



# Actuary ISSUE 32 | MAY 2012 of the Future

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## So I Got My Fellowship: What Now?

By Aisling Metcalfe

**W**hen I first started the exams, I thought that once I finished them I'd know everything I needed to know – now I know better! Exams do provide a good grounding in basic actuarial principles and equip actuaries to continue learning, but in a dynamic financial world with a continually changing regulatory environment, there is always more to learn. Our profession is continually evolving and facing new challenges. Current hot topics, such as how to provide for an aging population, bring actuarial ideas into general conversation.

Fortunately there are several avenues available to actuaries to continue learning. My personal experience is that the best way to learn is on the job, especially when the project requires a subsequent explanation of the project results to a coworker or supervisor. My colleagues have been an excellent source of information, recommending reading material, and explaining the history and reasoning behind a particular issue. Knowing the context of an issue contributes greatly to its understanding. One of the benefits of working in a consulting role is that there are always new projects, new things to learn and new ways to use what you've learned on previous projects. Finally, there are papers produced by the actuarial profession- (I read material produced by both the Society and the Institute of Actuaries), webcasts, conferences and meetings of local actuarial societies – all of which are a great source of learning material.

In addition to continuing technical development, it is important to develop “soft skills” or communication and management skills. Soft skills often receive less attention when a student is concentrating on passing exams but this doesn't reduce their importance in the professional environment. Finishing the exams frees up time to develop other areas professionally and post-qualification is a great time to work on soft skills. For example there are more opportunities for managing projects, people and budgets. Books on management

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To join the section, SOA members and non-members can locate a membership form on the Actuary of the Future Section web page at [www.soa.org/aof](http://www.soa.org/aof).

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## Chairperson's Corner

By Dave Snell

No time for complacency – “I wish my enemy 50 years of prosperity”

As the 2012 Chair of Actuary of the Future Section (AOF), I am both honored and intimidated to be following Jennie McGinnis, who continues to amaze me with her superb organizational skills. Under her leadership we ventured into SOA firsts for webcasts, appointed the first SOA section council intern and produced sessions at every major SOA meeting. Those of you who attended our breakfast at the Annual Meeting saw a list of section accomplishments so long that it still reached the floor when I held it over my head while standing on a chair during our summary skit.

We have a lot to be proud of as we reflect upon the 18 years of the section and upon the six decades of the SOA. Yet, the last thing I would wish us to do would be to become complacent. There is a Chinese saying that “I wish my enemy 50 years of prosperity” the idea is that a long period of prosperity can erode our initiative and our willingness to adapt to changing times. At age 64, I am probably the oldest Chair of this section. I passed my first exam over 40 years ago; and frankly, I wondered how appropriate it might be for such an ancient one to represent the Actuary of the Future Section. Fortunately, I have a young and vibrant council to better connect to our Younger Actuaries Network (YAN), to inject innovative ideas for projects and new member benefits, and to mentor me when my age and experience impede my ability to embrace new thoughts.

Additionally, I feel good about being able to share some insights from the years. Two disturbing trends I have noticed are the declining number of actuaries in the senior management positions of insurance companies, and the tougher job market for both new and newly unemployed actuaries. Perhaps we became a bit complacent. Quants from various other disciplines (CFAs, MBAs, CPAs and various others) stepped in and took portions of the risk management opportunities once dominated by actuaries. One project that we have initiated to address this is a Delphi study to investigate future career opportunities for actuaries. We know, from our complexity science studies, that we get better ideas by networking with kindred spirits and with sections with differing perspectives. This Delphi study will be a joint effort of AOF, Forecasting & Futurism, and the Entrepreneurial Actuaries Sections and we look forward to the power of our combined talents.

The Actuary of the Future Section Council members and friends of the council are excited about Delphi studies, complexity science, new ways of sharing information (like podcasts) and many other tools and techniques we think will better prepare us to remain viable and effective in the world of the future. And that is the purpose of our section – to identify and promote new opportunities, skills, and new ways of thinking to help you, as actuaries, excel on your career journeys.

I'd like to end this column with another Chinese quote - one a little more upbeat:

"If you want one year of prosperity, grow grain. If you want 10 years of prosperity, grow trees. If you want 100 years of prosperity, grow people."

Demographically, AOF has the youngest, and perhaps the most diverse membership. We are the Actuaries of the Future. Let's grow ourselves to make it a great future! ☆



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## Have you used the Competency Framework Self-Assessment Tool?

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across jurisdictions. To anyone considering working abroad post-qualification, I would say – do it! There are challenges and rewards, but for me the rewards have far outweighed the challenges.

A final goal which is applicable to all professionals, not just actuaries, is to attain an appropriate work-life balance! The actuarial profession offers rich rewards, exciting technical challenges and global opportunities, but it also allows opportunities to attain a sustainable career balance. After several years spent concentrating on studying, I aim to spend more time with my family and new baby, while continuing to grow professionally. ☆

theory and practice are useful, as are company-sponsored training courses and mentoring programs. I particularly like to learn by observing people whose style I admire, how they handle difficult situations, how they approach new problems and how they manage their team.



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My personal goal for the near future is to complete the Fellowship Admissions Course and attain membership in the Society of Actuaries by mutual recognition. Moving from England to the United States meant that I had to learn some U.S.-specific material, such as reserving techniques. It was interesting to see how much could be applied from what I'd learned in the United Kingdom. It made me realize how global the actuarial profession really is and how many of the themes are common

# AOF Webcasts

## Recapping our 2011 Webcasts and Discussing our Plan for 2012

by Michael McDermid

**F**or the past two years, I have had the pleasure of working with AOF to plan webcasts aimed at our section members' development needs. The following is a summary of the two webcasts sponsored by AOF in 2011, along with a few thoughts regarding our plans for 2012.

### "HOW TO BE AN EFFECTIVE MANAGER"

Our first webcast of the year was held June 22, 2011 and focused on the skills necessary to be a good manager. This webcast was an extension of the topic first discussed in 2010 on making the transition into a managerial role. AOF cosponsored this webcast with the Management & Professional Development Section. We had close to 70 sites register for this interesting topic!

On this webcast two amazing presenters shared their stories. The first was Stephanie Weist, an associate vice president at Nationwide Financial in Columbus, Ohio and she's also a council member of the MPD Section. In her presentation, Stephanie shared her views on engagement and motivation; two skills every strong manager has.

Our second speaker was Karen de Toro. Karen is a senior manager in the actuarial risk and analytics practice in Deloitte Consulting's Chicago office. Karen spoke about managing employees' growth and development. Multiple case studies were presented to engage the audience regarding potential real-life situations that all managers face.

After the formal presentation, we hosted an interactive Q&A session. In reading through the webcast feedback, this webcast was spot on for our members!

