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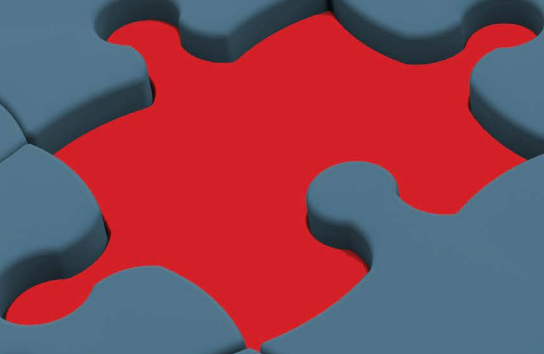
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on the cover

The Search for the Rate Filing Fast Lane

By JIM WEISS

Are your rate filings stuck in traffic? Don't just sit there! Read what these experts are doing to manage their estimated times of arrival.

Integrating Risk Metrics in a Larger ERM Framework

Learn about the key takeaways from the latest Monograph on integrating reserve variability.

CAS MONOGRAPH SERIES NUMBER 12

THE ACTUARY AND ENTERPRISE RISK MANAGEMENT: INTEGRATING RESERVE VARIABILITY
Mark R. Shapland, FCAS, FSA, MAAA
Jeffrey A. Courchene, FCAS, MAAA

CASUALTY ACTUARIAL SOCIETY

editor's NOTE By SARAH SAPP

For the Joy of Writing

The CAS Publications Department is working hard to constantly improve *Actuarial Review*, offering well-researched articles in each issue that are important to you, our readers. We are always looking for content about research, hot topics and trends for the industry, technical analysis, leaders/members and their professional/personal stories, member and organizational accomplishments, volunteerism, working group activities, CAS event coverage and more. And you can be a part of it all!

Under the leadership of *AR* Editor in Chief Jim Weiss, we have recently established an *AR* Writing Subgroup in the *Actuarial Review* Working Group. The purpose of this group is to establish a pool of authors who are willing to write stories for *AR*. These stories can be written individually or in a group collaboration. We have recently decided to open membership to the *AR* Writing Sub-Group to the wider CAS membership and invite you to join us in our pursuit to publish the best possible version of *AR*. Email AR@casact.org and let us know if you're interested.

AR Writing Sugroup members volunteer for a variety of reasons—the joy of writing, in many cases. Others join us to enhance their writing skills. Actuaries who refine their writing skills can effectively communicate complex findings and recommendations to diverse audiences, thus enhancing their professional impact. Contributing to a technical magazine allows them to distill intricate concepts into accessible content, honing clarity and precision in their expression. This practice fosters the ability to articulate insights cogently, which is vital for client presentations, reports and team collaborations. Moreover, writing can elevate your visibility within the industry, positioning you as a thought leader and fostering networking opportunities. Strengthening writing proficiency equips actuaries with a versatile toolset, indispensable for navigating the intricate P&C landscape.
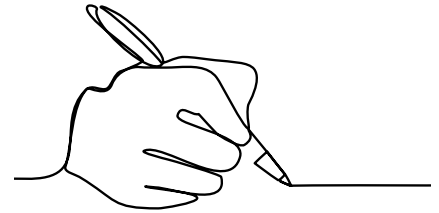
We hope you enjoy this edition! ●

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

Send your comments and suggestions to:
Actuarial Review
Casualty Actuarial Society
4350 North Fairfax Drive, Suite 250
Arlington, Virginia 22203 USA
Or email us at AR@casact.org

Follow the CAS

Obtain Your Credentials in Predictive Analytics and Catastrophe Risk Management From The CAS Institute
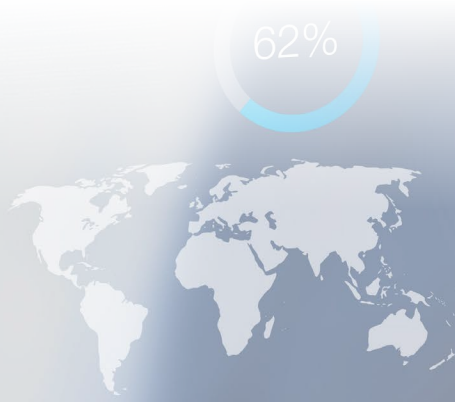
Certified Catastrophe Risk Management Professional (CCRMP) and Certified Specialist in Catastrophe Risk (CSCR)

The International Society of Catastrophe Managers (ISCM) and The CAS Institute (iCAS) have joined together to offer two credentials in catastrophe risk management. The Certified Catastrophe Risk Management Professional (CCRMP) credential is available to experienced practitioners in the field through an Experienced Industry Professional (EIP) pathway. The Certified Specialist in Catastrophe Risk (CSCR) credential is available both through an EIP pathway and an examination path.

Required assessments and courses for earning the CSCR include:

- Property Insurance Fundamentals
- Catastrophe Risk in the Insurance Industry
- Introduction to Catastrophe Modeling Methodologies
- The Cat Modeling Process
- Online Course on Ethics and Professionalism

Some exam waivers are available for specific prior courses and exams.

For more information, visit CatRiskCredentials.org.

Certified Specialist in Predictive Analytics (CSPA)

The CAS Institute's Certified Specialist in Predictive Analytics (CSPA) credential offers analytics professionals and their employers the opportunity to certify the analytics skills specifically as applied to property-casualty insurance. The program focuses on insurance as well as technical knowledge and includes a hands-on modeling project that challenges candidates to apply what they have learned throughout their studies to address a real-world scenario.

Required assessments and courses for earning the CSPA include:

- Property-Casualty Insurance Fundamentals
- Data Concepts and Visualization
- Predictive Modeling — Methods and Techniques
- Case Study Project
- Online Course on Ethics and Professionalism

Some exam waivers are available for specific prior courses and exams.

For more information, visit TheCASInstitute.org.

president'sMESSAGE By FRANK CHANG

Small Things Bring Great Things

"Great things are done by a series of small things brought together."

—*Vincent Van Gogh*

In an age of groundbreaking technologies like generative AI, it's easy for us to focus on transformational shifts and overlook the power of incremental steps. This sentiment has been on my mind lately regarding the CAS and our amazing volunteers and staff. For example, if we look at the Property and Casualty Predictive Analytics (PCPA) requirement, the project portion of the requirement would not be possible without our knowledge gained from putting together the Case Study Project requirement of the Certified Specialist in Predictive Analytics (CSPA) certification. The groundwork for this certification was laid by CAS Past President Bob Miccolis and those volunteers and staff who labored to create The CAS Institute. Each of these efforts were accomplished by a series of small things brought together. Similarly, many of the CAS recent launches and achievements, like the University Recognition Program and floating exam break, were the result of a series of incremental work and wins.

In this column, I would like to share the progress toward some of the 2024 priorities I shared in my initial President's Message.

CAS Strategic Plan

The Strategic Plan Task Force has been hard at work refreshing the CAS Strategic Plan for the next three years. The task force is reviewing a variety of resources to support their work beginning with the recent Quinquennial Membership Survey, which provides a wealth of input to assist the board in setting the short- and long-term direction of the CAS. Other resources include a SWOT analysis and interviews and focus groups with CAS volunteer and staff leaders. Membership input will be sought throughout the process and there will be several opportunities for members to provide input to the new Strategic Plan. Members will see a series of announcements and calls to action like pulse surveys beginning later in May and extending through the summer. We are also planning two virtual town halls open to all members. With the benefit of all this input, the task force is aiming to develop a draft of the next Strategic Plan for presentation and discussion with the board in August, with an unveiling to the membership to follow.

Admissions

Forty recent ACAS or near-ACAS candidates participated in the PCPA beta test to help us calibrate logistics, length, material and grading. Over one-third of the participants came from outside North America, representing multiple countries and regions across the world. In addition, we recently announced the Actuarial Professional Analysis effort to define the skills and knowledge needed by the actuary of the future. This analysis will include how we validate basic skills, which will help with our actuarial pipeline.

Governance

We are nearing completion of Phase 1 implementation, which sets the groundwork for governance work and adjusts our approach to board committees. We are now moving into Phase 2, which is focused on the overall governance structure of the CAS, board policies and procedures, and roles and responsibilities. We will be seeking feedback from the CAS membership on Phase 2.

Connecting with Members and Other Actuarial Organizations

In my January/February column, I mentioned that it was important to connect with members working internationally as well as with peer actuarial organizations. Many of these relationships have been established by CAS leaders who preceded me; my hope is that my participation would be another small thing in the series of small things leading to great things.

We recently announced the Actuarial Professional Analysis effort to define the skills and knowledge needed by the actuary of the future.

Institute of Actuaries of India (IAI)

In February I traveled to Mumbai with CAS Fellows Ron Kozlowski and Kendra Felisky to attend the Global Congress of Actuaries (GCA), hosted by the Institute of Actuaries of India (IAI). The trip included university visits as well as bilateral talks with IAI on potential collaboration. Ron and Kendra met with faculty and students at a few universities,

President's Message

from page 6

including the Sri Sathya Sai Institute of Higher Learning, which has undergraduate and graduate programs in actuarial science as well as a few dozen students taking CAS exams. Most of these students have passed MAS-I and a dozen have passed MAS-II. Those who graduate work for P&C companies. Although we currently only have a few members in India, this visit shows the potential for the CAS to have a large impact on future P&C actuaries there.

National Association of Insurance Commissioners (NAIC)

We are fortunate to have current and former CAS Board members who work in regulation.

At the urging of board director Wanchin Chou, FCAS, CPCU, CSPA, CCRMP, I followed up my trip to India with a visit to Phoenix to attend the NAIC Spring Meeting. Since this was my first NAIC meeting, I learned not just about current insurance regulatory issues, but also about the different interested parties. I also learned about how the CAS, the SOA and the Academy participate and engage the NAIC. There's definitely an opportunity for the CAS to do more — in the past, seasoned CAS leaders helped represent us and raise awareness, but with current issues like climate risk, advanced modeling and generative AI, there's an opportunity for the CAS to contribute more at these events. The highlight of my trip was a meet and greet set up by Kris DeFrain, FCAS, to talk with CAS members working in regulation, including South Carolina Department of Insurance Director Michael Wise.

Instituto Brasileiro de Atuária ([IBA](#))

A few days after returning from the NAIC, I had a business trip to São Paulo and stopped by Rio on the way to meet with IBA President Raquel Marimon and CAS Affiliate Member Cristina Mano. Cristina has attended many CAS Meetings. The three of us discussed problems common to all actuarial organizations: marketing our profession to future actuaries, showing the value of actuaries to employers, keeping our basic and continuing education relevant and learning how to engage our members and our volunteers. IBA's Annual Conference will take place in August and the CAS will be hosting a one-day, pre-congress program focused on property and casualty risks.

International Actuarial Association (IAA)

IAA President Charles Cowling and I spent a good amount of time together at the GCA in Mumbai. The themes from our conversation included the role of actuaries in emerging issues, including climate risk and artificial intelligence. Many countries have built accounting and other requirements around sustainability — the actuaries practicing in these countries are actively involved

Frank Chang (right) with R. Arunachalam, president of the Institute of Actuaries of India. The two were part of a presidential roundtable session called "Navigating Actuarial Boundaries Globally" during the Global Congress of Actuaries in Mumbai last February.

in the discussion and advise both on the quantification as well as on how to think through issues. On artificial intelligence, the IAA hosted an AI Summit in Singapore in April, which I attended and spoke at virtually. I plan to reconnect with Charles and the IAA at their upcoming Council and Committee Meetings happening near the end of May in Seoul.

A favor

I close my message with a small ask to the readers: Consider doing one small thing today that could be part of a series of small things that may bring great things to pass. If you need a suggestion, that small thing could be signing up to volunteer at the CAS, which may lead to you meeting new friends, learning new skills and other opportunities. Thanks for reading! ●

Copyright and Artificial Intelligence

Dear Editor:

I didn't attend the Annual Meeting artificial intelligence (AI) presentation, but I enjoyed Nick Witras's summary, "The AI Cheat Code: How ChatGPT (and AI Tools) Will (and Won't) Forever Alter Human Work" (*AR*, January-February 2024). Witras asks: "Are there intellectual property issues related to the use of AI such as copyright/trademark infringement?" There sure are!

Like everything with AI, copyright is evolving.

In general, copyright law protects the creator and provides five exclusive rights, including the rights to copy, distribute and make derivative works. The law provides various permissible uses (facts are not copyrightable, nor ideas). The fair use clause has a four-factor test and provides a rebuttable defense for some copying. An important fair use is transformative use, where the original use is transformed in a different manner or purpose from the original. Fair use law requires a case-by-case determination.

The AI tool has no copyright rights because it is not human. The AI user may have no copyright right if the user is deemed to have not performed sufficient creative input. The AI output may be deemed transformative and permissible, or it may be deemed a copyright infringement of one of the five exclusive rights.

There are currently several AI-related copyright infringement class-action lawsuits against AI firms and lawsuits against users. Copyright law is country-specific, and statutes and common law are not identical. *The New York Times* lawsuit and others may take years for the courts to resolve, and ultimately, we may see new laws.

—Jerry Tuttle, FCAS

See real-time news on our social media channels. Follow us on Facebook, Instagram and LinkedIn.

COMINGS AND GOINGS

Leslie R. Marlo, FCAS, has been appointed managing director at FTI Consulting, Inc. Prior to this post, she was a consulting actuary for Madison Consulting Group. A 2021 recipient of the CAS Matthew Rodermund Memorial Service Award, Marlo has served as a CAS Board member and vice-president-administration.

John Gleba, FCAS, MAAA, has been appointed managing director at FTI Consulting, Inc. He served 28 years at Madison Consulting Group as vice president and secretary. He has served on the Committee on Professional Education for 21 years.

Mark Crawshaw, FCAS, MAAA, has been appointed senior managing director at FTI Consulting, Inc. He began his actuarial career with Milliman and Robertson in 1984 and joined Madison Consulting Group in 1988. His experience includes loss and loss expense reserve analysis for personal and commercial lines; ratemaking and profitability studies for personal and commercial lines; and expert testimony in rate hearings.

James Bengston, FCAS, has been appointed vice president, chief actuary at Society Insurance. Previously, he served as vice president, chief actuary at Armed Forces Insurance, with leadership responsibilities in pricing, analytics, reserving, compliance and reinsurance.

Cori Kreif, ACAS, has been promoted to associate actuary at Acuity Insurance. Kreif joined Acuity in 2018 as an actuarial analyst.

