

# actuarialREVIEW

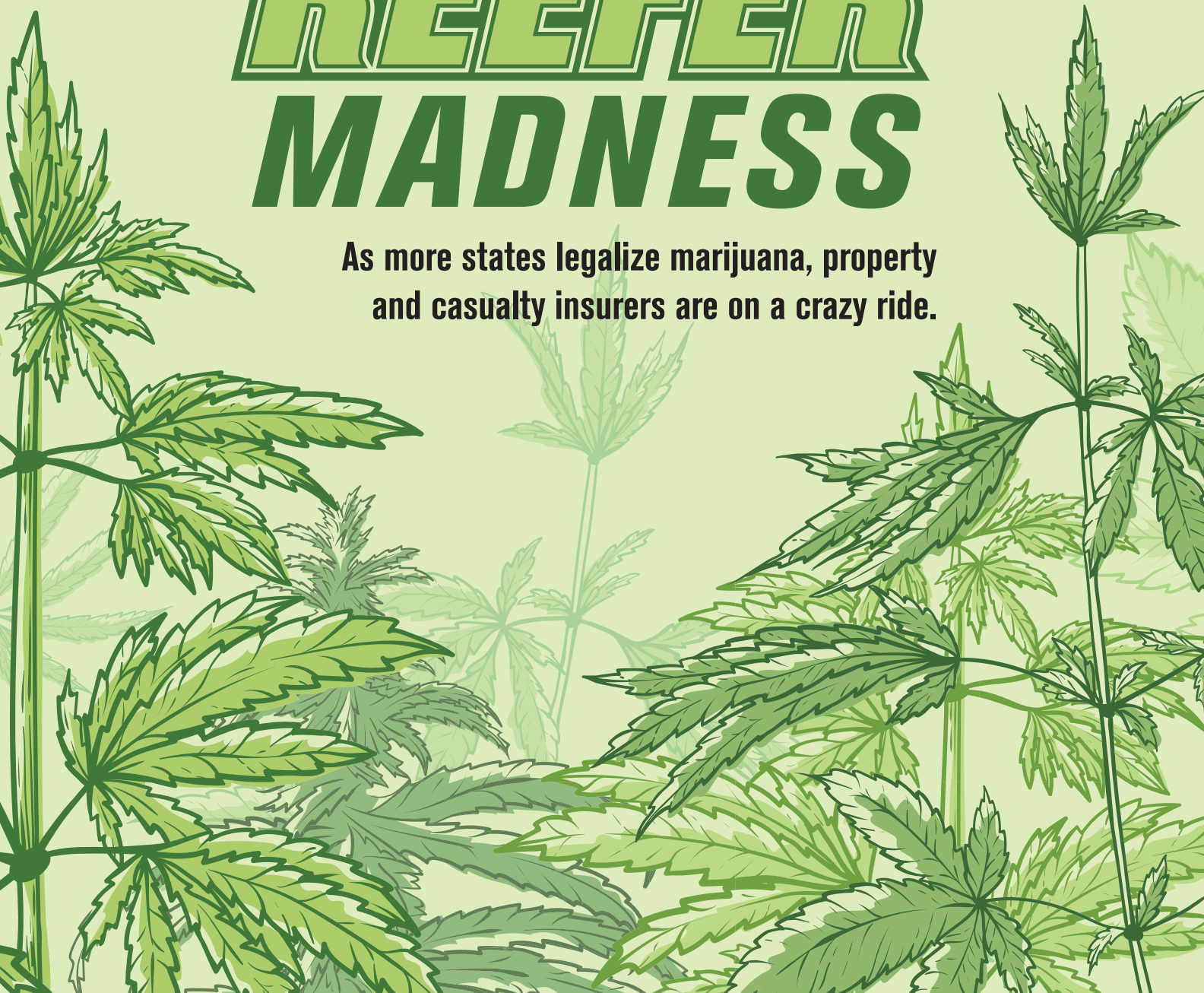
VOL 46 / NO 1 / JANUARY-FEBRUARY 2019

PUBLISHED BY THE CASUALTY ACTUARIAL SOCIETY



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and casualty insurers are on a crazy ride.**



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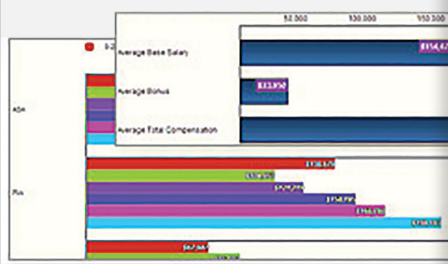
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### INTERACTIVE SALARY TOOLS

#### SALARIES BY

Exams  
Years of Experience  
Credentials  
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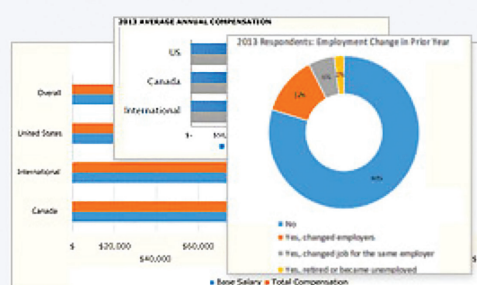
### INTERACTIVE SALARY MAP

#### MAP SALARIES BY LOCATION, SPECIALIZATION, EXPERIENCE



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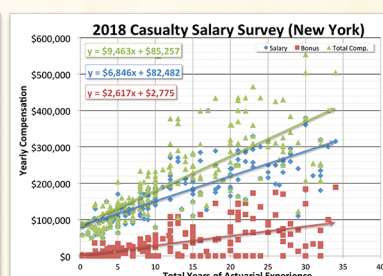
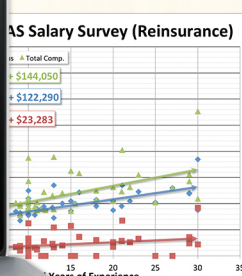
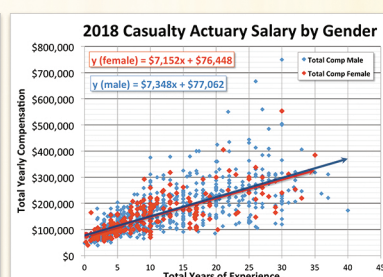
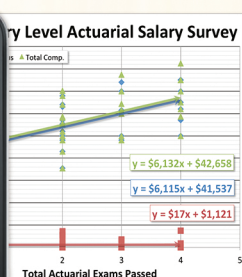
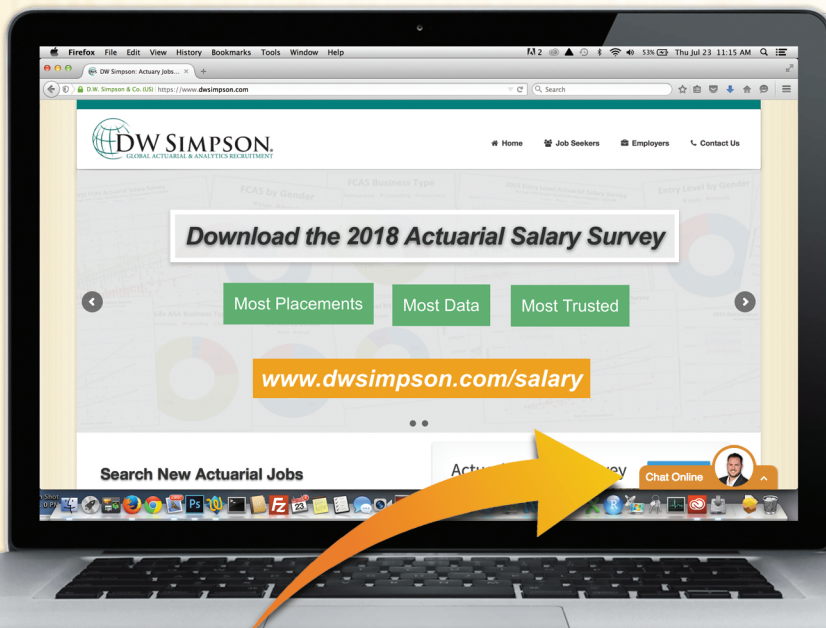
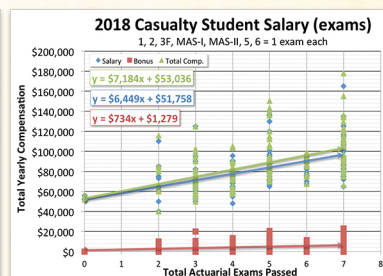
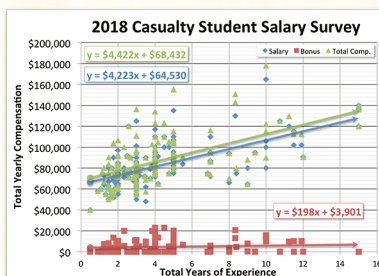
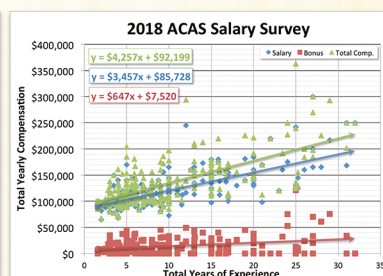
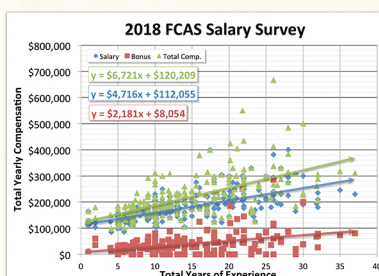


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FSC  
LOGO



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The 2018 Annual Meeting was a great time to learn, enjoy and celebrate all things CAS. See Member News for photos and Professional Insight for session coverage.



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## editor'sNOTE By GROVER EDIE

### Welcome to 2019!

Congratulations to those of you who start the new year as a newly minted CAS Fellows and Associates and Certified Specialists in Predictive Analytics. What a great way to bring in a new year!

Speaking of new members, be sure to read past CAS President Bob Conger's Random Sampler. His excepted "Address to New Members" is sage advice for both new and seasoned CAS members.

On another note, who would've ever thought a marijuana leaf would ever grace the cover of *Actuarial Review*? Now that elections are over, more states have either legalized or expanded the use of marijuana within their borders. Our cover story focuses on the challenges for actuaries and their employers. Emerging risks are not new for us actuaries, but we won't have any elder

statesmen and stateswomen to talk to about the last time something like this happened. (Prohibition came to an end in 1933 — and no, I wasn't around then.)

In *Explorations*, Stephen Mildenhall advocates that actuaries learn programming, not only to enhance their careers but to hone their problem-solving skills. And while many CAS members have been branching out into nontraditional roles, we are still concerned about non-actuaries encroaching on *our* turf. Jim Christie's President's Message addresses this topic. Lucian McMahon, our newest *AR* contributor, also covers this subject and others from the CAS Annual Meeting in *Professional Insight*.

On behalf of *Actuarial Review* staff and volunteers, I wish you all the best for a wonderful new year! Please enjoy this issue! ●



## HAPPY NEW YEAR!

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

SEND YOUR COMMENTS AND SUGGESTIONS TO:

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## An Exciting and Productive Year Is Ahead

Just attended the semiannual meeting of the International Actuarial Association (IAA) in Mexico City. It was amazing to see more than 200 actuaries from all over the globe (36 countries such as South Africa, England, France, Russia, Japan, Indonesia and Germany) working together to advance actuarial knowledge and strengthen our global actuarial profession. I was pleased to see the number of CAS members who were active participants in the IAA meeting. It was also very gratifying to meet representatives from countries like Indonesia and Israel, where the CAS has recently provided casualty actuarial expertise to help their local actuarial bodies.

I was also very excited by the CAS Annual Meeting in Las Vegas. We had record attendance this year — just shy of 1,300 attendees — and celebrated the induction of 245 new Fellows and 234 new Associates. Back when I became an Associate, the total CAS membership numbered 845 — a figure slightly more than the entire CAS classes of May and November 2018! Our growth in numbers and diversity is impressive: This past year our membership grew by 5.1 percent, and just watching the new Fellows walk across the stage showed how diverse the CAS is becoming.

Despite all the good news, there are storm clouds on the horizon for the CAS. Actuarial jobs are being affected by the cost-cutting of industry consolidations as well as new insurtech organizations that are employing few or no actuaries. Even insurers, the traditional employers of actuaries, are filling data analytics roles with non-actuaries. At the IAA

meeting, one national actuarial organization after another spoke about data analysts and their concerns about actuaries' roles in this new world of business. It was quite insightful. Although the CAS has taken steps by adding Modern Actuarial Statistics I & II to our syllabus and establishing The CAS Institute, we cannot rest on our laurels.

The CAS leadership had a tumultuous year during my year as president-elect. To name just three challenges, we dealt with the launch and failure of technology-based examinations (TBE), we assured the NAIC that the CAS syllabus addresses all their newly articulated educational expectations for appointed actuaries, and we presented CAS members with a proposal to combine with the Society of Actuaries (SOA). I am pleased that we made progress on all three.

On the TBE front, the CAS Board commissioned an independent task force to investigate what may have led to the TBE failures. That task force reported back with numerous recommendations for us to address before we bring back TBE. It was especially gratifying to see that the CAS was able to mobilize so many volunteers so quickly to be proctors for the Exam 5 retake we offered around the world. I offer my thanks to everyone involved in that effort!

Regarding the NAIC study, we submitted our analysis showing that all but one of the 100 or so NAIC education topics are currently covered by our Associate syllabus plus Exam 7. Again, I thank the large number of volunteers who worked on this analysis! The one remaining topic is covered by the whole syllabus, but we will make the necessary

minor change so that all NAIC topics are covered by the first seven exams.

Finally, although the board ultimately decided not to proceed with the proposed combination with the SOA, the CAS benefited from the work done exploring the proposal.

First, the leadership of both organizations developed respect and confidence in their counterparts. Those relationships at the leadership levels will ensure that we look for additional areas where the organizations can work together. We already work together on the ERM Symposium, diversity efforts, the Joint Risk Management Section, predictive analytics seminars and funded research as well as the initial responses to the NAIC education queries. At the IAA meeting, CAS and SOA leaders met to discuss potential joint efforts in the near future. Two items immediately identified were (1) a day-long banking seminar, to be held the day before the next IAA meeting in Washington, D.C., in conjunction with the South African and Canadian actuarial associations, and (2) a joint seminar combining speakers from health insurance and workers' compensation.

Second, we had tremendous member participation in the survey we conducted after announcing the combination proposal. From those responses we learned what our members value most about the CAS and the issues that most concern them. We will use these insights as the board moves forward with its strategic actions in the coming year.

In closing, I'm honored to be your president and look forward to an exciting and productive year. ●





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## COMINGS AND GOINGS

**Jeffrey Hay, FCAS**, has been appointed to senior director, consulting services with Willis Towers Watson's insurance consulting and technology practice. Hay joins Willis Towers Watson after a 13-year tenure at The Hartford.

**Kathryn Walker, FCAS, CSPA**, has also been appointed to senior director, consulting services with Willis Towers Watson's insurance consulting and technology practice. Walker was previously a consulting actuary for predictive analytics at Pinnacle Actuarial Resources.

**Ken Williams, FCAS**, has joined the Casualty Actuarial Society as its staff actuary. Prior to joining the CAS, Williams served as actuarial manager at COUNTRY Financial Insurance Company, a role he held since 2005.

**Daniel Merk, FCAS**, has been promoted to executive vice president and CEO of Rural Mutual. Merk began his tenure at Rural in 2009. Prior to that, he worked 20 years at Sentry Insurance.

### ACTUARIAL REVIEW LETTERS POLICIES

*Letters to the editor may be sent to [ar@casact.org](mailto:ar@casact.org) or to the CAS Office address. Please 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. Event announcements will not be printed.*

**Michael Belfatti, FCAS**, has been retained at Searchlight Capital Partners as senior advisor. Prior to joining Searchlight, Belfatti served as COO at Greenlight Re.

**Mark D. Lyons, ACAS**, has been promoted to chief financial officer at AIG. Lyons joins AIG from Arch Capital Group, Ltd., where he served as executive vice president, chief financial officer and treasurer since 2012.

