actuarial REVIEW

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Going Insurtech

As digital technology shapes contemporary insurance models, actuaries are helping along the way

Highlights of the 2021 CAS Annual Meeting

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departments

FSC LOGO

on the cover

By ANNMARIE GEDDES BARIBEAU

Digital technology is shaping modern insurance models — and actuaries are here for the assist.

The 2021 CAS Annual Meeting has taken over *AR*'s Professional Insight and ViewPoint departments with stories on meeting sessions covering climate risk, race and insurance pricing, and cyber insurance as well as pioneering career paths for actuaries.

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editor's NOTE By ELIZABETH A. SMITH, *AR* MANAGING EDITOR

Together Again, Briefly

Last November, CAS members converged on San Diego, California, to attend the CAS Annual Meeting. It was our first event in person since the start of the pandemic and one that was filled with many emotions.

For some, joy; for others, trepidation. And there definitely was a distinct feeling during the proceedings. Some would go so far as to define it as electricity. "The energy of people seeing each other in-person was palpable," said CAS Professional Education Manager Kellee Jenkins, who was working at her first CAS Annual Meeting.

CAS staff and attendees may have been a bit rusty at conference routines, but soon got up to speed and into the groove.

Our feature stories highlight Annual Meeting sessions on several hot topics in the insurance industry. And, of course, we've included photos. New CAS Associates and Fellows, who earned their designations in 2020 and 2021, got their chance to celebrate their accomplishments. (Group photos of these new and proud CAS members will appear in the next *AR*.)

Déjà vu all over again

Although the weather was nice and the meeting went seamlessly, they did not portend that the Omicron variant would soon cause a surge in COVID cases.

And so, the CAS Board has decided to conduct the 2022 RPM Seminar virtually and to forego the in-person event. The decision was made with the utmost of caution. Please see the CAS website for all the information you need on the 2022 Virtual RPM Seminar.

I am certain that CAS members will meet again soon in person as a community at the 2022 Spring Meeting for the exchange of ideas — and business cards! Until that time, be safe and healthy!

On the cover

Our cover story showcases four CAS members who have taken the leap into insurtech. Their companies are dedicated to enhancing the customer experience, among other things, utilizing cutting-edge, modern technology. Traditional insurers haven taken note, either following suit wholeheartedly or gradually adapting insurtech ideas.

I hope you enjoy this issue of *Actuarial Review*.

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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Continuing 2021's Achievements: Welcome to 2022!

I began my year as president-elect in late 2020 having just completed a three-year term on the CAS Board of Directors. During that time, I helped shape the direction of our new CAS Strategic Plan and Envisioned Future, so I am heavily invested in carrying out our plan that sets the direction for the continued growth and success of the CAS.

In 2021 I had a front-row seat as we executed Year 1 of our three-year plan. Now, as we move into Year 2, I am excited to have the opportunity to lead the effort as CAS president. Since our Strategic Plan drives our activities as an organization, it will be my main focus as president, thus an appropriate topic for my first *Actuarial Review* column.

I want to share a few of our successes from Year 1 to help members better understand our organization's direction.

The CAS Strategic Plan

The inspiration for the CAS Strategic Plan is our Envisioned Future, which foresees that:

> CAS members are sought after globally for their insights and ability to apply analytics to solve insurance and risk management problems.

The Plan is built around three Pillars that focus us on the opportunities we will pursue over the next three years:

- Pillar 1. Building Skills for the Future
- Pillar 2: Diversifying the Pipeline
- Pillar 3. Expanding Globally

These Pillars are buttressed by a foundation of building capabilities across the organization, from the staff to the board, and from improving processes to adopting new technology solutions.

I am looking ahead to executing our Year 2 goals, but first I want to share a few of our successes from Year 1 to help members better understand our organization's direction.

Building Skills for the Future

As stated in the Plan: "Just as the profession is transforming and changing at an accelerated pace, so must the CAS revolutionize how it prepares our members for the future." Our Year 1 goals gave us a strong start in doing that. Following are just a few examples of our progress:

- **Published the Admissions Transformation Plan (ATP).** The ATP is an ever-evolving plan designed to enhance the CAS credentialling program. Our Modern Actuarial Statistics Exams (MAS I & II) will be the first to be updated; their launch is targeted for 2023.
- **Instituted a new Research Council to direct and align projects.** Since its official kick-off this past summer, the Research Council already has 30+ new ideas for advancing actuarial practice in 2022.
- **Launched a new microlearning program.** Inspired by the challenges of COVID-19 lockdowns and travel restrictions, this new continuing education format first offered free online courses on "Wildfires and the Competitive Marketplace" and "Flood." The program plans to expand in 2022.

Diversifying the Pipeline

Our Strategic Plan sees CAS members of the future emerging from a wide variety of universities, majors, degrees and other pathways. Several programs implemented in 2021 were designed to expand our outreach efforts, with diversity as a particular focus. Other accomplishments include the following:

- **Continued increasing the number of employer visits with CAS Leadership.** Outreach to employers is not only vital to the profession but to business success.
- **Upped the number of "Be an Actuary" student days from prior years.** Now even more high school students will get to know our profession.
- **Expanded the University Liaison target list for 2022, where we match CAS members with colleges and universities.** These additions include historically Black colleges and universities, Hispanic-serving institutions and women's colleges.

Expanding Globally

With 19% of our candidates taking CAS exams outside of North America, we are invested in serving our members working around the world. A few specific activities over the past year that are helping to expand our global footprint included the following:

- **Launched the new Exam 6-International.** Candidates rated Exam 6-I as good to excellent on our surveys.

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STUDENT CAS CENTRAL

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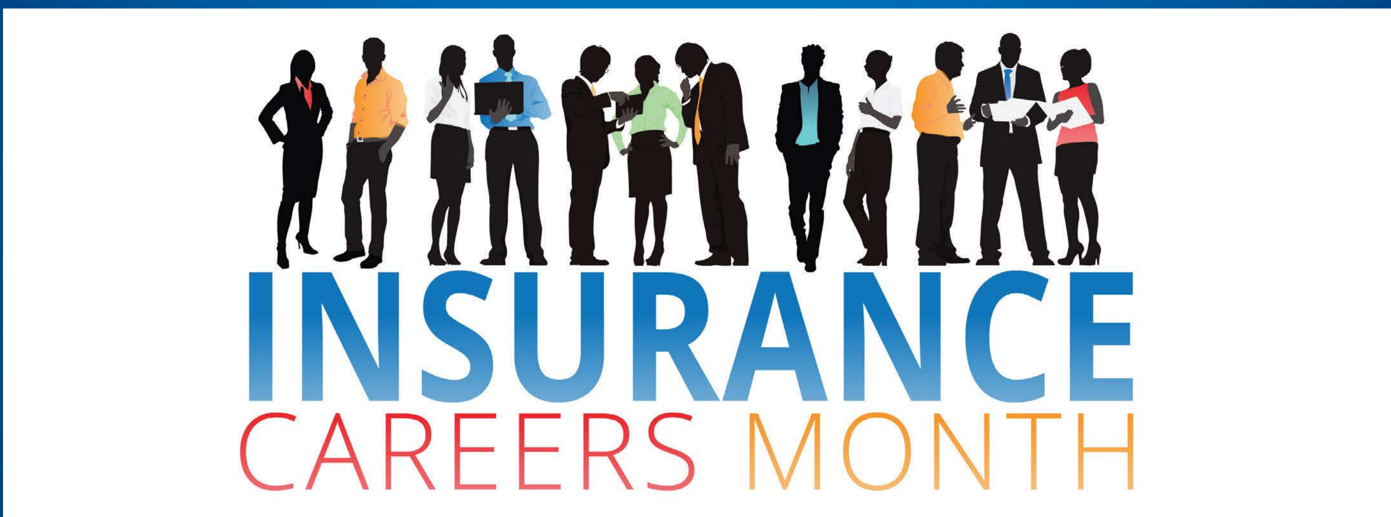
which seeks to inspire young people to choose insurance as a career.

FEBRUARY 2022



Why are you in the insurance industry?

In support of the movement, insurance professionals are sharing their stories.

Contact mkerr@casact.org to share <u>your</u> story and be featured through CAS Student Central!

Visit InsuranceCareersTrifecta.org for more information on the movement!

President's Message

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- **Increased the number of international summits and meetings.** We have more plans for outreach to local associations worldwide in 2022.
- **Continued expansion of testing center locations from previous testing years.** Last year CAS candidates used over 175 Pearson centers worldwide.

Building Capabilities at CAS

Early on we recognized that to achieve our Strategic Plan, we simply need to be better. With staff and volunteers working together, there were opportunities to dramatically improve the value that the CAS delivers to its members and candidates. We strengthened our capabilities over the past year by:

- **Expanding senior staff with a new chief growth and product officer role.** The new role will focus on growth and product lifecycle practices.
- **Developing a new iCAS business case.** The board reviewed a recommendation for advancing the CAS Institute and its product offerings.
- **Completing a staff capability assessment and working on opportunities for organizational improvement.** Our CAS office is filled with talented people — we want to make the most of their talents.
- **Increasing the number of volunteer appreciation and recognition activities.** We made certain that our volunteers know how much we value their contributions to our Society.

What a year! And what a tough act I have to follow in our Immediate Past President Jessica Leong!

It is important to acknowledge our CEO Victor Carter-Bey, for being a driving force behind this effort, along with the CAS staff. Victor's leadership has been phenomenal. Without him, we would not have made the strides we made in Year 1 nor have a clear path to success in Year 2 and beyond. As a volunteer leader with a demanding day job as CEO of EMPLOYERS, I am reassured that we will forge ahead aggressively with Victor as my leadership partner, along with CAS Board Chair Jessica Leong and President-Elect Roosevelt Mosley.

Looking forward

One of my personal passions for my year as president is to continue our efforts to enhance member engagement. But our focus on engagement is not limited to members — we want to engage with candidates as well.

I will address the topic of engagement and more in future President's Message columns.

