jones, Ludwig Steven Wasik, Melissa N. Huenefeldt, Christa Janine Jenkins, Jeffrey W. Casey, Dan William Cunningham, James Garbe.*

Row 1, left to right: *Kathleen M. Knudson, Ruoyan Hua, Andrew Bond Thompson, Gilbert Grady Jr.,* **CAS President Wayne Fisher**, *Tilia G. Tanner, Christina Marie Trefil, Marina Goldovskiy, Cassandra L. Paulson.*
Row 2, left to right: *Robert L. Markwell, Qing Liu, Laurna C. Castillo, Kimberly Marie Marxkors, Melanie Colleen Leavy, Alexandra Alexandrova Takeva, Megan Marie Morris, Janette Pollard, Andrew Scott Nonnweiler, Xiuyu Li, Aaron James Hardiek.*
Row 3, left to right: *Andrew J. Draper, Marcus A. Deckert, Wayne A. Heppner, Andrew R. Orlando, Katherine A. Williamson, David James McFarland, Charlotte Paige McAuliffe, Jonathan M. Parad, Thomas D'Onofrio, Jon R. Fredrickson.*

Row 1, left to right: *Selena Elisabeth Ransom, David C. Bagnoli, Kristin E. Barrow, Rebecca Ann Peterson,* **CAS President Wayne Fisher**, *Rebecca Yuming Hou, Heidy Shuyu Chang, Yue Hou, Vanessa Robinson.*
Row 2, left to right: *Billy J. Onion, Farhan N. Chaudhry, Julie-Anne Theriault-Cauchon, Maxime Carpentier, Annie-Claude Toupin, Sarah Ann Hillman, Nadejda G. Raynova, Kevin W. Sutanto, Kyle Scott Osborne.*
Row 3, left to right: *John Stephen Koo Lam Tseung, Justin J. Bartoszek, Hengyu Yuan, Chad Richard Jenkins, Ran Guo, Darrin Hinman, Daniel Anthony Collins, Robert Brian Anderson, Andrew D. Otto, Matthew Joseph Murdock.*

Row 1, left to right: *We Lia Tan, Victoria Gutica, Ajay Kishore Marathe, Michelle Terriquez,* **CAS President Wayne Fisher**, *Melinda Etschman Woodcock, Newton Butler Jennings, Laura M. Thomas, Julie Caroline Wagner.*
Row 2, left to right: *Douglas Franklin Moses, Cheng Khang Saw, Stanislav I. Gotchev, Stephene Ng, Murphy O'Hearn, Huijun Wang, Lauren N. DuBois, Lauren Ann Train, Patrick James Orndorf, Jeffrey P. Kenia.*
Row 3, left to right: *Aron Michael Fisch, Jamie Shooks, Bradley Alan Tumbleston, Buyi Zhang, Daniel Michael Ward, Andrew Keith Heikes, Mark Jesse Lockwood, Alexandra Decoste, Chun Hin Lam, Michael J. Hebenstreit, Thomas James Harrington.*

NEW ASSOCIATES ADMITTED IN 2014

Row 1, left to right: *Nicole Marie Bigos, Wendy E. Coffing, William Joseph Pitts, Doupu Geng,* **CAS President Wayne Fisher**, *Alex T. Wesseling, Andrew R. Remington, Cathine K. Lam, Stephanie C. Brazie.*
Row 2, left to right: *Timothy James Butler, Yun Wu, Jennifer Lynn Edwards, Brooke A. Engel, Wenyi Zhang, Christian Citarella, Eric L. Truax, Christopher A. Harris.*
Row 3, left to right: *Chet Bradley Homyak, Ryan Yinfatt Foo, Joshua Jacob Newkirk, Samuel M. Kloese, Mitchell A.J. Paden, Sean Robert Davis, Daniel Bruno Jr., Ari Moskowitz.*

Row 1, left to right: *Xingyun Liao, Yan Miao, George R. Ling, Todd F. Witte,* **CAS President Wayne Fisher**, *Chihfan Flora Liu, Sophia Zhonghua Lee (FCAS), Christopher R. Manhave, Snezhana Todorova Dimova.*
Row 2, left to right: *Timothy Paul Jensen, Maijaleena Zimmerman, Nicolas Lehoux, Kimberly A. Lippincott, Christine Rebecka Luthi, Daniel Enrique Fernandez, Matthew Todd Veibell, Andrew Michael Weinecke.*
Row 3, left to right: *Joshua Tyler Havelka, Blake Jay Fuchtman, James Peter Englezos, Bryan James Hartwig, David M. Wolpov, Kyle R. Kinkade, Jon N. Schultz, Jesse Theobald Carroll, Alec J. Richards.*

Row 1, left to right: *Gabriel Vachon-Marceau, Charles Beaudin, Amanda C. Weihe, Hugo Lafortune-Brunet (FCAS),* **CAS President Wayne Fisher**, *Feng Chen, Zhengzheng Yang, Baixiu Liu, Peter Joseph Reggiannini.*
Row 2, left to right: *Ishan S. Shukla, Steven T. Miller, A.J. Charles Markham, Ji Chi, Hung Vi Vuong, Adam Jeffrey Kallin, Andrew A. Harder, Terrie Marcus Tin.*
Row 3, left to right: *Jonathan William Carmine, Jianhui Yu, Marc Christopher Schmidt, Derek J. Haney, Steven N. Honcharik, Karen Allyson Kazun.*

Row 1, left to right: *Yi Luo, Jayson Taylor, David Spencer Levy, Sean Shiva Ramlal,* **CAS President Wayne Fisher**, *Inmo Koo, Kylie Lucinda-Marie Justo, Han Jiang, Henry Ding Liu*
Row 2, left to right: *Robert Edward Feitt Smith, Alvin Hwehmin Kim, Xi Chen, Eric McInturff, Danielle Rinaldi, Amanda B. Gesseck, Julie L. Kress, Michael Lloyd Hedstrom, Joshua John Brady.*
Row 3, left to right: *Jonathan C. McBeath, Peter J. Riihiluoma, Pauline E. Philip, Diana Zaidlin, Kevin Paul Kerr, Samuel B. Hanig, Drew R. Russell, Nicholas Michael Schneider, Nicholas R. Madine.*

NEW ASSOCIATES ADMITTED IN 2014

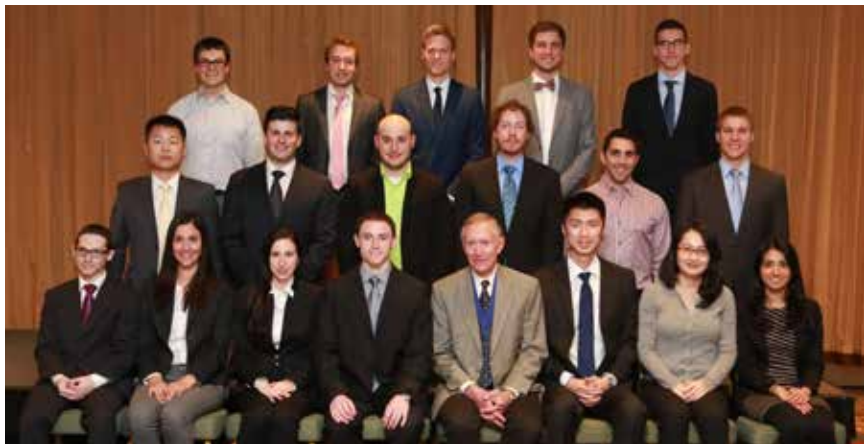
Row 1, left to right: *Amy Qiuxiao Mo (FCAS), Peng Li, Katherine McGovern Ewald, Cyan Justina Manuel,* **CAS President Wayne Fisher**, *Chunyang Fan, Jun Hu, Leonor Lujan-Gomes, Si Yao "Grace" Gu.*
Row 2, left to right: *Charles Wang Lei, Jin Yuan Lin, Andrew Wade Raynes, Garret D. Hepburn, Charles Lindberg, Ben Henig, Timothy James Walant, Wei Hsiang.*
Row 3, left to right: *Dennis C. Wong, Clifford Kin Lok Lau, Anson Ming Hin Lo, David Yi Dai, Sammany Chea, Clarke D. Bjarnason, Jonathan William Schroeder, Christopher David Pirkl, Nicholas Guy Hartmann.*

Row 1, left to right: *Mark William Harrison, Waley Chun, Ryan Janovitz, Elisa Menghua Lam,* **CAS President Wayne Fisher**, *Dionne M. Schaaffe, Ran Kan, Mujiao Li, Siew Gee Lim.*
Row 2, left to right: *Lisa Marie Pankau, Stephanie I. Lynn, Christian Thomas Hammond, Andrew John Dalgaard, Joseph Kenneth Lindner (FCAS), Andrew Winston Parr, Sheri C. Foster, Jennifer W. Louie, Darcie R. Truttmann.*
Row 3, left to right: *Andrew Michael Ruhrdanz, Constantinos Hadjistephanou, Michael Justin Fairchild, Valerie Nicole Albers, Thomas B. Fischer, Gregory W. Fears Jr., Jason Thomas Smith, Brett Moberg, Rohin Danush Bepat.*

Row 1, left to right: *Sarah Shihua Cui, Jolin Shi, Wenyuan Wu, Kelda Slattery Carlson,* **CAS President Wayne Fisher**, *Molly Smith, Steven Saunders Chamberlain, Nicole Cathryn Dikun, Kelly E. Witte.*
Row 2, left to right: *Neil Schwarzenberger, Marian R. Bowar, Mariel Capco, David Claudio Tolusso, Ryan R. Samaratunga, Nicholas James Principe, Matthew G. Malusa, Richard Dale Derr, Richard Christopher Lally, Christina May Coppage, Evan C. Petzoldt.*
Row 3, left to right: *Scott Sellers, Jenna Ann Shatek, Elizabeth Demmon Storm, Steffen Siegel, Matthew R. Jahnke, Feng Zhang, Erin L. Svec, Philip B. Marsel, Michael Cesaro, Brett Stuart Foster.*

Row 1, left to right: *Daniel F. Gibson, Mark S. Weihs, Abby L. Sternberg, Regina Kintana,* **CAS President Wayne Fisher**, *Sarah Ryan, Emily Lyster Lowery, Michelle Marie Moriarty, Binbin Xing.*
Row 2, left to right: *Elena V. Blagojevic, Barry Michael Wilken, Mary L. Rothlisberger, Sarah E. Dallmann, Aaron Frederick Fezatte, Yunqin Li, William John Courchain, Bo Wu, Jason N. Filip.*
Row 3, left to right: *Forrest Milton Preston, Spencer David K'Burg, Andrew Ryan Yuhasz, Keven Trottier, Ryan L. Liang, Brian W. Jennings, Scott Handley, Robert A. Kranz.*

NEW ASSOCIATES ADMITTED IN 2014



Row 1, left to right: *Joseph T. Gerhardstein, Sarah Power, Madeleine Lavery, William H. Alpert,* **CAS President Wayne Fisher**, *Cheuk Yam Tam, Wenwen Sun, Catherine Pallivathuckal.*
Row 2, left to right: *Daochun Li, David Mamane, Keven Grenier-Denis, Matthew T. Knepper, Charles Hammal, Brian T. Wellman.*
Row 3, left to right: *John Wanielista, Jean-Sebastien Fournier, Rene Menard-Kilrane, Antoine Marquis, Eduard Alpin.*

New Associates not shown: *Daniel Steven Ajun, Tarek Saeid Alameh, Lauren E. Amendo, Faizan Amlani, Alana Consuelo Anderson, Wesley Arai, Andrew J. Ascoli, Sean P. Bailey, Anna Baryshnikova, Gabriel Belanger, Kevin D. Bell, Dimitry Borchenko, Sheridan B. Buckland, Bradley Bykowicz, Richard C. Carter, Bradley Scott Cassmeyer, Chien-Long Chen, Han Chen, Sarah Marie Clemens, David E. Colon, Joshua J. Crumley, Arijit Das, David H. Deacon, Belinda DeArce, Cherie M. Dill, Alex-Antoine Fortin, Meghan E. Gaier, Erik M. Guffy, Patrick Guillemette, Liang He, Nicholas Hinzman, Jing Hong, Pamela Hughes, Bin (Chris) Jiang, Nathan Wooyung Joo, Alex E. Jurhs, Daria Roumenova Kachev, Kathryn Rose Koch, Ekaterina Kruchinkina, Alvin Tan Jin Kuan, Anthony Kuhns, Matthew S. Lasater, Kenneth Yin-Hei Lau, Kevin Tse Wing Lee, Samantha Lee, Weilin Will Li, Xiong Lian, Xiong Lian, Jin Liu, Brian J. Lock, Andrea Lucchesi, Elena G. Madden, Cameron Dale Maffit, Tara Nicole Malinowski, Miekael Menberu, Joshua David Merck, Simon A. Michellepis, Robert Lazar Midgette, James Harold Miller, John T. Montgomery, James W. Morse, Pradnya Nimkar, Robert Allan Olshefski, Matthew E. Olson, Theodore S. Ori, John Wilson Orr, Craig Steven Pacelli, Stephen Kihyun Park, Joshua William Parvin, Wilnex Canes Paul, Lili Peng, Kathleen M. Rahilly, Haseeb Rehman, Christopher J. Reynolds, Florian Richard, Steven Lawrence Rosen, Brent M. Rossman, Brian P. Scott, Samuel Palley Segal, Sital Vipin Shah, Abigail G. Shahriyar, Jaehong Danny Shin, Jason Thomas Shook, Ian MacKenzie Sims, Stephanie Marie Slowinski, Justin P. Smith, Gregory Murphy Sollenberger, Alan Speed, Blake Jonathan Stein, Glenn Edward Stewart, Firoozeh Talebian, Chao Tan, Jia Wen Tan, Qian Tao, Yi-Wei Teo, Emily Helen Turek, Timothy Cameron Vosicky, Wei Wang, Carly Williams, Bihling Wu, Simon Ying, Yong Kyu Yoo, Gabriel Ronald Young.*

NEW CHARTERED ENTERPRISE RISK ANALYSTS

New CERAs, left to right: *Justin J. Brenden, FCAS; James N. Stanard, FCAS; Steven Carl Rominske, FCAS;* **CAS President Wayne Fisher***; Jeremy D. Shoemaker, FCAS; Gerald S. Kirschner, FCAS.*
New CERAs not shown: *Pierre Guy Laurin, FCAS; Donald F. Mango, FCAS; Michael Ian Solomon, FCAS.*

NEW FELLOWS AND ASSOCIATES RECOGNIZED IN TAIPEI

Some new Associates and Fellows admitted in 2014 who were not going to be able to attend the CAS Centennial Celebration and Annual Meeting in New York City last November were honored in a special ceremony with CAS International Ambassador Bob Conger on October 18. This first recognition ceremony in Asia for new CAS Fellows and Associates was held during the 18th East Asian Actuarial Conference, which took place at the Grand Hotel in Taipei. The CAS plans to have a recognition ceremony every year in Asia. Pictured left to right are Mu-Chun Huang, ACAS; Sz-Fan Lai, ACAS; Lyndon Yu Te Lin, ACAS; Conger; Shze Yeong Ong, FCAS; Steve Tsz Kit Wong,FCAS; and Yung-Chih Chen, FCAS.