**Michael Kerner, FCAS**, has joined Munich Reinsurance America as CEO for Munich Re Specialty Insurance. He brings more than 30 years' experience in the global reinsurance market to Munich. ●

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

Want the latest on CAS member activities? We post real-time news on our social media channels. Follow us on Twitter, Facebook and LinkedIn to stay in the know!

## IN REMEMBRANCE

*In Remembrance is an occasional column featuring short obituaries of CAS members who have recently died. Longer versions of these obituaries are posted on the CAS website at [bit.ly/PCASobits](http://bit.ly/PCASobits).*

### Silicon Valley Native

**Robert A. Weber (ACAS 1987)  
1958-2017**

Rob Weber grew up in the region that would later be dubbed California's Silicon Valley, the epicenter of high tech, innovation and social media. He attended Lynbrook High School in San Jose, where he was part of the track team, and attended nearby Stanford University, graduating in December 1979 with a BS in math sciences.

He began his actuarial career in 1980, working three years with Argonaut Insurance Company in Menlo Park, where he focused on areas of medical malpractice and workers' compensation pricing and reserving. He left his home state and was next hired by Oregon Mutual Insurance Company as the company's first actuary. He worked there for three years with responsibilities for pricing, reserving, accounting, computer development and statistical reporting. In late 1986, Weber met Gustave Krause, FCAS, who persuaded the young man to go east and join Tillinghast, Nelson & Warren in Atlanta, Georgia, in January 1987.

California beckoned Weber back in 1988, and he began working for Coopers & Lybrand in Irvine. In 1991 he left the company and opened his own firm in Irvine, Weber Consulting. The organization operated for about 28 years. ●

## IN MEMORIAM

Alan R. Seeley (FCAS 1991)  
1952-2018

Edward C. "Ted" Stone (FCAS 1990)  
1960-2018

## D.W. Simpson Marks 21st Year Donating to the CAS Trust

The Trustees for the CAS Trust are pleased to announce that D.W. Simpson Global Actuarial Recruitment donated \$10,000 to the Trust in 2018, bringing the company's total contribution to \$220,000 over the past 21 years.

Established in 1979, the CAS Trust is a non-profit organization that funds actuarial research and education. One of its most notable programs is the CAS

Trust Scholarship, which aims to build students' interests in the property-casualty actuarial profession and to encourage the pursuit of CAS designations.

The CAS sincerely thanks D.W. Simpson and its employees for its continued support of the CAS mission to advance actuarial science. Thanks to contributions, the CAS Trust is able offer \$20,000 in scholarships each year. ●

## NOTICE

### 2018 Annual Report of the CAS Discipline Committee to the Board of Directors

#### Background

The CAS Rules of Procedure for Disciplinary Actions (as amended May 3, 2009 by the Board of Directors) requires an annual report by the Discipline Committee to the Board of Directors and to the membership. This report shall include a description of its activities, including commentary on the types of cases pending, resolved and dismissed. The annual report is subject to the Confidentiality requirements.

#### 2018 Activity

Two cases involving candidates were received this year and are currently in the process of investigation. Both cases relate to matters other than exam-related activities.

There are no additional cases pending before the committee.

—Pat Teufel, Chairperson of the 2018 Discipline Committee  
November 6, 2018

## CALENDAR OF EVENTS

**March 25, 2019**

Underwriting  
Collaboration Seminar  
The Westin Boston Waterfront  
Boston, MA

**March 25-27, 2019**

Ratemaking, Product and  
Modeling (RPM)  
Seminar & Workshops  
The Westin Boston Waterfront  
Boston, MA

**May 19-22, 2019**

Spring Meeting  
Hyatt Regency New Orleans  
New Orleans, LA

**June 3-4, 2019**

Seminar on Reinsurance  
Fairmont Southampton  
Hamilton, Bermuda

**September 16-18, 2019**

Casualty Loss Reserve Seminar  
(CLRS) & Workshops  
Fairmont Austin  
Austin, TX

**November 10-13, 2019**

Annual Meeting  
Hilton Hawaiian Village Waikiki  
Beach Resort  
Honolulu, HI



## MEET THE VEEP

## Meet CAS Vice President-International Roger Hayne

**O**ur Meet the Veep column introduces our members and candidates to the CAS Vice Presidents who serve on the CAS Executive Council. The EC is the governance arm of the CAS that oversees the operations of the organization, and it consists of the president, president-elect, executive director and six vice presidents in charge of different functional areas.

*In this installment, we are pleased to introduce the CAS Vice President-International Roger Hayne, Ph.D., FCAS, MAAA, who has completed two years of his latest stint on the EC (VPs typically serve three-year terms).*

**What is your day-to-day job?**

After a 40-year career at Milliman as a consultant, I'm now retired, though I still work part-time on select reserving projects. I'm also teaching at University of California Santa Barbara. I teach the risk theory course, covering material from the old SOA Exam C, which is now the new SOA Short-Term Actuarial Mathematics exam. Working with college students keeps me on my toes — they're sharp and it's interesting to see things from their point of view.

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

I have always been active in the CAS and don't think I've ever turned down opportunities to serve. This goes all the way back to my service on the Exam

Committee. Most of my volunteer work has had a research component — as a Ph.D., I'm not afraid of squiggly lines. I volunteered for the Committee on Theory of Risk (COTOR), where I took the lead on several projects, and eventually served as vice chair and then chair. I also chaired the Research Policy and Management Committee, which I called the VP-Research Gofer Committee because of the work we did supporting the VP-Research.

From research, I made the natural move to publications, where I was on the committee that worked on creating *Variance*. I also served on a task force on our meetings and seminars, looking for more efficient ways to offer continuing education to our members.

Through all this, I got a broad and expansive view of the CAS and developed a reputation as a person who gets things done. This led to my first stint on the CAS Executive Council as VP-Research. I was then nominated to serve as president-elect, and I served as CAS president in 2009-10. During my time as president, I had a real interest in the CAS's role as a global organization. I worked to make sure the CAS maintained a cooperative attitude with other organizations, leading to established policy that defines how the CAS approaches international affairs.

It was a long path, but it all brought me to where I am today as the VP-International, which is my third go-around on the EC.



Roger Hayne

**What is your role as the CAS Vice President-International?**

My focus is on serving our members and candidates outside the U.S., and my responsibilities cut across all of the functional areas of the CAS. With admissions, I'm working on putting together an Exam 6-Southeast Asia to cover regulatory topics, similar to our Exam 6-U.S. and Exam 6-Canada. With professional education, I'm working to facilitate CE opportunities around the world. With marketing and communications, I'm working to expand the awareness of the CAS with other actuarial organizations. Basically, my job is to ensure that all of the functions of the CAS perform for all of our members and candidates, wherever they live and work. I also serve as the CAS representative on the board of ASTIN, which is the non-life section of the International Actuarial Association. The VP-International is a bridge that brings ASTIN and the CAS closer together for collaborative efforts.

### **What are your goals as the CAS Vice President-International?**

My goals directly parallel those of the CAS strategic plan, which, broadly speaking, is to further the CAS's mission to be the premier organization for education and research for property-casualty actuaries around the world. I believe the best way to do that is through cooperation and outreach with other actuarial organizations.

For example, I have been working closely with CAS International Ambassador Bob Conger on strengthening relationships in Asia. We've worked with the CAS Regional Affiliate in Asia, ARECA (Asia Region Casualty Actuaries). ARECA puts on a number of conferences in the region each year. Prior to being appointed VP, I attended two such conferences, one in Shanghai and another in Singapore. In conjunction with those conferences, I got a chance to visit universities. The CAS has also worked to offer seminars or sessions in Malaysia, Indonesia and Vietnam among other countries in the region. With so many opportunities, we formed a new CAS committee, the Asia Regional Meeting Coordination Committee, to work with local organizations to fill speaking slots at their various conferences.

CAS outreach extends well beyond Asia — other recent opportunities range from the Caribbean to Israel. Our depth of knowledge and the quality of our education is well-recognized around the world, and my goal is to reinforce that.

### **Could you share an interesting fact about yourself?**

I am a Southern California native. I was born and raised here, and am a beach bum at heart. There is no place I'd rather be, and I've had the chance to visit a lot of different places over my career. In retirement we've down-sized to a small beach community. Now I have time for my interests in photography, focusing on nature. I also enjoy traveling, but you'll always find me back on the beach!

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

Volunteer, volunteer, volunteer! The CAS has a strong volunteer culture and that is one of our strengths. I tell new members to look for your passion — look for ways to leverage your energy about a topic or cause. Volunteering gives you the chance to meet people you wouldn't otherwise. Give to the CAS, and the CAS gives back to you! ●



*Above, a Cape buffalo swims at a game reserve outside Kruger Park in South Africa.  
Middle, the Hungarian Parliament Building on the banks of the Danube in Budapest.  
Bottom, Monument Valley Navajo Tribal Park in northeast Arizona.  
All photos courtesy of Roger Hayne.*

## The CAS Institute Announces New CSPAs

**E**ighty-four individuals have earned The CAS Institute's Certified Specialist in Predictive Analytics credential since April 2018. For more information about The CAS Institute, visit [thecasinstitute.org](http://thecasinstitute.org).

**Syed Danish Ali, CSPA**

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**Christopher Allard, FCAS, CSPA**

Westfield Insurance

**Paul Arendt, CSPA**

CNA Insurance Companies

**Priyam Banerjee, CSPA**

Deloitte Consulting, LLP

**Matthew Berry, FCAS, CSPA**

Allstate Insurance Company

**Kevin Bingham, ACAS, CSPA**

Deloitte Consulting, LLP

**Stewart Bobbitt, CSPA**

Horace Mann Companies

**Margaret Brinkmann, FCAS, CSPA**

Milliman, Inc.

**Jess Broussard, FCAS, CSPA**

Tokio Marine HCC

**Mark Chamberlain, FCAS, CSPA**

United Services Automobile Association

**Etienne Chasse St-Laurent, CSPA**

Aviva Insurance Company of Canada

**Julian Coleman, CSPA**

Allstate Insurance Company

**Keith Curtis, CSPA**

United Services Automobile Association

**Gene Dan, FCAS, CSPA**

Milliman, Inc.

**Steve D'Cruz, CSPA**

Earnix Ltd.

**Zach Dietz, ACAS, CSPA**

Pinnacle Actuarial Resources, Inc.

**Robert Dohner, FCAS, CSPA**

USAA P&C Insurance Company

**Tom Dwyer, CSPA**

Greenlight Reinsurance Ltd.

**Natalya Dymova, CSPA**

The Hartford

**Jonathan Fesenmeyer, FCAS, CSPA**

Allstate Insurance Company

**Jonathan Fox, CSPA**

United Services Automobile Association

**Brian Garfield, FCAS, CSPA**

Amerisure Companies

**Yoram Gilboa, CSPA**

MCIC Vermont LLC

**Meghan Goldfarb, FCAS, CSPA**

State Farm Mutual Automobile Insurance Co.

**Stanislav Gotchev, CSPA**

The Hartford

**Marcela Granados, FCAS, CSPA**

EY

**Beverly Hallfrisch, CSPA**

Hagerty

**Robin Haworth, FCAS, CSPA**

Allstate Insurance Company

**Daniel Heinz, Ph.D., CSPA**

CNA Insurance Companies

**Gregory Helser, FCAS, CSPA**

Grange Mutual Casualty Group

**Snezhana Hufnagel, ACAS, CSPA**

United Services Automobile Association

**Christian Hunt, CSPA, CPCU**

State Farm Insurance Companies

**Tasha Jeirath, ACAS, CSPA**

United Services Automobile Association

**Rongfang Ji, FCAS, CSPA**

Everest Insurance

**Adil Khan, CSPA**

CNA Insurance Companies

**Prince Kohli, ACAS, CSPA**

LexisNexis Risk Solutions

**Caolan Kovach-Orr, Ph.D., CSPA**

Verisk Analytics

**Kohei Kudo, ACAS, CSPA**

AIG

**Paul Kutter, FCAS, CSPA**

Citizens Property Insurance Corporation

**Marcia Lami, CSPA**

The Hartford

**Karen Landrum, FCAS, CSPA**

Merlinos & Associates, Inc.

**Denys Lebedev, ACAS, CSPA**

Deloitte Consulting, LLP

**Hoi Leung, CSPA**

AIG

**Haibin Li, CSPA**

The Hartford

**Jingfei Li, CSPA**

Allstate Insurance Company

**Gavin Lienemann, FCAS, CSPA**

State Farm

**PeiQing Luo, ACAS, CSPA**

**Christopher Macella, CSPA**

Allstate Insurance Company

**Harsha Maddipati, FCAS, CSPA**

Willis Towers Watson

**Roman Makordey, CSPA**

Zurich North America

**Christopher Manhave, FCAS, CSPA**

USAA P&C Insurance Company

**Rebekah Milliken, CSPA**

The Hartford

**Tina Morse, CSPA**

State Compensation Insurance Fund

**Erick Mortenson, CSPA**

Willis Towers Watson

**Sean Moser, CSPA**

OneBeacon Insurance Companies



**Michelle Moyer, FCAS, CSPA**  
United Services Automobile Association

**Mei Najim, CSPA**  
Gallagher Bassett Services

**Michael Nielsen, FCAS, CSPA**  
United Services Automobile Association

**Christopher Norman, FCAS, CSPA, MAAA**  
United Services Automobile Association

**Tom Norwood, CSPA**  
American Modern Insurance Group

**Jufeng James Peng, CSPA**  
The Hartford

**Lili Peng, FCAS, CSPA**  
ICW Group

**Yu Peng, CSPA**  
RSA Canada

**Brent Petzoldt, CSPA**  
JLT Re

**Xiaobo (Andrew) Qin, CSPA**  
AIG

**Peter Quackenbush, FCAS, CSPA**  
ACCC Insurance Company

**Jeffrey Rambole, CSPA**  
State Farm Insurance Companies

**Robert Sanche, CSPA**  
Travelers

**Adam Scarth, FCAS, CSPA**  
Northbridge Financial Corporation

**Joshua Schmidt, CSPA**  
Guidewire Software

**Forrestt Severtson, CSPA**  
State Farm

**Rajiv Shah, CSPA**  
Data Robot

**Darin Showalter, ACAS, CSPA**  
Auto-Owners Insurance Company

**Gregory Sollenberger, FCAS, CSPA**  
Horace Mann Companies

**Jeffrey Stoiber, CSPA**  
State Farm Insurance Companies

**Carlos Valenzuela, CSPA**  
United Services Automobile Association

**Tony Van Berkel, FCAS, CSPA**  
QBE Insurance

**Oscar Velandia, CSPA**  
QBE Insurance

**Zhiwei Wang, ACAS, CSPA**  
Zurich

**Dylan Wienke, CSPA**  
CNA Insurance Companies

**Chunpong Woo, FCAS, CSPA**  
Willis Towers Watson

**Michael Woods, FCAS, CSPA**  
Allstate Insurance Company

**Takeshi Yamaguchi, Ph.D., CSPA**  
AIG

**Kunshin Yin, FCAS, CSPA**  
Esurance ●

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(requires CAS login)

## Shawna Ackerman Becomes President of American Academy of Actuaries



*Incoming Academy President Shawna Ackerman receives the gavel from outgoing President Steven Alpert. Ackerman is the 54th Academy president.*

CAS Fellow Shawna Ackerman began her term as the 2018-2019 president of the American Academy of Actuaries at the organization's 2018 Annual Meeting and Public Policy Forum in November 2018. As Academy President, Ackerman leads a professional association of more than 19,500 members whose mission is to serve the public and the U.S. actuarial profession.

Ackerman has been an active CAS member and volunteer for over 20 years.

Her CAS service includes CAS Examination and Ratemaking Committees, *Variance* Editorial Board and the CAS Board of Directors (2011-2014).

Ackerman's numerous Academy volunteer positions include roles as vice president-casualty and chairperson of several committees. She is currently the chief actuary at the California Earthquake Authority and has held positions at Pinnacle Actuarial Resources and the California Department of Insurance. ●

# DIVERSITY

At the Casualty Actuarial Society, we know that a diversity of perspectives and life experiences will help build an actuarial profession that grows and evolves to meet the needs of tomorrow.

Learn more about our commitment to this multidimensional picture at [casact.org/diversity](https://casact.org/diversity).