Dan Palardy, ACAS, has been promoted to chief actuary at Cowbell, a cyber insurance provider. Palardy began at Cowbell in 2022 as the lead actuary, working as the head of the actuarial and catastrophe modeling team. His 13 years of experience include actuarial, underwriting and reinsurance analytics roles. ●

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

2023 Annual Report of the CAS Discipline Committee

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

2023 Activity

On January 5, 2023, the Discipline Committee received a report from the Actuarial Board for Counseling and Discipline (ABCD) recommending that a subject actuary be publicly reprimanded for a material violation of Precept 1, Annotation 1-4 of the Code of Professional Conduct.

In accordance with the CAS Rules of Procedure for Disciplinary Actions, a hearing was held. The Discipline Panel voted to reject the ABCD recommendation and dismissed the case.

There were no cases pending before the committee as of November 30, 2023.

—Pat Teufel, Chairperson of the 2023 Discipline Committee
December 15, 2023 ●

CAS *E-Forum* Volunteers Wanted

The CAS *E-Forum* is looking for dedicated CAS members who love language and enjoy developing well-written prose. E-Forum is in need of volunteers to edit copy for several upcoming CAS research call papers, essays, independent research papers and several CAS-sponsored research projects.

E-Forum Working Group members have early access to many CAS research work. Volunteers also are able to contribute to the refining and crafting of final research products.

Volunteer time over a year can be anywhere from one to six hours depending on the assignment.

Please consider becoming part of this important volunteer group. Email CAS Director of Publications and Research Elizabeth Smith (esmith@casact.org) to volunteer and to learn more. ●
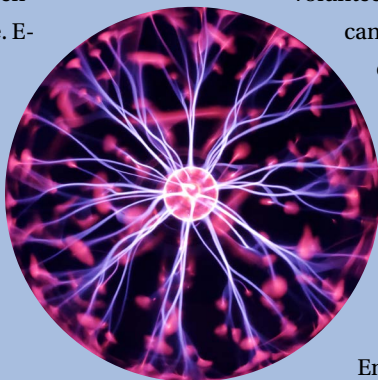
IN MEMORIAM

George Morison (FCAS 1962)
1928-2021

Aaron Mark Sass (FCAS 2021)
1994-2023

DOWNTIME

Downward Dog Trend: A Yoga Analysis By CHRISTINA CUFF

I was pursuing a master's degree in mathematics for secondary education the first time I heard the word "actuary." Soon after, I sat for my first exam and began working as an actuarial consultant. I stayed in that job for over a decade. Since then, I have filled pricing roles with carriers and now with a managing general agent (MGA). Studying was tough for me, and the long hours working as a consultant did not help. So, I took many years off from exams and pursued a work-life balance that promoted wellness. I became a martial artist, certified paddleboard instructor and yoga teacher, writer, performer and producer. I did not realize outside interests, like yoga, would help me pass exams!

I first discovered yoga in my 20s. I attended a weekly class but struggled to find a personal connection to the practice. In 2018 I began teacher training for yoga on weekends while working full-time. I was not interested in teaching yoga. Rather, I wanted to incorporate it into my life. I now have a personal practice and have led yoga classes and meditations in corporate settings, studios, recovery centers, on the beach and online.

Yoga is more than just handstands and fancy pants. It is the single most effective healing modality I have found! Yogic postures are a helpful tool for healing and stress relief. Yoga is a way of living that was outlined thousands of years ago. It presents tools such as breathwork, meditation, mindfulness and service to others.

When I decided to leave my consulting job in 2019, I started taking exams again to advance my career. I was concerned about sitting, as it weighed heavily on my mental and physical well-being in the past. However, I was now aware that frequent breaks to breathe, meditate and move would make me more productive. Mindfulness and meditation eventually led me to investigate new study techniques. I highly recommend this book for anyone actively studying: *Make it Stick: The Science of Successful Learning* by Peter C. Brown.

For many people, incorporating yoga into their lives takes time, patience and *ahimsa* (a Sanskrit word meaning compassion). One way to begin practicing yoga and feeling the benefits right away is through *pranayama*. Pranayama is a Sanskrit word meaning life force and loosely translates to breathwork. Our breath is an effective and accessible stress reliever. Here are three pranayama exercises that you can try right now:

1. Take five
   - Open your left hand, palm facing up.
   - Place your right pointer finger on your left wrist. As you inhale, drag the right pointer finger toward the tip of your left pinky.
   - As you exhale, drag the right pointer finger back to the wrist.
   - Repeat inhaling up and exhaling down each finger until you reach the thumb.
   - You can switch hands and

Christina Cuff

repeat, making it a "take ten." This exercise brings us into the present moment through tactile sensation and mindful breathing.

2. Box breath
   - Inhale for a count of 4.
   - Hold at the top of the inhale for a count of 4.
   - Exhale for a count of 4.
   - Hold at the bottom of the exhalation for a count of 4.
   - Repeat for several rounds.
   - You can decrease or increase the count to 3 or 5. You can also shorten the time spent holding your breath if it is uncomfortable. This exercise can lower the heart rate, calm the mind and deactivate the sympathetic nervous system (fight or flight mode).

3. Physiological sigh
   - Inhale fully into the belly and

then into the chest on the same inhale.

- When full, pause for a second, then sip in additional air.
- Exhale fully through the mouth.
- Repeat several times.

When stressed, people tend to take shallow breaths which causes the air sacs in our lungs to collapse and increases the CO_2 levels in our blood. This in turn causes more stress! By inhaling fully and then introducing additional oxygen, the pockets in our lungs are forced to reinflate. This engages our parasympathetic nervous system (rest and digest mode).

Another way to begin practicing yoga is to incorporate chair yoga into your workday. You can find short, simple chair yoga flows on YouTube.

You are practicing chair yoga without even knowing it when you stretch your arms overhead or rotate your neck while at your desk. Chair yoga helped me become more mindful. I used to think a headache was a cue to pop an Advil, but now I see it as a notification to stretch, rest and drink water.

Yoga has helped me overcome personal obstacles: the fear of not being good enough; physical pain, anxiety and stressors at work; and the stress of exams, to name a few. As a result, I am passionate about sharing how yoga can help others too. I have led colleagues in virtual and in-person yoga, meditation and chair yoga de-stress sessions. I was also blessed to start an employee-led wellness committee. I hope to continue this work with my new company and within the CAS.

As actuaries we are constantly analyzing and reviewing the past, while projecting and sculpting the future. No wonder it can be tough for us to stay in the present! Our work can be stressful, and exams create immense anxiety. Yoga has helped me quiet my overactive mind, ignite my parasympathetic nervous system and experience a mind-body connection. It has enabled me to work and study more efficiently and live life to its fullest potential.

If you have any questions or would like to know more about how to incorporate yoga into your life, please reach out to me via LinkedIn. I would love to hear from you! ●

Christina Cuff, ACAS, MAAA, is an actuary working for Distinguished Programs Group in New York City.

MAKING THINGS HAPPEN

The Meeting Guru By DR. SARAH SAPP, CAS EDITORIAL/PRODUCTION MANAGER

"Making Things Happen" features CAS and iCAS members who serve the associations in many capacities and enrich the volunteer experience for all.

"Seeing attendees being invested in the sessions that you helped to organize is a great measure of success," says Meagan Mirkovich, FCAS, MAAA, CAS volunteer chair for the Spring Meeting Working Group. "Whenever we try something new and it gets positive feedback, it gives our working group the drive to continue to look for ways to create innovative content."

The "we" Mirkovich refers to are those who are part of the team that organizes and plans the content for the Spring Meeting: Volunteer Vice-Chair Ravi Sharma and CAS Staff Chairs Nora Potter and Kathleen Dean.

Mirkovich's goals include planning a meeting that has valuable content for all members at various stages of their careers. "We are not focused on a specific topic like RPM or CLRS," she says, "so we need to appeal to a wide range of attendees."

Mirkovich and her volunteer and staff colleagues are constantly looking for new ways to increase continuing education opportunities for the attendees. "More and more people are attending the Tuesday afternoon events. So, we are looking for new ways to provide continuing education besides the roundtables that have usually been in that time slot," she says. In 2023 they screened the documentary *Elemental*, which was a large success. Last year they also offered a volunteer opportunity during some free time at lunch — that gave attendees a chance to give back and network at the same time."

Meeting attendees volunteered assembling packages to promote the actuarial career to local middle school students. The CAS partnered with the Actuarial Foundation to distribute the packages to local middle school students. They contained calculators, Be An Actuary flyers and the book *Magic School Bus Takes a Risk: A Book About Probability*.

Mirkovich is known as a standout volunteer because of her leadership skills and impeccable work ethic. "Her dedication and commitment to her volunteer work make her a valuable asset to the Professional Education field," says Potter, who is director of professional education. "Meagan is not only a hard worker but also a great team player, always willing to go above and beyond to help her fellow volunteers and ensure success. Her positive attitude and enthusiasm make her a delight to work with," says Potter.

Mirkovich is most proud that the group successfully held two virtual meetings during COVID while gaining volunteers for the Spring Meeting Working Group.

Since earning her credentials, Mirkovich has been a consistent volunteer with the CAS, starting out with the Syllabus and Examination Committee. She was also a leader in Casualty Actuar-

Meagan Mirkovich

ies of New England (CANE). "CANE helped me to make the switch to the CAS Annual and Spring Meeting Planning Committee," says Mirkovich.

This year marks Mirkovich's last Spring Meeting as chair of the Spring Meeting Working Group. "I have enjoyed leading the team and getting to know the other volunteers," she says. "While it is bittersweet to step down, I know the committee will be in great hands going forward, and I'm excited for the opportunities that lie ahead."

Mirkovich graduated from Bryant University in Smithfield, Rhode Island. She had prior roles at The Hartford and Travelers but now serves as Actuary I at NCCI.

"I enjoy giving back to the community and the profession," says Mirkovich. "I've been able to meet other members from across the country and build great friendships through my involvement with the CAS." ●

CAS SPOTLIGHT ON DIVERSITY 2023
ASIAN COMMUNITY IN THE CAS

United States Membership and Candidate Data as of December 2023

The CAS is sharing demographic data of members and candidates to be transparent about our diversity efforts and to hold ourselves accountable.

CAS Community Today

- **18%** All CAS Members
- **23%** New Members 2014-2023
- **22%** ACAS Exam Candidates 2023
- **21%** MAS-I Exam Candidates 2023
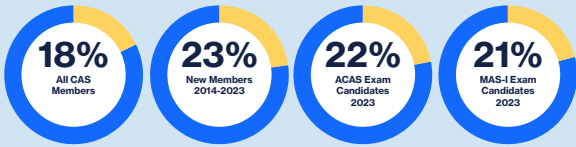
80% of US members, 91% of US members in the last 10 years, 93% of US candidates in 2023 and 92% of US MAS-I Candidates in 2023 voluntarily reported their race ethnicity.

Comparison to External Benchmarks
Asians make up 6% of the US population Ages 25 & Up

- **6%** Insurance Industry Employees
- **16%** Mathematics Employees
- **14%** STEM Bachelors Degrees
- **8%** Business Bachelors Degrees
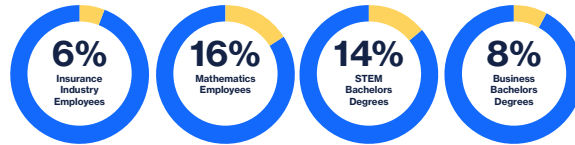
US population, Ages 25 and up, estimated for 2022 by US Census Bureau, Population Division. Insurance Industry Employees in 2022 based on Bureau of Labor Statistics Current Population Survey. Mathematics Employees from 2017-2019 based on Pew Research Center analysis of American Community Survey. Science, Technology, Engineering and Math (STEM) and Business Bachelors Degree Conferred in 2020-2021 based on National Center for Education Statistics Digest of Education Statistics.

Gender Breakdown of Worldwide Asian Members Compared to All Members

Female / Male

All Races/Ethnicities	White	Asian	Latino	Black
31%	30%	45%	26%	34%
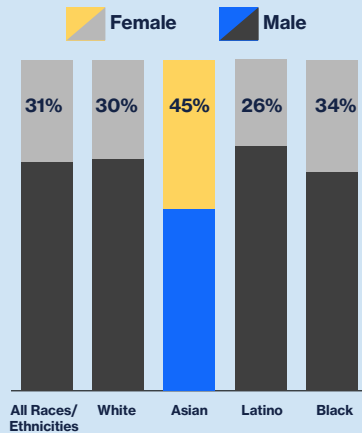
Percent of Worldwide Asian CAS Members in Leadership Roles

- **24%** Volunteers in the latest year compared to 25% in 2022
- **16%** Conference Presenters in 2021-2023 compared to 17% in 2020-2022
- **12%** Committee Chairs in 2021-2023 compared to 11% in 2020-2022
- **11%** Executive Council/Board in 2019-2023 compared to 7% in 2018-2022

GET INVOLVED

JOIN THE DIVERSITY IMPACT GROUP TO VOLUNTEER AND SHARE YOUR IDEAS AT COMMUNITY.CASACT.ORG

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sana SOUTH ASIAN NETWORK OF ACTUARIES
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If you want to make sure that your demographic information is included in these metrics, please log on to the CAS website and update your membership profile.

Q&A with Michaël Bordeleau-Tassile, winner of the CAS's 2023 Hacktuary Challenge By ANNMARIE GEDDES BARIBEAU, CAS RESEARCH MANAGER

Michaël Bordeleau-Tassile developed the winning app for the Casualty Actuarial Society's 2023 Hacktuary Challenge, a contest that encourages tech-savvy actuaries to develop a useful consumer-facing app.

Integrating property overviews, predictive analytics and insurance data insights, PropertInsight is an innovative platform that provides consumers with comprehensive features to make informed decisions about purchasing property while also giving insurers access to valuable data for risk assessment. The use case features Montréal, Canada.

In this exclusive *Actuarial Review* interview, I asked Bordeleau-Tassile about the inspiration behind the app, the challenges in creating it and the secret to successful implementation.

Baribeau: Tell us about PropertInsight. Which feature do you think consumers will find the most helpful? What do you want readers to know about it?

Bordeleau-Tassile: At first glance, I think customers will really appreciate the map search feature, especially with all its layers. Wondering where you can afford to live? Concerned about living in a heat hotspot where you would need to crank up the air conditioning to endure scorching heatwaves? Worried about the risk of flooding? How much noise can you tolerate?

I want readers to know that PropertInsight represents the future of technology in both the real estate and insurance industries. By seamlessly integrating property overviews, predictive analytics and insurance data insights, it streamlines the home-buying process while also revolutionizing how insurers evaluate risk. It's a win-win for both consumers and insurance companies, bringing innovation and efficiency to age-old decisions.

