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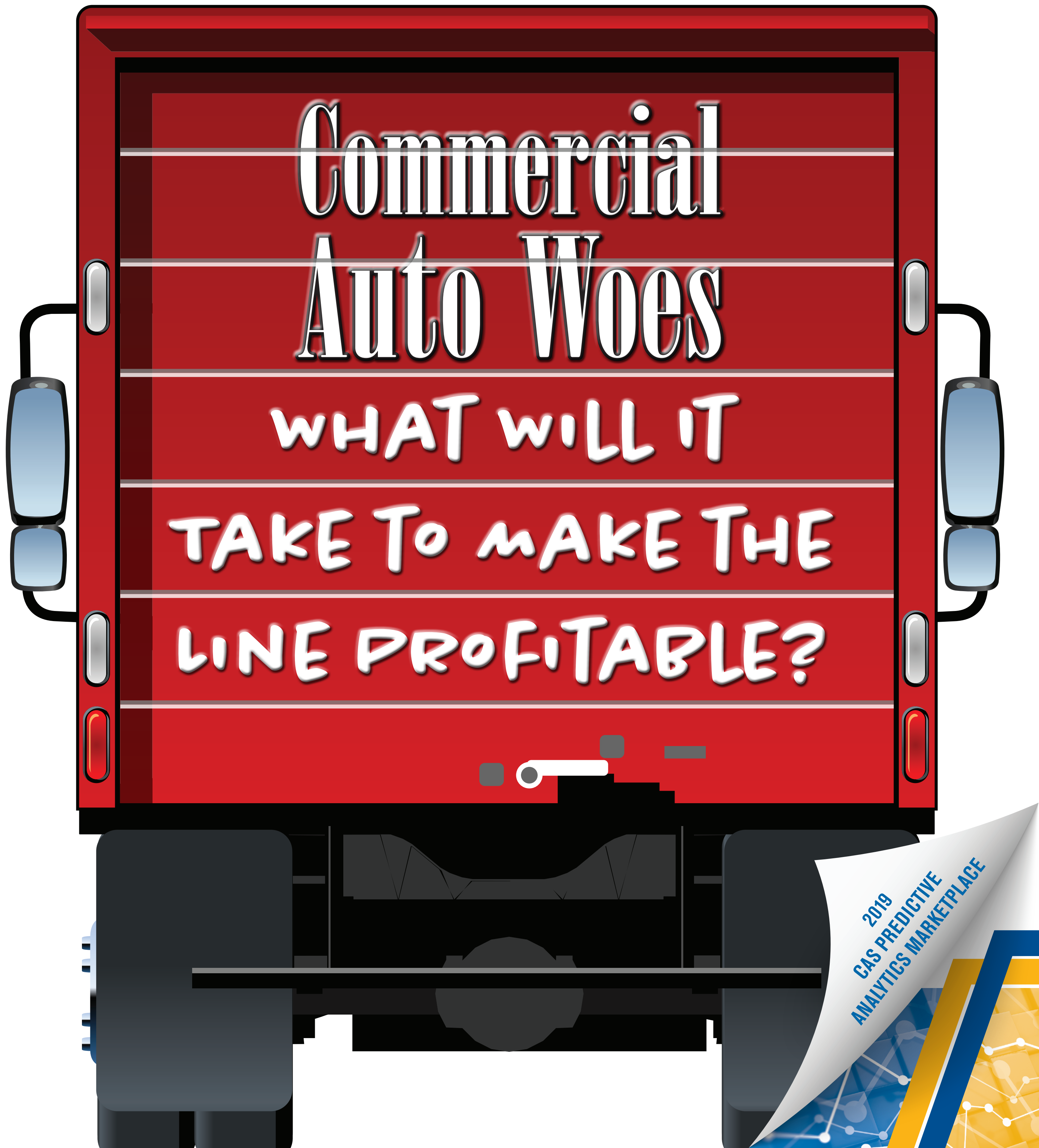

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May-June 2019

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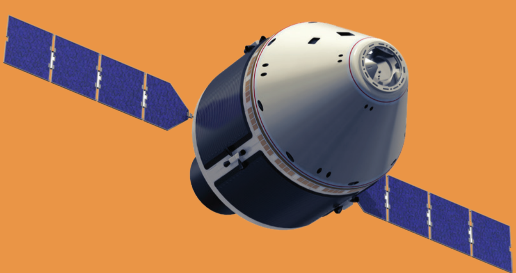

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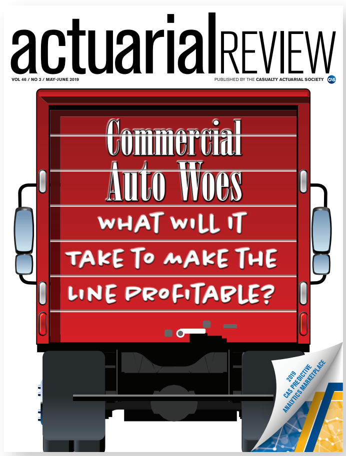

Commercial Auto Woes: What Will It Take to Make the Line Profitable?

BY ANNMARIE GEDDES BARIBEAU

Commercial auto's unprofitability is not what it seems.

2019 Predictive Analytics Marketplace

A Supplement to *Actuarial Review*

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actuarialREVIEW
The magazine of the Casualty Actuarial Society

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

Maybe I'm Amazed

Actuarial Review is often packed with good information that even a non-actuary can use — something that never ceases to surprise me.

For example, you don't have to be an actuary to recognize conflict resolution is a great skill to have in your toolkit. From time to time, you will have to go up against someone who thinks that you don't know what you are doing. You have to learn to paddle through predicament-filled ponds to come to resolution, and, if you are lucky, you'll emerge a bit wet but free of pond scum, and something will actually get done. Grover Edie gives a good refresher on keeping the ego in check while getting the work done for people who think they know the answer. (Haven't we all been that person at one time or another?)

I found a lot of value in Jim Lynch's coverage of the recent RPM Seminar. In particular, his article on finding the right insurtech partners reminds me how crucial it is to "kick the tires" of an innovative concept or product before incorporating them into your work life. The time put into vetting and picking a potential partner can be off-putting, but the rewards can be great. And if it doesn't work out, go on to the next firm or idea. Today, it's about being open to change.

Goin' Mobile

Vehicles are a big part of our everyday lives, and commercial vehicles are figuring in even more prominently. Whether you're driving on a highway, hiring a plumber or ordering goods online, a commercial vehicle is usually involved. Which is why I am so surprised to learn from our cover story that there is so little data available on the ubiquitous commercial vehicle.

The idea for the story, written by Annmarie Geddes Baribeau, came about from a discussion I had with CAS Staff Actuary Ken Williams. As the story was being developed, I learned something quite unexpected from him: Commercial auto is the poster child for unprofitability. With all the emphasis on big data and predictive analytics, I was amazed to learn that not more is being done to collect statistics on commercial vehicles.

Amazing, indeed.

So, I invite you to be amazed and read our cover story. Also, be sure to look up from your smart phone and check both ways before crossing the street.

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

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Follow the CAS

president'sMESSAGE By JIM CHRISTIE

Relations with the Society of Actuaries

I have been speaking at various formal and informal meetings of actuaries during the almost six months since I became your president. At virtually every meeting someone asks, "What is our relationship with the Society of Actuaries now?"

To answer this questions, I am going to describe to you the current relationship between the CAS and the SOA, but first I will give you a little background.

Last November the CAS Board failed to achieve the two-thirds majority necessary to take the proposed combination of the CAS and the SOA into a single professional organization. This was a necessary constitutional step before proceeding to a full CAS membership vote.

Why did the board decide not to move forward with the combination proposal? While I don't know precisely what any individual board member's reasons were, I will try to broadly describe the board's collective thinking. I would characterize those who did not support the combination as not voting so much against the SOA as voting in favor of the CAS continuing to concentrate on the specialized needs of property-casualty actuaries and maintaining our unique culture and sense of community. Some board members wanted to continue our intense focus on developing our distinct predictive analytics strategy for our current and future members.

The board greatly valued the member survey conducted shortly after the initial combination announcement. The results of that member survey (which have subsequently been released to the membership) were discussed in depth

The CAS and the SOA — What We Do Together

Long-standing activities

- Actuaries Climate Index (sponsored jointly with the American Academy of Actuaries, SOA and Canadian Institute of Actuaries)
- Annual Enterprise Risk Management Symposium (with SOA Joint Risk Management Section)
- North American Actuarial Council (semi-annual meetings with all actuarial bodies in Canada, U.S. and Mexico)
- Commissioned research projects' funding
- Regular dialogue between SOA and CAS executive directors
- www.BeAnActuary.com

Recently established efforts

- Predictive Analytics Seminar, Toronto, February 2019 (with the CIA and SOA)
- Actuaries in Banking Seminar, Washington, May 2019 (with SOA, CIA & Actuarial Society of South Africa)
- Actuarial Research Conference, Purdue University, August 2019
- Joint Diversity Committee
- Regular dialogue between SOA and CAS presidents
- 2018 Task Force on dues structure for the International Actuarial Association
- 2019 Task Force on governance for the IAA
- Joint Proposal to National Association of Insurance Commissioners on annual attestation requirements
- Dialogue with NAIC regarding their white paper on qualification criteria for P&C Appointed Actuaries
- Dialogue with NAIC on how to gain assurance on appropriate continuing education for Appointed Actuaries
- Responses to NAIC on automotive trends analysis
- Registration open to CAS members for SOA's Predictive Analytics Certificate program

In the works or under consideration

- Joint Seminar on Workers' Compensation (CAS) and Disability Insurance (SOA)
- Cryptocurrency insurance research
- SOA Chartered Enterprise Risk Analyst exam as an alternate option for CAS members' CERA qualification
- Continuing Education compliance software
- Joint University Engagement Committee
- Regularly scheduled meetings between SOA and CAS staff and leadership

While the above lists may not be complete, they do illustrate that the two organizations can and do act together on many initiatives.

by the board before their vote.

Our shared efforts with the SOA exploring the combination revealed more similarities than differences between us. I believe this understanding has strengthened our overall relationship despite the failure of the initiative. There is still a significant level of goodwill between both organizations' leadership teams. The CAS leadership and I are committed to capitalizing on this goodwill to work collaboratively where this is in the best interests of both organizations and the actuarial profession.

The actuarial profession is too small to conduct every initiative as separate organizations. To ignore these joint opportunities may slow progress on these initiatives or result in increased collective costs.

Many of the comments in the member survey suggested that the two organizations should have worked collectively on more projects before considering any combination. While we certainly could have done more of this, the CAS and the SOA have engaged in collaborative activities for years, at both staff and volunteer levels.

It is true that collaborations have waxed and waned over the years as relations between the two organizations have warmed or cooled. But there have been and will continue to be numerous initiatives where it is to the benefit of both organizations to work together. The actuarial profession is too small to conduct every initiative as separate organizations. To ignore these joint opportunities may slow progress on these initiatives or result in increased collective costs (dollars and staff and volunteer efforts).

Because many of our members may have only limited knowledge of our existing joint efforts, I am listing some that immediately come to mind in this column's sidebar. I am sure I have missed some, but the lists illustrate the answer to that question of the relationship status between the CAS and the SOA: We can and do act together on many initiatives and will continue to do so in the future.

ACTUARIAL REVIEW *LETTERS POLICIES*

Letters to the editor may be sent to ar@casact.org or to the CAS Office address. Please include a telephone number with all letters. Actuarial Review *reserves the right to edit all letters for length and clarity and cannot assure the publication of any letter. Please limit letters to 250 words. Under special circumstances, writers may request anonymity, but no letter will be printed if the author's identity is unknown to the editors. Event announcements will not be printed.*

COMINGS AND GOINGS

Josh Crumley, ACAS, has been promoted to chief of staff at AmeriTrust Group, Inc. Crumley has been with AmeriTrust for 13 years working in a variety of roles, most recently as vice president, operations and analytics.

Susan Cross, FCAS, has been elected to serve as director of Unum Group. Cross previously held the positions of executive vice president and global chief actuary for XL Group Ltd. (now AXA XL) in Bermuda.

Anthony Ptasznik, FCAS, has been elected to chair the board of directors for the Highway Loss Data Institute. Ptasznik joined the Auto Club Group in 2001.

Claudine Modlin, FCAS, has been promoted to head of personal lines product, Western zone for Farmers Insurance. Modlin has been at Farmers for one year, previously serving at Willis Towers Watson as director, head of P&C pricing and product management for 10 years.

Shane Barnes, FCAS, CSPA, is the new P&C claims analytics lead at USAA. Prior to joining USAA, Barnes held several positions at the Hartford. He currently serves on the CAS Executive Council as the vice president-marketing & communications.