### "A SHIFT IN ACTUARIAL METHODS: INSIGHT FROM THE BEHAVIORAL PERSPECTIVE"

Wanting to tackle a more technical topic, our second

webcast of 2011 covered behavioral economics. Held on Nov. 30, 2011, this webcast introduced the topic of behavioral economics by providing an understanding of the psychological, social and other factors that influence decision making, highlighting specific applications to actuarial problems. With over 90 sites in attendance, this was our most successful webcast to date!

Our first speaker was David Wheeler. David is a recent graduate of DePauw University, earning a B.A. in behavioral economics. David brought a fresh perspective to this webcast – that of the new breed of academic specialists focused on the business applications of behavioral economics.

Our second speaker was Rick Gorvett. Rick is the director of the actuarial science program and the State Farm Companies Foundation Scholar in Actuarial Science at the University of Illinois at Urbana-Champaign. Rick has an MBA from the University of Chicago, and a Ph.D. in finance from the University of Illinois. He shared his thoughts on the implications of behavioral economics on real-world ERM strategy and practice.

Like our other webcasts, we really got into the topic during the Q&A session. Serving as the moderator for the webcast, I was intrigued by the high-level questions submitted by the audience. Based on these questions and the comments in the post webcast survey, this topic was clearly a hit with our members!

... THIS WEBCAST INTRODUCED THE TOPIC OF BEHAVIORAL ECONOMICS BY PROVIDING AN UNDERSTANDING OF THE PSYCHOLOGICAL, SOCIAL AND OTHER FACTORS THAT INFLUENCE DECISION MAKING, HIGHLIGHTING SPECIFIC APPLICATIONS TO ACTUARIAL PROBLEMS.



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### LOOKING AHEAD TO 2012

For 2012, we are planning a number of webcasts for our section, keeping the focus on both career development and technical topics. While still in the preliminary stages (using the same joke I used last year, please note that I'm writing this while the Leafs still have a chance to make the playoffs! – or late February for you non-hockey fans), we wanted to share our plans for 2012.

Building on the success of the “Making the Transition” series, we are looking at a summer 2012 webcast on other career development skills. Possible subtopics to further delve into include leadership, communication and other management skills.

To focus on the technical side, AOF is currently working with the Technology Section to co-sponsor a webcast

series on spreadsheet best practices and a variety of subtopics related to spreadsheets. For those of you planning to attend an SOA meeting this year, you may have noticed that the AOF and Technology sections are co-sponsoring meeting sessions on this topic. We are hoping to use the webcasts and meeting sessions as multiple ways to reach our members.

Finally, we are looking at the possibility of a late fall 2012 webcast on complexity science. Recognizing that AOF has been a leader on discussing this topic within the SOA, we feel that we are in a great position to host a webcast to introduce this topic to our members.

Again, please note these may be subject to change. If you have any suggestions for topics/speakers, please do not hesitate to let us know; you can reach us at [aof@soa.org](mailto:aof@soa.org).

### THANK YOU!

Similar to last year, AOF would like to formally thank the SOA for all their hard work in bringing these webcasts to life. The behind-the-scenes work performed by the SOA was invaluable. In particular, Amy Wojcik was instrumental in ensuring the success of both of our 2011 webcasts. Thank you for all your help and we look forward to working with you in 2012! ☆



# What Isn't an Actuary?

by Mark Mennemeyer

**B**y now we've all heard the jokes and misconceptions about what an actuary is: A place for dead actors; someone who studies birds; that guy played by Ben Stiller (or was it Will Ferrell?) in that "Polly" movie—you know, the one with the magic computer or whatever. I used to joke that I spent my day "actu-ating," until a friend politely informed me that such a word already existed, and it had no relation to my daily work. For a career that consistently receives top rankings in criteria such as employment opportunities, income and workplace environment, the actuarial field remains relatively unknown.

For a long time I shared the confusion. Prior to becoming employed in an actuarial field, I would have struggled to explain what an actuary was, had anyone bothered to ask. However, after gaining some experience, I quickly came to realize that the actuarial profession spans many areas of knowledge, and perhaps a better question might be: What isn't an actuary?

Let's begin with a simple definition of an actuary: a professional who uses statistical analysis to quantify and manage risk, often in a financial or insurance context. For ease of discussion, I will generally assume a U.S. life insurance context. Performing these tasks involves some use of standardized processes (e.g., the calculation of regulatory capital requirements is largely determined by prescribed methods) combined with a large amount of professional judgment, subject to actuarial guidelines and other best practices. As a result, an actuary must have a working knowledge of many professional areas, each of which I will explore in more detail.

One key topic is accounting. Insurance companies face many financial reporting requirements, and an actuary often plays a prominent role in adequately meeting these requirements. Shareholders require statements prepared according to Generally Accepted Accounting Principles (GAAP), regulators require statements prepared according to regulatory requirements (which vary by state!), and many companies also prepare additional metrics for



internal or rating agency reporting. These requirements do not simply refer to the structure of the financial statements, but to the broader set of assumptions and calculations underlying the statements. A good example of this is Statement of Financial Accounting Standard (SFAS) no. 157, which defines "fair value" valuation principles. Already complex in its own right, SFAS 157 has further interactions with other key statements, such as SFAS 133 (accounting for derivatives and hedging), and an actuary must ensure that actuarial valuations are consistent with all of these frameworks when performed for reporting. Furthermore, an actuary must understand these frameworks when reading income statements or balance sheets prepared by someone else. With expertise in areas such as these, is an actuary an accountant?

Another key topic is taxation. There are many tax implications associated with issuing or owning an insurance policy, and actuaries involved with product development and pricing must understand these issues. For example, Sections 7702 and 7702A of the Internal Revenue Code define the requirements for qualification as life insurance, which allows for favorable tax treatment on death



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benefits and cash value distributions. Most of these requirements focus on the relationship between premium levels and death benefit amounts, and both marketing and administrative perspectives dictate that the actuary should design products to remain within the legally defined boundaries. The first step, of course, is to understand the details and legal technicalities associated with the tax code, which leads to the question, is an actuary a lawyer? A tax ?

Another key topic is computing. The past decade has shown tremendous advances in computing power, and risk management practices have largely embraced these new abilities. Although—thanks to the central limit theorem—it was once acceptable to build models that focused on averages (average mortality, average portfolio yields, etc.), the increasing complexity of insurance products and the more recent financial crisis have shifted the focus to tail risk associated with low frequency, high severity events while highlighting the need for advanced stochastic models. Actuaries have stepped up to the challenges of implementing these models, and many have developed a working knowledge of concepts such as distributed processing and computing grids, not to mention “fluency” in multiple programming languages. With all of these technological advances underway, is an actuary a computer scientist?

