

actuarialREVIEW

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PUBLISHED BY THE CASUALTY ACTUARIAL SOCIETY

WHATEVER HAPPENED TO THE 100-YEAR EVENT?

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VOLUNTEER
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RETAINED - Senior Consultant, Europe: Top consulting firm seeks designated P&C Actuary to serve in a senior analytical role. Must have knowledge of the General Insurance industry in the UK and Europe and experience in applied statistics / econometrics. (#40039)

RETAINED - Actuarial Director, Midwest USA: Client seeks FCAS with several years of general experience and at least 2 years in a loss reserving role. Excellent communication skills a must. (#39428)

RETAINED - Senior Actuarial Analyst, West USA: Work will focus on rate reviews and rate change proposals. This newly established expansion to the Actuarial Department will be responsible for personal lines pricing, working with product and regional office business partners and report directly to the Chief Actuary. Ideal opportunity for advancement. (#37894)

RETAINED - Actuarial Manager, Canada: Canadian P&C insurance firm seeks qualified Actuary to serve in a managerial role. Work will include overseeing the daily operations of the department and developing rates for personal auto lines. (#39973)



Articles in this issue include: *A Pathway to "Chief" Success, Laying the Foundation for Your Actuarial Career, Welcome to the Team, Always Use Spell Check, Q&A DW Simpson Retained Search Services*

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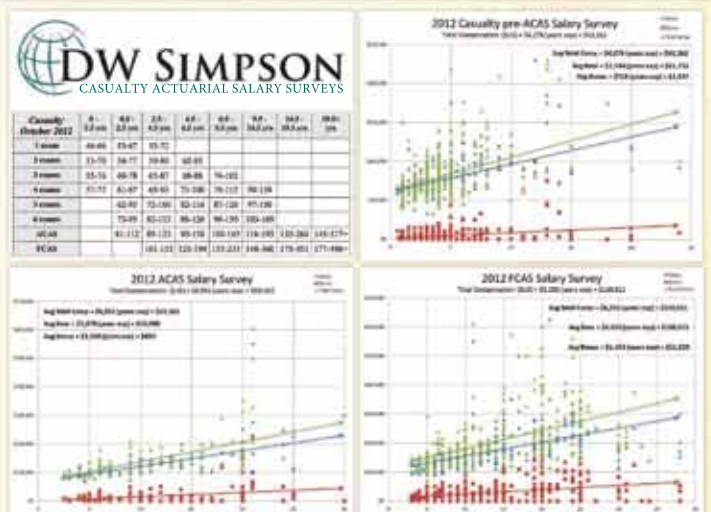
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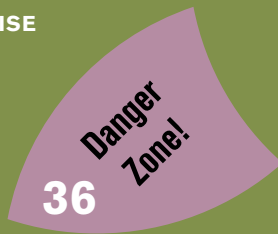


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Whatever Happened to the 100-Year Event?

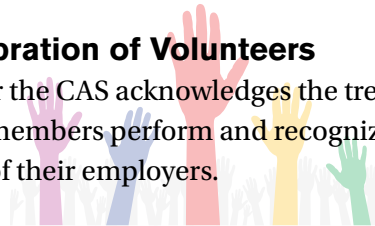
BY STEVEN SULLIVAN

The term “100-year event” expresses a probability rather than a certainty. It is often misunderstood by the general public and some insurance professionals.



In Celebration of Volunteers

Each year the CAS acknowledges the tremendous work its members perform and recognizes the support of their employers.



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ICA 2014: “What’s In It For Me?”

BY J. MICHAEL BOA

Key people involved in planning the ICA 2014 educational program and festivities took some time from their hectic schedules to share their thoughts on what attendees can expect from this outstanding conference.



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editor'sNOTE By ELIZABETH A. SMITH

Flood, Volunteers, Advice and all that Jazz

I am pleased and delighted to welcome new writers and guest columnists to the pages of *Actuarial Review*.

No stranger to actuarial topics, Steven Sullivan talked to some of the CAS's leading experts on catastrophe modeling for our cover story on 100-year events. Steven previously worked for the Academy's publication, *Contingencies*. Much in the story serves the general public's need to know about how consumers and the insurance industry deal with these events.

This issue features a new column and a renamed *AR* column favorite. Kay Adams takes on our first actuarial workplace advice column, "Problem Solved." Read it and see if you've ever had that problem or if you have caused such a situation. How does Kay's answer compare to your own advice?

We are also looking for more "explorers" for the new column "Explorations," previously called "Brainstorms." Jim Guszczka, who takes the helm for this first column, explains how he came up with the new name and manages to weave in some jazz references. He doesn't leave out the rockers, however, as you will learn when you read his column.

We also take some time and space to honor our many CAS volunteers who work so hard. Volunteers plan meetings and seminars; develop continuing education curricula; write, peer-review and edit papers and articles; write, proctor and grade exams; conduct research; create budgets; and make investments. The Volunteer Honor Roll is just a small token of esteem for all the people who keep things running.

Volunteers do even more jobs than what is mentioned above, not the least of these is to govern, which brings me to CAS President Gary Josephson. Gary has been one of the top supporters of the new *AR*. On behalf of the *AR* team, I thank him for his backing and the insights he has shared in his "President's Message."

And so, look for more new types of articles and columns in the upcoming issues. Yes, I think 2014 is going to be a good year.

Correction

In the *AR* September-October 2013 issue, Aaron Hillebrandt was incorrectly listed as joining the Bloomington, IN office of Pinnacle. The office is in Bloomington, Illinois, not Indiana. ●

Actuarial Review always 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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Professionalism: A Badge of Honor and Responsibility

Approved by the Board in 2012, the [CAS Strategic Plan](#) has a number of recommended actions related to professionalism. The professionalism goal is: "The CAS will support activities that continue to enhance confidence among stakeholders and that promote the quality of work among CAS members." While this may seem an obvious goal, professionalism falls more broadly under the umbrella of the [American Academy of Actuaries \(AAA\)](#). The AAA sets qualification, practice and professionalism standards for actuaries credentialed by one or more of the five U.S.-based actuarial organizations. The AAA also houses the [Actuarial Board for Counseling and Discipline \(ABCD\)](#), which was established to strengthen members' adherence to standards of ethical and professional conduct.

If the development of qualification and professionalism standards, and investigation of members' adherence to these standards, is the responsibility of the AAA, what is a CAS member's role? Isn't it sufficient for each of us to do high-quality work? I would argue that this is a necessary condition, but not a sufficient one. As a profession, we are collectively expected to have high standards of practice and conduct, as well as processes for investigating and responding to alleged violations of these standards. As individuals, we need to keep these standards front and center when doing our work, or when reviewing the work of other actuaries. The consequences of failure to do so can be severe.

Some of our nonactuarial constituents have pointed out that, since the

[Actuarial Standards Board \(ASB\)](#) and the ABCD are housed within the AAA, and both boards and their committees are made up of AAA members, actuaries are essentially self-regulated. This has led to questions as to whether this is appropriate, or whether a more independent process of regulation should be developed. (In the U.K., the actuarial profession is subject to independent oversight by [The Financial Reporting](#)

As a profession, we are collectively expected to have high standards of practice and conduct as well as processes for investigating and responding to alleged violations of these standards. As individuals, we need to keep these standards front and center.

[Council](#).) More specifically, the [National Association of Insurance Commissioners \(NAIC\)](#) has formed a [Joint Qualified Actuary \(A/B/C\) Subgroup](#) whose charges include:

- Recommending a definition of "inappropriate or unprofessional actuarial work."
- Recommending a process, which could be an existing process, for regulatory and/or professional organizations' to deal with inappropriate or unprofessional actuarial work.

The subgroup was formed because of regulators' concerns with regard to what they consider substandard work, and the processes for investigating and taking action on such work.

The AAA is working diligently with the NAIC to respond to their concerns and inquiries. The CAS has also re-

sponded to certain issues relating to property & casualty actuaries. Whatever the outcome, this investigation by the NAIC suggests that our process of standard setting, investigation and discipline does occasionally come under scrutiny, and will only continue if our constituents have confidence in the results.

So what can we do to help ensure that our processes for developing standards and investigating potential viola-

tions remain our own? First, of course, is the necessary condition above: Make sure that we do quality work. We all need to make sure that our work meets the relevant standards, not only with respect to the technical aspects, but with respect to the support (documentation) and communication. Standards of practice are not something that we simply read once and place on a shelf. We should periodically review them in relation to our work. In addition, we all have an opportunity to participate in the development of standards, through volunteering to work on one of the committees of the ASB.