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

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

CALENDAR OF EVENTS

July 23-26, 2019
R for the P&C Practitioner Bootcamp
The Westin O'Hare
Rosemont, IL

September 16-18, 2019
Casualty Loss Reserve Seminar (CLRS) & Workshops
Fairmont Austin
Austin, TX

October 1-3, 2019
In Focus
Virtual Event

November 10-13, 2019
Annual Meeting
Hilton Hawaiian Village Waikiki Beach Resort
Honolulu, HI

March 2020
Ratemaking, Product and Modeling (RPM)

IN MEMORIAM

Paul W. Simoneau (FCAS 1960)
1929-2019

CAS Executive Director Ziegler to Resign at End of 2019

Cynthia Ziegler, CPCU, ARM, AAI, CAE, the longtime executive director of the Casualty Actuarial Society, will resign her post at the end of 2019 after 18 years on the job.

Cynthia Ziegler

Jim Christie, CAS President, lauds Ziegler's service to the CAS and the actuarial profession. "The CAS and the services it provides to its members and candidates have grown exponentially during Cynthia's tenure," says Christie. "As a dedicated partner to our board of directors, a persuasive voice on our executive council, and a strong leader to our staff, her contributions over the years have been critical to advancing the priorities of the organization."

During Ziegler's tenure, the CAS Office staff grew from 19 to 42 full-time employees, including the addition of three staff actuaries, and the CAS membership increased from around 3,500 to more than 8,600 members. Among the CAS's many accomplishments under Ziegler's leadership are the launch of The CAS Institute and record-setting numbers of candidates sitting for exams and attending CAS continuing education programs. Also, during Ziegler's tenure, the CAS enhanced its international presence and expanded its educational offerings to include webinars (first introduced in 2007) and livestream events.

In 2006 CAS Fellows voted to make the executive director position a full member of the CAS Executive Council and an officer of the Society. In a segment of the CAS Centennial History Book, *100 Years of Expertise, Insight, and Solutions*, Ziegler wrote of the change in the CAS Bylaws and Constitution: "This acknowledgement by the membership of the important partnership between staff and volunteers was a happy and proud moment for all of us."

In order to ensure a smooth transition and continuity of the work of the Society, the process to identify Ziegler's successor has begun, with the goal of finding a new executive director by late summer 2019. Christie is heading up a CAS special committee that is working with an executive recruiting firm to launch a national search.

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Five Key Insights for Small Commercial Insurance

To better understand how commercial insurers are dealing with various pressures to maintain profitability, LexisNexis® Risk Solutions commissioned a third-party survey of 412 U.S. commercial insurance professionals. We asked for their perspectives on five factors with direct bearing on their business–automation, data assets, predictive modeling, customer experience, and market trends. Flip this card to see the **key insights in each of the five areas**.

5 Key Insights

Insight #1:
Automation lags behind desired levels
The lack of automation remains the number one pain point in commercial underwriting.

Insight #2:
Valued data assets are widely used
Though carriers deem data assets as useful, these assets are not used consistently in their workflows.

Insight #3:
Predictive modeling is also used inconsistently
Although predictive modeling is deemed important, only one-third use it consistently.

Insight #4:
The customer experience needs improvement
The factors that can improve the customer experience are the same factors identified as needing improvement.

Insight #5:
Carriers want to embrace market trends
Yet, less than half are making strategic changes in response to trends.

These insights point to gaps that can be turned into opportunities toward meaningful progress.

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Guo Chosen CAS Staff Actuary in China

BY KATE NISWANDER, CAS MARKETING AND COMMUNICATIONS MANAGER

The CAS has selected Ran Guo, FCAS, as its first-ever China-based staff actuary. In this new role as director of international relations, Guo will work to strengthen, develop and engage the CAS's community of actuaries in China and regions in Asia. Guo's efforts with CAS member volunteers will be to provide actuarial support to candidate, academic and regulatory communities throughout Asia.

A member of the CAS for over 10 years, Guo's diverse background includes pricing, reserving, corporate finance and business development. He is founder and CEO of Puying Technology Limited, a Shanghai-based joint venture with a U.S.-based insurance software provider that supports third-party administration for claims. Guo previously served as the investment director of the insurance merger & acquisition department for Fosun International Limited in Shanghai.

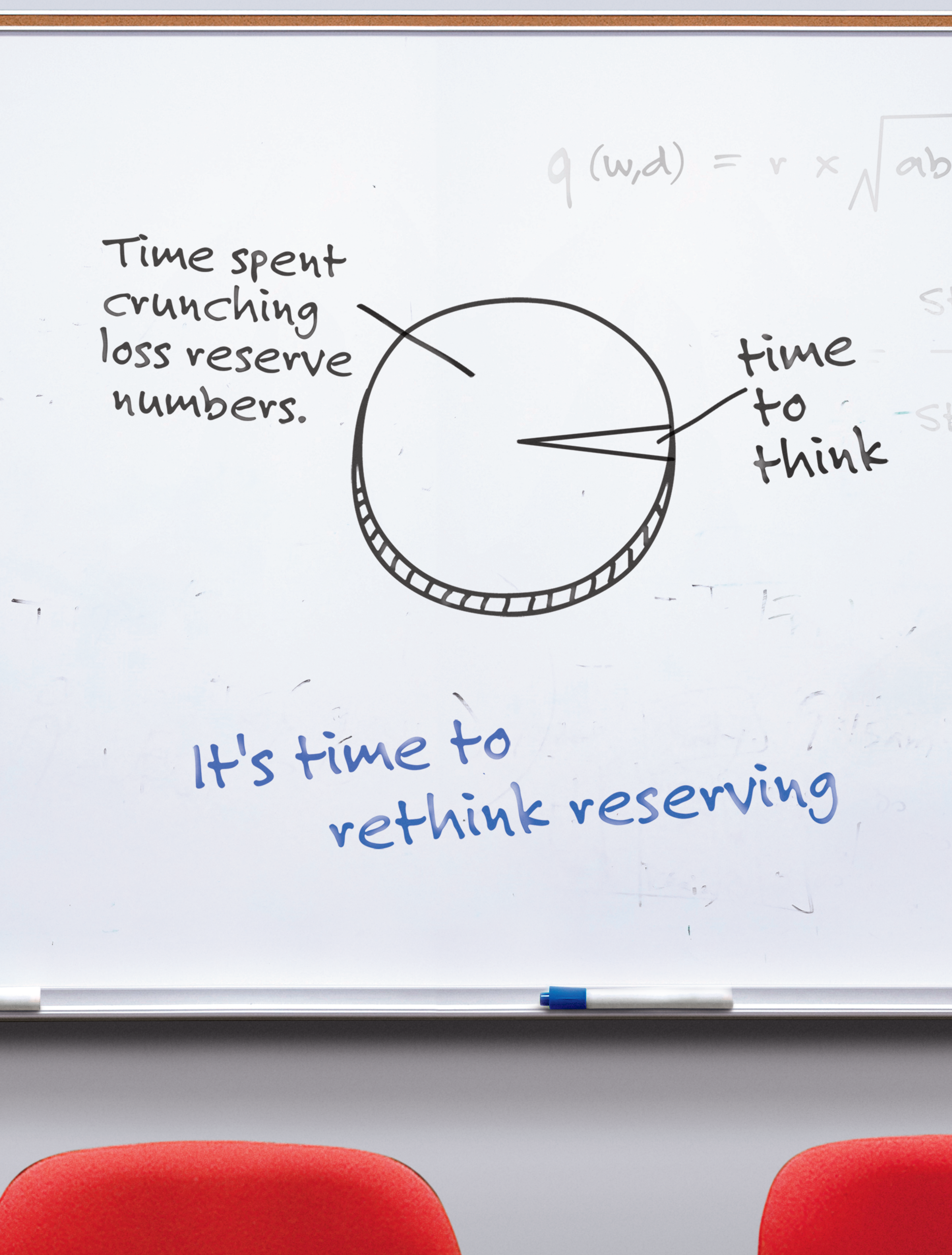
Guo has served as a member of the CAS Asia Regional Committee and as a CAS University Liaison. Guo's addition to the CAS staff marks the third full-time position filled by an actuary and the second full-time position stationed in Asia.

"We are pleased to have Ran join our staff in this critical new role," says CAS Executive Director Cynthia Ziegler. "As the demand for property and casualty education and credentials continues to grow internationally, the CAS continues to add resources that meet the needs of our members, candidates and partners in high-growth regions," Ziegler says. "We hope to keep expanding and providing support to our growing community of international members and partners."

Ran Guo, FCAS

"I am thrilled to take on this position, as the CAS is a symbol of excellence widely recognized around the world," says Guo. "I look forward to expanding the CAS's visibility and profile in Asia, providing services to local members and serving as the bridge between the local community and the CAS executive leadership."

Guo, who is based in Beijing, earned a bachelor's degree in statistics from the University of California, Berkeley, and a master's degree in statistics from the University of California, Los Angeles.



q (w,d) = r x √ab
Time spent crunching loss reserve numbers.
time to think
It's time to rethink reserving

CAS STAFF SPOTLIGHT

Meet Wesley Ross, Associate Director of Information Technology

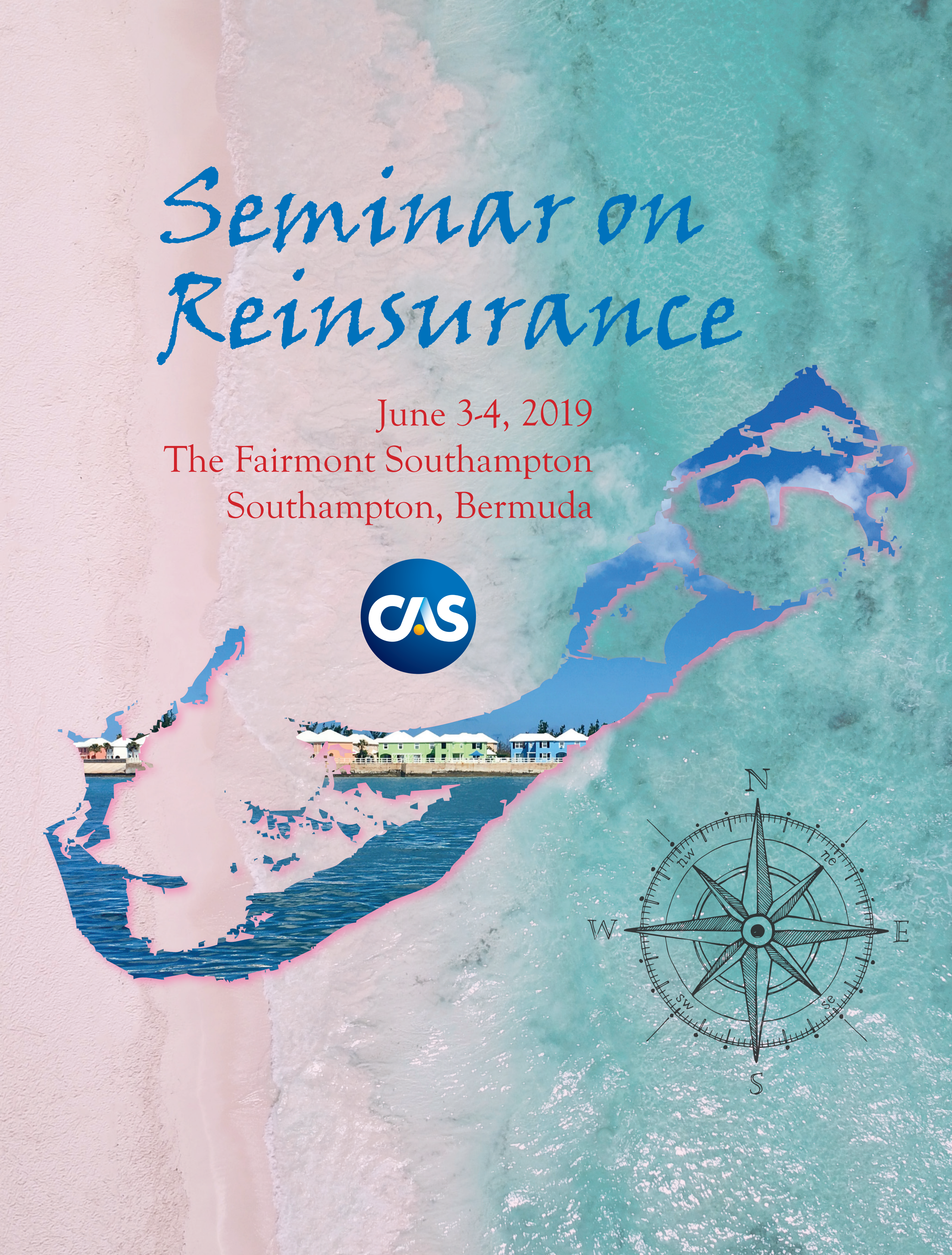
Welcome to the CAS Staff Spotlight, a column featuring members of the CAS staff. For this spotlight, we are proud to introduce you to Wesley Ross.