A related component of risk management practices is the ability to hedge market based guarantees, such as those frequently embedded in variable annuities. Armed with stochastic models and market indicators, actuaries are called upon to design effective hedging strategies. One technique for developing these strategies might involve studying “the Greeks,” that is, measurements of the sensitivity of derivative prices to movements in underlying parameters. Another technique might involve the development of a replicating portfolio—a portfolio of tradable assets that mimics the behavior of a given set of insurance liabilities. If these techniques sound familiar, it is probably from taking a quantitative finance course.

Does that mean an actuary is a quantitative analyst? An investment manager?

Despite a natural focus on actuarial roles within the insurance industry, many actuaries find a range of opportunities available to apply their skills in nontraditional roles. Actuaries serve as nonprofit organizers, teachers, and marketing directors, just to name a few, and I know at least one actuary who runs a successful food truck. I personally expect nontraditional actuarial employment to grow significantly as wider uses for actuarial skills come into demand.

In summary, what isn't an actuary? Of course I admit that an actuary isn't really a substitute for any of the other professions listed here. Most of us are not formally qualified to give legal advice, audit financial statements, or design computer systems, and it would be irresponsible to believe otherwise. However, actuaries frequently do develop skill sets that overlap with those of accountants, lawyers, teachers, investment managers, computer scientists and many other professionals. These skills enhance an actuary's ability to analyze risk, and they can be leveraged for effective communication with a broad range of audiences. By continuing to develop advanced techniques and unique insight, actuaries will be well positioned to add social and economic value across many disciplines in the future. ☆

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**"Sessions were great! Loved the smaller groups and wide range of topics!"**

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# Will Computers Ever Overcome the Need for Actuaries?

by Bruno Caron



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Through their Grammy award winning album of the year, *The Suburbs*, Arcade Fire expressed their interest in technology in the song *Deep Blue*: “You could have never predicted that it could see through you Kasparov, Deep Blue, 1996”<sup>(1)</sup>. In 1996, Gary Kasparov, the number one chess player in the world at the time, beat Deep Blue, a computer programmed by an IBM special team, at a game of chess. A year later, an improved version of Deep Blue won over Kasparov. This event triggered many discussions on where artificial intelligence stands, and begged the ultimate question: will computers ever be superior to human beings? Many machines have replaced jobs in the last century, both white and blue collar. How will this evolve in the future and where do actuaries fit in all of this, are questions this article will explore. I was asked in a casual conversation if computers would ever replace actuaries. My first reaction was: never! I started thinking a little more about it, and let’s see if a closer look at the topic will change my mind...

Chess is an interesting “man machine” combat, given the need for strategy and visualization. The human against the computer chess battle was somewhat of a close match (1996: 4-2 Kasparov and 1997: 3.5-2.5 Deep Blue). Many similar chess competitions took place from that day to today, but this one was particularly interesting, because it was the first time a computer beat the best chess player in the world in an official match under standard rules. Deep Blue was able to process 200,000,000 positions per second. In contrast, experts estimated that Gary Kasparov was able to analyze three positions per second. It naturally follows that the computer can analyze 12,000,000,000 positions in a minute. Can we do the same simple linear interpolation for a person? I have my doubts about it: given the presence of emotions and feelings, the human brain

doesn’t work as steadily as a computer. The number of possible chess games is astronomical. Even sophisticated computers can’t go through all possible combinations of positions through brute force (at least not yet...). A computer can calculate and analyze many positions quickly, but it looks like humans (well, at least Gary Kasparov) was able to find the right moves and positions without having to go through all possible scenarios. With experience, knowledge and good judgment, Kasparov was able to narrow down good future moves to a smaller subset and analyze those moves without going through all the possible combination of positions. It is hard to determine which set of “skills” is better. The battle was ferocious and even a bit , but most importantly, what can we really conclude from that?

Let’s try a different angle. What do a high school student, a rocket scientist and a painter have in common? They all use a traditional calculator to do their homework, analyses and taxes respectively. It’s a tool virtually everyone uses to a certain degree. Between the traditional calculator and the human brain, which device would you place a bet on computing the following expression the fastest within 10 decimal places:  $1,984 \times 4 / [\ln(12)]^{0.5}$ ? My money would be on the calculator (at least if my brain was competing...) Does that mean that the machine is superior to man? In terms of performing this calculation, yes, I would say that the calculator is better. But human beings created the calculator. So which one is “smarter”? Does asking this question even make sense?

Again, let’s have a look at another context: the invention of the car. When the automobile was invented, were people scared of the new invention, thinking: “Will the machine get better than mankind”? Obviously I was not around to posit this, but some people could have had the following reaction: the machine is getting stronger and faster than human beings, this is scary! Like chess, a contest could have been organized (and may have happened): the machine against the 100 meter world champion. In our era, I don’t feel that people have an inferiority complex

THE COMPUTER CAN ANALYZE 12,000,000,000 POSITIONS IN A MINUTE. CAN WE DO THE SAME SIMPLE LINEAR INTERPOLATION FOR A PERSON?

toward cars or trucks which can go faster from one point to another and carry heavier loads of cargo than them.

In the construction and manufacturing world, machinery has evolved in the last few decades. The eternal question “Will robots ever replace the need for human labor?” has always aroused opinions. But if we look around, does every single individual have an adequate place to live? Is every single house of every neighborhood of every suburb and cities with children in perfectly renovated? Most would agree that the world would be a better place if every abandoned piece of land or building could be replaced by green grass or a place where kids could play baseball (or ice rinks for Canadian kids so they could play hockey...) But yet, the answer to the robot question is no. So there is still a very present need for human labor! With the improvement of technology, construction projects require less human intervention making the end product more accessible economically to more individuals and families, freeing up human resources, now needed given more households have access to it.

In the same way, as computing technology improves, actuaries find themselves manually computing less and analyzing more. It is clear that technology has changed the role of actuaries over the decades, just like it has for virtually every other profession in one way or another. Actuaries have been affected, particularly given the many calculations required to perform most studies. As technology improves, the human computation part of the job decreases to leave room for more sophisticated evaluations in a wider range of contexts. A few decades ago, actuaries needed to spend time calculating by hand or calculator what modern actuaries can get instantly. No matter where computing power leads us, insurance and retirement income is used by people. The hard part of the analysis performed by actuaries is naturally not the actual computing of the calculation, but more the understanding and explaining of the calculation, results, magnitude and direction. Once that’s understood, one needs to make a judgment on how that fits into the surrounding social,

demographic, economic and regulatory environment and understand choices available and consequences. The work performed ultimately affects other human beings such as the actuary himself, which leads me to believe that actuaries will always be needed.