ACTUARIAL REVIEW *LETTERS POLICIES*

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.*

Going Even Further Beyond Triangles

Dear Editor,

In response to "Beyond Triangles Capturing Insights From New Analytic Technology" (*AR* September-October 2021), I agree that improving technology and a growing set of analytical tools at hand means that we have more options today to do reserve analysis than we had a few years ago. The article seemed to imply though that P&C reserving actuaries have a choice between staying with link ratios and aggregate triangles or moving on to use more advanced analytics at an individual claim level for reserving both to identify segments of the business that behave materially different than other segments for a given coverage and to do the forecasting work to create reserve estimates. I believe there is a third option that has advantages over either of those approaches. One could do the segmentation work for a given coverage at an individual claim level using claim characteristics that link to policy-level characteristics and then do the forecasting work to create the reserve estimates using Bayesian Markov chain Monte Carlo (MCMC) methods on incremental aggregated data using those selecting segments in a single model. Using a Bayesian MCMC approach lends itself to credibility weighting the segments to help with reliability in forecasting the total payments as well as providing a readily available means to deal with correlation issues in forecasting and tools to test the total forecast reliability of different models as opposed to devising ad hoc routines.

—Michael R Larsen, FCAS, MAAA

COMINGS AND GOINGS

Maryellen Coggins, FCAS, CERA, MAAA, began a one-year term as president of the American Academy of Actuaries in November 2021. Coggins's service on CAS committees includes membership on the Education Structure Implementation Task Force CERA and the Enterprise Risk Management Symposium Joint CAS/SOA Program Committee, and vice chairperson for the ERM Committee. Coggins previously served for six years on the Actuarial Standards Board, including as chairperson from 2016 to 2017. From 2011 to 2013, she was the Academy's vice president, risk management and financial reporting. She is a managing director, risk and capital management services, at PwC in Boston.

Stephanie Lynn, FCAS, ARM, has been named vice president, enterprise risk management, for the stock insurer Church Mutual Insurance Company. Lynn's role will include oversight and strategic direction for the organization's enterprise risk and business continuity programs, which includes negotiating and managing corporate reinsurance and insurance contracts. She has been with Church Mutual for almost eight years, having joined the company as an actuarial consultant. Most recently, she served as ERM senior director/actuary and is currently the president the company's Women's Leadership Initiative. Since 2016 she has served on the CAS Membership Advisory Panel and joined the Exam Committee in 2021.

The insurtech Hourly, an insurance intermediary and developer of a workers' compensation technology platform, has hired **Tomer Eilam, FCAS,** as its chief risk & analytics officer. Eilam has focused most of his 20+ year career on California's complex workers' compensation system. Among his new duties, he will oversee an initiative to prevent work-related injuries with targeted safety content through the company's platform. Eilam previously served as chief actuary at Atlas General Insurance Services, the president of Titan Claims Management and chief actuary at Arrowhead. He also served on the Actuarial Committee of the California Workers' Compensation Insurance Rating Bureau.

Robert Osicki, FCAS, FCIA, has been appointed chief insurance officer for SGI Canada. He will oversee the corporate insurance division, which includes corporate claims, product management, pricing and corporate underwriting. Osicki joined SGI Canada in 2004 while studying actuarial science at the University of Regina. He took on increasingly senior actuarial roles and most recently served as the vice president of product management and corporate underwriting.

Jon Levy, FCAS, MAAA, is the first recipient of the Certificate in Risk Governance in Bermuda. The Certificate is awarded to those who have completed an intensive 17-course education program and evaluation. The curriculum is designed for current and aspiring board members who seek to advance the governance of risk-taking at their organizations and those who interact with boards. In 2020 Levy became

Comings and Goings, page 10

CALENDAR OF EVENTS

March 15–16, 2022
Ratemaking, Product and Modeling Seminar
Virtual Event

May 15–18, 2022
Spring Meeting
Disney's Coronado Springs Resort
Orlando, FL

June 21–24, 2022
Actuarial Colloquia
(hosted by the CAS)
Virtual Event

September 19–21, 2022
Casualty Loss Reserve Seminar
TBD

November 6–9, 2022
Annual Meeting
TBD

Visit casact.org for updates on meeting locations.

Comings and Goings

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president and CEO of Watford Re Ltd., a global P&C insurance and reinsurance company in Bermuda. From the company's inception in 2014, he served as its CRO. Levy has over 20 years of insurance experience, in which he held roles as chief pricing actuary, corporate actuary and senior consultant for multiple companies.

Erie Insurance (ERIE) has named **Dorothy Leemhuis, FCAS,** as vice president and corporate risk officer, leading the enterprise risk management department in ERIE's actuarial division. In her previous role as director of actuarial modeling and data analytics, she led a team responsible for the actuarial modeling of ERIE's auto, home and business insurance products. In 2020 Leemhuis played a critical leadership role in the design, modeling and successful refresh of the popular ERIE Rate Lock® auto insurance feature.

Jonathan Charak, FCAS, MAAA, has been named one of 100 professionals who made the *Insurance Business* (IBA) annual Hot 100 list for 2022. Nominated by insurance professionals throughout the U.S., the honorees exhibit can-do attitudes in the face of adversity, solid understanding of themselves and the industry, and willingness to extend a helping hand to the next generation of insurance professionals. Charak is the vice president-emerging solutions director for Zurich North America.

Ariel Re, the Bermuda-based reinsurer, has appointed **Apryle Oswald, FCAS,** to the newly created role of chief analytics officer. Oswald will be based in Ariel Re's Bermuda office. She will lead the team responsible for providing the company with leading-edge analytics to promote superior underwriting capabilities. She will also support the global data management and governance, research and develop new data analytics capabilities, and expand the company's current analytics abilities. She most recently served as portfolio manager at Nephila Capital. Oswald is a chartered financial analyst and certified life coach.

AIA General Bhd, a subsidiary of AIA Bhd, has appointed **Gary Hoo, FCAS, FSA,** as its new CEO. He will provide strategic leadership and oversee day-to-day operations to ensure the continuous growth and sustainability of the business. In his previous post as AIA General's head of conventional business and its appointed actuary, he spearheaded the license separation and formation of the company as a new entity as well as launched AIA's flagship personal accident, motor and fire insurance products.

State Auto announced the intention of Liberty Mutual Insurance to appoint **Kim Garland, FCAS,** as president of State Auto, following the completion of Liberty Mutual's pending acquisition, which is expected in 2022. Garland joined State Auto in 2015 and is currently senior vice president of personal & commercial lines and managing director of State Auto Labs, the company's corporate venture capital fund that he helped found. Garland also led the rebuild and restructuring of State Auto's personal lines and commercial lines businesses. He was previously chief product officer for AIG's Global P&C Consumer Division.

Chris Schumacher, FCAS, CSPA, MAAA, has been promoted to assistant vice president-senior actuary for Church Mutual Insurance Company S.I., which is based in Wisconsin. He has 14 years of experience in the insurance industry, 10 of which were with Church Mutual, and has a specialization in deep learning

Michael Branson, ACAS, has been hired as senior actuarial analyst for AXA XL's North America Programs business unit. His experience includes six years with Liberty Mutual where he supported global risk solutions, global retail markets and capital attribution.

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

IN MEMORIAM

Linda M. Groh (FCAS 1988)
1946-2021

James E. Gillespie Sr. (FCAS 1964)
1932-2022

Frederick Oliver Larson (FCAS 2017)
1989-2021

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; search for "Obituaries."

The Red Sox Fan

Linda Wolusky Groh (FCAS 1988)
1946-2021

Linda Groh, 74, of Southampton, Pennsylvania, passed away January 2, 2021. Born in Boston, Massachusetts, to Margaret and Charles Wolusky, she earned a bachelor's degree from Emmanuel College in Boston and a master's degree at Rutgers University in New Brunswick, New Jersey. A proud Boston native, Groh resided in Branchburg, New Jersey, for 46 years and frequently spent time in Naples, Florida. She was a lifelong Boston Red Sox fan and especially enjoyed watching pre-season games in Florida. A true hodophile,[1] she especially enjoyed visiting national parks and traveled extensively internationally. She was a season subscriber to the New Jersey Symphony Orchestra and enjoyed live theater. When home, she delighted in sewing and knitting, especially for her grandchildren. She also loved gardening, crossword puzzles, Sudoku, cooking and reading. An animal lover, she was also a cat owner/servant. Groh was one of a growing number of women actuaries who joined the actuarial profession when it was primarily made up of men. She retired after more than 25 years at the Chubb Group of Insurance Companies as senior vice president and actuary. Groh died at the Floral Creek Alzheimer's Special Care Center in Yardley, Pennsylvania. Survivors are her husband of 52 years, John Groh; daughter Lauren (Dominic) Holmes of Littleton, Colorado; son Brian (Lisa) of Holland, Pennsylvania; and three grandchildren. Memorial contributions may be made in her memory to Alzheimer's Association Greater New Jersey Chapter, 400 Morris Ave. Denville, New Jersey 07834.

Devoted to Christian Service

Chester J. Toren (ACAS 1966)
1920-2015

Chester Toren passed away June 11, 2015, in Munster, Indiana at the age of 94. He was born in Chicago on October 10, 1920, to Anthony Toren (a salesman) and Mamie (Dekker) Toren. In 1937 he was the first family member to go away to college, graduating from Hope College with a bachelor's degree in mathematics and education in 1941. He enrolled in a graduate program at the University of Chicago's School of Business, which was interrupted by military service in the U.S. Army Signal Corps during World War II. He was discharged with the rank of Staff Sergeant. In June 1947, he married Lucille Teninga, a graduate of Hope College and schoolteacher. The couple, married for 58 years, had five sons. He earned his master's degree in business administration in 1947 and started his 38-year career with Zurich Insurance Company, retiring in 1985 as an assistant vice president. Devoted to Christian education, he was a founding member of Trinity Christian College in Palos Heights, Illinois, in 1959, and served on its first board of trustees. He also sat on the school boards of Lansing Christian School and Illiana Christian High School. He was very active at his church, which was the core of his social life; he performed in several capacities, including as Sunday school teacher. He is survived by his children, John (Susan) of Shawnee, Kansas; Glenn (Nancy) of Carmel, Indiana; Carl (Margaret) of Lynwood, Illinois; Paul (Heidi) of Shawnee; Kevin (Shelley) of Ada, Michigan; and about 20 grandchildren. Gifts in his honor may be given to the Toren Scholarship Fund, Hope College, Holland, Michigan 49423.

World War II Hero

John S. Ripandellli (ACAS 1966)
1918-2018

John Ripandellli died at his home in Tallahassee, Florida, on June 30, 2018, after a brief illness. He was 99 years old. After graduating from Columbia University in 1940, he was drafted in 1942 and spent two years at infantry training school in Spartanburg, South Carolina. He married Eleanor Richards in North Carolina in 1943 and they spent 54 years together.