- **What do you do at the CAS?**
  I recently joined the CAS in the IT and Online Services department. My role is project management in nature, related to web and other online presences, network infrastructure, communications platforms, GDPR, security and data. I will always be the "IT Guy," but that role has certainly expanded in the last few years.
- **What do you enjoy most about your job?**
  I enjoy that every day is different and that I work with a smart bunch of people who want to improve the member experience and who aren't afraid to put in the effort to do so.
- **What's your hometown?**
  I'm from Foley, a small town on the Gulf Coast of Alabama. I grew up mainly in Alabama until 2009, when I relocated to Virginia. My wife and I now live in Maryland just outside D.C.
- **Where'd you go to college and what's your degree?**
  I've been a lifelong learner! I attended the University of South Alabama for a BA in international business. I completed my master of public administration at the University of Alabama at Birmingham. I transferred to Norfolk, Virginia, where I completed six years of coursework toward a Ph.D. in public policy.
- **What was your first job out of college?**
  I started working when I was 12 years old at a gas station by our home, cleaning floors, restocking — things like that. I worked in restaurants and hospitality through college. My first "corporate" job was with Cooper/T. Smith, a multinational company with stevedoring as its primary business. It also had a hospitality division, so I took on the IT role supporting that division during and out of college.

Moulton Tower, on the campus of the University of South Alabama.

Wesley Ross

- **Describe yourself in three words.**
  Loud, funny, respectful.
- **What's your favorite weekend activity?**
  My wife and I recently had our first child, Isabella, so our weekends are mostly spent entertaining her while she lights up our lives. We love wineries and brunches when we get the time. I personally enjoy working in the yard all weekend. And in the fall, college football reigns supreme! Roll Tide!
- **What's your favorite travel destination?**
  This one is difficult! My wife and I love to travel. I've been doing it since I was old enough to drive. So, I'd have to choose two: New Zealand I would move to happily and stay there if I could — the people, wine and scenery are incredible; Vienna, Austria, is my favorite city destination —architecture, drinks and music!
- **Name one interesting or fun fact about you.**
  I have a real estate license in Alabama that I got right when I was old enough to pass the exam. I kept it all these years, just in case.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June 3-4, 2019
The Fairmont Southampton
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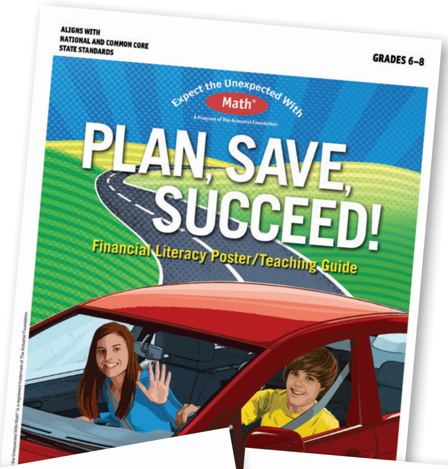

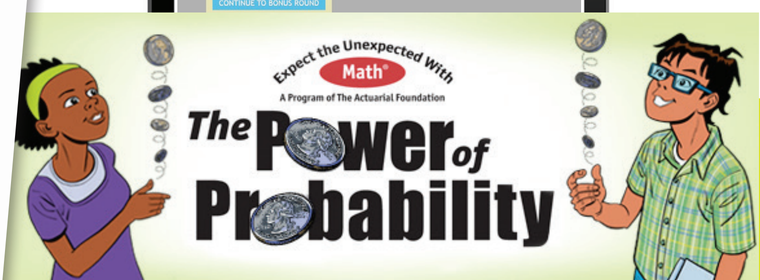

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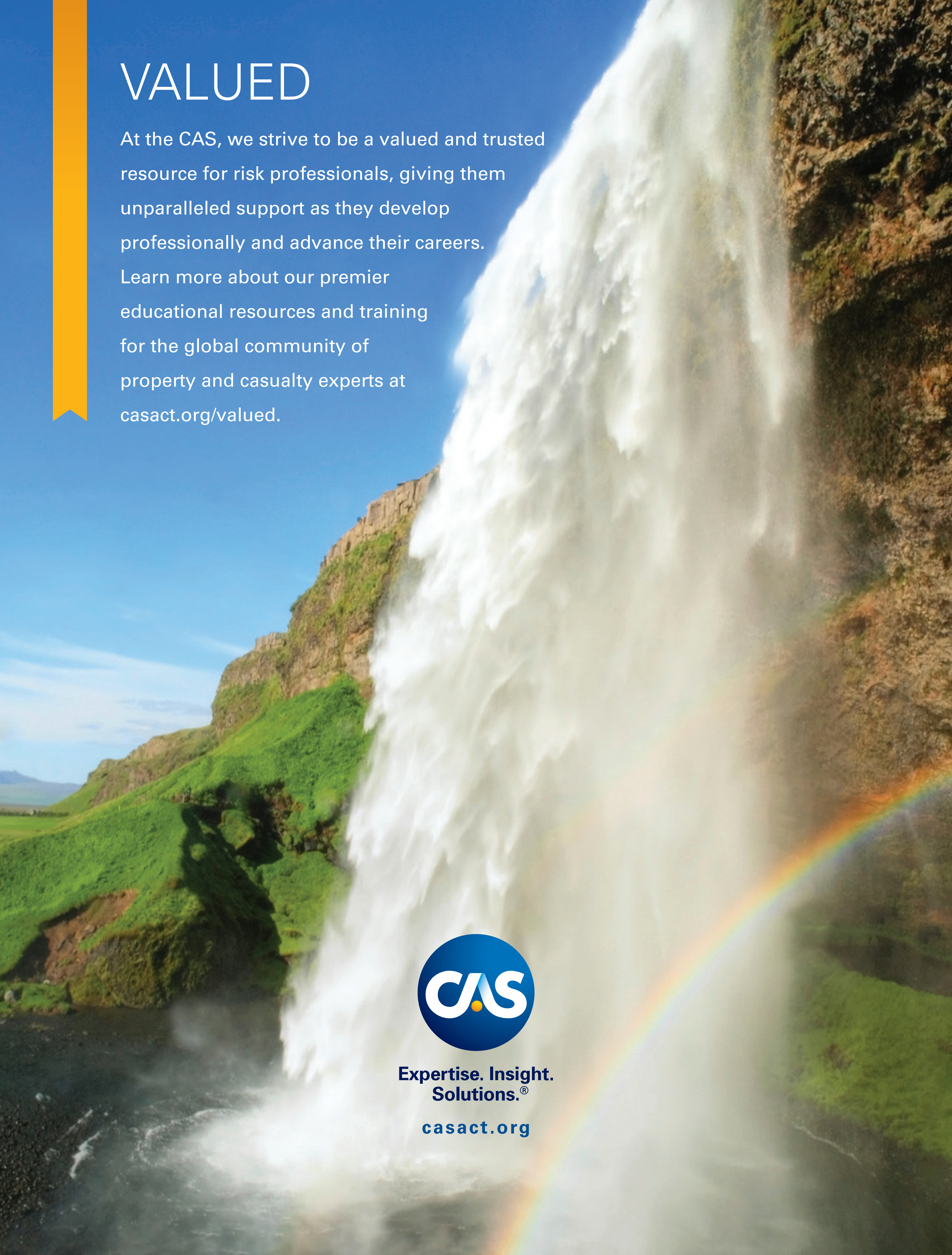
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Process Mining Can Smooth the Road of Business

BY JAMES P. LYNCH

Imagine sitting at 10,000 feet and watching cars pour out from a busy downtown at the evening rush hour. Thousands of tiny cars course down interstates and channel off, seemingly at random, into surface arterial streets until they branch off onto secondary streets, then tinier streets still, then home.

The first attempt to map a process doesn't result in a nice, neat, street-like grid. It looks hopelessly tangled, like a plate of spaghetti.

If you can picture that, then it is easy to imagine what the demonstration of process mining looked like when Aarynn Crawley of KPMG showed it to actuaries at the March 2019 CAS Ratemaking, Product and Modeling Seminar in Boston.

Process mining is the visualization of a business activity. It is a cutting-edge way to make those activities more efficient because, like cars heading home at rush hour, any business process is subject to bottlenecks and traffic jams. Finding those impediments is the first step in eliminating them, and process mining promises to do just that.

Process mining is also a good example of how quantitative experts like actuaries can contribute to making business run more smoothly.

The idea of efficient business operations is hardly new. In the early 1900s, Frederick Winslow Taylor became the father of scientific management by observing, then streamlining the way factory workers did their jobs.

Taylor's observe-then-improve model worked well for decades. These days, unleashing a team of observers to shadow employees could be disruptive, says Jonathon Wong, a director at KPMG, who spoke to about 30 actuaries attending the session, "Profit Mining in P&C Insurance." It could also be inaccurate, he says. "People tend to be biased toward one way a process is adjudicated," Wong says.

Data collection began to improve around 20 years ago, when billing and content management systems began to timestamp when people did various tasks and how long those tasks took. At the same time, computers became more powerful, which paved the way for models that could put the data to work.

"This is an objective — to get to what is actually happening on the ground," Wong says.

Early attempts occurred in the same manufacturing realm where efficiency experts had invented their craft. A factory floor is a relatively simple process, Wong says. "The machine can't go off script," he says. Financial service pro-

cesses, like settling property-casualty claims, however, are far more complex.

The first step is collecting data and keeping the key bits of it, says Tony Beirne, an FCAS with KPMG. The important data fields — a unique identifier, action names, start times, action costs and action executor — are present in most systems.

There are a lot of ways to solve one problem, but the first attempt to map a process doesn't result in a nice, neat, street-like grid. It looks hopelessly tangled, like a plate of spaghetti.

Analysts generally find the five or 10 most common variants and focus on them, Beirne says. For example, a simple auto physical damage variant would be:

- Open claim.
- Get inspection.
- Write check for repairs.
- Close claim.

If the policyholder has rental replacement coverage, a simple variant emerges:

- Open claim.
- Get inspection.
- Open rental.
- Close rental.
- Write check for repairs.
- Close claim.

Analysts construct their streetscape from the most common variants, then unleash a visualization routine. The visualization shows how each event flows through the system. Inevitably, it finds bottlenecks.

They also develop a cost model, where the total cost equals time per activity times resource cost per hour times activity count. In solving problems, companies can balance time versus money. Analysts also put together dashboards to let management monitor a process in real time, to see if new bottlenecks emerge.

There is also a "happy path" that shows the ideal way for the process to unfold. Looking at the gaps between the actual path and the happy path, a new variant is developed, then tested with the visualization software. Testing lets management make sure its new method won't "torpedo your business processes," Wong says.

Beirne says that the process works best in high-volume work areas, like basic insurance claims or policy processing. Actuarial processes could be analyzed, he says, but an actuarial unit might handle, for instance, 40 reviews in a year versus 40,000, claims — meaning an analysis of actuaries might not save as much time or money.

Process mining "takes the analyst to the front line" of a business, even though it is not the usual endeavor for actuaries, Beirne notes. "It is not going to generate coefficients," he says, "but it will help you think through what is happening."

James P. Lynch, FCAS, is chief actuary and director of research for the Insurance Information Institute. He serves on the CAS Board of Directors.

2019 CAS PREDICTIVE ANALYTICS MARKETPLACE PROVIDERS DIRECTORY

Insurers Explore New Frontiers in Claim Management

BY KATEY WALKER, FCAS, MAAA, CSPA

Emerging data sources and advanced analytics provide a universe full of promise for insurers — if they can navigate it effectively.

Advanced analytics has the potential to transform an insurance company's operations. Many insurers have made considerable efforts to leverage analytics to create better segmentation and more accurate premium calculations but are now changing the focus to the other side of the loss ratio: how to identify, manage and mitigate losses. In the recent Willis Towers Watson survey of the U.S. property-casualty industry, insurers emphasized claim management as a high-impact area for analytics applications within the next two years. The investment in claim analytics is not limited to personal lines but includes commercial LOBs such as workers' compensation, commercial auto, general liability, business owners and medical malpractice. Detecting potential fraud ranks among the top use cases for analytics in claims (Figure 1).

Figure 1. How advanced analytics will transform claim management

	Now	Two Years
Evaluation of claims for fraud potential	26%	82%
Claim triage (identify complex claims to triage workflow)	26%	80%
Evaluation of claims for litigation potential	15%	74%
Evaluation of claims for subrogation potential	13%	62%

Reducing insurance fraud

At a cost of more than $30 billion annually, insurance fraud is the second costliest white-collar crime in the U.S., according to the National Insurance Crime Bureau. The Association of Certified Fraud Examiners Inc. notes that internal fraud alone costs the typical organization 5% of annual revenue. Fraud identification is challenging, as claim handling can be complex and involve multiple third parties, introducing opportunities for disparate fraud schemes. Also, the volume and speed of transactions limit a company's ability to monitor and identify potential fraud. Impactful uses of data, including predictive modeling and business intelligence, are essential tools to help adjusters uncover sophisticated and complex fraud schemes.