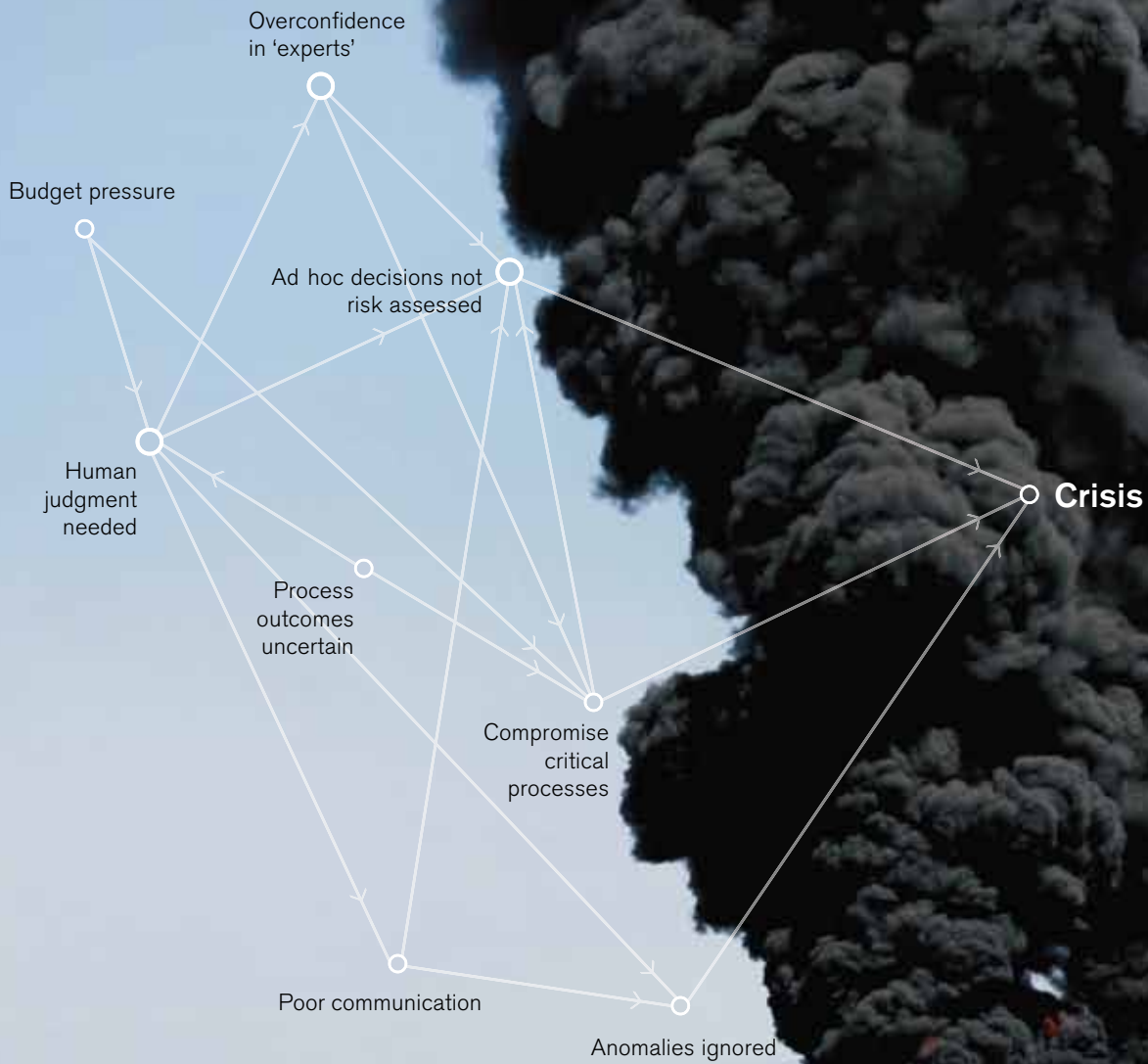
We also should be constantly aware of the [Code of Professional Conduct](#). Most of the precepts in the code should be clear and unambiguous without having to refer to them often, for example,

President's Message, page 8

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President's Message

from page 6

integrity, courtesy and cooperation. However, some areas, such as conflict of interest and control of work product, may vary with the nature of our work and therefore should be periodically reviewed in the context of that work.

The Code also addresses our responsibility when we observe apparent violations of the Code by other actuaries. And we do have a responsibility. It is incumbent upon each of us to understand what our responsibility is and what options we have when in this situation, and then to act accordingly. If we don't act in these situations, others may. It is important to understand the "C" in ABCD. Whenever we have questions about potential substandard work, the ABCD is available to counsel us on the appropriate action.

We should all be proud of our profession and badge of honor that it represents. But it is also a badge of responsibility to do all that we can to make sure that our stakeholders have confidence in the quality of our work, and that the processes are in place to maintain the standards of quality and conduct. That is the CAS goal.

* * *

This is my last "President's Message" column. It has been a privilege, over the past year, to share my thoughts on some of the important activities that are surrounding our day-to-day professional lives. It has been my pleasure to work with the CAS publications staff for their patience in receiving my (always late) articles, as well as their professional review and edits that make me appear much more eloquent than I really am. And thanks to all of you for reading. ●

COMINGS AND GOINGS

Linda Bjork, FCAS, CERA, was appointed to the Career Advisory Committee of the Alumni Board for State University of New York-Geneseo as a representative for STEM (science, technology, engineering and math) careers.

Lee Bowron, ACAS, has been appointed to the actuarial advisory board for the University of Alabama, where he reports that he is tasked with identifying promising high school actuarial candidates who can also play for Coach Nick Saban and the top-ranked Crimson Tide football team.

Amy DeHart, FCAS, has been promoted to vice president for actuarial services with Secura Insurance. DeHart joined the company in 2000 as an actuarial consultant, and was promoted to manager of pricing in 2005 and director of pricing in 2006.

In October 2013, **Richard Easton, FCAS**, published a book co-written with Eric F. Frazier titled, *GPS Declassified: From Smart Bombs to Smartphones*, which examines the development of global positioning system (GPS) technology from its secret, Cold War military roots to its emergence as a worldwide consumer industry. Easton's father, Roger L. Easton, led the Space Applications Branch of the Naval Research Laboratory from the Vanguard satellite era to the early days of GPS development.

Endurance Specialty Holdings Ltd. announced that **Scott Galiardo, FCAS**, senior vice president, will assume the newly created role of group actuary, with oversight responsibility for Endurance's corporate actuarial, reserving and ceded reinsurance activities on a global basis.

Philadelphia Insurance Companies (PHLY) has hired **Kurt D. Hines, FCAS**, as senior vice president of field underwriting. Mr. Hines will be responsible for growing and managing PHLY's field underwriting operations, which incorporate the company's 46 offices across the country. Mr. Hines joins PHLY with more than 18 years of experience in the insurance industry.

Brian E. Johnson, ACAS, has been reappointed to the Penn State University Actuarial Advisory Committee.

Camille Minogue, FCAS, has been appointed adjunct professor in the actuarial science department at Simon Fraser University in Vancouver, British Columbia.

Jerome Tuttle, FCAS, gave a lecture on "Copyright and Math Teaching" at the October meeting of the Association of Math Teachers of New Jersey.

Monty Washburn, ACAS, has been recently reappointed to the advisory board of the department of mathematics and actuarial science at Maryville University in St. Louis, Missouri. ●

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

IN MEMORIAM

Bernard G. Schaeffer
(FCAS 1980) 1947-2013

Scott A. Martin
(ACAS 1995) 1968-2013

2013 CAS ELECTION RESULTS

Fisher to Become President; Miccolis Voted President-Elect

Constitutional Amendment Passes Overwhelmingly

ARLINGTON, Va.—Wayne Fisher, who was elected president-elect in 2012, will become CAS president at the close of the 2013 CAS Annual Meeting. Robert S. Miccolis has been elected CAS president-elect. CAS Fellows also elected four Directors and approved a constitutional amendment enhancing the ability of the CAS to express opinions on public policy issues.

Those elected to the Board of Directors are Jessica (Weng Kah) Leong, Stephen P. Lowe, Donald F. Mango and Robert Wolf.

CAS Fellows overwhelmingly approved an amendment to the CAS Constitution, with 1,129 Fellows (92.5%) voting yes and 91 Fellows (7.5%) opposed. The CAS Constitution and Bylaws states that these governing documents “may be amended by an affirmative vote of 10% of the Fellows or two-thirds of the Fellows voting, whichever is greater.”

The amendment to Article IX “Public Expression of Professional Opinion” now enables the CAS to express opinions on issues of public interest. The amendment provides that 75% of Board members (14 out of 18) must agree before the CAS Board is allowed to comment on issues of public interest on behalf of the association. The revision struck wording requiring advance approval by an affirmative vote of at least 90% of the Fellows who vote in a mail ballot.

The authority granted to the CAS Board to comment on public policy issues is envisioned to be used only in the defense of a strong and preeminent ACAS/FCAS designation. The reliance by the CAS on the American Academy of Actuaries for making public policy statements on behalf of the actuarial profession in the United States is envisioned to continue in all other cases.

Immediate Past President Gary R. Josephson will chair the CAS Board of Directors. Earlier this year, the CAS Board of Directors elected or re-elected the following members to serve as vice presidents:

- Jeff Courchene, Vice President-International
- Roosevelt Mosley, Vice President-Marketing and Communications
- Chris Nyce, Vice President-Administration
- Virginia Prevosto, Vice President-Admissions
- Julia Stenberg, Vice President-Professional Education
- Alice Underwood, Vice President-Research and Development



Wayne Fisher



Robert S. Miccolis

These members will assume or re-assume their positions at the close of the 2013 Annual Meeting in Minneapolis, Minnesota.

Voter turnout was down this year with a total of 1,392 Fellows (32.9%) voting compared to 1,670 Fellows (41.4%) last year. ●



CALENDAR OF EVENTS

Interactive Online Courses
[“Understanding CAS Discipline
 Wherever You Practice”](#)
[“Introduction to Predictive
 Modeling”](#)

[www.casact.org/education/
 interactive/](http://www.casact.org/education/interactive/)

March 30-April 1, 2014
[Ratemaking and Product
 Management Seminar](#)
 Marriott Wardman Park
 Washington, DC, USA

March 30-April 4, 2014
[ICA 2014](#)
 Marriott Wardman Park
 Washington, DC, USA

May 21-22, 2014
[Seminar on Reinsurance](#)
 Grand Hyatt New York
 New York, NY, USA

September 15-16, 2014
[Casualty Loss Reserve Seminar](#)
 Manchester Grand Hyatt
 San Diego
 San Diego, CA, USA

November 9-12, 2014
[CAS Centennial Celebration](#)
 New York Hilton Midtown
 New York, NY, USA

25 YEARS AGO IN THE *AR* BY WALTER WRIGHT

Actuarial Consulting

In the November 1988 issue of The Actuarial Review Stan Khury pointed out some key differences he encountered when switching from “company actuary” to “consultant.” Twenty-five years later these still ring true. Here is a selection of Stan’s observations from his “Random Sampler” column.

[I]t became clear to me that actuaries are being held to account to a much greater extent than I could have possibly imagined. The relative comfort and safety of operating as a company actuary is not available to the consulting actuary. In public practice, the everyday work of an actuary could be exposed in a court room to a barrage of pointed questions by hostile attorneys where a minor actuarial misjudgment becomes a major flaw; where a change of assumption without support becomes a serious contradiction in logic...

Another point I experienced quickly was the need to explicitly document the assumptions and limitations of the actuarial work product. In a company

environment, the actuary can survive without [doing this]...

The need to communicate to the client so that the work product is self-contained and understandable to the lay reader represents yet another significant difference. As a rule, company work tends to be part of a larger complex and is seldom seen as a stand-alone product. On the other hand, when a consulting assignment is completed, the work tends to be a free-standing document...

In consulting, peer review is generally a requirement...Company actuaries are often in a position of reporting critical analyses to individuals who are not actuaries. Assumptions can go unstated, and some unintended implications can potentially slip through, simply because the reader is unable to rigorously check the thought process behind the analysis.