CAS Celebrates Outstanding Volunteers

BY MATT CARUSO, CAS MEMBERSHIP AND VOLUNTEER MANAGER

In celebration of the spirit of volunteerism, 11 exceptional CAS volunteers were honored during the 2014 Centennial Celebration and Annual Meeting at the Midtown Hilton in New York City. The award ceremony took place during the CAS Business Session on Nov. 10, 2014.

The Above and Beyond Achievement Award

Each year, more than a third of CAS members participate as volunteers. Among them are individuals who contribute far more than is expected of a typical volunteer. The Above and Beyond Achievement Award (ABAA) recognizes short-term volunteer contributions during the previous year.

Photos by Craig Huey.

John Buchanan

John Buchanan (FCAS 1989) was nominated for the ABAA by the chair of the Reinsurance Seminar Planning Committee. Typically each committee member is responsible for two continuing education sessions. When the committee was short staffed in planning its 2014 meeting in New York, Buchanan stepped in and arranged two sessions in addition to his own. He was also responsible for the seminar's first student program, organizing student sessions and a member mentoring program. Buchanan said, "I enjoy working with the new CAS Student Central initiative. It was fun to interact with the students to see how they would approach insurance for pets, including protecting against 'cat'astrophes."

Bob Conger (left) and CAS President Wayne Fisher.

Robert F. Conger (FCAS 1979) was awarded a 2014 ABAA for his work as chairperson of the International Congress of Actuaries (ICA) 2014 Organizing Committee, a role he served from 2003 to 2014. The ICA is a quadrennial event bringing actuaries together from around the world. ICA 2014 was held in Washington, D.C., and was the first Congress held in the United States since 1957.

The Organizing Committee chair is responsible for details including program, venue, special events, tours, risk management, funding and philanthropy. Conger said, "As the planning developed, one of the gratifying dynamics was to be part of an effective team comprised of 130 diverse volunteers and staff members from all of the United States actuarial organizations." The successful event was attended by more than 1,100 delegates representing 130 countries. "I know that relationships formed at ICA 2014 will last for many years and that those relationships will yield dividends for the actuarial profession that we cannot begin to imagine," he said.

C.K. "Stan" Khury

C.K. "Stan" Khury (FCAS 1973) is a 2014 ABAA winner for his work on the CAS Risk Management Committee (RMC). The RMC is an integral part of the CAS policy initiatives. In 2014 Khury led a subgroup evaluating all CAS collaborative activities. The subgroup lacked sufficient resources but still completed its tasks on time thanks to Khury's leadership. Moreover, a CAS board member suggested the subcommittee report's combination of detail and high-level summary be the model for other subgroups' activities. Khury said of volunteering for the RMC, "I enjoy the interaction among very serious people who are dedicated to the success of the CAS on every level, and the importance of the work and its direct relationship to CAS policy making."

Glen Leibowitz

Glen Leibowitz (FCAS 2009) received a 2014 ABAA for several roles he took on within the Committee on Health Care Issues (CHCI) where he serves as a vice chairperson and as a research liaison to

the University Engagement Committee. He directed the CHCI's effort to assure a quality and practical work product for the request for proposals that the CAS issued on Medicare secondary impacts on workers' compensation. Leibowitz has raised the standard from producing purely academic work to further empowering the CAS to make an impact. In the CHCI he has found the ideal combination of personal interest and volunteerism. "I have always felt a desire to give back to the Society as CAS support has played a strong role in my success in the industry," he said.

Tom Whitcomb

Tom Whitcomb (FCAS 2010) was awarded a 2014 ABAA for his work in university engagement. Whitcomb is chair of the Ball State University Actuarial Science Advisory Board, where he provides guidance to students and employers. He has also brought his passion for actuarial science to students at Casualty Actuaries of New England meetings. "The more we spread the word about the actuarial career, the better we guarantee the CAS and our companies have access to the flow of top talent," he said. Whitcomb also serves on the CAS University Engagement Committee and its Academic Working Group. He was instrumental in the creation of the CAS Curriculum Guide, distinguishing himself as a true leader.

The final 2014 ABAA recipient is Chad Wischmeyer (FCAS 1991), who chairs the Committee on Professionalism Education (COPE) and has served on COPE since 2001. In response to

Chad Wischmeyer

candidate feedback, he spearheaded significant changes to the CAS Course on Professionalism. The course now includes e-modules that allow attendees to better absorb the material and encourage meaningful discussion. Wischmeyer said, "Even after being in the field for over 25 years, hearing a different viewpoint during the course has made me stop and think about aspects I thought I knew the best approach to." The course is often the first contact candidates have with members outside of the exam process. "It is an opportunity to stress the importance of professionalism in aspiring actuaries' careers and their responsibility to those who built the strong reputation before them," he said.

New Members Award

Initiated in 2011, the New Members Award (NMA) recognizes volunteer contributions during an individual's first five years from their most recent credential.

Jonathan Charak

Jonathan Charak (FCAS 2013) received a 2014 NMA for his work on the Automated Vehicles Task Force (AVTF) and the International Member Services Committee. For the latter, he is the liaison to the Education Structure Implementation Task Force-CERA, in which he plays a vital role in developing the new CERA syllabus and exam. Charak volunteered for the AVTF after attending a presentation on automated vehicles at the 2013 CAS Annual Meeting in Minnesota. "To me, this was a way to take a topic I was interested in and dig deeper," Charak said.

Michelle Iarkowski (left) and Shane Barnes, Chair of the CAS New Members Committee.

Another 2014 NMA winner who was able to turn an interest into meaningful volunteerism is Michelle Iarkowski (FCAS 2010). Iarkowski has taken a leadership role with the Exam Committee driving innovation, quality assurance and collaboration. She said, "I volunteered for the Exam Committee because I wanted to see the process from start to finish." Her nominator wrote that Iarkowski proactively addresses problems and provides workable solutions. "I enjoy the opportunity to make small changes along the way that I hope future candidates will find to be valuable," Iarkowski said.

Melissa Tomita

Melissa Tomita (FCAS 2013), the third

2014 NMA winner, got involved with the CAS just after achieving her ACAS in 2011. Tomita began volunteering for the Casualty Actuaries of the Desert States (CADS), the CAS Regional Affiliate, and she recently completed her term as CADS president. "Being a CADS officer has helped me develop skills like public speaking, organization, and leadership that also help me in my day to day work," she said. In November Tomita became chair of the University Engagement Committee (UEC). She said, "I love that the UEC informs students about the actuarial profession, and then goes beyond that by providing interview/resume tips, case study material, networking opportunities and all the tools they need to pursue an actuarial career."

The Matthew Rodermund Memorial Service Award

The Matthew Rodermund Memorial Service Award annually acknowledges CAS members who have made considerable volunteer contributions to the actuarial profession over the course of a career. Both of this year's Matthew Rodermund Memorial Service Award winners exemplify a lifetime of service helping to accomplish a variety of CAS initiatives.

Curtis Gary Dean

Like many CAS volunteers, 2014 Rodermund Award winner Curtis Gary Dean (FCAS 1981) began volunteering with the Exam Committee. This began an illustrious career of volunteerism for the CAS, primarily focused on areas of admissions, administration and publications. Over his career, Dean has led seven committees and task forces, including the Exam Committee, the Investment Committee and the Task Force on Publications. The Task Force on Publications recommended creating a peer-reviewed journal, *Variance*, to replace the publication *Proceedings of the Casualty Actuarial Society*. Dean became the first editor-in-chief. He said, "That job required building an editorial board, helping design the journal, and many other activities," he said. "It is probably my single most memorable deliverable for the CAS."

Dean has served on the CAS Board of Directors and as vice president-administration for the CAS Executive Council. "The Executive Council was my favorite CAS activity," he said. "It required a lot of time and work but it allowed me to participate in the management of the CAS."

Louise Francis

Louise Francis (FCAS 1989), the second 2014 Rodermund Award winner, also began her volunteering career with the Exam Committee. Her impressive volunteer career includes terms on the Committee on Review of Papers, the CAS Risk Management Committee, the International Research Committee and a term on the Executive Council as vice president-research. "As VP of research I have fond memories of the relationships I established in that capacity in the United States and also internationally in the United Kingdom and Australia," she said.

Research is the area in which Francis has specialized, through committee work and the contribution of many papers for publication. She volunteered for the Committee on the Theory of Risk (COTOR) for 14 years, finishing with a term as chairperson. "I have a special affection for COTOR," she said. "We did some nifty things. We developed a hands-on course on using regression techniques to assess the validity of reserving technique assumptions, and we sponsored the multi-year Risk Premium Project that created a living bibliography on quantifying risk."

Congratulations to all of our 2014 volunteerism award winners!

Please help the CAS recognize outstanding volunteers by nominating worthy members for the 2015 Above & Beyond Achievement Award, New Members Award or Matthew Rodermund Service Award when invited to do so in May. If you have questions about the awards, please email Matt Caruso at the CAS office (volunteer@casact.org).

CAS RATEMAKING AND PRODUCT MANAGEMENT SEMINAR AND WORKSHOPS

MARCH 9–11, 2015
INTERCONTINENTAL DALLAS
DALLAS, TX

Photos by Craig Huey.

The CAS *Centennial* Experience

The following vignettes capture the insights and perspectives of those who celebrated at the CAS Centennial — a truly one in one hundred year event!

At left are attendees of the CAS Centennial Gala Dinner, held on November 11, 2014. Above, is a detail of the CAS Wall of Names, which was on display in the exhibit hall during the CAS Centennial Celebration. Milliman sponsored the event and the Wall of Names.

Paying Tribute to Our Past, Looking to the Future

BY KATE NISWANDER, CAS MARKETING AND COMMUNICATIONS MANAGER

The Casualty Actuarial Society celebrated its first century during the sold-out CAS Centennial Celebration and Annual Meeting, held Nov. 9-12, 2014, at the New York Hilton Midtown. The meeting, which hosted a record 2,000 attendees, paid tribute to the CAS's integral role in the evolution of the property and casualty insurance industry while looking forward to the future of the actuarial profession with an educational program focused on emerging issues.

The 100-year history of the CAS was on full display at the meeting, which included a CAS Museum, historical photo gallery, and wall of names displaying every member who has ever earned CAS credentials. Attendees received a commemorative CAS Centennial History Book that features historical photos and personal recollections from CAS members. The CAS also debuted a Centennial video that highlights milestones from 100 years of the CAS and includes testimonials from the association's oldest living member, 96-year-old Bill Wieder, who earned his Fellowship in the Society in 1947.

The meeting showcased the CAS's continued commitment to fostering the next generation of property and casualty actuaries. The CAS recognized 263 new Fellows, 430 new Associates, and nine Chartered Enterprise Risk Analysts at the meeting, bringing the Society's membership to more than 6,500. [See page 16-27 for group photos of the new Fellows, Associates and CERAs.]

The meeting also included a full day of activities for university students who are members of the CAS's student membership program, CAS Student Central. Three of these

students, one each from St. Johns University, University of Wisconsin–Madison, and University of Connecticut, were recognized at the meeting for receiving CAS Trust Scholarships totaling $20,000.

The meeting featured a robust agenda of educational sessions, including four general sessions, 41 different concurrent sessions and nine roundtable discussions. Topics addressed included the future of the insurance industry, big data, automated vehicles, climate change, reinsurance markets, the Affordable Care Act, homeowners and auto insurance telematics, and cyber risks. [For more on the meeting sessions, see Professional Insight.]

The celebration culminated with a gala dinner, where attendees were treated to a musical performance by an orchestra and chorus comprised of actuaries. As part of the historic celebration, the CAS also hosted 16 leaders from international actuarial organizations around the world and honored 30 past presidents in attendance.

More than one-third of CAS members volunteer for the organization, and the CAS presented several awards that highlight the membership's commitment to giving back to the profession. [See Member News for more on the CAS award winners.]

The CAS also recognized achievements in actuarial research. The 2013 *Variance* Prize, which recognizes the best papers published in the CAS's peer-reviewed journal, *Variance*, was awarded to Harald Dornheim and Vytaras Brazauskas for their paper "Case Studies Using Credibility and Corrected Adaptively Truncated Likelihood Methods." [See *Actuarial Review*, November-December 2014.]

"Our Centennial Celebration demonstrated that the CAS community is strong, vibrant and more relevant than ever," said Wayne Fisher, outgoing CAS president. "We continue to grow and evolve to provide our members with the problem-solving and specialized skills that employers expect. Our members have a shared depth of training in dealing with P&C risks that continues to strengthen, even a century after the organization was founded." ●

Staffing a Celebration BY TAMAR GERTNER, CAS UNIVERSITY ENGAGEMENT MANAGER

The Centennial Celebration and Annual Meeting was a wonderful opportunity for CAS staff to meet and connect with the CAS members in attendance. I was particularly excited to meet members of the University Engagement Committee (UEC) and the University Liaison Program.

We were expecting to host a record number of attendees, so the CAS staff arrived at the hotel a day before the meeting got underway to start the behind-the-scenes preparations. This entailed locating and organizing the materials sent by our partners and meeting sponsors, and filling just fewer than 2,000 bags to be given to CAS members when they registered. Into each bag we carefully added several sponsorship items, as well as the CAS Centennial history book, which contains photos and recollections written by CAS members. We started around 1 p.m., and, by the time we were finished in the evening, we had filled 12 towering hotel bins!

Tamar Gertner, seated left, takes a break with some of her CAS coworkers at the CAS Centennial Gala. Seated, left to right, are Gertner, Kate Niswander, Leanne Wieczorek and Jen Walton. Standing, left to right, are Mike Boa, Todd Rogers, Elizabeth Smith, Kathleen Dean, Ashley Zamperini, Danelle Gee and Dave Core.

Throughout the four-day event, I supported the team of CAS staff members working at the registration desk, checking badges and tickets on the Intrepid and at the Gala Dinner. Along with the rest of the staff, I jumped in wherever needed.

I also had the opportunity to work on UEC initiatives throughout the event. Upon learning that nearly half of the committee's members were planning to attend the Centennial, the UEC leadership held a committee breakfast for the first morning of the meeting. After countless hours of committee teleconferences and emails, UEC members and

Edee Morabito (right), a 33-year CAS staff veteran, was a special guest at the CAS Centennial Gala. At left is her nephew, Andrew Morabito.

staff were finally to meet one another in person!

I was also able to talk with several of the more than 100 University Liaisons who attended the Centennial Celebration. On the last full day of the conference, the UEC hosted a student program for 23 students from 10 universities. CAS members helped the students navigate the meeting as they attended student-specific sessions, concurrent sessions and networking breaks. The students also had professional photos taken. (See CAS Trust Scholarship Winner Erin Yetter's headshot below.)

I really enjoyed staffing this historic meeting. The enthusiasm and energy of the meeting attendees were inspiring. I look forward to seeing the excitement generated during the meeting continue throughout this 100-year celebration! ●

Scholarship Winner Takes it All in BY ERIN YETTER, CAS TRUST SCHOLARSHIP RECIPIENT

As one of three recipients of the CAS Trust Scholarship for the 2014-2015 academic year, I had the incredible opportunity to attend the CAS Centennial Celebration in New York City. I am a student at the University of Wisconsin-Madison, and it was exciting to explore NYC for the first time! The CAS graciously sponsored both my travel and lodging.