Understanding the calculation is the important thing. For example, if one punches  $3 + 4$  on a calculator, the result 7 does not tell much if the user does not understand the concept that if he has 3 apples in a bag and 4 apples in another bag, and then combines the content of each bag into a single bag, he will end up with a total of seven apples. The same is true for actuaries: if a software program calculates a certain reserve under certain assumptions, no one can actually make good use of the figure if he doesn’t understand the concept, purpose and manner in which it was calculated.

Virtually all actuaries perform modeling in one way or another in their work. Box once said: “All models are wrong, but some are useful”<sup>(2)</sup>. Models do not provide an exact prediction of the future. They provide a good sense of direction and magnitude, but a good modeler understands the limitations of the models he created. Further, black box analyses are usually useless, because they can’t explain anything, so it’s pointless to provide a review on something if a discussion on results is not possible. Opinions, discussions and visions are what actuaries really bring to the table. The interaction between the input and the output is the fundamental basis that will forge a meaningful opinion. Model sprawling can give a false sense of security. A good modeler needs to achieve the right balance between details and simplicity, which again requires judgment. So the machine itself is not the essence of the work; it’s only a tool.

Pension and insurance liabilities are estimated based on future human actions, behaviors, the economic environment, randomness and countless other factors. Those liabilities have to be backed by assets that need to be invest-

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ed in a way that meets those liabilities. Those investments will always be estimates and depend on a number of factors. Complex situations will always require judgment which is something computers can't do.

The liabilities that insurance companies assume on behalf of their policyholders are complex and usually unknown. Equally complex are retiree pension liabilities that employers assume through a pension plan. These benefits (and corresponding liabilities) inure individuals who don't necessarily have the background to analyze whether or not the liabilities established are sufficient to keep the promises made to them. This is why regulators exist. Regulators consist of individuals with appropriate knowledge and expertise who act in the interest of insurance policyholders and employees. Here again, computers just can't come up with laws, limits and regulation in a dynamic and always changing world. They need to understand human behaviors on top of the knowledge and expertise of the domain.

Buying insurance policies and getting retirement benefits fulfill normal human needs. As long as individuals and families seek those needs, judgment will always be needed in order to make an opinion. But until everyone has optimal insurance coverage and a reasonable retirement plan, society will need actuaries to use their in-depth knowledge and skills to adapt to the current situation. Humans will always rely on other humans to build, understand and adapt their habitat, whether it is to build a house or insure it.

Hopefully, it is clear that both my first and second impressions led me to the same conclusion. As long as machines do not get a place to live, go to church, date, vote, buy goods, stocks and bonds, people will never be surpassed by machines and computers. Even IBM recognizes that their computer is not close to replacing any human any time soon: "Deep Blue is stunningly effective at solving chess problems, but it is less "intelligent" than even the stupidest human."<sup>(3)</sup>

Further, I think humankind should be proud of the positive machines they have built and developed to make the world a better place. If machines can perform tasks that humans used to perform, machines allow workers who formerly used to perform those tasks to be useful in society in a different way and allow more people to benefit from it in the long run. Knowledge, expertise, studies, experience and hard work by humans can never become obsolete and can only improve our environment assuming that the intentions are in the right place. Going back to the Deep Blue example, experts agreed that a reasonably good chess player who had access to the computer would beat any grand master easily. The combination of machines and human actions is what allows us to build and accomplish more in every context of life. Chess computer programs of today easily beat any chess grand master. Serious chess players usually view this as a positive thing as they now have an extra tool to practice, develop and shape their game. In fact, many experts believe that computers elevated the general caliber of the game of chess, since computer programs are readily available.

In parallel, computers allow actuaries to do more, otherwise they wouldn't be used in the workplace. Society will always need protection and face contingencies (through insurance, retirement income, investment, risk management and whatever the future brings). These protections can become quite complex. The actuaries' challenges will be to adapt to the current environment and gauge how to use their skills the best possible way, and I believe that computers will be a tool, not a threat. Humans will always need other humans to understand them, and the need for technical skills and mathematical reasoning combined with a good comprehensive view of the environment can always be put to good use.

Last time I checked, no political party wanted to grant Social Security numbers to computers, so we should be good for a while... ☆



HUMANS WILL ALWAYS NEED OTHER HUMANS TO UNDERSTAND THEM, AND THE NEED FOR TECHNICAL SKILLS AND MATHEMATICAL REASONING COMBINED WITH A GOOD COMPREHENSIVE VIEW OF THE ENVIRONMENT CAN ALWAYS BE PUT TO GOOD USE.

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#### REFERENCES

- Band "Arcade Fire", Album "The Suburbs", Song "Deep Blue"
- Box, G. E. 1976 Science and Statistics, Journal of the American Statistical Association, 71:791-799
- <http://www.research.ibm.com/deepblue/meet/html/d.2.shtml>
- <http://www.research.ibm.com/deepblue/meet/html/d.3.shtml>
- <http://www.research.ibm.com/deepblue/watch/html/c.10.shtml>
- <http://www.research.ibm.com/deepblue/watch/html/c.shtml>
- [http://en.wikipedia.org/wiki/Computer\\_chess](http://en.wikipedia.org/wiki/Computer_chess)
- Jayanti, Vikram, Documentary: "Game Over: Kasparov and the Machine"

# The Future of Our Industry

by Liz Mennen



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Actuaries are asked to make predictions every day. *How much is needed to keep this pension sufficiently funded? What is the present value of this company's future profits? What if interest rates drop 5 percent?* This is the nature of our work, and the implicit complexity and mystique of making such predictions is likely a large reason why we became actuaries in the first place.

What about predicting the future of *our industry*? Not exactly a simple task; especially without a way to make Excel or financial modeling software help us. I chatted with some senior actuaries, across specialties and lines of business, to hear their opinions on the matter. My expert panel included: John Fenton, a director in Towers Watson's (TW) life insurance consulting practice; Joan Barrett, a vice president and actuary in UnitedHealthcare's national accounts group; Russell Gao, an associate within Goldman Sachs' global insurance asset management group; and Frank Sabatini, presi-

dent of Sabatini Advisory Services, LLC, and a member of the SOA .

These four experts possess pleasantly optimistic outlooks regarding the future of our industry. John Fenton of TW foresees plenty of work to keep us busy in the traditional actuarial fields going forward. In particular, he predicts a continued flurry of activity in individual life and annuities, as well as the group and health, markets. Additionally, he notes that financial reporting and product development are becoming more and more sophisticated, and reminds us to stay aware of the challenges inherent in adapting to these changes.

Joan Barrett of UnitedHealthcare also shares a positive view on the future of our industry. She believes that actuaries are very well-positioned for what lies ahead because we understand risk, statistics and most importantly, the *application* of these metrics to our day-to-day work.

Joan believes that our preparedness for the future is rooted in the balance between our rigorous technical training and our understanding of its *application* to the real world.