In consulting, the value of the actuarial work product is sharply defined. The client pays a specific fee in exchange for a work product.

Now that I actually log my daily activities (mostly to track billable client hours), it is apparent how much waste there can be in a day if I do not guard my time. I urge every company actuary to keep a log for a month and observe just how much time is spent doing actual work and how much of it gets diverted to administrative tasks and attending meetings. ●



ETHICAL ISSUES

Regulatory Compliance

John Dogood is a new FCAS employed by Honest, a regional carrier that writes mostly professional liability coverage. John has spent most of his career on the reserving side, but was recently appointed manager in a pricing unit for medical malpractice after the previous manager retired. John is currently working on a rate filing for State X.

For several years, State X has been among the most expensive states for medical malpractice insurance. To address this problem, the legislature passed various tort reforms that are intended to bring down insurance costs. The insurance department of State X released a guidance paper expressing their opinion that the reforms should decrease insurance costs by at least 15%.

The reforms went into effect on January 1, 2010, and for the filing John is using policy year data through the end of 2012. The analysis is going smoothly by and large, but one of the major difficulties he is facing is choosing a frequency trend. Historically, Honest has looked at countrywide or state group trends in order to make selections, and given the volatility in those numbers, they typically do not select frequency trend factors. Due to the recent reforms in State X though, John decides to investigate the figures for both State X and for the state group in which State X falls (which represents experience for about 35% of the country). Here is what he finds:

Based on these figures, John concludes that the experience for State Group Y is too volatile to select a reliable frequency trend, and the experience for State X is much too thin and unstable to be useful. Moreover, tort reforms similar to the ones recently implemented in State X have been tried in other jurisdictions and have generally had little impact, and John has no reason to believe that the experience in State X will be any different. Thus, he feels comfortable selecting a 0.0% frequency trend, and he completes the filing accordingly and sends it, along with all of the supporting exhibits, to Mike Grouchy, the actuary in charge of government relations, for review. Mike is an FCAS and has been in the industry for many years.

CLAIM FREQUENCY FOR STATE X			
Policy Year Beginning 1/1/xxxx	Developed Incurred Claim Count	Trended Earned Premium At Current Level	Claim Frequency
2002	31	\$9,412,952	0.0033
2003	26	\$9,699,164	0.0027
2004	29	\$9,837,032	0.0029
2005	21	\$9,952,849	0.0021
2006	27	\$10,292,525	0.0026
2007	39	\$10,838,509	0.0036
2008	37	\$11,021,239	0.0034
2009	36	\$11,041,940	0.0033
2010	38	\$11,246,617	0.0034
2011	24	\$11,470,336	0.0021
10 Year Indicated Frequency Trend			-0.2%
7 Year Indicated Frequency Trend			+1.4%
5 Year Indicated Frequency Trend			-10.2%

CLAIM FREQUENCY FOR STATE GROUP Y			
Policy Year Beginning 1/1/xxxx	Developed Incurred Claim Count	Trended Earned Premium At Current Level	Claim Frequency
2002	192	\$55,907,753	0.0034
2003	194	\$57,067,905	0.0034
2004	186	\$61,831,836	0.0030
2005	174	\$61,216,850	0.0028
2006	178	\$62,651,117	0.0028
2007	188	\$67,671,749	0.0028
2008	201	\$70,134,627	0.0029
2009	198	\$69,483,128	0.0028
2010	194	\$67,792,662	0.0029
2011	203	\$69,711,265	0.0029
10 Year Indicated Frequency Trend			-1.8%
7 Year Indicated Frequency Trend			+0.4%
5 Year Indicated Frequency Trend			+0.9%

A few days later, Mike schedules a meeting with John to discuss the filing for State X. Mike opens the meeting by saying “John, overall I think this is a very good filing. I have always been impressed by the work that you do and I was happy to hear that you received the recent promotion.”

Mike continues, “In creating a rate filing, particularly for a finicky state like X, we need to be very careful. They have faced unacceptably high med mal rates for years, and that has created a political firestorm in the state. They recently passed some measures, which I’m sure you’re aware of, that are designed to decrease the frequency of med mal claims. They’re really not going to be happy with the selection of a 0% trend. Do you follow?”

John responds by saying that he fully understands Mike’s concerns and explaining that he looked closely at both state-specific and regional figures, and ultimately concluded that there was too much uncertainty to make a frequency trend selection.

During John’s explanation, Mike becomes visibly agitated. Once John finishes, Mike replies “Ok, John, I don’t think I made myself clear before. You’re a very analytical guy and I like that about you, and I think that will generally serve you well throughout your career, but when it comes to rate filings, you need to be more grounded. I saw your trend exhibits and I agree that there isn’t sufficient credibility to make a selection, but that’s not what the State X regulators are going to see. They’re going to see -10% indicated frequency for the past five years and make us select that. I think we can compromise with them at -5%, but they’re not going to accept 0%.”

Mike continues, “So here’s the

Changing assumptions... seems slimy, but... he is new to this area of actuarial work and Mike is the expert.

bottom line. You agree with the overall indications in this filing, and we want to implement those. But we can’t because they’re based on a frequency trend selection that will never fly. So we need to make the numbers work. The question is, what other assumptions can we change to make the rate indication jibe with a -5% frequency selection? I mean, this is med mal, so there’s got to be room on your LDF selections. Why don’t you take a week to figure this out and re-send me the filing after that.”

Mike abruptly ends the meeting before John can respond, but he’s too confused to reply anyway. He returns to his office to ponder Mike’s request, and he is very conflicted. On the one hand, changing assumptions to comply with what Mike expects State X’s reaction will be to the frequency trend selection seems slimy, but on the other hand he is new to this area of actuarial work and Mike is the expert on regulation.

As John contemplates his next move, here are some of the alternatives available to him.

Option 1

John should heed Mike’s advice and look for ways to arrive at the same overall indications with a -5% frequency trend selection. Mike is far more knowledgeable about the regulatory environment, and if changing some selections is necessary in order to get the filing approved, then John should do that. John re-reads the actuarial professional guidance documents and believes that this course of action is justified. In particular, he focuses on the following two principles

from the Statement of Principles Regarding Property and Casualty Insurance Ratemaking:

- Principle 2: A rate provides for all costs associated with the transfer of risk.
- Principle 3: A rate provides for the costs associated with an individual risk transfer.

John believes that, as long as the rates are correct, he has met his professional duties.

Option 2

John should refuse to materially change any of his assumptions. He is confident in all of his selections, including the frequency trend. If the State X regulators object to the frequency trend then he will defend his selection to the best of his ability, and if they make him change it he will comply. Upon reading the actuarial professional guidance documents, he believes that this is the only justifiable course of action. In particular:

- Precept 1 of the Code of Professional Conduct, Annotation 1-4: “An Actuary shall not engage in any professional conduct involving dishonesty, fraud, deceit, or misrepresentation or commit any act that reflects adversely on the actuarial profession.”
- Section 4.2 of Actuarial Standard of Practice 1: “Actuaries should take a good faith approach in complying with ASOPs, exercising good judgment and professional integrity. It is not appropriate for users of ASOPs to make a strained interpretation of the provisions of an ASOP.” ●

Pushed to the Limit and Asked to Do More

Actuarial Review introduces “Problem Solved,” a column open to guest columnists devoted to helping solve workplace problems, both technical and personnel-related.

Problem

A few years ago, a team worked really hard over a couple of months to roll out some new rates in many states. This project involved a lot of long hours, including giving up weekends. Once the project was done, a member of the team attended a staff meeting only to learn that his team would be tasked with a new project, starting within a couple of days. This new project would be of the same magnitude of the one just completed and would require another big push from the very same team—more long days and working weekends.

What can you do about a work environment that’s constantly too demanding?

Solution

In dealing with your boss, it’s best to be calm, clear and above all, not make her wrong. After all, the boss has the power to give you the worst projects, affect your reputation with your peers and superiors, and pick you first for a layoff.

Knowing that, you need to first gauge what your boss most wants. Is she extremely competitive—trying to show

the company how hard she and the team work? Is she just malevolent—pushing the team while she works regular hours? Or, is she simply following the company mandate to achieve certain goals, perhaps fearful that she might lose her own job if she doesn’t? Maybe it’s a combination of motives.

Then, gauge how she’s best persuaded. If she really is kind at heart, she might buy an argument about how the staff is suffering. Or, if she’s very logical, she might be persuaded by appealing to reason. For example, you might be able to suggest an alternative to doing all of the work immediately (some tasks could be handled every other year). If she’s super-competitive, she could be convinced by talking about how the greatest athletes alternate between high performance, practice and rest. If she’s fearful, she might be persuaded by hearing about how there’s more staff turnover when the pressure remains intense over a long time period.

Do some research, such as talking to others on your team to see if they’re feeling the same way, or if they are thinking of leaving the company. You could talk to people in similar jobs in other companies to see if working this many hours is the norm.

Put together your appeal. Use whatever emotional and logical arguments you can. Practice on a neutral party such as a friend or significant other. Make

your appeal as strong as you can.

Finally, talk to your boss in a helpful manner. Bring in another person or two if you think that will help. Express your argument. See what she says.

