



actuarialREVIEW

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PUBLISHED BY THE CASUALTY ACTUARIAL SOCIETY 

The Diversity & Inclusion Issue

FALSE POSITIVES: Avoiding Pitfalls in Your Diversity Hiring

Plus: Coronavirus Spread Reveals Coverage Gaps

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SALARY SURVEY RESULTS

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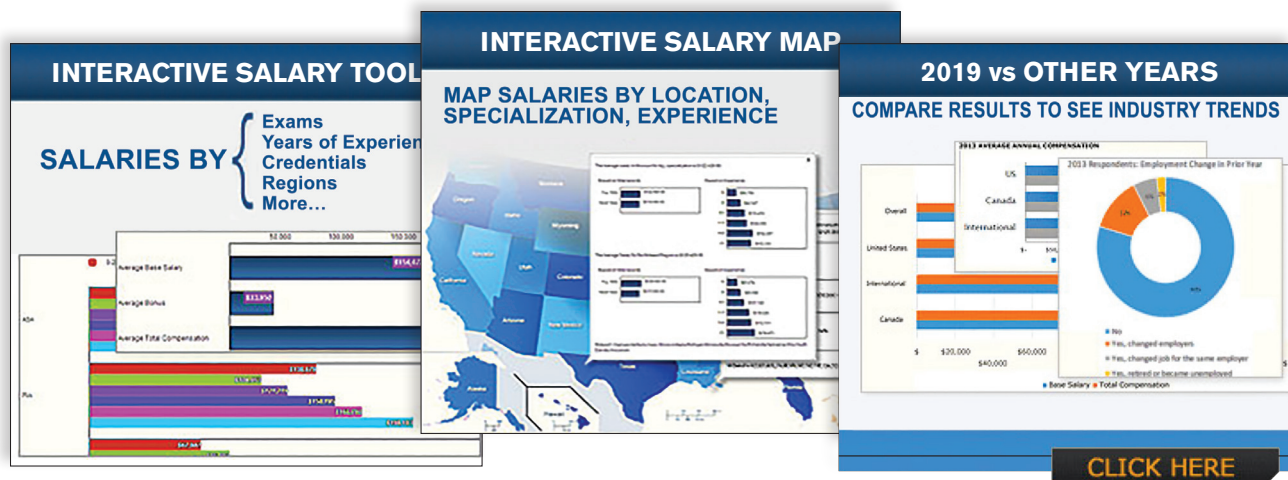
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This year our results represent responses to questionnaires we sent to more than 40,000 actuaries, others who volunteered to participate, and from information we gather from candidates and the companies we recruit for.

There are a few samples below, but you must go to our website <http://www.actuarialcareers.com/> and click on the Salary Survey tab to find the 2019 results. You can also see and query past year's results too!



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Pricing & Filing Actuary - New York: NYC client seeks Student Actuary, ACAS or FCAS with 7+ years of experience in Actuarial Pricing, Product Management, or Predictive Analytics, as well as 5 years of experience in personal lines insurance. Excellent communication skills, strong analytics background, and experience with SAS, SQL, R or Python are a plus. (#49020)

Head of Commercial Lines Pricing - New Jersey: Casualty client seeks ACAS or FCAS with at least 10+ years of commercial lines pricing experience, and 5+ years managing an actuarial team. The ideal candidate would have extensive experience performing rate reviews for worker's compensation, general liability, and auto liability lines of business. (#49001)

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on the cover

False Positives: Avoiding Pitfalls in Your Diversity Hiring

By KUDA CHIBANDA, FCAS

A deep dive into barriers to recruiting black entry-level talent.



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Editor in Chief

Grover M. Edie

Managing Editor and Associate Director of Publications

Elizabeth A. Smith

Graphic Designer

Sonja Uyenco

Marketing & Corporate Relations Manager

Clarisa Figueroa

Editor Emeritus

C.K. "Stan" Khury

Associate Editor

Martin Adler

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Rebecca Armon	Julie Lederer
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Advertising

Al Rickard, 703-402-9713



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editor'sNOTE By ELIZABETH A. SMITH, AR MANAGING EDITOR

AR in Real Life

I know that *Actuarial Review* touches on matters beyond the actuarial profession, but this issue in particular illustrates quite a lot of the risks of living in this all-too-real world.

As the new coronavirus COVID-19 threatens to become a pandemic, this year's cold and flu season is far from ordinary. Because *AR* is a bimonthly publication, a subject like COVID-19 would usually be too much of a fast-moving story for us to cover. Only the 24-hour news cycle can keep up. Instead, we decided to focus on how the disease will affect the business of insurance. As this story unfolds, keep washing



your hands, cough into the crook of your arm and stay home if you're sick. The flu may still be a more dangerous prospect than COVID-19.*

In more real-life news, soon people in the U.S. will decide who will lead the country — first choosing party nominees and then president. Jon Evans's

column sets up a puzzle on voter polling that results in stolen data and the violent and damaging repercussions of that theft. This scenario seems fantastical — at least I hope it is — but the puzzle challenges solvers to find a safe solution to the possibility of such a data hack.

Back to work life, I don't have personal experience of this, but I have known people who would like to hunt down their predecessors and tell them just how they feel about the messes they left behind. Our "Ethical Issues" column features a genteel protagonist who patiently questions a defensive actuary about the project he worked on before her.

Everyday Celebrations and Awareness

Special times throughout the year focus our attention on various groups and their histories or their causes. February and March are African-American History Month and Women's History Month, respectively. Latino History Month runs mid-September through

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* For current information on COVID-19, visit the Centers for Disease Control and Prevention www.cdc.gov and the World Health Organization www.who.int/.

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.

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SPRING MEETING

MAY 10-13, 2020 • HILTON CHICAGO • CHICAGO, IL



Creating Change from a Position of Strength

The Casualty Actuarial Society is doing well.

Really well.

We are seeing consistent growth in membership. We are experiencing record numbers of people attending our meetings. We are administering more examinations than ever before and in more and more parts of the globe outside of North America. We have quite likely the most diverse board of directors and executive leadership group in years.

Some would say, "If it's not broken, don't fix it."

I disagree. Transformation and reinvention are best accomplished when a company comes from a position of strength. Now is the ideal time for the CAS to anticipate new needs and new marketplaces.

And that is exactly what we are doing!

By "we," I am referring to Victor Carter-Bey, our new CEO, and the leadership he brings to the staffs of the CAS and The CAS Institutes; to Jim Christie, our board chair, for his management of a new and eager board of directors; and to Jessica Leong, our president-elect, for her wisdom and influence shaping our strategic direction. Together, we form a dedicated team.

Here are just a few things that the Casualty Actuarial Society is undertaking to progress in this continuously changing environment.

- 1) Historically, the CAS has refreshed its Strategic Plan once every five years (with the last refresh having been conducted and published in 2017). The CAS Board of Directors

is on pace to release a transformational Strategic Plan later in 2020 that will position us for accelerated growth and brand recognition.

- 2) Admissions Staff Actuary Wes Griffiths, the CAS staff and admissions volunteers are looking at examinations from top to bottom for enhancements to the syllabus as well as improvements to the candidate experience — how content is consumed, learned and retained. This includes hiring a full-time educational design expert and conducting a comprehensive job task analysis to ensure that the syllabus covers both the current and future work being conducted by property-casualty actuaries. By the end of 2020, we anticipate publishing a Core Education Roadmap (formerly known as Basic Education) that will enable all stakeholders to

- 4) Our growing membership spans several different generations, and we are currently undertaking numerous surveys and focus groups to better understand our current and future members' needs. The CAS is in deep conversations with employers, educators, regulators, candidates and members (employed and retired), both domestically and internationally, to ascertain the unique needs of all our stakeholders.
- 5) Administratively, the CAS is reforming our nominations procedure to make it easier to understand and apply for. A thoughtful nominations process can ensure that future CAS Boards and leadership positions will be filled with the best candidates to further evolve and transform the CAS. In this same vein, the CAS Board has decided to

Now is the ideal time for the CAS to anticipate new needs and new marketplaces.

understand the evolution of CAS Core Education that will take place between 2021 and 2024.

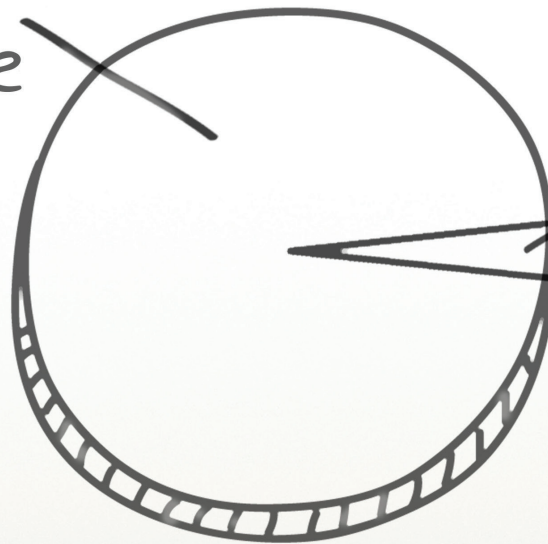
- 3) At the March board meeting, we expect to review and approve a new CAS international strategy that will further our efforts as a global actuarial society. This new international strategy, coupled with offering a new Examination Part 6-International, will position the CAS to attract candidates around the globe who are interested in learning property-casualty insurance.

put an initiative on the 2020 ballot that would permit Associates who have held their credentials for five or more years to vote in future CAS elections for board members and president-elect.

It is an amazing time to be both a leader and member of the CAS. We look towards the future with tailwinds at our back and creating these positive changes from a position of strength. I hope all of you are as excited as we are about the foundational change and direction that we are cementing here in 2020! ●

$$q(w,d) = r \times \sqrt{\text{abs}\{m^2 w,d\}} + M_{w,d}$$

Time spent
crunching
loss reserve
numbers.

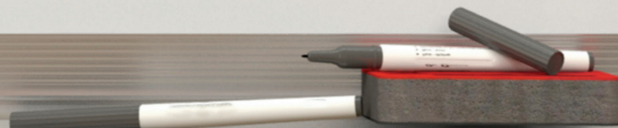


time to
think

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Editor's Note

from page 4

mid-October. January is National Volunteer Blood Donor Month and February is Insurance Careers Month. There are also special days, too many to list and some too frivolous to mention, that ask people to pay attention to all kinds of things: ♪, pets, grandparents and the Earth.

But all these activities don't have to be relegated to official days and months. Take Insurance Careers Month as an example. CAS University Liaisons don't just limit themselves to February; they work all through the school year bringing their knowledge of the actuarial profession to potential new members. You can do outreach to students you know — your kids, your friend's kids, your kids' friends.

Every day can be a time to celebrate different cultures or to make people aware of your profession or any of the things that you care about.

A Final Note

AR welcomes first-time contributor Kudakwashe Chibanda, who has written our cover story on diversity and inclusion in hiring practices. Ms. Chibanda began her first year as a CAS Board Director in November 2019. The cover story also ties in an introduction to Gamma Iota Sigma, the college academic fraternity that promotes careers in insurance, risk management and actuarial science. We've also included some information on the Organization of Latin Actuaries and the International Association of Black Actuaries. All of these organizations offer volunteer opportunities for CAS members — no special month or days are necessary to participate. ●

COMINGS AND GOINGS

Donna Glenn, FCAS, has been appointed to chief actuary for the National Council on Compensation Insurance. Glenn was previously with Liberty Mutual Insurance in Boston.

Pinnacle Actuarial Resources has promoted **Tim Mosler, FCAS**, to principal and consulting actuary. Prior to that, Mosler served as director and consulting actuary at Pinnacle.

Nathan Rugge, FCAS, has been appointed to senior vice president, actuarial reserving at Selective Insurance. Rugge has been with Selective Insurance since 2009.

Tracy Ryan, FCAS, has been promoted to president of Liberty Mutual's global risk solutions, North America. She has been with Liberty Mutual since 1994, with a recent role of executive vice president.

Robert Hopper, FCAS, has joined CNA as chief actuary. Hopper joins CNA after a 28-year career at Chubb.

Hopper will succeed **Larry Haefner, FCAS**, who will retire at the end of 2020, after a notable 40-year insurance career. Haefner served on the CAS Board of Directors for three years from November 2015 through 2018.

AM Best announced the promotion of **Matthew Mosher, FCAS**, to CEO of their Asia-Pacific subsidiaries in Hong Kong and Singapore. Mosher was previously executive vice president and chief operating officer. ●

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Letters to the editor may be sent to 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.

IN MEMORIAM

David Reed Bradley (FCAS 1975)
1950-2019

IN REMEMBRANCE

In Remembrance is an occasional column featuring short obituaries of CAS members who have recently passed away. These obituaries and sometimes longer versions are posted on the CAS website at bit.ly/CASMbrObits.

A Connecticut Yankee in California

David L. Larson (ACAS 1993)

1964-2018

David L. Larson died on May 27, 2018, at his home in Irvine, California. Born November 3, 1964, he was raised in Connecticut and graduated Phi Beta Kappa with a mathematics degree from the University of Connecticut and earned an MBA from Bryant College in Rhode Island. During his last 10 years, Larson was a senior vice president of National General Insurance in Irvine.