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## The 2018 CAS Volunteer Awardees: In Their Own Words

**M**ore than a third of CAS members volunteer every year, and that group makes things happen. Some go “above and beyond” for a focused and finite project over the course of a year. Some are new to volunteering and to the CAS but have shown themselves to be outstanding leaders. Others are long-time volunteers who have devoted themselves all through their careers to elevating and advancing the actuarial profession. The following are 12 such exceptional CAS volunteers, in their own words.

### The New Members Awards

*Recognize volunteer contributions during the first five years of an individual's most recent credential.*

#### Patrick Ford (FCAS 2014)

First volunteered in 2014.

*Recognized for work with the Syllabus and Examination Committee.*

“I volunteer for the CAS so I can ‘pay it back’ for all the years I was a consumer of the exam process. Without the volunteer base, there would be no credentialing process and thus my letters wouldn’t have much value. I think getting to see colleagues and peers a couple times a year at the volunteering events is a real treat. I’ve now been volunteering with some of the same core people for several years, so it’s nice to have recurring get-togethers with these people.”



#### Daniel Watt (FCAS 2017)

First volunteered in 2015.

*Recognized for work in the Syllabus and Examination Committee, Candidate Liaison Committee, New Members Committee, and the Casualty Actuaries of New England (CANE).*

“I enjoy the opportunities that volunteering for the CAS provides of networking with great folks, contributing to improvements, participating in mentoring and communicating with candidates to help them along their journeys to ACAS and FCAS. The CAS does a really great job of accepting all volunteer efforts. Some people only have time to do a little, some desire to do a lot, but all volunteers are welcome and appreciated. In particular, the CAS office staff is amazing!”



#### David Wang (FCAS 2015)

First volunteered in 2014.

*Recognized for work with the University Engagement Committee.*

“I really enjoyed creating materials that are consistently used to introduce the actuarial career to prospective students. A younger me back in school would have jumped at the opportunities my team has created, and the thought that the next generation has benefited is really rewarding. The one thing that stands out to me is the col-



laboration between volunteers and staff. Our team of University Engagement staff is the glue that holds the large number of volunteers together. They’re the sounding board for ideas as well as the experts in managing the daily operations of the committee work.”

### The Above and Beyond Achievement Awards

*Recognizes short-term volunteer contributions during the previous year.*

#### Mallika Bender (FCAS 2011)

First volunteered in 2011.

*Recognized for work with the Diversity Committee.*

“I volunteer because I think if we want to be proud of an organization, we have to help build it and constantly make it better. I want the actuarial profession to be a shining star when it comes to diversity and inclusion, and I think our volunteers are passionate and motivated to make that happen.”

“My professional network has grown exponentially since I started volunteering with the CAS. I’ve met so many amazing people who are part of my committee, and I have engaged with the CAS staff (a powerful force in themselves), CAS leadership, and chairs and volunteers in other committees, all through simply caring about my one small corner of the CAS world. I think that is a really special thing that will provide returns for many years.”



**Todd Lehmann (FCAS 2002)**

First volunteered in 2003.

*Recognized for work with The CAS Institute (iCAS).*



"There are many reasons for me to be a volunteer. I believe in the CAS mission to help educate and enhance the practice of casualty actuarial science. I want to be part of the continuing development and evolution of our practice. I want to give back to this profession which has meant so much to me and my colleagues.

"It really is rewarding to meet and work with other actuaries who are also passionate about the CAS. In that sense, we have a unique culture and community, and each volunteer is able to connect with that."

**Alejandro Ortega (FCAS 2006)**

First volunteered in 2014.

*Recognized for work in the formation of the Organization of Latino Actuaries (OLA).*



"I volunteer for the CAS because it is my way of giving back. We all received help in our education and career paths. It's important to give back by helping the next generation. I strive to be a mentor to students — mentoring is something that I needed when I was a student. This is what drives me to give my time, knowledge and resources.

"I love seeing the impact it has on our students. Watching them succeed

is amazing. It's very exciting when I get a text message that a student received an interview, internship or job offer. It brings me back to when I started and was so excited to have those achievements. I also really enjoy giving the students confidence — showing them that the skills they have and their characters are valuable in a way that an experienced person can perceive."

**Stephanie Gould Rabin (FCAS 1999)**

First volunteered in 2002.

*Recognized for work with the Annual and Spring Meeting Planning Committee.*



"Without volunteers, the CAS would either cease to exist or have to charge exorbitant amounts of money to support staffing. I enjoy being able to use my own expertise to fill in for potential gaps that help the CAS. I'm currently an actuary working outside the actuarial track in a corporate strategic role with responsibilities across a wide range of functionalities. So, I love that I can share some of my own experiences even in some small ways with volunteering. It gives all of my hard work some more meaning. And let's face it: Actuaries rock!

"When I transitioned away from a pure actuarial role and became credentialed as an industrial-organizational psychologist, I never thought the two would meet! The CAS has been incredibly fashion-forward in hiring a learning specialist to enhance people's experience at our meetings. And while I like to think of myself as an experienced

presenter who has expertise in people's motivation, leadership and learning, I still learned more! And so, the Learning Enhancement Program (LEP) at our meetings is such a great step for the CAS. As a coach of our LEP mentors, I love that I can keep searching for more and better ways to get the message and learning out there. It is an ever-changing process that is incredibly fulfilling. I only wish I could spend more time, but the day job calls me back!"

**Peter Royek (ACAS 1995)**

First volunteered in 2009.

*Recognized for work with the Professional Education Committee.*



"I am very passionate about professionalism and business ethics. Being on the CAS Committee on Professionalism Education allows me to combine that passion with my passion to volunteer. Some of you who have been to a session in which I have presented may have figured out that I like to have a little fun at the same time. That doesn't mean I am not serious about the topic, but 'if it's not fun, why do it?'

"I know that, to various degrees, I am making a difference. That's what really stands out to me. The feeling that I am helping to further (in a 'prolonging' sense) whatever endeavor in which I am involved. For some period of time, I take up the mantle that eventually gets handed off to another, and they in turn hand it forward, as well. Nothing makes me happier than to volunteer."

### Joshua Taub (FCAS 2008)

First volunteered in 2012.

*Recognized for work with the Insurance On-Demand Working Party.*



“Volunteering gives me an opportunity for additional exposure to things I find interesting — anything from learning about how new technologies are impacting insurance to discussing how behavioral economics relates to the ethical decisions actuaries need to make.

“I’ve been able to meet tons of people through the volunteer work and speaking that I’ve done. That certainly includes many other CAS members, but it also includes insurance experts and actuaries from around the world. Recently I was fortunate enough to represent the CAS at an actuarial seminar in Vietnam, which was a great experience. Volunteering has definitely broadened my network.”

### The Matthew Rodermund Memorial Service Award

*Acknowledges CAS members who have made considerable volunteer contributions to the actuarial profession over the course of their careers.*

### Regina Berens (FCAS 1983)

First volunteered in 1988.

*Through the years, she has been the chairperson for the Strategic Planning*



*Committee, the Long Range Planning Committee, Volunteer Resources Committee, Membership Survey Task Force, and additionally was a two-time member of the CAS Board of Directors.*

“My first volunteer work with the CAS started even before I was an Associate. My boss ‘delegated’ his committee work to me and I found that I loved meeting actuaries outside the company, planning seminars in the years before we had a professional staff, and being on-site when they happened. I continued because I enjoyed expanding my network and taking on new projects that would help the CAS. This profession has provided me with a great career, and now a happy retirement.

“I like meeting and working with people I might not have met otherwise. When I brought my then 12-year-old son to a meeting in Bermuda in 1997 and members kept greeting me as we waited to check in, he said, ‘Mom, why does everybody here know you?’

“In 1995 I was working for a company that was about to be spun off as an IPO. The new CEO declared that volunteer actuarial work would not be supported by the company — we had to take vacation time and use our own funds if we wanted to volunteer. At the same time, I was asked to run for the board. After some thought I decided to run anyway. The ballot for the board went out to all Fellows of the CAS just about the time I was downsized and had to look for a new job. It was priceless publicity and perfectly timed. I had four offers and in six weeks I had a new job with employers who supported volunteering. I got elected to the board, too!”

### David Oakden (FCAS 1979)

First volunteered in 1982.

*Through the years, he has been the chairperson for the Education Policy Committee, Future Education Methods Steering Committee, a part chairperson for the Examination Committee and a two-time member of the CAS Board of Directors.*



“When I first qualified as an FCAS, the CAS was basically an all-volunteer organization. I think that we had a single person on staff. I had benefited from the efforts of prior volunteers and thought that I should do my part. My first experience was very positive and I felt that I also benefited from my volunteer work by being exposed to leading-edge techniques, gaining contacts and making friends. It also helped that my employer was supportive. As a result I continued to look for opportunities and usually said yes when asked to serve on a committee or task force. The actuarial profession is very important to me and I am proud to have played a role in its development. While I am not as active as I once was, I continue to volunteer.

“What I enjoy most is the opportunity to meet and work with the other volunteers. I have met some amazing actuaries through my volunteering and it has been a privilege to work with them. I am also fortunate to count many of them as personal friends.

“As a volunteer you get to play a role in the development of the profession. The CAS today is very different from the CAS when I qualified. It will continue to



evolve and the volunteers will chart the direction. I would also like to think that I played a role in the growth of the CAS in Canada. When I started out there were about five CAS members in Canada. We now have several hundred members — roughly as large as the entire CAS was when I started out.”

### The President's Award

*This new award recognizes one or more members who have, in the opinion of the CAS president, made significant contributions to the profession and to the CAS. This award was created to recognize the work of current officers or past-presidents who are ineligible for the Matthew Rodermund Memorial Service Award.*

### Robert F. Conger (FCAS 1979)

First volunteered in 1980.

*In addition to being a member of the American Academy of Actuaries, Conger is an Honorary Fellow of the*



*Institute and Faculty of Actuaries (U.K.) and a Membre d'Honneur (Member of Honor) of the French actuarial organization, Institut des Actuaire. He is a former CAS president, CAS Board chairperson, and CAS vice president of administration and international, and served as an elected CAS Board member and chairperson of several CAS committees. Currently, he is CAS's International Ambassador.*

“I have lots of reasons for volunteering, but two reasons that stand out are my desires to give back to a profession that has been very good to me and

to support the growth of the actuarial profession in places where it is not yet well-established. I want to see bright opportunities for future actuaries around the globe, and I think it is important that we continue to build a strong actuarial profession that works for the well-being of society.

“I really enjoy meeting actuaries, candidates and students and chatting about the work that they are doing, the challenges they are encountering, and their dreams for the future.

“On a daily basis, I am continually inspired by the fantastic, positive energy of a team of volunteers working on a project that we share a passion for.

“One of my most memorable volunteer experiences was helping facilitate an actuarial seminar in a region that recently had been torn apart by civil war, and finding that the actuaries from the opposing factions remained committed to working together to build a strong actuarial profession in the region.” ●

## McNulty Wins *Variance* Prize

Gregory F. McNulty, FCAS, has been awarded the *Variance* Prize for his paper, “Severity Curve Fitting for Long-Tailed Lines: An Application of Stochastic Processes and Bayesian Models.” The prize-winning paper is published in *Variance* 11:1-2. CAS President Brian Brown presented the prize money to McNulty in Las Vegas during the CAS Annual Business Session on November 12, 2018.



McNulty’s paper presents evidence for a model in which parameters fit to the severity distribution at each report age and follow a smooth curve with random error. The stochastic process outlined in the paper allows users to estimate parameters of the ultimate severity distribution. McNulty also details a Bayesian hierarchical model that takes a modestly sized dataset of triangulated individual claim data and returns posterior distributions for the parameters of the ultimate severity distribution, trend and loss to an excess layer.

In 2013 McNulty won the Ratemaking Prize for best paper with his paper, “Extending the Asset Share Model: Recognizing the Value of Options in Insurance Rates.” He earned a bachelor’s and master’s degree in mathematics from UCLA and the University of Michigan, respectively. Currently a vice president, he joined SCOR Reinsurance in 2010 as a treaty pricing actuary where he developed new methodologies for modeling ALAE using copulas, large loss development using stochastic processes and severity curve fitting using Bayesian hierarchical models. His current work focuses on casualty catastrophe modeling and aggregation.

The *Variance* Prize honors original thinking and research in property-casualty actuarial science and is awarded to the author or authors of the best paper published in each volume year. To be eligible, a paper must show original research and the solution of advanced insurance problems. ●

# Scenes from the 2018 ANNUAL MEETING





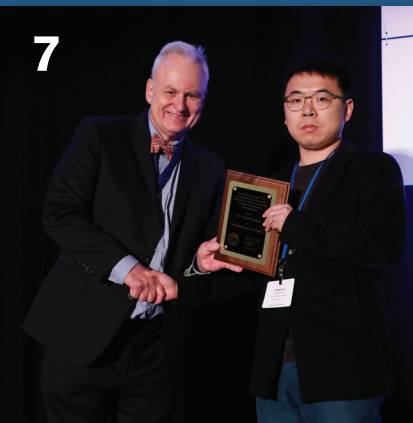
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7



1. **Monograph authors awarded honoraria.** Anand Khare, FCAS, MAAA, CPCU, (left) is congratulated by CAS President Brian Brown during the CAS Annual Business Session for honoraria he and his co-authors Mark Goldburd, FCAS, MAAA, and Dan Tevet, FCAS, MAAA, received for their CAS monograph, "Generalized Linear Models for Insurance Rating." The CAS Monograph Editorial Board established the honorarium in response to a call for monographs on predictive modeling in P&C ratemaking and pricing. Jim Kunce, FCAS, and Som Chatterjee, FCAS, were also awarded honoraria for their CAS monograph, "A Machine-Learning Approach to Parameter Estimation."
2. **Mixing and mingling.** Newly minted CAS Associates celebrate at a special reception honoring them and their families.
3. **A big check for big dreams.** CAS Trust Scholarship winner Ann Pogrebitskiy (left) receives a big check in the amount of \$10,000 from CAS President Brian Brown. Pogrebitskiy attends the University of Nebraska-Lincoln. Kristen Marshall of Illinois State University and Adam Lathan of Drake University were also awarded \$5,000 each from the CAS Trust.
4. **Actuary in training.** Elizabeth Van De Mark practices receiving a Fellowship diploma with CAS President Brian Brown. Elizabeth is the daughter of new FCAS Canaan Jung Van De Mark and his wife, Amber Van De Mark, who holds the youngest Van De Mark, Emma.
5. **STEM/STEAM advocate is Annual Meeting featured speaker.** Dr. Talithia Williams's talk focused on how data and people can transform the future. Dr. Williams is a host of the PBS's NOVA Wonders, a TED speaker and an author.
6. **Applause! Applause!** New Associates give themselves a hand.
7. **Universities honored.** Representatives from three schools were on hand to receive the CAS University Award during the Annual Business Session. Pictured with CAS President Brian Brown, from right to left, are: Guangyuan Gao of Renmin University of China; Alisa Havens Walch of the University of Texas at Austin; and Jelena Milovanovic of Arizona State University.



## NEW FELLOWS ADMITTED IN NOVEMBER 2018



**Row 1, left to right:** Jonathan Almagro, Hanna Komlos, Theresa Kamykowski, Nataliia Stern, Taylor Krebsbach, **CAS President Brian Brown**, Tyler Hendry, Emily Kessler, Xin Fan, Alexandre Laverdure-Archambault, Adam Weeks.

**Row 2, left to right:** Matthew Godkin, Scott Will, Alex Leitheiser, Man Lok Eric Ho, Chi-Fan Wei, Scott Macneil, Nathaniel Wleczyk, Kimberly Lukens, Tracy Yin, Constanza Giordano, Jonathan Bisschop.

**Row 3, left to right:** Robert Furia, Jeremy Jacko, Justin Gensler, Barthelemy Mahieu, Simon Ying, Haonan Li, William Yocius, Khong Chun Leong, Kevin McInturff, Bradley Tumbleston, Michael Mason.



**Row 1, left to right:** Lulu Ji, Alan Johnson, Justin Bell, Shyang Bin Wong, Julie Wood, **CAS President Brian Brown**, Gregory Tucker, Nicholas Hamwey, Sergey Tsitlenko, Wenyi Gong, Xiaoxiao Wang.