Most bosses are reasonable and will try to improve the situation. Some are just nasty and won’t. If your boss falls into the “nasty” category, explore alternative positions in your company or dust off your resume. It may be time to switch jobs. ●

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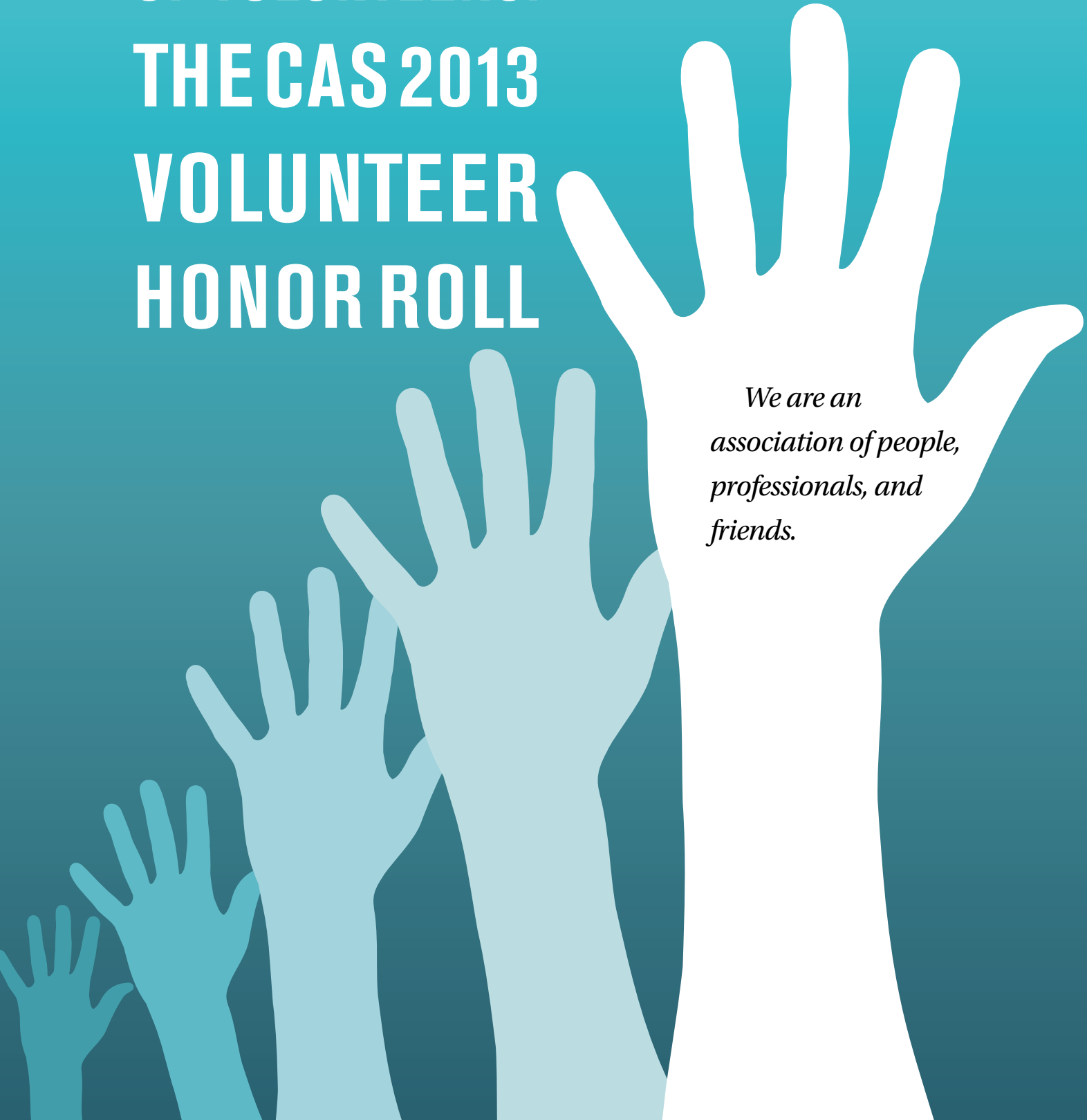


Need advice on a workplace problem? Want to be a guest columnist? Send an email to ar@casact.org.

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In one particular year, 902 CAS members volunteered to fill 1,359 positions. An effort of this scale, which is quite typical, generates a continuous need for volunteers. Each year about a third of these positions become available through normal rotation. These positions include the entire range of CAS activities: the examination committees, research and development activities, liaison representatives, and various program committees and speakers, who serve as faculty for these programs. We'd also like to thank AAA volunteers, meeting and seminar speakers, and Regional Affiliate program participants not listed here. We recognize that none of these activities can take place without the active participation of the many CAS volunteers and for this we thank you.

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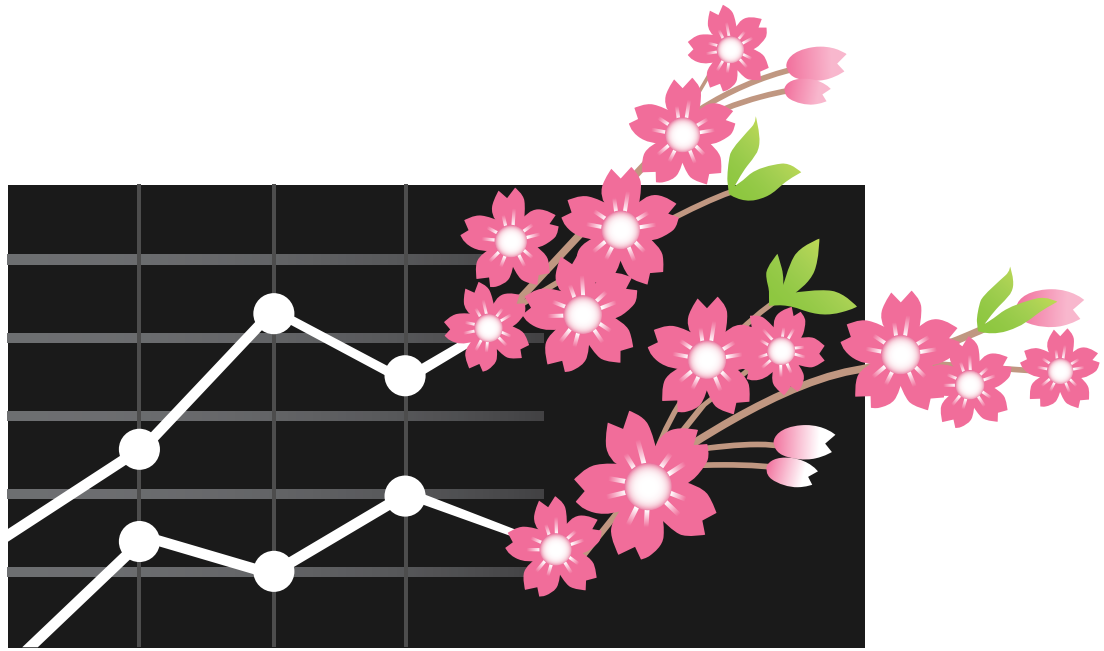
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Whatever Happened to the 100-Year Event?

They're big, we know them when we see them, and we remember them.

By STEVEN SULLIVAN



By September 16, 2013, more than 4,500 square miles of Colorado were under water. That's an area roughly the size of Delaware by some estimates; others compared it to Connecticut. The territory on the eastern slope of the Rocky Mountains had already been subjected to six straight days and 17 inches of rain, more than five inches above the annual average for the area. More than 1,200 people were missing, 19,000 homes were damaged or destroyed, 12,000 people evacuated. Fatalities were still unknown, but expected to be numerous. Television images showed raging torrents in streams and creeks that rivaled the last few hundred yards of the Niagara River before the Falls.

Colorado was experiencing not just a 100-year event; this was a 1,000-year event, a flood that even the National Weather Service characterized as not only historic, but biblical.

That turns out to be a pretty good characterization of a 100-year event. They're big, we know them when we see them, and we remember them: Hurricane Katrina in 2005; Super Storm Sandy in 2012; the tornado that devastated Moore, Oklahoma in 2013; the entire wildfire summer of 2012. And if one of them takes your loved ones, your home, or your possessions, it doesn't really matter if it makes the record books.



Misleading Term

The term “100-year event” (or whatever number you want to attach to it) expresses a probability rather than a certainty. Events this extreme are commonly measured by how likely they are to happen. In the case of Boulder, Colorado, a flood of this magnitude is expected to occur only once in a thousand years. Lesser catastrophes may happen more frequently, say once every 100 years. But these are only guesses. Projections. There’s nothing to say that another 1,000-year event won’t happen next year. Or next week. Or not for another 2,000 years.

The term became popular in 1973 when the [National Flood Insurance Program \(NFIP\)](#) needed a standard to measure flooding across the country. Some areas are more prone to flooding than others, some flood more frequently than others, and some areas of the country haven’t kept records long enough to ensure statistical accuracy for prediction. Nevertheless, the NFIP was mandated to map all the flood plains in the country. Bringing all these factors together, along with a number of different ways for measuring flood magnitude, it compromised on the 100-year frequency as a standard.

“The term ‘100-year event’ is misleading and is often misinterpreted by both the general public and insurance professionals,” says Mark Bove, senior research meteorologist with Munich Re America. “A ‘100-year event’ refers to a natural catastrophe that has one

percent annual probability of occurring at a given location. For example, if Miami, Florida, is impacted by a 100-year hurricane event in 2013, this doesn’t mean the next 100-year hurricane in Miami will occur in 2113; the probability for another hurricane in Miami in 2014 of the same intensity remains one percent. Hundred-year events in consecutive years are rare, but certainly not impossible.”

“We need to make sure we’re communicating that we don’t mean this is going to happen only once every 100 years,” adds Mary Frances Miller, an actuary with Select Actuarial Services in Nashville. “It’s possible to get two in a row. Highly unlikely, but possible. And we need to communicate that it’s based on a model. It’s not like we’re absolutely confident that the probability is one in 100. It might really be one in 60. Or one in 200. We can’t confidently say it’s not one in 10. It’s unlikely, and it’s out on the I-don’t-really-know-how-unlikely end of the scale.”

In other words, there’s nothing certain about predicting any extreme event. Yet certainty is what many people are looking for. Certainty makes them feel confident, and that confidence can get them into trouble.

Probably Questionable Behavior

Dr. Howard Kunreuther and Erwann Michel-Kerjan, both of the Wharton School at the University of Pennsylvania, wrote an op-ed piece in *The New*

**“We need to make sure we’re communicating that we don’t mean this is going to happen only once every 100 years.”
—Mary Frances Miller**

York Times (“Paying for Future Catastrophes”) after Super Storm Sandy. “Our research shows,” they said, “that half of all policyholders cancel their flood coverage after only three or four years. Why? Because they paid premiums without getting anything in return and are likely to think ‘Bad investment!’ But insurance is a safety net, not a bet.”

Miller tells the story of a man in Miami who was rebuilding in the wake of Hurricane Andrew in 1992, at that time the worst storm in Florida history. He was installing a set of glass doors that clearly weren’t up to code and would never withstand another hurricane. When asked why he was doing this (aside from saving money, of course), he replied that since Hurricane Andrew was a one-in-25-year storm, and the doors were designed to last for maybe 20 years, there really wasn’t anything to worry about.

“We chuckle,” says Miller, “but that just indicates a profound misunderstanding of probability.”