Data analytics can be used for more than just fraud; applications include appropriate adjuster assignment, subrogation, litigation management, settlement evaluation, loss reserving, fast-track identification, and claim service strategies and prioritization.

Workers' compensation

The Willis Towers Watson industry survey notes that in commercial lines, claim analytics usage is highest in workers' comp (27%) and is expected to grow to 65% in two years as more companies invest in claim triage, severity propensity and fraud identification modeling.

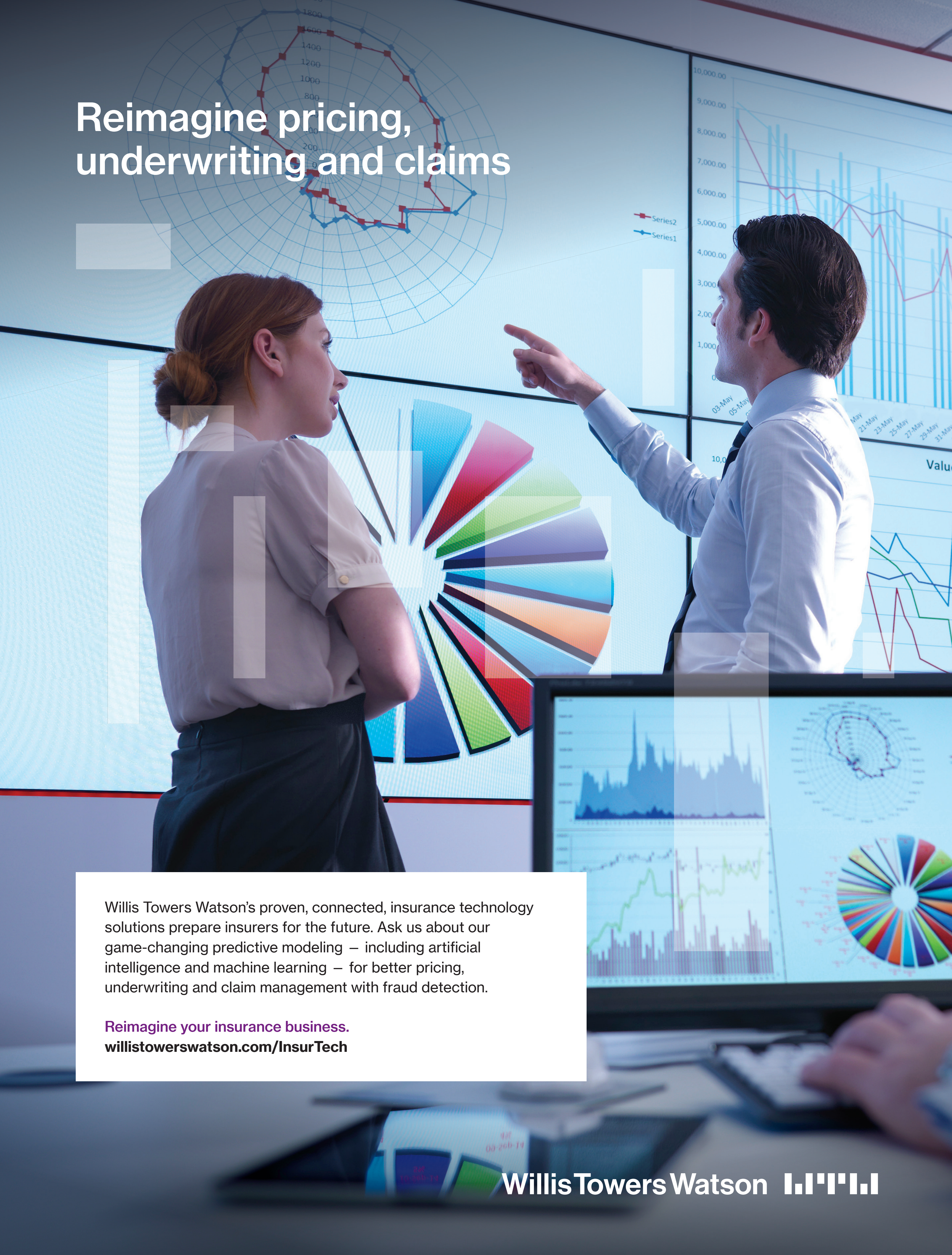
Workers' comp is conducive to claim analytics applications. It has a longer claim duration than other commercial lines, with many claims remaining open years after they were first reported. Additionally, workers' comp claims often have extensive data for the adjuster to consider (e.g., medical reports, interviews, diagnostic/procedure codes, litigation status and injured worker demographics), since they frequently involve a serious injury and may coexist with sensitive employer-employee dynamics. As a result, there is an opportunity for analytics to be used to help adjusters recognize which claims may become complex and how severe those claims are likely to be.

Guiding principles

Each company's journey will be different, but our experience has continually reinforced four guiding principles to advance claim operations:

1. **Data first.** New analytical methods, including AI and machine learning, are justifiably getting a lot of attention, but quality experience data, predictors and customer response information will outperform new methods. Companies can also improve their models by augmenting their data with third-party information.
2. **The endgame is *implementation.*** Once the analytics is done, the product is only valuable when the business can understand, implement and monitor it. Otherwise, the work done is simply a technical modeling exercise.
3. **Stay on top of tech.** Legacy systems and networks make it increasingly difficult to extract the full benefits of big data and advanced analytics. New technologies that enhance analytical capability and system connectivity, including those offered by new insurtech companies, will have a greater role to play.
4. **Build a dedicated fraud management team.** It's important to deploy specific resources to prevent fraud internally and externally.

Katey Walker is a senior director in Willis Towers Watson's Insurance Consulting and Technology business.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The Internet of Things and Insurance: Seizing the Opportunity

BY JOHN BEAL

Insurers long ago mastered the ability to draw insights from large data sets. But the amount of available data is exploding, largely thanks to the Internet of Things (IoT) — or the network of connected devices that exchange information over the internet via embedded sensors.

While other industries are actively capitalizing on these new data sources to drive innovation and enhance customer value, the insurance industry has lagged behind. LexisNexis released results of a study that explored the industry's readiness for the IoT data influx. Findings show that carriers seem to be knocking at the door of the new big data era. It's time to step forward to seize the opportunity at hand.

IoT and the State of the Insurance Industry Study

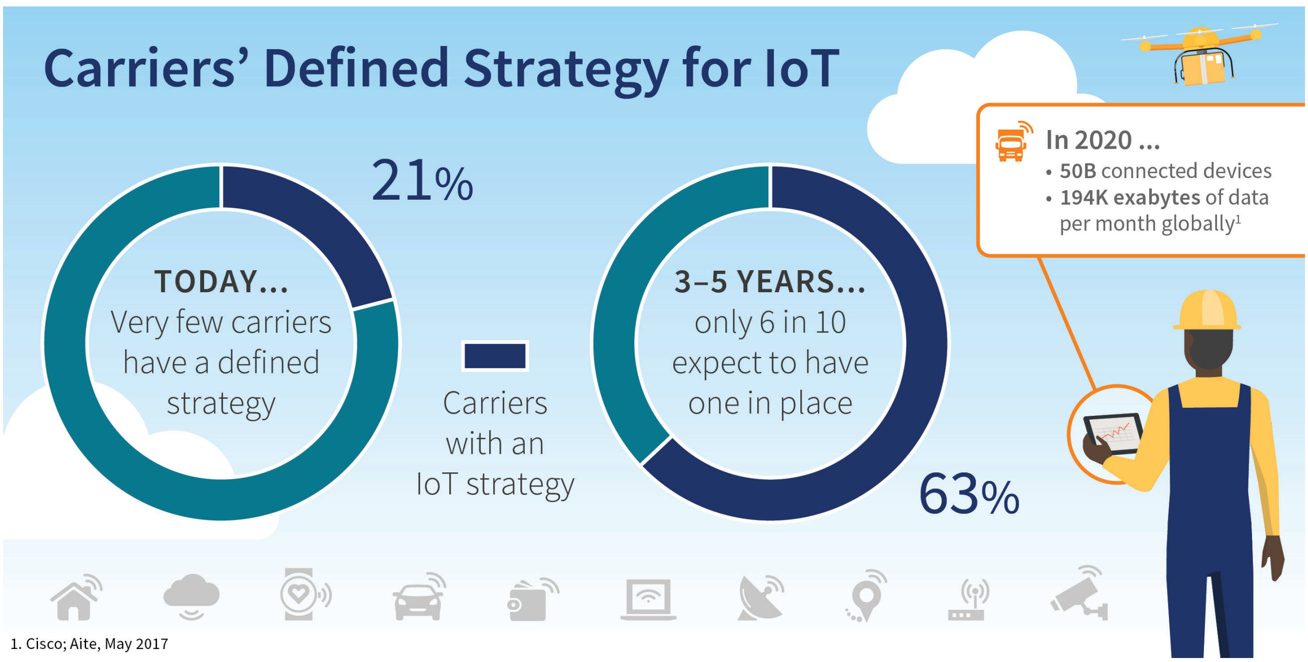
In late 2017, LexisNexis commissioned its "IoT and the State of the Insurance Industry Study" to determine the extent to which carriers are ready to collect, analyze and gain insights from the anticipated massive amounts of IoT data.

The national survey was conducted by an independent research firm and included nearly 500 professionals from the top 100 U.S. carriers from auto, home, life and commercial lines of insurance. Respondents worked in marketing, underwriting, product management and claims. The study unveiled that:

- Few carriers (just two in 10) are currently collecting data from telematics, connected homes, connected properties and wearable devices. Even fewer — just 5% — are analyzing the data they are collecting.
- Similarly, a large majority of carriers (79%) do not have a defined IoT strategy or dedicated IoT resources (93%) in place today, but 70% believe having a strategy is important.
- This changes in the next three to five years, with 63% indicating they have a longer-term strategy, and 36% anticipating their company will add dedicated resources specifically tailored to the IoT.
- While relatively little is being done today, about half of carriers (48%) believe that the IoT will define the industry leaders and the carriers that are collecting and gaining insights from IoT data (50%) will be at a competitive advantage.

The urgency for the insurance industry

Respondents are still treading cautiously when it comes to using IoT data in decision-making, even though about six in 10 indicated they believe that other carriers are doing so. This suggests that many are taking a wait-and-see approach and will likely use existing in-house systems until the return



1. Cisco; Aite, May 2017

on investment from IoT is proven. Despite the apparent desire among carriers to be deliberate, external factors are driving the need for greater urgency.

For one thing, connected devices have the propensity to alter the very nature of risk. Imagine a world where risk can be assessed in near real-time. This could have major implications for policy underwriting, with more data translating to more precise and robust information about a policy holder. It could also impact the way that claims are handled, with opportunities to mitigate or even prevent claims before they occur through more active loss prevention information gleaned from machine sensors.

Imagine a world where risk can be assessed in near real-time. This could have major implications for policy underwriting, with more data translating to more precise and robust information about a policy holder.

Additionally, more data sources are driving new business opportunities for insurers. Increased data about a consumer can promote more relevant and tailored product offerings and personalized customer interactions. In addition, instantaneous data access promotes a shift from reactive to proactive services (think storm alerts), and different types of business models.

Finally, in addition to product development considerations for prioritizing an IoT strategy, carriers also face the risk of being upstaged by competitors from outside of the insurance industry that have direct access to their customers' data.

The need for expertise

Although a portion of the LexisNexis research asked about carriers' strategies related to data collection, the study additionally explored some of the perceived barriers that are prohibiting progress. Approximately four in ten (42%) respondents agreed that it's difficult to foresee how to store, track, analyze, and make sense of the data. Another 43% indicated that security will be a major challenge. With infinitely more structured and unstructured information about policyholders, carriers will need expanded capabilities and technology to cleanse, normalize and synthesize the data. They'll additionally need the expertise to apply machine learning, AI or other methods of predictive modeling that are ideal for processing vast volumes of information quickly and precisely.

Insurers must also have a clearly defined data privacy policy that outlines the scope of data they plan to collect, and how they plan to use it. It is important to begin with an understanding of the business problem to solve, identify the specific types of data that will help solve it and leverage analytics to understand which data is important to keep. In doing so, insurers can minimize the volume of data coming into their organization and mitigate against excessive data collection.

A level playing field

While the study did not reveal any true segmentation by line of business or job function, there was a very small group of respondents that were slightly ahead of the others when it comes to IoT readiness and active planning. LexisNexis labeled this group "Trend Spotters," and they place "very high" importance on having a three- to five-year IoT business strategy. Otherwise, there were no other factors to rank or distinguish between segments. The lack of differentiation underscores the point that the insurance industry does not yet have any clear leaders that are leveraging IoT data for more informed decision-making — which means the door is wide open for any forward-thinking carrier to move ahead.