He was an active participant in Catholic service and prayer groups. Larson was generous with his time and money for those in need. The avid golfer continued to be a fan of teams from back home including the Hartford Whalers and UConn's football and basketball teams.

He is survived by his parents, Linda and Joseph Brislin of Wethersfield, Massachusetts, two brothers, four nieces and nephews, and many cousins and friends.

A Life Well-Played

Paul W. Simoneau (FCAS 1960)

1929-2019

Paul W. Simoneau died at home in West Hartford, Connecticut on January 15, 2019. He lived a full life with amazing youth and stamina, even playing tennis competitively with family and friends the year before his death.

Born in Woonsocket, Rhode Island, he graduated from the University of

Rhode Island and served as a U.S. Air Force navigator during the Korean War. He then joined Aetna, which wrote property-casualty insurance at the time, and retired after 30 years in 1986.

He was known for his understated wit and being a solid "rock" to his family. He based his life on a strong belief and trust in the Catholic faith. Besides instilling morals and ethics in his children, he taught them how to sail, ski and play tennis and chess.

Buried with military honors in the Massachusetts National Cemetery in Bourne, he is survived by his wife of 63 years, Jeanine; two sons; two daughters; nine grandchildren; and two sisters.

The Actuarial Innovator

Lee M. Smith (FCAS 1972)

1945-2019

Lee M. Smith sought to adapt new ideas to help actuaries better understand and measure risk. When enterprise risk management (ERM) was an innovative concept in the mid-2000s, Smith chaired the CAS Risk Management Task Force for ERM and served the CAS as the ERM liaison to the Risk & Insurance Management Society. An actuarial explorer, he studied alternative concepts such as chaos theory.

Smith died in his home in the Fox Valley River area of Illinois on March 2, 2019, following multiple illnesses. Born March 8, 1945, he was raised in

In Remembrance, page 10

CALENDAR OF EVENTS

May 10-13, 2020

Spring Meeting
Hilton Chicago
Chicago, IL

May 13, 2020

Underwriting
Collaboration Seminar
Hilton Chicago
Chicago, IL

June 1-2, 2020

Seminar on Reinsurance
Loews Philadelphia Hotel
Philadelphia, PA

September 14-16, 2020

Casualty Loss Reserve Seminar
(CLRS) & Workshops
Hilton Orlando Bonnet Creek
Orlando, FL

October 6-7, 2020

Crash Course in Vehicle
Technology and Driverless Cars
Insurance Institute for Highway
Safety – Vehicle Research Center
Charlottesville, VA

October 20-22, 2020

In Focus Virtual Seminar

November 8-11, 2020

Annual Meeting
Washington Marriott Wardman Park
Washington, D.C.

IN REMEMBRANCE, FROM PAGE 9

Aurora, Illinois, and graduated with a finance degree from Northern Illinois University and a master's in economics at Trinity College. As chief actuary for the Michigan Department of Insurance and Financial Services from 1974 to 1981, he oversaw implementation of no-fault auto insurance. When he became national director of Ernst & Young's actuarial practice from 1983 to 2000, the company became one of the nation's largest actuarial consulting firms.

In 2000, Smith founded Paradigm Actuaries, which specializes in advanced actuarial and financial modeling solutions for the financial sector. Called a true family man, Smith is survived by his wife, Susan, his two sons and several family members.

The Teacher

Bernard Lynn Webb (FCAS 1965) 1924-2016

Bernard Lynn Webb died February 3, 2016, in Alpharetta, Georgia. After working in several insurance roles and writing numerous books and articles, he felt drawn to teaching. For nearly three decades, he was a professor at Georgia State University's College of Business before becoming professor emeritus.

Born in Arkansas, he volunteered for the U.S. Navy in 1946 and was stationed at Okinawa, Japan, during World War II. Shortly after the war's end, he earned his M.S. in business administration specializing in actuarial science from the University of Richmond. Upon

retirement, he enjoyed traveling the world and spending time at home in Franklin, North Carolina.

The son of William Albert and Jenny June Webb, he is predeceased by his son, four sisters and two brothers. He is survived by the love of his life and his wife of 69 years, Rose; his daughter; and grand- and great-grandchildren. Donations in Webb's memory can be made to the Georgia State University Risk Management Foundation.

The Executive and Fixer Upper Philip Gardner Buffinton (ACAS 1962) 1923-2016

If something was broken or did not work correctly, Philip Gardner Buffinton could fix it. Graduating with a mechanical engineering degree from Massachusetts's Worcester Polytechnic Institute (WPI), Buffinton would eventually retire in 1987 as State Farm Fire and Casualty Company's executive vice president and chief operating officer.

Buffinton was born on October 18, 1923, in North Adams, Massachusetts, to Arthur, a history professor at Williams College, and Mary (Edwards) Buffinton. In 1942, he enlisted in the U.S. Army Air Corps, piloted B-24 bombers and was lead pilot for 19 missions during World War II. He married Rita Gagnier in 1945 before graduating in 1949 from WPI.

His career began as a fire protection officer for the Factory Mutual Insurance Companies in Boston. In 1961, he became vice president at State Farm Fire

and Casualty Company in Bloomington, Illinois. After retirement, he was a consultant for the General Reinsurance Corporation.

Buffinton died August 25, 2016, in Bloomington. He is survived by his wife of 71 years and three daughters, one grandson, two great grandchildren and siblings.

The Jovial Advocate

Joshua Stewart "Stew" Sawyer (ACAS 1969)

1942-2018

Joshua Stewart Sawyer, part of the team that established the first CAS website, died March 31, 2018. He was born March 17, 1942, in Hillsboro, Oregon, to Joshua Stewart Sawyer Jr. and Loree C. Barham. As a youth, Sawyer earned the nickname "Big Stew." Later, the affable man was simply known as "Stew." He was his high school's valedictorian and a National Merit Scholar, and he earned his research and applied mathematics degree from the University of Oregon's honors college. While there, he was a leader at the Tau Kappa Epsilon fraternity and the Air Force ROTC.

Sawyer started his 45-year career at State Farm and then worked at Firemen's Fund before finishing his career as vice president and actuary for Wells Fargo Special Risk. He also was board chair of the Independent Insurance Agents & Brokers of California. Sawyer was a member, vice chair and chair of the CAS Committee on Online Services,

which developed the first CAS website.

He was committed to ensuring that disabled people could enjoy the outdoors as he did, and so he served on the Outdoors for All Foundation Board of Directors for 19 years. He is survived by his wife, brother, three children and five grandchildren.

The Michael Jordan of Crossword Puzzles

Douglas J. Hoylman (FCAS 1979)

1943-2015

Douglas J. Hoylman, the six-time national champion of the American Crossword Puzzle Tournament, died at his home on November 2, 2015, in Chevy Chase, Maryland. An actuary for GEICO from 1970 to the 1990s, he was born July 2, 1943, in Kalispell, Montana, to Byron G. Hoylman and Nona Marie (Velten) Hoylman.

He earned a mathematics degree at the Massachusetts Institute of Technology and completed his doctorate in mathematics at the University of Arizona in Tucson in 1969. In high school, Hoylman won several accolades for his mathematical acumen, including double honors and the highest score in the Mathematics Association of America and the Society of Actuaries' math contest in 1959.

While living in an apartment across the street from his employer, Hoylman rose to fame as a crosswords champion. He was dubbed "the Michael Jordan of

crossword puzzles" during a radio interview and was the subject of a November 1998 *Actuarial Review* column, "Nonactuarial Pursuits of Casualty Actuaries."

He acquired his love for the word game from his mother and also played Scrabble and Trivial Pursuit competitively.

He is buried at Conrad Memorial Cemetery in Kalispell with a headstone featuring a crossword puzzle connecting the words "Crossword Puzzles Champ." His brother survives him.

Title Insurance Extraordinaire

Paul J. Struzzieri (FCAS 1994)

1961-2019

Paul J. Struzzieri died suddenly on April 12, 2019. The life-long Long Islander graduated in 1983 with a degree in applied mathematics and economics at Stony Brook University. Upon graduation, Struzzieri's career started at Insurance Services Office as an actuary. He then worked at the Home Insurance Company's special casualty underwriting unit before joining Milliman, Inc. in 1998. A principal & consulting actuary for Milliman, Struzzieri was the recognized authority on title insurance and was a frequent speaker at captive insurance and title insurance industry organizations.

Born in Wantagh, New York, on February 24, 1961, he was a life-long devotee to New York sports teams, including the New York Yankees and Jets. Noted for his devotion to family, he

is preceded in death by his brother, who was a firefighter and 9-11 first responder. Struzzieri's survivors include his wife, Donna, three daughters, parents and two brothers.

The Passionate Musician

David Reed Bradley (FCAS 1975)

1950-2019

David Reed Bradley died November 30, 2019, with his wife by his side in Avon, Connecticut. Born January 19, 1950, Bradley graduated from Brown University in 1971 with a B.S. in applied mathematics and also served with the Rhode Island National Guard. He joined The Hartford's actuarial department and rose to executive vice president during his 29-year career.

A talented and dedicated performer, he served as a substitute and interim organist for area churches including Asylum Hill Congregational Church, where he was an active member for 40 years. He loved sports, including golf, tennis and squash.

He is survived by his wife of eight years, Kathleen Schiano. Other survivors include his mother, son, daughter, grandson, stepson, sister and aunt. Donations can be made to the David Bradley Family Fund, c/o Asylum Hill Congregational Church or the David Bradley Music Fund, c/o Ahern Funeral Home in Unionville, Connecticut. ●

CAS STAFF SPOTLIGHT

Meet Victor Carter-Bey, CAS CEO

Welcome to the CAS Staff Spotlight, a column featuring members of the CAS staff. For this spotlight, we are proud to introduce you to CAS Chief Executive Officer Victor Carter-Bey.

- **Where's your hometown?**

I grew up (and still live) in Baltimore, Maryland, which is famous for its steamed crabs. It's the city where Francis Scott Key wrote the U.S. national anthem, "The Star-Spangled Banner." It's also the hometown of three historic athletes: Babe Ruth and Cal Ripken Jr. from Major League Baseball, and swimmer Michael Phelps, the most decorated Olympian of all time.

- **Describe yourself in three words.**

Humble, competitive, team-oriented.

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

Boating. I got my boater's license in 2019. From March to November, I enjoy cruising the beautiful waters of Maryland's Chesapeake Bay!

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

There's a tie in this case: San Diego and Cape Town, South Africa. The combination of coastal living, mountains and outdoor activities in both cities is amazing. The weather in San Diego is probably the tie-breaker!

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

I lettered in three varsity sports in college. In both football and track and field, I was a team captain and a three-time, all-conference selec-



Victor Carter-Bey

tion. Basketball was the third sport.

- **What's your favorite sports team?**

This one is easy: the two-time Super Bowl champions, Baltimore Ravens. I'm a huge professional (American) football fan!

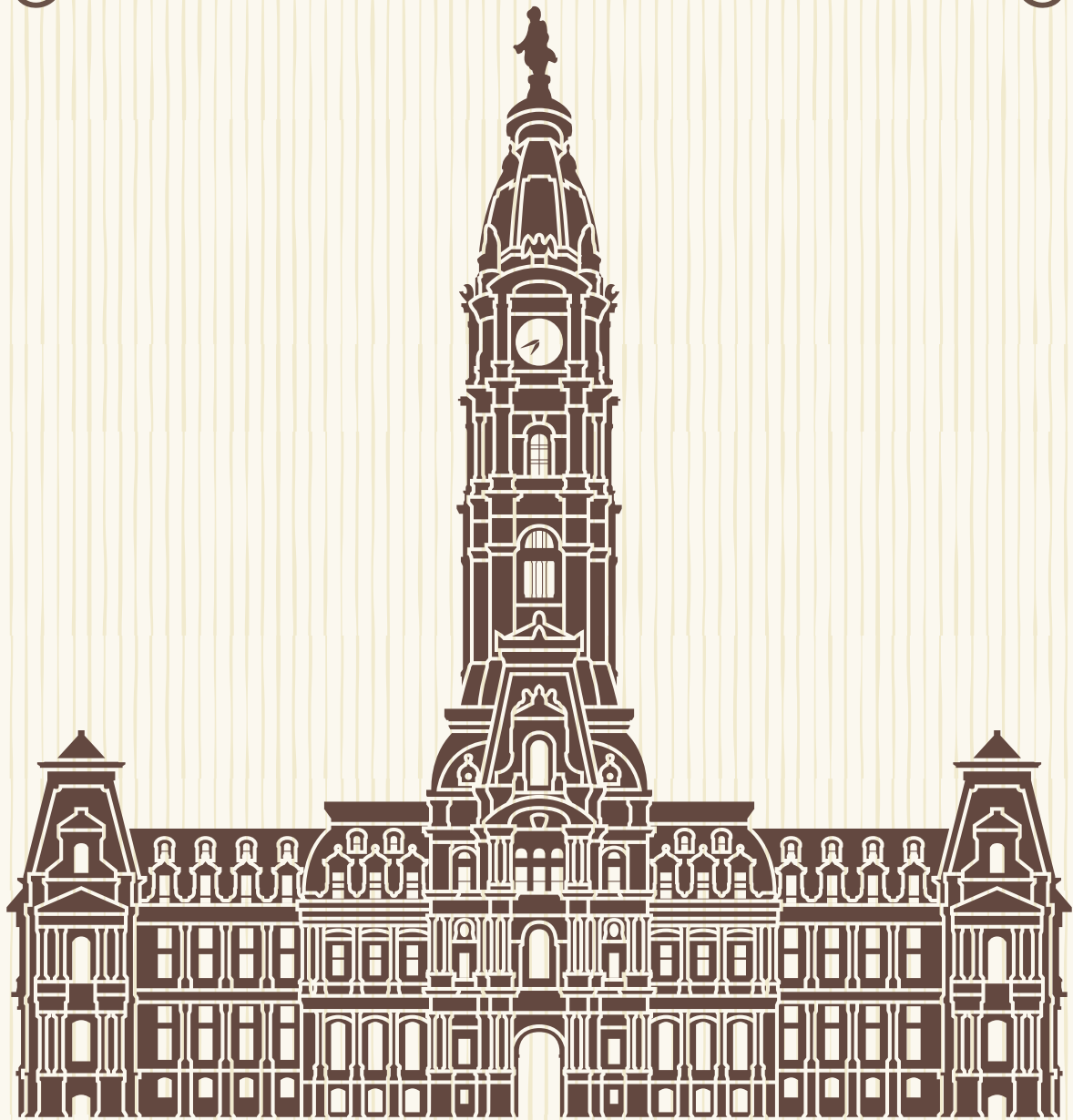
- **Where'd you go to college and what's your degree?**

I love the classroom and would love to be a career student in another lifetime. For this lifetime, however, I did my undergraduate schooling at The Johns Hopkins University (bachelor's in political science), my MBA at the Stern School of Business at New York University and my management doctorate at the University of Maryland Global Campus.