While at the Centennial Celebration, I participated in the conference as well as the Student Program. During the Business Session, the other scholarship winners and I had the honor of being recognized for our efforts in front of an audience of CAS members. That experience validated the work I have put in thus far and inspired me to continue to achieve more in my career. I also had the chance to network with the Trust Scholarship Committee, which allowed me the pleasure of meeting and thanking those who selected the award recipients. Additionally, attending concurrent sessions and learning about emerging industry trends were both inspiring and thought-provoking.

Erin Yetter (left) accepts the CAS Trust Scholarship award from Aaron Hillebrandt (right), chair of the CAS Trust Scholarship Committee.

During the Student Program, I networked with Fellows of the CAS, found out how to enhance my professional skills and learned more about the property and casualty insurance industry. Each student at the program was provided a mentor to interact with throughout the day. Through this experience I formed valuable connections and deepened my understanding of the industry. Getting expert advice through a workshop with an actuarial recruiter was definitely a highlight for me — I even had a professional headshot photo taken for future use!

The author's professional photo.

My experience at the CAS Centennial Celebration was extremely valuable and one that I will not forget! ●

Struggling Artistic Endeavors of an Actuary BY BOB MICCOLIS, CAS PRESIDENT

The historic event of the 100th anniversary of the CAS was personally an important and auspicious milestone to me as I assumed the role of CAS President. I very much wanted to commemorate the CAS on this occasion with a piece of art that symbolizes the actuarial endeavors of CAS members. Personally, my artistic skills lack any real training and experience. However, I have lived around artists for much of my life. My late father and my wife, Laurie, definitely have the artistic gift. Laurie and her late mother had worked in stained glass for several years, so I thought that a piece of art in stained glass would be a very nice gift to the CAS. That was the easy part.

After consulting with Laurie and her stained glass art instructor, Mark Kidd, the design of such a piece was a major question. What symbols or visual impressions of actuaries would be appropriate? This certainly required a part of my brain that I don't use a whole lot. Visually, 100 years of casualty actuarial work — rating formulas, reserve runoff triangles, regression equations, — were not very inspiring for a piece of art. Then I realized that the shapes of probability curves and trend curves might be promising as a visual theme.

The artistic world works very differently than the actuarial world when it comes to getting advice on a design. It was a good thing that I had this crazy art idea many months before the big day, because it was a process of trial and error. I tried a few very crude designs. Then Laurie would take a look and say, "Try something else." This was not like solving a business or math problem. So, I got a lot better at sketching — first on paper, and then on my iPad.

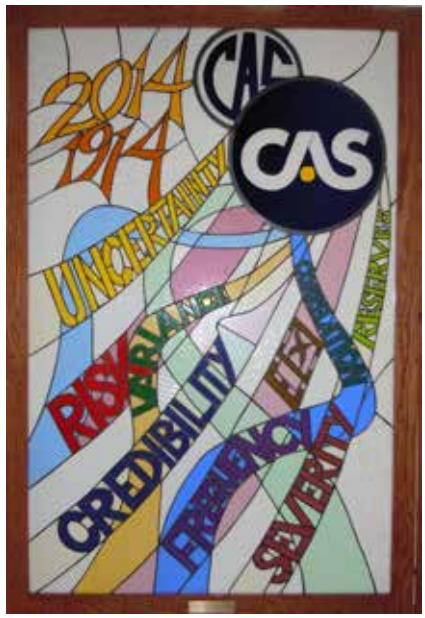
Alas, my "design" ideas were still lacking a connection to the actuarial world. Curves and the CAS logos were just not enough. My doodling in school and college came back to me — I always liked to draw letters, words, and numbers. Aha! Let me try putting some key actuarial words into the design. After several crude sketches, it seemed to be coming together. And my artistic consultants gave me the thumbs up!

Selecting colors and texture is a real skill — I had no idea what I was doing. Luckily, my artistic consultants were extremely helpful. Of course, now I got to play art critic and say "Try some other colors." Easier to say than to do, for sure — particularly, since I was doing the recoloring myself on an iPad.

It was very hard for me to imagine what this was going to look like in stained glass. My very simple sketch for the art piece, even with selected colors, seemed to be dull. I had seen Laurie's sketches for smaller stained glass pieces really come to life as all of the glass pieces were cut, edges foiled in copper, and then soldered together into the final piece. However, her designs were much more traditional, floral and symmetrical.

Luckily, Mark Kidd is a professional stained glass artist and artisan. So, the crafting of the final sketch into a piece of stained glass art was in excellent hands.

As the piece was being completed, I realized that it needed a name. But what did I know about naming a piece of art? Many of my ideas were easily vetoed by my wife. Articles culled from Google searches suggested looking for inspiration within the art. Again, my actuarial training and experience were not particularly helpful. I thought about spending a night under the stars hoping for some inspiration but then thought I would just be up all night in the cold. Then, somehow, I scribbled down a few words, rearranged them, and voilà, "Convergence of Knowledge."



Convergence of Knowledge

Convergence of Knowledge is now on display at the CAS office in Arlington, Virginia. Hopefully, some of those who missed seeing the piece in New York may visit the CAS in the future and be able to see it in person. It was a real pleasure, and an interesting journey, to be able to create this gift for the CAS for the years to come.

Bob Miccolis, FCAS, is a director at Deloitte Consulting in Philadelphia.

CAS Style! Centennial Chorus Brings it

BY MICHAEL ERSEVIM, CAS CENTENNIAL ORCHESTRA/CHORUS DIRECTOR

For its finale, the CAS Centennial Orchestra and Chorus brought down the house with an actuarial take on Gangnam Style, the "ear-worm-worthy" song by the Korean power pop sensation Psy. The performance garnered a much-deserved encore. See Ron Lettofsky's lyrics at right.

As we started to gather expectantly in the rehearsal room, I wondered many things: Had anyone practiced the music beforehand? Are we going to have enough men? Will they sound any good? Can we pull this together in time? And what on earth could they be serving Tuesday night at $350 a plate? But possibly the very last thing I was wondering was, *"Can they dance?"*

As a side note, certainly anyone sizing up my "not-exactly-lean" 100 kg-plus frame (you do the conversion) could be forgiven for assuming that I was probably some sort of dancer. Ballet perhaps? No. Jazz? Hmm…ah yes, of course: clearly a modern, hip-hop dancing master. But more on this thought a bit later.

The first rehearsal on Saturday progressed very nicely with the chorus and the orchestra, both of which were very attentive, responsive and musically talented. We had more than a chance of sounding good; this concert was really going to *shine*. But something was missing from the final rap medley … a certain *je ne sais quoi*, an energy, a liveliness, a shared celebratory experience. I couldn't put my finger on it then, but it would come to me later in a dream.

As I was lying in the king-sized Hilton bed Sunday morning, I had a vision — a vision of dancing actuaries. A vision of past CAS presidents and chief actuaries, of managers and modelers, leaders and captains of industry, all cutting loose, letting go of inhibitions, shaking their collective booties and downright "gettin' jiggy wid it!"

Alas, but who to train these yet unsculpted mounds of raw talent? They needed someone to choreograph and rehearse the steps, dance steps which distilled the very essence of being alive and a credentialed actuary. That's where I came in. Armed with only my humble ACAS designation, I somehow managed to piece together the show-stopping moves which quickly became one of the most watched videos on YouTube!

The CAS means a lot of different things to different people, but I was so very happy that we were able to add a musical and artistic meaning to an organization that has given me so much. More than a fantastic career, the CAS has also given me many friends, great experiences and opportunities. As someone with an advanced music degree, I was thrilled I got to merge both of my worlds, math and music, in a night of celebration with so many others who could share and express the same thing alongside their peers. ●

The CAS Centennial Orchestra and Chorus take a bow.

When he's not dreaming up dance numbers, Michael Ersevim, ACAS, is AVP-actuary for AmTrust Underwriters Inc. in Rocky Hill, Connecticut.

CAS Style by Ron Lettofsky, CAS Centennial Orchestra Conductor/Music Arranger

To the tune of *Gangnam Style*

C-A-S Style, Gangnam Style
Ope-Ope-Ope-Ope, C-A-S Style
Gangnam Style
Ope-Ope-Ope-Ope, C-A-S Style

Hey Actuary!
Ope-Ope-Ope-Ope, C-A-S Style
Hey Actuary!
Ope-Ope-Ope-Ope, A-a-a-a-a-a

I-L-F, L-D-F, I-B-N-R, A-L-A-E.
My compound Poisson Gamma process
GLM is Tweedie.
Umbrella, home and auto, GL,
Work Comp, Property.
I'm a P and C Actuary!

Hey Actuary!
Ope-Ope-Ope-Ope, C-A-S Style
Hey Actuary!
Ope-Ope-Ope-Ope, A-a-a-a-a-a

C-A-S Style!

Ron Lettoffsky, ACAS, works for Fireman's Fund Insurance in Chicago.

On Meeting Matt Lauer BY TREVA MYERS

While in New York City for the CAS Centennial Celebration I had the opportunity to visit the "TODAY" show's street-side studio known as the "Plaza," along with two of my colleagues at EMC Insurance Companies, Donia Freese, ACAS, and Kristin Brown, ACAS. As you are probably aware, the "TODAY" anchors usually dedicate a few minutes of the show to greeting visitors in the plaza. Hoping to score a live interview with one of the anchors and promote the CAS Centennial Celebration, we created a sign that read "Celebrating CAS 100 Years."

We waited for over an hour before the anchors came outside. It was a beautiful morning and time went quickly. While we were waiting, we chatted with NBC employees and watched the Rockettes run through their routine before their live performance. One of the employees we spoke with shared that her boyfriend is currently studying to be an actuary and we had a nice conversation about the career.

When the show took a break, anchors Matt Lauer, Savannah Guthrie, Al Roker and Tamron Hall came around and greeted visitors in the plaza. They were very friendly and took time to shake hands with the crowd. Though there wasn't enough time for the anchors to interview any of the visitors, the connection that we made with the NBC employee led to our getting our picture taken with Matt Lauer.

The "TODAY" show was a great way to wrap-up our New York City experience!

Treva Myers, ACAS, is associate-actuary-pricing for EMC Insurance Company in Des Moines, Iowa.

Even Matt Celebrated: Left to right, Treva Myers, Donia Freese and Kristin Brown pose with "TODAY" show host Matt Lauer.

Frank Harwayne, the second-oldest member of the CAS, enjoys the Centennial Gala festivities with his wife and colleagues. Left to right are Harwayne, Ruth Harwayne, Anne Kelly and Stan Dorf. Harwayne, Kelly and Dorf represent three generations of chief actuaries who served the New York Insurance Department.

Reception revelers see what it's like to be in a helicopter from the safety of the Intrepid Sea, Air & Space Museum. Ernst & Young sponsored the CAS Centennial welcome reception on November 9, 2014.

Appreciation, Pride and Relief — What I Took Away from the Centennial

BY GAIL ROSS, CHAIR, CAS CENTENNIAL STEERING COMMITTEE

Gail Ross (background, left) finally gets to relax as her husband, Steve Ross (foreground, right), is charmed by a young Gala attendee.

Chairing the CAS Centennial Steering Committee meant overseeing the planning, organization and execution of the meeting. It was a challenge with a tremendous payoff.

At the conclusion of the Centennial Celebration, I felt (in this exact order):

1. **Appreciative** — for all of the hard work of my colleagues on the various Centennial Committees and the CAS staff.
2. **Proud** — that we had delivered an outstanding educational program coupled with fantastic entertainment. This feeling was affirmed by the number of emails and calls I received from fellow CAS members stating that the Centennial was the best meeting they had ever attended and offering congratulations to all involved.
3. **Relieved** — that after more than 10 years of planning it was over!

During the event, my personal highlights included finding my name in the Rolodex in the CAS Museum (boy — we've come a long way!), seeing Frank Harwayne (our second oldest living member) get a standing ovation from the nearly 2,000 attendees, and watching the Centennial video. The video tugged at my heartstrings when CAS Past President Charlie Hewitt said that he was sorry he could not be at the Centennial in person (and knowing that he had passed away within days of recording his piece).

Last, but not least, I loved hearing our CAS orchestra and chorus blow the room away with their songs from the 10 decades of our existence! ●

Gail Ross, FCAS, is principal and consulting actuary for Milliman Inc. in New York City.

A New Fellow's Journey Just Begins

BY MATHIEU BELLEMARE

Being recognized as a Fellow of the Casualty Actuarial Society was easily for me the highlight of the Centennial Celebration and Annual Meeting in New York City. Achieving this career milestone at the 100th year anniversary of the CAS, with all my colleagues and friends, including 16 other new Fellows from Intact, made it even more memorable.

I am proud to be part of an organization that develops and supports the best property and casualty actuaries around the world. Now that all of the studying is behind me, it is time to give back to the organization. I have started volunteering as a CAS University Liaison to support and help other future Fellows through this rewarding journey. I hope to see many more Fellows from our Canadian universities being recognized at future CAS meetings.

Congrats to all the new CAS Fellows who celebrated with me in New York City! ●

Mathieu Bellemare, FCAS, is senior analyst for Intact Financial Corporation in Toronto.

The author (left) with CAS President Wayne Fisher.

The Risks Around the Corner

By STEVEN SULLIVAN

Three emerging risks that will keep insurers and actuaries busy in the years to come.

Technology has always tempted us with visions of a brave new world. We can imagine ourselves commuting to work in a car that's essentially its own chauffeur, one that automatically whisks us through the traffic that we used to dread — while we read or text or even catch up on a few minutes' sleep — and delivers us safely to the door.

Or we can imagine that Super Bowl Sunday when the old TV bites the dust and we finally get to order that big-screen behemoth we've always coveted — and have it delivered safely to our door two hours later by a hovering delivery drone, just in time for kick-off.

And we don't even have to imagine how we pay for it. We pay for it like we do now, with a piece of plastic or a smart phone or some other magic device yet to be devised that makes money change places in a nanosecond.

All these gizmos may make our lives better, but, as with any new or emerging technology, there are risks and costs. Some of them we know about already, and some we don't. Nevertheless, it's the job of actuaries and the insurance companies they work for to identify those risks and quantify the costs.

Battle in Cyberspace

One such risk we know is going to be costly because it's already hit the headlines. Hard.

During the end-of-2013 holiday shopping season, cyber thieves stole

payment data on about 40 million credit and debit card accounts of customers of the retail giant Target. The criminals used malware they installed on Target's store checkout systems. They also stole personal information on up to 70 million individuals. Latest reports show $248 million in losses incurred as of November 1, 2014, and directly attributed to the data breach, partially offset by expected insurance recoveries of $90 million, for a net loss of $158 million.[1] And this doesn't include the reputational damage to Target or that its CEO lost his job after the breach.

And, of course, Target wasn't alone; PF Chang, Neiman Marcus, Home Depot, and JP Morgan Chase also experienced high-profile breaches that have cost untold millions (or billions) of dollars. And who knows how many more have happened since this was written? [Editor's note: The hacking of Sony Corporation came to light in late 2014.]

"When it comes to emerging technologies, cyber is the one risk that affects them all," says Alex Krutov, president of Navigation Advisors, NYC. "We can see it everywhere from medical devices and autonomous vehicles to the so-called Internet of Things. However, cyber risk is certainly not just about new technologies. It is something that's here and now, not just in the future. And it's rapidly growing"

The problem seems almost insurmountable: As soon as security experts erect impregnable defenses around their sensitive data, hackers devise ways to get through them. And hackers don't just hit and run. As in the case with the JP Morgan breach, they not only broke in multiple times, they hung out for a while to look around. Is any of our information safe? Will it ever be?