Baribeau: What inspired your app?

Bordeleau-Tassile: The housing crisis across North America is having a

Michaël Bordeleau-Tassile, FCAS, winner of the CAS Hacktuary Challenge.

severe impact. In the past few years, I've watched families desperate for homes jump at the first available properties, sometimes overpaying, and often buying without thoroughly checking out the place and its surroundings.

Baribeau: Was there anything particularly challenging about developing the app? If so, what was it?

Bordeleau-Tassile: Surprisingly, out of the 28 datasets I utilized, I was only familiar with one beforehand!

Everything else was entirely new territory for me. So, the initial hurdle was hunting down relevant data, grasping its intricacies, and figuring out how to leverage the value.

Then came the daunting task of seamlessly merging these diverse data sources. Integrating real estate, environmental and social data into a cohesive, user-friendly interface was quite the challenge.

Nevertheless, armed with a bottomless cup of coffee and an insatiable curiosity, no challenge, no matter how

The prize-winning PropertInsight app.
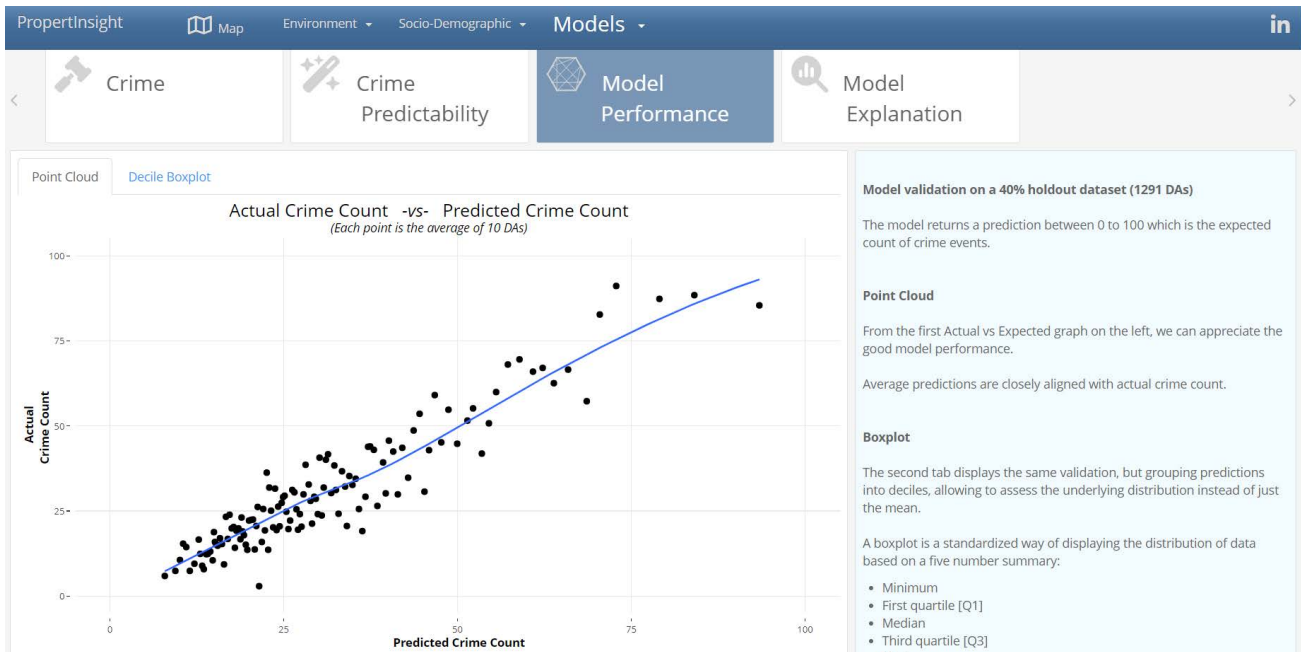
A model in PropertInsight analyzes actual crime versus predicted crime.

complex, will hold me back. That's my little secret ... I'm a bit of a data junkie, if you will. There's always a rush of excitement when I get to dive into new data, uncovering patterns and discovering their significance.

Baribeau: Well, it is not a secret anymore! But what you are saying should inspire other actuaries: intellectual curiosity and dedication can lead to potentially game-changing innovations such as PropertInsight.

When developing the app, who tested it?

Bordeleau-Tassile: I asked my sister to give it a try, while I watched carefully to see if the navigation was intuitive enough to her. To some actuaries, I tried to explain the unique transformation process for the fire hazard model. It became clear that breaking down the process into a simple step-by-step

example was necessary for the user to better understand it.

Baribeau: What future plans do you have with the app?

Bordeleau-Tassile: My future plans would involve some serious lobbying with the real estate board to pry open the gates to their coveted garden of data. Once we've got those keys, it's game on for integrating even more juicy data into the mix!

Baribeau: Anything else you would like to share?

Bordeleau-Tassile: Given the buzz surrounding artificial intelligence these days, I must give credit where it's due.

First, as a French-Canadian, AI proved invaluable in refining certain sentences, making them sound more natural in English. Think of it as a sophisticated translator. Additionally, I utilized generative AI to craft the three-image slides featured on the app cover.

"I want readers to know that PropertInsight represents the future of technology in both the real estate and insurance industries." – Michaël Bordeleau-Tassile

Trust me, finding a free photo depicting a suburban aerial view with houses and shrubbery twisting into a maze pattern was like searching for a unicorn in a haystack!

Baribeau: But you did find yourself through the maze and look at the result! Thank you for sharing with us! ●

CAS Trust 10K Challenge Complete!

By STEPHANIE LITRENTA, CAS CANDIDATE ENGAGEMENT MANAGER

The CAS reaching the 10,000-member milestone is an achievement the organization has been celebrating over the last several months, and what better way to close out the celebrations than by giving back through the CAS Trust 10K Challenge. Members were challenged to participate in 10,000 seconds (about three hours) or more of movement weekly from February 1-15, 2024. The challenge served as a vital platform to raise needed funds for our annual CAS Trust Scholarship program, which supports the next generation of actuaries. To date, the CAS Trust has awarded over 75 scholarships, contributing to the growth and development of talented future actuaries.

In an inspiring display of collective effort and support, the CAS Trust 10K Strong Challenge raised over $15,000 that will be donated to the CAS Trust, funding scholarships for our society's future. Fueled by a shared commitment to making a difference, nearly 200 participants contributed to the success of this impactful initiative.

The challenge garnered support from individuals and saw active participation from six generous sponsors, whose contributions played a vital role in the challenge's overall success.

Throughout the two-week challenge, participants collectively logged an astonishing 6,744,899 seconds of movement all over the globe! From the Eiffel Tower in Paris to the Catskill Mountains in New York to Brian Head Ski Resort in Utah, our members moved together for a purpose.

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Superannuated Actuaries

1. *MedPro Group's Veronica Brown, ACAS, captures her three children, from left to right, Adelaide, Atticus and Barnaby.*
2. *Thomas Holmes, FCAS, of Akur8, tools around the Arc de Triomphe in Paris.*
3. *Mary Hosford, FCAS, AIM, CPCU, MAAA, of the Massachusetts Division of Insurance, takes on a weighty issue.*
4. *Milliman's Melissa Huenefeldt, FCAS, MAAA, works out with her daughter Sophia.*
5. *Zora Law, FCAS, of Milliman, hits the slopes in Utah.*
6. *Retired actuary and active grandparent, Jerry Tuttle, FCAS, CPCU, ARM, Are, takes a break with his canine friend.*

The challenge included a few contests, for which we are happy to announce the winners!

Best Team Name
Superannuated Actuaries, a self-made team of 10 CAS members

Regina Berens, FCAS; Jonathan Brienza; Jennifer Byington, ACAS; Melissa Huenefeldt, FCAS, MAAA; David Pochettino, ACAS; Jerry Tuttle, FCAS, CPCU, ARM, Are; and Joshua Youdovin, FCAS.

Team with Most Average Seconds Per Individual
Team MilliMove

Carl Ashenbrenner, FCAS; David Blake, ACAS; Brian Brown, FCAS; Bethany Cass, FCAS; Diana Manuela Dodu; Brian Fannin, ACAS, CSPA; Christine Fleming, ACAS; Jonathan Glowacki, FCAS; Alyssa Grove, ACAS; Kimberly Guerriero, FCAS; Brekk Hayward; Michael Henk, FCAS; Derek Jones, FCAS; David Kennerud, FCAS; Sue Klein, FCAS; Scott Kurban, FCAS; Zora Law, FCAS; Richard Lord, FCAS; Billy Onion, ACAS; Michael Palmich; Carly Rowland, FCAS; Ken Scalf; Sandra Schrader, FCAS; Andi Shah; Eric Wunder, FCAS, MAAA; and Deborah Yin, FCAS.

Individuals with the Most Seconds

1st Place — Milliman's Sue Klein, FCAS

2nd Place — North Star Mutual Insurance Company's Steve Belden, FCAS

3rd Place — Milliman's Melissa Huenefeldt, FCAS

The CAS extends its deepest gratitude to all the participants, sponsors and supporters who made this event a success. Together we have made a difference in the lives of those who will benefit from the scholarships funded by this initiative. Thank you for contributing to the growth and development of talented future CAS actuaries! ●

Integrating Risk Metrics in a Larger ERM Framework

A new volume in the CAS monograph series, *The Actuary and Enterprise Risk Management: Integrating Reserve Variability* by CAS Fellows Mark R. Shapland and Jeffrey A. Courchene, proposes moving beyond reserve variability quantification to allow for full integration of key reserve risk metrics into the larger enterprise risk management framework.

Janice Young, ACAS, member of the Monograph Editorial Board, discusses stochastic reserving models with the authors.

Janice Young: What would you say are the key takeaways in the monograph?

Jeff Courchene: I think the three key takeaways are: (1) powerful KPIs for managing reserving risk are made available through integration of reserve risk measurement within an ERM

I think that number two is probably the most compelling, and that has to do with when you're looking at how well your models have performed.

Simply lining up what you expected with what happened gives you a directional indication of how well you did, either higher or lower, and gives you a magnitude indication.

If you were a lot higher or a lot lower than what happened, it becomes a question of significance, and there's a big difference between magnitude and direction and significance and direction.

And so, it is exactly the inclusion of the stochastic reserving element that needs to be closely aligned with the processes in your deterministic methods.

That enables you to think about whether the recent performance is close to what would have been expected, meaning mean or median expectation, or whether it falls outside of what your

> **These observations are available not only in total, but based on the framework that we put together, drilling down by line of business, drilling down further by accident year and depending on your appetite for complexity could be drilled down even further.**
>
> **— Jeff Courchene**

framework; (2) KPIs providing the direction and significance of deviation from expectation are much more powerful compared to KPIs providing the direction and magnitude; and (3) proactive engagement with insurance professionals outside of the actuarial silo at the front end of a reserve analysis provides better results.

own uncertainty analysis would have concluded as a one-in-100-year event, or anything in between. Another thing that we found is actual performance is potentially outside of the distribution that you've calibrated for that line of business, which has implications for the uncertainty distribution that you previously had come up with.
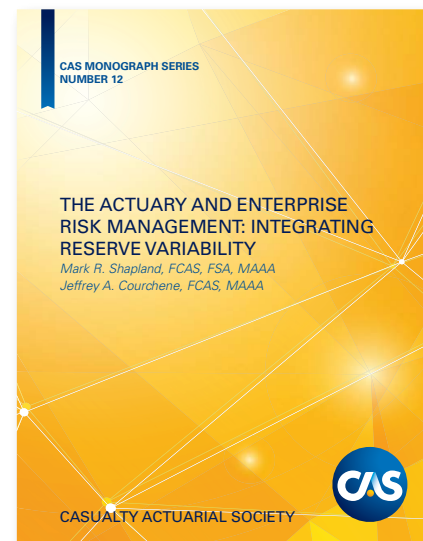
Janice Young: It's wrong?

Jeff Courchene: Not necessarily wrong, but not wide enough to handle what we've just experienced in the past year.

And these observations are available not only in total, but based on the framework that we put together, drilling down by line of business, drilling down further by accident year and depending on your appetite for complexity could be drilled down even further.

Mark Shapland: That's a great list. The only thing we could add to that list is the ability to help manage actuarial resources as well.

So, having these KPIs, you can quickly see where the problems are and maybe you need to reallocate some of your actuarial resources to the more problematic areas.

One of the things that wasn't part of my thought process during the creation of the monograph, but now in retrospect I've added, is hoping that this might motivate U.S. actuaries to do more.

I presented the monograph about

Left to right: Janice Young, and authors Jeffrey A. Courchene and Mark R. Shapland.

six months ago or so at the [CAS Regional Affiliate] Central States Actuarial Forum, and one of the things I said when I was introducing this is (to me this is kind of in line with Jessica Leong's theme of the actuary of the future) that while a lot of actuaries in the U.S. are not doing this — not that I know of anyway — I think this could be something that could be part of standard actuarial practice in the U.S.

I think this [Monograph] could be something that that could be part of standard actuarial practice in the U.S.

— Mark Shapland

I certainly won't be around to see it, or at least not unretired long enough to see it, but I think it's something actuaries could do here. And I hope it does motivate people to do more and do some of the things that the Europeans are doing.

Whether that happens or not, I don't know. It probably depends on whether the accounting standards change. As long as our accounting standards are point estimates and that's all we need, it may not happen, but I would throw that in there, anyway.

Jeff Courchene: Yes, I think that the point about resources shouldn't be underappreciated.

I did not include that, I had forgotten about that, but we talked about that on a number of occasions as kind of an unintentional consequence of the work that we did: that actuaries tend to build up an actuarial team and then allocate various individuals to various parts of the portfolio that the company writes.

Those individuals grow up being the workers' comp specialist actuary out of a team of 10, dealing with the reserving issues that deal with workers' comp, and they kind of stay in that silo. There's value to building up experience in that silo.

But what our framework offers is an early indication of which of the methods and models have performed particularly well and particularly poorly at any point in time.

So, if a team has resources that

have, let's say, a technical skill set that is more advanced than that of others on their team, then an indication that there's a problem in the methods and models could motivate the allocation of that resource on a targeted basis to exactly those parts of the business that have essentially performed differently than what was previously expected.

And so you end up as an actuary managing a department. You end up in a very powerful position to not only rely on individuals gaining experience in various lines of business, which is beneficial to the process, but also being able to target technical skills in areas where significant technical skills are needed in order to refine or to think about how the model supporting that part of the business is being run.

So, it's kind of another dimension to the management of the team that's unlocked.