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

After undergraduate school, I was pretty sure I wanted to work as a corporate attorney. I took a job as a legal assistant in a corporate law firm and loved the environment, but the legal world wasn't quite what I expected. After many years of subsequently working in a few different industries, I now have the greatest job in the world here at the Casualty Actuarial Society! ●





SEMINAR ON REINSURANCE

JUNE 1-2, 2020

LOEWS PHILADELPHIA HOTEL
PHILADELPHIA, PENNSYLVANIA

The 2019 CAS Volunteer Awardees: In Their Own Words

About a third of the CAS membership volunteers every year. Of that group, the CAS honors those who were recognized by their volunteer peers for excellence. 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 throughout their careers to elevate and advance the actuarial profession. The following are 15 such exceptional CAS volunteers.

The New Members Awards

Recognizes volunteer contributions during an individual's first five years from their most recent credential.

Laura Cremerius (FCAS 2015)

First volunteered in 2015.

Recognized for work with the University Engagement Committee.

"I really enjoy meeting and collaborating with CAS staff and fellow volunteers from around the country, and I appreciate the variety of ways to get involved with the organization. It's easy to find volunteer roles that match your interests, development goals and capacity. It's really exciting to see all of the resources that the University Engagement Committee has launched and improved over the years to help make actuarial science more accessible for university students. For example, when we host Student Programs, we get to bring students outside of the



classroom and give them a glimpse of the real world of the actuarial profession for a day. I think this really boosts their understanding of the career and gives them an advantage as they enter the workforce. And these events really are a team effort; we rely on volunteers to serve as mentors, speakers and career panelists, who all contribute to making the day meaningful for the students."

Melissa Huenefeldt (ACAS 2014)

First volunteered in 2014.

Recognized for work with the Professionalism Education Committee.

"When I took the Course on Professionalism as a pre-ACAS, I sat with one of the course facilitators (Marty Simons) at lunch. I told him that once I became credentialed, I was going to volunteer for the Professionalism Education Committee. I remember thinking how incredible it was that actuaries, with full-time jobs, took time out of their busy schedules to teach the candidates the importance of professionalism. This is my chance to give back to the organization that has played a large role in my career development. I get to help candidates take that big step in their path to becoming a credentialed actuary. I have met so many new people as a part of this committee, both fellow actuaries and actuarial candidates. I have facilitated courses with past CAS presidents. I have had candidates attend the course who, after becoming credentialed, join the committee. I feel like our committee is a great gateway



volunteer opportunity, and we have many members who have been a part for many years."

Sean Smith (FCAS 2014)

First volunteered in 2013.

Recognized for work with the Exam Committee.

"After completing exams, I was curious to learn more about how the exam process works and wanted to contribute towards improving it. I've continued to volunteer because of the great people I'm working with and the importance of admissions to the goals of the CAS. The amount of effort and coordination put into the exam process by hundreds of volunteers is incredible. It's great to work with other Fellows who are passionate about making the exam process as fair as possible for current students."



The Above and Beyond Achievement Awards

Recognizes short-term volunteer contributions during the previous year.

Eric Blancke (FCAS 2016)

First volunteered with the CAS in 2016.

Recognized for work with the NAIC educational requirements working group.

"I volunteer to give back to the actuarial community. Like all credentialed members and stu-



dents, I spent my early career diligently studying. After finishing my exams, I wanted to be a voice for future Fellows to improve the admissions process. Despite being a relatively new volunteer, I find my voice is always heard openly and respectfully. I try to maintain the perspective of a student in everything I do. There are volunteers inside fighting to keep academic rigor high without sacrificing quality and fairness — I always try to be one of them!”

Christian Coleianne (FCAS 2004)

First volunteered in 2004.

Recognized for work on the University Engagement Committee.

Coleianne’s nominator wrote the following on his behalf: “The CAS University Award Program is well respected among the academic community, and much of this success can be attributed to having Chris as the program’s program leader. Chris is passionate about the vision of the program, which is to promote P&C education and to share ideas across schools so that more students gain exposure to property and casualty concepts and more programs are willing to hire P&C adjunct professors to ensure the concepts can be taught.”



Minchong Mao (FCAS 2007)

First volunteered in 2007.

Recognized for playing a central role in establishing the new CAS Institute (iCAS) credentials in catastrophe risk management.

“When iCAS decided to establish a certificate for catastrophe risk manage-

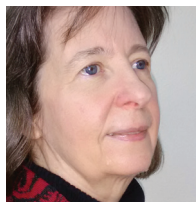
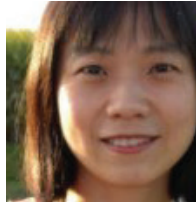
ment, I felt this was a great opportunity to enhance CAS’s presence in catastrophe risk management and modeling. When we started, a lot of cat management expertise existed outside of CAS. Because I had been practicing in this field for over 15 years and had broad connections, I thought that I could help build a solid curriculum to benefit the industry and CAS members and help CAS recruit qualified volunteers to develop the curriculum. The CAS is a strong organization that largely depends on members’ volunteer work. As a member, I benefit from organization’s reputation and network. I want to give back to the Society whenever I can. This is a unique opportunity to start a big project, engage a lot of people within and outside of the CAS. I enjoy the experience to lead a big project, to start from scratch, to be able to overcome resource limitations and to balance the priorities of other volunteers. This experience makes me more effective at work. I really appreciate that iCAS gave me this opportunity.”

Sarah McNair-Grove (FCAS 2004)

First volunteered in 2005.

Recognized for work with the NAIC education requirements working group.

“Being an actuary has been fun and has provided me with many wonderful career opportunities. Volunteering for the CAS allows me to give back to the organization and lets me invest in the careers of other actuaries. I enjoy the satisfac-



tion it brings with the feeling that I am a part of the CAS and that I am contributing to the organization.”

Scott Merkord (FCAS 2013)

First volunteered in 2013.

Recognized for work with the NAIC Task Force.

“I volunteer for the CAS to ensure a strong CAS for the future as I recognize this organization has provided so much to my career through a valuable credential. I really enjoy the relationships that I have built through volunteering such as laughing over group dinners and learning from peers. Through volunteering, I started to view the CAS as a community and have really enjoyed getting to know the CAS Staff who work really hard for the members.”

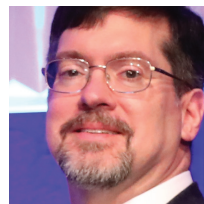


Christopher Monsour (FCAS 1999)

First volunteered in 2000.

Recognized for his work with the iCAS Certified Specialist in Predictive Analytics credential.

“I do volunteer work for the CAS in order to help the CAS enhance the actuarial profession and help it continue to keep up with developments, especially with respect to data science and machine learning. I enjoy volunteering because of the opportunity to network with other actuarial professionals whom I might not otherwise get to know; for example, the Professionalism Policy Review Coun-



cil reviews proposed changes to the standards of practice, where I routinely collaborate with the regulatory actuaries and auditors in addition to the company and consulting actuaries, to ensure that we capture a diverse perspective. It also helps that the CAS staff is very supportive. What stands out to me most about volunteering is just how much there is to be done. Realizing we all have busy times in our lives when we can't do much volunteering, I'd encourage those who are not at those busy times to volunteer. I'm also supportive of the CAS's plans to add staff to get more work done. Volunteers should still play a critical role in my opinion, but my experience suggests there's way more the CAS should be doing than it can do with the current model."

Michael Speedling (FCAS 2005)

First volunteered in 2009.

Recognized for his work on the Professionalism Education Committee.

"I volunteer for the CAS because it makes me happy to do so. I have benefited from the actuarial community, and by volunteering, I get to give back while interacting with my friends, making new friends and trying new things. It also gives me a sense of accomplishment and allows me to share my experience with other actuaries. The best thing about volunteering is working and building lasting relationships with great, like-minded actuaries while accomplishing goals that benefit other actuaries. What really stands out? The people. They are great! They are engaged and willing to give their time to



help out. They are the best."

Chris Styrsky (FCAS 2004)

First volunteered in 2004.

Recognized for his work on the Exam Committee.

"I enjoy getting to know other Fellows that I would never meet if we weren't volunteering on the same committee. It is a great opportunity to meet individuals within the CAS community, but outside of my discipline. It is impressive to see how many people are dedicated to committing their free time and give back to the organization."



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.

Don Mango (FCAS 1994)

First volunteered with the CAS in 2001.

Through the years, Mango has served on multiple committees, been the chairperson for the Audit Committee, served on the Executive Council, and been a two-time member of the CAS Board of Directors.

"I have found my CAS volunteering efforts, from writing papers and presenting to committees to executive council to the board, to be among the most rewarding and fulfilling experi-



ences of my career. The beauty of the CAS is that it creates almost a seamless career experience, uniting your work world inside your employer with the broader profession and the industry as a whole. [Volunteering provides you with a] chance to contribute and make a difference. The CAS culture of openness, sharing, collaboration and communication is the envy of many other professions. The volunteering platform we have gives members at any career level the opportunity to learn new skills, share knowledge and give back. The whole profession is a shared asset into which we all make contributions and from which we all draw resources and value. Volunteering is how you 'make a deposit.' [Volunteering] is free career development — not easy to find these days. Look at the range of committees, presentations and publications. Find something that interests you, and chances are the CAS has the means to make it happen in the real world. "

Mary D. Miller (FCAS 1998)

First volunteered with the CAS in 1998.

Through the years, she has served on multiple committees, was a member of both the CAS Executive Council and Board of Directors; she is a past president of the American Academy of Actuaries.

Miller's nominator wrote the following about her: "Mary D. Miller has been an FCAS for 21 years, following a number of years spent in teaching. She was the chief actuary at the Ohio Insurance Department and the chief financial examiner as well. She has also been an active actuarial volunteer and a friend and mentor to many within and outside the regulatory community. In addition to her activities with the CAS and

AAA, she was an essential resource [within the NAIC]



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on the Casualty Actuarial Task Force and for several accounting working groups. Mary was busy enough at the Ohio Department to leave the NAIC activities to others, but she always seemed to have time and energy to help with any problem. She's served our profession well in her various roles."

John Purple (FCAS 1981)

First volunteered with the CAS in 1988. *Purple has served on many committees; has chaired the Continuing Education, Ratemaking Seminar and Long-Range Planning Committees; and has served on the CAS Executive Council and Board of Directors.*

"When I attained my Fellowship in 1981, I was working at Aetna Life & Casualty. The actuarial department management team was

very supportive of the CAS, and new Fellows were expected (an unwritten part of our job description) to join a committee

(usually an exam committee). It had taken me almost 10 years to get through the exams and I wanted no part of those committees, so I joined the Continuing Education Committee. I soon learned from the more senior actuaries on the committee the value of committee work and what volunteering meant to the overall success of the CAS. I quickly bought into the idea and have volun-



teered on a committee, board, council or task force every year since then. For the first half of my career I worked for a large company with many actuaries. Volunteering gave me the opportunity to interact with actuaries outside of my company, which broadened my perspective on issues of interest. I also made a number of friendships over the years that continue today. For me, professionalism education has become my area of interest for volunteering. I recognize the importance of our responsibility as professionals to our own self-regulation. After serving on the CAS Discipline Committee and then the Actuarial Board for Counseling and Discipline, I realized the importance of every actuary being aware of their responsibility to the well-being of our profession. This ongoing need to educate other actuaries on their responsibilities under the Code is what drives my current focus on volunteering."