**Row 2, left to right:** Eric Yskes, Gene Dan, Shuzi Zhou, Cara Jarman, Hans Kist, Stephen Giusti, Christopher Wetzels, Jeffrey Stoiber, Canaan Van De Mark, Bryan Hartwig.

**Row 3, left to right:** Gregory Dietzen, Troy Klingler, Chengwei Wang, Spencer Hall, Mu Zhao, Matthew Galinsky, William Johnson, Gregory Coffman, Kyle Kamer, Andrew Iden, Solomon Frazier.



**Row 1, left to right:** Sarah Schubert, Youjia Xiong, Sarayyah Baksh, Kelsie Zirolli, Carl Raimond, **CAS President Brian Brown**, Qian Wu, Daria Kachev, Danielle Brennan, Anna Pan, Kirsten Newton.

**Row 2, left to right:** Jason Scott, Kyle Benzing, Stephanie Aube, Brian Ruberti, Javid Ali, Charlotte Schilkowski, Eric Brecht, Ralph Dweck, Michael Suess, Dean Vanden Bush.

**Row 3, left to right:** Timothy Barnett, Justin Teal, Alexander Swanton, Alan Tomo Oldiges, Aaron Halpine, Maximillian Kehrli, Collin Walter, Laurence Verheye, William Litner, Brian Paul, Robert Prusiewicz.



**Row 1, left to right:** Can Wang, Joseph Rocco, Michael Anderson, Lu Cao, Adwaita Bhagwat, **CAS President Brian Brown**, Qihui Zhu, Mingjen Chen, Jonathan Choi, Kelley Christensen, Molly Colleary.

**Row 2, left to right:** Eric Chan, Ziran Gu, Zachary Altman, Elizabeth Casazza, Renee Henderson, Michael Ricker, Paul Rosing, Jeremy Vinson, Ryan Snyder, Ut Fong.

**Row 3, left to right:** Jing Yean Wong, Pamela Biewer, Brian Schwartz, Zachary Keller, Sarah Cast, Amy Carlson, Raymond Tobias, Joshua Gopin, Jason Nikowitz, Benjamin Chanzit, Stephen Nash, Matthew Vallo.



## NEW FELLOWS ADMITTED IN NOVEMBER 2018



**Row 1, left to right:** Erin Campbell Wagner, Kasey Ostarello, Madhu Rao, Dereck Tanaka, Lu Yi Chen, **CAS President Brian Brown**, Wanchen Zhang, Kelvin Tong, Zhanhang Xiao, Yuan Fang, Evan Teitelbaum.

**Row 2, left to right:** Dean Parnell, Alyssa Ferrando, Diana Aulisa, Eric Chao, Selene DeWolfe, Sukaina Visram, Judy Chiu, Samuel Brunell, Ruoshu Chen, Shuang Bi.

**Row 3, left to right:** Eric Kitchens, Xunchi Chen, Sang Cho, Nathan Heng, Samantha Delperdang, Joseph Stratton, Ashley Leonard, Joe Fang, Steven Sulkin, Matthew Shugrue, Tyler Roe.



**Row 1, left to right:** Peng Seng Kuok, Shiyun Zhang, Virginie Peloquin, Elodie Tessier, Andreanne Cantin, **CAS President Brian Brown**, Rafael Rocha Da Costa, Richard Houston, Heidi Miles, Sarah Fiset, Jacob Sasson.

**Row 2, left to right:** Hyunho Kang, Danny Vu, Dave Prud'Homme Tasse, Sabrina Paradis, Joanie Gosselin-Allard, Catherine Tremblay, Jaea Linda Kim, Benjamin Kane, Stefan Ciszewski, Samuel Sauvageau, Nicholas Cerminara, Mitchell Paden.

**Row 3, left to right:** Richard Tyson, John Clabots, Nicolas Vrolyk, Etienne Scarborough, Ludvic Laberge, François Milot, Victor Lauzon, Maxime Carpentier, Kok Weng Low, Spencer Roach, Juan McNamara, Matthew Veibell.





**Row 1, left to right:** Jingting Yi, Yanzhu Chen, Robert Chamoun, Charles Nguyen, Mohammed Moussaïf, CAS President Brian Brown, Ryan Liang, Wenjing Miao, Lingxiao Li, Bao Anh Nguyen, Robert Cao.

**Row 2, left to right:** Alexandre Nault-Daigle, Daniel Siu, Marc Liebman, Mathieu Prud'homme, Brad Rosin, Benoit Plante, Guillaume Champagne, Troy Meadows, Benjamin Woods.

**New Fellows not shown:** Pranav Amin, Justin Bell, Kara Boehm, Jonathan Brophy, Lauren Campbell, Tania Chakrabarti, Yanjun Chen, Kam Shing Cheung, Nicholas Chrzanowski, Chunling Cong, Matthew D'Armi, Dustin Duncan, Ellen Grohoveña, Erica Helinek, Martin Ho, Jonathan Humphrey, Steven Hunke, Phil (Kyungphil) Lee, Chou Chio Leong, Bingfu Li, Ziping Lin, Manyi Luo, Qiyao Luo, Zhen Ming, Arifa Nusrat, Catherine Pallivathuckal, Preneshan Ramaloo, Ellen Raushel, Nicholas Reed, Gaurav Sharma, Monica Shokrai, Joshua Snow, Qifeng Sun, Minrui Tang, Yun Toh, Bruno Veillette-Cossette, Jonathan Woelfel, Ming Yi Wong, Jing Yan, Yang Yu.

## NEW CHARTERED ENTERPRISE RISK ANALYSTS ADMITTED IN NOVEMBER 2018



Anne Ruel, CAS President Brian Brown, Taylor Krebsbach.

## NEW ASSOCIATES ADMITTED IN NOVEMBER 2018



**Row 1, left to right:** Jeffrey Beamer, Krystal Smuda, Vibha Jayasinghe, Sung Hong, Ruilun Gong, **CAS President Brian Brown**, Hannah Anderson, Adam St. John, Kristen Flens, Lindsey Smith, Luke Nygaard.

**Row 2, left to right:** Kaihua Chen, Joshua Nymeyer, Christine Bell, Yeshaya Rosner, Laurie Shih, Lisa Taylor, Colleen Laughlin, Angela Lin, Anna Breigenzer, Laura Saucier, Khoi Luu.

**Row 3, left to right:** Ryan Smith, Manpreet Mann, Kyle Lord, Nicholas Bruns, Tyler Boogaard, Yu Zhang, Casey Lilek, Christopher Schneider, Neil Biegalle, Diana Liu, Heather Lyhne, Rebecca Yellets.



**Row 1, left to right:** Yinglu Fan, Heather Kanzlemer, Xi Sun, Qian Gao, Audrey-Anne LeBlanc, **CAS President Brian Brown**, Kelsey Kent, Liulin Chen, Minjie Li, Khue Bui, Li Zhen.

**Row 2, left to right:** Jennifer Nei, Mathew Marchione, Xinchun Xie, Yu Meng Wang, Xinxing Li, Stephen Jacobs, Nicolas Dubuc, Xiaotong Hou, Xixi Duan, Brett Appleyard, Dean Guo.

**Row 3, left to right:** Ryan Li Mow Ching, Eric Herman, Yue Mu, Zhenglun Lou, Boya Du, Ruoshu Chen, Keith Lam, Thomas Roltgen, Brian McKenna, Tyler Gray, Hanbing He, Xin Fan, Matthew Moser, John Klodnicki.





**Row 1, left to right:** Gregory Breda, Amin Hashimi, Mary Korch, Marni Wasserman, Cindy Chou, **CAS President Brian Brown**, Zhi Qi Li, Chad Holmberg, Benjamin Tucker, Hui Ni, Xue Bai.

**Row 2, left to right:** Steven Reslie, Jay Halbreiner, Christopher Nahas, Scott Johnson, Nehal Sapre, Xu (Howard) Han, Allison Hettinger, Mary Gibbs, Alexandra Wallace, Aaron Sass.

**Row 3, left to right:** Eric Hoey, Alfred Erickson, Sean Moore, Mitchell Peterson, Joel Belliveau, Richard Slim, Lawrence Overway III, Joseph Griffin, Nan Tang, Nicolas Vega-Beltran, Etienne Bessette, Darien Porter.



**Row 1, left to right:** Kaitlyn Freeman, Alexis D. Gingras, Mary Jo Curcio, Cara Heffling, Shaoran Yu, **CAS President Brian Brown**, Eliane Morin, Audrey Boulianne, Catherine Leger, Kendy Ng Cheong Sang Imrith, Eric Dynda.

**Row 2, left to right:** Kahyee Fong, Abdul Qureshi, Xu Chen, Daniel Piao, Shane Randa, Kyle Smith, Jeffrey Prince, Kendra Letang, Stephanie Lerner, Sean Hannah.

**Row 3, left to right:** Andrew Ellerbrock, George Schuler, Christopher Heffling, Cody DePersia, Thomas Basile, Tianchen Zhao, Samuel Cyr-McNeil, Laurent Caron, Trevor Franda, Charles Dupuis, Marc-Andre Cote, Kevin Lynch.



## NEW ASSOCIATES ADMITTED IN NOVEMBER 2018



**Row 1, left to right:** Elizabeth McMillen, Bright Amudzi, Brittany Baudier, Tracey Tarkowski, Michael Musary, **CAS President Brian Brown**, April Yu, Tiffany Huang, Catherine Rosie, Kathy Ma, Lauren Thoreson.

**Row 2, left to right:** Matthew Savolskis, Christina Negley, Kristina Biddle, Christopher Woidill, Julia Stotland, Devin Bryant, Gina Covine, Jeffrey Johnson, Zhe Wang, Robert Antochy, Steven Coleman.

**Row 3, left to right:** Jonathan Jacques, Kevin Jang, Trevor Hanhilaammi, Paul Hendrick, Jordan Paszek, Jeffrey Durham, Jonathan Hoyt, Edem Togbey, John Irving, Sung Hun Chung, Anthony DuVernois.



**Row 1, left to right:** Edward Shin, Kimberly Plesnicar, **CAS President Brian Brown**, Joseph Kablan, Thanh Mai.

**Row 2, left to right:** Briea Moyer, Lawrence Wang, Alan Richter, Bo Peng, Simone Beauford, Yaxue Zeng.



**Row 1, left to right:** *Kelley Murrone, Brett Nortz, CAS President Brian Brown, Di Zhang, Min Zhong.*  
**Row 2, left to right:** *Joseph Huang, Stephanie Uibel, Jordan Donohue, Mark Hebert, Richard Southwell Jr., Calvin Curd.*



**Left to right:** *Neeraj Nachnani, Emily Wu, CAS President Brian Brown, David Angeli.*

## NEW ASSOCIATES ADMITTED IN NOVEMBER 2018



**Left to right:** Griffin Rock, Katherine Cable, Jillian Chung, **CAS President Brian Brown**, Mathieu Rheault, Kevin Whalen.

**New Associates not shown:** Avraham Akerman, Mary Annese, Andre Aubert, Clinton Bartlett, Harlem Chamberland-Carrier, Ka Tsun Chan, Yun Tao Chen, Anthony Colangeli, Christian Costa, Andrew Doidge, Matthias Benedikt Drees, Jeremy Dula, Muhammad Fahad, Jordan Golaszewski, Rui Guan, Raam Hariharan, James Hillen, John Huh, Samantha Jackson, Fanbo Ji, Connie Kang, Jiagang Ke, Natalie Keyes, Conner Knox, Man Hin Kwan, Andrea Lapras, Travis Lawrence, Charlotte Li, Jinyuan Li, Yinru Lu, Meghan McWilliams, Ivana Mikic, Daniel Moore, Kevin Morrison, Audrey Nguetie, Ngoc Nguyen, Noelle Nouneh, Suyash Paliwal, Yue Pan, Dallas Simons, Giles Spurling, Annmarie Tabaka, Ariaiah Tough, Yoyo Tsai, Jianqi Wang, Wenqian Wang, Douglas Wirth, Luke Wolmer, Ellen Woodruff, Ming Yi, Chumeng Zhao.

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# ***REEFER MADNESS***

**As more states legalize marijuana, property  
and casualty insurers are on a crazy ride.**



*Marijuana legalization is a growing risk exposure starving for quantification.*

State legalization of marijuana introduces a plethora of legal and logistical complexities for property-casualty insurers. Not only does it expand accident exposure, but insurers are also getting caught between federal laws, which deem marijuana illegal, and each state's individual laws.

Forty-six states and the District of Columbia allow medical marijuana in various degrees. Nine of these states allow recreational use. And more states are following suit. Marijuana is also more potent than in the past because there is more of its active ingredient, THC (delta-9 tetrahydrocannabinol), which causes cognitive impairment that can lead to vehicular and on-the-job accidents.

"Marijuana legalization raises a lot of questions and uncertainty for insurers. [Insurance is] a business based on predictability," says Robert Passmore, assistant vice president of personal lines policy for the Property Casualty Insurers Association of America (PCI). Legalizing marijuana has been made possible by the growing cannabis industry and the support of the American population. In a Harris Poll released in July 2018, 85 percent of respondents agree that marijuana should be legalized for medical use and 57 percent are fine with recreational use.

There are anecdotes that point to marijuana's dangers. One example is a driver under the influence of marijuana and sedatives who hit a church bus and killed 13 people,<sup>1</sup> which resulted in the National Transportation Safety Board's recommendation that the state of Texas do more to prevent alcohol- and drug-impaired driving. However, there is very little research showing how marijuana legalization is impacting P&C insurers. Only the Insurance Institute for Highway Safety's (IIHS) studies of automobile claims in recreational use states shed some light on this growing trend.

The recent IIHS study concludes that vehicular crashes have risen as much as 6 percent in Colorado, Nevada, Oregon and Washington — states where it is legal to use marijuana recreationally. The study, "Legal pot: Crashes are up in states with retail sales," was published in IIHS's *Status Report* in October 2018. Other research, however, finds no relationship between legalization of marijuana and fatalities.<sup>2</sup>

<sup>1</sup> <https://www.nytimes.com/aponline/2018/10/16/us/ap-us-church-bus-crash-texas.html>

<sup>2</sup> <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.303848>

Meanwhile, major insurance organizations, including ISO and the National Council on Compensation Insurance Inc. (NCCI), lack the data to follow the impact of marijuana.

Since legalizing marijuana is leading to greater use of a drug more potent than ever and a likely increase in accident frequency, the insurance industry needs to find out its true cost. P&C lines realizing the greatest impact are automobile, both personal and commercial, and workers' compensation.

### Going to Pot

During U.S. President Barack Obama's administration, the federal government, through the Cole Memo, began a hands-off approach to enforcing federal law in states where marijuana was legal. Despite the administration's relaxed stance to state-legalized cannabis, the U.S. Department of Justice's Drug Enforcement Administration (DEA) denied a petition to move it from a Schedule I drug (no currently accepted medical use) to a Schedule II drug, (currently accepted medical use, but high potential for abuse, like prescription opioids). The DEA's position was based on a U.S. Department of Health and Human Services' conclusion that marijuana's risks outweigh its potential benefits.

President Donald Trump is also open to adjusting federal marijuana policy in some form. However, during his time as U.S. attorney general, Jeff Sessions rescinded the Cole Memo. Despite decades-long warnings concerning the risk of addiction, health problems and suppressed cognition due to cannabis, legalized marijuana is becoming big business. For 2018, retail sales in the United States are expected to reach \$8 billion to \$10 billion, a nearly 50 percent increase from 2017, *Marijuana Business Daily* reports. Sales are projected to rise to \$22 billion by 2022.

The marijuana industry is effectively changing people's attitudes, says Dave Monteau, a former administrator of self-insured workers' compensation groups in Oregon. In New York, for example, marijuana interests spent about \$3 million on lobbying over five years, successfully convincing Gov. Andrew Cuomo to reverse his opposition to legalizing the drug,

the *Rockland/Westchester Journal News* reports.