Russell Gao of Goldman Sachs agrees that this balance is a significant advantage going forward. After obtaining his FSA, Russell decided to pursue a Masters of Financial Engineering and explore opportunities within this nontraditional realm. Looking back on his experience, he remembers that recruiters within the financial engineering front “loved” candidates with an actuarial background, due to their strong statistical training which is uncommon in candidates with the more common physics or engineering degrees.

According to Russell, crossing over into nontraditional actuarial roles can open a wealth of new opportunities in the future. Russell has first-hand experience doing so, and from his perspective, there are plenty of potential roles for an actuary in an investment bank. One such role could involve the trading function of an investment bank, where an actuary would use his or her actuarial modeling skills to price mortgage backed securities using prepayment tables. Prepayment tables quantify prepayment risk, which is cumulative and needs to be modified based on experience, so they function similarly to mortality tables in pricing a life insurance policy. Another potential role concerns asset-liability management, where actuaries could use their thorough understanding of insurance companies’ financials to assist in asset-liability management for the bank’s insurance clients. It is important to note that this role differs from a traditional actuarial role because it is largely focused on the *assets* rather than the liabilities, although the traditional knowledge of liabilities and regulations would help in designing portfolio strategies for the insurance company’s assets. Russell points out that many nontraditional actuarial opportunities involve applying/leveraging classic actuarial training to new situations, that is: same formula, different  $q_x$ .

The potential for growth in nontraditional actuarial fields is also recognized by Frank Sabatini of Sabatini

## THE SKY IS THE LIMIT FOR FUTURE ACTUARIES TO APPLY THEIR TRAINING TO NON-TRADITIONAL FIELDS.

Advisory Services. With particular expertise in enterprise risk management, Frank has noticed the growing role of actuaries in risk management, and believes this trend will continue, especially if we cross over into nontraditional roles. He is convinced this crossover can happen, though there is uncertainty around when and how. Frank says the challenge for the SOA is to “figure out what it takes,” and adapt the curriculum and accreditation process accordingly so actuaries are even more desirable across multiple industries.

John also acknowledges the uncertainty regarding an actuary’s role in a nontraditional environment going forward. The big unknown, he asserts, is going to be fulfilling the risk management role in non-insurance companies. Over how broad a spectrum can we apply our specialized expertise? According to Joan, we can contribute much more risk analytics to other industries—manufacturing, for example—though there is also room for growth and development in tools used for advanced business analytics. As it appears from these experts, the sky is the limit for future actuaries to apply their training to non-traditional fields.

Growth and development outside of the United States was also highlighted by many of these seasoned professionals. Frank notes that we are on the verge of having 10 actuarial associations worldwide, and that the SOA has adopted a strategy to grow internationally. He believes that the pattern of crossing over into other industries will happen first *outside* the United States, as examples are already prevalent in countries like the United Kingdom. John also notes the prominent growth in the Asian and Brazilian insurance markets, and the opportunities for actuaries that arise from this growth. Many of the major industry players are focusing on international expansion, which affirms even more

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forcefully that the international markets are likely to be a key opportunity for the future.

These experts were also asked to share their perspectives on how the current FSA tracks relate to their outlooks on the future of the actuarial industry. Many point to the Group and Health track and its indubitable relevance to the economy today. There is a huge need to understand and analyze the costs of companies, as Joan points out, as well as to measure the related outcomes. The Finance/ERM track remains a popular choice for these seasoned actuaries, as they believe that a knowledge base of ERM is becoming more and more crucial. Additionally, the CERA designation merits attention, as it is gaining popularity and can be achieved along with an FSA.

As a relative newcomer to the actuarial profession, I could not help but probe these senior actuaries for any advice they felt generous enough to pass along. Their

message was relatively simple, but empowering: always be open to new opportunities, and gain exposure to as many projects/fields as possible. Learn the basic principles of actuarial science and how to apply these across many lines of business, without getting too enamored of one particular subject. If you are toying with the idea of crossing over into a nontraditional position, it is still valuable to go through the arduous exam process and start out in a traditional role in order to learn the skills and to gain knowledge of the industry. Lesson learned: as long as we keep doing what we are doing—challenging ourselves to stay at the forefront of risk management methodology and actuarial applications to the industry—our future will remain bright.

*Disclaimer: The views and opinions expressed in this article are the personal views of those interviewed, and do not represent the views of their employers. ☆*



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Join the SOA Actuary of the Future LinkedIn group.

Go to LinkedIn.com and search for Actuary of the Future Section.

# Did (x)'s Future Lifetime Just Get a Little Less Random?

by Maambo Mujala and Rick Balgobin

If you could find out when you were going to die, would you want to know? Groundbreaking research done within the last year aims to tell patients exactly that, with a test to determine how long you have left to live poised to hit markets in Britain.

The test measures the rate of degradation in a person's telomeres, structures found on the tips of chromosomes, and determines how fast a person is biologically aging. Based on the assumption that the length of telomeres correlates with the rate of a person's biological aging, researchers seek to offer individuals some insight into just how much longer their bodies can hold up.

Scientists believe telomeres are one of the most important and accurate indicators of the speed at which a person is aging. Every time chromosome replication occurs in your cells, the ends of your chromosomes become shorter, deteriorating and becoming more susceptible to damage (Singer 2011). Thus, rather than risk losing delicate genetic information during replication, your chromosomes become tethered with telomeres at their edges, which get shortened instead. Research has shown that those with shorter than normal telomeres have shorter than average life spans than those with longer telomeres.

The miracle test is simple; only a blood sample is required. However, it's not hard to imagine that such accessible testing can create a severe case of anxiety in patients, which is something critics see as a problem.

Insurance companies may move to mandatory telomere testing to help secure their life blocks, leading to inevitable discrimination of those with shorter telomeres. It may also stoke the public's fear of death. Customers unfamiliar with telomere biology might be lured in by the promise of false anti-aging remedies. "Miracle cures" may be offered to reduce telomere degradation and increase life expectancy.

The test would benefit responsible, health-conscious consumers who might have been disadvantaged by high premiums based on their chronological age. Not to

mention boosting the effectiveness of preventative care, as well as helping doctors to become more proactive in treating and predicting the onset of conditions like Alzheimer's, cancer, obesity and cardiovascular disease (Pollack 2011).

"Knowing whether our telomeres are a normal length or not for a given chronological age will give us an indication of our health status and of our physiological 'age' even before diseases appear," says María A. Blasco, who heads the Telomeres and Telomerase Group at the Spanish National Cancer Research Center and who co-founded the company Life Length in September 2011 (Braconnier 2011).

The test is not meant to be a diagnosis or a prognosis, according to Calvin B. Harley, Telomere research pioneer and co-founder of Telome Health, but rather a tool to help people make "personal lifestyle decisions" regarding diet, exercise and stress. The knowledge of one's probable lifespan could lead to fatalistic thinking resulting in a lack of desire to curb unhealthy habits such as smoking.