"It has always been an ongoing battle between hackers and the defenders against them," says Hank Haldeman, executive vice president and director, The Sullivan Group, Los Angeles. "An Internet security insurance consultant made an analogy to medieval times — the constant development of weapons technology resulted in new defenses and then even newer weapons. Unfortunately, that means the cyber attackers are always one step ahead of the defenders, so it's always a matter of responding."

Alan Paller is director of research for the SANS Institute, a firm that specializes in providing computer security education and training for companies. During a panel discussion on NPR's *Diane Rehm Show*, he was asked if teaching good guys how to protect against data breaches doesn't give ideas to the bad guys. His response: "They already know."

Most of the high-profile retail cases (Target, Neiman Marcus, Home Depot) have involved compromised credit cards. Improvements in credit card technology, such as the "chip and PIN" system widely adopted in Europe, have helped reduce the risk of fraud somewhat. But chip and PIN works only if the card itself is present; it has no effect on Internet transactions. For that, companies like VISA are experimenting with a system called "tokenization" that replaces sensitive information with coded "tokens." But even that, experts say, isn't foolproof.

At the risk of being fanciful, it's not difficult to imagine this as an epic conflict in a DC comic book, where valiant cyber risk managers in a blasted landscape endlessly battle shadowy villains who are always one step ahead. But trying to manage this all-but-unmanageable risk isn't the same as insuring against it. Is this wild and chaotic territory really any place for the insurance industry? Cyber insurance may be the fastest growing line of insurance right now, but how do you quantify a risk when everything is constantly changing?

"That is exactly the difficulty," says Krutov. "In dealing with cyber risk, one of the greatest challenges is its quantification. Insurance companies need to assess cyber risk in quantitative financial terms rather than only the qualitative terms that are so often used in cyber security and cyber risk management. Those are important — by themselves and in assuring compliance with specific standards — but they don't always lend themselves to translation into quantitative measures that describe probability and magnitude of potential losses. That's what's needed for proper pricing of cyber insurance and it's a very significant challenge. But, right now, very often purely qualitative as opposed to quantitative methods are used for cyber risk assessment. It's not surprising because so many aspects of cyber risk are poorly understood."

According to Karl Olson, vice president of Sullivan Brokers Wholesale Insurance Solutions, San Francisco, there are basically two types of cyber exposure: network security and privacy. Network security has to do with the storage or processing of data, which would

[1] U.S. Securities and Exchange Commission Form 10-Q, Quarterly Report [of Target Corporation] Pursuant to Section 13 or 15(d) of the SEC Act of 1934, for the quarterly period ended November 1, 2014.

include any company's internal software systems, databases, or cloud servers. Privacy liability involves first- and third-party exposures, which include personally identifiable information (PII) and protected health information (PHI).

The 50 or so companies that cover these exposures price their products competitively and aggressively but each product is different. They all contain more than one insuring clause — a clause for network security, one for privacy, one for notification and credit monitoring, a clause for media — specifying what the insurer will pay in that area.

Who's going to be liable? Will driverless cars really eliminate "driver error"? … Who does the human sue when he gets hit by an autonomous car? The owner? The manufacturer? The computer programmer?

"There are now 47 states that have laws that require some action in the event of a data breach," says Olson, "and I'd say that the regulatory exposure is certainly one emerging risk. What that means is that there are 47 different platforms or thresholds or definitions of PII and PHI. Not only do you have 47 different state platforms but you have all these different carrier products that call the same exposure different things, providing similar coverages under different names. You have limit structures that in some cases make sense and in some cases are deficient from the insured's perspective. There's no real commonality to the viewpoint of risk. It's taken about 12 years to get to where we are now — the first was California in 2003 — and it's still evolving."

Cyber risk insurance has been underwritten by insurance companies for some time now, according to Alex Krutov, but the industry still has to develop expertise in the analysis of this risk. He believes that actuaries need to work with other disciplines — risk managers, IT experts, attorneys, data analysts — to improve the way cyber risk is analyzed and underwritten.

"I believe that significant improvements can be made in cyber risk modeling. This will allow us to make cyber insurance pricing more risk sensitive, with higher premiums charged where the risk is higher. The risk is rapidly evolving, which may require changing insurance rates more frequently than in other lines and possibly making adjustments to the risk margins in insurance premiums," Krutov says. He acknowledges that if interpreted very broadly, in some cases this could be seen as a controversial position and may run into regulatory resistance.

"It's surprising how few of the smaller organizations that are involved in capturing credit card information aren't protected," says Haldeman. "They're liable if they're negligent with the information that crosses their thresholds. New exposures arise out of the use of the cloud for storing information and data, and many insurance policies don't deal effectively with data that you're not actually storing onsite. What is your responsibility versus that of the purveyor of the data storage? Insufficient attention has been paid to that question. Technology is often changing beyond the scope of the policies, so a company that bought a policy five years ago and thinks it's covered may not be as covered as it thinks it is."

Who's Driving Miss Daisy?

The response to cyber risk may still be emerging, but the risk itself is here and has been for quite some time. The same cannot be said for the driverless car. Though many believe they're inevitable and won't be long in coming, they're not here yet. At least not on our roads and highways. But they're definitely being driven, tested and developed.

Go to http://www.google.com/about/careers/lifeatgoogle/self-driving-car-test-steve-mahan.html and you can see Steve Mahan, who is legally blind, sit behind the steering wheel while his autonomous Toyota takes him down local streets, to the dry cleaner and even the Taco Bell drive-through.

Not long ago, for about 45 minutes on Google corporate campus and the highway in California, Alex Krutov was also a passenger in one of Google's test models.

"It was a unique, unusual experience, being in a car that didn't really have a driver," he says. "There was a Google test engineer with me who could take control at any moment, but the car was driving itself. Five years ago we would have seen it as science fiction. I wasn't anxious at all. Despite my natural focus on risk and the analysis of uncertain events, this experience felt absolutely safe. To the best of my knowledge, none of Google's self-driving cars has been in an accident where it was the car's fault. Somebody did rear-end one when it stopped at a traffic light but that couldn't be blamed on the car's software or hardware."

Which raises one of the most important questions insurers will have to face when these vehicles finally start to hit

the road: Who's going to be liable? Will driverless cars really eliminate "driver error"? Obviously, it's easier for driverless cars to operate if there are only driverless cars on the road. But at least for a while they'll have to share road with cars driven by humans. So who does the human sue when he gets hit by an autonomous car? The owner? The manufacturer? The computer programmer?

According to Google, one of the most difficult problems its developers have to deal with is programming the car to react to completely unexpected actions by human drivers. And humans are good at making unexpected actions that make no sense to a computer.

Many cars on the road today are already equipped with computers designed to reduce the risk of human error: blind spot monitoring devices, rearview cameras, and lane-departure warnings. Vehicle-to-vehicle (V2V) communication systems in some high-end models can help drivers avoid collisions.

"As crash avoidance technology gradually becomes standard equipment," says an Insurance Information Institute paper,[2] "insurers will be able to better determine the extent to which these various components reduce the frequency and cost of accidents. They will also be able to determine whether the accidents that do occur lead to a higher percentage of product liability claims, as claimants blame the manufacturer or suppliers for what went wrong rather than their own behavior."

According to the 2008 National Motor Vehicle Crash Causation Survey (NMVCCS), 93 percent of accidents are caused by human error. But this statistic doesn't account for driverless vehicles. Last year, the Casualty Actuarial Society created a Task Force on Automated Vehicles (CAS AVTF) to look into what impact this new technology will have on insurance and risk management. The task force found that the standards referenced in the NMVCCS survey really don't apply to automated vehicles. "Automated vehicles can be expected to address up to 51 percent of accidents, not the 93 percent that is commonly referenced," the task force said in its executive summary.[3] "Things that cause accidents today may or may not cause accidents in an automated vehicle era."

If reducing accidents can reduce the cost of liability insurance, what about comprehensive coverage of driverless cars? With all that computer hardware and software aboard, they're going to be expensive to repair or replace. But, according to a 2014 RAND study on driverless vehicles, the lower risk of accidents may offset the higher cost of insuring the equipment, resulting in lower insurance costs overall.

Watch the Skies!

"Widespread commercial use of drones is probably 15 or 20 years away," says Karl Olson. "When you've got a sky littered with drones, like flocks of birds… that's too far on the horizon for me to speculate."

Maybe. Maybe not.

Drones — also known as unmanned aircraft systems (UAS) or even flying robots — are already controversial when they're used as weapons in Afghanistan, Iraq and other modern battlefields. They're even more controversial when contemplated in civilian air space. Some are used today in a variety of peacetime uses — including law enforcement, firefighting, disaster relief, and search and rescue. Drones were used by insurance companies in the aftermath of Hurricane Sandy to assess damage in areas it was difficult or impossible to get to. Only recently, the Federal Aviation Administration (FAA) decided to allow filmmakers to use drones for aerial shots in the United States — cheaper and safer than a helicopter.

But their use is largely unregulated. Air space in many areas is already crowded and adding unmanned aircraft to the mix can be dangerous. And any discussion of civilian use of drones inevitably turns to violation of privacy issues, with dire predictions of airborne robotic cameras hovering and leering outside our bedroom windows.

In March 2013, Rep. Ed Markey (D-MA) introduced the Drone Aircraft Privacy and Transparency Act, which attempts to set up a regulatory framework for the use of drones that includes

[2] "Self-Driving Cars and Insurance," III, September 2014.
[3] "Restating the National Highway Transportation Safety Administration's National Motor Vehicle Crash Causation Survey for Automated Vehicles," http://www.casact.org/pubs/forum/14fforum/CAS%20AVTF_Restated_NMVCCS.pdf

protection of privacy, data collection and enforcement. So far it seems to be grounded in committee. Even so, Congress has given the FAA until September 2015 to devise and implement a regulatory policy.

Meanwhile, as of February 2013, the FAA had already issued more than 1,000 drone licenses to government and private users. According to Vikki Stone, senior vice president of Poms and Associates, an insurance broker in Los Angeles, insurers are trying to figure out how they're going to cover these things once they eventually do get off the ground.

"Coverage for drones is currently being negotiated with a number of different insurance companies," Stone told A.M. Best. "There isn't an actual policy out there right now that will pick up the kinds of exposures we'd be seeking when the FAA approves the commercial use of drones. There are certainly drones in use right now and those are, of course, being insured. But at this time we're in the negotiation phase of our program."

The kinds of exposures insurers will be looking at include the drone itself, property damage it might cause, liability (both general and aircraft product), cyber insurance against the hacking of drone data, workers' compensation, employment practice liability, and directors and officers liability. And who knows what other exposures might reveal themselves in practice?

In July 2014, the TEAL Group, defense and aerospace industry consultants, predicted that worldwide annual spending on drones would almost double over the next decade, from a current $6.4 billion to $11.5 billion a year, totaling close to $91 billion in the next 10 years. This is going to translate into major bucks for insurance companies.

"Drones will affect the insurance industry in many ways," says Stone, "but the major effect will be to provide a new income stream."

"I think we're in an exciting time for entirely new insurance products to be developed," Karl Olson agrees. "From the carrier perspective, there are many talented individuals who are directly addressing these exposures." ●

Steven Sullivan is a freelance writer and editor in Baltimore, Md.

Insurance Industry Leaders Discuss Future Trends, Challenges

BY JIM LYNCH

The buzzword in business today is disruption, as industry after industry faces the disruptive potential of technological leaps, a point brought home by a quartet of business leaders at the closing session of the CAS Centennial Celebration and Annual Meeting in New York in November.

The importance of actuaries and other bright minds was never far from the spotlight.

The panel — W. R. Berkley Corporation Chairman and CEO William R. Berkley; Hamilton Insurance Group CEO Brian Duperreault, ACAS; A.M. Best rating analyst Matthew C. Mosher, FCAS, CERA; and Vincent J. Dowling, managing partner of Dowling & Partners — also focused on how alternative capital is changing the business in their presentation, "The Future of the Insurance Industry — The Next 100 Years."

Panelists agreed that the recent growth of pension and hedge fund investment was likely to have a lasting impact. This so-called "alternative capital" has poured into reinsurance, primarily catastrophe business. There are signs that it is expanding to other lines.

Pension investors bring with them $30 trillion in capital, said Dowling. That's enough to comfortably write the approximately $325 billion in catastrophe limits purchased every year, while still maintaining a disciplined, diversified pension portfolio.

Property-casualty actuaries and the rest of the industry have become so good at quantifying and estimating catastrophe risks that the new investors have grown comfortable underwriting reinsurance against them.

Panelists traced the story back to Hurricane Andrew in 1992. Losses from that storm were so much worse than the industry expected that insurers began to use computer models to quantify and manage risks. The industry had another shock in 2005, when Hurricane Katrina generated more losses than the computer models anticipated.

Insurers realized that they had to get better. They expanded computer capacity, capturing and analyzing even more sophisticated data. Today insurers are better managed than ever, said Duperreault.

"We play chess in insurance," Dowling said, "but they play speed chess."

The "Class of '93" insurers placed more importance on data and analytics, and the entire industry became more sophisticated.

"We're in pretty good shape as an industry," Duperreault said. "It's no surprise we've drawn a crowd."

Most of the capital growth has occurred in the past few years, with no Andrews or Katrinas to threaten it.

The next big storm might quell the tide, Duperreault said, but won't force it to ebb.

If models err, "You'll see some shock," he noted. "You'll see some withdrawal." But even a devastating event won't deter them forever, because the new investors are so much bigger than the catastrophe reinsurance market.

"Big changes for us are small changes for them," Duperreault stated.

It may be better, panelists agreed, to ask how much more insurance this new breed will write. There are signs that new capital is expanding beyond catastrophe business into other lines, including casualty.

Catastrophe business, said Berkley, "is a heads or tails business." Reinsurers lose money if a catastrophe strikes and make money if it does not.

Not so for the casualty business, where the events that drive profit and loss are less distinct and play out over several years.

Dowling predicts that the new capital will affect casualty markets, either through direct investment or by forcing traditional reinsurers to write more casualty business. Duperreault believes that reinsurers need to find ways to serve the new entrants, helping them write business and manage their insurance portfolios.

Beyond the capital threat, panelists noted, lies a technological challenge.

New technologies, such as increased computer power handling enormous data blocks, will profoundly impact the future, panelists agreed, particularly in the way insurance is distributed. Insurers may be able to use big data analytics to drive down the cost of administering insurance business.

Right now, Dowling noted, consum-

ers pay $1 in premium and receive on average about 65 cents to cover losses. Most of the remaining margin covers administration of the business and distribution costs (agent and broker commissions). If insurers don't narrow that margin, Dowling said, other companies will, especially Silicon Valley. "We play chess in insurance," Dowling said, "but they play speed chess."

They will find ways to streamline. They might use a home address, for example, to comb databases for enough information to write the risk.

Other technological advances, such as driverless cars or ridesharing, could shrink the personal auto insurance market to 10 percent of all property-casualty insurance written, down from the current 38 percent, Dowling said.