During WWII, he was a first lieutenant combat engineer for reconnaissance for the 284th Engineer Combat Battalion. During the Rhineland Campaign, he participated in the battle of the Remagen Bridge, allowing the first U.S. Army soldiers to cross into Germany. For his participation in the Battle of the Bulge, he received the French Legion of Honor medal (Chevalier). He was also portrayed as the character "John" in the

[1] One who loves to travel.

book by Mikel Shilling, *Silent Heroes*, a compilation of the war experiences of the soldiers in Ripandelli's battalion. In 1953 he left Asheville, North Carolina, to become the state of Florida's chief actuary and insurance examiner. He resigned in September 1959 to be an independent actuarial consultant and continued until the age of 92. He enjoyed solving crossword and math problems and playing piano. Ripandellli was born in New York City on October 1, 1918, to Ida Gimma and Francesco P. Ripandelli, who was knighted by the Italian monarchy for technological innovation in the Italian banking system. He is survived by three daughters: Carol Ripandelli, Diane Ripandelli and Joan (Wayne) Sizemore; and two grandchildren.

The Social Butterfly

Elisabeth Stadler Pader (FCAS 1990)
1950-2020

Elisabeth Stadler Pader died suddenly on September 29, 2020. She was born in Romania on June 18, 1950, to Eva and Ludvig Stadler, Jewish prisoners who survived Nazi concentration camps during World War II. At 18 she moved to New York City with her mother at the invitation of her aunt. She graduated from the City College of New York with a mathematics degree in 1972. Since she enjoyed math, she was encouraged to become an actuary. She started her career at Royal Globe Insurance Company and worked at Continental Insurance before realizing her greatest accomplishments at Swiss Re. She also participated in various CAS committees. In 1982 she married Curt Pader whom she met at Continental Insurance. She had an absolute joy for life; she enjoyed the performing arts, shopping, traveling, spending time with family, cooking and cleaning. She was also quite social. She had an amazing talent for remembering faces and a knack for making and keeping friends. During her retirement years, she enjoyed volunteering at Tanglewood in Massachusetts, which is the summer home of the Boston Symphony Orchestra and a popular venue for several music festivals and artists. She served as a tour guide there and volunteered in other capacities to support the arts. Her survivors are her husband; son Len; daughter Sarah; and five grandchildren.

New York's Influential Actuary

Stanley A. Dorf (FCAS 1965)
1931-2020

Stanley A. Dorf, the former head of the New York State Insurance Department's policy and planning bureau, died July 7, 2020. Born in 1931 on Manhattan's Lower East Side to Irving and Sally Dorf, he suffered permanent damage on his right arm during birth and "mild" polio, but he accepted his limitations without complaint. While in a school for gifted children, he skipped two grades and was later offered a full-tuition scholarship at Columbia University. Since his parents could not afford room and board, he lived at home in Brooklyn, trekking back and forth to Manhattan's Upper West Side. He enrolled at Cornell University to pursue a master's degree in philosophy. In 1956 he married Annette Kaplan, the love of his life of 57 years. After briefly working at the Royal Insurance Company, he joined New York's insurance department. There he served as chief of the casualty actuarial bureau and later at the policy and planning bureau. He was instrumental in enacting New York's no-fault auto insurance law and contributing to medical malpractice insurance reform. At home he enjoyed spending time with his wife, children and grandchildren. He also pursued a doctorate in history. A lover of the arts and music, Dorf accumulated and categorized more than 10,000 LP records and often played them at high volume. As an early technology adopter, he proudly owned one of the very first calculators and used it until his iPhone app rendered it obsolete. He is survived by his brother, William Dorf; daughter Laura Dorf Queller; son Michael C. Dorf; and grandchildren Sarah, Philip and Julia Queller, and Meena and Amelia Colbdorf.

The Chess Master

Boris Privman (FCAS 1991)
1957-2021

"Had the God of Actuaries [existed and] wanted to punish them for their pride, he'd start with the creation of multiple incompatible data formats," said Boris Privman in a passage from the 1999 CAS Discussion Paper by Aleksey Popelyukhin called "...Per Aspera: The Last Few Obstacles on the Way to Digital Paradise." Privman earned his living as a reserving actuary, but his favorite pastimes were being with family and playing chess. Privman was one of the busiest chess players in the U.S. Chess Federation. Perhaps his finest accomplishment was in the 2000 New York Open Chess Championship, where he scored 6-3 against four International Chess Federation (FIDE)[2] grandmasters and three international masters, becoming a FIDE Master at age 43. Following news of his death, his fellow chess play-

[2] FIDE is the French acronym for Fédération Internationale des Échecs, which is also known as the World Chess Federation.

ers honored him with a memorial chess event. Born in Ukraine, he moved to Israel as a teenager and graduated from Tel Aviv University with a mathematics degree in 1981. Shortly after, he moved to the U.S. and became an actuary by the suggestion of another chess player. He began his career at the National Council on Compensation Insurance and later became managing actuary for the New Jersey Department of Banking and Insurance in the office of solvency regulation's actuarial unit. Most recently, he was the supervising actuary for financial reporting for the New York State Insurance Fund. Privman's survivors are his sister, Robin; sister-in-law, Marina; and six nieces and nephews.

The Faithful Adventurer

Mark S. Wenger (FCAS 2006)
1966–2020

Mark S. Wenger died in October 2020, at the age of 54 after a long struggle with leukemia. He was born in Marion, Indiana, to Dale and Martha Sue (Royer) Wenger. He graduated from Taylor University in Upland, Indiana, in 1988, and earned his master's degree in mathematics from Miami University of Ohio in Oxford in 1990. Wenger's Christian faith was his greatest passion in life. He was an active church member, volunteering as a deacon, financial secretary, youth basketball league coach and unofficial brush removal specialist. He also served at Livingston Christian School as its first high school basketball coach. He was an actuary for 29 years. Most recently, he worked 13 years as assistant vice president and chief property and casualty actuary at Auto-Owners Insurance in Lansing, Michigan. He also served on the advisory board at Michigan State University in East Lansing. Wenger lived a life full of adventure. He ran half and full marathons in 2016 and 2018, respectively, and hiked across the Grand Canyon. He also completed bike rides from Lansing to Mackinac City, Michigan; from Montana to Alaska; and down the coast of California. He was an eternally joyful spirit who loved playing games and spending time with friends and family. He is survived by his mother; his wife, Ruth; children, Daniel (Hannah), Luke (Jenny) and Sarah; his sister Debbie (Keith) Harvey; and his nephew and niece.

Changes to iCAS Exam 3 Underway

By AMY BRENER, DIRECTOR, THE CAS INSTITUTE

To help streamline the studying process for exam takers, The CAS Institute (iCAS) is making changes to iCAS Exam 3: Predictive Modeling — Methods and Techniques for the Certified Specialist in Predictive Analytics (CSPA) credential. The curriculum changes will be effective for the Spring 2022 sitting.

"Rather than requiring individual readings that may not appear to connect to other readings, we pared the reading list down to selected chapters from three sources, all of which are available for download at no charge," said iCAS Exam 3 Committee Chair Louise Francis, FCAS, CSPA. Francis stated that the changes offer a "more unified and consistent voice" and are the result of several years of feedback on the exam process. The books are *Introduction to Statistical Learning* (ISL) by James, Witten, Hastie and Tibshirani; *Modern Applied Statistics in S* (MASS) by Venables and Ripley; and *Computational Actuarial Science with R* (CASR) by Arthur Charpentier.

Both ISL and MASS are classic references and well-recognized in the predictive modeling community; ISL is a source in the current syllabus for some of the machine learning topics. While CASR is a less well-known reference in the predictive modeling community, Francis stated that it has a focus on practical insurance examples, which is lacking in most predictive modeling texts. CASR also covers model selection — the consideration of several measures and objectives when selecting a final model to deploy in a predictive modeling project.

Motivated by the insurance industry's increasing demand for people with predictive modeling and data science skills, iCAS began awarding the CSPA in 2016 to nonactuarial insurance professionals as well as actuaries. The first class of individuals who received the credential did so through an Experienced Practitioner Pathway; however, in 2017 iCAS began offering examinations as the primary means for attaining the CSPA. The curriculum requires three exams, an ethics and professionalism module, and a project.

Over the past several years, changes have been made to the CSPA syllabus that reduce and streamline the readings. In 2020 the two topics of "project planning and ethics" and "social considerations" were moved from Exam 3 to Exam 2. Based on feedback that the Exam 3 syllabus remained too daunting, the topics "linear mixed models" and "causality" were removed in 2021. iCAS will address these topics in an upcoming webinar continuing education series.

CAS Staff Actuary Brian Fannin, ACAS, CSPA, is leading efforts for the series on linear mixed models, while Christopher Monsour, FCAS, CSPA, of DataRobot is leading the efforts on causality. These topics are not included as part of the iCAS syllabus but are of interest to many actuaries and CSPA candidates.

The iCAS is also introducing new individual waiver opportunities for CSPA candidates who can demonstrate prior education or mastery in the various elements that make up each exam. Waivers for Exam 1: P&C Insurance Fundamentals and the ethics and professionalism requirement were available from the start to those who received their general insurance education as part of their actuarial or CPCU studies. Now, individuals who can demonstrate knowledge and capabilities in data concepts, exploratory data analysis, and visualization will be able to obtain a waiver for CSPA Exam 2. Similarly, individuals who have taken appropriate university statistics and modeling courses or who can demonstrate experience using a variety of predictive models will be able to obtain a waiver for CSPA Exam 3. Waivers for CSPA Exam 3 are already granted to those who have passed Modern Actuarial Statistics I (MAS I) (or equivalent) and MAS II. These exams cover many of the same modeling techniques as CSPA Exam 3. For the latest information on available waivers, please visit the iCAS website.

Because MAS II does not cover all of the practical applications covered in CSPA Exam 3, the Exam Committee is looking into developing an optional course that will provide a more practical coding overview for those being offered a waiver for this exam and others who have not had prior modeling or coding experience. This will better enable them to successfully complete the Case Study Project required for the CSPA.

The Annual iCAS Community of Practice Event has been renamed the iCAS Data Science and Analytics Forum. The new name better reflects the event's content. Denise Christophel, CSPA, chair of the iCAS Continuing Education Committee, anticipates a highly interactive event with six separate sessions. Registration for this all-day virtual Forum, scheduled for Monday, March 14, will be opening soon.