Mark Shapland: Yes. It's management of the enterprise risks within the firm, but also management of personnel within the actuarial function.

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Read the full interview on our website, ar.casact.org. ●

The Search
for the
Rate Filing
Fast Lane

By JIM WEISS

Are your rate filings stuck in traffic? Don't just sit there! Read what these experts are doing to manage their estimated times of arrival.

magine you just put the final touches on an insurance rate filing, dotting every proverbial "I" and crossing every figurative "T." You proceed to complete your transmittal forms, remit your filing fee, sign your name and click submit in the System for Electronic Rates and Forms Filing (SERFF). Then you wait. Now imagine you are reviewing various companies' insurance rate filings for compliance with your state's laws and regulations and the filing we just mentioned lands atop your queue. You work your way through the rest of the queue and proceed to peruse the one you just received — but just when you are about to click approve, you observe a potential statutory issue you simply cannot overlook. You document your objection, return the filing to its sender and then you wait.

In recent years, the rate filing process in many states has at times felt like a waiting game — except that the "game" is not fun for any of the players and the stakes are potentially existential. "I think the number of filings overall has shot up because there was a huge spike in inflation," says Scott Fischer, head of government relations and general counsel at Lemonade, who previously served as New York's chief insurance regulator. "It is getting more expensive to do everything, and that quick rise in inflation meant lots more filings. You have less people at departments doing more complicated work and more of it. Things are going to slow down even in the best circumstances." Slower approvals in high inflationary environments, in turn, challenge insurers' rate adequacy and in extreme cases, destabilize markets.[1]

"I make the analogy to traffic on the road," says Gennady Stolyarov II, FSA, ACAS, lead property/casualty actuary at the Nevada Division of Insurance (DOI). "If there is a low-to-moderate amount of traffic on the road, every car can go at the speed limit, but there comes a point where the road is sufficiently congested that all cars move more slowly. You can try to redirect the traffic. You can try to encourage some vehicles to take exits. You can maybe even over time build more lanes. But if more and more vehicles keep coming in and continually congesting the roads, and we can channel the existing vehicles away from the main road only so fast, then this is a situation that's going to last for some time."

"I have heard people say, I really wish there was a fast lane for getting filings approved," adds Dorothy Andrews, Ph.D., ASA, who is chief behavioral scientist at the National Association of Insurance Commissioners (NAIC). "One way to get closer

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[1] The California property market is a topic on its own but is an example of where some view filing delays as a destabilizing factor. For more information, read Dale Porfilio's coverage in the March-April *AR*.
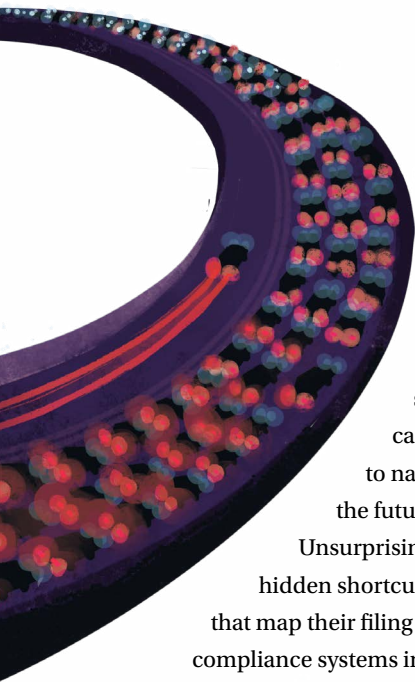
to the fast lane is to make sure your filings are complete."

Our goal with interviewing experts such as Andrews, Stolyarov and Fischer was to understand why some filings experience delays, how carriers and regulators can work together to navigate and minimize them, and what the future may hold for filers and reviewers.

Unsurprisingly, our research did not discover any hidden shortcuts, but we did generally find that carriers that map their filing routes carefully in advance and keep compliance systems in good working order have the potential to navigate — if not to the fast lane — then at least to HOV lanes that can help minimize time spent in congestion.

Slow and steady

To understand how we arrived in the present state, it is useful to reflect on halcyon days when filings moved briskly. Stolyarov has held various responsibilities at the Nevada DOI since 2009. "I recall the 2010s as a period where we had the resources to delve in depth into many of the insurer filings and develop a kind of expertise that, in my view, placed us at the cutting edge of insurer rate reviews," he says. "We were able to not just understand exactly what was happening but suggest refinements and improvements that not only made the outcomes more fair to consumers, but — as an additional benefit — helped improve the utility of these tools for insurers in some cases." However, Stolyarov has observed several factors putting pressure on this public-private type partnership over time since then.

First, technology-driven efficiencies helped companies that may have once filed every two to three years move to annual cycles. "Previously enough time would have elapsed between filings that we would actually understand what happened with the previous filing, how it affected the rate level," he says. Increased filing frequency has made unpacking feedback effects more challenging, time consuming and inferential.

> **To understand how we arrived in the present state, it is useful to reflect on halcyon days when filings moved briskly.**

The pandemic then brought about even more filings, for example, for auto — when insurers justifiably looked to incorporate impacts of drastic driving reductions into pricing. "I don't think our society has quite returned to the way it was before the pandemic," says Stolyarov. "Certainly, there have been objective indicators suggesting that the costs of losses to insurers have increased. As a result, the frequency and the magnitude of insurer rate filings skyrocketed. Some insurers might have been filing once or twice a year at that point, but it was not yet enough of a burden that it would strain capacity. Around early 2022, many insurers started filing two, three, four times per year, and the magnitude of each individual proposed rate increase was no longer that low or mid-single-digit percentage increase that it had been previously."

Compounding matters, "During the period of the so-called Great Resignation or Great Reshuffle, we lost a lot of qualified, experienced staff members," says Stolyarov.

More broadly, "It is very challenging for state agencies to get people that are going to do this work when there is a lot of competition for this type of talent," observes Fischer. "It is a staffing crisis, and I think it is probably across the board in a number of different states." The challenge runs even deeper than backfilling vacancies or adding headcount within tight agency budgets.

"The learning curve can be fairly steep," Stolyarov says. "There is an aspect of training that cannot be learned simply from studying actuarial texts. It is a matter of knowing the history and the precedents of an organization and having that institutional memory." A newer reviewer may take longer to turn around approvals while acquiring said memory.

Once a filing goes under the microscope, interactive dialogues can pressure timelines even further. "Sometimes you will see filings go six or seven rounds of questions," says Andrews, who notes that the American Academy of Actuaries will offer a webinar on speed-to-market on June 10, 2024.[2] "It may be a month or two between rounds. By the time you get to seven, you may be talking up to 12 months before approval. If both parties could settle the initial set of questions upfront, then it could be just one round — a month or two." Andrews

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[2] https://www.actuary.org/Speed-to-Market-NAIC-Presentation.

Artificial Intelligence

A number of regulations have moved forward in recent months related to insurers' use of artificial intelligence (AI). Several states adopted the NAIC's model bulletin on the Use of Artificial Intelligence Systems by Insurers.[1] New York and Colorado also put forward draft regulations for industry feedback. Two commonalities across many of the new regulations are carriers' accountability for vendor products and expectations around bias testing.

"If a company is using third party data, did they test the data for veracity? Do they understand how the third parties put this data together or how they built their model? Could bias in some way have crept in and disparately affect the final result?" asks Andrews, who is a frequent author[2] and presenter on algorithmic bias and big data topics. "You are really starting to see regulators pay more attention to this. Some of the new regulations are basically saying that if carriers are using third-party data or a model, and they don't know how it was constructed, then they could be held responsible for the adverse effects. That ultimately puts a lot of onus on the company."

Fischer asks, "How will one decide if there is enough of a nexus with the risk of loss for any given data point so that its use in rate making makes sense? For example, suppose whenever there is a full moon, auto crashes go up. That's not causation, but if it's correlated is it useable? There is something weird and unsatisfying to nonactuaries about using things that don't make intuitive sense." Many people might agree that rating on the cycles of the moon would be "obscure, irrelevant, or arbitrary,"[3] but other variables may not be as clear-cut. Fischer sees an opportunity for the American Academy of Actuaries or partners to help fill some of this space by strengthening standards and guidance. "Actuaries can help regulators and filers understand what they need to know about when a feature or variable makes sense versus something that is random or, at the worst case, at the edge case, something that actually could be a proxy for protected class," he says. "It would be helpful to hear actuarial organizations talking about these dynamics more."

While the regulations have the potential to allow AI initiatives to travel more safely at high speeds by means of guardrails, they may also add speed bumps. "When the industry does start employing more new methods, the types of questions should evolve with the methods," says Kong. "If the questions are not applicable and that creates more delays, it could create reverse incentives for carriers to stay in the past, rather than trying new techniques and technology that could potentially benefit consumers."

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[1] https://content.naic.org/sites/default/files/inline-files/2023-12-4%20Model%20Bulletin_Adopted_0.pdf.

[2] https://www.actuary.org/sites/default/files/2023-07/risk_brief_data_bias.pdf.

[3] See section 3.2.3 of Proposed Revision of ASOP No. 12 – Risk Classification (for all practice areas), https://www.actuarialstandardsboard.org/asops/risk-classification-for-all-practice-areas/.

sees some of the back and forth as reducible on all fronts: "Regulators have to ask strong questions and companies have to answer those questions."

Some questions are avoidable altogether. The NAIC Rate Model Review Team makes available a GLM filing checklist of items to include in a filing, yet Andrews observes that some model-based filings do not include all the diagnostics or narratives in the checklist.[3] "If you want to improve the speed at which your filing is approved, you should consider making sure to include these types of items in the initial filing," she says.

Stolyarov also authored recommendations carriers may utilize to help expedite filing review, which appear on the Nevada DOI's webpage.[4] These include providing underlying data and formulas where possible, defining acronyms and providing specific

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[3] https://content.naic.org/sites/default/files/call_materials/NAIC%20Reviews%20GLM%20document%20list.pdf.

[4] https://doi.nv.gov/Insurers/Property-Casualty/Filing-Information/Personal-Automobile-Insurance/.
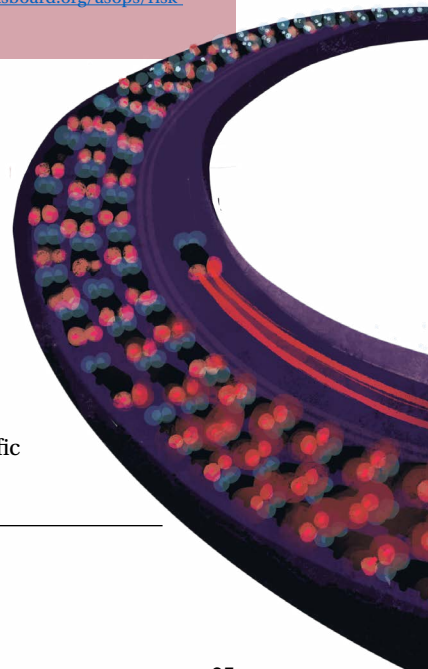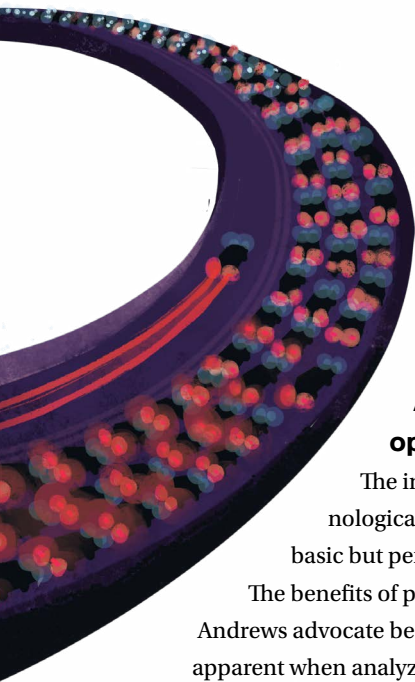
answers to specific questions that may be asked. "I actually wrote those back in 2010," he reflects, "but they're still relevant."

Asked, answered, operationalized

The industry is innovating a number of technological and process solutions to address these basic but persistent issues that contribute to delays.

The benefits of practices such as those Stolyarov and Andrews advocate become even more apparent when analyzed with emergent technology such as large language models (LLMs). Nickolas Alvarado, FCAS, CSPA, is a consulting actuary at Milliman and was a part of a multidisciplinary team that used LLMs to help thematically characterize recent objection letter dialog from SERFF.[5] "We saw this as a way of unlocking value from documents that were just sitting there in the past," says Alvarado. "There was rich data but how could you actually use it? It would take any person a very long time to do a fraction of what we could do with LLMs." The LLMs streamlined text from the objections, and machine learning (ML) clustered them into topics that legal and compliance professionals reviewed and analyzed. Many of the prevalent themes identified in the analysis related to matters such as following instructions, completing checklists and adhering to guidelines. "It was sort of confirming what we knew, which was that filers were not putting in as much detail as they perhaps should, or in some cases, were not including things that are rather obvious," says Alvarado. "Following the directions correctly makes it easier for you and easier for the regulator."

When the Milliman team sifted through the themes its algorithms identified, they also found that many topics required specific knowledge of state laws, requirements and customs to interpret. Stolyarov has one theory for why such objections arose. "There is a natural desire to save on work by submitting

> **The industry is innovating a number of technological and process solutions to address these basic but persistent issues that contribute to delays.**

the same filing package to every jurisdiction," he says. "We always encourage insurers to keep detailed records of what we have requested before, how those requests were responded to, and whether the resolution was satisfactory to us so that the approach can be carried forward in future filings."

Allstate has taken a comprehensive approach to operationalizing institutional knowledge such as this, which we learned more about during an interview with Alex DeWitt, FCAS, and Maggie Kong, FCAS, CSPA. DeWitt is a senior actuary and director who leads work connected to state filings while Kong is former director of pricing predictive modeling.

DeWitt notes that the filing process begins well before and ends well after a company submits its filing. Every filing travels a long and winding road that begins with analysis, continues with decisions of what to file and when, and (after the filing adjudicates) concludes with effecting the results in systems and storing appropriate documentation, he says.

"We started by mapping out the cycle of what we would call a flat rate change, which is a straightforward rate change," says DeWitt. "How do we get that into market? We essentially mapped out a pipeline. We identified at least 72 discrete steps in that process as well as handoffs occurring across seven groups of people." The individual steps, such as document preparation or electronic submission, were then automated and integrated with one another. Regarding state-specific practices, DeWitt adds, "The process is meant to encompass all of the markets we might be trying to put an analysis into, so it includes tailoring aspects that may be relevant for different jurisdictions. We are very thoughtful about preparing well-designed filings that think about the end user, which is our regulator." Allstate's forethought includes programming logic where, for example, a rate level analysis may indicate no rate change is needed, triggering a second human look to possibly determine not to proceed with a filing — sparing regulators' queues from unnecessary congestion.