Conclusion

The unprecedented amounts of data from IoT and its connected devices will put real-time insights in the hands of insurers, creating the potential to fully disrupt the industry with a redefined take on risk. The opportunities are many: more proactive underwriting and claim resolution, personalized product offerings and services, and new business models. With no one too far ahead of the curve, the time is now for all carriers to capture these and other opportunities and help shape the industry's future.

Download the entire "IoT and the State of the Insurance Industry Study" at www.risk.lexisnexis.com/IoTwhitepaper.

John Beal is senior vice president, Analytics, Insurance, LexisNexis Risk Solutions.

CONGRATULATIONS

TO THE RECIPIENTS OF THE CERTIFIED SPECIALIST IN PREDICTIVE ANALYTICS CREDENTIAL

The CAS Institute recently awarded the Certified Specialist in Predictive Analytics (CSPA) credential to the following individuals:

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IFG Companies

Terry Barr, CSPA

Adam C. Blair, ARA, ARM-E, CPCU, CSPA
State Farm Insurance Companies

Morgan Haire Bugbee, FCAS, CSPA
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Commercial Auto Woes

WHAT WILL IT TAKE TO MAKE THE LINE PROFITABLE?

By ANNMARIE GEDDES BARIBEAU

Commercial auto insurance displays all the signs of a troubled line. Unprofitable for eight years with an estimated combined ratio of 112.9% for 2018, the line's residual market premium has grown 75% in recent years. In the marketplace, insurance agents and their clients are facing higher premiums, larger deductibles, lower limits and tighter risk selection.

The line's predicament goes far beyond commonly cited claim trends — especially when other lines like personal auto and workers' compensation are doing fine. A closer look also reveals that some commercial auto insurers are quite profitable.

For the entire line to become healthy, the oft-neglected commercial auto line begs for investment in risk mitigation, data, technology and predictive modeling. Rethinking the sale of commercial auto as a loss leader in bundled business insurance packages might help as well.

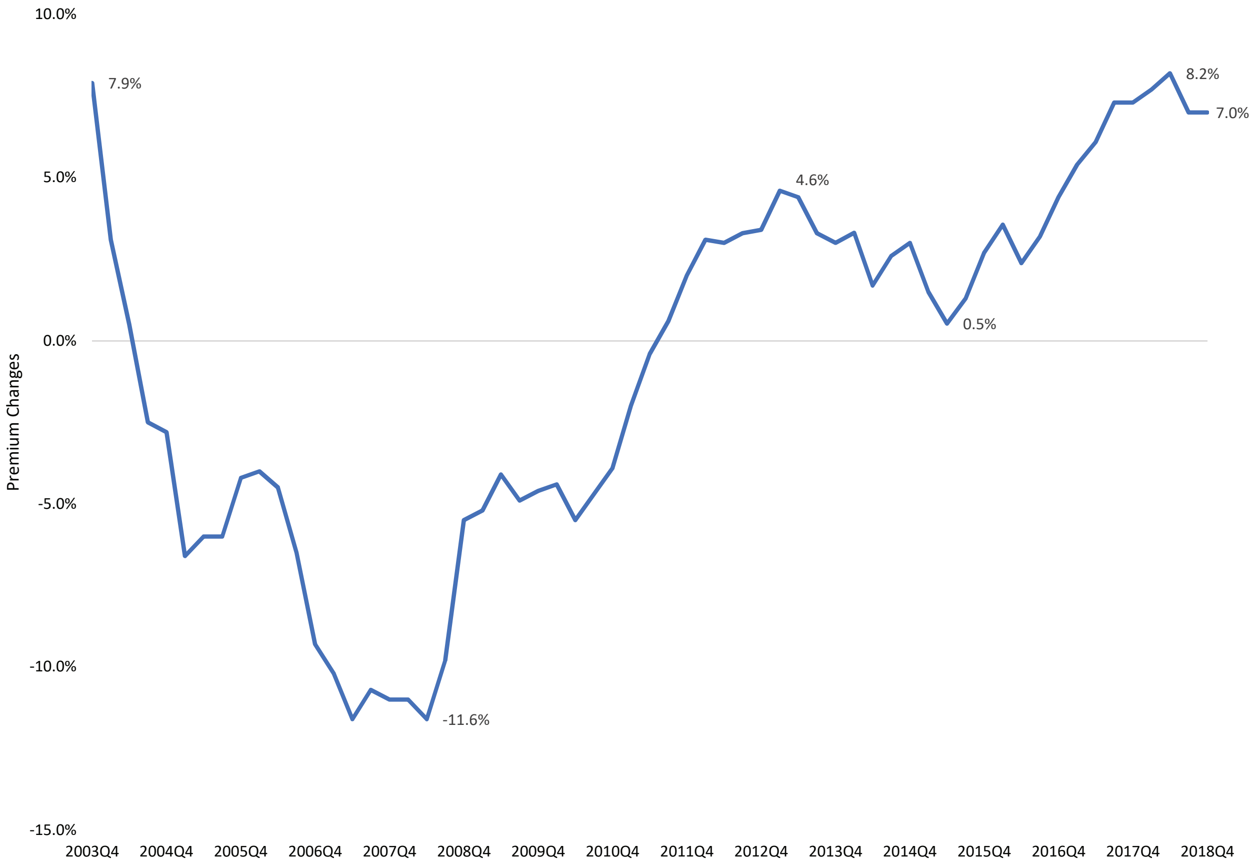
An Unhealthy Market

The commercial auto line is, in a word, miserable. Coverage is more expensive and harder to get. Residual market premium grew 75% from $100 million in 2014 to $174 million in 2017, with the pace increasing to $164 million for the first three quarters of 2018, according to the latest Automobile Insurance Plans Service Office data obtained by *Actuarial Review* April 2019.

According to "Commercial Property/Casualty Market Index," 45% of brokers and agents expressed growing demand for commercial auto coverage from the third to fourth quarter 2018. This was likely due to less underwriting capacity, according to the quarterly report, which was published in March 2019 by the Council of Insurance Agents and Brokers (CIAB).

Agents and brokers characterize underwriting as "much more restrictive," in the report. Insurers are also pushing for higher deductibles and premiums, which is making the line harder to place and price across the board. After peaking at an 8.2% average premium increase in second quarter 2018, commercial auto insurers premium rose another 7% in each of the third and fourth quarters, the report states. This is after more than eight years of consecutive quarterly increases.

Chart 1. Average Commercial Auto Premium Changes, 2003-2018



Developed by Actuarial Review *with data provided by the Council of Insurance Agents and Brokers*

Insurers are asking more underwriting questions, and some are charging prices high enough to discourage buyers, says Robert Klinger, president of Klinger Insurance Group. "Insurance companies are pulling out of the market altogether," he adds.

One managing general agent, Energi Inc., is transitioning from offering traditional guaranteed cost insurance products to providing captive insurance programs through eCaptiv (an affiliated entity of Energi) for commercial auto and other business insurance lines. This allows members to have "skin in the game" and the firm to provide loss prevention training based on industry best practice standards, technology-based risk management services and products, such as telematics data capabilities and best-in-class claims management, says Energi's president Tim Kolojay, ACAS.

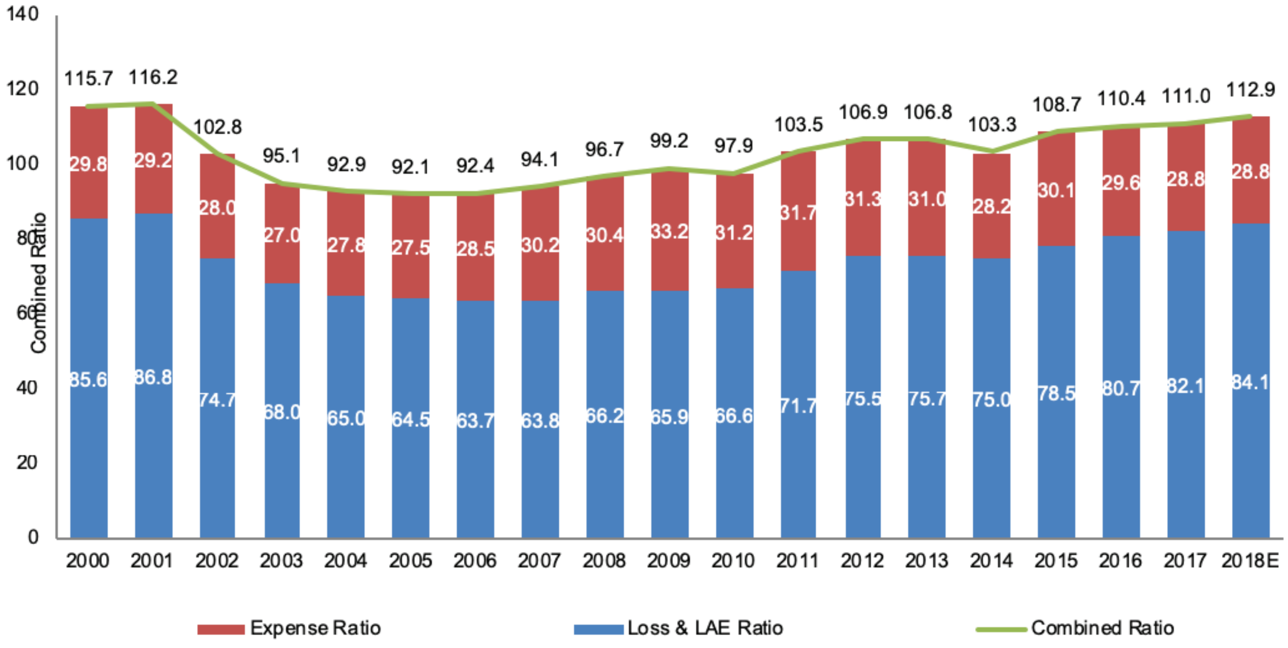
According to the CIAB data, insurers started taking commercial auto premium increases in excess of inflation only in the last few quarters and even the latest average increases are less than 10%, offers Ken Williams, FCAS, staff actuary for the Casualty Actuarial Society (CAS). "Compare that to the price increases in the late 1990s and early 2000s, where CIAB data shows that commercial auto average premiums increased in excess of 10% for 20 consecutive quarters," he observes.

The Rearview Mirror

A look at the rearview mirror reveals commercial auto insurer financials started tanking during the years 2011 to 2012. Commercial auto average insurance premiums, which had been declining for six years, began pulling back in first quarter of 2011, according to the CIAB report. A year later in the first quarter 2012, average premiums rose +3.15%.

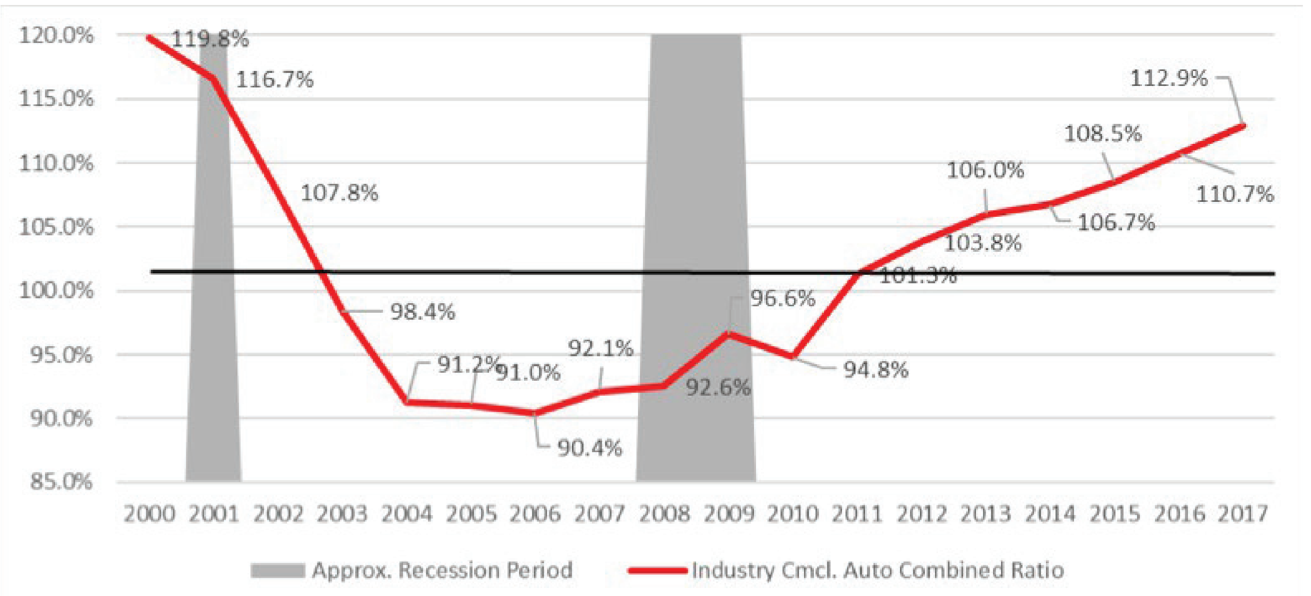
Correspondingly, AM Best shows that the line's combined ratio became unprofitable in calendar year 2011, according to its report "U.S. Commercial Auto Results Continue to Deteriorate" released in March. In 2011, the profitability measure climbed from a respectable 97.9% in 2010 to 103.5% the next year. (See Chart 2.)