**INSURANCE COMPANIES MAY MOVE TO MANDATORY TELOMERE TESTING TO HELP SECURE THEIR LIFE BLOCKS, LEADING TO INEVITABLE DISCRIMINATION OF THOSE WITH SHORTER TELOMERES.**

The test is currently costly, at approximately \$700, though it is a cost that's likely to decrease as the test becomes more available and public demand increases. However, the best way this innovative research can be utilized is to measure the rate at which telomeres shorten, requiring several tests over a period to generate a time-frame of telomere loss. Acquiring such a detailed picture would prove to be too expensive and time consuming to both insurer and the consumer. Also accidental death would be still left unaccounted for.

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Another reason telomere testing isn't widespread is lack of uniformity across any group of people. There is an accepted average range of telomere length at certain ages, but many healthy individuals naturally have telomeres that fall outside of that range. A person could possess shorter telomeres without having a heightened propensity toward early death. As with every other health issue, telomeres do not always fall within the expected range.

While the blood test offers numerous benefits, this new technology would take several years to be implemented in the underwriting of insurance policies. The best way to take advantage of this new technology is to take multiple blood tests over a few months to observe the rate of deterioration of one's telomeres. This, however, would increase the cost of underwriting.

In conclusion, while the current research into telomeres is quite exciting, even promising, its real-world, widespread application is far from being realised. With several reliability and standardization issues to be addressed, insurance companies will remain understandably hesitant in considering its involvement in underwriting. It's business as usual with average death rates remaining the prevailing method of predicting mortality in actuarial science.



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#### A TELOMERE TIMELINE (CONNER, 2011)

**2003:** Scientists show that telomere length is a good indicator of whether a 60-year-old is likely to reach age 75 by studying 20-year-old blood samples from 143 people.

**2004:** Research indicates that some types of stress reduction, such as meditation, may lengthen telomeres. Women with chronically sick children are found to have shorter telomeres.

**2007:** A study of Scottish men reveals those with the shortest telomeres were twice as likely to develop heart disease as those with the longest. Telomere length was

shown to be as accurate as levels of cholesterol at cardiovascular disease risk prediction.

**2009:** Inherited bone marrow disease is linked with short telomeres.

**2010:** Genetically modified mice with no telomerase (an enzyme that maintains telomere length) age much more quickly than normal mice. This was shown to be reversible via injection of telomerase.

**2011:** A study in the UK shows that civil servants with more educational qualifications have longer telomeres than those with less educational qualifications. People from rich backgrounds have been shown to age slower compared to less well-off families. ☆

#### WORKS CITED

Steve Connor 2011, 'Moralists see red over longevity test', *New Zealand Herald*, 21 May, viewed 11 February 2012, <[http://www.nzherald.co.nz/science/news/article.cfm?c\\_id=82&objectid=10727090](http://www.nzherald.co.nz/science/news/article.cfm?c_id=82&objectid=10727090)>.

Thea Singer 2011, 'My, What Long Telomeres You Have', *Scientific American*, 7 April, viewed 19 February 2012, <<http://www.scientificamerican.com/article.cfm?id=my-what-long-telomeres-you-have>>.

Andrew Pollack 2011, 'A Blood Test Offers Clues to Longevity', *The New York Times*, 18 May, viewed 19 February 2012, <[http://www.nytimes.com/2011/05/19/business/19life.html?\\_r=2&pagewanted=all](http://www.nytimes.com/2011/05/19/business/19life.html?_r=2&pagewanted=all)>.

Braconnier, D 2011, 'New blood test shows how long you will live', *Medicalxpress*, weblog post, May 17, viewed 19 February 2012, <<http://medicalxpress.com/news/2011-05-blood.html>>.

# New Tools and Techniques for Actuaries Living in a Complex World

by Dave Snell

Actuaries are very good at building mathematical models to simulate the financial impact of real world risks. It is important to remember though, that a model is not reality. If it were, it would no longer be just a model.

When we build our models, we have to make simplifying assumptions. We assume a set of variables to represent the real world situation. Then we assume the values of these key variables and the relationships between them. Over the years, our actuarial models have served us well. Sometimes, however, we discover that the world does not conform to them as well as we had hoped and expected.

Complexity sciences provide complementary ways to test, or extend our models to address situations where classical deterministic mathematical techniques sometimes do not adequately anticipate unusual situations. Nassim Taleb, in his popular book, *The Black Swan*, contends that financial models are defective in that they seem to be unable to predict the occurrence of highly improbable but very significant events. We believe that actuarial models are useful and necessary, but perhaps not sufficient to cover these outlier events that can have a great impact on results, yet occur under unusual circumstances. It is not likely that we will ever be able to accurately model the world well enough to predict all the outlier events. A goal of complexity tools is to help us anticipate them a bit sooner than usual – perhaps soon enough to develop mitigation strategies so that their impact is not as severe.

Examples abound: Many lives could have been saved if the Katrina hurricane disaster could have been anticipated a few weeks sooner. The economic crisis of 2008 could have been lessened if the collapse of interrelated securities markets could have been more widely noticed sooner.

Over the past 25 years, several other fields of study have been embracing inductive techniques that seem to take a bottom-up rather than top-down look at the complex

relationships of our increasingly complex world. Some have categorized them under the general heading of complexity science (or even complexity sciences) since they attempt to recognize some aspects of the complex nature of interrelationships. Below I describe a small group of terms that have gained favor in sociology, physics, engineering, anthropology and several other fields of study. We feel that they should also be of interest to actuaries. The important point is not whether they fit a strict definition of complexity science (which is still under debate), but whether they may be of use to you as a complement to your classical deterministic actuarial techniques:

**Deterministic Chaos** – One of the early population growth equations, the logistics map, was published in 1838. It is a very simple equation:  $x(t+1)=R*x(t)[1-x(t)]$ , where R is a constant, and x(t). When R is small, say R=2, it does not matter what starting value you choose



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for  $x(0)$ . The resulting iterations will always converge to a single attractor of 0.5. As  $R$  increases every so often, according to Feigenbaum's constant (4.6692016) the number of attractors doubles and the later iterations oscillate between them. Once  $R$  reaches 4, the later durations become hypersensitive to the starting value. A starting value difference of 0.000000001 will have very noticeable impact on the later duration values. The implication for actuarial models, which may be far more complicated than the logistic equation, is that very small variations in starting values may have huge unforeseen consequences. Read more about the science of *Chaos Theory in Chaos: Making a New Science*, by James Gleick.

## IN THE LIFE ACTUARIAL ENVIRONMENT, PREDICTIVE MODELING IS A POTENTIALLY USEFUL TOOL, BUT MANY PEOPLE HAVE RAISED CONCERNS ABOUT ITS APPROPRIATENESS FROM A LEGAL AND ETHICAL CONCERN.