From a regulatory perspective, former California Insurance Commissioner Dave Jones started, and was chairing, the National Association of Insurance Commissioners' (NAIC) Cannabis Insurance Working Group in August 2018. The group will consider insurance regulatory issues surrounding the legalized cannabis business "from seed to sale, including availability and scope of coverage, workers' compensation issues, and consumer information and protection," according to a California Department of Insurance news release. A working group has not been established to look into marijuana's growing insurance losses, however.

**Despite decades-long warnings concerning the risk of addiction, health problems and suppressed cognition ... legalized marijuana is becoming big business. For 2018, retail sales in the United States are expected to reach \$8 billion to \$10 billion, a nearly 50 percent increase from 2017.**

### Growing Risk

Marijuana's potency is stronger than it used to be due to higher levels of THC. In 2014, the level of THC in confiscated samples was 12.2 percent, up from about 3.8 percent in the early 1990s.<sup>3</sup> This is due largely to the competition between growers to deliver the best high.

Legalization also encourages greater use. Prevalence is the highest since the federal government began tracking it more than 30 years ago, with intake doubling in most age groups.<sup>4</sup> Specifically, for Americans aged 19 to 28 years, annual use rose by 7.2 percentage points from 2012 to 2017, according to the National Institute on Drug Abuse's *Monitoring the Future* report published in July.

Some workers' compensation sources see medical marijuana as a step towards the larger goal of permitting recreational use. "The genesis of medical marijuana utility was nothing more than a thinly veiled strategy by those favoring its use," says Monteau. Since marijuana use was high in certain

<sup>3</sup> <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>

<sup>4</sup> *Drug and Alcohol Dependence* [https://www.drugandalcoholdependence.com/article/S0376-8716\(18\)30453-8/pdf](https://www.drugandalcoholdependence.com/article/S0376-8716(18)30453-8/pdf)



areas of Oregon, and claim costs associated with the drug were much more expensive than other claims, some employers in high-use areas were prevented from joining the groups under Monteau's management.

After recreational use was legalized in Colorado, Nevada and Oregon, medical use declined, according to a *Marijuana Business Daily* article published in July 2018. In the three years (2013 to 2015) after Colorado moved from legal medical to recreational use, intake rose by 12 percent to 11.8 percent for 12- to 17-year-olds; 16 percent to 31.5 percent for 18- to 25-year-olds; and 71 percent to 13.6 percent for adults aged 26 and older, according to the Governors Highway Safety Association (GHSA)'s report, "Drug-Impaired Driving," released in 2018.

Besides increasing claim frequency, marijuana use can

crashes more than doubled from 8 percent before legalization in 2012 to 17 percent between 2013 and 2014, reports the AAA Foundation for Traffic Safety.

*The Denver Post*, after conducting its own investigation, offers similar findings. The newspaper reports that in 2013, drivers tested positive for marijuana in about 10 percent of all fatal crashes. That increased to 20 percent in 2016. Cannabis use is showing up in the bloodstream in 69 percent of fatalities in 2016, up from 52 percent just two years earlier, it reports. The GHSA report suggests the best overall estimate of the drug's effect on crash risk is an increase of 25 percent to 35 percent.

There is also evidence that just as the incidence of driving under the influence of alcohol is decreasing, driving under the

**There is also evidence that just as the incidence of driving under the influence of alcohol is decreasing, driving under the influence of pot is growing. Polls suggest that people believe driving while stoned is safer than under the influence of alcohol.**

influence of pot is growing. Polls suggest that people believe driving while stoned is safer than under the influence of alcohol.<sup>5</sup> Breathalyzers that can measure levels of marijuana and alcohol are in the testing phase.

Making a direct link from positive marijuana test results to impairment to accidents — whether on the road or on the job — is difficult because the drug

also boost litigation costs, says Peter R. Foley, principal of C.L.A.I.M.S, LLC, a claims policy consulting firm. "It will raise losses but it is difficult to pinpoint data." Since recreational marijuana use is now legal in Canada, it is important to watch the effect of claims there too, he adds.

### Causation Concerns

Marijuana research varies greatly by areas of study, data, methodologies and conclusions, making it difficult to reach public policy consensus. And since marijuana remains classified as a Schedule I drug by the DEA, research does not come easily.

On its website, the National Highway Traffic Safety Administration states that the extent to which marijuana contributes to vehicle crashes is "unclear." However, research comparing fatal crash statistics before and after cannabis legalization shows increases in drug-related fatalities. In Washington state, for example, the percentage of pot-related fatal

can last in the body up to 30 days. To make matters worse, marijuana is often used with other drugs and alcohol.

Driving under the influence of marijuana is illegal in all 50 states and the District of Columbia. However, determining impairment from marijuana is "much more complicated than alcohol," Passmore of PCI says. In some states, the legal limit for marijuana is a whole blood THC level of 5 ng/mL.<sup>6</sup> And while police officers are adept at perceiving alcohol impairment, many need training to detect drug impairment to assure immediate testing, the GHSA report notes.

"While auto insurers are facing increased costs associated with driving under the influence of marijuana, it is difficult for them to do anything to combat the issue until law enforcement solutions are solidified," says Roosevelt Mosley, principal with Pinnacle Actuarial Resources. Currently, insurers have underwriting and rating rules to address the increased risk of a driver with a DUI in his or her history, and the insurer can access this information from traffic citations, accident reports

<sup>5</sup> <https://www.livescience.com/51450-driving-on-marijuana-alcohol-dangerous.html>

<sup>6</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4410963/>

or court conviction records. However, “Until there is a reliable way to determine if a driver is high, insurers will not have access to that same type of information for high drivers,” he explains.

## Workers’ Comp-Sequences

From marijuana’s role in causing accidents to issues associated with returning to work after an accident, legalized marijuana affects workers’ compensation in several areas. Depending on the state, testing positive for marijuana can mean outright claim rejection or indemnity benefit reductions. In Colorado, employers can terminate employment, hampering return to work, explains Amy Newton, associate vice president of claims for Pinnacol Assurance. Pinnacol Assurance is Colorado’s competitive state workers’ compensation fund and covers 50 percent to 60 percent of the state’s workers’ compensation market.

The insurer was the only organization that provided workers’ compensation claims data to *Actuarial Review*. In 2015, Pinnacol Assurance received 13 claims with a positive test or admission of marijuana use or both out of more than 40,000 claims, Newton says.

More Americans in the workforce are testing positive for pot, according to Quest Diagnostics’ Drug Testing Index released in May. This is most dramatic in states that have legalized recreational marijuana since 2016 with Nevada increasing by 43 percent, Massachusetts by 14 percent and California by 11 percent. Use has also grown 8 percent for federally mandated, safety-sensitive workers, such as airline pilots, first responders and nuclear power plant workers.

Meanwhile, the rules for assuring a drug-free workplace have relaxed. Michael Murray, a national loss control leader at Gallagher Global Brokerage USA, suggests that some states consider the “100 percent drug-free, no tolerance policy” to be discriminatory and a violation of the Americans with Disabilities

Act (ADA).

There is enough confidence that drug-free workplace programs reduce accidents that states and some carriers offer premium discounts. However, there is “no or insufficient evidence” to support or refute a statistical association between cannabis use and occupational accidents and injuries, according to the report “The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research.” Released in 2017 by the National Academies of Sciences, Engineering, and Medicine (NASEM), the report’s conclusions are based on a large-scale literature review of 10,000 marijuana-related studies since 1999.

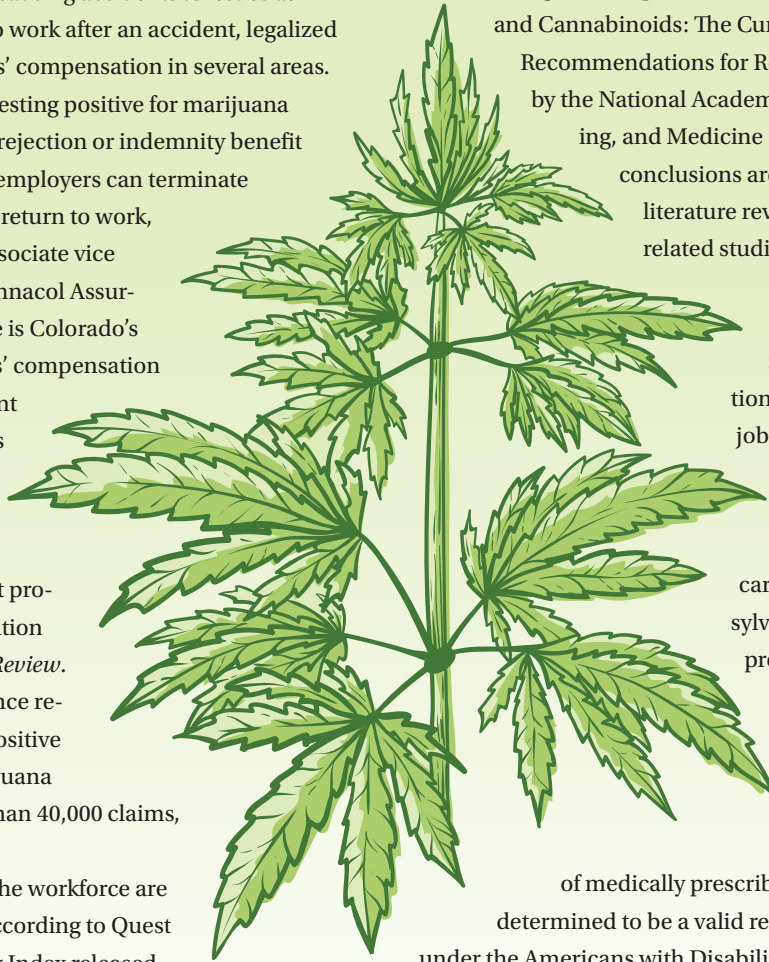
The biggest workers’ compensation challenge from marijuana legalization, Murray says, is on-the-job medical marijuana use.

“Certain states impose a duty to accommodate marijuana use for valid cardholders,” he says. Pennsylvania passed a law in 2018 prohibiting employers from discriminating against employees approved for using marijuana for medical reasons.

“Lawful, off-site use of medically prescribed marijuana has been determined to be a valid reasonable accommodation under the Americans with Disabilities Act and state disability laws,” he explains, with the exception being safety-sensitive positions.

## Cure or Comorbidity?

Marijuana has the potential to address a whole host of ailments. However, for every condition it can improve, there are already drugs approved by the U.S. Food and Drug Administration (FDA), says Mark Pew, senior vice president of product development and marketing for Preferred Medical, a pharmaceutical benefit management company that services workers’ compensation claims.



Marijuana is known to create comorbidities such as abuse, addiction and health problems that can interfere with healing and returning to pre-injury employment. Although addiction is complex, recent data suggest that 30 percent of cannabis users may have some degree of marijuana-use disorder.<sup>7</sup>

The FDA has approved synthetic THC-based medications to help cancer and AIDS patients. Like the plant-based cannabinoids, the synthetic version's side effects include the same "high" and euphoria as natural marijuana. Nabilone can be habit-forming and Marinol can cause new or worsening psychosis. Cannabidiol-based Epidiolex<sup>®</sup> treats children with severe forms of epilepsy. Lacking THC, it became a DEA Schedule V drug in September.

Marijuana is also being touted as a resource to help manage opioid addiction, though more research is needed, according to the NASEM report. The report does state, however, that there is substantial evidence that cannabis can be effective for treating chronic pain conditions.

Medical experts and researchers are trying to understand the specific components of marijuana that are effective for chronic pain and how to best integrate its use with other non-opiate based therapies. "Patient belief is terribly important," says Michael Shor, MPH, managing director at Best Doctors' Occupational Health Institute. The placebo response can typically be evoked in 30 percent of patients, he explains. But on the other side, he observes, "Every message we get from advertising tells us there is a pill that will cure every ill."

Chronic pain is a very frustrating clinical condition. To optimize recovery, patients need interdisciplinary approaches as soon as possible and support from every profession involved with an injured worker's claim. And while Shor has seen some patients benefit from marijuana for pain relief, several risk factors deserve con-

sideration first. Internal research by Best Doctors and others show that biopsychosocial risk factors, such as smoking and substance abuse histories, and physical or emotional abuse as children, can place injured workers at much higher risk for developing chronic pain and opiate dependencies. Pew offers that insurers should be more open to covering other ways to learn coping skills for pain, such as cognitive behavioral therapy, yoga or anti-inflammatory diets.

Rather than encouraging managed and individualized

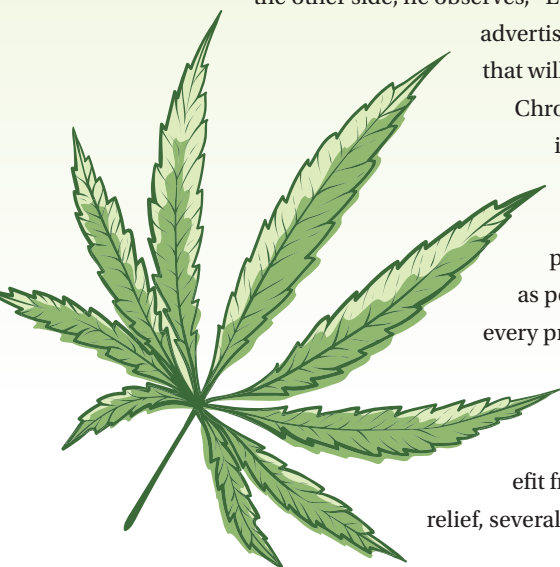
## Although addiction is complex, recent data suggest that 30 percent of cannabis users may have some degree of marijuana-use disorder.

treatment, many state laws allow medical use as the patient desires. Unlike drugs approved by the FDA, which have determined appropriate use, dispensing, marketing, manufacturing and other factors for all 50 states, Pew notes, "Marijuana is the only 'medicine' that is self-procured and self-prescribed."

Though some states require one or two doctors to recommend medical marijuana, he explains, in other states, becoming a registered patient is easier. "Universally it's the patient that determines what strain, dosage, frequency, duration, formulation is appropriate for treatment," says Pew. Guidance may come from a dispensary "budtender," but there is generally no guidance from a clinician or pharmacist.

This can lead to potentially dangerous use of medical cannabis. In a Colorado survey, 70 percent of 400 licensed pot dispensaries said they offer marijuana for curtailing morning sickness in pregnant women, Bob Troyer, the U.S. attorney general for the District of Colorado, writes in a September *Denver Post* op-ed piece. This goes against expert advice. Legalization does not assure drug purity either. The state also issued over 40 recalls of retail marijuana laced with pesticides and mold, he writes.

Pot use also differs. "There are several ways to ingest marijuana beyond smoking — vaping, edibles, oils, tinctures — and each have different modes of action," Pew explains. For example, an edible is generally more potent and takes longer to take effect while being processed through the digestive system compared to smoking or vaping.



<sup>7</sup> <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive> <sup>7</sup> <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>



Because of its euphoric effects, marijuana use can also hamper return to work. Unfortunately, there are no clinical studies showing marijuana's impact on return to work, Pew says. Dave Monteau says return-to-work durations are always longer when marijuana is involved, thus adding to claim costs.

## Covering Cannabis

Auto liability insurance generally covers liability claims regardless of impairment, but first-party coverages such as medical payments or no-fault do not have to pay for the claimant to get medical marijuana to treat the injury from the claim, Passmore says.

Workers' compensation insurers, however, do have to cover medical marijuana in some states. Laws and court decisions requiring insurers to cover cannabis vary. In Colorado and Washington, two states where medical marijuana has been legal for years, workers' compensation carriers do not have to cover marijuana due to its DEA Schedule I status. But as states continue to relax marijuana laws that could change.

In other instances, workers' compensation carriers have different philosophies concerning payment for medical marijuana. Some insurers are looking at marijuana as a "viable alternative" while others "think marijuana is not medicinal" and will not reimburse for it, Pew says. Liberty Mutual, for example, has a process for injured workers seeking treatment with medical marijuana, which includes meeting with claims, legal and medical staff.

Regardless of the state, some insurers are paying injured workers directly and others pay their attorneys, but reimbursements are after-the-fact, he explains. In New Mexico, the nation's only state with a fee schedule for medical marijuana under workers' compensation, the injured worker first covers the drug out of pocket.