Finally, they will find ways to bypass agents and brokers — unless those parties can show that they add value beyond bringing the customer to market. Lower commissions and fees would reduce transaction costs.

"We have not really been disruptive as an industry," Duperreault said. "We can't sustain this high cost of transaction," he added.

Their predictions could be daunting, but panelists discussed how high-level analytic experts, such as property and casualty actuaries, have a challenge and an opportunity.

Duperreault recommended that actuaries devote time to understanding new capital and the potential ramifications of big data and algorithmic decision-making. "And get into other parts of the business. Distribution costs are ripe for attack, and someone is going to make a breakthrough — why not us?" ●

Actuaries Look Beyond the Hype to Find Promise in Big Data

BY JIM LYNCH

If you are reading this article, it is most likely because it contains the words *big data*, even if you are not sure what those words mean.

Take heart. The latest information revolution has a lot of people trying to sort hope from hype. Two actuarial thought leaders lent their perspectives on big data and its massive potential to more than 2,000 actuaries at the opening session of the Casualty Actuarial Society's Centennial Celebration and Annual Meeting in New York in November.

They also touched on big data's challenges and the privacy concerns the topic raises.

First, here is some hype, culled from the media by James Guszcza, FCAS, U.S. chief data scientist at Deloitte:

"Data is the new oil."

"Big data is one of the greatest sources of power in the 21st century."

"In the past few years we have produced more data than in all of human history."

The rhetoric sounds overblown, but maybe it is not — not entirely, anyway. It is certainly true that we now have unprecedented ability to gather and store staggering amounts of information. We have computers and algorithms that can sift, arrange and analyze the data in ways that did not exist even a few years ago.

"It's easy to dismiss all of this as a lot of hype," said Guszcza, "but there's something new here."

Guszcza offered three definitions of big data:

1) A dictionary-style definition: "Data sets with size beyond the capability of standard IT tools to capture and analyze."
2) A conceptual definition: "Data with a high volume, plus velocity ("It comes at you all the time," said Guszcza) and variety (not just numbers, but text, photos and videos)."
3) A half-joking definition: "Anything that doesn't fit in Excel."

How big is *big*? Around a petabyte, said casualty actuary Steve Mildenhall, FCAS. That is a million gigabytes, or all of the hard drives of about 10,000 laptops combined.

Big data is different, Mildenhall said, not only because there is more of it.

Traditional data were expensive to collect and store, explains Mildenhall, CEO of analytics for Aon. At the same time, the information was valuable in pricing and underwriting, which justified the time and expense of gathering it.

Insurance claims are a good example of traditional data, Mildenhall said. Adjusters update claim estimates regularly. Actuaries then summarize that information quarterly and then estimate ultimate claims. The process is laborious, each step is taken with great care; however, the results are quite valuable.

By contrast, he said, big data (Facebook likes, Twitter hashtags and smartphone pings) is cheap or free, but no individual datum is particularly valuable.

Jim Guszcza. Photo credit: Craig Huey

Invoking an image from eminent statistician David Hand, Mildenhall said "Raw data is like iron ore, a large, bulky useless thing." The tweets of a teen, for example, are worthless unless combined with a million others. Like drops of water in an ocean, they have little meaning until you see the wave that they form together.

Mathematical models — the actuary's specialty — detect the wave.

Right now the most famous wave detectors arise from Silicon Valley. Google, for example, noticed that it could spot where people were getting the flu faster than government researchers. The company cleverly tracks spikes of such flu-related terms as "fever" or "cough."

The best analysis goes past the obvious, Mildenhall stated. If a Netflix bot does no more than recommend sci-fi action movies to fans of sci-fi action, it is not doing much of a job. It not only has to find something a viewer might like, it must find something that the viewer would not have otherwise considered.

The key is turning the information into insight, using analysis and models — familiar territory for property-casualty actuaries. Driving behavior has been known to be linked to age and gender for decades, a fact so well known today that it seems obvious. More recently, credit score data has been linked to auto insurance claims. That link was not well understood at first, but today credit data is increasingly viewed as a reflection of underlying behavioral traits that can also manifest themselves in "risky" driving. Commenting that data volumes are an imperfect proxy for useful information, Guszcza suggested that "behavioral data" might be a more useful organizing principle than big data for thinking about the "digital breadcrumbs" that people increasingly leave behind as they go about their daily activities.

Distilling raw data into actionable insight won't always be as straightforward as some think.

Far from being a panacea, big data can actually exacerbate data analysis pitfalls. As an example, Guszcza again pointed to Google Flu Trends. Though valuable, the algorithm began to overestimate flu outbreaks because no methodology was in place to recalibrate the model to reflect changes in the Internet search behavior that generated the data. Another example of a big data pitfall: If an analyst tests enough hypotheses, random chance alone makes it likely that some relationships will appear significant, even when nothing is actually happening. This is a major reason why many medical, psychological and sociological findings fail to replicate. As big data becomes more prevalent, so do the risks of false discoveries. To illustrate, Guszcza alluded to a peer-reviewed publication reporting that women tended to wear red or pink when they were in peak fertility. When evaluating such findings, it is good to consider what other hypotheses might have been tested along the way.

As big data becomes more prevalent, so do the risks of false discoveries.

Big data also raises privacy concerns. Everyone leaves behind "digital breadcrumbs" from their shopping, Internet searching, networking, driving and travel. "If you have a smartphone, all bets are off," Mildenhall said. People are more likely to compromise on privacy if they trust the user and also receive value in exchange, he added. But data live forever once they are stored, and no one can predict how they could ultimately be used.

The ultimate risk for insurers would be too much knowledge, Mildenhall said. If one could predict exactly which drivers will crash or which homes will flood, then the basis for insurance disappears. People who are not at risk would not buy insurance; imperiled people could not afford insurance.

The perfect forecaster, though, seems unlikely. Regardless of what happens in the insurance world, Mildenhall said, big data holds enormous potential — and property-casualty actuaries have the skills to capitalize.

They could end up as the statistical forecasters of the future, both inside insurance and out.

To view the complete CAS conference session, "Big Data — What It Is, and What It Means for the Insurance Industry," visit the CAS website. ●

Actuaries Debate Insurance Issues In Ridesharing

BY JIM LYNCH

Actuaries added their quantitative acumen to the debate over ridesharing services like Uber and Lyft during a presentation at the Centennial Celebration and Annual Meeting of the Casualty Actuarial Society (CAS) in New York in November.

Uber and Lyft are among a new set of companies that use a smartphone app to match passengers and drivers. But drivers who use their personal vehicles for livery introduce insurance issues that are being debated in legislatures and city councils across the country.

The problem: The typical personal auto policy does not cover livery. While everyone agrees that a personal auto policy should not cover vehicles while carrying passengers for hire, not everyone agrees on whether the personal insurance policy should cover a vehicle that is available for hire but not providing transportation services.

At the CAS meeting, two property-casualty actuaries discussed how to approach the issue, joined by a consultant for a major insurance trade group.

There are three distinct periods to ridesharing:

Period 1 — the time when a driver is online and available for hire.

Period 2 — the time after the driver has received a ride request and is on the way to pick up the passenger.

Period 3 — the time after the passenger has been picked up and is being driven to a destination for drop-off.

The question: When is the driver covered by a standard personal auto policy?

While all the panelists agreed that a driver needs commercial insurance in the last two phases, the big question revolves around what coverage exists in Period 1.

In this case, the coverage varies by insurer, said Frank Chang, FCAS, lead actuary of Uber. His analysis is based on reading the exclusions in the policies of dozens of different insurers. The most common wordings, he said, would exclude coverage only when the driver has a passenger. That would mean a driver in Period 1 — not carrying a passenger and not en route to pick one up — could have coverage under a personal auto policy. He also argued that the driver's exposure during Period 1 is similar to personal auto because the driver is alone, driving a known, rated vehicle. The presence of passengers as well as typical livery hazards such as loading and unloading of passengers and goods, finding areas for safe pick-up and drop-off, and driving prescribed routes do not exist in Period 1.

Uber's insurance policy covers drivers on the way to a fare and while they have one. In Period 1, though, Uber's coverage is contingent; it only applies if the driver's own personal auto policy does not.

Chang's analysis is disputed by Diana Lee, a consultant recently retired from the Property Casualty Insurers Association of America (PCI). Lee said personal auto policies exclude all commercial activity — Periods 1, 2 and 3 — due to the change in driving risk. Lee notes that drivers tend to go to urban areas looking for passengers, where the exposure to the risk of loss is higher. In addition, Lee contends that risks should be insured by a policy appropriate to the activity; therefore, shifting the cost of a commercial activity to a personal policy is not appropriate.

The trade group has been working with state legislatures to create a "bright line" between personal and commercial auto by placing all three periods on the commercial side, she said. California and Colorado have passed legislation clarifying what periods are to be covered by ridesharing companies. More than a dozen other states have debated the issue, and nine cities have already passed ridesharing ordinances.

Drivers tend to look for rides when demand is high. That means they tend to drive later at night (carrying bar-hoppers) and in bad weather (when potential customers do not want to wait for a bus).

One other issue that was discussed was the impact of ridesharing on the personal auto insurance industry.

To gain further understanding, PCI hired Pinnacle Actuarial Resources to estimate how much coverage for Phase

1 might cost a driver. Pinnacle actuary Laura Maxwell, FCAS, who presented her method and her findings, said that the challenge was finding publicly available information on which to base her analysis. Currently there is scant information on ridesharing exposures, so Maxwell gathered information from news stories and government analyses, a strategy actuaries often employ when they do not have a complete data set. Like many actuaries, she then created high- and low-scenarios to test the sensitivity of her assumptions.

For example, Maxwell needed to know the age of and miles driven by a typical rideshare driver. She used government information on miles driven by age group for all Americans. She then found a newspaper article that gave a rough breakdown of Lyft and Sidecar drivers by gender and age.

Maxwell also adjusted standard insurance rates to reflect differences between rideshare drivers and the typical personal auto policyholder. Drivers tend to look for rides when demand is high. That means they tend to drive later at night (carrying bar-hoppers) and in bad weather (when potential customers do not want to wait for a bus).

Rideshare drivers also tend to be more distracted, Maxwell said, while checking their apps and finding their fares. She found government databases that show the increased risk of an accident from all these factors, then adjusted the results again because most rideshares take place in urban areas. With heavier traffic, urban areas see more accidents than other areas; however, these accidents involve lower speeds, so damages tend to cost less to repair and injuries are less severe.

She created four scenarios to reflect the fact that some drivers use rideshare to supplement income while others make it a full-time job. She did this for Colorado and California while those states were contemplating rideshare legislation.

Depending on the state, she concluded, rideshare drivers who put in about 1,000 miles a year could expect to pay $100 to $200 a year to obtain coverage for Period 1. Full-time drivers in Colorado would pay $1,000 to about $1,500 and full-time drivers in San Francisco would pay an additional $3,000.

Chang approached the issue from a different angle. He cited a study done by Milliman to measure the impact of ridesharing drivers on Period 1 in Colorado; the net result on the personal auto insurance market to all policies was $0.70/policy. Chang then noted that each passenger in a ridesharing vehicle is one less driver on the road. Because ridesharing vehicles are covered by commercial insurance while transporting passengers, this reduces the miles covered by personal insurance. He argued that by giving bar-hoppers a safe way home, ridesharing actually makes roads safer. Chang also noted that drivers in Period 1 are not always driving; they will sometimes turn on their smartphone and await assignments while either parked or at home. Finally, Chang suggested that products for ridesharing in Period 1 would be a great growth opportunity and differentiator for personal auto insurers.

Because ridesharing vehicles are covered by commercial insurance while transporting passengers, this reduces the miles covered by personal insurance … by giving bar-hoppers a safe way home, ridesharing actually makes roads safer.

The debate continues, with property-casualty actuaries lending their expertise where needed. Through October 2014, 23 states have alerted drivers and passengers of the potential insurance risk. More states and cities are expected to consider ridesharing legislation and regulations in the upcoming year.

"It has been a very fluid issue," said Lee. "It has been a challenge to keep up." ●

The Future of Loss Reserving May Be "Outside the Triangle"

BY JIM LYNCH

Loss reserving — the art-slash-science of property and casualty actuaries — can seem arcane to outsiders, even mystical. To mathematicians and actuaries, however, it is fairly straightforward.

The basic method, known as the chain-ladder, assumes the losses a company has incurred to date reveal how much more in losses the company will incur. Other popular methods are offshoots of that idea.

After that, an actuary's knowledge, skill and judgment find ways to hone the estimate. Much of the loss reserving craft depends on understanding nuances of the method and its brethren.

Are there better ways to estimate loss reserves?

A panel of property and casualty actuaries addressed the question at the CAS Centennial Celebration and Annual Meeting in New York in November. The panelists had lots of help, with robust participation from an audience of more than 500 and the results of a free-form survey conducted in advance of the meeting.

Research indicates that actuarial reserving methods — using the famous loss triangle most in the industry have heard of — tend to give cyclical answers, said Jessica Leong, FCAS, business execution lead for predictive analytics at Zurich North America. Estimates tend to be too high for several years, then too low for several. In both cases, early estimates are way off; they then stair-step toward the correct number.

To do a better job, Leong said, actuaries should look "outside the triangle." They should bring in external information; the way economists consider a myriad of data to refine their forecasts. Panelists noted that having accurate information on exposures or rate changes improves an estimate, even if the information does not come from a company's own data. More important, said panelist David Clark, FCAS, senior actuary at Munich Reinsurance America, Inc., is that the data act as a good predictor of events that drive estimates higher or lower.

Cost comes into play, said audience member Mary D. Miller, FCAS. Actuaries and management tend to invest in analytics for pricing, not reserving. A refined pricing model can maximize profitable business. A refined reserving model gets to the right answer faster, but it does not change the amount of losses incurred.

Panelists noted that having accurate information on exposures or rate changes improves an estimate, even if the information does not come from a company's own data.

In part, a limited methodology hampers the reserving process, said panelist James Guszcza, FCAS, U.S. chief data scientist at Deloitte. Current methods were devised in the era of pencil-and-paper statistical analysis. In today's era of open-source statistical computing packages and inexpensive computing power, there is no necessity for actuaries to restrict themselves to traditional methods.

Today it is practical to build sophisticated models using summarized triangle data as well as analyze the individual claim-level data underlying loss triangles. When actuaries restrict themselves only to loss triangles, they are summarizing away information, Guszcza said.

Panelists offered three solutions. Leong suggested using a more sophisticated model known as generalized linear modeling (GLM). It has become the preferred method of pricing insurance. These models allow the actuary to adjust results to explicitly include economic or other changes into an estimate.

The method has other advantages. Mathematically, the traditional methods are a special type of GLM, so property and casualty actuaries have a leg up understanding it. And because GLMs have priced policies for years, executive management has heard of it, a fact that helps create buy-in.

Clark recommended that actuaries conduct research to find variables that predict shifts in loss reserves. He focused on latent variables, or elements that do not directly cause losses but that happen to be proportional to them.

Sometimes these can be hard to measure. Clark said social scientists, for example, try to study the results of a happy childhood, but struggle to figure

out what one means by "happy." So they ask a series of questions and shape the answers into a score.

In insurance, credit-based scores are classic latent variables. A high score correlates with a poor driving record. The scores do not directly cause a person to drive worse, but the higher the credit score, on average, the better the driver.