The other extreme is becoming too cautious. The classic example of this is flying vs. driving. Plane crashes are extremely rare, but they’re usually spectacular when they happen. Traffic accidents happen every day—many times every day. Yet people tend to be more afraid of dying in a plane crash than a car accident, even though their chances of dying in a car are much higher.

Yet somehow we (or at least the media and politicians) seem to admire the people who refuse to retreat, who are determined to rebuild in the same flood plain after they’ve been wiped out. The ones who decide not to make the same mistake twice are viewed as quitters. So what is the proper response to a 100-year event?

There’s no easy answer to that question. It may be one thing if you’re a homeowner living in New Orleans or Miami or Boulder. It’s another thing if you’re an insurance company covering properties in those areas.

Where the People Are

There’s a difference between a 100-year meteorological event and a 100-year insurance loss event, says Mark Bove. “The former deals with the frequency and severity of the hazard at a given location, while the latter is largely influenced by the built

Wilderness is prime real estate for those who can afford it, and those who can afford it build expensive houses, communities, and businesses in what was once pristine prairie or forest....So even if wildfires aren’t becoming more frequent, they’re certainly becoming more costly and destructive from a human standpoint.

human environment impacted by an event. It is quite possible to have a 100-year (or longer return period) event occur in an unpopulated area, causing little to no insured loss, while a weather event of moderate severity, well below a 100-year return period, could cause a 100-year insurance loss if it impacts a densely populated area with high insurance penetrations.”

“It all boils down to people,” says Tom Jeffery, senior principal scientist at CoreLogic in Madison, Wisconsin. “People who live in coastal areas face a known risk, some more than others. If they continue to live there, there is going to be a recurring cost of damage.”

It’s too early at this writing to say how bad the 2013 wildfire season was. Though memory of the more than 6 million acres that burned in 2012 may have faded, the more than 3 million scorched acres so far in 2013 seem bad enough.

There have probably been even worse fire seasons before recorded history, when lightning strikes ignited hundreds of square miles of unpopulated wilderness and burned until the rain eventually extinguished the fire. Even when Native Americans began to settle that wilderness, their nomadic lifestyle enabled them to pull up stakes and move whenever fire appeared on the horizon and threatened their settlements. That was their fire insurance.

It’s not so easy for modern settlers. Wilderness is prime real estate for those who can afford it, and those who can afford it build expensive houses, communities, and businesses in what was once pristine prairie or forest. None of it is movable. And in addition to those random lightning strikes, all those people can accidentally or deliberately start fires with a careless match or a spark from a piece of machinery. So even if

wildfires aren't becoming more frequent, they're certainly becoming more costly and destructive from a human standpoint. This extends to other types of natural disasters, too.

The numbers are daunting: Estimates for the cost of Hurricane Katrina range from \$108 billion to \$150 billion with more than 1,800 dead; Super Storm Sandy cost \$65 billion and killed 285; Hurricane Andrew destroyed \$26.5 billion in property and caused 65 fatalities.

"The incidence of extreme events is far more frequent," say Kunreuther and Michel-Kerjan in their *New York Times* article. "Twenty of the 30 most expensive insured catastrophes worldwide from 1970 to 2011 have occurred since 2001—and 13 of them were in the United States. Aside from the 9/11 terrorist attacks, all were natural disasters. The increase is most likely because of the location in high-risk areas of more people and more valuable properties, along with a changing climate."

An Understood Currency

Correctly assessing that risk is the work of catastrophe modelers. Using high-speed computers, modelers have learned how to create complex programs that combine data of past occurrences and emerging science to come up with a reasonable probability for how many extreme events might occur in a given time frame, how severe they might be, and the cost of the damage they might inflict.

According to Kay Cleary, an actuary and director at the modeling company Risk Management Solutions (RMS), catastrophe models have come a long way since they were first used in the 1980s to provide point estimates—like the 100-year probable maximum loss (PML). But no matter how sophisticated they are, they still can't provide a straightforward right or wrong answer.

"The 100-year PML just gives you a probability and a number," says Cleary. "It would be nice if you could just draw a couple of lines and say 'That's my range of uncertainty.' But it doesn't work quite that way because of the complexity of what goes into it. With the advances in computer speed and science, you can now drill down and determine the amount of trouble you'll be in, assuming you are in trouble. You can do more sensitivity testing by varying some of the assumptions and seeing how it shifts things around. You can learn a lot more, a lot easier, and a lot faster by having more numbers to look at than just a point estimate of PML."

What models do provide, Cleary says, is an agreed-upon, understood currency that enables insurers to quantify the risks



and trade them in the marketplace. "We hope the number is close to reality, but even so, it's an agreed-upon amount that allows things to happen. The fact that it's exactly right or exactly wrong is obviously important, but what it mainly does is enable us to do business. It's kind of like a stock price. What is a stock price, really, but an agreed-upon transaction number? It's not a real number."

According to David Lalonde, a senior vice president with the modeling firm AIR Worldwide, "the one percent exceedance probability loss (or the 100-year return period loss) is estimated to be just over \$200 billion—a figure that could be driven by an active and severe U.S. hurricane season or by a combination of different perils in different regions, as was the case in 2011. AIR estimates the average annual loss (AAL) from natural catastrophes is \$59 billion, in line with global catastrophes losses from 2012, which are estimated to be around \$58 billion."

So why are we seeing more of these events that are getting so destructive and so costly? It's tempting, of course, to blame global warming. But scientists and modelers are cautious. Mark Bove at Munich Re says we still don't know enough to be certain, but a warmer, moister atmosphere could be

conducive to more tornado and hail events across the eastern two-thirds of the United States. Climate change may or may not produce more frequent extreme events but “those that form could become more intense, reducing the return period of severe hurricanes.”

“Climate change makes the model more complicated,” says Mary Frances Miller. “I don’t know if it makes hurricanes more or less frequent, there’s argument about that. But it certainly makes the modeling more difficult.”

Global warming, or climate change, is a long-term phenomenon, adds Kay Cleary, and models are better suited to much shorter-term projections—two to five years—so models typically don’t reflect it. “We don’t know enough to do that responsibly. However, to the degree that there have been trends recently and the impact of global warming is felt, we do look at that information in light of the medium-term rate.”

There’s a controversy in hurricane modeling between the long-term rate and the medium-term rate, Cleary explains.

“The long-term is based on the 112 years of data that we have. The medium-term acknowledges that there are cycles. Right now we’re in a somewhat higher than long-term average cycle. If you look at the 112 year average, what we expect in the

next five years is a little bit higher than that. We don’t make an explicit adjustment for it, but we think there is some implicit acknowledgement of those impacts.”

“Attributing every weather anomaly to manmade climate change—other than the higher temperatures the global warming phenomenon is named for—is a high-stakes gamble, rooted more in politics than in science,” says Nate Silver in his 2012 book, *The Signal and the Noise: Why So Many Predictions Fail—But Some Don’t*. “There is little consensus about the ways that climate change might manifest itself other than through temperature increases and probably rising sea levels. The greenhouse effect almost certainly exists and will be exacerbated by manmade CO₂ emissions. This is very likely to make the planet warmer. The impacts of this are uncertain, but are weighted toward unfavorable outcomes.”

Improved models now account for a previously unrecognized peril: storm surge. Storm surge is a hybrid, neither wind nor flood. Even relatively weak wind events can push huge volumes of water to surge over the land, causing billions of dollars of damage.

“It has to do with [bathymetry](#), the study of the underwater landscape,” Cleary says. “Water pushing against the ocean floor starts to build up and inundates the land, creating a surge flood. Initially, it made a lot of sense to have surge factor off the wind, but we found that surge has its own characteristics not necessarily related to the wind. We upgraded our model to account for not only the severity of what can happen, but also the types of things to worry about.”

Paying for the Risk

So who pays for all this? That, of course, is what insurance companies are for, but many private-sector insurers have



“Water pushing against the ocean floor starts to build up and inundates the land, creating a surge flood. Initially, it made a lot of sense to have surge factor off the wind, but we found that surge has its own characteristics not necessarily related to the wind.” —Kay Cleary

increased premiums in high-risk areas to make it virtually impossible for some people who want insurance to afford it. Some carriers have exited certain markets altogether. And most carriers depend on reinsurers—like Munich Re and Swiss Re—to share much, if not most, of the risk.

But there are other mechanisms as well. States prone to natural disasters, particularly along the coasts, fund wind pools that offer high-risk coverage at lower rates. Wind pools grew out of the [FAIR \(Fair Access to Insurance Requirements\)](#) plans that were formed in 1960s when many insurers pulled out of areas hit hard by rioting and civil unrest. One of the largest wind pools, [Florida's Citizen's Property Insurance Corp.](#), covers nearly \$500 billion in assets. Most wind pools, however, aren't nearly so well-endowed and must resort to the reinsurance market as well.

In 1968, the federal government instituted the NFIP to subsidize premiums for people living in flood plains. But claims from the disastrous 2005 and 2008 hurricane seasons forced the NFIP to borrow \$18 billion from the U.S. Treasury, which it hadn't yet repaid when Super Storm Sandy hit in 2012.

In July 2012, Congress passed the aptly named [Biggert-Waters Flood Insurance Reform Act](#), which attempts to make the NFIP more financially stable and ensure that flood insurance rates more accurately reflect the real risk of flooding. The act institutes changes in flood hazard mapping and flood plain management, but primarily it gradually eliminates the subsidies that enabled many insureds to pay lower premiums than are reflected by their risk.

"The Biggert-Waters Act is moving exactly in the right direction," says Howard Kunreuther. "It's the first piece of Congressional legislation that I'm aware of that has risk-based rates, not on all homes but on second homes and on repetitive-flooding homes. With risk-based rates you can give a rate reduction when people mitigate."

Mitigating Circumstances

Risk mitigation is something that Kunreuther has been championing for years, though he admits it can be a tough sell because it can be expensive for homeowners. The trick, he says, is to give people a financial incentive to relocate or retrofit their homes to better withstand wind and water damage. He advocates long-term loans and low-cost, long-term insurance—perhaps as long as 20 years—that would be tied to the

Politically, says Tom Jeffery, mitigation can be a can of worms because it ultimately impinges on individuals' rights to live and own property wherever they want to.

property rather than the property owner. The cost of the loan, he says, will be less than the benefits from the lower insurance premium.