ANNUAL MEETING

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1. ***Looks like she made it!*** *Left to right, Jessica Leong and Steve Armstrong congratulate new CAS Fellow Cherie M. Dill, who is accompanied by her young, grinning daughter, Karis.*
2. ***Life imitates art.*** *Jacob Galecki of Galecki Search Associates LLC strikes a familiar pose.*
3. ***Machine learning advocate.*** *Featured speaker Eric Siegel, Ph.D. discusses "Forging a Successful Path to Machine Learning Deployment."*
4. ***Passing the torch.*** *Jessica Leong bestows the CAS Presidential Medal upon incoming President Kathy Antonello*
5. ***During and after.*** *Jacob Novonty, an actuarial science student at Otterbein University in Westerville, Ohio, poses for the CAS photographer. CAS Student Program participants had the opportunity to attend sessions and learn from members in the industry as well as to network with other students and professionals. Inset: Novonty's head shot.*
6. ***Recognizing new ACAS and FCAS.*** *Two floor-to-ceiling name walls were erected to honor CAS Associates and Fellows who earned their designations in 2020 and 2021.*
7. ***A Town Hall discussion.*** *Outgoing CAS President Jessica Leong, CAS CEO Victor Carter-Bey and incoming CAS President Kathy Antonello host an in-person and webcast Town Hall with CAS Leaders on November 8, 2021.*
8. ***A banner accomplishment.*** *A new ACAS poses at the CAS "step and repeat" photo backdrop during the Recognition Reception for New Associates on November 7, 2021.*
9. ***The food of knowledge.*** *Cooking up some actuarial expertise as part of the concurrent session, "Travelers Actuarial Reserving Cooking Show," are (left to right) Colin Heydorn, FCAS; Darian Garner, ACAS; and Nick LaPenta, FCAS.*

Going Insurtech

By ANNMARIE GEDDES BARIBEAU

As digital technology shapes contemporary insurance models, actuaries are helping along the way.

When insurtech was coming to the forefront a half decade ago, the expectation was that technology-based companies would use their wares to disrupt the traditional insurance model and provide better products and services.

Showing insureds, who were accustomed to dealing with carriers through agents and customer service representatives, that they could trust insurtechs with their next-generation minimalist web designs, chatbots and pre-filled personal information was difficult to imagine. But now, actionable online platforms are becoming more commonplace. The architecture, analytics and artificial intelligence behind insurtech sites continue to grow more sophisticated to bolster customer experience from premium quote to claim filing to policy renewal.

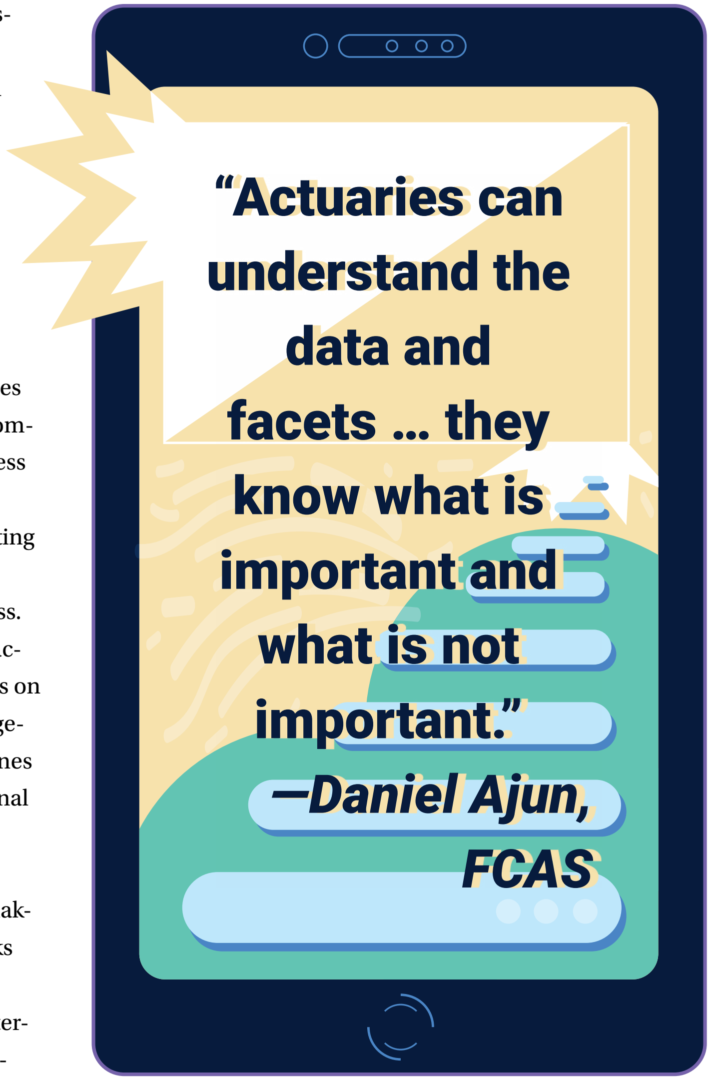
While traditional insurers are gradually adopting concepts from insurtech companies, insurtechs are evolving and looking more to actuaries to move forward. The four property-casualty insurtech actuaries featured in this article have a few attributes in common. All of them were excited about moving into the insurtech field because it afforded them the opportunity to be more innovative at a faster pace compared to working for traditional insurers. They are also millennials who are leading the way in exploring the breadth and depth of actuarial practice. Finally, they encourage other actuaries to consider working at insurtechs and offer suggestions to get there.

Daniel Ajun, FCAS

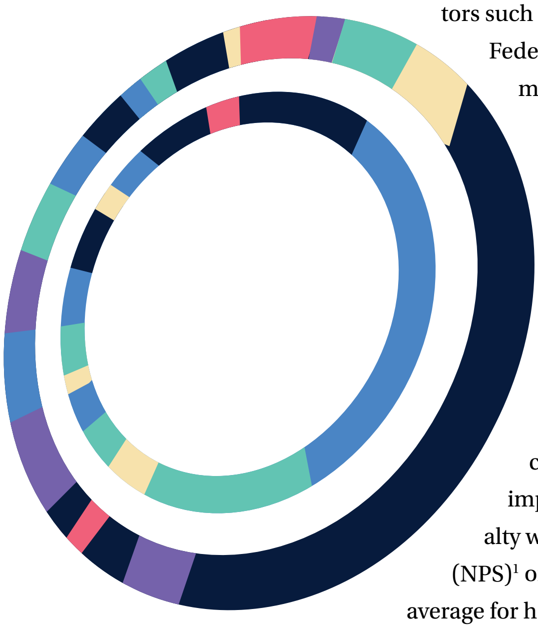
Daniel Ajun, Chief Actuary, Kin Insurance

Being the chief actuary at insurtech Kin Insurance involves more than reserving, ratemaking and pricing, says Daniel Ajun, whose company provides direct-to-consumer homeowners coverage. Besides performing traditional actuarial duties, Ajun is also playing a role in perfecting his company's online interface to give customers a seamless premium quoting process while ensuring that Kin has the data necessary for appropriate pricing.

Kin Insurance stands apart from many insurtechs and insurance companies. *Fast Company* magazine recognized the company in its list of the ten most innovative finance companies of 2020. Its ratemaking approach is unique. Rather than pursuing a risk-bearing strategy that relies on a mix of exposures, Kin specializes in covering homeowners in states especially vulnerable to catastrophic events, such as Louisiana and Florida. Offering property coverage "in very catastrophe-prone states requires a lot of analytics to do quickly and profitably," Ajun said, compared to working with the homogeneity of risk for homes less prone to such losses.



In addition to using homeowners' personal data as rating variables, Kin focuses on property data by accessing thousands of data points to customize coverage by street address. Unlike other insurers, Kin does not use traditional rating factors such as ZIP codes nor relies on Federal Emergency Management Agency's flood zones that inform the National Flood Insurance Program.



Beyond ratemaking, Ajun also works on improving Kin Insurance's web interface to provide accurate quotes to potential customers. Kin boasts impressive customer loyalty with a net promoter score (NPS)[1] of 85, when the industry average for homeowners insurance is 42, according to a post on Clearsurance.com.

Another part of Ajun's job is to develop questions to ask customers that elicit responses that can provide the most valuable data possible — a challenging task when there is so much variation in risks and rates. Considering how to structure questions and apply the algorithms "really opened my eyes in terms of how my decisions impact the customer," Ajun said.

Anticipating answers with built-in data sets makes it easier for customers to sign up for coverage. About 10% of users obtained their policies without an agent, Ajun said. Asking the right questions also helps Kin collect the data necessary to develop premium electronically. "A lot of underwriting is data prefill," he explained. Kin's website invites applicants by stating that customers who switch to Kin can save an average of $500.

To ease the quoting process as much as possible, Ajun also watches online activity to find where users get stuck or give up on the process. For example, homeowners often do not know the age of their dwelling. To discourage giving up on the process or guessing and inputting the wrong answer, he hopes to gain the information so it will prefill. "If successful, they will

[1] NPS or net promoter score measures custom loyalty. Scores range from -100 to +100 with higher score being most desirable.

never see that question," he added.

Working for Kin has been a boon to Ajun, who previously felt stagnant in his career. His former work was redundant, he explained, and it took a year or more to see one of his ideas come to fruition. "I like the speed we move at here, and a lot of my ideas are happening," he said. "I can see I am meaningfully contributing to the company."

Ajun secured his position about three years ago when a colleague referred him to the company. He welcomed the opportunity because he was excited to apply data management and analytical tools to new applications.

Since he sees insurtechs as the wave of the future, he recommends that actuaries pursue careers in this burgeoning field. "Insurtechs will control the whole personal lines market pretty soon. The commonality of risks and quick adaptation to changing climate and economics give us a strong advantage." He predicts that the "customer experience will become better and faster."

Pursuing a career in insurtech requires good communication skills to explain insurance to developers and marketing and sales professionals, he said. Arjun said that actuaries are especially poised to contribute to nontraditional tasks; they have proper insurance knowledge to ask the right questions and understand the limits of compliance.

"Actuaries can understand the data and facets of how it comes together," he observed. "They are in a unique position [because] they know what is important and what is not important."

Chelsea Adler, Senior Manager, Pricing and Actuarial, Root, Inc.