The President's Award

This award recognizes one or more members who, in the opinion of the CAS president have made significant contributions to the profession and 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.

Patricia Teufel (FCAS 1979)

First volunteered with the CAS in 1979.

Teufel is a CAS past president and a dedicated CAS volunteer for over 40 years. She has shared her expertise on everything from the Audit Committee to



the Employer Advisory Council. Having enjoyed a notable career as a leading principal at KPMG, she now continues to give back to the profession as a professor at the University of Connecticut. She is well-respected for her professionalism and integrity, and she is particularly passionate when imparting her knowledge to budding actuaries at the Course on Professionalism. Teufel is also president of the Seasoned Actuaries Section as well as Emeritus Trustee on the Actuarial Foundation Board of Trustees.

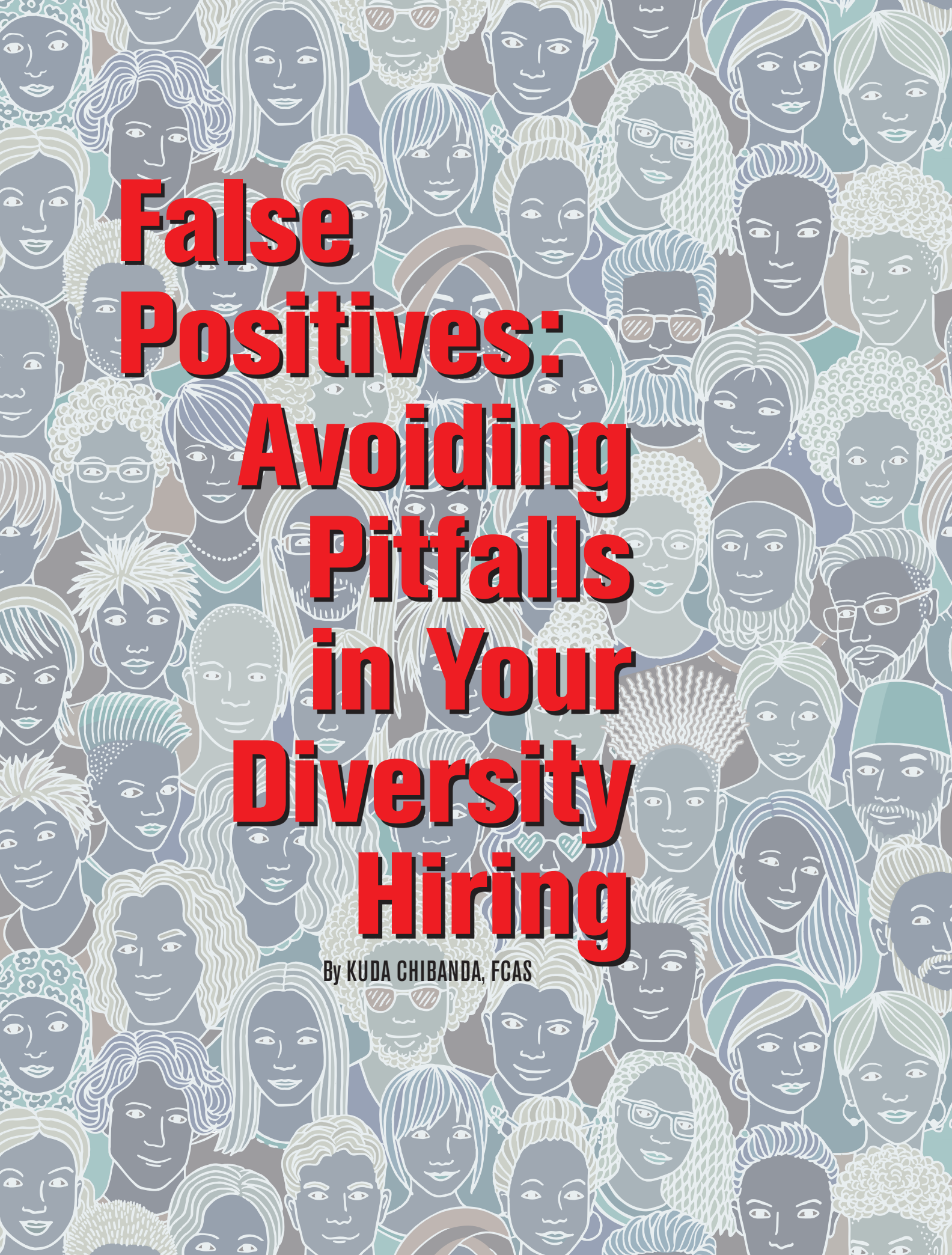
"Initially, volunteering for the CAS was my way of 'paying it forward,'" said Teufel. "In addition to honing key business skills, I have been able to influence the direction and reach of the actuarial profession and the insurance industry. Volunteering is a perfect way to make a difference." ●

Nominate CAS Members for Volunteer Awards

Do you know someone that you believe deserves to be recognized for a CAS Award?

Please visit the CAS website under the volunteer tab (<https://www.casact.org/community/volunteer>), where you can find more information on award eligibility.

The nomination window will open in mid-May 2020, so look for that announcement! In the meantime, feel free to download the forms and fill them out at any time. Once the nomination window is open, we will accept your nomination form. We encourage nominations from any and all members. If you have any questions, email Mikey Bevarelli at mbevarelli@casact.org.



False Positives: Avoiding Pitfalls in Your Diversity Hiring

By KUDA CHIBANDA, FCAS



A deep dive into barriers to recruiting black entry-level talent

There is a misperception that diversity initiatives are unnecessary in the actuarial profession. As the thinking goes, we are a pure meritocracy, where a blind examination system ensures that talent is the only barrier to entry. However, the recent spotlight on diversity has made it clear that we are not immune to diversity challenges, particularly around ethnicity. One need only look at the CAS membership trends¹ to illustrate the issue.

On the following page, Figure 1 breaks down the proportion of CAS members by ethnicity and year. Each bar represents a year, and the proportion of each ethnicity for that year's membership is indicated by different colors. The chart shows that from 2015 to 2018, the proportion of members who identify as white has increased from about 66% in 2015, to about 72% in 2018. During that time, membership has grown from just under 7,000 to over 8,300. In other words, we have become less diverse.

Some may argue that the membership statistics do not necessarily reflect strides made in the entry-level pipeline, where most diversity efforts are concentrated. In order to adequately assess the channel for entry-level hires, we would need to consider company hiring trends. This data is not available, but the closest proxy available is information about Exam P candidates.

In Figure 2 on the following page, the proportion of candidates who identify with each ethnicity are graphed by year. From 2012 to 2014, data provided by the SOA is used. Thereafter, the SOA ceased providing data to the CAS, therefore the numbers are compiled from self-reported CAS candidate data. As such, there is a lag between exam sitting and reporting in the post-2014 numbers. Despite this, the trend shows that the majority of students who take exams identify themselves as white or Asian. Admittedly, the trend also shows a slight increase in the proportion of non-white, non-Asian exam takers. But is a slight increase good enough?

With this in mind, it is a good time for your organization to evaluate whether your diversity strategy is aligned with best practices. The answers to the following three questions can help your organization determine if its diversity strategies are as effective as they could be.

1. Do you focus on achievement or acumen?

There is a glut of actuarial entry-level talent. For every open position, most organizations typically receive dozens of resumes. The abundant supply has led many companies to use exams passed as the minimum threshold for resume review. Actuarial

¹ Data compiled from CAS Annual Reports.

Figure 1. Proportion of CAS Members by Ethnicity and Year

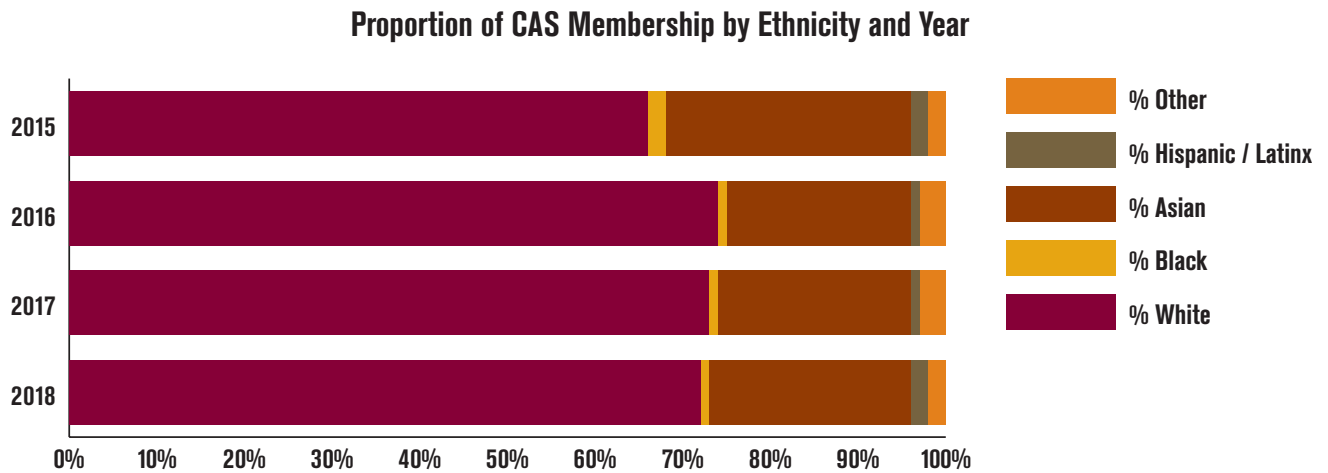
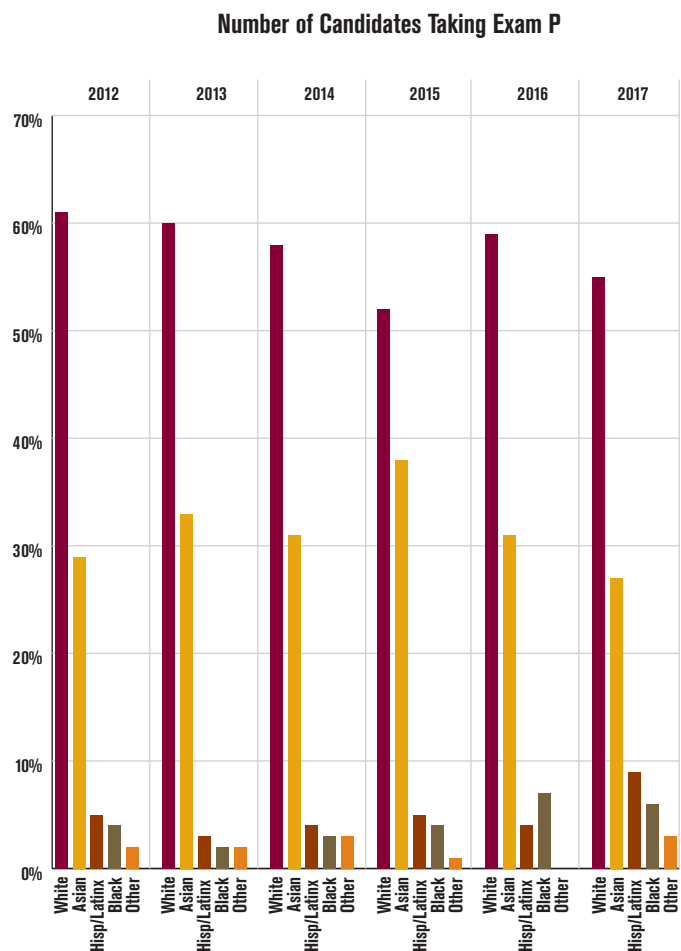


Figure 2. Exam P Candidates by Year and Ethnicity²



² Data compiled from statistics provided to the CAS by the SOA for the period up to and including 2014. Subsequently, candidates self-report data to the CAS, usually when seeking to take the Course on Professionalism or attain membership.



HR departments are routinely advised to seek only candidates with at least one and often two or more exams passed. As Figure 2 shows, however, this threshold is effectively limiting candidates to almost exclusively those who identify as white or Asian. Even if the exam pass rate for minority candidates were 100%, we would still expect that almost 90% of candidates who qualify using exam-only thresholds would be white or Asian. This gap in black and Hispanic/Latinx candidates taking exams was the subject of research conducted by the International Association of Black Actuaries (IABA), the CAS, the SOA and The Actuarial Foundation. Aimed at examining barriers to entry for black and Hispanic/Latinx candidates, the research found that lack of awareness was one of the main reasons we do not see more minority candidates in the pipeline.

So rather than the issue being that minority candidates are not passing exams or do not possess the necessary skills, the concern is that black and Hispanic/Latinx candidates do not find out about the profession until well after their white and Asian counterparts have started taking exams.

For this reason, your organization might consider creating metrics that are geared towards identifying acumen and potential, rather than relying solely on exam progress for selecting candidates. After all, exam progress is not a foolproof way of ensuring that you hire a successful candidate. Many

candidates fly through the exam process, but they do not necessarily make the best workers. Similarly, many candidates struggle to pass exams but are very effective actuarial workers.