Even though risk-based rates make economic sense for those who can afford them, they'll still end up pricing many low-income homeowners out of the market. "Our response to that is to help them out by using vouchers," says Kunreuther, similar to the Supplemental Nutrition Assistance Program. They would receive the means-tested voucher, as well as a loan, only if they agree to mitigate and make their homes safer. "Mitigation will bring their premium down so much that the actual magnitude of the voucher, even if they pay for the loan themselves, would be less than just paying the difference between what they can afford and the much higher insurance premium."

Politically, says Tom Jeffery, mitigation can be a can of worms because it ultimately impinges on individuals' rights to live and own property wherever they want to. And it's not just about the cost of individual insurance coverage. The levees that were rebuilt to protect New Orleans from another Katrina-level storm cost in excess of \$14 billion. Estimates for building a sea wall that would protect New York from another Sandy run as high as \$23 billion.

"It's an awfully big undertaking," he says. "In an area like New York, it certainly would offer tremendous protection and reduce or eliminate the tens of millions of dollars of damage that could come in the future. And that's the question everybody wants answered: What can we expect in the future? Nobody knows. We can project based on what's happened in the past, but nobody knows if it'll happen next year, in 10 years, or in the next 100 years. All we know for sure is that there will be another one sometime in the future."

Steven Sullivan is a writer living in Baltimore, Md. ●



ICA 2014: “WHAT’S IN IT FOR ME?”

A Roundtable Discussion

INTERVIEW By J. MICHAEL BOA, CAS DIRECTOR OF COMMUNICATIONS AND MARKETING

Every four years, actuaries from all over the world and from every discipline come together to enhance and impart their knowledge, connect with their colleagues, and as a result, cultivate their business intelligence.

Next year this unique opportunity comes to North America—the [2014 International Congress of Actuaries \(ICA\)](#) will be held March 30 through April 4, 2014 in Washington, D.C. at the Marriott Wardman Park.

“Learn, Interact, Grow” is the theme of ICA 2014 and the 2,000 actuaries expected to attend the conference will have many opportunities to do exactly that, with a week-long offering of educational sessions and networking events.

Planning was underway for ICA 2014 well before the prior ICA, held in 2010 in Cape Town, South Africa. That first small planning team has evolved into a collection of committees responsible for organizing all aspects of ICA 2014. Now less than six months from the conference, preparations to host the world’s actuaries are at its peak.

In the midst of the frenzy of activity required to welcome the worldwide actuarial profession to North America, chairpersons of key ICA 2014 planning committees shared their insights on what attendees can expect at the conference.



Chairpersons providing their perspectives include:

- Bob Conger, who leads the overarching ICA 2014 Organizing Committee.
- Aaron Halpert, whose Finance and Risk Management Committee is managing the conference's finances and risk management plan.
- Roger Hayne, whose Scientific Committee, aka educational program committee, is responsible for the overall design and content of the sessions being offered at ICA 2014.
- Chris Carlson, who is leading the development of general sessions headlining the educational program.
- Maggie Conger, whose Hospitality Committee will ensure a welcoming and entertaining experience for delegates and their accompanying guests.

Mike Boa: I would expect that past experience in attending an ICA is critical to planning such a major international event. What did you enjoy the most about past ICA you have attended, and how have you used that experience in planning ICA 2014?

Bob Conger: At past ICAs, I most enjoyed the opportunity to learn about how actuaries around the world are solving business problems. The ICA format really works well at creating this type of learning environment—many of the sessions exposed me to situations and solutions that were different in some important ways from what I had experienced in my actuarial career. And then the networking breaks allow for continued informal discussions of these issues with colleagues who may have experiences quite different from my own—this further broadened my perspectives. For ICA 2014, we have assembled a great mix of topics and speakers, and we have provided times and places that will be conducive to discussion.

Roger Hayne: I agree with Bob. The unique thing about ICA is the opportunity to engage in good discussions with other actuaries from across the globe. The program at ICA 2014 will offer 85 concurrent sessions covering over 220 presentations in seven specialty tracks to appeal to actuaries of all disciplines and interests. In scheduling the program, we have committed to presenting high-quality concurrent sessions within each track and have included ample time in the schedule between sessions to allow for additional discussion away from formal presentations.

Maggie Conger: As the spouse of an attendee, I have spent most of my time at previous ICAs going on the tours offered to accompanying guests. I have enjoyed so many of the tours! The Hospitality Committee is pleased to provide ICA 2014 attendees with a wide variety of tour options.

What do ICA 2014 attendees have to look forward to regarding the part of the event that you are planning?

Hayne: With the robust program we have planned, an actuary in any discipline should be able to find interesting material in any of the concurrent session slots. In addition, we have some really great general sessions planned that will appeal across actuarial disciplines.

Chris Carlson: That's right. We have secured very interesting featured speakers on timely and relevant topics. For example, one session will discuss the increasing longevity of our population, which impacts almost every line of insurance and actuarial estimates. Another session will challenge actuaries to periodically take a step back to see which current methods and models are the most appropriate for estimating future costs and contingencies. We will also feature a panel of chief executive officers to provide their insights on the insurance industry, the global marketplace, and the actuarial profession.

Maggie Conger: The Town Square will be a gathering place each morning for attendees and registered guests to meet, enjoy continental breakfast, network, use the Internet café, shop for regional handmade gifts, and interact with ICA 2014 sponsors and exhibitors. The Town Square will serve as the gathering place for attendee networking breaks throughout ICA 2014.

Aaron Halpert: Attendees will not be as exposed to our committee's work as they will be to those committees dealing with the education and social program. However, attendees can take comfort that the Finance and Risk Management Committee is addressing and mitigating all of the major risks associated with planning and running such a significant event.

Bob Conger: I would sum it up by saying we are offering great choices: varied concurrent sessions, a good mix of planned tours, activities, and workshops on Tuesday and Thursday afternoons, and a huge array of options for using any free time to explore beautiful Washington, D.C.

What aspect of the ICA 2014 planning are you most proud of?

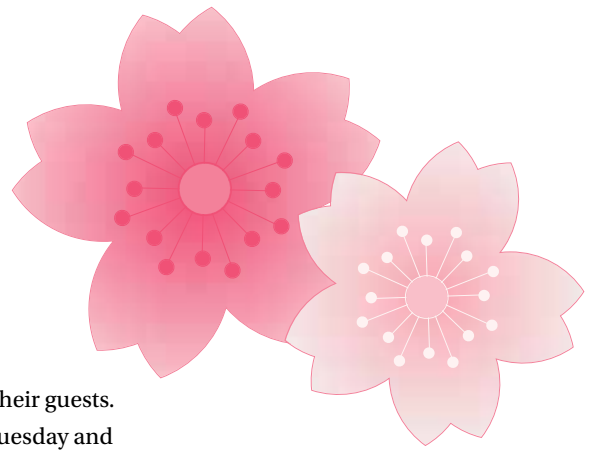
Bob Conger: I've been pleased with the broad involvement of a cross-section of the U.S. actuarial profession in the planning activities. ICA 2014 is being hosted by the five U.S.-based actuarial organizations, and our planning team includes more than 100 people, both actuaries and non-actuaries, who have brought a diversity of perspectives to the design of the conference. We have benefitted greatly from the ideas and expertise of the professional staff at all of the U.S.-based actuarial organizations.

Halpert: To take that thought a step further, we have pooled the knowledge of the sponsoring organizations to develop a robust risk management program for the event. This program can be further used and customized for our own organization's future events.

Hayne: I am proud of our truly global program reflecting interests of the various IAA Sections, as well as the viewpoints of members of the U.S.-based actuarial organizations.

Carlson: We will hear from three tremendous keynote speakers and a wonderful panel of leading CEOs who will provide thought-provoking ideas and comments to attendees from all areas of actuarial practice from around the globe.

Maggie Conger: I'm pleased with the variety of social and cultural activities that we have organized for attendees



and their guests.

On Tuesday and

Thursday afternoon of the Congress

week, attendees can choose from activities like a trolley tour of Washington, D.C., a visit to the [Air and Space Museum](#), or a tour of Historic [Mount Vernon](#), home of George Washington. Additional optional tours are available throughout the week, and we have also organized optional tours for before or after the conference.

Tell me one thing about ICA 2014 that potential attendees should know.

Maggie Conger: While we are offering a wide variety of tours, some of the more attractive tours are limited attendance. So attendees should not delay in registering for the conference and making their tour selections.

Hayne: And if you don't get a spot on the tour you want, we have an alternative. In addition to the tour options on Tuesday and Thursday afternoons, we are offering learning opportunities for a limited number of attendees. I tell you, 85 concurrent sessions plus general sessions just aren't enough for some actuaries I know!

Carlson: Our featured speaker for Wednesday, [Dr. Paul Embrechts](#), drew high praise for his speech at ICA 2010 and a standing room only crowd for a follow-up session later that day. Dr. Embrechts' combination of academic and industry perspectives always draws rave reviews. This is one session you do not want to miss!

Bob Conger: There is so much good content and so much happening in and around the [Marriott Wardman Park](#) that it may be tempting to never leave the hotel neighborhood, but I want to encourage attendees to find some time to explore what Washington, D.C. has to offer. For example, get up early one day and take a sunrise photo tour of the cherry blossoms. Spring is the most beautiful time of year in Washington D.C., with the millions of cherry blossoms typically hitting their peak beauty during the first week of April. It is a fabulous time to enjoy the outdoor beauty of the city, and to take advantage of the ease of walking or public transportation from one historical or cultural attraction to the next.

What would you tell an employer of actuaries who asked you why the company should send members of the actuarial team to ICA 2014?

Carlson: There are few opportunities for North American actuaries to interact with practitioners in the same area of expertise from countries around the world. Having ICA 2014 in the United States provides a low travel cost opportunity to do so.

Just to build on that, Chris, the last time an ICA was held in the U.S. was 1957, so ICA 2014 represents, for most actuaries, a once-in-a-career opportunity to attend without having to travel overseas.

Maggie Conger: And I would stress the number of continuing education credits that can be earned at ICA 2014.

And I should mention that attendees who participate in the full week of ICA 2014 will have access to up to 27 actual hours of continuing professional development (CPD), those attending the first half of the week will have access to up to 18 actual CPD hours, and those attending the second half, 15 actual hours.