DeWitt notes there is rigorous ongoing user acceptance testing around Allstate's process. "You have to do whatever

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5   https://www.milliman.com/en/insight/analyzing-insurance-product-filings-artificial-intelligence-llm.

you can to minimize the risk of error," he says. "In the same way that you would when you set up a quality process for humans, you need the same guardrails for machines. Humans can make mistakes. Machines can make mistakes. That part is not different."

Exhibiting model behavior

Filing automations may represent sound prevention against common objections on common filings, but novel filing situations or objections are trickier to streamline. "Anything that comes across a regulator's desk that has the word model in it is more likely to draw a significant amount of questions," says Kong. "There is also a lot more depth of the types of questions being asked." She attributes this to various factors: "Generalized linear models (GLMs) have been in common use for so long that the industry has a much deeper proficiency and can ask deeper questions than 20 or even 10 years ago. On the other hand, with newer methods there is a curiosity where regulators may not know the techniques as well yet and would like to build greater working knowledge." This fervor can create difficult cost-benefit decisions around how much to provide simply to satisfy curiosity. "I love when more people are

> ### Filing automations may represent sound prevention against common objections on common filings, but novel filing situations or objections are trickier to streamline.

interested in modeling and want to learn more. That eagerness excites me," Kong says. "But it creates a balance of wanting to preempt questions versus not wanting to present an overwhelming amount of information that may not be material to review," she says. "There are times when we will proactively provide information, and others when we will proactively have information ready to provide." Over time and with experience, carriers can move closer and closer to that ideal balance.

Meanwhile, Andrews and her colleagues on the NAIC Rate Model Review Team are attempting to drive greater consistency in this type of questioning. She estimates that more than half of states presently utilize her team's services to

Starting Small

Alex DeWitt, Maggie Kong and their teammates did not simply come to work one day and decide to introduce automation into over 300 of Allstate's books of business. "I don't think any one person had this genius idea or this one capstone project that everyone rallied around," says DeWitt. "It started small with everyone wanting to apply the latest technology available to their own work to make it more efficient." Initial efforts focused on the biggest time drags such as preparing filing memos, but as more modules accrued, an overarching platform was implemented. The modular origins still yield benefits. "It makes it easier to respond to something like a technology upgrade or regulatory changes in a given state because we are not changing our entire technology platform all at the same time," says Kong. Changes like these are also examples of opportunities, she and DeWitt say, where humans can get involved and infuse their expertise. "We are not opening up a ChatGPT-like platform that you can prompt to run an indication for a state and submit it when it's ready to go," says DeWitt. "What we are really trying to do is find the critical thinking elements that require the people and the brains and the collaboration, and removing the friction and busy work that comes in between those steps. As an actuary or as another individual benefiting from automation, it improves the richness of the work that you can do."

provide assistance reviewing filings that carriers may file in any given state. One resource the team maintains is a database of previously reviewed model filings. "If a company, for example, wants to file the same model in five different states, we may have already written a report for one state that the other four states can go in and look at," she says. Reading the reports also has knock-on benefits to the quality and consistency of questions carriers receive. "Knowledge gets transferred," Andrews says. "Our goal is to help state reviewers become more independent, and I think we are seeing that because regulators are asking
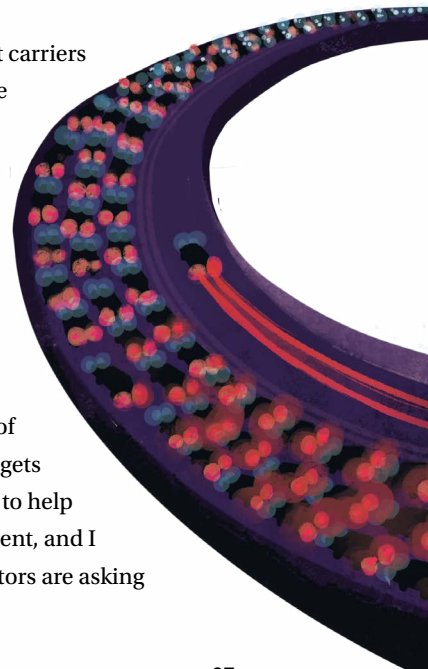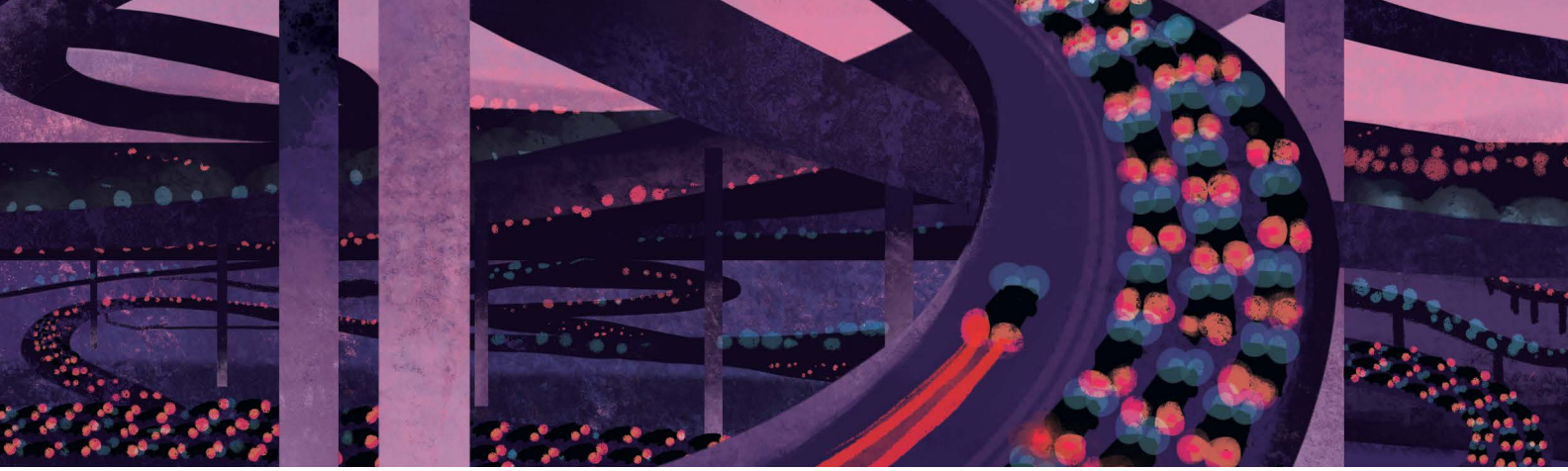
more technical questions without our assistance."

Besides innovating on conduct around the filing itself, filers are also testing ways to model and manage regulator workloads. In addition to the LLM-driven analysis discussed previously, Alvarado and teammates also empirically analyzed the average number of days from filing to approval over time in several different prior approval states.[6] They found that time to approval is roughly consistent over time in any given state but can trend positively or negatively depending on factors such as staffing and procedural changes. Companies can potentially perform analyses of their own times to approval or that of their peers to avoid unnecessary corrective filings. "If you are doing a rate filing, for example, then you have to select a trend that you expect over, say, the next year," says Alvarado. "The rates are for that prospective period for which you priced. If your filing isn't approved when you expect it to be, then those rates technically need to be revised and refiled." With the richness of diagnostic data available in SERFF, optimization analysis can also potentially be used to marshal resources towards filings more likely to lag or to monitor for lower traffic periods during which to submit filings.

Paving the road forward

As the pandemic fades into the rearview mirror, the road ahead for filings may contain fewer potholes. "One would hope that there would be some easing of the inflationary pressures," says Stolyarov. He has cautions, however. "The pandemic has taught us that the future is radically uncertain," he says. Some changes could potentially future proof the filing process further against unforeseen stresses that may arise.

One area to do this could be through statute and regulation. "There might be things that could be accomplished in terms of having more inflationary aspects embedded into rates," says Fischer. "You could build in a little bit more flexibility. Nobody likes rates going up, but it might be more palatable for consumers to experience a 2.5% increase year over year, than to get virtually nothing for five years and then be surprised when you're getting a 15% increase." Such approaches are not unprecedented: Several states already permit some level of "flex rating" where prior approval is not required when rate changes are within a certain range.[7] Additionally, almost all states permit model year rating for auto physical damage whereby far out emergent model years receive higher rates than current ones before any data even comes in. "Flexibility does not give up any of the control of the prior approval, but it says that at the beginning of the process, we are going to think about the unknowns," Fischer adds.

Fischer also points to the Interstate Insurance Compact as having improved speed-to-market for life insurance, where a number of states have agreed to delegate away limited regulatory functions traditionally conducted within their own insurance departments. While there are a number of state-specific considerations in property/casualty that are not ripe for delegation, the NAIC Model Rate Review Team is an example of how limited delegation can distill efficiencies into bogged processes.

For now and in the near future, regulators and filers are likely to continue finding themselves waiting longer than they prefer from time to time. However, the participants in the ecosystem are not sitting idly by waiting on the world to change. Innovations such as those described in this article are permeating almost every dimension of the filing experience, allowing innovators to figure out which parts work best and run with them. If these improvements happen to also coincide with an easing in inflationary pressures, it is not hard to envision a scenario where better conditions arise sooner than we expect. ●

Jim Weiss, FCAS, CSPA, is a vice president for Crum & Forster and is editor in chief for Actuarial Review.

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6   https://www.milliman.com/en/insight/regulatory-insurance-intelligence-rate-filing-days-approval-february-2024.
7   https://www.leg.state.nv.us/session/76th2011/exhibits/assembly/cmc/acmc279j.pdf.

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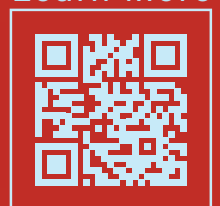
ETHICAL ISSUES

The Actuary's Guide to the Code of Professional Conduct (Part 1)

BY MELISSA HUENEFELDT, CAS PROFESSIONAL EDUCATION WORKING GROUP CHAIRPERSON

If you are an actuary practicing for a business in the U.S., the Code of Professional Conduct (the Code) applies to you. You may have the "little blue book" close at hand, ready to refer to any of the 14 precepts contained within (I personally keep mine on my desk).[1] Or your familiarity may stop at what you learned in your actuarial society's professionalism course.

The Code allows us to uphold the reputation of the actuarial profession, permitting our profession to continue to be self-regulated. Other professions, such as doctors and lawyers, have regulatory bodies that supervise the actions of their members, enforcing their responsibilities to the public. This article covers each precept, providing examples to illustrate ways to maintain public trust. I'll start with some background on the Code.

History and purpose

There are five U.S.-based actuarial organizations.[2] Prior to 1992, each of these organizations had their own guidelines. Actuaries who belonged to more than one, such as the American Academy of Actuaries (AAA) and the CAS, had to comply with all applicable rules, and there were inconsistencies that could cause potential conflict.

A Joint Committee on the Code of Professional Conduct was formed to develop a unified Code that became effective January 1, 2001, and was adopted by all five organizations.

The purpose of the Code is to "require Actuaries to adhere to the high standards of conduct, practice and qualifications of the actuarial profession...."[3] A violation of the Code could result in disciplinary action and tarnish the reputation of the actuary in violation and the profession.

In the Code, the term *Actuary* (capitalized) is defined as "an individual who has been admitted to a class of membership to which the Code applies by action of any organization having adopted the Code." A Member of the AAA (MAAA) or a Fellow of the CAS (FCAS) would both be considered an Actuary. "The uncapitalized 'actuary' refers to any individual practicing as an actuary, regardless of organizational membership or classification."[4]

The following precepts describe the behaviors and actions that are necessary to comply with the Code.

Precept 1: Professional Integrity

"An Actuary shall act honestly, with in-

tegrity and competence and in a manner to fulfill the profession's responsibility to the public and to uphold the reputation of the actuarial profession."
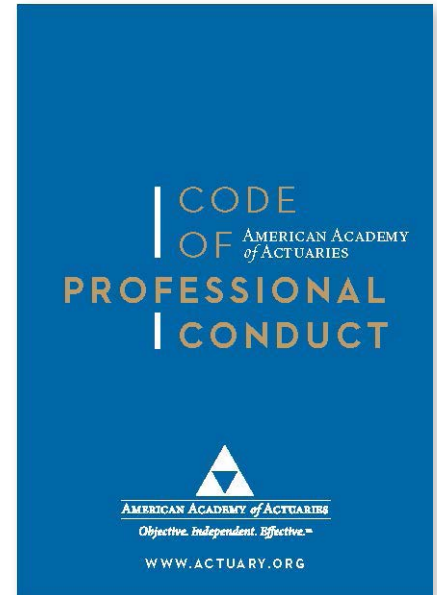
Because of the overarching nature of Precept 1, a violation of any of the other 13 precepts will also likely result in a violation of this precept. According to the 2022 Annual Report from the Actuarial Board of Counseling and Discipline (ABCD), Precept 1 was the most violated of the 14 precepts.[5] The report shows the number of inquiries for the year (22) and provides a summary of alleged violations by precept. Some inquiries involved

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[1] https://www.actuary.org/content/code-professional-conduct.
[2] American Academy of Actuaries (AAA), American Society of Pension Professionals & Actuaries (ASPPA), Casualty Actuarial Society (CAS), Conference of Consulting Actuaries (CCA), and Society of Actuaries (SOA). Members of the Canadian Institutes of Actuaries (CIA) practicing in the US must also comply with the Code.
[3] The Code, page 1.
[4] The Code, page 1.
[5] 2022 ABCD annual report. http://www.abcdboard.org/resources/annual/.

multiple issues, but 41 of 50 issues alleged were related to Precept 1.

Violations of Precept 1 fall into three separate categories:

- Failure to act with integrity: When an Actuary performs Actuarial Services,[6] they are to exercise skill and care. I use the "mirror test" as a guideline for this. If, in performing Actuarial Services, you can't look at yourself in the mirror because of your actions, you are likely violating Precept 1.

  An example is intentionally understating reserves due to pressure from your Principal.

  Fourteen of the 41 issues alleged related to this category.

- Failure to perform services with competence: Actuaries undergo rigorous educational and experience requirements to exercise skill and care. Performing actuarial services outside of your expertise would violate Precept 1.

  Some examples are a life Actuary performing services for a casualty line of business or a casualty Actuary with commercial insurance reserving experience setting rates for homeowners insurance. You should be working with another Actuary who has the appropriate experience if you are working outside of your area of expertise.