What can your organization do to combat the “exams passed” bias?

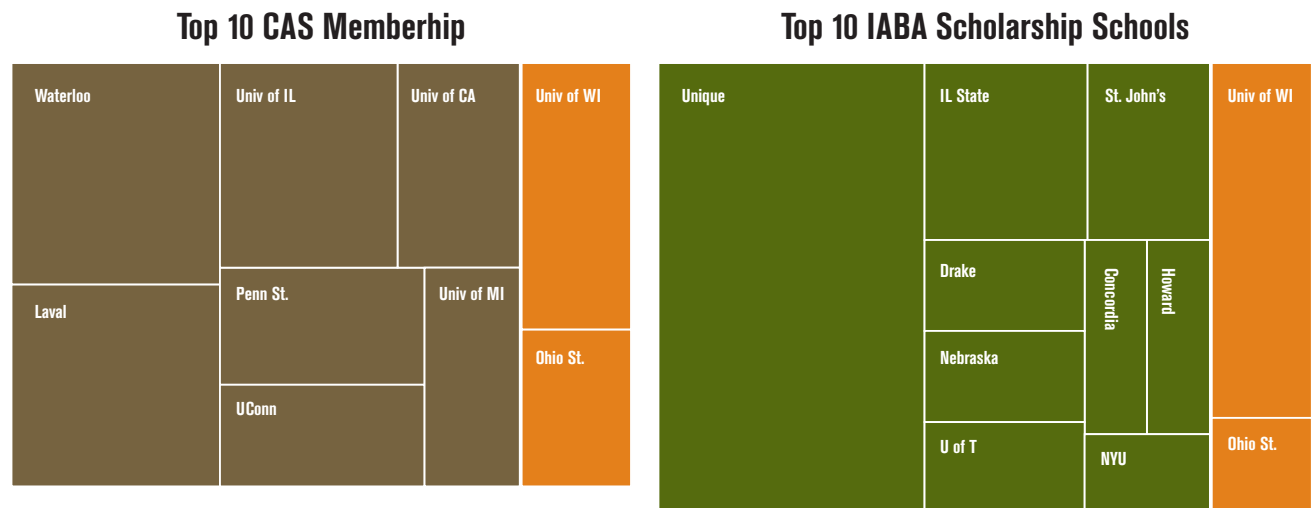
Some companies have adopted a two-pronged threshold, where instead of relying just on exams, the selection criteria can be exams and a combination of grade point average, course work and major field of study. This would ensure candidates still have the adequate background to handle actuarial work, while also relaxing the exam requirement.

2. Where are you looking for talent?

The “feeder school” phenomenon is alive and well in all industries, the actuarial profession included. Organizations typically have schools where they do the bulk of their recruiting, based on alumni concentration or prior favorable experiences. Using only feeder schools, however, actually creates concentration risk and could derail your diversity strategy. Black students often do not attend the schools from which organizations are used to recruiting — another effect of the late awareness. This is illustrated in Figure 3.

In Figure 3, we see the divergence between the most common schools for CAS members versus those for IABA

Figure 3. Top 10 Schools for CAS Membership and IABA Scholarship



scholarship recipients.³ Specifically, the CAS Membership chart shows the top schools for CAS members, with those in orange indicating schools that are also highly represented in IABA membership. Only the University of Wisconsin and Ohio State University appear on both lists. Waterloo and Laval, the two largest feeder schools for CAS membership, have fewer than five black CAS members among their alumni. This statistic may seem alarming, but it may be more indicative of a lower percentage of black students attending those Canadian universities. Figure 3's silver lining could be that IABA scholarships are bringing more awareness of the actuarial profession to the schools that are not the usual feeder schools for future actuaries.

On the IABA chart, we see that the majority of IABA scholarship winners (Unique) come from schools where they are the only IABA scholarship recipients and, often the sole black actuarial candidates. This indicates that diverse candidates often do not attend actuarial schools and may even discover the profession while attending a school that does not have any actuarial presence at all. In order to find such candidates, organizations

will have to venture out of the comfort zone of actuarial feeder schools. This can be done in a variety of ways, one of which is sending representatives to the IABA Annual Meeting (more on this later), where a career fair affords sponsorship companies the opportunity to recruit candidates.

Figure 3's silver lining could be that IABA scholarships are bringing more awareness of the actuarial profession to the schools that are not the usual feeder schools for future actuaries.

3. How does your company provide support?

Most companies will naturally focus on backing initiatives that have a direct, causal relationship with advancing their diversity representation. With a landscape where less than 1% of our profession is black, however, it makes sense for organizations to consider supporting the general pipeline in addition to hiring trends. For example, what representation does your company have at the IABA Annual Meeting? As mentioned previously, the meeting is a unique opportunity to recruit top diverse talent. But there are many other benefits

to having a presence at the meetings. Anecdotal evidence suggests many organizations are struggling with retention of black actuaries. The "Barriers to Entry" research suggests that lacking a support system could result in higher attrition rates

³ Figures for Top 10 CAS Members were provided by the CAS Office. Those for Top 10 Schools for IABA Scholarship recipients were compiled from the detailed list of scholarship recipients since 2000, https://cdn.ymaws.com/www.blackactuaries.org/resource/resmgr/docs/programs&events/scholarships/iaba_scholars.pdf. Repeat recipients were only counted once.

Portrait of an IABA Scholarship Recipient

Efua Mantey differs from many International Association of Black Actuaries (IABA) members in that she had heard about actuarial science prior to applying to colleges. Further distinguishing her from many of her IABA peers, she was fortunate to have a parent who was familiar with the profession — someone who could answer her myriad questions. Drawn to how the actuarial profession applies mathematical principles to solve real-life problems, Mantey set out on her path to become a credentialed actuary.

Originally from the West African nation of Ghana, she describes her fellow Ghanaians as hospitable and loving. Mantey, whose first name means Friday in Fante, one of the many local Ghanaian languages, loves cooking and singing and spending quality time with her family and 17-month-old daughter. Ghana's warm climate, rarely getting colder than 70 Fahrenheit, differs considerably from her current home in Boston, Massachusetts, where she has worked at Liberty Mutual Insurance in predictive modeling for the past seven years. She is currently a senior actuarial analyst.

She stumbled upon the IABA when researching scholarships as she prepared to enter graduate school at

Ball State University in Muncie, Indiana. Winning the IABA Scholarship in 2012 allowed her to attend the IABA Annual Meeting for the first time. The experience afforded her the opportunity to meet and interact with other people in the same field.



“The connections I made at my first IABA Annual Meeting and subsequent meetings have served as a strong support base that has cheered me on when I passed difficult actuarial exams,” said Mantey. Her connections “cried with me when I had to retake exams and encouraged me through challenging work experiences,” she explained. Mantey feels the network that IABA provided helped build a crucial foundation of support. “It’s very easy to feel like the only black actuary at work, so it’s nice to connect with other people just like me.”

Although it’s been several years since Mantey received the IABA Scholarship, she continues to attend IABA Annual Meetings. She earned her ACAS designation in 2017 and has been serving as a volunteer with IABA since her scholarship award. She has since shifted from leader of the IABA Newsletter Committee to her current role as co-leader of the IABA Boston City Affiliate.

for black and Hispanic/Latinx candidates. One way to provide the support system that your diverse candidates need is to get involved in the IABA Annual Meeting, scheduled for July 30 through August 1 in Philadelphia.

In addition to its annual meeting, IABA has many programs that seek to increase the number of black actuaries. These include the scholarship and boot camp programs that have had a meaningful impact on exam progress for black candidates, as shown in Figure 4 on the following page.

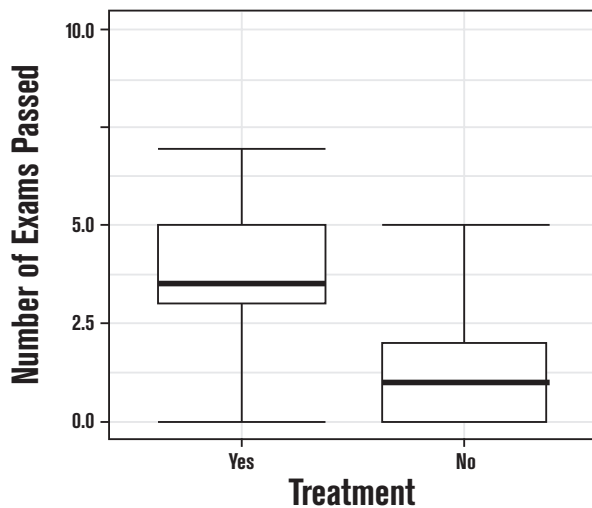
Figure 4 represents the results of an assessment that IABA made of the scholarship and boot camp programs covering 2012-2017. Completed in July 2019, the evaluation compares the number of exams passed by IABA Scholarship recipients

or Boot Camp attendees or both (Treatment Yes) with those who did not participate in either program (Treatment No). Scholarship recipients and boot camp attendees passed a significantly higher number of exams than those who did not participate in the programs (median of three exams versus one, respectively).

It is impossible to know if those who were part of the programs would have passed as many exams without participating. The control group, however, was chosen to have as many similar characteristics to the programs’ participants as possible (gender, school, residency), such that the two groups are roughly comparable.

If your organization is willing to support the scholarship

Figure 4. Exam Progress for IABA Scholarship and Boot Camp Recipients⁴



The boxplots show IABA members who were awarded scholarships or selected for boot camp participation (marked by “Yes” on the Treatment scale) versus those who were not (marked by “No” on the Treatment scale).

program, you may have access to talent with a high likelihood for success — another finding of the study was that 75% of scholarship recipients end up achieving at least an ACAS or ASA during their careers. Note that access to scholarship recipients and boot camp participants is available to companies who join IABA’s Corporate Advisory Council (CAC), a funding group made up of corporate sponsors that counsels IABA with ideas, strategies and feedback. CAC also helps other member corporations develop strategies to retain, develop and advance their minority talent.

Visa sponsorship is yet another consideration. There is no denying that diverse talent often requires employment sponsorship. For some organizations, this is a no-go area because of company-wide restrictions. For others, a case-by-case evaluation is made. Others still have sponsorship-blind recruitment. Regardless of where on this spectrum an organization falls, it is important to consider the impact that a company’s stance on visa sponsorship will have on its diversity recruiting goals.

Not a Needle-in-the-Haystack Proposition

The process of recruiting diverse talent can seem daunting,

Get Involved with OLA!

The Organization of Latino Actuaries (OLA) is looking for volunteers who can help Latinx actuarial candidates make their way through the job search process. OLA candidates are eager to connect with actuaries and actuarial students, and they are grateful for any help you can provide.

This year the organization launches the OLA Academy, a webinar series on the various aspects of searching for actuarial jobs. OLA needs volunteers to review resumes and conduct mock interviews. Volunteers will be matched with two participants a month from March to August, based on volunteers’ availability. Those available for only a month or two are also encouraged to sign up.

OLA’s mission is to increase the number of Latinx actuaries by promoting the profession, providing guidance, mentorship and networking opportunities. To volunteer for the OLA Academy, submit an online form at <https://form.jotform.com/200536962658160>. Questions can be sent to LatinoActuaries@gmail.com.



but it is really quite simple. Make some strategic moves in your recruitment methods and you can find yourself making strides towards achieving your diversity goals. If enough organizations employ these approaches, we can become a profession that better reflects the society in which we operate.

For more information on IABA and quick links to its 2019 Annual Meeting sessions, visit <https://www.blackactuaries.org/mpage/2019AnnualMeeting>. ●

Kudakwashe F. Chibanda, FCAS, is director, data science for The Hartford in New York City. She currently serves on the CAS Board of Directors.

⁴ Taken from the Assessment of IABA’s Scholarship & Boot Camp Programs: An Empirical Analysis.

The Insurance Industry and the Future of Talent — The Results of the Gamma Iota Sigma Student Recruiting Survey

Being in the business of risk, the insurance industry should not take talent risk lightly. In case you missed it, talk of a talent crisis has loomed for years. Studies and statistics point to a significant workforce reduction thanks to baby boomers' ongoing waves of retirement. By no means is insurance the sole industry to face this phenomenon, but the industry is being hit particularly hard because of decades-long challenges in asserting its brand position and appeal on a global scale. It's time for the insurance industry to get out in front of entry-level talent and to tell its incredible story in a compelling way.

So, what can be done to meet hiring and retention needs? The answer is complex for many reasons. One contributing factor is that new and different hiring practices are needed. Advances in artificial intelligence, other automation and emerging technologies, as well as the burgeoning segment of insurtech, dictate the need for a hiring overhaul. From a talent pipeline perspective, something is already being done to mitigate this large-scale workforce disruption that has significant support among like-minded partners, but it needs the industry's widespread attention to grow.