**Predictive Modeling** – In many actuarial models, we look at data and 'fit' this data into a mathematical model that presumes a deterministic causal relationship.  $Y$  is some function of  $X$ . The relationship is then used to predict a future outcome. In predictive modeling, the underlying data may or may not have some discernible causal relationship, but the outcome can be inferred from the clustering of the data itself. In essence, the data becomes the model. Auto insurance companies have embraced this technique and use it extensively. In the life actuarial environment, predictive modeling is a potentially useful tool, but many people have raised concerns about its appropriateness from a legal and ethical concern. Predictive modeling texts abound and are often found under searches for detection theory, data mining, and customer relationship management.

**Network Theory** – Networks cross many science boundaries and the key elements go by many names: vertex and edge (geometry); site and bond (physics); website and

hyperlink (); neuron and synapse (anatomy); actor and tie (sociology) etc. but the basic idea is that a network has locations and it has connections between those locations. The strength of a network is its usual fault tolerance. Random hits may take out as many as 80 percent of the locations and the network will still have functionality. The weakness of a network is its vulnerability to targeted hits. Some locations have far more connections than others and targeted hits may take out just one, or a few of them and cause chaos. Network theory applies way beyond computer networks – to power grids, supply chains, air traffic and organizational dynamics. A good start on network theory can be found in *Linked: The New Science of Networks*, by Albert-Laszlo Barabasi.

**Fractals** – Fractals have emerged as a lot more than pretty pictures. In recent years we have learned that many aspects of life, such as trees, our lungs, and life itself – our DNA strands, all follow a fractal pattern. Furthermore, many mathematicians make the argument that stock prices and financial instruments exhibit fractal tendencies. Fractals involve what are called fractional dimensions, which are a disturbing deviation from the Euclidian geometry we learned in grade school. Yet in many mathematical circles, the Hausdorff-Besicovitch dimension has gained favor over the former ideas of dimensionality. Actuaries may find readings such as *The Misbehavior of Markets: A Fractal View of Financial Turbulence*, by Benoit Mandelbrot, an interesting read.

**Behavioral Economics** – A long-standing assumption in economic and actuarial models has been that people always act in their own self-interest. Yet recent researchers have shown that to be a false assumption. Humans tend to be conditional cooperators, who will go out their way to help someone they believe has their best interest at heart, and altruistic punishers, who will strike back at those perceived to behave unfairly – even at the expense of their own immediate interests. Behavioral science addresses the many ways that we are manipulated to do things contrary to our assumptions of rationality. *Predictably Irrational, the Hidden Forces that Shape our*

*Decisions*, by Dan Ariely gives an excellent introduction to this important science that can help actuaries get more honest information from insurance applicants and make better modeling assumptions.

**Genetic Algorithms** – Some problems have a relatively small number of variables and a solution can be derived theoretically. Others may have a limited number of solutions and all of them can be tested to see which one is optimal. However, if the potential interrelationships between variables are too complex for a direct theoretical approach and the number of possible solutions is too large for an exhaustive search in real time, then the problem may be a good candidate for a genetic algorithm solution. In this approach, you can define your restrictions (such as boundary conditions) and then randomly assign a case table of actions for various conditions. Run several hypothetical robots through the trials, grade the results, and let the winners survive to another generation and even propagate offspring via gene splitting. In a sense this is mimicking our genetic evolution for a very small universe that we define. Over the course of hundreds or thousands of generations, the robots develop solutions that are often far superior to those that we would derive from our theory. *Agent-Based Models*, by Nigel Gilbert, is concise but meaty. I think it is a good read after an overview book such as Melanie Mitchell's *Complexity: A Guided Tour*.

**Cellular Automata** – The most famous book on cellular automata is *A New Kind of Science*, by Stephen Wolfram. In one sense, cellular automata are very simple applications of very simple rules. Yet in another, they can be thought of as a dimensional extension of genetic algorithms. Instead of a generation of robots each acting on their own, in a cellular automata simulation all of the generation interacts with one another. They cooperate, they compete for scarce resources and they form alliances. Wolfram is convinced that this is the most important science of all and that all others can be derived from it. He predicts that the children of 2056 will learn cellular automata before they learn algebra.

This is, by no means, an exhaustive list of newer techniques for actuaries. Our complex society has spawned several nontraditional tools such as Serious Games, Delphi Studies and a host of other innovative ways of approaching the current and anticipated problems of risk management. The important thing to remember is to keep an open mind to new developments in fields outside of the mainstream actuarial literature. It's an exciting. Enjoy it! Continue your education beyond study notes. ☆

# How Can Attending an SOA Center of Excellence School Benefit an Actuarial student? One Student Shares Her Experience

By *Rosena Chan*



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With over 70 universities offering actuarial science degrees around North America, it is a tough job to choose which school will be the best fit for your interests. The good news is that according to the 2008 – 2012 SOA strategic plan, the two main goals are: “to produce and support research that expands the boundaries of actuarial science” and “to promote the development of intellectual capital and identify opportunities or its”. The SOA then established the Centers of Actuarial Excellence (CAE) program to allow universities and colleges with outstanding actuarial programs to be recognized and to compete for substantial grants for education and research.

Currently, there are 23 universities in the CAE program, 14 in the United States, seven in Canada and two in China. For an actuarial student, it is truly an honor to attend a university that has been accredited as a CAE school, because this is equivalent to enrolling in a high-quality actuarial program. The CAE schools do not only offer actuarial science as a major, but also provide the best resources to help you take your first step in pursuing actuarial credentials (Associate or Fellow).

To be accredited as a CAE school, the school must offer actuarial science as an identifiable major. Is actuarial science in your school being recognized when compared to other programs? It directly affects the number of courses it offers and the amount of funding that is provided to your program. This gives you an advantage if your school is fully supporting its actuarial science program.

At the University of Manitoba, one of the first schools accredited as an SOA CAE school, the actuarial science program is offered through two different faculties, the Faculty of Management and the Faculty of Science. With the financial support from our school, each year we are able to send our students from both faculties to attend the conference hosted by the Actuarial Students National Association (ASNA). The ASNA conference hosts the biggest career fair in Canada every year. This is a great

opportunity for students to expand their social network and meet actuaries from different companies, understand more about the industry and meet students from other universities. This type of opportunity is not offered in every school.