  Seven of the 41 issues alleged related to this category.

- Failure to uphold the reputation

of the actuarial profession: A lot of focus is placed on violations that happen while performing Actuarial Services, but violations of Precept 1 can stem from what we do in our personal lives as well.

For example, if you are charged with criminal activity, such as driving under the influence (DUI), and it is highlighted that you are an Actuary, the reputation of the profession could be tarnished and you would be in violation of Precept 1. Twenty of the 41 issues alleged related to this category.

USQS outlines the amount and type of CE hours required to attest that you are qualified to perform Actuarial Services for the following year.[9] You also must determine if CE is relevant and track your hours in case your CE log is reviewed.[10]

- Experience: The USQS requires that you have three years of experience before you perform Actuarial Services in a given area. For example, if you are a new Associate of the SOA (ASA) with only two years of applicable experience, you wouldn't be in full compliance to provide

The USQS outlines the amount and type of CE hours required to attest that you are qualified to perform Actuarial Services for the following year.

Precept 2: Qualification Standards

"An Actuary shall perform Actuarial Services only when the Actuary is qualified to do so on the basis of basic and continuing education and experience, and only when the Actuary satisfies applicable qualification standards."

The U.S. Qualification Standards (USQS) outline the three requirements to comply with the Code:

- Basic education: The examination process[7] for your Recognized Actuarial Organization (RAO).[8]
- Continuing education (CE): Once you obtain your credentials, you must fulfill CE requirements. The

Actuarial Services on your own.

This precept also discusses the jurisdiction where the Actuary renders Actuarial Services. If you are a Canadian Institutes of Actuaries (CIA) member practicing in the U.S., you must adhere to the USQS. CIA members who practice only in Canada must adhere to their own jurisdictional code. If you are an Actuary living in the U.S. and provide Actuarial Services for a Principal[11] in another jurisdiction, you will adhere to that jurisdiction's code.

Precept 3: Standards of Practice

"An Actuary shall ensure that the Actu-

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[6] The Code defines Actuarial Services as "professional services provided to a Principal by an individual acting in the capacity of an actuary."

[7] The examination process is part of the basic education requirement; for additional details, review the USQS.

[8] The Code defines a "Recognized Actuarial Organization" as "an organization that has been accepted for full membership in the International Actuarial Association or a standards-setting, counseling, or discipline body to which authority has been delegated by such an organization."

[9] Reading this article may count as professionalism CE for you.

[10] All this information, and more, can be found at: https://www.actuary.org/content/us-qualification-standards. Also, see CE Requirements and Compliance article in Jan/Feb 2024 *Actuarial Review*.

[11] The Code defines Principal as "a client or employer of the Actuary."

arial Services performed by or under the direction of the Actuary satisfy applicable standards of practice."

Actuarial Standards of Practice (ASOPs)[12] are promulgated by the Actuarial Standards Board (ASB) to provide guidance on how to perform specific functions of actuarial work. For example, ASOP 23, "Data Quality," provides guidance to the Actuary when performing Actuarial Services involving data.[13]

If you provide Actuarial Services involving data and do not follow the guidance of ASOP 23, then you may be in violation of Precept 3. If you start working in a new area and don't know which ASOPs may apply, the AAA has developed applicability guidelines matching ASOPs to particular tasks.[14] The applicability guidelines are helpful but are not binding or comprehensive. It is your responsibility to stay current on

It is your responsibility to stay current on ASOP additions and changes to ensure you are adhering to Precept 3.

ASOP additions and changes to ensure you are adhering to Precept 3.[15]

Precepts 4, 5 and 6: Communication and Disclosure

"An Actuary who issues an Actuarial Communication[16] should take appropriate steps to ensure that the Actuarial Communication is clear and appropriate to the circumstances and its intended audience, and satisfies applicable standards of practice." (Precept 4)

"An Actuary who issues an Actuarial Communication shall, as appropriate, identify the Principal(s) for whom the Actuarial Communication is issued and describe the capacity in which the Actuary serves." (Precept 5)

Precepts 4 and 5 require identification of the responsible Actuary, clarification of the availability of additional supplementary information, and identification of the Principal when providing Actuarial Services.

"An Actuary shall make appropriate and timely disclosure to a present or prospective Principal of the sources of all direct and indirect material compensation that the Actuary or the Actuary's firm has received, or may receive, from another party in relation to an assignment for which the Actuary has provided,

or will provide, Actuarial Services for that Principal." (Precept 6)

If you were building a single model to fulfill the needs of multiple clients, and you billed each client 100% of the time charges to build the model without disclosing that they were not the sole Principal, that might be a violation of Precept 6.

Watch this space

We are only half way through the Code. We've covered the history and purpose of the code, Professional Integrity, Qualification Standards, Standards of Practice, and Communication and Disclosure. Next issue, we will wrap it up with the remaining precepts covering Conflict of Interest, Control of Work Product, Confidentiality, Courtesy and Cooperation, Advertising, Titles and Designations, Violations of the Code, and the candidate codes of ethics.

In the meantime, please send us any questions or comments via email to ar@casact.org. ●

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[12] https://www.actuary.org/content/actuarial-standards-practice-asops.

[13] http://www.actuarialstandardsboard.org/asops/data-quality/.

[14] https://www.actuary.org/content/applicability-guidelines-actuarial-standards-practice-0.

[15] The AAA periodically publishes the ASB Boxscore with the status of the ASOP changes. http://www.actuarialstandardsboard.org/boxscore/.

[16] The Code defines Actuarial Communication as "a written, electronic, or oral communication issued by an Actuary with respect to Actuarial Services."

NAIC Model Bulletin Recommends NIST's Approach

Federal Agency Aims to Manage or Reduce the Risk of Bias in Artificial Intelligence Systems BY REBECCA ARMON

While the National Association of Insurance Commissioners (NAIC) has artificial intelligence (AI) resources directed specifically at insurance companies, its latest model bulletin also refers to the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) as a valuable resource regarding bias in artificial intelligence (AI) to numerous commercial and scientific entities.[1]

Like many working in insurance, the federal agency expresses concern that artificial intelligence systems (AIS), defined as a "machine-based system that can ... generate outputs such as predictions, recommendations, ... [that are] influencing decisions" can "potentially increase the speed and scale of biases and perpetuate and amplify harms to individuals, groups, communities, organizations, and society."[2]

The NAIC on AI

The NAIC's 2020 Principles on Artificial Intelligence[3] recommends that insurance professionals should promote AI, which includes data processing systems that perform human-like functions such as reasoning, learning and self-improvement, and considers machine learning as a subset of AI. The model bulletin states that AI should be fair and ethical, secure, safe and robust, accountable, compliant (with regulations) and transparent. The principles also recommend avoiding proxy discrimination against protected classes.

In December 2023, the NAIC issued a model bulletin titled, "Use of Artificial Intelligence Systems by Insurers,"[4] to establish some "expectations as to how insurers will govern the development/acquisition and use of certain AI technologies."

Further, the model bulletin's Regulatory Guidance and Expectations section discusses the need for creating corporate guidance and internal controls specifically to mitigate the risk of adverse outcomes for consumers.

The model bulletin does not define bias, but it does offer that an insurer's internal controls should include bias analysis and minimization. There was significant discussion about whether the word "bias" should be included in NAIC's model bulletin. Some wanted the term removed or replaced with *unfair discrimination* or *statistical bias*, but ultimately, the word, "bias." remained.[5] The model bulletin focuses on governance and risk management, including internal controls such as documentation of "the insurer's risk identification, mitigation, and management framework ... at each stage of the AI System life

NIST's AI Risk Management Framework. Credit: N. Hanacek/NIST

[1] NIST, Artificial intelligence, https://www.nist.gov/artificial-intelligence.

[2] NIST, Artificial Intelligence Risk Management Framework (AI RMF 1.0) (nist.gov), https://www.nist.gov/artificial-intelligence.

[3] NAIC, Materials - Innovation and Technology (EX) Task Force, https://content.naic.org/sites/default/files/inline-files/AI%20principles%20as%20Adopted%20 by%20the%20TF_0807.pdf.

[4] NAIC Model Bulletin: Use of Artificial Intelligence Systems by Insurers Model - Innovation, Cybersecurity, and Technology (H) Working Group (naic.org), https:// content.naic.org/sites/default/files/inline-files/2023-12-4%20Model%20Bulletin_Adopted_0.pdf.

[5] NAIC Adopts Revised Model Bulletin on AI | Day Pitney.

cycle." Furthermore, it states that AIS risk management "should address the Insurer's process for acquiring, using, or relying on (i) third-party data ... and (ii) AI Systems developed by a third party." The bulletin recommends NIST's risk framework as one way for insurers to assess their AIS risk.

NIST

Since NIST is under the U.S. Department of Commerce, its focus is less industry-specific. In January 2023 under the direction of Congress with input from public and private sectors, NIST developed an AI risk management framework (AI RMF).[6] The AI RMF is intended to provide discussion and suggestions that will help to manage AI risks and develop trustworthy AI systems. The AI RMF states that to provide trustworthiness AIS must be valid and reliable, safe, secure and resilient, accountable and

Figure 1. Bias Types[1]

Systemic	Human-Cognitive	Statistical/Computational
Historical	Group	Processing/ validation,
Societal	Individual	Use and Interpretation
Institutional		Selection and Sampling

[1] For more in-depth information on these bias types, see Figure 2 in NIST Special Publication 1270.

tional and statistical, and human-cognitive. (See Figure 1.)

Systemic bias refers to bias present in AI datasets, organizational norms, practices and processes across the AI lifecycle and the broader society. Computational and statistical bias is bias present in AI datasets, algorithms and systematic errors due to non-representative samples. Human-cognitive bias can

groupthink or sunk cost fallacy," which are forms of human-cognitive bias. The playbook recommends having a process for third parties to report potential concerns about potential biases in the AI system.

Future

NIST plans to continue to develop its risk framework, and it has a mandate to do so by Executive Order 14110: "Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence."[9] Several states have adopted NAIC's model bulletin, while New York, as of this writing, was developing its own regulations. AI and bias will continue to be a subject worth monitoring, and those involved in all stages of an AI system life cycle may find these resources helpful. ●

Systemic bias refers to bias present in AI datasets, organizational norms, practices and processes across the AI lifecycle and the broader society.

transparent, explainable and interpretable, privacy-enhanced and fair — with harmful bias managed.

NIST provides some good discussions around what bias means in Special Publication 1270,[7] titled "Towards a Standard for Identifying and Managing Bias in Artificial Intelligence." But in AI RMF, the discussion is abbreviated, focusing on three major categories of AI bias to be managed: systemic, computa-

be individual or group bias and present in decision-making processes.

NIST AI RMF core is composed of four risk functions: govern, map, measure and manage. There is a playbook[8] developed to assist in working through the framework. A suggestion from the playbook about bias is to have the professionals evaluating results be independent from AI system developers to help "counter implicit biases such as

Rebecca Armon, FCAS, MAAA, is a property-casualty actuary at the Texas Department of Insurance in Houston. She is also a member of the Actuarial Review Working Group.

[6] NIST Risk Management Framework Aims to Improve Trustworthiness of Artificial Intelligence | NIST.
[7] https://nvlpubs.nist.gov/NISTpubs/SpecialPublications/NIST.SP.1270.pdf.
[8] NIST AIRC Playbook, https://airc.nist.gov/AI_RMF_Knowledge_Base/Playbook.
[9] Federal Register, "Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence," E.O. 14110 of Oct 30, 2023.

ON THE SHELF

Tales of Two Wildfires BY JIM LYNCH

California Burning: The Fall of Pacific Gas and Electric — and What It Means for America's Power Grid, By [Katherine Blunt](), Portfolio 2022, 368 pp, $29.00.
Fire Weather: A True Story from a Hotter World, By [John Vaillant](), Knopf 2023, 432 pp, $17.55

Two books show how wildfires teach crucial risk management lessons. Risk management is an exercise in discipline and imagination. The organization needs the discipline to do what's right and the imagination to know how bad things can get.

In two books, wildfire teaches those lessons. *California Burning* by Katherine Blunt shows the toll of lax risk management. *Fire Weather* by John Vaillant reveals the risk of limited imagination.

California Burning describes the plight of Pacific Gas and Electric. Across a single decade, the company was held criminally responsible for events that

risk management, but a risk management professional could easily spot gaps that, if properly addressed, would have helped the company.

The 2018 Camp Fire is a signal example. The failure of a single hook on an electric tower threw off the sparks that started the fire, which destroyed the town of Paradise and killed 85 people. The utility pleaded guilty to 85 counts of manslaughter. The faulty hook cost 56 cents. It had been purchased in 1921.

It's true that 100 years ago few would have collected, preserved and collated such a trivial purchase, but PG&E suffered from inadequate data preservation.

Blunt sprinkles tales of data inadequacy throughout: inaccurate leak surveys, inspection teams rewarded for *not* finding leaks, failure to modernize record-keeping as the law required, spreadsheeting of permanent regulatory reports.

The 2018 Camp Fire is a signal example. The failure of a single hook on an electric tower threw off the sparks that started the fire, which destroyed the town of Paradise and killed 85 people

killed more than 90 people, most tragically the 2018 Camp Fire that destroyed Paradise, California.

Blunt is a talented *Wall Street Journal* reporter. Her writing isn't flashy, but she clearly describes the technical and regulatory challenges PG&E faced. She doesn't call the story a failure of

Weak data hurts data-driven processes like knowing which power lines to inspect and what parts to replace.

There were chances to fix things. The utility's gas division modernized record-keeping and equipment monitoring six years before the Camp Fire. Unfortunately, that was after a PG&E gas
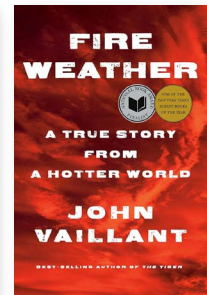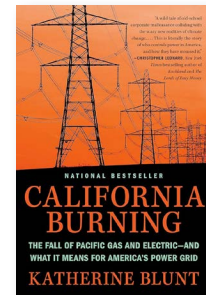
line exploded in San Bruno, California, killing eight and destroying 38 homes.

After that cleanup, the head of the gas works suggested that the electric division do the same. It chose not to.

PG&E instead developed a corporate culture that put shareholders and profits over safety. The starkest evidence came from a PowerPoint that set grounds for debate at a corporate retreat.

One slide showed, "What Is Not Up For Debate."

Bullet Point No. 1: 8% growth in earnings per share.

The next slide showed "What Is Up For Debate." Among the debatable: "Safety" and "Reliability."