A Collegiate Beacon of Talent

For over 50 years, Gamma Iota Sigma (GIS) has fueled the insurance industry's talent ranks through a full complement of world-class programs. GIS has partnered with faculty and university programs to cultivate a robust talent pipeline across all industry segments and functional areas. GIS is committed to showcasing the industry's breadth of opportunity to students of all backgrounds. GIS is 5,000+ student members strong and is made up of all majors hailing from over 90 colleges and universities across North America. Considered the industry's collegiate talent beacon, GIS is uniquely positioned to aggregate, analyze and present the student perspective on the recruiting process, and it has gathered compelling data to inform how the industry can best reach, recruit and retain top talent.

More than 725 students and recent college graduates from 76 schools participated in the 2019 GIS Annual Student Recruiting Survey, which was presented to GIS Sustaining

Partners and talent advocates during the GIS Annual International Conference in the fall of 2019. The results were widely distributed in a comprehensive infographic and a webinar that show key insights and trends and actionable takeaways for the industry. Following are a few insights gleaned from the survey results.



Exposure is the Dominant Change Agent

A little exposure can go a long way, but a lot of exposure can go even further. Internships, campus speakers, faculty and career-related events have been significant factors in beckoning students to an actuarial career. It's a strategic move for insurance companies to have substantial presence on college campuses. The relationships established there can be a vital source of talent. GIS presents a full complement of year-round single-access-point programming in both live and virtual formats to meaningfully connecting students with opportunities throughout the industry. Registration is open for the Annual International Conference, a forum designed to connect with, develop and recruit the rising generation. The conference includes the largest career fair of its kind and has been attended by over 650 students of all majors from 65+ colleges and universities.

GIS chapters are also doing their part by engaging student members to serve as GammaSAID diversity and inclusion (D&I) officers. A student-led initiative, GammaSAID offers a best practices framework for making D&I part of everyday conversations, intentions, outreach and events, all while promoting the profession among other majors and student groups.

GIS has also launched One Campus At A Time, an outreach program supported by Chubb and Spencer Educational Foundation, who are Lead Partners and GIS Sustaining Partners. The program incorporates industry insights from the Insurance Information Institute (I.I.I.) into ready-made resources to connect with students. A cornerstone of this ini-

tiative, Boots on the Ground Month, is a call to action for insurance professionals to go to schools to tell the stories of their careers. The program runs throughout the month of October, but those looking for talent need not limit their efforts to just special months.

Two other takeaways from the survey show that it's never too late to change a career path (many juniors and seniors do change their majors) and that majors other than actuarial science are not barriers to entering the profession.

Percentage rankings of survey respondents' top three choices for engaging with potential employers on campus.

75% rank career fairs in top 3
(47% rank as #1)

61% rank on-campus interviews in top 3
(13% as #1)

46% rank info sessions in top 3
(8% as #1)

Other notable on-campus engagement preferences are chapter/club and classroom visits.

Internships: Critical Building Blocks

Internships are like test drives for students and employers: Interns can determine if they would be happy with the work, and companies can evaluate whether the students would be good employees.

Although deemed valuable investments for students and employers, internships are not that plentiful nor are they offered in all functional areas. The GIS survey results show that 58% of seniors and recent grads report having had one or no internships. GIS recognizes this as an opportunity to improve.

Beyond the Annual International Conference and campus-specific programming, another upcoming national event is the Leadership Symposium, which begins the academic year convening a group of 120 chapter leaders. Two GIS events that just concluded, the Regional Conference Series on January 24-25 and The Pipeline Virtual Career Fair on February

Open floorplans and work-from-home options tick all the boxes and can add up to considerable organizational and operational cost savings for employers. But it is a misstep to accept prevailing stereotypes as defining the rising generation.

11, showcased many internship opportunities and resources available to students. Internships are always free to post on the GIS Career Center, an industry-wide resource and forum exclusively for internship and entry-level opportunities across all functional areas. Companies are welcome to take advantage of all of these GIS platforms.

Debunking Generational Stereotypes

Over the past decade, employers have striven to attract talent by appealing to perceived notions of workers' modern preferences. The advent of open floorplans and work-from-home options tick all the boxes and can add up to considerable organizational and operational cost savings for employers. But it is a misstep to accept prevailing stereotypes as defining the rising generation. Employers often think that modern talent prefers a more virtual recruiting environment too. The survey data, however, shows otherwise.

While 61% of respondents conducted their initial job searches on online career platforms, only 15% credited these as the ultimate source for an internship or full-time position. Students valued tangible relationships, career fairs, alumni and faculty networking, and internships far more as means for getting their jobs. Students are also attuned to diversity and inclusion considerations for their prospective employers. Sixty percent indicate that a commitment to and demonstration of diversity at all levels of the company is important, and 52% stress demonstrated fairness in recruiting practices.

Conclusion

Students entering the workforce want much the same thing as the rest of us: a fulfilling, growth-oriented and stable career.

The insurance industry can offer this kind of career, but it must revolutionize the way that it recruits and sustains a robust, diverse talent pipeline.

For more information on GIS, visit <https://www.gammaio-tasigma.org/>. ●

Coronavirus Spread Reveals Coverage Gaps

By ANNMARIE GEDDES BARIBEAU

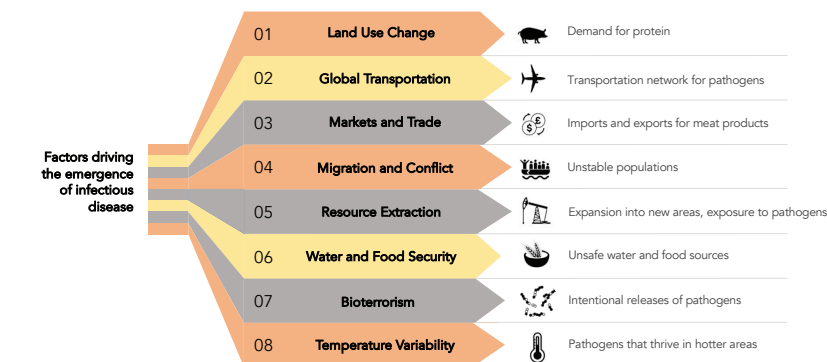
Although the coronavirus first diagnosed in China's industrial city of Wuhan is continuing to spread worldwide, experts predict its impact on the property-casualty insurance industry will be minimal. But that does not mean that the pathogen, known as the 2019 novel coronavirus (COVID-19), should be ignored.

At press time, COVID-19 has the potential to become a pandemic according to the World Health Organization (WHO), which is calling for \$675 million to cover a global preparedness and response plan.¹ COVID-19 is often compared to severe acute respiratory syndrome (SARS), which raised panic in the early 2000s. Both airborne illnesses initially spread from animal to person, then person to person.

There are two observable differences between COVID-19 and SARS. For starters, the total number of cases for COVID-19 has reached 93,164, according to WHO, with thousands being added to the count daily. While cases have been reported in 77 countries, most of the victims are in China. At press time, the illness so far has caused 3,199 deaths, a 3.4% case fatality rate.^{2,3}

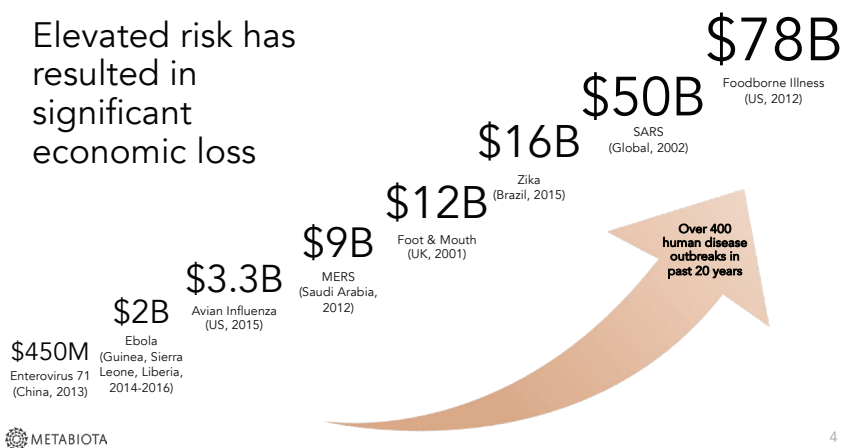
From late 2002 to the summer of 2003, SARS spread to about 8,000 people, causing 774 deaths or a case fatality rate of 9.6%. Victims were predominantly in China, but the pathogen spread to 26 countries.⁴ The total estimated economic impact of SARS was about \$50 billion according to Metabiota, which

What's Driving Epidemics and Pandemics?



METABIOTA

Elevated risk has resulted in significant economic loss



METABIOTA

tracks and anticipates the social and economic repercussions of pathogenic microbial agents. Another coronavirus, the Middle East respiratory syndrome (MERS), affected 27 countries and killed 858 people, or 35% of the 2,494 victims, according to WHO.⁵

How far a disease spreads and the resulting fatality rate also depend on the originating country's ability to combat it. Chinese officials have initiated the most extensive quarantine in history, requiring about 60 million citizens to remain in

¹ <https://www.who.int/news-room/detail/05-02-2020-us-675-million-needed-for-new-coronavirus-preparedness-and-response-global-plan>

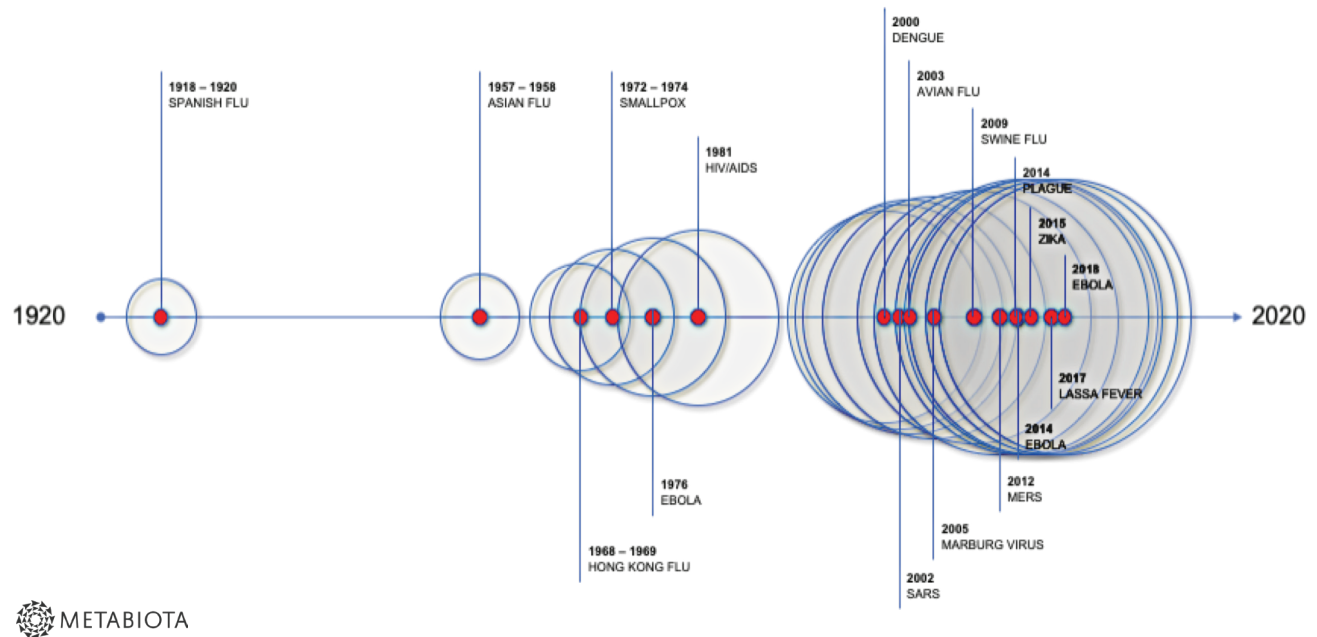
² <http://who.maps.arcgis.com/apps/opsdashboard/index.html#/c88e37cfc43b4ed3baf977d77e4a0667>

³ <https://www.epidemictracker.com/2019-Novel-Coronavirus-2019-nCoV>

⁴ https://www.who.int/csr/sars/country/table2004_04_21/en/

⁵ <https://www.who.int/emergencies/mers-cov/en/>

Deadly, costly and increasingly frequent threats



lockdown to quell the spread of the highly contagious pathogen. There are concerns that China did not call for the police-enforced quarantine soon enough, however. There is also a suspicion that the country is not being entirely forthcoming. “We don’t exactly know when the outbreak started in China. It is still at the beginning of the outbreak,” says Cathine Lam, a property-casualty actuary at Metabiota who joined the company after seeing the impact of SARS (see *AR* Nov/Dec 2017).

P&C Implications

In an interconnected world, the economic implications of COVID-19 are expected to affect transportation, hospitality, retail, manufacturing and other sectors. However, there will be little impact on P&C insurance, says Robert P. Hartwig, clinical associate professor at the Finance Department and director for the Center for Risk and Uncertainty Management at the University of South Carolina. Commercial property and business interruption coverages generally restrict coverage to perils involving physical damage, he explains.

Few workers’ compensation claims stem from occupational diseases of any sort. Travel insurance could honor claims if the disease was contracted while visiting China, or a flight was cancelled by an airline or a government.