Root, Inc.'s mission to leverage technology to make insurance fair and transparent in personal auto insurance is one of the reasons why Chelsea Adler is excited about her role at the auto insurer. "I loved the mission of the company because it seemed well-positioned to create lasting change in the industry."

In 2020 Root boldly announced its intent to drop credit scoring as a rating variable by the year 2025. "Driving data is the most important or influential factor," Adler explained. "Other variables do not have as much predictive lift." This is not surprising since credit scoring has always been viewed as a proxy for behavior. The transition, however, will take more time. Currently, telematics is one of many variables Root uses.

Root, run by president, co-founder and actuary Alex Timm, has always been a disruptor in the personal auto insurance realm. "We are a mobile-first telematics company," said Adler. Usage-based insurance "is the first factor that we take into consideration."

The company began offering usage-based personal auto insurance in 2016 thanks to telematics. Rather than adjust premium by whether annual miles driven are more or less than the typical 12,000 to 15,000 miles, Root takes a more detailed approach, analyzing features such as distracted driving and aggressive maneuvers on a per-mile and per-minute basis. The approach was quite novel at the time, but traditional insurers are now following suit.

Chelsea Adler, FCAS

Root also deploys telematics differently from traditional insurers. The insurtech requires customers to drive with the Root app so that driving behavior can be measured, which affects insurability and premium level. When Root was unveiling its approach, traditional insurers, in contrast, were deploying telematics to offer discounts to existing customers.

Root's technology foundation, which features a flexible, nimble and quick infrastructure, supports the company's competitive advantage, Adler said. For example, when Washington state banned credit scoring last summer, Root adapted more rapidly than traditional carriers by using a new model sans credit scoring. Root can implement a rate filing within a day or two of receiving a state regulator's approval, Adler said. In contrast, when she worked for a former employer, the process to change effective rates often took months.

The expeditious turnaround is also due to the company's dynamic culture. Working at Root, Adler said, means being flexible enough to move quickly. There's more of an all-hands-on-deck mentality with less formality. Part of fulfilling her role is to learn skills that are not in the job description and to create solutions from scratch.

Adler's enthusiasm for Root, the actuarial profession and her faith is evident on LinkedIn, where she regularly posts inspiring messages. In October, she celebrated two years at Root and offered reflections on what she had learned. “People make the company,” was among her thoughts. The best part of her job, she told *Actuarial Review*, is the people she works with. “[They are] passionate about the problems they are solving,” she added. Her team is also growing. When she started at Root, there were three people on her team, but now there are more than 20.

While she recognizes the fast-changing environment at Root might not be for everyone, she recommends that actuaries consider working for an insurtech. “Go for it,” she advised. “If it does not work out, the skills you learn are valuable for positioning yourself for the next job,” she added.

Daniel J. Falkson, Director of Actuarial, Lemonade, Inc.

Fascinated by Lemonade Inc.’s unique approach to offering homeowners and renters coverage, Daniel J. Falkson followed the company years before becoming its director of actuarial.

“At the time, I was struck by how differently they were trying to think about insurance,” he said, “but I never imagined I would work here.” While employed for an insurer in Manhattan, he read that Lemonade’s chief insurance officer was building up the company’s actuarial functions. “It was a ‘drop everything and get your resume together’ moment.”

He joined Lemonade about a year ago with great excitement. “I knew they were trying to marry the ways in which technology companies operate with traditional risk selection and pricing methods,” he explained.

Daniel Falkson, FCAS

Lemonade entered the insurance world in 2015 as an industry disruptor by offering homeowners and renters insurance. “The founders came from a technology background rather than an insurance background and identified some of the real pain points customers experience when interacting with their insurance companies,” he said. “They identified that there is a large base of very online, very digitally-engaged potential customers who may be dissatisfied with their insurers, or may not even be current insurance customers,” he said.

Since then, Lemonade has expanded beyond traditional property-casualty lines to pet and term life insurance, and, most recently, car insurance. In November, the insurtech announced its purchase of Metromile, one of the original insurers to offer usage-based auto coverage. Lemonade also offers contents insurance in France, Netherlands and Germany, and plans to roll out further in Europe.

Applying new thinking to an old industry has driven the value proposition at Lemonade, Falkson said. The insurtech is famous for its simple interactive website that provides “instant everything” by automating every step of the customer journey. Getting coverage from Lemonade, according to its website, takes about 30 seconds, while claim filing takes a “super fast” three minutes. Customers can get help from a live person, if necessary.

Falkson also likes the company’s Giveback Program, which allows policyholders to direct leftover premium dollars to the charities of their choice after accounting for claims and administrative expenses. “The hypothesis is that introducing

[a] third party into the traditional insurer/insured relationship will curb bad behavior by both." Lemonade takes a flat fee and considers the rest of the money as that of the insured's. Customers know that attempts to inflate or file fraudulent claims will directly reduce the amount going to their selected charities.

Although Falkson works exclusively on pricing, he has contributed to shaping the organizational structure of the actuarial function. "I had to think about what has worked well and not so well in my past experience to inform that," he said.

Because Lemonade is a small and growing company, he enjoys exposure to all areas of the business rather than just the underwriting and actuarial departments. "I regularly have contact with people working on technology, product design, distribution, creative and more," he added. At Lemonade "there is a greater willingness to try new things and experiment, which I found lacking in past roles," he offered. The actuarial team looks at applying different data sources and modeling methodologies "while still ensuring that our overall strategy is governed by actuarial principles," he added.

Most of all, Falkson enjoys working with his colleagues. "Everyone is committed to growing the company with an eye on long-term sustainability, and it is truly exciting to work on new products, enhancements and launches in new states and countries," he said. He also enjoys the give and take between insurance and technology professionals. "There is value to insurance people learning how to think like software developers, but it also needs to run the other direction, with technology people thinking like underwriters," he observed.

Actuaries who want to work for an insurtech company should "pick up some coding skills and familiarize yourself with data science concepts," he advised. Even if an actuarial role — whether in pricing, reserving or enterprise risk management — does not include coding and building models, it's important to know how the models operate and their shortcomings. "This will assist you in guiding data scientists and statisticians and will also help you in crafting narratives for use in rate filings," he explained.

Kelli Broin, Chief Product Officer, CoverHound

Kelli Broin joined CoverHound, a purveyor of direct-to-consumer personal and business insurance, by invitation of her mentor. "I was excited about working for a small company and being involved in building something." Initially hired to manage the personal lines team in 2017, Broin now oversees the insurtech's products.

CoverHound is one of the few websites where users can compare both personal and business insurance quotes and buy multiple insurance policies online, which is impressive considering the complexities of underwriting commercial coverage. Deploying technology to act as a digital insurance intermediary, the company offers coverage options from mostly large, well-known insurers. "We are the face to the customer," she said. Offering options to purchase online and over the phone, licensed insurance agents work with customers under the CoverHound brand.

Acquired by the insurance broker Brown & Brown in 2020, CoverHound began in 2010. Broin, one of the company's founders, often said the company was an insurtech before insurtech was cool.

Kelli Broin, FCAS

CoverHound's online sales rose 142% from 2019 to 2020, reflecting the digital transformation due to the COVID-19 pandemic.

After customers enter their information into CoverHound's platform, the insurtech produces a comparison page offering coverage choices by insurer. CoverHound, she said, is the first company to develop a solution to make buying multiple lines of business coverage from multiple carriers a more seamless process. "That had not been done effectively at the time in insurance," she said. Today, customers can purchase up to five products in one online transaction. In total, CoverHound offers 19 types of P&C coverages from personal auto to cyber insurance.

Introducing business insurance required some extra effort compared to personal lines, she said. Personal lines coverage is more standardized, and people are more comfortable shopping online for personal lines insurance compared to business insurance, she explained. To offer business insurance, she works with different carriers to ensure insurance products offered through the CoverHound marketplace align with the needs of the digital customer. And though the rule of thumb is that younger generations are more comfortable purchasing coverage digitally, CoverHound has found that the desire to purchase business insurance online reflects an organization's tenure and size rather than the buyer's age. For some small businesses, she said, it is easier to buy coverage on CoverHound than through a traditional agent. "We see a lot of start-up businesses," she added.

Although Broin does not have a traditional actuarial role, she believes her actuarial background has made a big difference in her current position. "You have to understand what kind of risk information we need to collect from the customer for quoting, underwriting and binding," she explained. As an actuary working behind the scenes, she said, she has the context to understand the importance of the data points the carrier needs for the various stages of the purchasing process and works with the carriers to optimize the customer journey. The effort is working. CoverHound's NPS is 82; according to Delighted's NPS Benchmarks, the industry average is 37.

Although [Kelli] Broin does not have a traditional actuarial role, she believes her actuarial background has made a big difference in her current position. "You have to understand what kind of risk information we need to collect from the customer for quoting, underwriting and binding."

And because people respect actuaries, she said, "being in insurtech in a nonactuarial role works to my advantage." More actuaries should pursue careers in insurtech. "I personally felt at times when I was working for insurance companies, you get pigeonholed as an actuary to specific roles," she said. In contrast, at insurtech companies, actuaries have the opportunity to influence a lot of decisions, especially within a small start-up. "You get to see a lot of functions and you get to learn a lot about things outside the insurance world," she observed.

Broin recommends that actuaries consider other ways they can contribute to organizations to make it easier to break into the technological aspects of insurance. "[Actuaries] often talk about traditional versus nontraditional roles," she said. "[It would be] beneficial for the actuarial community to talk about what skill sets actuaries have, why they are important and how to apply them in a wide variety of business applications," she offered.

For actuaries who want to move into insurtech, she advises them to educate themselves on the domains of the tech world including product management from a technology perspective along with digital marketing, data analytics and modeling. "There are many applications in insurtech outside of the typical actuarial domains and actuaries are uniquely positioned to combine their insurance expertise and technical skills to contribute."

Race and Insurance Pricing Session Defines Terms and Advises on Next Steps By DALE PORFILIO

As the insurance industry focuses attention on potential racial bias across all practice areas, CAS actuaries are being called upon to understand and assess the issues and to develop solutions. In that spirit, the 2021 CAS Annual Meeting Planning Committee scheduled a session titled "CAS Race and Insurance Pricing Research — Defining Discrimination and Quantifying Disparate Impact in Insurance." The session provided an overview of two new CAS Research Papers commissioned as part of the Casualty Actuarial Society's Race and Insurance Pricing initiative.