Bob Conger: ICA 2014 will provide a richness of continuing education—not only in terms of the quantity, but in the richness of the diversity of ideas and experiences that the speakers and fellow attendees bring to the discussions.

Hayne: No matter where the company is based, actuaries can pick up new ideas from practices in other geographical areas, and also from other disciplines. ICA is the only event that brings actuaries from all disciplines from around the world together in one place.

Halpert: It truly does offer an excellent opportunity to ex-

pose your actuaries to views from companies operating in all global jurisdictions. This is an excellent learning opportunity to broaden one's view on issues that are important to all U.S. insurers, whether they operate globally or only in the U.S.

Finally, let's talk about the location. Why do you think Washington, D.C. is an ideal location for ICA 2014?

Hayne: Washington, D.C. boasts a superb conference venue in the Marriott Wardman Park, amidst sites of cultural and historical significance. The museums of the Smithsonian Institution provide a vast array of historical and artistic treasures while the monuments on the [National Mall](#) provide a sweep of history, both of the U.S. and the world. On top of that, Washington should be decked out in its finest attire, thanks to the gracious gift of numerous cherry trees from Japan.

Carlson: I would add that ICA 2014 will take place during the world famous [Cherry Blossom Festival](#) in Washington, D.C. It is a unique time of the year to experience the museums and other historical landmarks.

Maggie Conger: Where to begin? Washington, D.C. has so much to offer: easy access, delicious restaurants, marvelous museums, and next spring...a great actuarial conference. International travelers should consider that D.C. is centrally located to a variety of other can't-miss cities, like New York and Philadelphia, for trips before or after ICA 2014.

Bob Conger: Washington, D.C. provides a great mix of cultural, historical, recreational, and entertainment options for the attendees—and many of them are easy to get to and free. The city provides a look at many sides and aspects of America. And, the city is quite easy to get to from almost anywhere in the world.

To learn more, visit the ICA 2014 website at www.ICA2014.org today for additional details and register online. ●



EXPLORATIONS BY JAMES GUSZCZA

Data Science and the Future of the Actuarial Profession

I was pleased and honored when Glenn Meyers asked me to write for his celebrated “Brainstorms” column. As we spoke, Glenn commented that perhaps a title other than “Brainstorms” would be a propos, and I agreed. I propose we adopt “Explorations” as the new title. The idea came to me in a fit of free association as I remembered the album of the same name by the jazz great Bill Evans. It better reflects my own approach to topics in actuarial science, perhaps establishes an improvisatory mood, and is at any rate a bit less intimidating to live up to! (Also, I suppose it’s more appropriate for an actuarial column than “Sunday at the Village Vanguard” or “Waltz for Debbie.”) In this and successive columns I plan to explore a number of technical and non-technical facets of our work. I hope to dig a little deeper into our foundations and maybe also to expand our collective focus of attention. And I hope to share the jazz podium with many colleagues. – Jim Guszczka

A few years ago, I wrote an [article](#) on business analytics for a general-interest business publication. I took care to emphasize that while the term is new, the practice of business analytics itself is most certainly not. The practice doesn’t date back mere years or even decades. Business analytics in fact dates back centuries, at least to the first time an insurance company mathematician used data to price contracts. I am thinking of Richard Price, best known as the philosopher and nonconformist

minister who edited and introduced Thomas Bayes’ original paper on inverse probability. Less known is that Price was also in effect the world’s earliest consulting actuary. He constructed a life table and worked on annuity pricing for

als to help price insurance contracts and set aside provisions for future liabilities.

Today, a different—but no less real—dynamic is making data analytics as much of a requirement for organizations in any number of domains. The

The nascent profession of “data science”... is regularly called out in such publications as the *Harvard Business Review* as being one of the glamour professions of the 21st century. Good times for the actuarial profession, no? Well, maybe.

the Equitable Life Assurance Society of London. Price helped train his nephew William Morgan, known today as the father of actuarial science.

Fast forward to today. Business analytics is arguably the hottest topic in business. [Books](#) on “big data” appear on international best-seller lists. And the nascent profession of “data science” (more on this in a bit) is regularly [called out](#) in such publications as the *Harvard Business Review* as being one of the glamour professions of the 21st century. Good times for the actuarial profession, no?

Well, maybe. Insurance companies were early adopters of business analytics thanks to the distinctive nature of their products. Because the cost of providing a unit of insurance is unknown at the time of sale, insurers have always needed to employ quantitatively skilled profession-

exponentially increasing availability of computing power, data, and open source statistical learning algorithms often present surprising opportunities for improved business processes and innovative business models. In domains ranging from professional sports to Hollywood movie production to consumer business to electoral politics, inspired data-driven business strategies enable analytical “haves” to outperform the analytical “have-nots.” In short, the fruits of Moore’s Law¹ have forever changed the general business landscape in ways that play to the quantitative strengths of actuaries. Channeling Milton Friedman, I closed my article with the hopeful

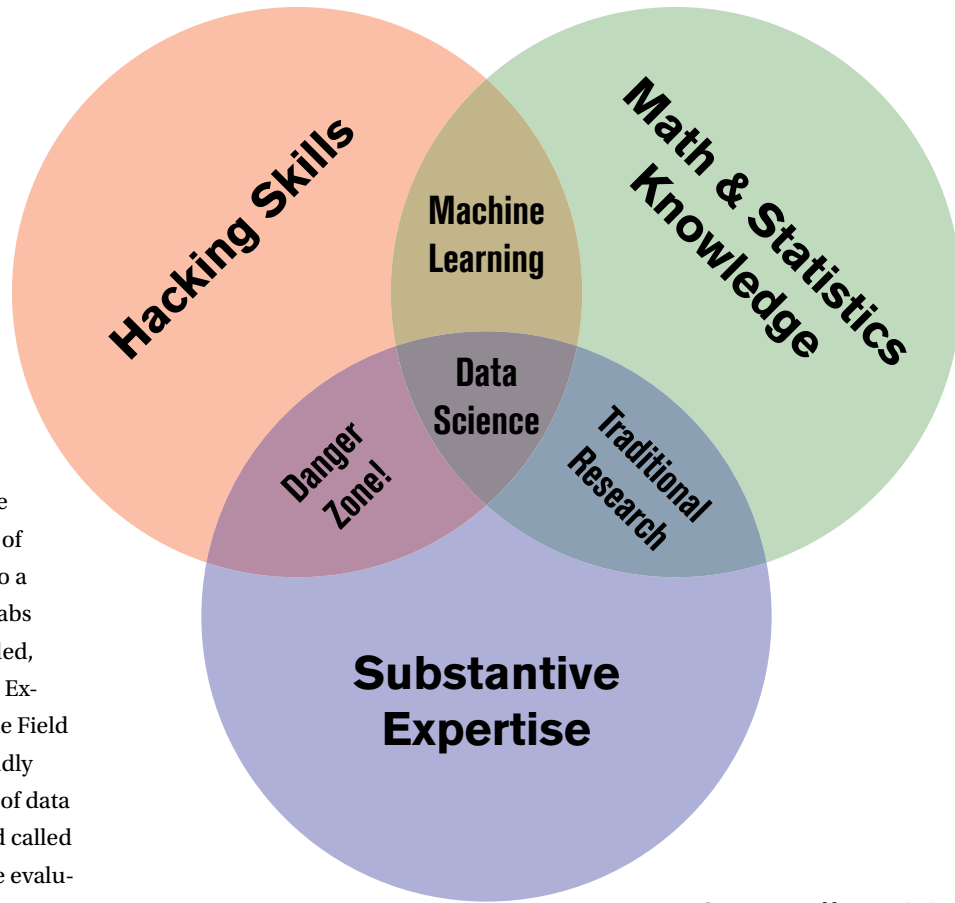
¹ Moore’s law is the observation that, over the history of computing hardware, the number of transistors on integrated circuits doubles approximately every two years (http://en.wikipedia.org/wiki/Moore%27s_law).

declaration, “We are all actuaries now.”

And yet closer examination of the notion of “data science” reveals another side of the story. The newly trendy “data scientist” job title is often credited to the former LinkedIn Chief Scientist [D.J. Patil](#). But to the best of my knowledge, the notion of “data science” in fact dates back to a prescient [2001](#) essay by the Bell Labs statistician William Cleveland, titled, “Data Science: An Action Plan for Expanding the Technical Areas of the Field of Statistics.” Anticipating the rapidly expanding volumes and varieties of data used in statistical work, Cleveland called for “computing with data” and the evaluation of statistical computing tools to be incorporated into university curricula.

It is worth noting that Cleveland is a pioneer of the field of data visualization, and was a Bell Labs colleague of the eminent statisticians John Tukey and John Chambers. Tukey invented the subfield of statistics known as exploratory data analysis (EDA); and Chambers invented S, of which the R statistical computing language is an implementation. Although Tukey invented the term “software,” ironically, he was not a software user. Nevertheless, [Chambers credited Tukey](#) as one of the inspirations for S. Today it is estimated that half of working data scientists use R and that statisticians increasingly regard R as the lingua franca of their field. Clearly, “computing with data” is now part and parcel of modern statistical practice. Cleveland rocks!

The political/data scientist Drew Conway famously telegraphed Cleveland’s core idea with his “[data science Venn Diagram](#).” Conway’s image



©Drew Conway. Used by permission.

Without grounding in statistics, there will be an increasing tendency for professionals to work in the “danger zone” identified in Conway’s diagram.

prompts the several questions: Does the actuarial curriculum and credentialing process produce actuaries who are data scientists? Or are they primarily lodged in the “traditional research” region of Conway’s diagram? Should (many) actuaries be data scientists at all? Does the newfound prominence of business analytics and data science present the actuarial profession with new opportunities? Or new threats?

Today there is a laudable move amongst business schools and other university departments to offer innovative degrees and certifications in business analytics. This is perhaps in partial recognition of the fact that without grounding in statistics, there will be an

increasing tendency for professionals to work in the “danger zone” identified in Conway’s diagram. Massively On-line Open Courses (MOOCs) offer another medium of education that lends itself to the mass training of analytically oriented professionals.

Insurance is a data-rich field, and will increasingly be one of data-driven innovation. And there is little doubt that professionals from a variety of backgrounds will be increasingly well equipped to meet the emerging challenges. Where should the technical core of the actuarial profession reside going forward? In the realm of traditional research or that of data science? ●

Inside *Variance* BY DONNA ROYSTON

For new papers on reinsurance, reserving, risk and credibility, be sure to read [Volume 7, number 1 of *Variance*](#).