Due to the current epidemic, insurance brokers are also becoming more interested in offering related coverage to their

customers, Lam says. Yet, insurers in general have a limited appetite for covering non-physical damage, says Christopher Lang, global placement leader, U.S. & Canada, for Marsh LLC. Working with customers desiring the coverage “tends to be a sophisticated conversation,” including a “parametric type” of policy language. Marsh offers a product tied in with Munich Re and Metabiota called Pathogen RX which provides business interruption coverage for outbreaks.

Actuarial Involvement

Actuaries can play a role in expanding business interruption insurance to cover disease outbreaks. “Insurers and actuaries should monitor the spread of the virus and identify any possible vulnerabilities,” says Hartwig. “Contingency plans should be developed in the unlikely event the virus reaches epidemic proportions in the U.S., where lines such as workers’ compensation and event cancellation could be most impacted.”

Lam also encourages actuaries to contact her for more information. “I don’t like to see history repeat itself,” Lam says. “There is a pattern of economic losses, and I feel insurance actuaries can find relief for a lot of these losses.” ●

Annmarie Geddes Baribeau has been covering insurance and actuarial topics for nearly 30 years. Find her blog at www.insurancecommunicators.com.

New CCRMPs Discuss Worldwide Catastrophe Management and Climate Change

Actuarial Review January/February 2020 featured an interview with four CAS members from the inaugural class of experienced catastrophe risk management professionals. They have been recognized by the International Society of Catastrophe Managers and The CAS Institute with the new Certified Catastrophe Risk Management Professional (CCRMP) credential. In this issue, iCAS Director Amy Brener talks with Minchong Mao, Stephen Mildenhall and Rade Musulin about the international aspects of catastrophe management and how the profession is addressing climate change.

Amy Brener: Steve, when we first met, you were based in Singapore. Minchong, you travel frequently to China, and Rade, you moved from Florida to Australia. How do the cat risk credentials apply worldwide?

Steve Mildenhall: Catastrophe risk management is a global phenomenon. Catastrophes happen almost everywhere. The reinsurance industry in particular is very much a global industry that pools risk worldwide. My former firm had cat modelers in all the major insurance centers, as do lots of other companies. While the specifics of the perils vary — maybe some places call it hurricane, some call it typhoon — there are a lot of similarities within the perils. Moreover, there is almost complete similarity within the processes of data aggregation, data preparation, running the models, transformation and communication, etc. CCRMP is a credential that can be used globally. The employers of cat modelers are global, and I think they



Mao

will appreciate having a credential that is the same throughout the world.

Minchong Mao: The level of practice in catastrophe risk management is quite different among countries. Each country has different priorities and socioeconomic conditions. As a result, catastrophe risk management practices in some countries may not be as mature as in the U.S. The CCRMP designation may serve as a catalyst for the development of education curriculums, regulations and additional regional catastrophe models for developing countries, and promote the best cat risk management practices worldwide.

Each country has different priorities and socioeconomic conditions. As a result, catastrophe risk management practices in some countries may not be as mature as in the U.S..

Rade Musulin: Earlier in my career, I worked in reinsurance across Asia Pacific. I saw examples of good risk management like the New Zealand earthquake, and others where major risks were poorly understood, like Thailand, where there were terrible floods and huge losses that surprised everyone.



Mildenhall

In Thailand, people mistakenly thought that because the risk wasn't modeled, it didn't exist. Cat risk awareness has great social benefits in terms of preparing for events.

AB: Rade, can you discuss how regulators view catastrophe risk in Australia and the role that actuaries play in the process?

RM: After several very serious events about ten years ago, the Australian Prudential Regulation Authority (APRA) signaled that it expected boards and senior management to demonstrate a clear understanding of catastrophe risk to comply with risk management standards



Musulin

and financial condition reporting. This meant that actuaries preparing capital adequacy reports for firms where extreme events pose a material risk needed to ensure they had a solid understanding of catastrophe modeling and risk management. The existing syllabus did not have requisite material, requiring an

— Minchong Mao

effort to train actuaries and demonstrate expertise. The CCRMP credential is a way of addressing situations like that.

In addition, rating agencies like AM Best and S&P have strengthened their requirements for disclosure of catastrophe risk and articulation of an insurer's cat risk management regime where material catastrophe risk exists. There are some significant capital charges associated with catastrophes. This credential can help an actuary demonstrate expertise in this key area and improve

wrong in another sense, in that catastrophe risk is one of the most important tail risks the insurance industry faces and understanding and managing that risk is at the core of our actuarial mission. This credentialing process recognizes that.

AB: How does climate change fit into the cat management arena?

RM: The importance of understanding catastrophe risk management will grow in the coming years, as climate change risk assessment becomes a core requirement of shareholders and regulators.

insurers in particular, you need a strong foundation of cat risk management, for example to understand the impact of warming seas, poleward migration of tropical cyclones, or stalling events such as Harvey and Dorian.

There is a social problem that needs to be solved dealing with what I refer to as the "mitigation gap." Hurricanes are likely to become more intense in places like New Jersey and New England due to warming seas and other reasons, yet building codes are not being strengthened quickly enough. In Florida, we saw the chaos that was caused when Hurricane Andrew hit, exposing poor construction practices. You can use catastrophe modeling technology to forecast the effect of future climate scenarios on the housing stock in places like the northeast U.S., and work to "future-proof" building codes — for example, by elevating properties for rising sea levels to cut down losses in the long run.

The strong foundation in catastrophe risk management and modeling underlying the new credentials will position holders of the new credentials to address these issues.

A subsidiary of the Casualty Actuarial Society, The CAS Institute (thecasinstitute.org), provides educational opportunities to quantitative specialists in specific areas, including predictive analytics and data science, and catastrophe risk management. The first iCAS credential, the Certified Specialist in Predictive Analytics, has been awarded to more than 260 members. For more information on the CCRMP and Certified Specialist in Catastrophe Risk (CSCR) credentials, visit CatRiskCredentials.org. ●

You can use catastrophe modeling technology to forecast the effect of future climate scenarios on the housing stock in places like the northeast U.S., and work to "future-proof" building codes.

— Rade Musulin

rating agencies' confidence in a firm's risk management, which strengthens the case for strong ratings.

Until now, none of the major global actuarial associations have had a clear syllabus of material on this topic, particularly in countries where actuaries work across life, health and general (casualty). Further, there has been a view among some segments of the actuarial community (particularly in some other countries) that catastrophe risk modeling is not an "actuarial" area and instead should be the province of scientists, engineers and software developers. That is true in one sense, in that actuaries alone do not possess the breadth of expertise required to evaluate exposure to extreme events — a multidisciplinary approach is needed. But that view is

There is a huge emphasis on climate risk globally. While the U.S. is still debating the issue, most other countries have moved on and are requiring a range of climate risk assessments and disclosures that actuaries will be a key part of.

In my current job, I lead the climate risk practice for an actuarial firm in Australia. Insurers and other financial institutions around the world are beginning to make extensive disclosures to shareholders and regulators about not only the physical risk posed by climate change but also the transition risk associated with decarbonization and the resulting economic transformation that will occur over the next 20-30 years. As a prerequisite to be able to understand a lot of the impact of climate change on the financial services industry, and

ETHICAL ISSUES

I've Moved On

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

Claire is excited. She got to walk across the stage at the Spring Meeting to receive her Fellowship diploma. As if that wasn't enough, she was hired by Fleabag Insurance Ltd. three months ago as its in-house appointed actuary. As part of her new role, she is to provide and sign the company's Statement of Actuarial Opinion for submission with its financial statements. Fleabag terminated its contract with the former appointed actuary, Boo, an independent consultant, when it decided to hire an in-house appointed actuary.

Claire is reviewing Boo's work and finds that there are some issues with his analysis. She can't find all of the underlying spreadsheets and much of the analysis is only available in the actuarial report. She attempts to contact Boo by phone and email, but he is unresponsive. When he finally responds to one of Claire's emails, he doesn't address any of her questions or concerns.

Claire is frustrated. She wants to do well in her new position, but she needs to reconcile Boo's work before she can complete her analysis. She decides to talk to Martin, her boss/Fleabag's CFO, to get some more information about Boo.

Martin tells her that he is disappointed that she is having difficulty fol-

lowing Boo's work because Boo assured him that everything was in order when they parted ways.

"Well, I reviewed your work from last year and I'm having difficulty explaining the discrepancies in the

What is Claire to do? . . . Is Boo required to cooperate with Claire and provide her the requested documentation?

Claire explains that some of the numbers in Boo's underlying workpapers differ significantly from those in the actuarial report and that she isn't able to find all of the spreadsheets used to develop the exhibits. Claire tells the CFO she tried to contact Boo, but he said he was too busy and didn't have time to talk to her.

"Sounds like we have a problem," Martin tells Claire. "I will reach out to Boo and let him know that I expect him to cooperate with you in resolving any issues."

"Thanks. Let me know when I can reach out to Boo."

The following week, Boo calls Claire. "Hi, Boo," she says. "Thanks for taking the time to talk to me and answer my questions."

"Yeah. I'm mad that you went to the CFO," he tells her. "I would eventually have found time to talk to you. What's so important?"

workpapers as compared to the actuarial report," says Claire. "I also need to understand the justifications for your assumptions and selections. It would be helpful if I could get the spreadsheets for the exhibits that weren't part of the documentation you provided."

"Those spreadsheets are the proprietary property of my consulting firm. You'll have to develop your own or have Fleabag compensate me for providing them. I can't just hand them out."

"Hold on!" Claire exclaims. "Those spreadsheets were developed while you were working for Fleabag. We should be able to use them."

"Not all of them. Some of them were developed for engagements with other clients and not specifically for Fleabag. I will not give you those."

"OK. Then can you walk me through the workpapers so I can understand how you got to some of your numbers? The documentation wasn't sufficient for me



to make an objective appraisal of your work.”

Boo is obviously getting very irritated with Claire. “What is your problem? Nobody has ever questioned my documentation before. I don’t have to spend time with you without getting compensated. I’ve got another client now,” Boo says. “I don’t know if they will want me helping out an old client. They may see it as a conflict since they are competitors.”

Claire is also getting exasperated with Boo’s reluctance to help. “It is your report! You have a responsibility to your principal, in this case, Fleabag, to assist in a review of your report as stated in Precept 10 to the CAS Code of Professional Conduct.”

“Well, that’s your opinion. I will talk to my current client and think about this before talking to you again. Goodbye!” Boo says as he slams down the phone.

What is Claire to do? Is Boo in violation of Precept 10? Does the quality of Boo’s work suggest that he’s violated of Precept 1? Is Boo required to cooperate with Claire and provide her the requested documentation?

Yes, Yes and Yes.

CAS Code of Professional Conduct Precept 10 states: “An Actuary shall perform Actuarial Services with courtesy and professional respect and shall cooperate with others in the Principal’s

interest.” Annotation 10-5 further states: “When a Principal has given consent for a new or additional actuary to consult with an Actuary with respect to a matter for which the Actuary is providing or has provided Actuarial Services, the Actuary shall cooperate in furnishing relevant information.”

Precept 1 states: “An Actuary shall act honestly, with integrity and competence, and in a manner to fulfill the profession’s responsibility to the public and to uphold the reputation of the actuarial profession.”

Actuarial Standard of Practice No. 41–Actuarial Communications, Section 3.2 Actuarial Report states: “The actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary’s work as presented in the actuarial report.”

Actuarial Standard of Practice No. 41–Actuarial Communications, Section 3.8 Retention of Other Materials states: “An actuary should consider retaining sufficient information for any recurring project so that another actuary could assume the assignment.”

No, No Comment and No!

Precept 10, Annotation 10-5 states: “When a Principal has given consent for

a new or additional actuary to consult with an Actuary with respect to a matter for which the Actuary is providing or has provided Actuarial Services, the Actuary shall cooperate in furnishing relevant information, *subject to receiving reasonable compensation for the work required to assemble and transmit pertinent data and documents* [emphasis added].”

Annotation 10-5 also states: “The Actuary need not provide any items of a proprietary nature, such as internal communications or computer programs.”

Precept 7 states: “An Actuary shall not knowingly perform Actuarial Services involving an actual or potential conflict of interest unless: (b) there has been disclosure of the conflict to all present and known prospective Principals whose interests would be affected by the conflict; and (c) all such Principals have expressly agreed to the performance of the Actuarial Services by the Actuary.”

Actuarial Standard of Practice No. 41–Actuarial Communications, Section 3.8 Retention of Other Materials states: “If . . . a report does not include all of the supporting information identified in this ASOP, the actuary should consider retaining the supporting information that was not included in the report. The actuary is not required to create additional documentation for this purpose.” ●

IN MY OPINION By GROVER EDIE, AR EDITOR IN CHIEF

Applying Insurance Principles to Time Management: Part 2

In a prior column, I mentioned some of the ways I used insurance principles in time management. Since then (perhaps as a result of having more time), I've come across a few more methods of saving time and, in a sense, money.