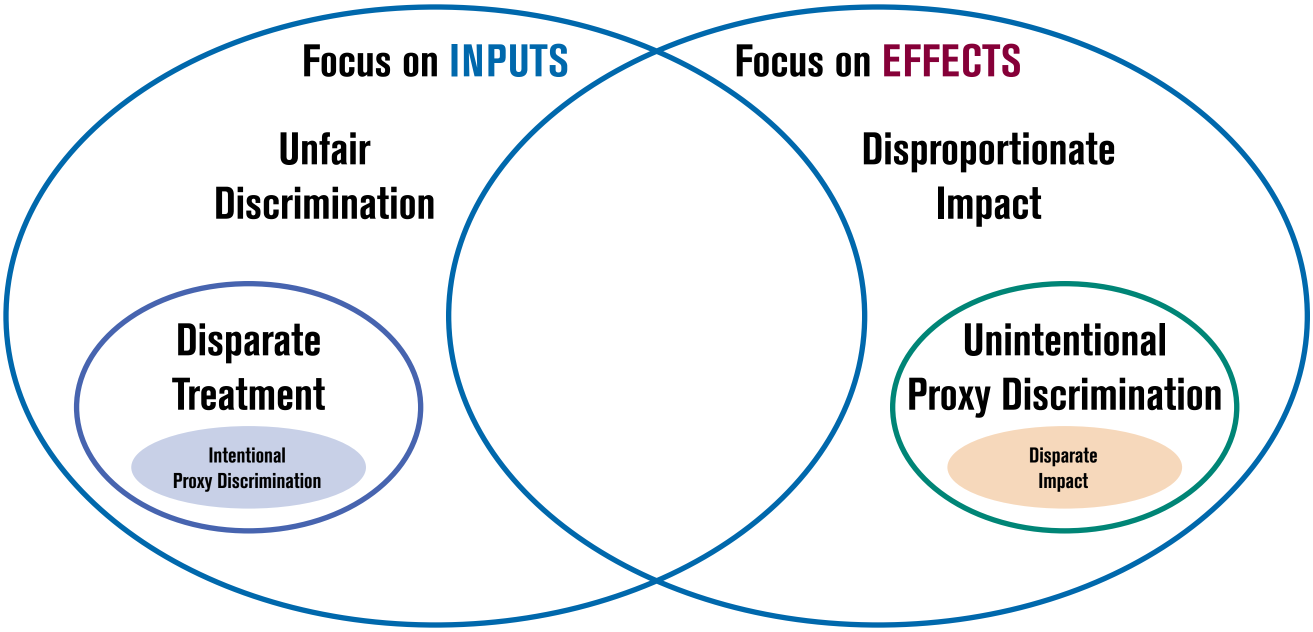
CAS Diversity, Equity and Inclusion Staff Actuary Mallika Bender, FCAS, moderated the session. She opened with an overview of the broader CAS Race and Insurance Pricing Research series. Four Research Papers will be published in early 2022, with the first two of the following featured in this session:

1. "Defining Discrimination in Insurance"
2. "Methods for Quantifying Discriminatory Effects on Protected Classes in Insurance"
3. "Approaches to Address Racial Bias in Financial Services: Lessons for the Insurance Industry"
4. "Understanding Potential Influences of Racial Bias on P&C Insurance: Four Rating Factors Explored"

CAS Board Member Kuda Chibanda, FCAS, is an assistant vice president of data science at The Hartford and the author of the first Research Paper. Chibanda presented her research on key terms being used in the industry debate on race and insurance, such as *protected class*, *unfair discrimination*, *proxy discrimination* and *disparate impact*. The Research Paper also explains the implications of conflicting definitions of these terms. A key point is that all definitions in the paper come from other insurance stakeholders and not from Chibanda nor the CAS.

Protected class refers to a group of people who share a common characteristic, for whom federal and state laws have created protections prohibiting discrimination because of that trait. The "big three" protected classes are race, religion and national origin, but the definition has been expanded by federal laws over the decades to include sex,

Mallika Bender, Kuda Chibanda and Roosevelt Mosley.



family, age, pregnancy, disability, sexual orientation and gender identity. Race is often the focal point of debates, but the industry needs to keep the broader definition in mind throughout these discussions.

Unfair discrimination was first defined for insurance in the McCarran-Ferguson Act with the phrase "rates must not be excessive, inadequate, or unfairly discriminatory." The Act uses discrimination as a synonym for differentiation and does not define protected classes. Protected classes for unfair discrimination in insurance were subsequently defined state by state as the Act was implemented, which leaves the term with significant variation across the United States.

Proxy discrimination is more complex to define. In general, it is intuitive to define proxy discrimination as the use of one or more characteristics that stand in for protected classes for the purpose of prejudicing a certain group. Chibanda elaborated on five different interpretations of proxy discrimination used by insurance stakeholders, which vary based on concepts like whether intent is required and causation vs. correlation (which is complex enough to require its own research effort).

The textbook example of proxy discrimination is neighborhood redlining by the Home Owners' Loan Corporation (HOLC) in the 1930s. Documentation makes clear that the HOLC's intent was that "properties shall continue to be occupied by the same social and racial classes." The HOLC pursued segregation by race and class, even though those variables were not used directly in the underwriting manual. The HOLC created color-coded maps that were used by banks and insurers to determine eligibility for mortgage loans. While these maps were discarded decades ago, they were in place long enough to influence where people live, and they continue to influence many quality-of-life metrics today.

The fourth and final key expression, disparate impact, is a legal term with a very specific definition. A determination that disparate impact exists requires affirmative findings at each step of a three-tiered test. First, the plaintiff is asked to prove whether the practice causes a discriminatory effect on a protected class. If yes, then the defendant has to prove there is a necessary relationship to a legitimate interest. If yes, then the plaintiff again has to prove there is an alternate, less discriminatory practice. Only when all three exist is there a determination that disparate impact exists and that the practice should be discontinued.

Chibanda closed by putting all these terms together in a convenient Venn diagram for actuarial practitioners to think about how they perform their work every day. She brought together the focus on inputs and outputs to help determine whether actuaries are producing work products (whether using algorithms or human judgment) that create disproportionate impacts and unfair discrimination. With a review of definitions complete, the session shifted to the second Research Paper.

CAS President-Elect Roosevelt

Mosley, FCAS, CSPA, is a principal and consulting actuary with Pinnacle Actuarial Resources and the co-author with Radost Wenman, FCAS, CSPA, of "Methods for Quantifying Discriminatory Effects on Protected Classes in Insurance." The paper explores disproportionate impact and compares several potential statistical methods that actuaries can apply to measure this impact in the context of insurance rating. The session quickly turned from conceptual to statistical to challenge the audience.

This research is especially timely because Colorado's insurance commissioner is actively developing rules for implementation of the state's Senate Bill 21-169. This bill will require insurers to test for unfair discrimination across a wide range of protected classes, with specific definitions somewhat different than what Chibanda presented.

Mosley and Wenman's paper investigates the latest research in model fairness and model de-biasing, which introduces an additional component to the concept of model bias to transcend the purely statistical context. The central theme is to measure the effect of rating algorithms on protected classes that models may perpetuate based on bias in the underlying data and to ensure that models do not produce discriminatory effects against protected classes.

Mosley then dove into the three categories of fairness criteria:

1. Independence — which requires that the predictions and the protected attributes be statistically independent.
2. Separation — which is satisfied if the predictions and protected attributes are statistically independent but conditional on the actual response.
3. Sufficiency — which is satisfied if the predictions and protected attributes are statistically independent but conditional on predicted values.

The presentation and paper both delve into the statistical methods that have been developed to evaluate each of these criteria.

Mosley then discussed bias mitigation techniques, especially for machine learning. He focused on measuring for any bias and determining how to mitigate any bias found in the following three areas:

1. Pre-processing — attempting to mitigate bias in the training data.
2. In-processing — attempting to mitigate bias in the model phase.
3. Post-processing — attempting to mitigate bias by adjusting the modeling predictions.

The power in this Research Paper is that it provides practitioners with the math required to test their existing models for discriminatory effects and to investigate approaches to mitigate any bias found. Actuaries responsible for building and maintaining any segmentation models that could result in disproportionate impact on a protected class would benefit from reading and applying the findings of this paper.

In a Q&A following the presentations, the audience questions drew out some of the complexities around race and insurance pricing. When asked what should be done to replace the predictive power of credit-based insurance scores (CBIS) if their use is prohibited, Mosley recommended reviewing all characteristics holistically to find balance between predictive power and fairness. A 2007 Federal Trade Commission study showed concerns with CBIS *between* protected classes, but it also showed that CBIS were predictive *within* protected classes. Instead of removing any single characteristic in full, Mosley advised actuaries to find solutions that strike a better balance.

Two questions probed the scope of the debate: Should actuaries be reviewing modeling applications other than pricing and, similarly, should actuaries also consider commercial lines in addition to the more usual area of personal lines? Mosley clarified that personal auto pricing does garner most of the attention, but that actuaries need to consider testing all models, including underwriting, marketing and claims practices for all product lines. As an example, the Colorado legislation applies to all product lines (including life and health) for all applications.

Another member of the audience asked how actuaries should go about getting protected class data to perform this testing. Chibanda mentioned that third-party vendors have protected class data but that data quality is untested for insurance applications. Mosley suggested the option to use RAND's Bayesian Indirect Surname Geocoding method, which is the best-known method for imputing race.

The last two years have brought ample opportunity for all members of the CAS and the insurance industry to reflect on how they could, and perhaps should, be performing their work. The challenges are many, but as subject matter experts in the insurance industry, actuaries are well-positioned to play a leading role in developing solutions. ●

Dale Porfilio, FCAS, MAAA, is the chief insurance officer for the Insurance Information Institute in New York City.

When Nontraditional Meets Traditional: Executives Tout Innovative Career Paths and Old School Grit and Determination

By DALE PORFILIO

When Hurricane Andrew made landfall in south Florida, three catastrophe modeling firms were in their early years of existence — you might call them "the Insurtechs of 1992." In the wake of Andrew, insurers quickly began employing actuaries who were put in the nontraditional roles of applying catastrophe models for pricing and risk management.

Most of us now would consider catastrophe modeling to be *traditional* work for actuaries. "Actuaries Making a Splash in Nontraditional Roles," the final general session of the CAS 2021 Annual Meeting, cast a bright spotlight on the fluidity of what is deemed *nontraditional* as actuarial practice grows and evolves.