Clark has found that the calendar year loss ratio for commercial auto physical damage business is a good predictor for accident year commercial auto liability results, even though the latter takes much longer to play out. All of the external predictors that Clark suggested can be incorporated within the GLM framework that Leong introduced.

Perhaps the most radical departure came from Guszcza. He recommended cultivating a more sophisticated mathematical approach, using what statisticians call Bayesian data analysis.

Bayesian approaches have become a trend in the statistical world since 1990, he said. They differ from standard approaches because they use probabilities to model all uncertain quantities in an analysis.

For example, a person predicting the next flip of a coin would weigh the information contained in the data (past flips of the coin) against the probability initially assigned as part of the analysis. Guszcza analogized judging the next flip of a coin that has been flipped only a handful of times with forecasting the future development of a cohort of insurance claims. In each case, the limited data available for analysis might not contain all of the information relevant for making the forecast. The Bayesian approach offers a formal approach for combining fresh data with prior knowledge.

Election prognosticators like Nate Silver use this method. They start with an econometric model that predicts an election, then updates the prediction with polling information as that becomes available.

The resulting analysis would look familiar to an actuary, as it resembles credibility weighting.

"I'm not saying throw out the chain-ladder method," Guszcza said. "The chain ladder is great." But to improve the process, actuaries need to keep things "sophisticatedly simple," meaning to start off simple but then be willing to add model structure as the situation demands. For example, Bayesian versions of the models Leong and Clark discussed are possible departures from the chain ladder or Bayesian chain ladder. Guszcza pointed out that the great flexibility of Bayesian data analysis facilitates the approach of sophisticated simplicity. ●

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

ACTUARIES ABROAD

The Motor Insurance Market in China: Going One Step Further

BY XIAOXUAN LI, HAO LI, AND XIAOYING CHANG

Following the strong growth of GDP, China's insurance market faces a notable opportunity. In 2013, the gross written premium of non-life insurance reached CNY 648 billion ($106 billion), of which motor insurance comprised around 72%. As the dominant business of non-life insurance, the performance of motor insurance attracts the close attention of numerous parties including the public, insurance company management and regulators.

Motor Insurance in China

The motor insurance market in China can be divided into statutory motor third-party liability (MTPL) and voluntary motor business. Statutory MTPL was first introduced by the China Insurance Regulatory Commission (CIRC) in July 2006, after promulgation of the Law on Road Traffic Safety, which required each vehicle owner to purchase Statutory MTPL. Statutory MTPL covers all damages to third parties, whether at fault or not, including property damage, bodily injury and medical expenses. It is written on a split-limit basis. The schedule of its coverages is shown in Table 1.

By contrast, the coverages of the voluntary motor insurance policy are much broader. Currently, there are three sets of model policy forms, known as Clauses A, B and C, which were developed by the Insurance Association of China (IAC). All insurance companies are required to develop their products based on one of the clauses and must use the corresponding rate, and can, with the permission of the CIRC, develop additional coverages under certain circumstances. Normally, voluntary motor contains four main coverages: motor own damage [equivalent to Part D of U.S. Personal Auto Policy (PAP)], voluntary third-party liability (equivalent to Part A of U.S. PAP), driver/passenger liability and theft. Several additional coverages like glass breakage, vehicle body scratch, and waiver of deductible, can be purchased together with the main coverages. A voluntary motor insurance policy is an excess over statutory MTPL in third-party claims.

Table 1: Policy Limits of Statutory MTPL Business

Coverage	No-fault (CNY)	At Fault (CNY)
Third-party bodily injury	11,000	110,000
Third-party property damage	100	2,000
Medical expenses	1,000	10,000

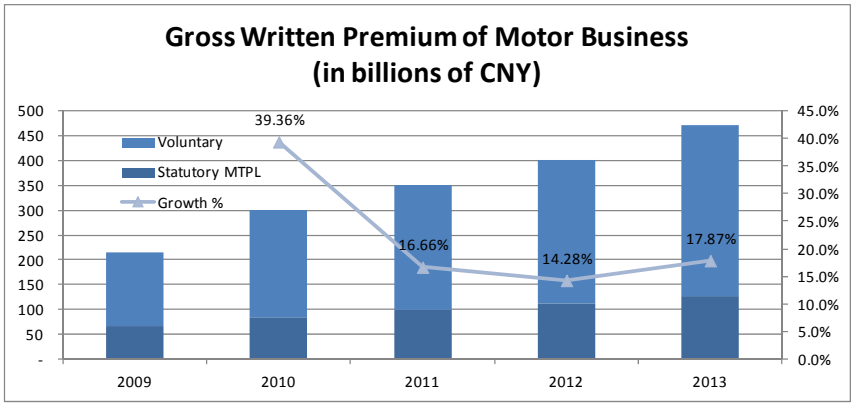
Development of the Motor Insurance Market in China

With stable growth of the economy, the number of new car sales in China exceeded that of the U.S. and reached 20 million in 2013. Meanwhile, the motor insurance market has expanded dramatically with an average growth rate of 20% during the last five years, and total premium income broke through CNY 400 billion in 2012 (Figure 1). Due to a series of economic stimulus measures, the rate of growth peaked in 2010. After that, premium growth declined and has since remained at a relatively stable level. During the past five years, the growth rates of motor insurance have been higher than those of nominal GDP growth.

According to market data, the loss ratio of voluntary motor policies has stayed between 50% and 60% but has shown an upward trend since 2011. Reductions in new car sale prices, as well as increases in spare part prices and repair costs, are major drivers of this trend. On the other hand, statutory MTPL has been losing money since its introduction in 2006. The loss ratios of statutory MTPL during some years have exceeded 80%.

Prior to 2012, only domestic insurance companies could write statutory MTPL business, after receiving approval of the regulator. However, foreign insurance companies are now also qualified to write statutory MTPL policies since the Ordinance of Statutory MTPL was revised by the government in May 2012. Most policyholders in China tend to purchase both statutory MTPL and voluntary motor policies from the same insurance company, which is the main reason why many P&C insurers, especially foreign companies, muscle into the statutory MTPL market.

Figure 1: Gross Written Premium of Motor Insurance



Source: China Insurance Regulatory Commission

Reform of the Motor Insurance Market in China

Before 2002, the premium rates of motor insurance were set uniformly by the regulatory authority. After China joined the World Trade Organization in 2001, China's motor insurance market experienced rate liberalization reform in 2003. This permitted insurance companies to set rates for motor insurance independently, and as a result, the loss experience of motor insurance deteriorated dramatically.

In 2006, the liberalization of rates was halted by the regulator and the aforementioned Model Clauses A, B and C were released by the IAC. Even so, the motor insurance market continued to lose money until profits were finally realized during the period 2009-2012.

The year 2012 marked the beginning of another wave of reform for motor insurance. The CIRC issued a new regulatory document on the policy clauses and ratemaking of voluntary motor insurance, and the IAC released new model clauses for voluntary motor insurance policies.

Currently, the premium rates of statutory MTPL are formulated by the government, and used uniformly across the country. The final premium consists of two parts: base premium and floating factors. For base premium, vehicles are categorized into eight classes based on vehicle type and usage, and then further divided into 42 subclasses based on other vehicle parameters. The floating factors include two adjustments: no claim discount (NCD) and road traffic safety violations. The rating formula is as follows:

Final Premium = Base Premium * NCD Floating Factor * (1 + Safety Violation Floating Factor).

For voluntary motor insurance policies, the rating tables are more complex in terms of both base premium and adjustment factors. The base premium table contains fixed premium and premium rates for different coverages, varying by province, size of vehicle, and age of vehicle. The adjustment factors take into account NCD, new/renewal policy, average mileage per year, road traffic safety violations, driver age, gender, years of driving experience, and the like.

For motor own damage (MOD), the rating formula is:

MOD Premium = MOD Base Premium * Adjustment Factors

= (Fixed Premium + Sum Insured * Premium Rate) * Adjustment Factors.

For MTPL, the rating formula is as follows:

MTPL Premium = MTPL Base Premium under different policy limit * Adjustment Factors.

Note: The insureds can choose different policy limits (CNY 100K, 200K, 300K, etc.) and pay different base premiums. The rating formula in China does not use the increased limit factors (ILFs) explicitly but gives different base premiums under different policy limits.

In the future, the development of motor insurance rates will undoubtedly undergo considerable change. According to the rough plan of the new reform, insurance companies will have greater authority and flexibility in establishing rates for their motor insurance business. The regulator will control only a few important rating factors, and allow insurers to independently select and use many other rating factors in pricing motor insurance business. It is still uncertain whether all the rating factors will be liberalized in the future. This may be the long-term goal of the market reform.

Generally, the reform of the motor insurance market will bring both opportunity and challenge to the marketplace. It is expected that the market players will face a more intensive competitive environment. Insurers' ability to navigate this new environment will be critical to their final operating results. Despite turbulence ahead, one thing is certain: China's motor insurance market will keep on changing to maintain its favorable momentum and progress further. ●

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ON THE SHELF BY LAURIE MCCLELLAN

What We Talk About When We Talk About Danger

The Norm Chronicles: Stories and Numbers About Danger and Death, **Basic Books, 2014, 384 pp, $10.94.**

Which is more dangerous, drinking a cup of coffee or eating a hamburger? According to the new book *The Norm Chronicles: Stories and Numbers About Danger and Death*, the hamburger is definitely the dicier option, and will, on average, shave a half hour off your life expectancy. Drinking two to three cups of coffee in one day, on the other hand, will add an extra 30 minutes to your life, statistically speaking. *The Norm Chronicles* is a guide for the layperson to something that actuaries deal with every day: risk. The authors have compiled a comprehensive guide to the hazards we encounter in our daily lives, including choosing between a trip to McDonalds and a stop at Starbucks. But they also look behind the data to illuminate the psychological aspects of weighing risks, shining a light on all the things, other than probability, that influence people's choices.

Fittingly enough for a book that combines numbers and stories, *The Norm Chronicles* is the work of a mathematician, David Spiegelhalter, and a journalist, Michael Blastland. Spiegelhalter is officially known as the Winton Professor of the Public Understanding of Risk at Cambridge University. Blastland is a British journalist who has spent much of his career writing about numbers, and the co-author of *The Tiger That Isn't*, a guide to understanding statistics. In order to capture both the numbers and the stories in the book, the authors began by compiling a great deal of data on dangers, both well known and obscure. In the chapter on health and safety at work, for example, they note that 14 people were killed in the London beer flood of 1814 when giant vats of porter burst at a brewery, and that a similar disaster in Boston involving an enormous tank of molasses claimed 21 lives in 1919. Spiegelhalter and Blastland then weave that data into the life stories of three characters: the perfectly average Norm, the perpetually cautious Prudence, and the reckless Kelvin and his brothers. They follow this trio through their lives, from growing up to their eventual demise, covering accidents, gambling, extreme sports, surgery, and dangers posed by outer space objects along the way. The approach allows the authors to show how a person who takes probability very seriously, a cautious person and a thrill-seeker might approach the same decision.

Although it's written for a general audience, this survey of life's dangers highlights a problem area for actuaries. The authors contend that communicating with people about risk is complicated by a host of factors that go far beyond the data. According to Michael Blastland, "There are 101 different things that make a difference to the answer to the question, 'how dangerous is that?' These can include errors people make in probability, but also their values, perceptions of risk, and [psychological] baggage." Deciding whether to drive or to fly is a classic example of psychological factors at work. "You may decide to drive rather than fly," says David Spiegelhalter, "because you think that if you get into a car accident, at least it was your own fault." Relying on a pilot robs many people of that reassuring feeling of being in control. In other words, even though flying is much safer than driving, many people just feel safer in a car. (Nervous flyers may wish to avoid the chart in the book's transportation chapter). This gap between data and behavior highlights a major problem in talking about risk. As Blastland points out, "If somebody simply says, 'don't jump off mountains wearing a wing suit, that's dangerous,' there's a ready answer to that: 'But I like it, I enjoy it, it's part of who I am.' That's not stupid, that's just a simple kind of statement about what it means to be a normal, rounded human being."

The authors also believe that stories about risk convey more than numbers alone. "I've realized that just bombarding people with numbers is not a very effective way of communicating," says mathematician Spiegelhalter. "Wrapping things up in narratives and stories is a much more powerful method to get through to people … It's how we understand things as human beings; we turn

everything into stories." The vivid power of a good anecdote carries a dark side as well, he says. "Somebody who can tell a good story, but actually ignores the evidence, is quite a dangerous animal."

In order to bring the evidence of risk to life, Spiegelhalter and Blastland rely on two innovative measurements, the micromort and the microlife. The micromort, which was pioneered by Stanford University professor and decision analyst Ronald A. Howard, represents a one in a million probability of dying. As it turns out, an American's risk of dying suddenly and violently from external causes equals 1.3 micromorts per day. Spiegelhalter describes this daily 1.3 micromorts as "an inevitable baseline of risk, just because the asteroid might come through the roof at any time." But he didn't think the micromort was a good way to measure all of life's risks. "The micromort is a unit of sudden death," he says, while "things which harm you in a chronic way … the smoking, the drinking, the bad diet … are much more difficult to deal with. So we invented a new unit." Speigelhalter came up with the idea of the microlife, a span of life 30 minutes long, which is "based on the idea that as young adults, we typically have about 1 million half-hours left to live, on average."

The two measures allow for apples-to-apples comparisons. For example, in the U.S., the probability of suddenly dying while driving 240 miles equals one micromort, as does the probability of suddenly dying while riding a motorcycle for four miles or traveling 6,300 miles by train. For men and women over 35, eating the recommended five servings of fruits and vegetables adds four microlives to one's lifespan every day, compared to the two microlives gained for the first 20 minutes spent exercising.

After putting all the data and stories together, journalist Blastland has some advice for presenting ideas about risk. For starters, remember the psychological factors that people bring to the discussion. "As soon as you accept that risk is not simply a matter of defining an objective probability, then you have to say, what else is it about?" he says. "And one of the things that it's about is people's sense of value in life, what matters to them, and also their sense of identity." The debate over global warming may be a good example of this phenomenon. Blastland credits Dan Kahan of Yale University, who studies how cultural factors shape people's opinions of risk, for influencing his own approach. For example, Blastland points out that in the case of climate change, people who highly value personal freedom can feel threatened by calls to restrict those freedoms, such as by mandating what kind of cars are allowed on the road. "I would think hard about how to represent this problem in a way that does not threaten people's cultural identity," Blastland says, suggesting that more emphasis on technological solutions, rather than fixes which involve restrictions, might be a better tactic to use when speaking with those who put a premium on individual rights. "Some part of people's attitude toward risk is to do with their cultural identity, so let's be aware of those cultural identities when we argue."

By the time they finished the book, both authors were surprised by what they had learned. "One of the things I was amazed by is how safe things have become," says Spiegelhalter. "When I was young, a thousand kids a year were killed in Britain on roads. And that's gone down by 95%." Blastland concurs, noting that "by age 10 in the U.S., you are the safest age you've ever been, and you ever will be, in the whole history of humanity." But paradoxically, *being* safer doesn't translate into *feeling* safer. "I suspect I was more anxious for my children than my parents were for us," Blastland says. "You can say, I think these parents are just fools, or the numbers don't tell you the whole story. And if they don't, okay, well now it's getting interesting."