The very existence of such a slide is evidence that the company didn't adequately consider the reputational risk of a profits-over-safety culture.

More typically, utility leaders would complain that the mathematical formula for setting rates discouraged spending on safety (see sidebar).

Even at its nadir, PG&E put profits first. It pleaded guilty to dozens of manslaughter charges rather than accepting a plea deal that carried a bigger fine.

Regulators didn't help. Over the decades, the state pushed utilities hard — first into a complex, untenable deregulation that failed almost immediately, then into a renewable energy drive that drove costs higher — which became another reason to skimp on safety.

As the utility soldiered along, California fell into the weather extremes that characterize climate change. Southern California utilities had to develop strategies to minimize wildfire risk, but regulators required less of northern utilities like PG&E.

That is not an excuse.

Regulators provide a floor for appropriate behavior, but companies need to do better. Drought is part of California's ecosystem. By my count, the state has experienced nine droughts across the life of the utility. Climate change wasn't going to make that better.

By failing to manage its risks, PG&E hollowed itself and underserved both investors and customers.

Fire Weather addresses only one risk management challenge — the Lucretius Problem, named after the Roman poet/philosopher: Humans struggle to imagine things more extreme than they have experienced.

We can't picture, let alone understand the dynamics of, say, a river wider than one we've seen, or a person a foot taller than anyone we've actually met, unless we have visited the Amazon delta or have a chum eight and a half feet tall.

Author John Vaillant tells how wildfire consumed the Canadian oil town of Fort McMurray in May 2016. Per Lucretius, everything in the story strains credulity.

The town sits deep in the absurdly

Rating Formulas and Safety

The first time I read it, well, I had to reread it.

PG&E employees were discouraged from spending on safety because there was no profit in it. *California Burning* author Katherine Blunt mentions the issue several times. For example:

The middle manager is responsible for overseeing two budgets: maintenance spending and capital spending. If the manager invests $1.00 in capital, he gets $1.20 back. Spending $1.00 on maintenance, meanwhile, is just $1.00 out the door - often with no obvious result or reward. (p. 215)

Inspections and other precautions, of course, are not capital spending.

This sounded so crazy I assumed I misunderstood the author, or the author misunderstood the situation.

The issue stems from rate regulation. Utilities, like U.S. insurers, have regulated rates. State officials approve what a utility charges, often after considerable discussion. The basic formula is:

Total revenue requirement = rate base *x* allowed rate of return + expenses.

Rate base is the depreciated value of the utility's assets.

Going back to the passage from Blunt's book: The middle manager is encouraged to allocate resources to capital spending and improvements. At the next rate hearing, regulators will let the company earn a return, say 11%, on the capital expenditure.

A safety program, though, is an expense. The regulator lets the utility recoup the expense but earn no profit from it.

This incentive structure is so well-known in utility circles it has a name and even a Wikipedia page: the Averch-Johnson effect. (The original paper emphasizes overinvestment in capital rather than underinvestment in safety.)

The utilities' formula differs from the standard ratemaking formula actuaries learn, which I'll simplify a bit here:

Rate = (pure premium + fixed expenses)/(1.0- variable expenses - profit).

Note that additional expenses, whether fixed or variable, increase profits.

Is the utility formula faulty? Is the insurance formula?

Stephen Mildenhall acknowledges that he is not an expert in utility pricing, but the CAS Fellow did write, with John Major, *Pricing Insurance Risk: Theory and Practice.* Mildenhall points out that a valid pricing of insurance could mimic the function utilities use:

Revenue required = expected losses + expenses + cost of capital.

Ultimately, market pressures determine the premium charged.

Neither formula is flawed. The failure would lie in how the formula is interpreted and used. Either the utility or the regulator could err in this way.

Safety expenditures, he noted, should not be considered in isolation. They generate an implied return of their own, in the form of lower expected losses from accidents.

I would add that all utilities face this constraint, but few if any have blundered safety issues as thoroughly as PG&E has.

Sources

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Coley Girouard, "How Do Electric Utilities Make Money?," *Advanced Energy Perspectives*, April 23, 2015.

Mark A. Jamison, "Rate of Return: Regulation," Public Utility Research Center, undated.

cold forests of Northern Alberta. The winter cold can shatter a bulldozer blade. The fire department's pumper truck has a heater so the water to put out the fire doesn't freeze en route.

People there work for oil companies. They don't extract oil, but bitumen, which is essentially road tar. Companies separate the bitumen sludge from the soil it permeates, then reverse engineer the goop back to sweet crude.

The tools to do this invoke Lucretius again: bulldozers three stories tall with tires that cost $85,000 apiece; a bitumen crusher that Vaillant describes as "a mechanical black hole . . . that can consume a city bus in three seconds."

The Fort McMurray fire itself represents an unimaginable level of destruction. It melted aluminum, vaporized lawn mowers and spawned its own weather patterns. It burned for 15 months.

As the fire approaches town, the Lu-cretius Problem befuddles town leaders. On the morning the town is evacuated, their advice is not to flee or to prepare to flee. They recommended that everyone "have a plan."

Evacuation was chaos. It is remarkable no one died.

Describing this all creates a Lucretius Problem for the writer. Vaillant solves it with careful research and vivid writing. After the fire, "nothing moved on the street now; even the ravens had fled."

He anthropomorphizes the fire; he gives it intelligence and desire. It is Godzilla, Moby Dick, Gilgamesh. It prowls the landscape; it devours buildings as snacks.

Five minutes from a nanny cam become their own Blair Witch Project, a panorama of horror. A did-I-see-something flicker outside the window cascades into "a malevolent entity from another dimension breaking through to this one."

The final Lucretius Problem is our own. Vaillant devotes the last third of the book to how climate change has turned the natural wildfire into the Beast. Extreme as northern Alberta is, its environment did not evolve to fire-welcoming, 90-degree spring days with 10% humidity. Spewing carbon dioxide into the atmosphere for going on two centuries has thrown the planet off kilter. The voracious chemical process that is fire is beneficiary.

Vaillant's final point is one a risk manager might make and one that *California Burning* echoes. The failure to confront risk leaves us vulnerable. The worst that can happen is far worse than anything we can imagine. ●

Jim Lynch, FCAS, MAAA, is retired from his position as chief actuary at Triple-I and has his own consulting firm.

Streamlining vs. Automating Your Rate Change Process BY D.J. FALKSON

Analyzing, filing and implementing new rates with agility are incredibly important for P&C insurers as they try to stay ahead of an ever-changing risk and a competitive landscape. This remains a cumbersome process, although insurers have made large technological strides in their data management strategies and internal ratemaking platforms. In their Ratemaking, Product, and Modeling Seminar presentation "Streamlining vs. Automating Your Rate Change Process," Erik Yost of WTW and Jamie Mills of Allstate presented some actionable strategies to more efficiently and accurately produce ratemaking analyses.

A primary business challenge addressed in the presentation is the need for companies to quickly adapt and respond to changes affecting their profitability. This need has been exacerbated by various dynamic factors such as market fluctuations, catastrophic events and economic shifts, including examples like COVID-19, hurricanes, wildfires and inflation. Traditionally, the processes to understand and implement rate changes have been burdensome and disjointed, involving multiple steps that are not only time-consuming but also prone to errors due to their manual nature. The end-to-end rate change process typically includes data preparation, peer reviews, rate level development, filing support, customer impact measurements, technology requirements and documentation — all of which historically involve many separate applications and extensive use of tools like Excel.

Streamlining the Rate Indications Process

Several strategic improvements can make the indication process more ef-

ficient and consistent. The presenters outlined a practical application where a single data source can provide a countrywide view of multiple rate level indications simultaneously. This approach ensures consistency despite the varied regulations across states and enhances efficiency by using uniform data models. The speakers discussed caveats in the setup of such a process, including the need for data to be flexible enough to allow for all potential groupings of indications that state managers may want to see, such as by annual statement line, coverage, state or program.

Key actuarial advantages of this streamlined approach include the ability to on-level premiums quickly under a variety of pending rate change scenarios. This method also allows actuaries to focus on one coverage at a time, enhancing confidence in pricing and the efficiency of trend selections. Additionally, the streamlined process facilitates easier access to regional, countrywide and industry data, aligning with actuarial standards and ensuring more credible data for decision-making.

The business impacts of streamlining are significant, enabling instant updates to program rate need views and providing a clear, easily digestible dashboard summary of indications that are readily available for senior management and regulatory filing purposes.

Automating the Rate Change Process

In contrast to streamlining the generation and management of rate indications, automating the rate change process requires a more extensive redesign of systems and a close collaboration between actuarial, product and technology stakeholders. This involves the initial setup of data transformations, database creation and the development of application programming interfaces (APIs) to connect various applications, creating a unified source of truth. This automation extends to creating smart default assumptions for various actuarial inputs such as premium and loss trends, loss development factors and underwriting expense selections. These default assumptions must have the flexibility to consider both internal company data and external sources and be able to mitigate the impact of one-time events or state-specific nuances so that analytical outputs are reliable and applicable in future periods. The reliability of these assumptions is critical to avoid the pitfalls of "garbage-in, garbage-out" scenarios.

The output from an automated rate change process includes state-specific indication values, comprehensive filing support and policyholder impact measurements, all designed to streamline the workflow for actuaries and reduce the time from analysis to implementation. Yost and Mills presented a compelling vision for the rate change process that automates all the time-consuming and error-prone tasks but allows for extensive actuarial intervention and decision-making.

They also highlighted the essential role of the actuary in building and overseeing this automated process to ensure the actuarial soundness of the outputs and adherence to Actuarial Standards of Practice. An expansive actuarial skill set, including programming and data visualization techniques, is necessary to ensure the success of a rate change process revamp.

The shift toward automation, while reducing manual errors, introduces the risk of systemic errors due to the interconnected nature of automated systems. One can easily imagine a data or calculation error carrying forward to all states, coverages or programs. Risk governance frameworks are essential to mitigate these hazards and ensure quality assurance throughout the automation process.

The presentation concluded with a discussion of different levels of streamlining or automation categorized as "Good," "Better," and "Best." Each category reflects varying degrees of automation complexity and organizational impact, from basic mechanization of current processes to a complete redesign of the entire rate change process for optimal efficiency and effectiveness. Yost and Mills then reiterated the need for companies to adapt their rate change processes to better understand and address profitability in a rapidly changing environment. Both streamlining and automating processes provide viable paths forward, with the choice depending on each company's specific capabilities, resources and strategic priorities. The goal is to enhance the speed-to-market and accuracy of rate changes, thereby supporting more robust and agile business operations.

These insights underscore the transformative potential of rethinking traditional actuarial processes through streamlining and automation and help to empower actuaries and businesses to achieve more with less in an increasingly complex marketplace. ●

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From Theory to Adoption: Operationalizing Bias & Fairness Considerations BY CRAIG SLOSS AND ELIZABETH BELLEFLEUR-MACCAUL

Across the CAS community, there is a growing general awareness of bias and fairness in the context of property-casualty insurance. Beyond regulatory requirements, insurers may be interested in understanding model fairness out of concern for the quality of the customer and employee experience. However, many insurers have not yet operationalized bias considerations by integrating them into their predictive modeling frameworks. As regulators continue to draft and implement policy to address model bias, the need for robust internal processes and governance frameworks becomes increasingly important.

In this article, we will highlight our company's experience with implementing bias and fairness considerations, including the development of governance, technical tools, qualitative guidance and formalized decision-making procedures. As a Canadian P&C insurer writing both personal and commercial property and auto lines, we customized our approach based on the regulatory environment, the types of business we write, our existing model development processes and the types of models most commonly used at our company. We hope that by sharing the high-level steps, other insurers can develop their own approaches tailored to their needs.

Developing and Documenting a Plan

Both model and data governance strategies benefit from the inclusion of bias considerations as they help to promote a consistent adoption of bias detection checks. Within our governance platform we created a model repository that allows us to track all models deployed at the company. This provided a foundation for us to introduce tailored bias assessments that can be directly linked to entries in the model repository. Actuaries and analytics practitioners can use these pre-built questionnaires to assess and document a bias detection plan specific to their predictive model(s) as part of their planning activities. This also serves as a point of control to ensure that analysts have done their due diligence.

The assessment developed at our company includes questions about the use case, such as identifying who is impacted by the model and whether the impact is potentially assistive or punitive. Following this, analysts delve into additional questions that cover topics such as:

- Determining the impact of regulation or legislation on predictor selection.
- Selecting the bias-detection tests that will be performed.
- Identifying groups for which bias tests will be performed.
- Developing methods for mitigating bias through human intervention.

The questionnaire is accompanied by links to in-house guidance to ensure assessment responses are reasonable and consistent. This guidance includes a bias-detection metric decision flowchart to help determine which test(s) should be included in the analyses.[1] (See Figure 1.)

The bias detection "cookbook"

We wanted to ensure that our company's analytics practitioners — who include both actuaries and non-actuaries — have the technical tools and knowledge needed to perform a model bias test. We started from publicly available sources, including "Methods for Quantifying Discriminatory Effects on Protected Classes in Insurance"[2] from the CAS Research Paper Series on Race and Insurance Pricing. This paper provides this criterion as the definition of "demographic parity" for a classification model:

> **The assessment developed at our company includes questions about the use case, such as identifying who is impacted by the model and whether the impact is potentially assistive or punitive.**

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[1] Our flowcharts are loosely inspired by the Aequitas "Fairness Tree" provided by the Center for Data Science and Public Policy at the University of Chicago: http://www.datasciencepublicpolicy.org/our-work/tools-guides/aequitas/.