“Reinsurance Credit Risk: A Market-Consistent Paradigm for Quantifying the Cost of Risk” by Neil Bodoff advocates that companies should evaluate reinsurance credit risk with a market-consistent paradigm, which manifests two salient features: (1) a probabilistic view of credit risk that assigns costs to low-probability events and (2) a willingness to use market-based instruments for the purpose of quantifying the cost of risk. The proposed market-consistent paradigm facilitates a company’s ability and willingness to measure, hedge and optimize reinsurance credit risk.

“The Theory of Split Credibility” by Ira Robbin tackles the question of why split credibility should be better than credibility without a split. New formulas show how parameter uncertainty is reduced by use of unsplit credibility and how it might be further reduced by introduction of a split. The paper derives the formulas for unsplit and split credibility when losses follow the widely used collective risk model (CRM). It then demonstrates that split credibility can sometimes be ineffective in a CRM context and can sometimes produce negative credibility values or inversions of the primary and excess credibilities.

“Estimation of Tail Development Factors in the Paid-Incurred Chain Reserving Method” by Michael Merz and Mario V. Wüthrich takes a look at claims reserving problems in P&C insurance, when the claims settlement process goes

beyond the latest development period available in the observed claims development triangle. This makes it necessary to estimate so-called tail development factors that account for the unobserved part of the insurance claims. These tail development factors are estimated in a mathematically consistent way. This paper is a modification of the paid-incurred chain or PIC reserving model of Merz and Wüthrich (2010). This modification then allows for the prediction of the outstanding loss liabilities and the corresponding prediction uncertainty under the inclusion of tail development factors.

“Ruin Probability-Based Initial Capital of the Discrete-Time Surplus Process” by Pairote Sattayatham, Kiat Sangaroon and Watcharin Klongdee studies an insurance model where the insurance company has to reserve sufficient initial capital to ensure that ruin probability does not exceed the given quantity α and proves the existence of the minimum initial capital. The results are illustrated by an example in approximating the minimum initial capital for exponential claims.

The current industry standard approach evaluates reinsurance effectiveness by calculating capital cost savings as the product of a fixed capital cost rate and the required capital that is released. Reinsurance is deemed “value-creating”



if the resulting capital cost savings is more than the profit margin ceded to support the purchase—a return on risk-adjusted capital (RORAC) approach. In reality, however, insurers do not typically release capital as a result of a reinsurance purchase. Rather, capital is generally fixed for the planning cycle. Capital cannot be simultaneously fixed and risk-adjusted. “Capital Tranching: A RAROC Approach to Assessing Reinsurance Cost Effectiveness” by Donald Mango, John Major, Avraham Adler and Claude Bunick describes how, instead of a RORAC measure, a risk-adjusted return on capital (RAROC) can be calculated using fixed capital.

For these and other scientific papers, visit <http://www.variancejournal.org/>. ●

RESEARCH NEWS

Working Party on Bornhuetter-Ferguson (BF) Initial Expected Losses

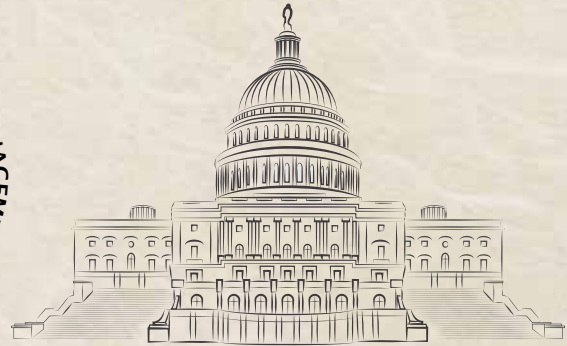
The BF Working Party presented the results of last year's survey at the 2013 CLRS in Boston in September. In addition, the committee presented the results of a study it undertook recently. Using industry Schedule P data, it tested the consistency and efficacy of various BF methods over time and against actual carried industry levels for several lines of business. The main methods tested

for initial expected loss ratios are prior year's ultimate indications, Cape Cod methods and trended loss ratio methods. A follow-up paper outlining the results, including details of the survey and testing, will be published in an upcoming *E-Forum*. —*Lynne Bloom, Working Party Chair*

Tail Factors Working Party

Also in attendance at the 2013 CLRS, the Tail Factors Working Party presented its survey findings, titled "[The Estimation of Loss Development Tail Factors: A Summary Report](#)." The report, published in the *Fall 2013 E-Forum*, summarizes an extensive survey of many approaches being used in the industry to select loss

development tail factors. The paper is organized by several broad classes of methods such as Bondy-type, algebraic, benchmark-based, curve-fitting, open count-based and others. Within each class are presented a description, an example, advantages and disadvantages, and users of each method. The examples use a common set of data; an [Excel spreadsheet](#) will be available with the report that allows the reader to easily follow formulas and delve deeper into the mechanics of the method. Although the report has been a long time in development, the document should prove to be a valuable aid to the reserving actuary. —*Nancy Arico, Working Party Chair* ●



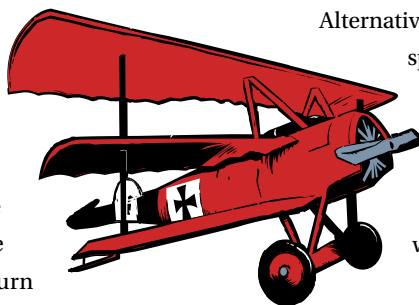
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IT'S A PUZZLEMENT BY JOHN ROBERTSON

Aerial Dogfight

Snoopy and the Red Baron fly past each other only inches apart, barely missing a head-on midair collision. Both are armed with laser pointers mounted on their planes that point only in the direction of motion, at zero angle of attack. Both fly at constant speeds but the Red Baron flies twice as fast as Snoopy. The Red Baron can also turn with triple the acceleration, "pulling three times as many Gs"



as Snoopy. As they pass, the Red Baron turns hard to his right and Snoopy turns hard to his left. Both continue in their turns until one wins by first shining his laser pointer on the other.

Who wins?

Alternatively, if the Red Baron's speed was only nine-tenths, and his turning acceleration only three-fourths of Snoopy's, who wins?

Thanks to Jon Evans for this somewhat surprising puzzlement.

Public Health and Urban Planning

This puzzle involved nurses making public health visits in a city. Nurses visit one resident at a time, leaving from one of 100 clinics (the one closest to the resident) and returning to the same clinic before visiting the next resident. Total travel distance for the nurses to visit each resident is 1 million miles. Increasing the number of clinics to 150 reduced the average round trip travel by two-tenths of a mile. What is the population of the city and what is the area of the city?

Rob Thomas's solution is more or less as follows: If m is the average one-

...very important group is uni- students. I have had the opportu- speak to several actuarial science well as other student groups, the Canadian Actuarial Students Association and Gamma Iota the fraternity for risk manage- insurance and actuarial science After meeting with these tal- lung minds pursuing actuarial I have been left with a very good about the future of the actuarial on. But these visits have also ed for me how important it is for to strengthen our relationships versities.

...oving communications and rela- s with candidates and academ- pp priority in the CAS strategic e reasons behind this objective os. For the CAS to continue to nd grow, we need to continue to he top students. This is nothing t what is new is that we can no- mply tell students the benefits

...other actuarial organizations around the world in developing and supporting ca-

...ademic curriculum in such a way professors support it and the stud appreciate it.

...Another recommendation of t versity Engagement Task Force re es the limited amount of time the members have available to give b the profession. Thus, we are deve a library of presentation material members can draw upon when n campus visit. These materials ran a basic introduction to the casual an profession to case studies th be used as in-depth presentation specific topics. As a result, our lia will have a ready source of mater can be tailored to the specific nee the university.

...order to carry out the recom mitions of the University Engage task Force, we need to ramp up r participation in the academic ou areas. If this is an area that you ar ested in, I encourage you to cont

University Engagement was created and charged with evaluating our current activities related to university students and

Director of Marketing and Comm

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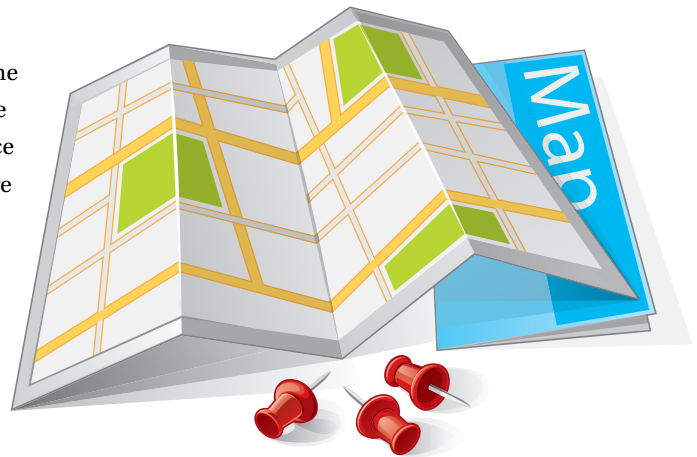
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way mileage for a visit when there are 100 clinics, then $m \sqrt{(100/150)}$ will be the average one-way mileage with 150 clinics. Hence $m \sqrt{(100/150)} = m - 1/10$, or $m = (((3/10))/((3 - \sqrt{6}))) \approx 0.54495$. So the average round-trip distance for each visit is about 1.08990 miles; total mileage is 1 million, so there are about 918,000 residents.

Area is a little trickier and less certain. Rob observes that the streets run east-west and north-south. So, for a resident who lives due northeast of a clinic, the one-way travel distance is about 1.4 times the distance the resident is from the clinic. For a resident who lives

due east of the clinic, the one-way travel distance is the resident's distance from the clinic. I'll spare you the integrals, but I think that the average one-way travel distance from the center to a point in a circle of radius r is about $0.85r$ (it would be $2r/3$ if you could travel directly to each point). So, thinking of 100 circles of radius r for $r = 0.54495/0.85$ miles, and ignoring the issue of overlaps, gives an area of about 130 square miles.



Thanks to Jon Evans for this challenging puzzlement. Solutions were also received from Bob Conger, Brad Rosin, Ryan Thomas and David Uhland. ●

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