David Spiegelhalter says he'd like people to realize "that there are bits of Norm, Prudence and Kelvin in all of us. I would like there to be a bit more Norm." But in the end, Blastland says, "We didn't want to preach to anybody." Instead, the two authors developed a statement they return to time and again: "Let's compile the data as well as we can, and then invite people to do what they damn well please."

"It's no business of ours, really, what kind of choices people make," says Michael Blastland, "but we hope we could at least give them this data as accurately as possible." ●

The authors show how a person who takes probability very seriously, a cautious person and a thrill-seeker might approach the same decision.

Laurie McClellan is a freelance writer living in Arlington, Virginia.

GET AHEAD BY BOB MORAND

Follow Your Fear

Those words hold a lot of meaning to me. They were impressed upon me and the rest of the performers of an advanced improv class during a rehearsal at the ImprovOlympic theater in Chicago in 1991. The speaker of those words, the late Del Close, was one of the original members of Chicago's famed Second City improvisational theater group in the early 1960s. He was someone who could strike fear into the most accomplished of actors and improvisers. For four decades, Del was an actor, teacher and improv guru, and he once directed *Saturday Night Live*. More importantly, he was a philosopher of sorts, who shared his comedy and life knowledge (not to mention a good amount of drugs) with the likes of John Belushi and other soon-to-be-famous comedic actors in the mid-'70s.

"Chris, what the hell are you doing?!" Del barked from the back of the theater during rehearsal one evening, as a pre-SNL Chris Farley was flopping around on stage, ignoring the objective of Del's improv exercise. Farley's physical humor was hilarious, even if he wasn't addressing the point of the scene. But when Del spoke, especially in a raised baritone, the class would go eerily silent.

"Get the hell off the stage!" Del snapped. Farley listened to Del and would skulk off stage to the back of the room, his reddish sheepdog hair covering his eyes. Del's voice was probably one of the few constructive voices Chris listened to. The two had a close relationship; Chris respected Del's expertise, mentorship and candor, while Del marveled at how Chris could fearlessly throw himself (often times, literally) into a scene to make comedy magic, even if Chris tried Del's patience during rehearsals.

Confront and attack the things in life that are most uncomfortable for you.

What Del had little patience for was actors/improvisers who avoided making the most of their talent and craft, and particularly those who froze on stage. "Why the (expletive)," he would ask, "are you in my class if you're afraid to be on stage? Follow your fear, man! Or get the hell out of my class!"

The words — actually the concept — of "follow your fear" stay with me today, even if it's been a few years since I've performed live improv. The premise of "follow your fear" is simple: Confront and attack the things in life that are most uncomfortable for you, and you will learn to master them, or, at the very least, you will learn to live with your fears in relative comfort.

For many performers, specifically actors who have little improv experience, the thought of getting on stage without a memorized script is terrifying. It's just you and another actor in the spotlight, and the only things you have to work with are a suggestion from the audience and each other. Some actors melt and swear off improvisation for life; others thrive and rise to the challenge of creating something potentially rich out of practically nothing.

Many business professionals, including actuaries, are faced with somewhat similar propositions. They're called presentations. The mere thoughts of getting up in front of others and giving a presentation can be mortifying. Panic hits and embeds itself well before the actual presentation. Sweat never knew so many pores; hearts never beat so fast; mouths never ran so dry. So, say you're one of those people who'd rather floss with barbed wire than give a presentation. What do you do? Follow your fear, of course. Easier said than done? Perhaps. But think about it … you're an intelligent human being who is working with, and among, some of the brightest individuals in the world. You regard yourself as a quantitative and technical expert. In fact, you've made the unstated declaration that you are really, really smart, simply by the profession you've chosen and within which you've succeeded.

Therefore, why can't you give yourself the same permission to be a stellar presenter? You can, by following your fear. Below you'll find recommended avenues for pulling together the best presentation you can.

A successful presentation is part preparation and part performance.

The Preparation

First, **know your subject matter thoroughly**. This will give you the confidence to react positively to questions during and after the presentation. There's nothing more excruciating than watching an individual stumble for information while giving a presentation. Preparation will keep you one step ahead of your audience, which is why you're presenting to them in the first place.

Additionally, **know your audience**. To whom are you presenting and what questions might they raise? Be current on industry/market issues that might affect the subject matter you're discussing.

How many people will be attending? **Know the room**. Is it a small conference room in which people will be close to you? Or, will it be a hotel, session-style room that could hold up to 100 people? This will be important as to how you engage your audience throughout the presentation.

Dress appropriately for the occasion. If you have outdated suits or frumpy business casual wear, invest in new clothes. The fact that you're making a presentation means that others have confidence in you to perform at a certain level. This is an opportunity to build on that and, believe it or not, sloppy or outdated clothing diminishes that confidence.

Make sure all technical aspects of the presentation are in order. In addition, have a contingency plan in case the beautiful PowerPoint presentation you've prepared fails, due to unforeseen technical difficulties. One option would be to provide all attendees with a hard copy of the presentation, while you move about the room sharing various sections of the information with various sections of the room. Individuals who can successfully improvise (ahh…it all comes back to improvisation, doesn't it?) in the face of adversity truly impress those who witness such a recovery.

If you are presenting with other individuals, **each person's role should be agreed upon** (and preferably rehearsed) before the presentation. Should one of your fellow panelists stumble during the presentation, be prepared to help him or her out.

Get a good night's sleep. Wake the morning of the presentation with the mindset that your performance that day is an opportunity to enhance your stock as an actuary and, increasingly important, as a business professional in the eyes of key decision makers.

Sweat never knew so many pores; hearts never beat so fast; mouths never ran so dry.

The Presentation

You've done all your preparation and now it's time to present. Get to the room early to **guard against any last-minute glitches**, e.g., another group has booked the conference room or the session has been moved elsewhere. The more in control you are of the event, the more confidence people automatically will have in you, particularly if you have to "save" a situation.

Focus. This is where the fear should disappear. If you focus on what you need to accomplish, i.e., preparation and performance, then you should have little time for the wasted energy of dread and nervousness. You absolutely must have, before this point, given yourself permission to be a good presenter. Approach the presentation as another problem-solving opportunity. Actuaries love solving problems, right? Put the presentation in this context and approach the "problem" with gusto.

Additionally, your focus should be on process, rather than the final product. If two improv actors went on stage hoping to have a successful scene rather than focusing on building a successful scene, more often than not they will fail. The same applies to business presentations: If you worry about being good or being liked by the audience rather than working to give a polished presentation, you've been selfish, to the detriment of yourself and the audience. Remember, the presentation isn't all about you; it's about the relationship you are able to foster with your audience through the interesting delivery of interesting information. Commitment to the process will ensure successful product.

Be yourself. Are you someone who doesn't normally crack jokes? Then don't try to kick off your presentation with "Have you heard the one about the priest, the rabbi and the duck?" Some people are naturally funny and can get away with that sort of thing. However, play to your strong suit.

Your charge should be to **ease the audience into the presentation**, including their acceptance of you as presenter, especially if the subject matter is overwhelmingly technical. You may want to consider a brief fact or anecdote about the facility, the city, or even something that happened to you that morning that, perhaps, you can tie into the presentation. It should be presented naturally and genuinely, but not out of the context of your personality.

If you are presenting to a smaller group of, say, five or ten people in a conference room, **try to learn and remember each person's name and role**, if they are not known to you. Recalling such information in the Q&A period will be impressive to them. If you are presenting to a larger audience, that is, of course, not necessary. However, during the Q&A period, ask attendees for their names and companies when they present a question or comment.

For a smaller group presentation, **make eye contact** with all the individuals in the room. For larger groups, make eye contact with the various sections of the room. Don't turn your back on the audience and hide your face into a screen of information. Don't forget: This is an opportunity for you to shine by integrating yourself, industry information and an audience into a 30- to 90-minute presentation.

Finally, you ask, what can one do to get better at giving presentations? The following are some suggestions that aren't a huge investment of time or money and might be fun in the process.

- **Take an acting or improv class**. They're mostly held in group settings and the instructors and fellow classmates are usually supportive. Also, consider taking an on-camera class. This provides a thorough look at how you come across; the instructor and you will review videotape of your performance, which will provide guidance for improvement.
- **Join a book club**. This will allow you to share ideas in a group setting.
- **Arrange for practice presentations with some of your peers at work**. Assign each other non-work-related topics that might be light or fun for you to present. Be open and supportive with one another when providing feedback.
- **Attend speeches and take notes on what you liked or didn't like about the speaker**. Also, consider getting involved in school or community groups in which opportunities exist for one to express opinions in a group setting.
- **Self reflect**. Don't buy into the excuse that you're simply "not good at presentations." Commit to working on presentations as you would commit to solving other problems that interest you.
- **Follow your fear**. Life is too short to impose artificial limits on your personal potential and career. ●

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EXPLORATIONS BY JAMES GUSZCZA

"B" is for Behavioral — What Big Data Means for Insurance

"For all the damage that misapplied data can do, data used correctly is a powerful positive force." — Cathy O'Neil, On Being a Data Skeptic

Big data is one of the signature issues of our time and also one of the most poorly understood. My previous column discussed what might be called "two dogmas of big data."

First: Data volume, variety and velocity are at best an imperfect proxy for useable information.

Second: Big data does not diminish the need for scientific and statistical methodology.

If anything, the opposite is the case. It is a sign of our data-infused times that this point is often at the heart of major news stories. For example the clever Google Flu Trends algorithm, long a poster child for big data innovation, began overestimating flu outbreaks because suitable methodology was not in place to account for changes in Internet search algorithms and behavior. Another example is the replication crisis in science: The more analytical options you explore and hypotheses you test, the more random chance tends to yield false discoveries. Most notoriously, a prestigious academic journal recently published a study reporting statistically significant evidence for "psi phenomena": a precognitive ability to anticipate the future. Unsurprisingly the findings subsequently failed to replicate. (Readers in the mood for a playful take on the episode can try Googling "Daryl Bem Colbert Report.")

Does this mean that "big data" is meaningless or irrelevant? No. But the naïve thinking about how "more is different" can lead to both poor scientific methodology and muddled strategic planning for data analytics.

I propose that, particularly in personal insurance and health care analytics, "behavioral data" would be a more useful organizing principle than big data (or at least a complementary one). The familiar use of credit data to help underwrite and price personal motor and homeowners insurance policies is a case in point. Credit is more than modestly predictive; it's highly predictive of insurance claim experience. The most likely reason is that credit scores serve as outward proxies for underlying behavioral traits that in turn influence insurance risk behavior. Figuratively speaking, credit functions as a sort of "window into the soul."

Credit is more than modestly predictive; it's highly predictive of insurance claim experience … Figuratively speaking, credit functions as a sort of "window into the soul."

Is credit data big data? Who cares? This semantic question is much less interesting than the observation that credit is behavioral data. While the observation might be obvious today, it was not always so. It took the insurance industry over three decades to adopt this powerful data source that had long ago revolutionized loan underwriting practices.

In hindsight, we can see the story of credit scoring as a bellwether example of a process that has rapidly become pervasive. Once upon a time, people paid cash for items and records of transactions were relatively few, far between and laborious to maintain. With the advent of digital computers and credit cards, bill-paying behavior began to leave behind "digital exhaust" that was later used in innovative ways to make predictions in numerous domains. Leap forward to today, and ever more aspects of our daily lives are digitally mediated. When we text a friend, binge-watch a season of a streaming TV show, make a social or professional network connection, short-change ourselves on REM sleep or take a corner too fast while driving, we increasingly leave behind digital exhaust. These digital traces can be mashed up and used to make powerful inferences about individuals' psychology and predictions

of their future behaviors, health states, financial positions and insurance risk.

A study performed at the University of Cambridge's Psychometrics Centre dramatically illustrates the power of behavioral data. Social networking "likes" of various bits of online content for 58,000 American subjects were matched with indicators of whether they were black or white, married or divorced, substance abusers or not, gay or straight, Democrat or Republican, and Christian or Muslim. Principal components regression applied to the "likes" was able to predict many of these attributes with 80-90% accuracy (as measured by the receiver-operating characteristic curve or AUC). Like, you know.

Alex "Sandy" Pentland, a prominent computational social scientist at the MIT Media Lab, puts the matter nicely:

> I believe that the power of big data is that it is information about people's behavior instead of information about their beliefs. It's about the behavior of customers, employees, and prospects for your new business. It's not about the things you post on Facebook, and it's not about your searches on Google, which is what most people think about, and it's not data from internal company processes and RFIDs [radio-frequency identifications]. This sort of big data comes from things like location data off of your cell phone or credit card: It's the little data breadcrumbs that you leave behind you as you move around in the world. What those breadcrumbs tell is the story of your life … Who you actually are is determined by where you spend time and which things you buy. Big data is increasingly about real behavior, and, by analyzing this sort of data, scientists can tell an enormous amount about you. They can tell whether you are the sort of person who will pay back loans. They can tell you if you're likely to get diabetes … .
> The implications for insurance are obvious, as are the broader societal implications. Pentland himself goes on to comment, "George Orwell was not nearly creative enough when he wrote *1984*."

An innovative mindset can help break the impasse by envisioning new products and services that simultaneously benefit individual drivers, the greater society and the insurer.

Considerations of social responsibility should therefore be viewed as part and parcel of the topic of innovation with behavioral big data. The behavioral content of big data accounts for the unease and controversy surrounding it. But viewing the situation simply as a tug-of-war between societal and industrial interests would be a missed opportunity. Telematics data is an example. Insurers might view telematics data as the ultimate actuarial segmentation machine: We can now track how quickly individual drivers accelerate, how they take corners, even whether they text while driving. On the other hand, individuals might view this as creepily invasive. An innovative mindset can help break the impasse by envisioning new products and services that simultaneously benefit individual drivers, the greater society and the insurer. For example, periodic feedback reports could be digitally delivered to drivers providing specific suggestions for how they can improve their driving behavior and potentially enjoy lower premiums.

Generally speaking, if a risk score benefits a company for underwriting and pricing, it can in principle also benefit the individual as a way to manage his or her own risks. Design principles suggested by behavioral nudge science ("Did you know that your lane-changing behavior is riskier than 80% of similar drivers?") could be A/B tested to help ensure that the digital delivery of information prompts the desired safe driving behavior change. Everything can be opt-in, and such arrangements can simultaneously benefit individuals, companies and the greater society. And perhaps the book of actuarial science will add a chapter on the science of behavior change.

Endnote: for more on the behavioral data theme, see "The personalized and the personal: socially responsible innovation through big data," *Deloitte Review* 14, 2014, and "Two dogmas of big data: understanding the power of analytics for predicting human behavior," *Deloitte Review* 15, 2014. ●

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RANDOM SAMPLER BY WAYNE FISHER

100 Years! A Centennial Celebration! A True One in One Hundred Year Event!

The following is an excerpt of the CAS Presidential Address given at the CAS Centennial Celebration and Annual Meeting on November 10, 2014.

By all measures it's been a highly successful 100 years. One can't help but reflect on the 97 charter members of the then Casualty Actuarial and Statistical Society and ask whether they would be pleased and proud of how the CAS has grown and evolved. I'm confident they would be proud…I certainly know I am! And I'm confident you are as well….all 2,000 of you who have come together to celebrate our Centennial and to be with professional colleagues with whom you've worked and served the CAS with through the years!