[2] See https://www.casact.org/sites/default/files/2022-03/Research-Paper_Methods-for-Quantifying-Discriminatory-Effects.pdf?utm_source=Landing&utm_medium=Website&utm_campaign=RIP+Series

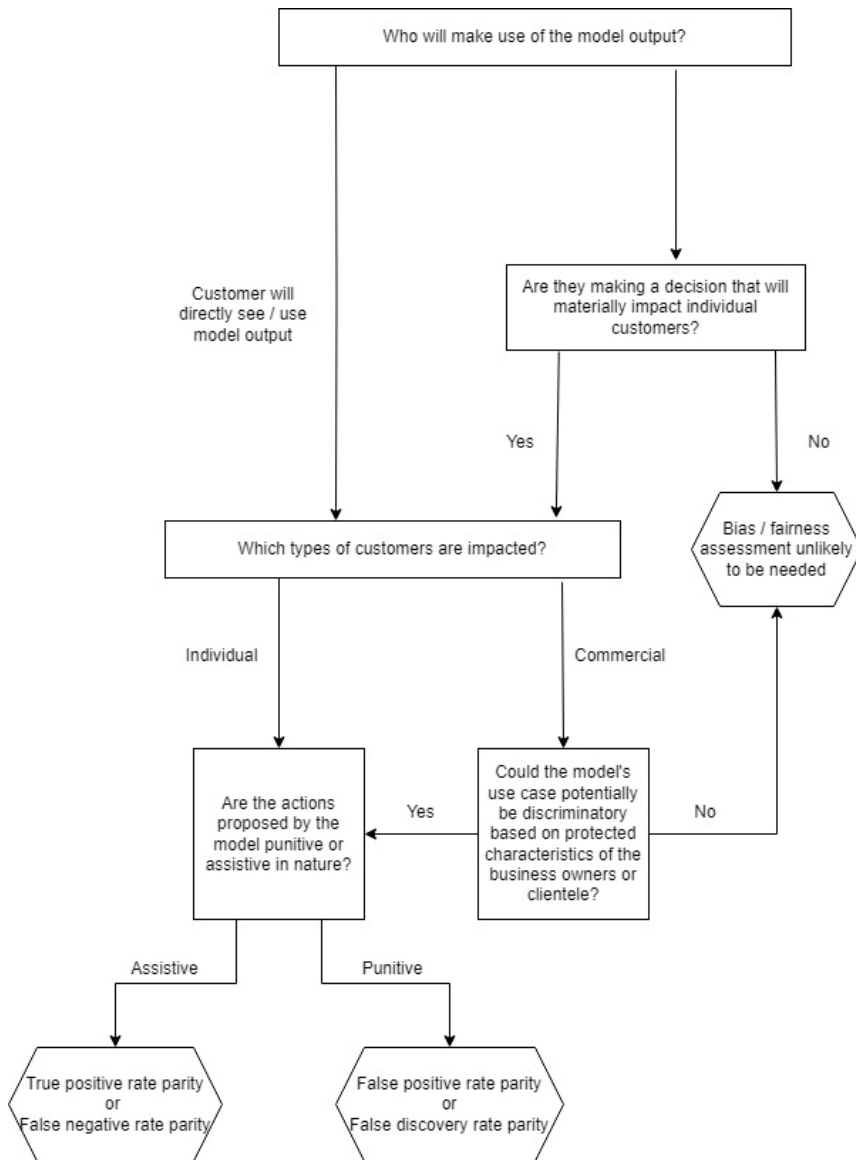**Figure 1. Bias-Detection Metric Decision Flowchart**

Figure 1 is a condensed version of our bias-detection metric flowchart, used for situations in which our notion of fairness corresponds to parity of model accuracy and the model is a classification model.

$$P(\hat{Y} = 1 \mid A = a) = P(\hat{Y} = 1 \mid A = b).$$

Because a criterion defined by an equation doesn't directly explain the steps to perform the test, we developed a "cookbook" containing verbal descriptions of the steps needed to perform the test ("recipes") in general terms. This also provided an opportunity to standardize practices around how we would account for situations where data on protected class membership ("A" in this equation) is not available.

Following is an excerpt from our cookbook that outlines the recipe for the demographic parity criterion:

1. Join census data on group membership by geographic unit.
2. Calculate model prediction for each observation.
3. Calculate average model prediction by geographic unit.
4. Assess whether there is an increasing or decreasing pattern in the average model prediction as the census variable increases.

This made the approach more accessible to a broader audience than a mathematical equation, and the broad language used in the recipe makes it widely applicable — the second step, for example, can apply to a wider range of models than just classification models.

The tool-agnostic nature of the recipes enables analysts to implement the test in whichever tool they're working with. One person might perform these steps in Excel, another in Python. An example of one of these tests is illustrated in Figure 2. We supplemented these cookbook recipes with a repository of code, implementing these tests in two of the most commonly used languages at our company, R and Python.

The need for qualitative guidance

Prior to joining the workforce, many actuaries and other data science practitioners complete post-secondary education in science, technology, engineering and mathematics (STEM) fields. While these programs provide actuaries with a strong understanding of bias from a statistical sense, many of today's actuaries did not go through programs that included coverage of the impacts of systemic biases in predictive modeling. This may present a challenge to actuaries, who may lack the foundational understanding, skills and experience to identify

Figure 2. Loss Ratio by Visible Minority Populations Band

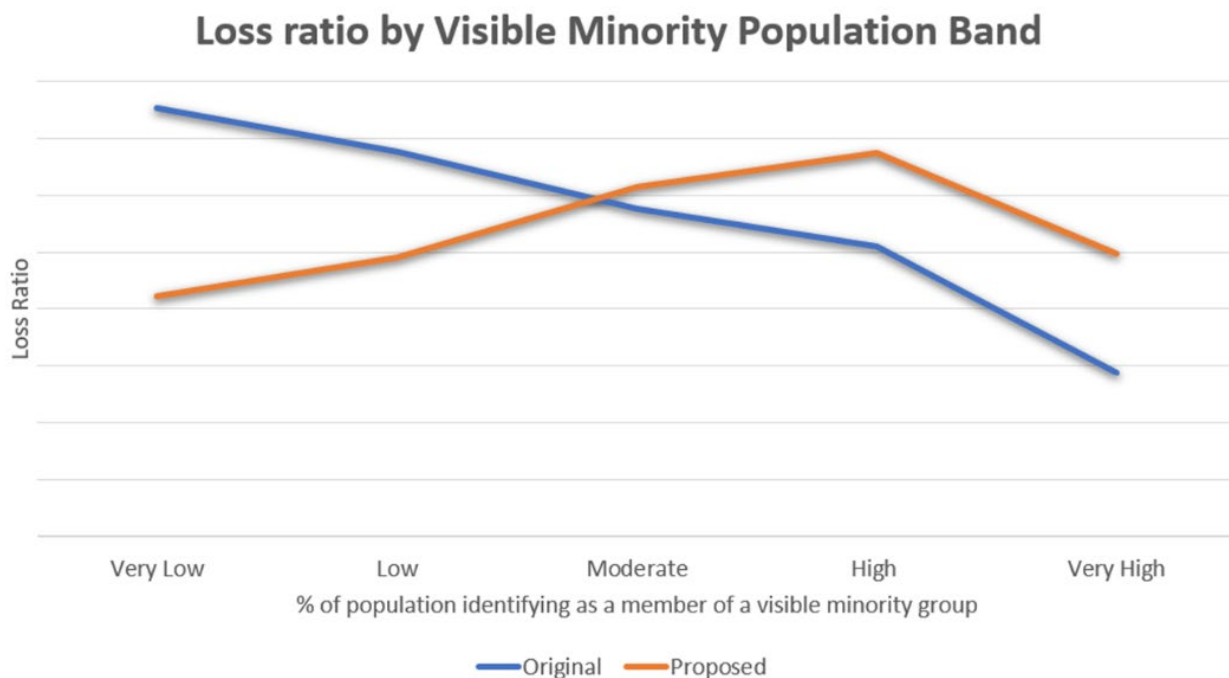## Loss ratio by Visible Minority Population Band

Figure 2 is an example of a hypothetical loss ratio parity test comparing two models. In the old model (blue), the loss ratio steadily decreases as the percentage of members of a visible minority group in an area increases, which indicates a lack of actuarial fairness due to unfair discrimination against members of visible minority groups. The revised model does not show a consistent pattern in the loss ratio, which indicates a greater degree of fairness.

situations where a pre-existing social bias can impact their predictive models. As such, there is a clear need for intentional education on this topic, to ensure that social biases that may be present in real-world data and algorithms are not further reinforced.

Feedback from end-users has played a crucial role in shaping the educational content we developed. The feedback received from project teams who implemented bias tests is that, while they understood the tests from a technical standpoint, they didn't know which biases they should be testing for. Teams would tend to "over-test," looking at numerous combinations of metrics and protected groups, without understanding the "why" behind the selections being made. We wanted them to narrow their focus to biases that we have a rational reason for suspecting could be present.

To address this, we developed a user guide that specifically identifies systemic biases that can impact predictive modeling in the context of the P&C insurance industry. This document synthesizes information pulled from the literature[3] and news media to create an overview of biases to be tested for, based on several considerations, such as:

- Situations in which human judgment can influence the response.
- Modeling use cases where known biases have been documented.
- Predictors whose quality may be impacted by systemic bias.
- Predictors that have historically acted as proxies for protected classes.

As an example, recent news reports[4] alleging racial discrimination in auto insurance availability suggest that we should be testing for racial bias in models used for underwriting risk selection. However, we also considered biases from other industries whose mechanisms could plausibly be impacting our

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[3] Including two papers from the CAS Research Paper Series on Race and Insurance Pricing, "Approaches to Address Racial Bias in Financial Services: Lessons for the Insurance Industry" and "Understanding Potential Influences of Racial Bias on P&C Insurance: Four Rating Factors Explored."

[4] See, for example: https://www.cbc.ca/news/canada/montreal/quebec-human-rights-commission-insurance-company-discrimination-indigenous-1.6639678.

models. For example, research on bias among medical professionals[5] suggests that we should be testing for bias in models used to support medical claims management.

The guide also serves as key reference material when analysts are completing their bias and fairness assessments, and it helps to further reinforce the importance of qualitative considerations when developing a predictive modeling plan. These assessments are submitted at the start of a project, and an independent reviewer provides feedback. This feedback loop provides a mechanism for analysts to build on their existing knowledge through reinforced, applied and tangible learning. It also provides a means for injecting diverse views into a process with considerable subjectivity.

Refining decision-making processes

In the example shown in Figure 2, the decision to use the new model would be easy: It is both more accurate and less biased than the old model. But this is not always the case — sometimes there is a need to decide between a more accurate and a less-biased model. The model approver needs to exercise business judgment to determine which model to use, considering specifics of the use case.

We developed internal decision-making processes to ensure, in situations where bias is a concern, that the decisions and reasons for them are clearly documented. These are described as a series of "escalation levels," depending on the complexity of the questions related to bias, and for each

level we answered questions such as:

- What metrics must the project team provide to support the decision, and how are they vetted?
- Who makes the decision on model usage, and who should they consult with?
- What information must be documented?
- What monitoring must be performed after the model is deployed? Examples of escalation levels include:
- No bias concerns. (In this level, the focus is on confirming that a bias test has been done, reviewed and

documented.)
- Decision between a more accurate model and a less-biased model.
- Decision between two models that exhibit different types of biases.
- Decision whether a model in which an otherwise-prohibited factor is used to mitigate the bias can be employed.

We tailored our answers to these questions based on the existing model development and approval processes at our company. More complex situations require more independence between individuals involved in the process. The process also specifies points at which the company's legal team must

be consulted, notably in situations in which there is ambiguity over whether a particular factor is permissible for use.

What's next?

Our company started the journey to integrate bias considerations formally into our predictive modeling process two years ago, and this journey is still ongoing. It has been a continuous process of learning about how our project teams were, using the resources we provided, understanding what their questions were and adjusting our approach to meet their needs. We hope that by sharing some of the approaches we have

Sometimes there is a need to decide between a more accurate model and a less-biased model. The model approver needs to exercise business judgment to determine which model to use, considering specifics of the use case.

used, other organizations will be able to accelerate their processes of operationalizing model bias checks by developing their versions of the tools that we have outlined here. ●

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[5] See, for example: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5333436/.

IT'S A PUZZLEMENT By JON EVANS

Rolling a Long String of Ones

A die with k sides, numbered from 1 to k, has an equal probability ($1/k$) of landing with any one of these numbers up whenever it is thrown. On average, how many times do you have to throw the die to generate n sequential outcomes of the number 1?

Which takes more throws on average?

- k and n?
- $k – 1$ and $n + 1$?

Infinitely Many Equal Pieces

The solution below is based on the solution submitted by Eamonn Long, FCAS, who correctly recognized that the answer hinges on the truth of the axiom of choice. In practice this axiom is usually assumed to be true. However, there are skeptics, and Long demonstrates both points of view.

The Question: "Given any finite positive real number A, can you define a set S, in the two-dimensional plane, with area A and a partition of S into infinitely many sequentially numbered subsets S 1, S 2.... such that any two of these subsets are isometric? Show it or prove it to be impossible. Isometric in this case will specifically mean two subsets related by a one-to-one mapping that only involves translation and/or rotation in the plane. Partition means that the subsets are pairwise disjointed and that their union equals S. Can you generalize your answer to a higher dimension?"

Remark: The Question could be viewed as appearing to relate to the second of Kant's antinomies. I will give an answer arguing it can be possible, and I will give an answer arguing it can be impossible.

Proof that it is possible (sketch, assuming axiom of choice is true)

The Area A is a red herring; scaling in finite dimensions can reduce us to the case of the unit hypersphere.

It is convenient to use the complex number plane to handle the situation in two dimensions. Let S be the set of all $e^{i\Theta}$ where Θ is real and i is the square root of –1.

Define x equivalent to y if and only if there are real numbers a and b such that $x = e^{ia}$ and $y = e^{ib}$ where $a – b$ is an integer. This equivalence relation defines a partition in the usual way.

Let A be the set formed (using the axiom of choice) of exactly one element of each equivalence class. For a given integer z, let A_z be the rotation of A defined by A_z in the set of all $e^{i(\Theta+z)}$ where $e^{i\Theta}$ is in A.

S is the union of all the A_z sets. Since the integers are countable, the number of A_z sets is countable. The A_z sets are pairwise disjointed, since the angle between any two points in different sets is not an integer. However, one A_z set can be rotated by such a non-integer angle onto another A_z set. So, the A_z sets are an example solution in two dimensions.

To generalize from the circumference to the whole circle, join rays from the origin to the edge and associate points on the circumference with all those on the rays joining from the origin (excluding the origin itself).

To generalize to higher dimensions, using n-spheres and n-balls (excluding the origin), just rotate in any two dimensions, as just shown, leaving the coordinates in the other dimensions fixed.

Proof by contradiction that it is not possible (assuming the axiom of choice is false)

In the Solovay model (see https://people.math.wisc.edu/~awmille1/old/m873-03/solovay.pdf), every set of real numbers is Lebesgue measurable.

Given that we are asked to consider a finite area being split into infinitely many isometric subsets (which, being Lebesgue measurable, must have the same measure), we must conclude that this is impossible since the isometric subsets can neither have a finite nor zero measure for the objective to be achieved.

Therefore, it is not possible in this model of set theory.

Bob Conger also submitted a solution. ●
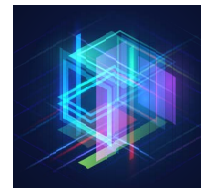
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