Chart 2. U.S. Commercial Auto — Net Underwriting Performance



Courtesy of AM Best.

Chart 3. Commercial Auto Direct Combined Ratio



Courtesy of Assured Research, LLC

Since then, AM Best reports that the calendar year combined ratio has gradually trended upwards to an estimated 112.9% in 2018. From 2008 to estimated 2018 figures, the loss ratio rose about 20% from 66.2% in 2008 to an estimated 84.1% in 2018. Thankfully, the expense ratio and loss adjustment expenses (LAE) remain stable at 28%-30% and 20%, respectively.

Other critical trend changes took place consecutively in 2012, observes William Wilt, president of Assured Research, LLC. The direct combined ratio, which does not include reinsurance, jumped 6.5 points from 94.8% in 2011 to 101.3% in 2012. (See Chart 3.) At the same time, reserve development was adversely deteriorating. Reserves dropped from a reasonable +1.9% favorable development in 2011 to -3.2% adverse development in 2012, bottoming at -8.6% in 2016. (See Chart 4.)

Further, the industry missed the economic turn from 2013 to 2016 when personal VMT (vehicle miles traveled) was exploding, Wilt observes. (See Chart 5.) "The economy was expanding and that was not captured in the rating algorithms," he says. There were also increases in transported tonnage, indicating more commercial vehicles on the road.

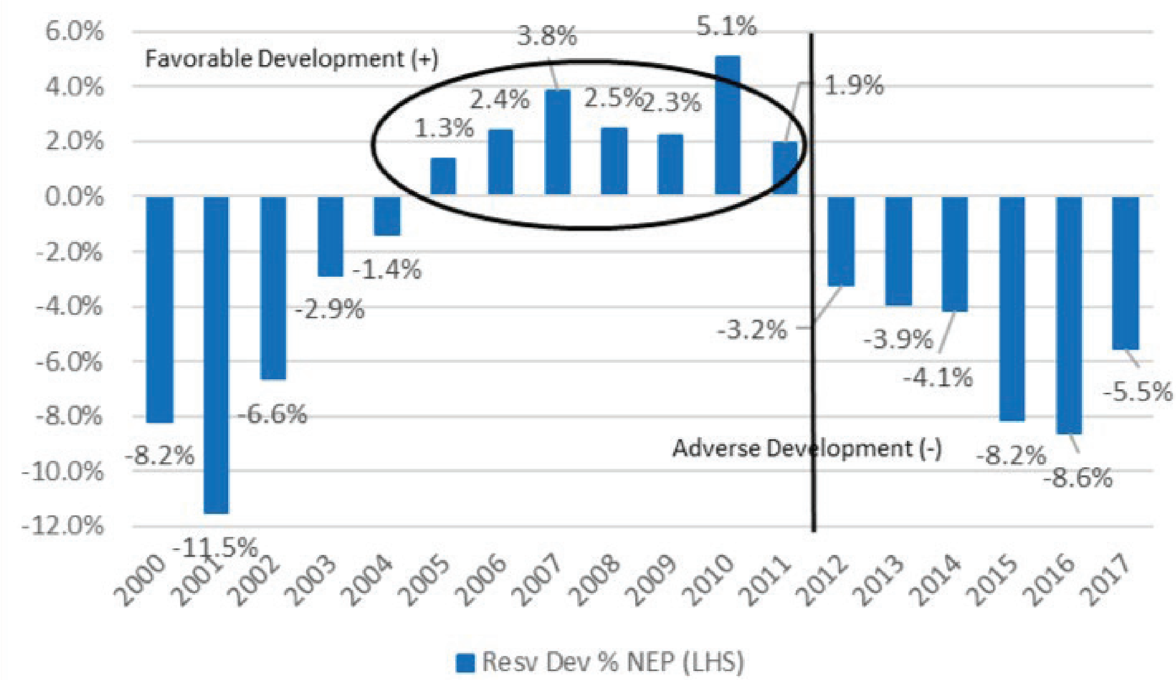
While it is understood that commercial auto is a medium-tail cyclical line, the most recent combined ratio upturn is different than the previous one during the late 1990s and early 2000s. Data provided by Assured Research shows the direct combined ratio of 119.8% (Chart 3) in 2000 while AM Best shows an after reinsurance combined ratio of 115.7% (Chart 2).

Both the AM Best and Assured Research charts not only show that the combined ratio from the last crisis was higher than the current crisis so far, but that results rapidly improved several percentage points in 2003. There is also a key difference with the line's current crisis compared to the last one. Unlike the last crisis when claim trends were negatively impacting most commercial lines, commercial auto stands alone. (See Chart 6.)

Losses and premiums are both rising, which is not allowing the industry to catch up, explains Brian P. Sullivan, editor of the weekly newsletter *Auto Insurance Report*. He notes that paid losses increased10% in 2018, raising losses to a record-breaking $22.96 billion in 2018. In 2016 paid losses rose 2.2% to $19.12 billion.

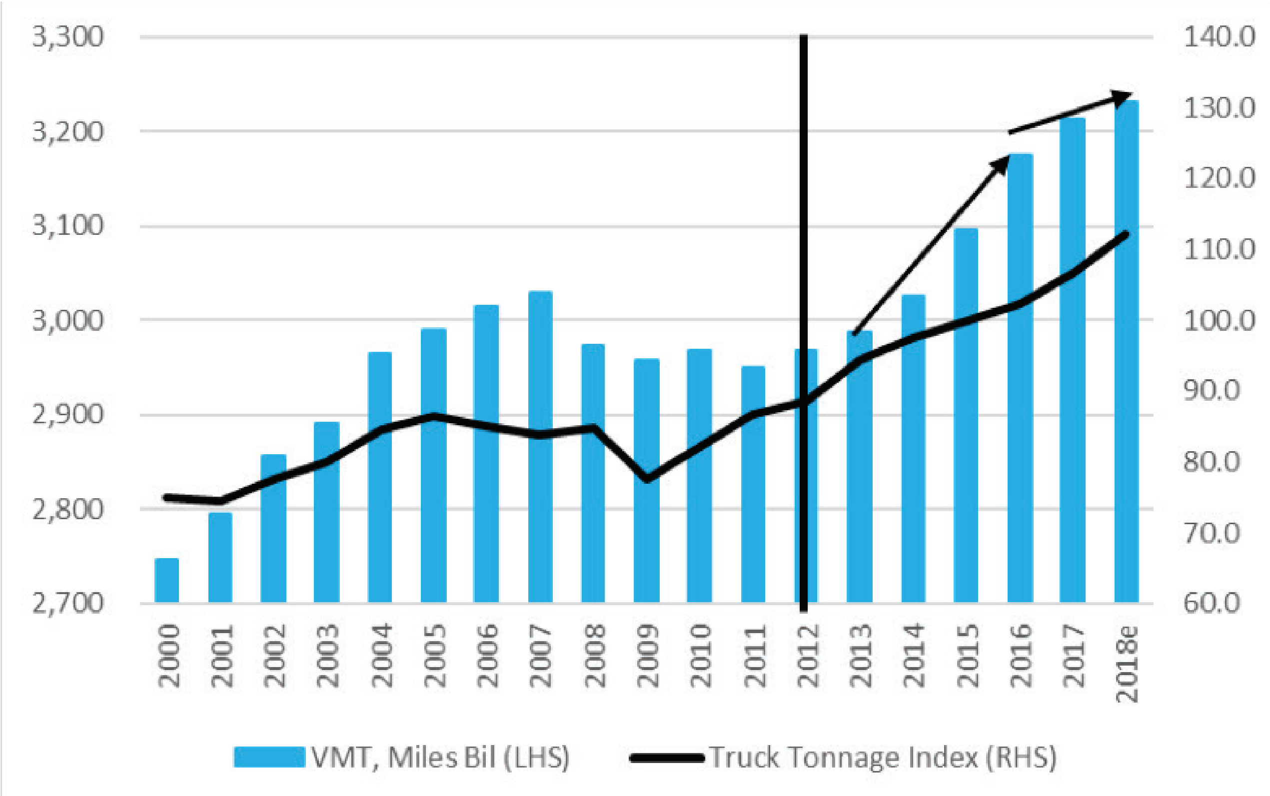
The reasons behind the industry paying out another $3 billion in three years are difficult to quantify. Claims frequency, which presumably rises with exposure, does not appear to be increasing significantly. "After reviewing rate filings in several states, claim frequency for commercial auto specifically appears to be relatively flat," Williams says.

Chart 4. Commercial Auto Reserve Development



Courtesy of Assured Research, LLC

Chart 5. Personal Vehicle Miles Traveled (VMT) and Truck Tonnage



Courtesy of Assured Research, LLC

"Frequency is not rising despite increasing vehicle miles driven," explains Roosevelt Mosley, FCAS, a principal for Pinnacle Actuarial Resources. "Part of the reason is that safety features in newer vehicles are working," he explains.

Severity in commercial auto, Williams observes, is increasing faster than the inflation rate, rising 7% to 9% in the most recent years. But once again, quantifying the contributors to severity remains elusive.

Some experts also point to growing investment in litigation and large settlements particularly for trucking accidents. Overall, litigation costs are not showing up as higher loss adjustment expenses (LAE), which have been neutral, Williams says. There is evidence that distracted driving, caused by cell phone use and feature-laden dashboards, affects personal auto frequency and severity. Since personal auto experience has limited application for commercial auto, its impact is difficult to quantify.

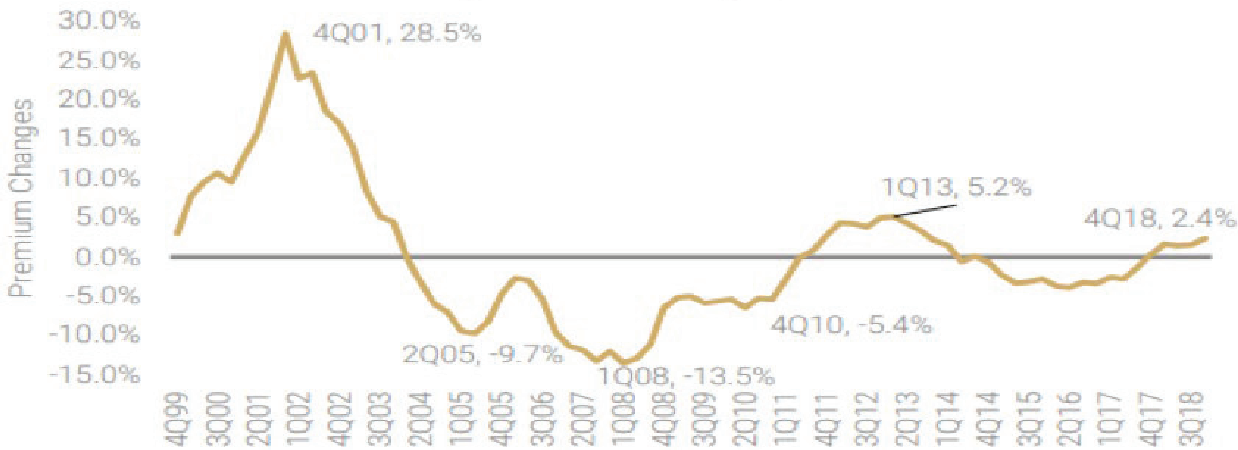
One severity contributor is the growing cost of vehicle repairs, especially those with safety technologies. Certainly, it is much more expensive to fix windows and mirrors with imbedded safety technologies than those without. But again, data on repair costs derive from personal vehicles, which are less expensive to fix than long-haul trucks.

For personal vehicles overall, the average repairable vehicle appraisal amount rose 11% since calendar year 2015 and 26% since calendar year 2010, according to data from CCC Information Services, Inc. The appraisal amount rose by 4% in calendar year 2018 to $3,053 after a 2.5% increase in CY 2017, according to the organization's report, "2019 Crash Course," released in March.

Limited Misery

Despite claim trends, some commercial auto carriers are showing nice profitability. "If you look at the disparity of commercial auto across the industry, you can see who is doing a better job than others. The difference between the extremes is wide," Mosley observes. The median combined ratio difference, according to AM Best data, is as wide as 60 percentage points.