I'm exceptionally proud that you gave me the honor of being president this very special year. It is certainly special and I couldn't be more proud of the CAS and our members. We stand for professionalism and share a collective pride in the CAS both as an organization and as individual members.

At such a milestone, it's opportune to look back at what drove our success and think about how we will duplicate or surpass that success in the coming 100 years.

Practically every business or organization has a written set of values — and perhaps the most common denominator in those value statements is "integrity": the character, shared values and mutual aspirations that we possess individually and collectively as a professional organization.

As an organization of professionals, we serve an interest greater than our own individual interest. We keep our eyes looking forward for the benefit of our current members, our future members, and our employer and regulator stakeholders. We have inherited a wonderful legacy and we are obliged to preserve it and pass it along.

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For virtually all of our 100 years, we have had the advantage of filling a growing and increasingly valued niche in the insurance business. Actuaries were certainly sought after and we added unique value to our employers. We have also had the advantage of no real competitors in our arena. That's changed recently, both from within the profession with the SOA and outside the profession with data scientists, statisticians and other similar specialists.

In spite of this competition, our membership growth is strong; 8% this past year and 7% the year before. The pipeline is healthy with a record 3,000 candidates taking our exams this spring. The future pipeline is also strong. I was recently on a panel at the Actuarial Society of New York career fair in which 750 students attended. These current and future candidates are counting on us to open new doors for them to have the same career opportunities we've enjoyed. We're not going to let them down!

An important long-term challenge for the CAS is dealing with increasing competition from other disciplines. We must ensure our continued, unique relevance. In part, this is why the internal, nonproductive competition is so disturbing. We are looking inward — "at our own shoes" — instead of at how we can collaborate to meet the expectations of our future members and build on the legacy of our former members.

Very recently the CEO of one of the largest insurers said in an interview that he's hired a "chief science officer." With a staff of 130 statisticians and similar technical experts, this CEO didn't even mention actuaries! That's a wake-up call. We need to ensure our basic education, continuing education and research are top notch so actuaries remain the real "value adders" — the ones in the firm who have sufficient technical skills to build on the other technical resources and bring that blend of insurance knowledge, business acumen and technical skills together to strengthen the company. That's our true challenge and we need to be flexible and

Wayne Fisher, right, congratulates new CAS Associate Alexandra Decoste. Ms. Decoste is AVP, GC Analytics for Guy Carpenter & Co. LLC in New York City. Photo Credit: Craig Huey.

adapt to this changing environment…

MySpace and York Barbell and countless other enterprises remind us that times change. And today, times are changing more rapidly than ever before. We need to anticipate these changes and welcome the opportunities they will present. We must embrace change and think like entrepreneurs. After all, we are risk professionals. Are we willing to take risk as an organization to innovate and improve or are we content to stick to the tried and true that's worked well for the last 100 years?

To paraphrase Satchel Paige, you won't succeed by looking over your shoulder at the competition and to see how well you've done; you succeed by looking ahead, focusing on your strengths. In our case, it is tempting to look back over our strong history. From our beginnings we have exhibited core values of openness and transparency with our members, have fostered integrity in our relationships with our employers and regulator stakeholders, and have instilled professionalism that creates mutual confidence in each other. We live by our Code of Professional Conduct.

In some respects competition has been very good for us. We've had to raise the level of our game, and we've done that…CAS Student Central has more than 1,100 students from 275 schools. CAS Academic Central is up and running with 200 academics participating. Our University Engagement volunteers write case studies that help teach practical applications of property-casualty subjects. More than 400 University Liaisons meet with students throughout the year to provide guidance only a practitioner can give…our Innovation Council…will stimulate thought and implement initiatives to provide new opportunities for all our members…

We are also developing alliances with other leading actuarial organizations throughout the world to create an information exchange. The CAS and these organizations all possess valuable casualty actuarial research and practitioner materials. Sharing these resources will benefit CAS members as well as the members of these organizations.

Our basic education is the standard employers and regulators expect… Technological innovations and content changes are well under way to provide new opportunities…We will maintain the unparalleled value of our credential.

These collaborative efforts represent the confidence our members have in the CAS, the respect we have earned internationally, the trust and mutual confidence we have in each other, and the shared goal to have the CAS remain independent, focused and strong…

We have a wealth of opportunities to be leaders and demonstrate our strengths identifying, assessing, quantifying and mitigating risk. Risk is inherent in so many emerging concerns: climate change, global instability, digitalization and "big data" and all its ramifications, social media, the Affordable Care Act, automated vehicles, unmanned commercial aircraft, cyber liability, our aging population and other related financial and social issues…We can add value both to our employers and society with our combination of analytical skills and business understanding. I'm confident we are ready for the challenge!…

Our core values of trust, integrity and professionalism…are the bedrock that has served us well for our first 100 years and that will serve us well in the coming years. We have every right to be proud of the CAS and every right to look forward to our collective contributions and continued success for not only the next year, or the next decade, but the next 100 years! ●

Wayne Fisher was elected CAS president in 2013. He is the former group chief risk officer for Zurich Financial.

RANDOM SAMPLER BY DAVID G. HARTMAN

Three CAS Presidents of Note



Charles C. Hewitt, Ruth E. Salzmann and Jerome A. Scheibl.

The following is an excerpt of the address to new members given at the CAS Centennial Celebration and Annual Meeting on November 10, 2014.

Over the past four months, three noted past presidents of the CAS have passed away—Charles C. Hewitt, Ruth E. Salzmann and Jerome A. Scheibl. Each had passions I would like to share with you in hopes that you will also embrace them.

Charlie Hewitt, CAS president from 1972-73, was one of the most intelligent, yet personable, people I ever knew. He could just as easily talk about esoteric mathematics as he could about nearly any other topic. His son Brian said about him "It is a rare person who is gifted with an advanced understanding and interest in mathematics while, at the same time, fluent in the written word and well-read in literature and history. Our father was one of those persons." Charlie's passion for good communication skills is one that is important for all actuaries.

You can be one of the world's greatest technicians, but if you cannot communicate the results of your work to others, what value do you provide? We actuaries are, in reality, salespersons. We are usually in the position of selling our work product to our customers—be they underwriters, clients, company management, regulators, legislators or the like. We are also educators. Educating our various customers is one of the most important things we do. We must effectively communicate what we want our customers to "buy" in order to close the deal.

Charlie was also a proponent of women actuaries and played a key role in getting Ruth Salzmann elected as the first woman CAS president. Ruth was CAS president from 1978-79. She was the first woman president of any North American actuarial association …

Ruth was president at a time when the National Association of Insurance Commissioners (NAIC) was seriously talking about imposing a loss reserve opinion requirement on property-casualty insurers. CPAs said they felt qualified to issue such opinions. Ruth passionately stood up for the actuarial profession pointing out that casualty actuaries were the most qualified professionals to opine on the reasonableness of casualty loss reserves, based on their knowledge and, importantly, a willingness to be held accountable for their opinions. As a result of the arguments Ruth and others made, the NAIC voted to have the statements of loss reserve opinions signed only by actuaries …

Jerry Scheibl, who served as president from 1980-81, described the learned actuarial associations in the U. S. as the "brains" and the American Academy of Actuaries as the "mouth" of the U. S. actuarial profession. He was a passionate advocate of volunteerism and service to the profession. He frequently quoted Francis Bacon saying, "I hold every man a debtor to his profession" urging CAS members to volunteer for service on a committee, write papers and appear on panels … Jerry also worked passionately on developing a common Code of Professional Conduct and getting it adopted by each of the five U.S.-based actuarial associations—down to the last comma! …

I hope you will each develop a passion for communicating effectively, being accountable, being a volunteer serving our profession and acting professionally.

Looking to your future, the sky is the limit on ways you can apply your attributes. In recent years there has been a growth in the number of actuaries working on risk studies and predictive modeling. These are both exciting, but within the sphere of insurance. There are many industries outside of insurance that can benefit from your analytical skills and training, including other financial institutions, serving as chief risk officers in every industry, and users of big data … Embrace technology and go for it!

In closing, I would like to recall for you a statement made by another CAS past president—LeRoy J. Simon. He happens to be the president who signed my FCAS diploma. He said, "It is easier to become an actuary than to be one." Think about that a bit. ●

David G. Hartman, FCAS, was elected CAS president in 1987.

IT'S A PUZZLEMENT BY JON EVANS

GPS in Flatland

Flatland, a two-dimensional Euclidean world, has set up three fixed GPS broadcast stations. The stations, A, B and C, are located on the vertices of an equilateral triangle with edges of length 100 kilometers. When Richard leaves his house in Flatland to visit Roger, his GPS receiver gets a time signal of exactly 7 a.m. from C, but the time from B is 0.00001 seconds earlier, and the time from A is 0.00004 seconds earlier. When Richard arrives at Roger's house, the time he receives from B is 0.00001 seconds later than the time he receives from C, and the time from A is 0.00004 seconds later than the time from C. How far is Richard's house from Roger's house?

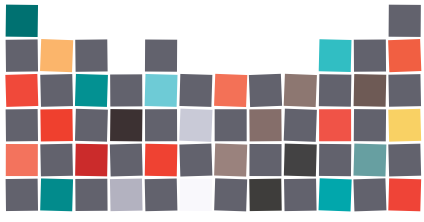
Betting on Squares and Cubes

In this puzzle, 10,000 integers were selected randomly from the set 1 to 10^(10^(10^(10^(10^10)))). For each integer that was divisible by a square (>1) but not by a cube (>1), Bernhard would pay 3.9 thaler, and receive 1 thaler for every other integer. The first question was, "Would Bernhard choose to reverse the payments?" The second question was, "Under his preferred rules, what is the probability that Bernhard would lose money?"

First, note an integer is divisible by a square or by a cube if and only if it is divisible by a prime squared or by a prime cubed, respectively. If p is a prime, then $1/(p^2)$ is the (asymptotic) fraction of integers divisible by p^2. It can be shown that if $p_1, \ldots, p_k$ are distinct primes, the fraction of integers not divisible by the square of any of them is the product $(1 - 1/(p_1^2)) \ldots (1 - 1/(p_k^2))$. This product, taken as a limit over all primes (chosen in ascending order $p_1, p_2, \ldots, p_k, \ldots$), is the fraction of integers not divisible by any square. It converges pretty quickly and is equal to $1/\zeta(2)$, where $\zeta(z)$ is the Riemann zeta function. Similarly, the fraction of integers not divisible by a cube is $(1 - 1/(p_1^3)) \ldots (1 - 1/(p_k^3)) = 1/\zeta(3)$. The fraction of numbers divisible by a square but not a cube is therefore $1/\zeta(3) - 1/\zeta(2)$. Either calculating the products to a high p_k or using numerical estimations of $\zeta(z)$, produces $1/\zeta(3) - 1/\zeta(2) = 0.22398\ldots$

So, under the original rules, Bernhard's expected gain per random integer is $(0.77602) - (3.9)(0.22398) = -0.0975$ thalers. Obviously, he would prefer to reverse the payments. Under reversed payments, according to the binomial distribution, his total expected gain would be 975 thalers with a standard deviation of $((10000)(4.9)^2(0.77602)(0.22398))^{1/2} = 204.3$. Direct calculation from the binomial distribution gives a little better than a 1 in 1.5 million chance of an overall loss. An overall loss would correspond to just over 4.77 standard deviations below the mean. Using a normal approximation, there would be a little less than a 1 in a million chance of an overall loss.

Solutions were submitted by Bob Conger, Jason Israel and Brad Rosin. ●



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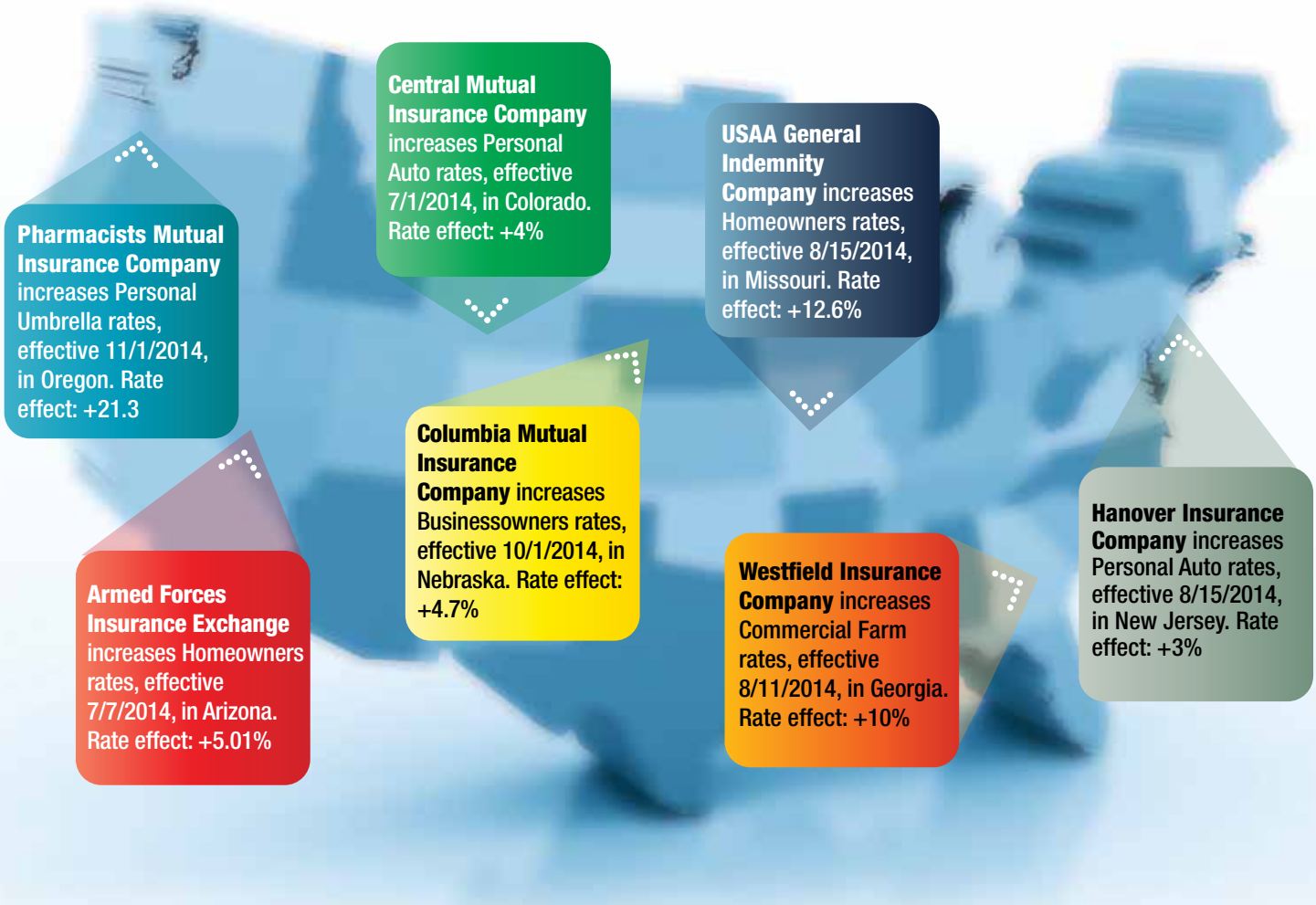

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