Injured workers can use medical marijuana there when treatment is deemed reasonable and necessary. The state follows medical treatment guidelines of the Work Loss Data Institute and the New Mexico Department of Health determines conditions appropriate for treatment. The maximum amount of reimbursement is \$12.02 per unit, which is one gram dry-weight equivalent, for up to 230 units per quarter. Actual payouts were 10.5 percent of the annual allowed maximum

of \$11,058 in 2016 and 2017. Use is limited. Total reimbursement for medical cannabis was \$46,826 in 2016, which rose to \$58,401 in 2017.

As for the cost of medical marijuana in workers' compensation, some insurers are conducting cost-benefit analyses of medical marijuana, sources say. "(But) nobody wants to go on the record," Pew says. This is not only for competitive reasons, but also because insurers are trying to avoid a clash with federal regulations as payers of medical marijuana. Insurers are required to report medical transactions through the NCCI Medical Data Call, says Kathy Antonello, FCAS, the organization's chief actuary. However, "To date, no payments for medical marijuana have been reported to NCCI."

## Conclusion

Marijuana is a drug that deserves respect for its potential to harm and heal. On one hand, it is leading to more accidents and carries an addiction risk. But on the other hand, it also offers relief for some patients.

**Pew offers that insurers should be more open to covering other ways to learn coping skills for pain, such as cognitive behavioral therapy, yoga or anti-inflammatory diets.**

While the cannabis industry is growing, thriving and attracting investors, it is not covering the accidents, injuries and deaths that the drug causes. The degree of insurer losses is not yet known, but those will certainly increase as the use of marijuana will across the U.S.. To complicate matters, P&C carriers are also facing legal and logistical issues from clashing federal and state laws and policies that will take several years to resolve.

Since marijuana remains an illegal drug under federal law, much of the research needed to realize scientifically reliable conclusions remains beyond reach right now. However, the insurance industry is in a unique position to shed light on marijuana's cost of risk and potential clinical benefits. Tracking the impact of marijuana will not be easy. It will cost insurers to code and develop the mechanisms necessary to realize the drug's impact on risk. But in the long run, uncertainty could cost even more. ●

# Actuaries Have Many Roles To Play in a Changing World

BY LUCIAN MCMAHON

**W**hat do actuaries do? The answer used to be simple: rate-making and reserving. But today's times aren't simple. Technology has begun to make disruptive inroads into insurance, especially actuarial science. What does the future hold for actuaries — and how can they adapt to a changing world?

Two sessions at the 2018 CAS Annual Meeting explored how data science and technology are impacting actuarial science — and showed that, while actuaries now have access to new tools and new opportunities, the profession can't become complacent.

cific questions about risk. These questions are unavoidable: Reserving and ratemaking are essential foundations of insurance.

Data science, on the other hand, is not a profession. Rather, as Frank Palmer, senior expert with McKinsey & Company, noted, data science is a broad spectrum of skill sets. These skills can be applied in a wide variety of roles and to address a wide range of questions — not all related to risk.

Calling “data science” a skill set may seem like a vague definition. As Mildenhall jokingly put it, “Data science is a marketing term to boost your salary by

they think “actuary.” But Barnes argued that this is precisely where actuaries can make a profound mark and reposition themselves. “Actuaries are business professionals who understand the [business] problem,” he said. “Data scientists can struggle to get the actual data science to work because they don't understand the business problem. Actuaries make strong data scientists because of that.”

So should everyone just become a data scientist? Mildenhall, Barnes, and Palmer all agreed that this is perhaps the wrong question to ask. The real question is, how can actuaries leverage data science technology and techniques to enhance their own professional capabilities? As Mildenhall pointed out, actuaries have a responsibility to work within CAS standards and regulatory constraints. “When we think about data science and possible synergies with actuarial science, it is important to consider if the work needs to pass regulatory review,” he said.

But if data science tools can help actuaries be better at ratemaking, then these tools should be embraced. Barnes

## Will data scientists come to replace actuaries? Hardly.

### Is everyone just a data scientist now?

As an actuary, you are probably hearing constantly that data science is the wave of the future and it's time to get with the program. Most industries — including insurance — have begun harnessing the power of insightful and useful data to drive innovation. Data scientists are helping carriers innovate throughout the insurance value chain. Will data scientists come to replace actuaries? Hardly.

In the CAS Annual Meeting session “A Tale of Two Analytics Tribes — Actuary vs. Data Scientist,” Stephen J. Mildenhall, FCAS, MAAA, CSPA, assistant professor at St. John's University's School of Risk Management, clarified that actuarial science is a profession. As a profession, it operates within an established framework to answer spe-

20 percent.” But in an insurance context, data scientists apply analytical tools to everything insurers do, from underwriting risks to identifying fraudulent claims. Shane Barnes, FCAS, CSPA, assistant vice president of data science at The Hartford, argued that nowhere is applying data science to insurance more critical than finding solutions to

**“Designations have no meaning to people in tech ... It's up to us as individuals and as an actuarial society to make it clear that we're more than what we study.”**

**— Joshua Pyle, FCAS**

customer-focused problems. Per Barnes, data science is all about making the insurance product more customer-centric.

Few think “customer-centric” when

said, for example, that actuaries can use analytics to determine loss drivers — and can then offer better solutions for their company and customers. “For

actuaries, data science offers a huge opportunity to retool and refocus on the customer,” he said.

Actuaries are professionals with strict professional responsibilities, but, if anything, that means they can — and should — develop some of the skill sets expected of data scientists. “Say goodbye to Excel and embrace Python,” Barnes joked. Mildenhall agreed: Actuaries “have to move away from living in Excel. If that’s the only tool you know, then that’s a disaster.” This is especially true for new, younger actuaries, who will (perhaps inevitably) be expected to use data science tools.

#### **Actuarial science is a versatile skill set, too**

But if actuarial science is an insurance profession, does that limit actuaries to working in insurance?

Absolutely not. Actuaries can do many things, such as working for technology companies, as panelists at the “Silicon Valley: Actuaries in Tech” session unanimously (and resoundingly) agreed. And they would know. They’re all Fellows working for technology companies:

- Frank Chang, FCAS, director of insurance and safety analytics at Uber.
- Gregory Ryslik, FCAS, vice president at Mindstrong, a health care innovation company.
- Joshua Pyle, FCAS, actuarial director at CyberCube, a cyberrisk analytics company.
- Anita Sathe, FCAS, chief strategy officer at CoverHound, an insurance comparison shopping company.

“We’re kind of everywhere,” Chang said about actuaries in the tech world.

Actuaries, he argued, are not unlike consultants: They can wear many hats and can solve many types of problems. “You have to be an insurance expert. You have to be a data scientist to solve technical problems. When you go into tech, people don’t know what an actuary does; you can define it for them,” said Chang.

Pyle went even further, arguing that actuarial science is a profession and a skill set — a skill set that, like data science, “can apply to any number of roles [that] don’t have to be insurance-related”. An open-minded approach to

**“Stop seeing threats as threats ... and start seeing threats as opportunities. Insurance is going to evolve to be more tech-savvy. Actuaries can be at the forefront of that.”**

being an actuary is crucial to succeeding outside of the insurance industry. “Don’t draw strict boundaries around what you can do or what you should be doing,” he said.

Being versatile and open-minded can be hard, especially in the professionalized world of actuarial science, with well-defined designations and competencies. But flexibility is necessary. “Designations have no meaning to people in tech,” Pyle said. “It’s up to us as individuals and as an actuarial society to make it clear that we’re more than what we study.”

Other speakers agreed. “We need to prove the value of actuaries outside pure insurance work,” said Chang. Ryslik stressed the importance of being adaptable: “In tech, you develop a tolerance

for risk and the confidence to take risks. And if something doesn’t work, you need to be able to fail fast and fix the issue.”

Actuaries can also carve out a niche for themselves: “You end up being the [insurance] expert because you’re the only one who knows insurance,” said Ryslik.

Sathe argued that actuaries may need to change their mindsets completely. “Stop seeing threats as threats,” she said, “and start seeing threats as opportunities. Insurance is going to evolve to be more tech-savvy. Actuaries can be at the forefront of that.” Part of that will be learning data science tools, such as

**— Anita Sathe, FCAS**

Python or R. “I think there has to be an effort to push people to learn the tools that will keep us relevant,” said Pyle.

The CAS has already begun offering these opportunities to its members: Its new offshoot The CAS Institute offers a Certified Specialist in Predictive Analytics (CSPA) certification — and for good reason. As both CAS Annual Meeting sessions demonstrated, the future of the actuary will be dynamic and ever-changing — and actuaries will need to be ready to seize the opportunities that await. ●

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*Lucian McMahon, CPCU, ARM-E, AU-M, is a senior research specialist at the Insurance Information Institute in New York City.*



## Blockchain — A Solution in Search of a Problem? BY LUCIAN MCMAHON

It seems like only yesterday that blockchains were magic pixie dust that would solve all problems and cure all ills. Remember when the Long Island Iced Tea Company changed its name to “Long Blockchain Company” and saw its stock jump almost 300 percent?

The days of irrational exuberance are ending for the simple reason that blockchains are not magic. The technology is incredible — but it also faces significant limitations — as CAS members learned during the CAS Annual Meeting session “An Actuary’s Guide to the Mechanics and Magic of Blockchains.”

The session featured Stephen J. Mildenhall, FCAS, MAAA, CSPA, assistant professor at the School of Risk Management of St. John’s University, and David C. Wright, ACAS, managing director at Beach and Associates, Ltd. Mildenhall, a member of the CAS Board, has conducted extensive research into cryptography and blockchains. Wright experimented with creating his own model insurance company using the Ethereum protocol.

### How do blockchains work?

Mildenhall suggested that the reason why so many people believe that blockchains are indistinguishable from magic is because they simply do not understand how blockchains work.

Blockchains are basically ledgers or databases. Like any ledger, they record transactions. But unlike traditional ledgers, blockchains are *distributed* across networked computer systems. Everyone with an internet connection and access to the blockchain can view and transact on the chain. Transactions are validated (thereby creating a “block”) and crypto-

graphically linked (“chained”) to previous transactions on the ledger — hence “blockchains.”

### No central authority needed.

Naturally, a transaction needs to be validated before it can be linked to the chain. This is done by the blockchain’s participants in a consensus-based manner — that is, everyone checks for the validity of a transaction. And because a blockchain operates under an established set of rules, it allows conflicts to be resolved automatically and transparently to all participants. This dispenses with the need for a central authority to enforce trust.

### Trust is created and rewarded.

Many blockchains use a “proof of work” consensus mechanism. Participants (“miners”) compete to solve mathematical problems that, once solved, verify a transaction. Solving these problems is extremely computationally intensive. In bitcoin transactions, to incentivize people to pay the high costs of validating transactions, the miner who solves the puzzle first is rewarded with bitcoin. Everyone is thereby invested in the integrity of the chain. (Global bitcoin mining operations now consume as much electricity as a small country.)

**Blockchains are immutable.** No one has the power to compromise the blockchain’s integrity. Links between blocks are created using a “cryptographic hash function,” a one-way function that makes it essentially impossible to figure out its input based on its output. To brute force a single input alone would be computationally infeasible. To brute force an entire blockchain would require the brute forcing of *every single* subsequent input — beyond the realm of the

possible. What this means is that no one can change a blockchain.

**Digital signatures ensure integrity.** The last important piece of a blockchain is a collection of cryptographically signed transactions. Blockchains will use public/private key encryption to create digital signatures for all participants. These signatures ensure three things: the initiating party of a transaction is authentic; the transaction is tamper-evident; and the transaction cannot be repudiated by the initiating party (since only they could sign off with their unique digital signature).

Blockchains are therefore incredibly powerful tools to store and transact data in a trustworthy, transparent way without recourse to a central authority.

### Blockchains and insurance

The features of blockchain technology have created quite a bit of excitement in the insurance industry in the areas of automated claims adjustment and settlement, fraud prevention and data auditing and custody.

Wright pointed out that there are already several companies working to develop blockchain insurance applications, including travel insurance, property catastrophe reinsurance, marine insurance and regulatory reporting. And Mildenhall noted that blockchains might theoretically be used for onboarding insureds or enforcing contract commitments.

### Blockchains come with significant limitations

But both panelists expressed skepticism that blockchain technology will be a fundamental disruptor of insurance in the

near future. As they explained, the very features that make blockchain technology so powerful can limit its usefulness.

Because verification relies on consensus, blockchains are inherently slow. Validating transactions can be incredibly expensive. Solving those math problems requires enormous computing power. And because blockchains lack controlling authorities, it's exceedingly difficult (if not impossible) to change a blockchain's underlying protocols if needed.

Blockchains are, in effect, slow databases that are impossible to upgrade. "Why would anyone want that?" asked Wright. He put it bluntly: "By any reasonable computational metrics, blockchain is a horrible technology."

Mildenhall compared a blockchain to a military tank: Could you drive your kids to school in a tank? Sure, but it would be extremely expensive, slow and inefficient. A minivan would probably be more appropriate. And indeed, for many applications, a simple SQL database would do the job that a blockchain could do, except much more cheaply, quickly and efficiently.

Furthermore, in many contexts the features of a blockchain might not make sense for an organization. For example, if an organization knows and trusts its established business partners, why would a blockchain be needed? The startup costs of creating a blockchain may wildly exceed any benefits it would provide, if any.

Or consider privacy issues. A key component of blockchain verifiability is the openness of the database (particularly in low-trust contexts). This openness could become a significant problem if individuals have an expectation of privacy or if regulators enforce data privacy restrictions. Immutability

## **Blockchains can ensure that someone's identity remains permanent, resolvable, cryptographically verifiable and decentralized. If everyone had full possession of their identities in this way, identity theft . . . could become a thing of the past.**

could also become an issue, particularly with the spread of "right-to-be forgotten" data regulations (think the EU's General Data Protection Regulation).

### **Do we even need blockchains for insurance?**

Wright suggested that maybe we've been thinking about the nature of blockchains the wrong way. Per Wright, blockchains are not just databases. They are tools for governance. They create trust outside traditional institutions — a particularly important feature for people who live under dysfunctional institutions.

But how useful is an alternative-governance mechanism for those of us who live in high-trust societies? Advanced countries have developed institutions to address trust problems.

As Wright pointed out, insurance is itself a product that solves trust problems. Insureds may not trust other insureds in a risk pool not to defraud the system. That is why we have insurers. They act as intermediaries who wield trust-enforcing mechanisms. Instead of cryptographic hashing, proof of work, and digital signatures, insurance has policy wordings, underwriting and claims management, rate filings, regulators and so on. Wright thinks it's an open question whether blockchains will be fundamentally disruptive tools of the already existing trust mechanisms of insurance, especially given how expensive and cumbersome blockchains now are.

### **The future of blockchains is anyone's guess**

So are we just stuck with a solution in search of a problem? It's unclear right now. Both panelists stressed that blockchain technology is still very much in its infancy. "It's [the] early days," said Wright. "The hype was a couple years ago; it's slowed down now," agreed Mildenhall.

But Mildenhall argued that the real impact of blockchain will be felt in identity management. Blockchains can ensure that someone's identity remains permanent, resolvable, cryptographically verifiable and decentralized. If everyone had full possession of their identities in this way, identity theft and misuse of personally identifiable information could become a thing of the past.

Wright noted that blockchain technology is improving every day, getting faster and more efficient. Other uses of blockchain will emerge as the cost/benefit relationship becomes more reasonable, though how long that might take, he couldn't say.

Indeed, Mildenhall compared blockchain today to the internet in 1996. The true potential of the internet wasn't fully understood then. Many endeavors had to fail and many iterations had to be developed before the internet's power could be properly appreciated and harnessed. That's just how technological development happens. Blockchains probably won't be different. ●

## Modeling Flood Risks: Opportunities and Challenges BY LUCIAN MCMAHON

Until recently, the attitude of much of the U.S. property-casualty insurance industry towards floods has been straightforward: Everything is insurable for the right price — except floods, which are uninsurable.

Floods were considered uninsurable for good reason. There are adverse selection problems in flood insurance: The only people who want flood insurance are the exact people who suffer floods. There are many types of floods: storm surge, river flooding, levee failure, ice jams, dam failures and volcano mud flows, for example. There are cost problems: The premiums needed to compensate for the risks involved would be unaffordable. And, of course, there are risk accumulation problems: Even high premiums probably wouldn't cover the losses after a catastrophic flood event.