Avoiding a concentration of risks

Insurers like to spread risk and avoid concentrations of risk. Having only a single resource can cause problems if something happens to the availability of that resource. Often, the company's information technology (IT) department is the only source for the data we use, and there is little we can do about that issue. At several companies, I established a "data extraction" team within the actuarial department that was able to directly get the data we needed, without IT's involvement. We still had a single source for our data, but we controlled it.

Prudent manufacturers have an alternate supplier for their parts and materials. Some buildings have a second power source in the event that their primary one fails. Similarly, I prefer to have a secondary vendor, already vetted, for crucial functions. This often comes in the form of two or more individuals who can perform a critical task, or critical software installed on multiple machines to prevent a crash from shutting down a critical activity.

I learned the hard way to never have only one person who can do an important task. ALWAYS have a backup, if for nothing else than to review the first person's work. You have a power backup

and a data backup for your computer — why not a backup for people doing critical tasks?

Business interruption

Prevention is a great form of loss control. My loss prevention involves keeping my antivirus and other cyber protection

not in the middle of the night when one of them starts chirping. (Or when you are out of town and your spouse can't reach the one that goes off. See "How Documentation Saved Me," my IMO in *Actuarial Review* September-October 2017.)

Life seems to have its interruptions,

I learned the hard way to never have only one person who can do an important task. ALWAYS have a backup, if for nothing else than to review the first person's work.

tools updated. But there are personal "business interruption" events as well:

You get called for jury duty.

You get sick.

Your kid gets sick.

Your coworker gets sick.

Your IT department has a rush job that delays your data.

Your office has a fire.

Your town is affected by severe weather (hurricane, tornado or flood).

With perhaps the exception of an office fire, these events are beyond your control. Building some slack into timelines to account for such potential events can help you meet a deadline, but it is not always possible. Being able to work through an interruption by working remotely, for example, is another means of handling such an event.

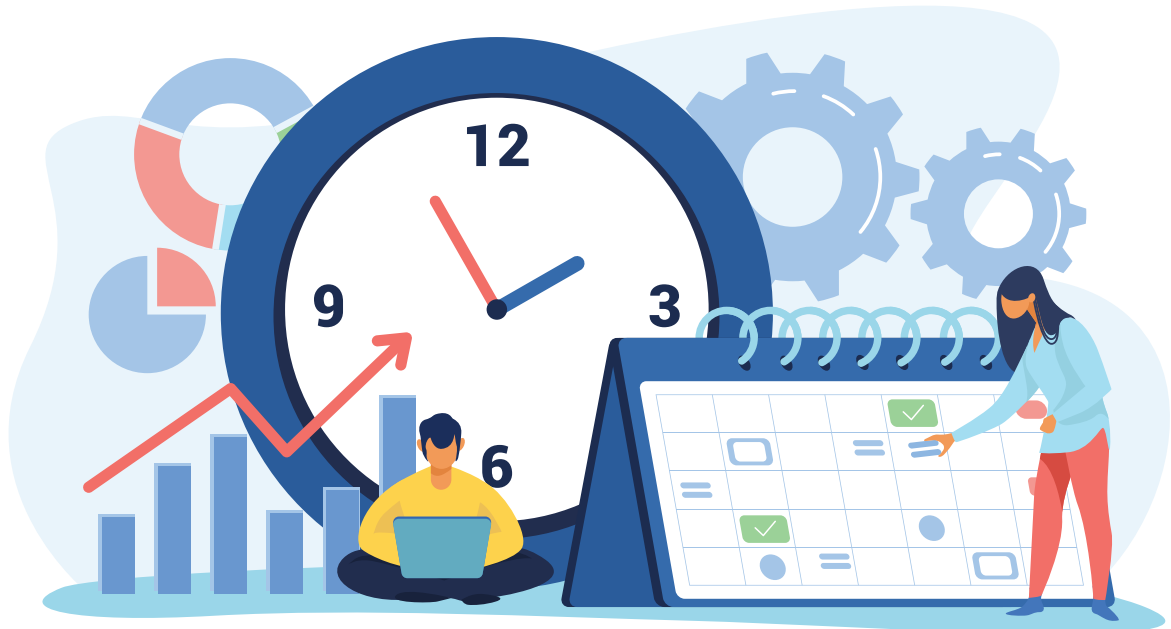
Scheduling routine maintenance items, such as replacing the batteries in your smoke detectors, enables you to do the maintenance on your schedule —

and you can't predict them. You can handle routine maintenance tasks when you have some slack in your schedule, so such interruptions will have less of an impact on your deadlines.

Business resumption

The business resumption function in the companies that I worked for had a lot of responsibilities. All of the individuals on the resumption team, as well as their backups, had manuals outlining their duties. I like to keep a similar manual for my personal work, with to-do items like regularly backing up my electronic files.

We can apply business resumption techniques to projects as well. Knowing I'll likely be doing the same analysis next quarter or next year, my documentation works like a "business resumption" plan. An actuarial report goes a long way to provide the business resumption documentation I need to restart the project a quarter or year later, but some



items, written like a cookbook, complete with ingredients and steps, can make it easier. Instead of “Preheat oven to 350 F,” it’s “Request report XYZ from IT one week following the close of the quarter’s books” as the first step in the actuarial analysis.

In those situations when your work stops, there needs to be a means of “re-starting” the project: a business resumption plan.

In those situations when your work stops, there needs to be a means of “re-starting” the project: a business resumption plan. We all stop working every day, only to pick it back up the next day or after the weekend. At the end of the day, I tend to write up a to-do list for the next workday — a sort of business resumption list. Occasionally a project will pause for days, weeks, or even months. (I am awaiting additional data

on one of my projects from a client as I write this. Hopefully, I have documented the project well enough that I can pick up where I left off, with minimal effort, when I get the data.)

Think of your routine rate and reserve work — once it is done, it doesn’t

happen again until the next month, or quarter, or even a year or more. You have completed the task, but it will recur, so it is similar to an interrupted project waiting for data. If you think of it as an “interrupted project,” it has a different meaning and a different approach. Again, proper documentation will do wonders for your ability to pick up the task.

Reinsurance

There are times that a company can successfully and profitably write more business, but financial restrictions keep it from doing so. In such instances, reinsurance can provide the needed extra capacity. Just like reinsurance can help the company handle capacity and volume issues, consultants and other services can operate to manage work capacity needs. Just don’t forget that, like reinsurance, not all of the burden gets passed on to the consultant. There is some work you need to do to make the engagement successful.

Now it’s your turn. What insurance and risk management techniques can you apply to your own time management? ●

IT'S A PUZZLEMENT By JON EVANS

Polling Privacy and Safety

A pollster anonymously surveyed voters before the elections. Unfortunately, during the last survey, a hacker broke into the polling software and publicly disclosed the identities and reported voting preferences of individual participants, literally as they pressed buttons on the survey form. Consequently, militant partisans retaliated against many survey participants. Survey participants suffered grievous injuries to body, property or finances. They were murdered, assaulted, robbed, vandalized, or they were fired from jobs.

Since anonymization alone is not sufficient to guarantee the safety of participants, the pollster intends to modify how the polling mechanism reports each response to achieve a “60/40” protection standard. Under this standard, even if a participant’s identity and reported response were disclosed, the true intended response of the participant could only be determined with a 60% probability of being correct. This should deter all retaliation, as there would be a 40% chance of “friendly fire” for any individual a partisan targeted for attack based on disclosure of that individual’s reported response.

Only two candidates are running in the next election and correspondingly, only two responses are on the polling form; no “undecided-” or “don’t know-” type responses are allowed. Normally, without implementing the 60/40 standard, a sample of N voters would be surveyed, for a margin of error



(standard deviation) of 2% in the overall result. Can the software be modified to report individual responses so as to satisfy the 60/40 standard? If so, how much must the sample size be increased so that, even after the 60/40 standard is achieved, the margin of error for the overall result is no more than 3%?

Bending a Laser Beam

It can be shown mathematically, with calculus, that the index of refraction would have to reach infinity to actually bend the light continuously by a total of 90 degrees when it leaves the circular path inside the annulus. This is either impossible or impractical, since it implies the laser beam would stop moving before it exited the optical element. Bob Conger took the practical approach of a physicist or engineer. Here is a condensed version of his description of his

solution:

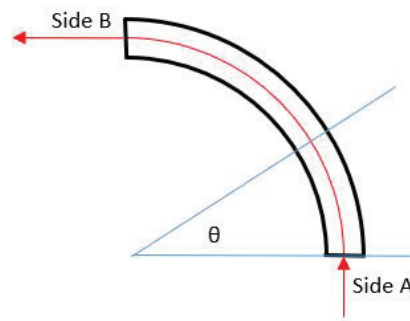
“I think Dr. Snell should be skeptical about the device. I built three spreadsheet models, varying the index of refraction with each 0.1- (version 1) or 0.01- (version 2) or 0.001- (version 3) radian increments in θ . I set the index of refraction equal to $e^{K\theta}$, where $[0]$ is rounded down to the next lower 0.1 or 0.01 or 0.001. I attempted to solve K , as a constant, to match the circular arc path for the laser beam. The form $e^{K\theta}$ allows for the ratios (n^1/n^2 ; see below) of the indices of refraction to be constant for each boundary transition.

“At each transition boundary (i.e., each 0.1 or 0.01 or 0.001 radian), I calculated the angle of incidence of the incoming laser beam ray (to a line perpendicular to the radial line at θ), and then the angle of refraction based on Snell’s law of refraction, $n_1 \sin(\angle \text{in})$

$= n_2 \sin(\angle \text{out})$. The angle of incidence is $\angle \text{in}$, the angle of refraction is $\angle \text{out}$, and n_1 and n_2 are the refractive indices at the inbound and outbound sides, respectively.

“With $K=1.05$, the index of refraction grows from 1, at the entry point of the device, to approximately 6, at the exit of the device (6 was the highest index of refraction referenced in my reading). The angle of the light ray is about 40 degrees above the horizontal at the time it exits the device, i.e., not at all close to horizontal. And the path of the light ray is more oval than circular; the distance from the “center” of the device to the exit point is more than two times the distance from the “center” of the device to the point where the light beam enters the device.

“To come close to making the 90-degree bend in a path similar to a quarter circle, I needed to use a value of $K \approx 8$, implying an index of refraction varying from 1 to approximately 800,000 inside the optical element. Since 6 was the highest index of refraction I could find referenced in my reading, it seems highly unlikely that the patent applicant has developed, or could develop, a translucent material with a refractive index 100,000 times greater. Even with $K = 8$, the light beam has not yet achieved a horizontal path when θ reaches 90 degrees or $\pi/2$. Rather, with $K \approx 8$, the light beam is traveling about 10 degrees above the horizontal when it reaches the end of the device. The path of the light



beam's travel is still not circular. If the distance from the imaginary point where θ is measured to the light path when it enters the device is 1,000, the distance is about 1,100 to the light path when it exits the device. Since the light beam path is constantly having to be pulled (by refraction) inward towards the circular path, the slope of the light beam path (absolute value) will always be greater than $\tan(\theta)$, and thus, the path will never be perfectly circular with $K < \infty$.

“Manufacturing a material that has a continuously varying index of refraction would be a considerable challenge, particularly since it would need to be accurate down to the granularity of the wavelength of laser beams.

“It appears that the only way to get the ray to bend completely to exit the device (as pictured in the puzzle) at 90 degrees is to have an infinite index of refraction (and even at that, the final path before hitting the exit face will be above the horizontal by a tiny amount). But in any case, since an infinite index of refraction is not achievable, a more practical solution might be to extend

the device by about 7 degrees past the proposed 90 degrees in the submitted design. Once the designer has determined the exact device dimensions at which a horizontal light beam is achieved just prior to exiting the device, the final exterior face of the device will need to be perpendicular to the beam to ensure that the beam does not get refracted away from the horizontal path as it emerges from the device into the surrounding medium (e.g., vacuum or air). But this is still not practical, since it still requires an index of refraction far in excess of anything ever cited in my reading.

“I also found reference to an index of refraction less than zero, of which radio waves bouncing in the plasma of the earth's ionosphere were cited as an example, curving around the bend of the earth. I'm not quite sure about the mathematics of that process, but it sounded like an interesting direction of exploration for another researcher. Perhaps the beam of light could travel along the inner edge of the center of the device. This seems more like reflection than refraction, but the reading does refer to it as refraction.”

Solutions were also submitted by Xunchi Chen, Dom Elia and Brad Rosin. ●

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Our **RETAINED, EXCLUSIVE** US client has asked Ezra Penland to find their **FIRST IN-HOUSE ACTUARY** for Position 87487. Total compensation range of approximately \$250K-\$300K. FCAS / ACAS with medical malpractice experience and business maturity. Must be able to work with senior management, outside consultants, ratings agencies, and other stakeholders. Organization has a wonderful story to tell and is undergoing remarkable growth in their markets. Work will include medical professional liability pricing, predictive analytics, product development, profitability analysis, reserves support, work closely with CFO, present to regulators, as well as present to executive team and Board of Directors.

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ACAS with 3-6 years of property and casualty actuarial experience is needed by our **NORTHEAST** client for Position 87342. Pricing, reserve studies, predictive modeling, statistical programming and other assignments. Exam support.

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