Moderating the executive roundtable was Amit Verma, ACAS, of KibaTech, the insurance and actuarial consultancy firm he co-founded after serving in traditional actuarial roles at Farmers Insurance and RMS. The three panelists had each crossed paths professionally and personally: Tetteh Otuteye, FCAS, vice president of risk for GM Cruise; David McFarland, FCAS, CEO and founder of Coterie; and Isaac Espinoza, FCAS, vice president and managing director for Root Insurance Company.

Speaking about what led them to their current positions, the common theme was beginning their actuarial careers in traditional roles, and then using their actuarial expertise in nontraditional roles at nontraditional companies. Otuteye switched from traditional pricing, reserving and analytical roles at One Beacon to the reinsurance space with Guy Carpenter and other companies. Next, he stepped into insurtech as director of risk and insurance for Waymo, an autonomous vehicle company. Now he leads risk management and insurance strategy at GM Cruise.

McFarland started at NCCI estimating the financial and pricing impacts of legislative policy on workers' compensation risk. He leveraged that position into opportunities with Madison Consulting Group and Jewelers Mutual before stepping into the insurtech space as chief actuary for Clearcover, a car insurance startup based in Chicago. In 2018 he founded Coterie and now occupies the firm's top post.

Espinoza began his traditional career at Farmers and Fireman's Fund before relocating to the Cayman Islands to join startup Greenlight Reinsurance, eventually becoming a venture capital investor with Greenlight. He then joined Root, a fast-growing insurtech, and now heads up their reinsurance programs.

Enterprise survival and cautions

An audience member asked a two-part question: "What percentage of insurtechs have a viable value proposition? What red flags do you see among those that fail?" In response, McFarland borrowed a phrase: "Never confuse innovation for alchemy." In other words, many startups may have brilliant founders with interesting ideas and chemistry, but they can lack true innovation.

Drawing from his venture capital

Left to right are Tetteh Otuteye, David McFarland and Isaac Espinoza.

experience, Espinoza said that because the number of insurtechs is exploding and so many are in various stages of maturity, it will be a long time before there will be data on an ultimate success rate. Espinoza's biggest red flags involved insurtech founders who thought they knew everything but lacked an understanding of insurance. Greater success comes when founders bring together technology and insurance domain expertise to foster collaboration. The nature of the business is now evolving to traditional carriers starting or acquiring insurtechs early on to address a specific business need.

Panelists agreed that successful and innovative insurtechs need technology and insurance experts to be humble and respect the essential contributions all parties bring to the company. Otuteye and McFarland shared examples where opportunities were won and lost by parts of the organization not working efficiently with other disciplines.

From nontraditional to traditional

I asked the panelists' perspective on the transitory nature of the nontraditional label: "Bach and Mozart were revolutionary composers for their day, and now we lump their music into classical. How will we know when nontraditional actuarial work becomes traditional?"

Otuteye likened when actuaries first became involved with pricing insurance to when he started working with engineers at Waymo. The engineers had no idea what actuaries did and why they were needed in the company. Otuteye had to show them how his actuarial skills could add value to their business problems designing autonomous cars. He did likewise at Cruise where actuaries integrate with tech and engineers. Something becomes traditional when it is obvious to hiring managers to recruit actuaries into these roles.

McFarland's answer focused on solving new problems and the skillsets needed to solve them rather than the exact label of who is doing the work. The actuarial skillset is beneficial for many functions within his company, so he hires actuaries to solve these problems. Besides, Bornheutter-Ferguson and Cape Cod reserving methods were once new and revolutionary and now are considered standard reserving practice. McFarland wondered where else these actuarial methods could be applied to other business problems like machine learning.

Handling failure and getting recognition

Otuteye counseled everyone to learn the absolute most from every situation as a way to manage failure and the risk of it. Failure is a cost of doing business, so maximize your organization's learning from this expensive education, he said. McFarland's take on handling failure was to define success first, such as the lessons and growth that can occur as a result of failure. Espinoza noted that nontraditional roles at startups may not offer comparable base compensation and benefits, but the experiences can accelerate your career to offset any compensation differences.

An online participant asked panelists how they responded when nonactuaries did not recognize their actuarial experience. Otuteye strongly identified with this question. At Waymo and Cruise, he had to find the language to help the engineers and lawyers understand what he brought to the table as an actuary focusing on the risk and insurance aspects. He admitted making many false starts trying to communicate his value proposition.

The value of CAS exams; advice to younger selves

McFarland credited his pursuit of the FCAS designation with preparing him for success. He found the content to be helpful foundational knowledge for an actuarial career, but the process was even more valuable in fostering dedication, grit and love for continuous learning.

Espinoza added that it's important for exam content to evolve with actuarial practice while making sure practicing actuaries are developing soft skills and professionalism. Otuteye challenged the CAS to develop shorter credentialling paths as actuaries compete with various master's programs for opportunities.

Verma closed the session by asking the panelists what advice they would have given their younger selves. Espinoza led off with a strong list: Take risks, find strong mentors (ideally not your direct manager) and seek peer mentors (preferably outside your company). Coincidentally, Espinoza and Verma have kept in touch since Verma was an intern at Farmers even though they have not worked together since.

McFarland advised surrounding yourself with people who will challenge you. Do things that are "first-order negative, second-order positive," he said. Examples include saving for retirement and investing in your health and education, rather than short-term indulgences that have future adverse consequences.

Otuteye said to have faith in yourself and your actuarial skills to solve a wide range of problems.

A personal reflection on the history and future of the CAS

When I became a Fellow in 1997, the CAS membership was 2,899. After welcoming our new Fellows and Associates in San Diego this past November, the CAS membership grew to 9,463.

We have not grown this rapidly because the employers of 1997 needed 6,564 more actuaries to perform the same types of work. CAS members have continuously pushed the boundaries of actuarial practice into nontraditional roles, companies, industries and countries. Some of these roles matured to become traditional, and adventuresome actuaries stepped into the next unconventional areas of practice.

The CAS Planning Committees could schedule this identical session every five years and the topics will always be new — if we retain this dynamic part of our professional culture.

—Dale Porfilio

Actuaries' "Superpowers" Are Essential to Navigating Climate Risk

By JEFF DUNSAVAGE

Actuaries have a critical role to play in measuring climate change as well as its impacts and driving long-term decision making, three risk management thought leaders told attendees at the CAS 2021 Annual Meeting.

In a session titled "Calling All Actuaries: The Need for Risk Experts to Shape Climate Action," the panelists (only one of them an actuary) explained the importance of the actuarial discipline for filling gaps in how the public understands climate-related risks and communicating about those risks to drive much-needed behavioral change.

Nancy Watkins, FCAS, described the "superpower" of actuaries — in particular, property-casualty insurance actuaries — as being "really good at word problems." Watkins, a principal and consulting actuary for Milliman, said, "We don't just do calculations. We're good at figuring out how to set up the problem, determine which questions need to be answered, and what the necessary data is to solve the problem."

Laypeople, in general, do not understand risk — especially complex, long-term risks like those related to climate change. This makes the rigor and data orientation of the actuary essential to seeing through often emotional and politically driven public narratives.

"We're a trusted voice," Watkins said. "Trusted to be independent."

Carolyn Kousky, executive director of the Wharton Risk Center at the University of Pennsylvania, reinforced Watkins' observation. She said the work around climate change "has to be underpinned by the sound risk assessment, independent, trustworthy risk assessment" that actuaries can provide.

Kousky highlighted two major areas

demanding this type of risk assessment:

1) Building resilience and better linking risk transfer with risk reduction.
2) Addressing the diverse risks associated with a transition toward a lower-carbon economy.

Serena Sowers, vice president for public sector solutions at Swiss Re, spoke about the issue from an economic perspective. She cited research indicating that, if targets set by the United Nations Paris Accords on climate change are not met, a 10% decline in global GDP is likely to result.

Such anticipated economic impacts, combined with an already large and growing global protection gap — only 30% of catastrophe damage globally is insured, Sowers said — demands long-term planning based on an understanding of the interconnectedness of economics, geography, culture and public health as well as life and property risk.

Sowers discussed the local and regional impacts of increasingly frequent and severe weather events, when communities that have not yet recovered from one "100-year storm" are quickly hit by another.

"How does a community recover if the tax base is totally disrupted?" Sowers asked. "How can you tax people who've just lost everything?"

In addition, climate change affects different communities disproportionally, often having the greatest impact on less-affluent ones and communities of color.

From a property-casualty perspective, Watkins stated that the problem is that insurance is priced on a one-year basis — this keeps premiums down but doesn't adequately reflect longer-term risks. As a result, she said, "All this unpriced, unacknowledged risk is maintained off-book by the government and passed along to the taxpayer."

Kousky concurred. "We disclose today's risk to buyers," she said, "[but] we don't disclose future risk. And the decisions we make as individuals and communities are rarely one-year decisions. When we move somewhere, we plan to stay there for a while. Our mortgage might be 30 years, and when a community is deciding where to put buildings and infrastructure, that can be there for centuries."

"There's a huge demand for long-term estimation," Watkins said. "State regulators are really struggling with it. Insurance companies are struggling with it. Actuaries can be very helpful in the dialogue, but it's a tough problem."

When it comes to the proliferation of climate models and available analytics and data resources for those seeking to better understand climate risk, Kousky sees a big opportunity for actuaries in user education. "It's not just about understanding the differences among the models and which model is fit for what purpose," Kousky said. "It's about understanding 'model uncertainty,' which doesn't roll off the tongue of the average user. We're going to need to do a better job about communication and education."

"A model is not reality; it's a simplification of reality," Watkins said. "The future will not look like the past, and people who are not risk experts are still going to have to make decisions and be responsible for planning ahead — but everything they know may not be useful to them."

The obligation for the actuarial community, Watkins said, is to educate people as to what risk means: "We need experts to report back to the non-experts."

Jeff Dunsavage is a senior research analyst for the Insurance Information Institute in New York City.

New Risk Mitigation, Pricing and Underwriting Strategies Breathe Hope Into Hard Cyber Insurance Market

By ANNMARIE GEDDES BARIBEAU

The cyber insurance market is hard right now, but new strategies should turn the situation around. Unlike other commercial lines also in hard markets, cyber insurance is unique because it is experiencing its first widespread speed bump, said Jonathan Laux, FCAS, vice president of analytics at CyberCube, a purveyor of cyber insurance analytics. Laux, who at the time of the 2021 CAS Annual Meeting was Aon's head of cyber analytics, spoke as a panelist at the general session, "Ransomware and Other Cyber Headlines."