Chart 6. Average Premium Changes, 1999-2018



Courtesy of the Council of Insurance Agents and Brokers

Some commercial auto insurers are "growing quickly and profiting handsomely at the expense of poor-performing competitors," according to the article, "Trouble in Big States Continue to Drag Down Commercial Auto" published by *Auto Insurance Report* in January. The article also points out that larger states, with the exception of Ohio, are showing poor returns in commercial auto.

Progressive Insurance, the nation's largest commercial auto carrier, has a favorable loss ratio of 59.5% for 2018, according to the *Auto Insurance Report*'s April 22 issue. Progressive grew a remarkable 38.6% in premium from 2017 to 2018. Fifth-ranked Berkshire Hathaway posted a 61.4% loss ratio and grew 27.8%.

Other carriers did not fare so well. Second-ranked Travelers Insurance saw its loss ratio spike to 74.5% but sustained market share. Third-ranked Liberty Mutual Group experienced a 79.3% loss ratio, which is better than its 93.5% loss ratio in 2017. Zurich Insurance Group, which is the seventh largest commercial auto insurer, posted a loss ratio of 79.8%, according to the publication.

"Claims costs go up and down all the time," writes Sullivan in an email. "The problem is that so much of the business is baked into other parts of the coverage, rather than standing alone." As a result, he continues, "Insurers have not managed the line as closely and are willing to use it as a loss leader. What has surprised everyone is how long insurers were willing to let that happen. I thought, and most insurers told me, that they thought it would improve long ago."

Williams says that some large writers who offer other commercial coverages and cover larger trucks showed poor commercial auto results. These include Zurich, Liberty, AIG and Hartford, companies AM best listed in the top 15 largest writers in 2017. The AM Best report states the fourth quartile of commercial line insurers are showing combined ratios around 138%.

However, the top quartile has an excellent median combined ratio of 77.7%. The two best performers of the 15 largest commercial auto insurers are Progressive, which writes vehicles fleets of one or two, and Berkshire Hathaway. Both carriers just offer vehicle coverage, so the product is sold unbundled. And not surprisingly, Progressive, is considered a leader in commercial auto predictive modeling for rating and pricing.

21st Century Rating

Another contributor to the disparity among insurers is the vast differences in how commercial auto insurers rate coverage. Mosley explains that some insurers use straight Insurance Services Office (ISO) information with some ability for schedule rating, some use ISO with some deviations and others have completely broken away from ISO.

While a few insurers are incorporating more granular rating plans, it remains common to use broad risk classifications such as long versus short haul, vehicle weight and class. "Once we get more detailed information about the exposure you can understand the risk better," Mosley says, which should lead to better class plans. “The ultimate application,” he explains, “is to develop new rating factors and relativities, and/or a more refined rating and underwriting approach based more on science than intuition.”

A few carriers are paving the way to 21st century rating by investing in technology and data collection — and closely guarding their secret sauce. Much of the commercial auto industry, however, is not there yet. Like workers’ compensation in the early 1990s, the overall poor performance is motivating some of the industry to get serious about risk management. Current data collection is primarily safety-focused as evidenced by the multiple vendors offering products that include cameras and sensors for that purpose.

Even though insurers understand that “who the driver is matters,” they are slow to adapt to technology in general, Mosley says. That might sound strange when telematics technology is successful for identifying and correcting unsafe driver behavior. The dongle devices are expensive, Mosley explains, especially when installing them in large fleets while insurers are “already dealing with profitability issues related to expenses.” Phone apps can also be effective, but it depends on the use.

For example, technology that can track vehicles in real time, such as the navigation service OnStar, have existed for years. “Insurance companies are not ready to consume, analyze and act on data in real-time yet,” he explains, which would provide new insights on a more frequent basis.

Commercial auto insurers are finding useful sources of outside data. Since a vehicle’s condition is associated with safety, commercial insurers are using CarFax data to learn miles driven, repair records and other vehicle history information, says Dan Hill, national sales director for CarFax’s Banking and Insurance Group. The data also helps to reveal fraud, such as previously flooded cars on the market and misrepresentation of the number of miles driven, Hill says. CarFax is also collaborating with Pinnacle on a free contributory data bank for personal and commercial insurers that will allow insurers to compare benchmarks with other insurers. For commercial auto, “the data is the story,” he observes.

Conclusion

Despite several years of premium increases, the commercial auto insurance line continues to grow more unprofitable. A combination of competitive pricing, adverse reserve development and missing major economic growth made the line vulnerable when vehicle repairs and other costs began increasing losses. As a result, the line is still playing catch up. But there is more to the line than it appears. A few commercial auto carriers are managing to be quite profitable.

Future success depends on everything from how the product is sold to the mix of covered vehicles and investment in risk mitigation, data collection and predictive analytics.

The condition of commercial auto should be the wakeup call. An industry commitment to invest in risk prevention and research to understand the line’s unique macro and micro challenges are two places to start.

Annmarie Geddes Baribeau has been covering insurance and actuarial topics for nearly 30 years. Her blog can be found at www.insurancecommunicators.com.

Less Drudgery; More Doughnuts: How Actuaries can Benefit from Disruption

BY JIM LYNCH

On his PowerPoint presentation, Stefan Peterson, ACAS, pulls up a photo of an auto assembly plant. Thick, yellow coils of machine arms arch into the skeleton of a car. They lift panels. They twist bolts. They reach, they bend, they finish their task and then repose, as they wait for the next car, the same way the thousands of workers they replaced used to do it.

Click!

Peterson's next slide is a modern office with dozens of people at desks.

He asks: How many of these employees will be replaced by artificial intelligence?

And what about actuaries?

Peterson and author Rob Galbraith (*The End of Insurance as We Know It: How Millennials, Insurtech, and Venture Capital Will Disrupt the Ecosystem*) gave the bad news/good news to actuaries at the CAS Ratemaking, Product and Modeling (RPM) Seminar in Boston in March. Their session was titled, "The Changing Role of the Actuary in the Face of Disruption."

The bad news: There is a 21% probability of actuarial jobs being automated, and parts of it can be automated right now.

The good news: The parts that can be automated now are probably things you don't like to do anyway, like data preparation.

There is a rule of thumb that data prep is 80% of analysis, and most actuaries would agree the thumb is right on this one. And it feels like you don't have to be much smarter than a thumb to do the job.

Says author Galbraith, "That really isn't using your skills and talents." The task is ripe for automation.

Peterson noted that actuarial work has three components:

- Ideation and hypothesis: developing new products and marketing strategies.
- Computation and distillation: creating models and reporting financial results — in Peterson's words, "Doing all the math."
- Decision making: As Peterson puts it, "We've got all these numbers. Now what are we going to do?"

The first of these tasks and the last have high levels of cognitive engagement. (You *need to think* — or, more accurately, because you're an actuary, you *get to think*.) The middle task takes up the time, though, and is ripe for automation.

Peterson spelled out a dreamworld where computers perform a quantitative analysis overnight, write a report, visualize the results and answer your questions about said report — all before you've finished your morning doughnut.

The technology to do it exists today, Peterson says.

You start with robotic process automation. In it, the computer takes over the grinding, repetitive tasks that can be explained with a set of rules — like pulling data from several sources, creating pivot tables, copying the tables into templates, then doing analysis. The computer mimics human actions, "like a macro on steroids."

Computers can do it faster. They make fewer errors.

The technology does have limits, however.

"It is not walking, talking robots," Peterson says. "It is not *Transformers*. Bumblebee is not going to pop out and do all your actuarial work for you."

The next step is cognitive automation. This is the brainier complement of robotic process automation. It is the quest to find patterns in data, text, voice or pictures and acts a bit like the mirror image of how actuaries work.

Actuaries find patterns in data and isolate variables, then the model calculates what parameters to assign to the variables.

"In the cognitive world," Peterson says, "you tell [the model] what the answer is, and the model tells you what the predictors are."

So, in Peterson's dreamworld, robotic process automation grinds along, creating a dataset, and cognitive automation does the analysis. The next two technologies create the report and answer questions about said report.

Those technologies are natural language processing and natural language generation. The computer analysis is a bag full of numbers, and numbers without narrative is nonsense. Natural language processing ingests all that information and turns it into something that, quite literally, only a computer can understand. That is where natural language generation takes over. What the natural language processing has created, natural language generation turns into a polished report.

This is all possible with existing

technology, and it will happen, Peterson predicts.

"Is it going to happen overnight?" he says. "No."

What is holding things up? Galbraith notes that it can take a long time to realize the potential a new technology holds. He sees it with his own family. They own an Alexa. Galbraith himself might ask it a simple question or request a song. His nine-year-old has conversations. She asks for the weather forecast for 10:15 a.m. (recess time). She asks to hear a joke. She sees possibilities where her dad did not.

While waiting for Peterson's bright new day, actuaries can still squeeze a lot of drudgery from their work.

Peterson describes how actuaries can break down their work flow into small pieces ("pixelation" is his term), then see how to improve.

Not all improvements require automation. But most analysis begins with data collection, and robotic process automation can help with that. Cognitive automation can help build models. Natural language processing and generation can simplify report writing.

He recommends establishing a team to focus on the work. "It's tough to do on the side."

The team should think big (getting familiar with the technologies); start small (pick a specific project) and act fast. If the project doesn't work, don't be afraid to start again.

"There are a lot of cool things happening," he says. "And we [actuaries] are going to be part of it."

James P. Lynch, FCAS, is chief actuary and director of research for the Insurance Information Institute. He serves on the CAS Board of Directors.

A View from Silicon Valley: How To Make Good on the Insurtech Promise BY JIM LYNCH

As the digital future moves from the threat of disruption to the promise of transformation, insurers and their actuaries are looking more closely at how they can find the most favorable partners to jump-start their innovations in this field.

At the CAS Ratemaking, Product and Modeling (RPM) seminar in Boston last March, three entrepreneurs were present to describe how insurers can build a bridge to Silicon Valley:

- Piyush Singh of Terrene Labs, a firm that specializes in the process of gleaning information about the risk of a small business insurance policy from basic policyholder inputs (e.g., name/address/phone number/website address).
- Hubert Byron III, director of sales at Omniscience, whose software automates the underwriting process.
- Geoffrey Werner, FCAS, of Octo Advisory, a telematics provider.

They talked a little about themselves and their products and, in a question-and-answer format, they described how insurers can fold the promise of digital technology into the insurance value chain. The session gave insights into how insurtechs operate and tips on how insurers can turn the promise of big data into successful insurance products.

The session was coordinated by Veronique Grenon, FCAS, an insurtech research lead with Guy Carpenter.

Two panelists, Singh and Werner, had worked at property-casualty insurers before.

Singh worked in information technology before moving to Terrene Labs (the data provider) and joked that he left insurance because he "did not want to do one more iteration of the deployment of a policy processing system." He also noted that he felt that corporate jobs were becoming "90% noise/10% strategy." His current job is 90/10 the other way.

Werner worked at two major insurers and a consulting firm before ending up at Octo Advisory (the telematics provider). He also coauthored "Basic Ratemaking," the text at the heart of the CAS Exam 5 syllabus. Inside the property-casualty world, Werner liked implementing new processes. "I have always liked innovation," he says. "I could do that day in and day out." So for him the shift to insurtech felt natural.

Byron followed a non-insurance path. He went to Omniscience (the underwriting toolkit maker) from management consulting, where he had come to believe that applications using artificial intelligence and machine learning would be growing fast. He found those topics interesting.

The floor was open for attendees to ask panelists questions. The following are a few of these questions and answers.

Q: How do you know if an insurtech is "for real" and whether the company can deliver on its promise?

Singh cautions skepticism for any firm that leans hard on buzzwords. Carriers can be "sucked into" believing empty claims and promotional press releases. He suggests that the company look at what it needs to create a strategic competitive advantage and see if the product helps achieve those business needs. Also, the product the company seeks should be sustainable.

Werner says some vendors have built models but lack the data to drive it. Look for proof, he suggests. "I'd want to make sure they aren't talking about expectations — [that] they are talking about actuals."

Q: Insurtechs don't employ many people with insurance backgrounds. Would hiring more help them create better, faster products?

Werner says his actuarial/insurance background gives him credibility. "When I walk into an insurance company, I know what you need." But he says insurtechs also need people with "a mindset of innovation and change." It would be best to have a mix of expertise and entrepreneurial drive.

One insurtech that Singh had heard of did not know what an endorsement was. It is not essential to know all the finer nuances of the industry, he adds, "[but] we truly need to understand the business and where the opportunities lie in terms of potential value proposition for the carriers."

Q: How should companies handle the challenge of manipulating and storing data?