The reasons above illustrate the need for the U.S. federal government's National Flood Insurance Program (NFIP), begun in the 1960s. But times are changing fast. The private flood insurance market reportedly grew by over 50 percent in 2017.<sup>1</sup> The private market now accounts for 15 percent of all flood written premium in the U.S. Clearly, many insurers presently believe flood risk can be insured.

Why?

During the CAS Annual Meeting General Session on private flood insurance, Matt Chamberlain, FCAS, principal at Milliman, argued that at least four forces are pushing insurers into the flood market:

- Recent catastrophic events and

legislation are encouraging private flood insurance development.

- Reinsurer market capacity is increasing, which means that reinsurers need a place to deploy capital.
- Consumer demand is growing, especially as populations continue to grow in flood-prone regions such as Florida.
- Flood risk and catastrophe models are improving, allowing for custom flood rating plans.

The last point is particularly important. Insurers can't provide flood insurance if they can't determine how much it should cost. James R. Watje, senior vice president at Wright Flood and panelist during the session, remarked, "Flood isn't uninsurable; it's actually the

hood," he said, and ask questions. For example, model estimates need to be assessed for whether they're valid on both an aggregate and a location-specific basis. On a location-specific level, are there risk discontinuities between jurisdictions, and do those discontinuities make sense?

For a specific risk, if a model spits out an average annual loss (AAL) of, say, zero, is the AAL *actually* zero or does the model simply not have enough events to assess the risk? If three different models give three very different AALs, which AAL makes the most logical sense? Does it make sense for risks close together to have wildly different AALs?

"Look at these things before you use the model. It's important to bring

**The private flood insurance market reportedly grew by over 50 percent in 2017. The private market now accounts for 15 percent of all flood written premium in the U.S.**

**Clearly, many insurers believe flood risk can be insured.**

**Why?**

pricing that's hard." But pricing is getting *less hard*, if not easy, thanks to improved (and ever-improving) modeling technology.

That being said, Chamberlain cautioned that catastrophe modeling is still in its infancy. Because there are substantial differences between the models that are currently available, Chamberlain especially stressed the importance of knowing why models may give an actuarially different estimates.

When looking at a model, "Open

in exogenous information to figure out if the model's results are logical," said Chamberlain.

Chamberlain also noted that actuaries should be aware of reinsurance costs. These costs may depend on what particular model the reinsurer — *not* the insurer — is using. That's important to know, since the reinsurance cost will be calibrated to the reinsurer's model regardless of what the insurer's actuary may think the actual expected losses are.

Most of these issues also boil down

<sup>1</sup> <https://www.insurancejournal.com/blogs/right-street/2018/03/18/483689.htm>





to data quality. And indeed, access to clean, robust data remains a significant challenge. Watje pointed out that the private flood market does not yet have much data from past losses. The NFIP has data, but it can be difficult to obtain.

Chamberlain noted that there are ways for actuaries to compensate for sparse data. One technique is to create a “market basket,” a portfolio of hypothetical risks with a realistic distribution. This can give an actuary the ability to analyze regions with little to no current data.

Another technique is to leverage geographic information systems (GIS) to enrich a model’s data. GIS data include geographic characteristics that correlate with flood risk, such as elevation, distance to bodies of water, size of bodies of water, hydrological features and flood protection infrastructure.

Given these constraints — the limitations of catastrophe models and sparse datasets — how can actuaries begin developing rates for flood risks? Chamberlain identified four possible approaches:

- **NFIP clone:** rates and territories that follow those of NFIP.
- **Refined rating plan:** a complete rating plan that reflects characteristics related to flood risks within a territory.
- **Grid rating plan:** pre-compiled rating, with grids based on latitude and longitude; additional rating factors are employed.
- **Risk-level modeling:** using a catastrophe model to determine AALs for every risk, which are then loaded for expenses.

trope model to determine AALs for every risk, which are then loaded for expenses.

All of these come with unique advantages and disadvantages. For example, risk-level modeling is relatively easy and quick to develop, but often requires relying on one catastrophe model. As noted above, this may be ill-advised given the current state of catastrophe modeling. Or consider a refined rating

analysis using multiple models, including catastrophe models. More variables are also being incorporated into NFIP ratemaking, such as a risk’s relative elevation, construction type and distance to the coast.

What all the panelists made clear is that, despite current constraints, flood is most definitely an insurable risk. The ability to reliably model flood risk is a big reason that this attitude has changed.

## **Flood is most definitely an insurable risk. The ability to reliably model flood risks is a big reason that attitude has changed.**

plan: It could allow for insurer control over pricing strategy and might have fewer discontinuities, but it can cost quite a lot to develop and maintain.

Fortunately, these approaches are not mutually exclusive. Chamberlain argued that they could be blended together or used separately to capitalize on the benefits of each. Either way, each insurer and its actuaries will need to determine which method (if any) aligns best with their goals and strategy.

And it’s not just private flood insurance that’s working to improve ratemaking. The NFIP is also moving to overhaul its rating methodologies to keep pace with these new modeling developments, noted Mitchell Waldner, FCAS, an actuary with the Federal Emergency Management Agency. Part of that overhaul includes better localized flood risk

Modeling will continue to help grow private flood insurance as models and data improve.

The growth in private flood insurance could not come soon enough. In a separate CAS session on climate change, Dr. Peter Sousounis of Verisk’s AIR Worldwide and Paul Eaton, FCAS, associate director with Aon, discussed how climate change is increasing the frequency and severity of extreme weather events, including events that would result in flooding, such as hurricanes. To compound matters, U.S. population shifts have largely been towards regions at greater risk of extreme weather events, especially the Southeast. Both of these facts will soon increase the demand and need among consumers for flood insurance and other risk management solutions. ●

## EXPLORATIONS BY STEPHEN J. MILDENHALL

# Programming Your Career

I love to program and am convinced that programming has been beneficial to my career. Other actuaries proudly proclaim their reluctance or inability to program, and a recent *Wall Street Journal* article even suggested Excel experts should keep their skills secret and “run the other way.”<sup>1</sup> An actuary’s unwillingness to program is always a question of attitude not aptitude: Programming is easier than passing actuarial exams.

“Programming Your Career” makes the case for becoming a programming actuary. It will explain why practical programming skills can enhance your career prospects. Some types of programming have a greater career impact than others, and this article will offer guidelines for which types of projects to undertake and which to avoid. Finally, it will explain why you can be more efficient as an actuary-programmer today than ever before and suggest some ways to get started.

### Deliver a Meal, Not a Recipe

You program to answer business problems. Actuarial models are invariably implemented in a program and so programming allows you to deliver a meal — the answer — not a recipe. The answer is much more satisfying!

I’m not saying you have to be a good programmer to be a good actuary; I am saying that given two actuaries

with similar *actuarial* skills, the one with better programming skills will be more useful, that is, better able to get to an answer in a more efficient and timely manner. And in the long run, the more *useful* actuary will have a more successful career. Companies are not run on the basis of theory of what *should* be analyzed, but on the results of actually applying relevant theory and models. Today, application means programming.

### Programming for Greater Understanding

A *model* is a simplified representation of relationships among real world variables using statistical, financial, economic, mathematical, or scientific concepts and equations. Models are used to help explain a system, to study the effects of different parts of a system, to predict the behavior of a system, or to derive estimates and guide decisions.<sup>2</sup>

Modeling and programming have a symbiotic relationship: A model is generally implemented in a program and the rigors of programming help you better understand the process you are modeling. Being forced to work the details of a model through to implemented code is a good discipline and almost always reveals aspects of the model that are not obvious from a cursory review. Once the model is in hand, it becomes

easier to perform what-if analyses in order to “study the effects of different parts of a system” and more fully understand systemic drivers. If it is hard to generate examples or test hypotheses, then few are generated and tested. Special cases and boundary conditions are missed, resulting in an incomplete understanding.

Statistics is not a spectator sport. Learning statistics by reading and applying each method in a statistical package is not a bad approach, though beware the “solution-in-search-of-a-problem” syndrome. I learned a lot from the SAS/STAT manual as a student, and I know other actuaries who found this approach productive. Being hands-on will teach you how to use each method so you can quickly move from textbook examples to your own applications. That said, everyone who uses GLMs should be able to set up and solve a GLM model in Excel, explicitly creating the deviance function and using solver (or even better, iteratively re-weighted least squares) to find the maximum likelihood solution. Do this once by hand, thereafter, use GLM in your favorite package. The winners in the analytics battle understand the theory *and* its implementation.

### Programming as a Career Booster

Not all programming exercises will enhance your career. As the *WSJ* article suggests, being the local Excel-help desk may well be detrimental to your career. However, being unhelpful will also be detrimental to your career. It can be a fine line.

You are adding value to your *actuarial* career when your programming supports your *actuarial* work. Remem-

<sup>1</sup> <https://www.wsj.com/articles/the-first-rule-of-microsoft-excel-dont-tell-anyone-youre-good-at-it-1538754380>

<sup>2</sup> ASOP Modeling Standard, draft.

ber Chris Dixon's famous quote about data scientists:

A data scientist is someone who is better at statistics than any software engineer and better at software engineering than any statistician.<sup>3</sup>

If a data scientist interpolates between a statistician and a computer scientist then I believe an actuary attempts a three-way interpolation among a statistician, a computer scientist and a business person — typically an underwriter. Actuaries understand both the models and the business processes they abstract; they know what is possible and can use that knowledge to envision and enable better solutions. Through programming they can better understand each model and, most importantly, can deliver solutions based on these models in a timely and efficient manner.

Here are some practical guidelines to help guide your understanding of when you can add value, both professionally and personally, as a programming actuary:

- You are actively involved in selecting, designing and parameterizing the algorithms used to solve each business problem. Simply coding to implement actuarial design choices made by someone else is a red flag.
- You leverage existing routines and you do not spend too much time (re-)coding fundamental algorithms — do not roll your own.
- You sell (pitch, explain, propose) your model *results* and are key to getting buy-in and adoption. You are the voice of your work. You don't waste time polishing a graphical user interface (GUI) and the

user interface to your tool; you sell the result and outcome! To quote Kimberly Holmes, Global Head of Strategic Analytics at AXA XL, "Be outcome-focused, not output-focused." You are programming to enable a better outcome, not to write cool code.

- You can explain the strengths and weaknesses of your models and their implementations as well as particular data reliances and sensitivities. But beware: Actuaries are often better at presenting the weaknesses of their models than the strengths. Avoid this trap.
- Name your system or tool. There is surprising power in a name, and it will be associated with you.
- If you see that your solution needs to be in production, you lobby for investment to do that rather than try to become a one person IT shop. Work *with* IT to have your tools *integrated* into production workflows.
- Your programming enables superior productivity. At several points during my career, I programmed because I didn't have time not to program. Getting work done required an automated solution and the programming time more than paid for itself. The trick to a good return is understanding which types of program you will reuse. That I learned the hard way .... Conversely, you are probably *not* adding value in the following situations:
  - If you are an *order taker* you are not career-programming. If other people are making the algorithmic and modeling decisions and you are just implementing them, you are

not being valued as an *actuary*. You are in danger of being pigeonholed as the *programmer*. Fear of the pigeonhole is a reason why many actuaries don't want to program, but it is a symptom of other failings and not a legitimate excuse.

- You waste time tinkering with a GUI. However much you love your GUI it is almost certainly terrible. Use a professional UI/UX designer if you need a user interface.
- You try to put half-baked solutions into production, worry about deployment or start being the help desk. These are important problems, but they can be handled by other professionals who are typically not paid on actuarial salary scales.
- You build an app — this is a special case of my "don't program GUIs" comment above. No one will use it. They don't want yet another system, they want to get to a better outcome.

Beware: Programming is fun and addictive. Make conscious decisions about how you program your career.

Remember that you have an IT department for a reason. It is a surprisingly long road from "It works on my machine" to "It works everywhere. It is secure, documented and upgradeable." If you respect that road, you will win the hearts of your IT colleagues and work more productively with them. Your manager will appreciate your efforts more if you document your methods to ensure a reproducible process. Train others — your replacements. Fear of key-person risk traps entire departments in spreadsheets. As much as I used to

<sup>3</sup> <https://twitter.com/cdixon/status/428914681911070720?lang=en>



love Excel spreadsheets, they are rarely the best answer.

## Programming Today is More Productive Than Ever

Programming today is orders of magnitude more efficient than it was 20 or 30 years ago. The advice to program your career was not as clear cut then. But, times have changed and we need to change too. The evolution of programming is an education in itself.

The first computer I programmed on had 4K of memory. You loaded the DOS on a 5 1/4" (genuinely) floppy disc and then typed in your very basic BASIC program.

Less than 10 years later I learned to program in C on a machine with 1MB of memory and a spacious 40MB hard drive. The computer and software cost over \$6,000 in 1988 dollars. It was an expensive, slow and painful process. I had one textbook<sup>4</sup> and when it was unclear I just had to figure it out.

Ten years later I learned to program C++ and Windows. The manual had expanded to five massive tomes and I spent several thousand dollars on text books and guide books, in addition to a considerable outlay for Visual Studio. It was still a slow and painful process.

In 2016 I started to learn Python. My inception to date financial investment: zero. The software is free. The documentation is free. If I encounter a problem, I can find a solution on Google or Stackoverflow.com in minutes. Python has an enormous user base and, as a result, packages are available for almost all the boring stuff. Packages are

easy to install from central repositories, generally with the source code available for inspection. I can focus on adding actuarial value in my programming efforts. Although I chose to learn Python, the same comments apply to R, except the R online help is not quite as comprehensive since it has a smaller user base.

Programming has exposed me to fintech, insurtech, crypto, open-source and other worlds and has greatly expanded the intellectual community I learn from. If you are interacting in these spaces you need to be able to converse on a level playing field. They are creating data lakes and standing up technology stacks.<sup>5</sup> To be taken seriously you need to be fluent in their jargon and have an understanding of their concepts and tools. You gain that understanding by interacting and experimenting with their tool sets, i.e., by programming. Many startups are a website, a white paper and a Github repo. They are building tools and they want developers and users to interact with them. The cutting edge is easy to access, educational and exhilarating. To broaden our actuarial reach beyond insurance requires that we extend our outlook beyond traditional tools and partners, and work with a wider and more diverse community of professionals. Get started today!

## Getting started ...

There is one downside to all of these new capabilities: They can overwhelm the beginner. I had two failed attempts to learn Python before I achieved escape velocity. Here are a few suggestions for getting started.

First, remember that if you've written an =IF(...) statement in Excel then you have already programmed. It is not hard! Have confidence you will succeed but expect it will take time and effort.

Second, be prepared for a steep learning curve. But know the learning curve offers increasing returns for your effort for a surprisingly long time: You will fly higher than you have ever imagined. The biggest hurdle to getting started is learning enough to understand the help! At that point, the training wheels come off and you will learn more quickly. You will develop a sense of what should be possible and what to Google to discover it. And you will find most programming languages are similar. Whatever you learn for one will help with the others.

Third, and this is critical, *start with a particular problem in mind*. If you just read a book on Language X you will quickly be overwhelmed. Concepts will blur and seem irrelevant. But if you have a particular problem — ideally driven by a business problem — you will be better able to dedicate the concentrated time you need to make progress. And at the end, you will have created something useful.

Fourth, choose your language. A Reddit thread on r/actuary<sup>6</sup> recently asked, "What programming languages should I learn to be a good actuary?" The collected wisdom: English, SQL, R (and R over Python), VBA, COBOL (honestly) and SAS ("but I haven't seen it at my company"). You must know SQL as a data description language. It is foundational but different to most other

<sup>4</sup> *The C Programming Language* by Brian Kernighan and Dennis Ritchie, Second Edition Prentice Hall, NJ (1988). It is by far the most useful computing book I've ever read. It teaches not only C but how to program, all in less than 280 pages. You can find a PDF online.

<sup>5</sup> We, of course, are just building databases with computers!