He is optimistic that losses and rates will improve, but the line is still recovering. The year 2020 was pivotal for the cyber insurance industry. For the first time, standalone cyber coverage cumulatively experienced 72.8% loss ratios averaging, Laux said, leading to combined ratios over 100% for the line as a whole. The harrowing increases were due to underwriting decisions made in 2019 and 2020, and the frequency and severity of ransomware.

While rates were going up, ransomware cyberattacks in 2021 affected the public in general, drawing even greater media attention, said Emma Ye, head of actuarial and risk analytics for At-Bay, an insurtech offering cyber insurance. Such attacks include the Colonial Pipeline incident, which raised concerns on critical infrastructure and disrupted gas supplies in the East Coast. As a result, cyber insurance rate increases rose rapidly in 2021 and are projected to continue through 2022, she said.

Due to the increased use of internet-connected devices, the dramatic shift in remote work and the growing demand of the interconnected global economy, organizations realized that "they desperately need cyber insurance," Ye observed. This has fueled demand for coverage.

Moderator Monica Shokrai, FCAS, now the head of actuarial, analytics and systems for Alphabet's Business Risk & Insurance team, raised challenges facing customers. "Rate and capacity are concerns for market buyers as well," said Shokrai, who also leads business risk and partnerships for Google Cloud.

Laux responded that insurers are hitting limits faster because they are being squeezed at both ends — rates are going up and clients want more coverage. "We have seen the price impact flowing to large primary buyers like Google," he added.

He said that insurers can only write so much business without support from reinsurers, explaining that about 50% of cyber coverage is ceded to reinsurers that have clamped down on capacity. They are cautious after catastrophic events such as the Microsoft Exchange Server attack in early 2021 Colonial Pipeline; these and other major incidents cost 1 to 1.5 loss ratio points, he explained. Laux also pointed out that since reinsurers check their books less frequently than insurers, there is a lag in how quickly they respond.

Like other risk bearers, Ye's company also saw a significant increase in the rates. "Pricing is not the only lever here," she emphasized, "we are very keen to help the insureds to close security gaps through active risk monitoring and to provide flexibility through a variety of sublimits on the coverage."

New risk realities

Part of what led to the current crisis is the changing nature of cyberattacks. It is a business for the hackers who want to hide in the backroom, Laux said, so when the Colonial Pipeline attack occurred, the bad actors did not know they hit a major piece of U.S. infrastructure.

Ye cites remote desktop protocol (RDP) as contributing to the rapid increase in ransomware attacks. "Once they get into the system, they can do anything they want," Ye said. Use of open RDPs will keep increasing, which is why customers' systems need continuous monitoring and proactive actions throughout the entire policy period.

In addition to RDP compromises, there are email phishing and software exposures like the Microsoft attack. Vulnerabilities can also arise in other ways. Companies involved in mergers and acquisitions can be exposed to risk intrusions, Ye said, when each division has its own separate system and then is connected to other divisions.

Positive developments

Now there are encouraging advances underway that should improve the cyberrisk and insurance situation. The speakers expressed relief that the federal government is becoming involved in cyberattacks and crime. "It feels like we're getting, at least for the U.S., more active government response for the first time," Laux said. The government is also

developing partnerships with the private sector to learn how to control risks.

Shokrai praised partnerships between private companies and the insurance industry, mentioning Google Cloud's Risk Protection Program as an example. She highlighted several initiatives Google is making to better protect its clients. "Google doesn't let anything run in our environment that we don't explicitly trust." Every day, Gmail blocks more than 100 million phishing emails and blocks more than 99.9% of spam phishing and malware from reaching its users, she added.

Laux offered that he would like to see insurers deploying tighter underwriting standards that require greater evidence of cyber hygiene, perhaps checking systems once a month or even continuously. All insurers are trying to grapple with identifying the greatest risks. "It takes time to build a strategy and change underwriting guidelines," Laux said. He indicated that there is some good news, however. Between underwriting actions and rate increases many cyber insurers right now feel like they are turning the corner. "Over the next year or two, it will be worked out," Laux said.

At-Bay is deploying automation for underwriting. As the cyber insurance line progresses towards more maturity, Ye is confident that the adoption of modern underwriting strategies will continue for cyber coverage. At-Bay is also engaging in practices Laux would like to see insurers implement, such as improving risk mitigation through continuous monitoring of its policyholders in order to actively respond to threats. The effort has helped to lower claims frequency and loss ratios compared to the insurance market.

However, successfully reducing cyberattacks raises a challenge for actuaries pricing cyber insurance, said Ye, because such companies do not have as much claims data for ensuring credibility as traditional insurers have.

A call to interested actuaries

Ye and Laux encouraged the audience to consider working in cyber insurance. Actuaries can work on a lot of fundamental questions, Ye said, such as determining the right underwriting choices for portfolio building, shortening the cycle from data to risk actions and participating in capacity conversations. Actuaries can also determine risk profiles to ensure good cyber hygiene.

Laux sees actuaries playing a greater role by being clear about the timing of information, such as explaining the difference between accident and calendar years. "Cyber is a shorter tail line, but there is a lag in the underwriting cycle," he added.

Actuaries can also better serve the cyber insurance industry by being as clear and specific as possible with their use of language. For example, distinctions should be made among the most prominent threats in today's environment, versus a planned change in underwriting or claims strategies for next year, versus a decision made in prior years that is now flowing through income statements," Laux said.

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

IN MY OPINION By JESSICA LEONG

Do You Want to Be the Actuary of the Future?

The following is taken from Jessica Leong's presidential address given at the 2021 CAS Annual Meeting in San Diego last November.

Do you want to be the "actuary of the future?"

What does that even mean?

Last year we made an important change to the CAS Envisioned Future. The envisioned future used to say that the CAS would "advance the *practice and application of casualty actuarial science*." Now, the envisioned future says that our members are "sought after globally for their *insights and ability to apply analytics to solve insurance and risk management problems*."

This was a big change — and it wasn't just semantics.

Let us take the old Envisioned Future that talks about the "practice and application of actuarial science." Hands up if you have applied casualty actuarial science in your job?

[Much of the audience reacts with a show of hands.]

Ok. Good. That's pretty much everybody.

Now, let's take "applying analytics to solve insurance and risk management problems." Have a think . . . in your job, think of a time when the business came to you with a problem, and you were able to apply analytics to get some insight, and then worked proactively with the business to solve their business outcome and got a good result for the business.

So, it might go like this: The business had a profitability issue and you applied actuarial science to estimate and understand the drivers of their loss ratio. Based on your insights, you then worked with the underwriters to craft and execute on a strategy to improve their loss ratio — perhaps they cut a part of their book, or they targeted a new profitable area, and their loss ratio is now showing 2 to 3 points of improvement.

The story ends in a positive business result.

Now, hands up: Who can tell a story like that?

[The audience reacts with a smaller show of hands.]

Ok. So, we have some of you but not all of you who can tell this story.

We are all applying actuarial science in our jobs, but not everyone here can share a story where they have solved a business problem that results in business impact.

Solving business problems is hard. That is why the CAS Board very deliberately focused our vision of the actuary of the future on solving business problems.

Many actuaries feel that it's enough to do high-quality analytics and effectively communicate the results. But the actuary of the future takes the next steps and helps the business act on those results.

Some actuaries think of themselves as umpires keeping score. But the actuary of the future thinks of themselves as a valuable member of the team.

So, if you want to be the actuary of the future, I issue a challenge to you: Make a pledge that, before the next CAS Annual Meeting, you are going to solve a new business problem.

You will have a story that you can tell, in which you have applied analytics that has a significant business impact. And I'll find you at that next Annual Meeting and get that story from you.

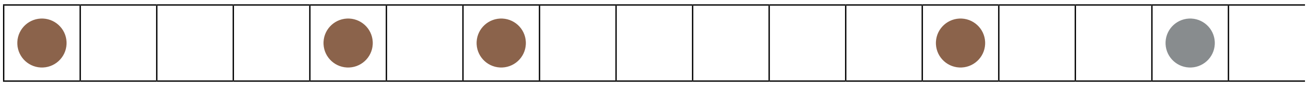
So, I ask again: Do you want to be the actuary of the future?

If you do, then be proactive and make that pledge!

CAS Immediate Past President Jessica Leong, FCAS, chairs the CAS Board of Directors. She is lead data scientist for Zurich North America in Chicago.

IT'S A PUZZLEMENT By JON EVANS

A Game of Coins



A game (illustrative example shown above) is played by two players who alternate taking turns, on a sequence of adjacent squares that extends without bound to the right. Initially a finite number of coins are placed, each on one square. No more than one coin may occupy a square. The rightmost coin is silver and the rest are copper. Each player in turn may either:

a. Move any coin to the left, any number of spaces possible without jumping over another coin, or
b. Capture and remove the leftmost coin.

Whichever player captures the silver coin, wins.

Under what initial conditions (number and placement of coins) does a player, either the player who takes the first turn or the other, have a winning strategy?

Questionable Odds

The solution below is based on John Berglund's submission.

A. Give an example of a question that maximally improves your expected probability of correctly guessing the individual: Is the person under age 50?
B. Give an example of a question that minimally improves your expected probability of correctly guessing the individual: Is the person over age 300?
C. How would you characterize questions with improvement greater than the minimum and less than the maximum? Answer: Nonexistent.

Proof:

Say that there are n people alive on Earth.

My expected probability of guessing the right person at the start is $1/n$.

I ask a question about something that is true for m people.

If the answer comes back "yes" this will leave me with m people, and I would guess correctly $1/m$ of the time. If the answer comes back "no" this will leave me with $n - m$ people, and I would guess correctly $1/n - m$ of the time.

Since the person is selected at random there is m/n probability of a "yes" and $(n - m)/n$ probability of a "no."

Consequently, as long as $0 < m < n$, my overall probability of correctly guessing is $(m/n)(1/m) + ((n - m)/n)(1/(n - m)) = 2/n$.

However, if m is equal to either 0 or n, "no" for everyone or "yes" for everyone, then I gain no information and my odds are still $1/n$.

Any question about something that is true for some people, but not all people, will double my expected probability of guessing correctly. Otherwise, there are no improvement in my odds.

Solutions were also submitted by David Skurnick and Jeff Subeck.

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

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