All of the panelists counsel against completely integrating data from all sources. Singh suggests keeping the core transaction in one system (a policy administration system, for example) and putting risk evaluation information (which would drive underwriting and actuarial departments) into another system. It is simpler to administer and costs a lot less, he says.

Byron recommends that companies be agile in handling data storage, creating multiple databases for third-party data and then joining them to their internal data.

Werner notes that the huge volume of telematics data requires special treatment to get the most value out of it. It is straightforward, he says, to use telematics data to supplement or replace current rating variables, correlating the number of times a driver slams on the brakes to that driver's chance of being in an accident. Doing so loses value, though, by not looking for all the variables that can cause accidents to happen at the same time.

He also cautions that different companies arrange their data differently, and without a careful system to coordinate all that incoming information, "you are going to have a mess on your hands."

Q: Why doesn't implementation happen more rapidly?

Byron notes that larger companies usually want to build their own systems, and it can take time to learn what needs to be done before the company can actually do it. Sometimes a model can be built with limited data, but it is a challenge scaling it up.

Werner says companies wonder whether regulators will accept an innovation. "You are talking about lots of battles in uncharted land." Sometimes the concern is warranted, but "sometimes we are not giving regulators enough credit," he says.

Q: What qualities should actuaries have to help transform the industry?

Werner thinks that, as they face the future, actuaries need to be cognizant that others (read: data scientists) are doing work that used to be exclusive to actuaries.

Actuaries remain valuable because of their deep knowledge of the insurance business, and they can build on that strength.

"We need to be keeping abreast of things," he says. "If we continue to do that, we will continue to be the most valuable talent in the insurance industry." ●

IN MY OPINION BY GROVER EDIE

What to Do When Your Results Are Challenged

I cannot count the times I have done an analysis, only to have someone counter with, "That can't be right. I have a different number." It's frustrating but common. What's an actuary to do? I can't just sit there and let the other side destroy my work and my credibility and let them go on their merry way. I am paid to present facts and objective analysis that enable management to make informed decisions. Sticking with outdated and incorrect perceptions leads to inaccurate decisions.

Letting others perpetuate erroneous thoughts is not good for your credibility and career, let alone your ego; however, that is not the worst thing. Failure to express the results of your analysis means you aren't earning your pay and might even be violating one or more of the Actuarial Standards of Practice.

But insisting that my result is correct is, in a sense, trying to prove that their answer is wrong — a stance that could be politically disastrous.

While the other party is saying, "Your answer can't be right. I have a different one," I am essentially saying the same thing: "Your answer can't be right. I have a different one." Outright arguing, "I am right, and you are wrong," only causes the other party to defend their position more vigorously and escalates the argument. Either way, I need to turn the outcome into a win-win situation, especially if the other opinionated person is my client, my boss or someone above either of them.

If the measure has been analyzed previously, I try to get that analysis so I can understand what has been reported in the past. Often, there is a preconceived idea, or "rule of thumb," of which I am not aware. Just as it is defined, a rule of thumb is "a rough and practical approach, based on experience, rather than a scientific or precise one based on theory."* In many such cases, I first learn of these preconceived notions when presenting my results. In those instances, as you are well aware, it's important to always control yourself. Never attack the decision maker, their ally or the rule of thumb itself. Never speak insults or even insinuate any. You could win the battle (the argument) and lose the war (your job).

For this column, I reflected on some of those instances, some of the reasons for the differences and some of the cases where I was able to bridge the gap.

Check Your Ego at the Door

First, I needed to realize that it wasn't about me; it was about the other parties' preconceived notions and their credibility. There was a logical reason for their preconceived answers, and they would defend them because they were protecting their own credibility. They wanted to save face. So I needed to find a way of allowing them to do that while still presenting the facts.

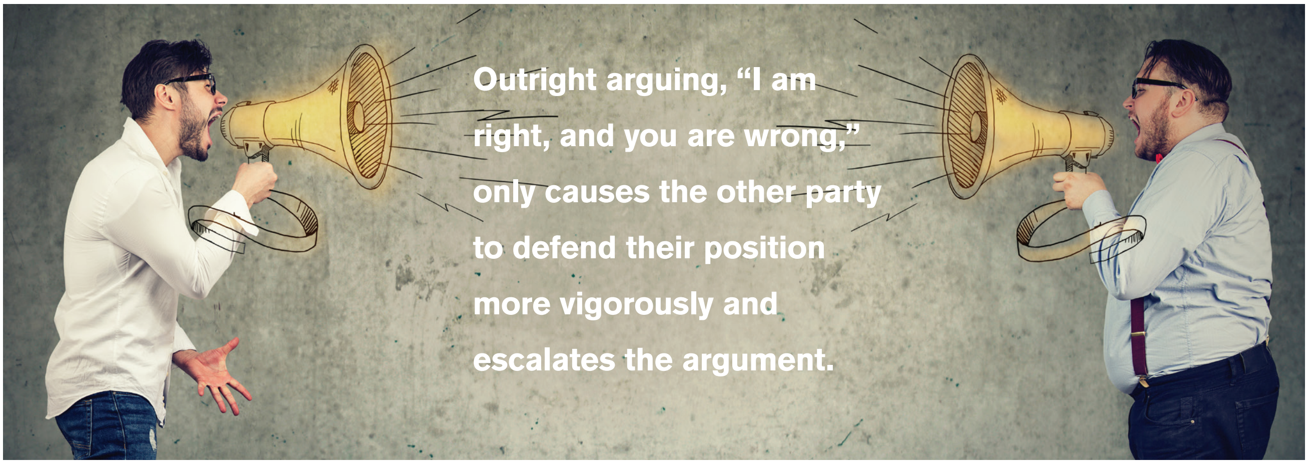
Too often, the other parties have used a rule of thumb or other preconceived notion for years, never having the occasion to update or validate the metric. My presentation was often the first time that their position was challenged. If my results confirmed their conventional wisdom, I could hear, "See, we didn't need some smarty pants to spend a lot of time and money just to say I am right!" If the results contradicted the preconceived value, I might hear, "Well, the way you explained the analysis makes sense, but the answer is still wrong."

Understand Their View

On a few occasions, I was able to determine the circumstances and assumptions required to make the other parties' answer correct; then the discussion could center around which of the assumptions might need to be changed or how the data had changed. I recall a meeting in which I reported a cancellation rate that was significantly higher than the marketing estimate. Marketing excluded flat cancellations due to the company's rule that they would flat cancel within 30 days of the sale date in order to provide an easier sell to the customer. Including the flat cancellations, my results were higher. Once the flat canceled contracts were removed, the difference disappeared.

In other instances, I had to tread carefully because the other parties had not kept up with the underlying activities that drove their measures, and their

* American Heritage® Dictionary of the English Language, Fifth Edition.



preconceived answer was way off the mark.

What's in a Name?

One of the biggest sources for differences is in the definitions of the metrics themselves. This often happens when metrics are presented by different departments. For example, marketing might define "cancellation rate" as simply the number of policies canceled divided by policies in force; underwriting might omit policies canceled and rewritten; finance might estimate it using an accounting code for remitted commissions; and the actuary might use an entirely different calculation.

Such differences in definitions can apply to just about any metric — even accounting metrics are not defined exactly the same way from company to company. Be careful of doing an analysis the "right way" (code for "how it was done at my last company") without finding out how the metric is defined in this situation. Definitions of the terms also can have varying meanings. Frankly, I have been shocked by some of the definitions I have come across.

The Straight Story

It's imperative that you start the analysis and the discussion with the assumption that both measurements, yours and the other parties', are correct. Conditions may have changed that make their measurements no longer current, in which case you should show how the driving metric has changed the outcomes. Tie the past (their number) with the present (your number) through an analysis of what has changed.

Under what conditions is the rule of thumb a reasonable estimate? It is best to find out what others think the outcome will be *before* the analysis. I ask this question not because I want to "work to their answer" but to have an idea of what preconceived values they may be bringing to the meeting. If it is a report, which we often provide as consultants in lieu of a meeting, we need to be able to communicate what we found in light of what was anticipated.

Also, before starting an analysis, I try to find out if there is a preconceived opinion about the metric, how long that metric has been around, and what activities, demographic shifts, marketing and other factors have occurred since the last analysis that might alter the measure.

During the analysis, I look for alternate means of measuring what I am measuring, for example, net or gross, with or without self-insured retention, by customer or by vehicle, direct response or something else. I try to figure out under what circumstances the answer that the client expects (the one I learned of before the analysis) could be correct. Establishing those conditions helps me bridge any difference between my results and the client's. Then, I look for agreement in the metrics.

If I can, I like to meet with the people who gave me the pre-analysis value and go over my findings with them before a meeting with others. This enables them to see my work as well as point out potential errors or erroneous assumptions or definitions before presenting my analysis to a wider audience. This sort of meeting has saved me from embarrassment on numerous occasions.

Conclusion

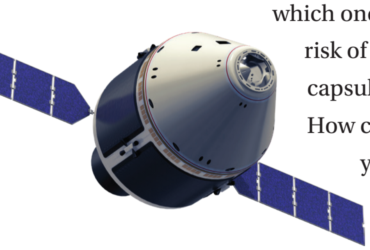
Presenting new results doesn't always go smoothly. But understanding and dealing with a recipient's expectations and preconceptions can eliminate a lot of unnecessary bumps in the road and, hopefully, everyone can win.

IT'S A PUZZLEMENT BY JON EVANS

Manned Spaceflight Safety

At the time of this writing, the United States has launched and landed four types of manned spacecraft. There have been three types of capsules (Mercury, Gemini and Apollo) and one orbiter-glider (Space Shuttle).

Based on the statistical analysis of the American spacecraft experience, which one is safer in terms of risk of a fatal accident — capsules or orbiter-gliders? How confident are you of your answer? If you are a truly wild Bayesian at heart, you may try to include experience from the Russian capsules (Vostok, Voskhod and Soyuz) and the Chinese capsule (Shenzhou).



Combination Lock

Following is a very thorough solution submitted by Bob Conger.

Based on the +/-2 inexactness of the lock mechanics stated in the problem, it will be sufficient to try combinations consisting only of 0, 5, 10, 15, 20, 25, 30 and 35, since all other values from 0 to 39 are within +/-2 of one of these eight values.

Assuming that two or even three of the values in the combination could be (or "round to") identical to one another, the potential number of combinations to try is 8^3, or 512. The mechanics of the lock possibly do not permit repeating the same exact or approximate number in a row, in which case the number of combinations to try is 8x7x7, or 392.

However, we can effectively test eight (or seven) combinations in one fell swoop dialing the first two numbers, say 25-30, in the usual way and then turning clockwise to 25, testing (gently) to see if the lock opens; continuing clockwise to 20, testing to see if the lock opens; continuing clockwise to 15, testing to see if the lock opens; and so on until reaching 30 and testing to see if the lock opens. By following this procedure for all possible first-digit, second-digit possibilities, the time required is only slightly greater than trying 64 (or 56) full combinations.

To gain a bit more time efficiency (by trying the quicker combinations first), I would start by trying all the combinations where the second number of the combination is equal to the first number of the combination + 5, mod 40. So, if the first number is 5, the second number is 10. If the first number is 35, the second number is 0. These combinations require turning the dial only 9/8 of a spin to get from the first number to the next. Then, I would gradually work the dial clockwise, testing at every multiple of five whether the lock would open, starting with 5-10; or 10-15; or 15-20; or 20-25; or 25-30; or 30-35; or 35-0; or 0-5.

Then, I would try all the combinations where the second number of the combination is equal to the first number + 10, mod 40, and so forth, finishing up with the combinations where the second number is equal to the first number + 40, mod 40, which is equal to the first number of the combination. Or, if the mechanical design of the lock is such that the first and second numbers cannot be (approximately) equal, I would finish up with the combinations where the second number is equal to the first number + 35, mod 40.

This problem reminded me of my days in high school, when some of my friends and I discovered that the mechanical design and behavior of Master padlocks allowed for a dramatically reduced number of possible combinations to open them. I don't recall that we reduced the number quite as effectively as the following tutorials,* but it started with a similar process of deducing one of the numbers of the combination by simple mechanical means.

I saw another post whose author claimed to be able to reduce the number of combinations down to eight possibilities by identifying numbers where the dial catches or has resistance.

Solutions were also submitted by Brian Barsotti, Jordan Bonner, Kristen Fox-Neff, Clive Keatinge, Richard Kollmar, John Pagliarulo, Hannah Park, Brad Rosin, Eric Savage and Betty-Jo Walke. Jerry Miccolis was inadvertently left off of last issue's list of solvers for "Risk Appetites", the 2018 September/October AR puzzle.

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

* https://lock-picking.wonderhowto.com/how-to/crack-master-lock-combination-padlock-easy-way-403808/
https://www.google.com/search?q=best+way+to+break+a+combination+lock&ie=UTF-8&oe=UTF-8&hl=en-us&client=safari

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