<sup>6</sup> [https://www.reddit.com/r/actuary/comments/9lol3g/what\\_programming\\_languages\\_should\\_i\\_learn\\_to\\_be\\_a](https://www.reddit.com/r/actuary/comments/9lol3g/what_programming_languages_should_i_learn_to_be_a)

languages. Pick between R and Python and know you will then be well set to pick up Python or R, VBA, COBOL, etc., as needed.

Here are some good starter projects — mostly things where Excel, well, fails to excel.

- Data munging: Become the data scientist!
  - String manipulation. Python has the best out-of-the-box text manipulation I have seen, but most serious languages are far more powerful than Excel. Look at regular expressions.
  - Automated data collection and aggregation, e.g., pull information from a variety of websites into a summary dataset and analyze it.
  - Use the R tidyverse package.<sup>7</sup>
  - Use Python pandas (*panel data sets*).<sup>8</sup>
- Try web scraping and data collection, e.g., FRED<sup>9</sup> time series downloads and analysis or interact with the Twitter API.<sup>10</sup>
- Create more complex data visual-

izations and graphics, e.g., create plots by-line, by-state, using ggplot in R or seaborn and matplotlib in Python.<sup>11</sup>

If you are still in college, take a basic computer science course; the underlying concepts in computer science help you learn all languages. The CAS has R seminars and is considering a Python introduction at the CAS Ratemaking, Product and Modeling Seminar. There are numerous great online resources.

### Conclusion

To be clear, being a good programmer does not make you a good actuary and being a good actuary does not require that you program. Interpretation, communication and contextual understanding are all important, but times are changing. The insurance industry was an early adopter of big data techniques and actuaries led the work to include behavioral data into ratemaking in the 1990s. Since those auspicious beginnings, we have lost ground to statisticians and data scientists applying predictive analytics *in our own space*.

For those aspiring to be actuarial leaders of tomorrow, I believe programming experience today is critical. Programming is not an either/or choice for an actuarial student, nor something to learn “if you have the time.” It is a necessity. Your ability to interpret results is honed by producing results, seeing how different methods work and when and why they don’t. Without actually coding it is hard to really understand and appreciate what technology can do. And remember that our competition, the data scientists, can and will program (and better than statisticians).

A strategy of trying to out-interpret data scientists will fail the profession. Problems requiring nuanced interpretation today will be built into an expert system tomorrow. However, the ability to solve a new problem through ingenious application of a model or method will endure. Only experience built through practice offers a route to permanent, productive employment. And practice requires programming. Start programming your career today! ●

<sup>7</sup> <http://r4ds.had.co.nz/introduction.html>

<sup>8</sup> <https://pandas.pydata.org/>

<sup>9</sup> <https://fred.stlouisfed.org/>

<sup>10</sup> <https://developer.twitter.com/en/docs.html>

<sup>11</sup> <https://ggplot2.tidyverse.org/>, <https://seaborn.pydata.org/>, <https://matplotlib.org/>

## Risks Issues Call for Papers

**R**isks, the online actuarial journal, intends to publish a special edition in the near future on the subject “Claim Models: Granular Forms and Machine Learning Forms.” The purpose of the special edition is to advance the ap-

plication of both granular models and machine-learning models to claim modeling, but with particular interest in models that bridge the gap between these two model types. Greg Taylor, adjunct professor in the Business School of the University of New South

Wales in Sydney, Australia, will be guest editor of the special issue.

The deadline for manuscript submissions is August 31, 2019. For more information, visit [https://www.mdpi.com/journal/risks/special\\_issues/learning\\_forms](https://www.mdpi.com/journal/risks/special_issues/learning_forms). ●





# **Underwriting Collaboration Seminar**

March 25, 2019

Boston, MA

The Westin Boston Waterfront





## IN MY OPINION BY GROVER EDIE, *AA* EDITOR IN CHIEF

### A Different Kind of Talent Gap

I have been hearing about the “talent gap” in insurance for several years. It generally refers to the lack of new entrants into the insurance business. But I’d like you to consider another talent gap. It’s the one between you and the people with whom you work.

programmers, but if you don’t, cultivate some friends there as well. It’s not just for the sake of furthering your career; some of these people are really nice and fun to be around. Networking outside the actuarial profession can help them as well as you.

### **I don’t mean we should underwrite policies or adjust claims, but we should appreciate and understand this work.**

This gap goes two ways: Others don’t have a talent for what we do and we don’t have a talent for what they do.

We won’t be able to get them to all become actuaries, so I suggest we meet them on their turf and try to be proficient in the work that they do. I don’t mean we should underwrite policies or adjust claims, but we should appreciate and understand this work.

Starting out in the underwriting or claims department while sitting for exams can be immensely useful for aspiring actuaries later on in their careers. Trust me on that; I was an underwriter before passing my first exam. And others in the industry who began that way have also told me that their early underwriting and claims experiences were helpful to them.

But what if you are already along the way and can’t step into such a role? There are other opportunities.

First, it isn’t such a bad idea to get to know some underwriters and adjusters and even agents and brokers. You probably already know some computer

Second, there are other designations you can pursue. A company president I know earned a designation in information technology because his company was about to undergo a big IT project. He found it advantageous being able to understand the terminology and communicate with the project managers — and they appreciated his taking the effort to get to know what they did.

I also knew an actuary who was

### **The nice thing about designations like CPCU or ARM is that they communicate to others, especially those with credentials, what you know about underwriting or risk management.**

being considered for a position within an extremely large corporation that dealt with his area of expertise. Unfortunately, the managers making the selection did not understand the importance of his actuarial credentials. Oddly, he landed the position not because of his actuarial credentials, but because he had an MBA.

The corporate decision-makers were big on MBAs.

The Institutes, with whom the CAS now partners, have many courses that can expand the scope of an actuary’s knowledge. The nice thing about designations like CPCU or ARM is that they communicate to others, especially those with credentials, what you know about underwriting or risk management. These sorts of designations can go a long way in bridging the talent gap between you and others.

And so, I have two pleas:

First, that the CAS continues to pursue changes to its education policies to prevent a gap between what we teach and test upon and what is needed in the marketplace.

Second, and this is for me as well as others, that we examine the syllabus and keep abreast of changes in that syllabus to prevent a gap from occurring between what we know and what is needed in the marketplace.

I have heard some people say they are done with school, done with learning and have read the last book they will ever read. This is sad, but that is their

choice. It’s not a choice that actuaries make, however, because we are life-long learners. From time to time, though, we can become complacent in our careers. Preventing personal talent gaps is up to us. Preventing our profession’s talent gap is the CAS’s job as well as ours. ●

## RANDOM SAMPLER BY ROBERT F. CONGER

## Address to New Members

*The following is excerpted from the Bob Conger's Address to New Members, given during the CAS Annual Business Session on November 12, 2018, in Las Vegas.*

**T**he lifelong dimension of your actuarial learning arises from two realities:

First, the world we operate in changes continuously and rapidly ... I selected the property-casualty side of actuarial work *precisely because* I foresaw that the impact and pace of change would keep it interesting. I was right! . . .

Lifelong learning — from books and online, classrooms and seminars, especially on the job — will be essential in order for you to keep up, to stay competent, to stay relevant and to enjoy your work ...

The second reality is that you will be operating in different environments over the course of your career — different job responsibilities, different products and customers, different competitors, different geographic areas and different employers or clients.

You must develop a strong understanding of both the technical elements and the business context of each situation in order to be effective at that moment of your career and to lay the groundwork for the future moments in your career.

Grab — embrace — every opportunity to learn all that you can ... learning is a lifelong journey ...

**Professionalism is a powerful ally**  
Qualification standards, actuarial

standards of practice, a code of conduct and more — all are components of a remarkable framework that helps us to do our jobs better and, when necessary, to defend our work.

But ... professionalism tools and practices become useful only when we use them. And they are most effective when they are part of the culture that you share with your actuarial friends and business colleagues.

I was very fortunate, about 11 years into my career, to join a leading consulting firm, where professionalism was fully baked into all of the daily business practices. But more importantly, professionalism was woven into the very culture of the organization. These people really, really believed in the importance of professionalism as part of how we could do our best work — and best serve our clients, the general public, our firm and ourselves ...

### Do the Right Thing

My very first day on the job as a consultant, one of the senior partners asked me to follow up with a client regarding a potential expert witness engagement that fit my skill set and experience very well.

Woo hoo! I was positioned to land a six-figure assignment within moments after joining the firm!

I dutifully called the client to learn more about the case and promised to call the client back the next day.

With a lot of guidance from my new colleagues, I then proceeded with some

internal research, including checking if we had any conflicts of interest with the engagement. Bad luck! We did have a significant business conflict, and we could not take the assignment!

With a heavy heart, I conveyed the finding to the senior partner. He was disappointed, of course, but he channeled that emotion into a wonderfully positive teaching moment about the practice and then joined me in making the call to the client. He taught me that doing the right thing up front and all along the way, though not always pleasant, saves a boatload of potential trouble later.

### Actuarial Work is a Team Sport

A month or so later, for a different client, I was completing my first loss reserve report as a new consultant. I had labored long and hard over the report, and, as far as I was concerned, it was a masterpiece of actuarial work and business writing.

It was time to submit the draft report, proudly, to the peer-review process through which every deliverable is reviewed by another consultant before delivery to the client.

Oh, how my spirits fell when my peer reviewer pointed out numerous ways that the report needed to be improved ... I had spent all of my writing energy explaining actuarial procedures — and I had provided very few insights that might actually interest the client ...

The final report, after I took the peer-review guidance on board, was vastly more informative to the client than my draft report would have been ... the experience directly helped me write better reports in the future.

The peer reviewer also helped me understand that all of her red marks on my paper did not constitute a failing mark for me, but rather represented part

of the team process for delivering our very best work to the client. She taught me that actuarial work is best performed as a team sport. In work, as in life, it is great to be part of a good team!

Over time, through immersion in the amazing culture I had joined, I truly came to understand that the actuarial profession's toolkit, the firm's comprehensive culture of and approach to professionalism, and the firm's collaborative and supportive team environment really helped me do my very best work — far better than the work I otherwise could have delivered.

I had discovered that, indeed, professionalism is a powerful ally. One of the most important things you can do, is to make the same discovery.

### Ask questions and listen actively

My actuarial career — really, my clients — also have led me to discover that good communications are just as important as good actuarial work.

When my work responsibilities started to include sales ... I learned that I possess neither the ability nor the appetite to sell a client an exciting new type of analysis or software tool, if the client doesn't really need them ... By asking questions and by listening very thoughtfully and actively to the answers that came back to me, I quite often would hear what I needed ... the client actually telling me what services to offer and to what purpose! Asking questions and active listening were the sales tools I needed!

It turns out that asking questions and active listening are equally valuable when it comes to performing the assignment.

These are the investigative tools that allow us to discover where the real con-



**Be like Bob.** CAS President Brian Brown, left, presents the CAS President's Award to Bob Conger. In remarks introducing Conger before his address to new members, Brown said: "Without him, I don't think we would have nearly as strong an international presence ... As I have traveled throughout the world ... everybody knows and loves Bob ... From Malaysia to Japan to China to the Middle East. He works tirelessly to advance education for property-casualty actuaries throughout the world ... Back in the '90s, everybody said 'I want to be like Mike ... [Michael Jordan].' So I think we should have a new expression at the CAS — 'I want to be like Bob.'"

cerns lie, to learn many of the facts we need from the client regarding the business and its operations, and to explore how the business got to be where it is today (and what strategies and solutions have led them here).

Those are some pretty powerful tools!

It really is not sufficient simply to grab a pile of data and grind it through a model.

Of course there comes a time for outbound communications, as well.

I discovered the following in the course of my first consulting peer review described earlier:

- Our actuarial work is not complete until we have translated our work into some business-relevant information, insights and solutions.

- Our actuarial work is not complete until we have delivered that information in a client-relevant context, using client-friendly vocabulary — maybe even a visual aid or two.
- Our actuarial work is not complete until the client is comfortable enough to ask some questions and we have given equally good answers.

It all adds up to good communications are just as important as good actuarial work .... ●

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*Bob Conger, FCAS, MAAA, is a consultant for Willis Towers Watson. He is a past president of the CAS, as well as a member and chair of several CAS committees. He currently serves as a CAS international ambassador.*



**IT'S A PUZZLEMENT** BY JON EVANS

# Combination Lock

**T**he dial on a standard combination padlock, the kind often used with gym lockers, is numbered zero to 39. The combination to open it is given by a set of three numbers. For example, if the numbers are 30-39-20, to open, turn right to 30, then turn left all the way around to 30 again and continue to 39, then turn right to 20. However, the mechanism is usually not very exact, and if you use a close combination like 31-38-22, it will still open. Suppose you can be off by up to an increment of two, either to the left or to the right, for each of the numbers and the lock will still open. If you had no idea what the combination was, using the most efficient search strategy, what is the greatest number of combinations you might have to try to open the lock?

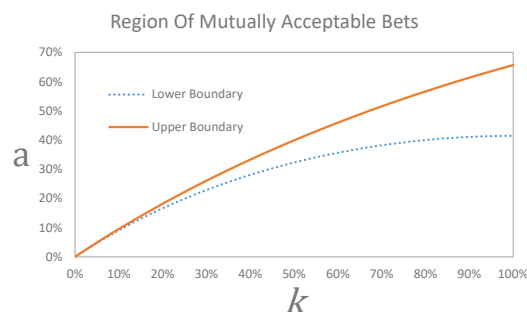


## Risk Appetites

Kim and Ann initially each have an equal total amount of money. Kim acts so as to maximize the expected squared amount of her total wealth, whereas Ann tries to maximize the expected square root of the amount of her wealth. Kim and Ann can each choose a fraction (from 0 percent to 100 percent) of their initial wealth to gamble on a fair coin flip, with the winner claiming the total amount that both bet. The coin flip is voluntarily negotiated beforehand so that the fraction each of them bets — the fractions need not be equal — is ac-

ceptable to the other one. What combinations of betting fractions would be mutually acceptable to them? Do you have an opinion about what specific combination of betting fractions they might settle on?

Solver Clive Keatinge let  $k$  be the proportion of Kim's wealth that she bets and let  $a$  be the proportion of Ann's wealth that she bets, where Kim and Ann start with the same amount of wealth. Kim requires that  $0.5(1+a)^2 + 0.5(1-k)^2 \geq 1$  and Ann requires that  $0.5(1+k)^{0.5} + 0.5(1-a)^{0.5} \geq 1$ . Thus, any combination of betting fractions that satisfies these two



inequalities would be mutually acceptable to both of them.

If equality does not hold in the first inequality, then Kim can do better by reducing the proportion that she bets until equality is reached. Likewise, if equality does not hold in the second inequality, then Ann can do better by reducing the proportion that she bets until equality is reached. Thus, a Nash equilibrium requires that equality holds in both inequalities. The only solution to these equations is  $k=a=0$ . Keatinge opines that

Kim and Ann will likely call the whole thing off.

Note that Keatinge's implicit opinion is that Kim and Ann are noncooperative and consequently cannot achieve an agreement to bet. In contrast, Bob Conger's opinion is that Kim and Ann would cooperate so that the expected utility (value of money) for both of them is equal and that this utility is maximized, assuming that they both have equal utility of one for their initial amount of money. This occurs around  $k=100\%$  and  $a=46.4842\%$ , so that they both achieve an expected utility of  $0.5(1+a)^2 + 0.5(1-k)^2 = 1.07288$ .

My opinion is that Kim and Ann would, along the lines of the Nash arbitration scheme, end up with an agreement that maximizes the product of the gains in their utilities over not betting.

This would result in  $k=100\%$  and  $a=54.231\%$ , with Kim's expected utility being  $0.5(1+a)^2 + 0.5(1-k)^2 = 1.18936$  and Ann's expected utility being  $0.5(1+k)^{0.5} + 0.5(1-a)^{0.5} = 1.04537$ . Both would gain, but relative to Conger's equal utility gain constraint, Kim would be driving a harder bargain

out of Ann. Note that the product of their utility gains under Nash arbitration  $(1.18936-1)(1.04537-1)=0.00859126$  is greater than under the equal utility gain constraint  $(1.07-1)(1.07-1)=0.0049$ .

Solutions were also submitted by Ernest Lin and Brad Rosin. ●

**Know the answer?**  
Send your solution to  
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