The first challenge that most actuarial students face is passing the preliminary SOA exams. Consider that the average passing rate of Exam P is between 35 to 45 percent—you will soon understand that the SOA exams are really different from the exams you took in your academic life. You will need to devote a huge chunk of time to prepare and keep updated on the current curriculums of the SOA exams. One of the criteria to become a CAE school is that the curriculum for the undergraduate program must cover at least 80 percent of the learning objectives in four of the five preliminary SOA examinations (currently P, FM, MFE, MLC and C), and also ensures that the program provides sufficient frequency and is easily available to students throughout the school year. This will greatly help students reduce the amount of time needed to prepare for an exam and build a strong foundation in actuarial study. For evidence to support this, University of Manitoba students have a higher average passing rate when compared to other candidates. Besides exams, a CAE school needs to provide qualified courses approved by the SOA for the VEE credits. A student will be able to fulfill all three of the VEE credit requirements while still in school.

For the third criterion of an accredited CAE school, “The school must have produced an average of no less than 10 graduates per year over the previous four years across all identifiable actuarial science majors.” How does this benefit actuarial students? Imagine your school has an excellent program; there are lots of students recruited each year, but for some reason, there are only a few graduating. What are the potential problems with this program? The courses may not be offered frequently enough for students to attend, or the program may be small due to the lack of recognition by the school. If



Studying at an SOA CAE school is truly beneficial for an actuarial student. I personally enjoy it a lot and am prepared for any challenges that may come up during the school year. I greatly appreciate the opportunities and support provided by the Warren Center for Actuarial Science and its faculty members. I look forward to the continuous growth of the program and the celebration of the 100<sup>th</sup> anniversary of the actuarial program at our school in 2012. ☆

there are more than 10 students graduating on average across the past four years, this will help ensure that students will be able to graduate with a Bachelor's degree in actuarial science.

The final criterion is “The faculty responsible for teaching actuarial courses and other program involvement must be sufficient in both quantity and quality”. The SOA has strict criteria on the qualifications of faculty members. There must be at least one member who is an actuary or is pursuing actuarial credentials (Associate or Fellow). They also have requirements on the number of PhDs and Fellows or the number of faculty members who demonstrate a “substantial commitment to actuarial science”. This allows the school to maintain a high quality actuarial program. The students can learn the materials in the best environment, and faculty are able to consult on any question on actuarial science, both about further study on research and future career path.

Besides having to sustain a high quality CAE program, CAE schools will retain the designation for five years. If there are any significant changes in the program, they will need to update the SOA with annual report. Being named and SOA Center of Excellence is one of the highest achievements for an actuarial program. Moreover, CAE schools are also eligible to compete for substantial year education and research grants provided by the SOA.

# Learning from the Past, Looking to the Future

by Jennie McGinnis



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As this article is being written it's the time of year when team and personal goals are being set for the upcoming months. When looking forward to identify those things that need to be accomplished it's difficult not to start with recognizing the work that has been done to date.

And so it is with AOF. As we continue to celebrate our 18<sup>th</sup> birthday it's a good time to reflect on the many efforts that have already been made by our section. One way that we've been able to revisit our history is through the review of past newsletters.

This review uncovered a few fun facts. For example, did you know that our mission was first introduced in 1998, rather than at the time the section was formed? Or that the Younger Actuaries Network (YAN) was first approved as a new section?

Also of interest is the number of topics and initiatives that have held our members' interest from the beginning. On several occasions a primary newsletter theme has been how to deal with a changing market and the resulting shift in actuarial job opportunities. An article with tips on how to cope with being downsized was shared in 2002, and with the most recent downturn in 2008/2009, AOF supported the reemployment of actuaries on several fronts. Namely, the section assisted in enhancing the *Image of the Actuary* website (which has since been incorporated into the SOA's Career Resources webpage).

Another topic that has been of long standing interest to the section is the identification of nontraditional job opportunities. An article that highlighted this, along with other key AOF initiatives, was Dorn Swerdlin's piece in the October 2006 issue.

Entitled "My Past with the Actuary of the Future", Dorn highlighted a number of efforts that originated within AOF and were eventually taken up by the SOA at large.

These include:

- The Pioneer Program: Identifying, supporting and sharing the stories of nontraditional actuaries through articles in *The Actuary*, sessions at SOA meetings and elsewhere.
- Enterprise Risk Management: Exploring the creation of an ERM credential, eventually leading to the establishment of the CERA designation.
- The Personal Actuary: Identifying and exploring opportunities for actuaries to assist individuals in a one-on-one setting including, but not limited to, risk and financial management.

The article that stood out the most to me can be found in our inaugural issue. Michael Rosenfelder's "Protecting and Enhancing Our Core Skills" speaks to many issues that were present at that time and continue to be pervasive today. These include:

- A competitive job market: Facing competition from skill sets offered by other professions or areas of study and adapting to keep up with advancing technology is nothing new and continues to influence how we approach ensuring the continued relevance of the actuarial profession.
- The need for a well-rounded skill set: It's not just about calculating an answer; it's about providing solutions. General business and communication skills play an important role in our being able to share findings and highlight our contributions. The ability to communicate our value is necessary to the continued strength of the profession.
- The declining number of actuaries in the C-suite.
- The need for education to address the above: Whether through the credentialing process or continuing education, we must develop professionally and personally to rise to the challenges faced by our profession.

We've posted the first AOF newsletter on our website so that you can join our trip down memory lane. We've

also reprinted an article from the first issue on page 26. (You can also find other issues dating back to 2002 on the SOA's website – see the links at the end of this article.) You'll soon discover that our math was a little off regarding our birthday. We knew our year of formation was 1993, and so we pegged our anniversary to the Annual Meeting. In fact, AOF's formation was approved at the Fall Board of Governors' meeting in 1992, and the section became official when membership reached 200 in early 1993. Just like that we've jumped to our 19<sup>th</sup> anniversary and will soon see our 20<sup>th</sup>!

After you've had an opportunity to review the inaugural newsletter we encourage you to join us in discussion on LinkedIn regarding your thoughts on what's changed, what's the same, and where we go from here. We're glad you've decided to join us as we work to influence the future of the actuarial profession! ☆

#### LINKS TO RESOURCES LISTED IN THIS ARTICLE

SOA Career Resources: <http://www.soa.org/careers/career-resources/default.aspx>

AOF website: <http://www.soa.org/professional-interests/actuary-of-the-future/aof-detail.aspx?s=0>

Past newsletters: <http://www.soa.org/BrowsePublication/BrowsePublication.aspx>

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## Protecting and Enhancing Our Core Skills

by Michael Rosenfelder

The "Actuary of the Future" can indeed bring skills to bear and make important contributions in new areas not generally thought of today as being major users of our skills. However, in our enthusiasm for developing such new opportunities, we must concurrently protect and enhance our "core" skills in the life insurance and employee benefit fields. There is some evidence that our roles and contributions within such core areas are contracting, perhaps in absolute terms and also relative to other professional groups.

In parallel with the studies of newer fields for the Actuary of the Future, a subgroup comprising a number of members of our task force reviewed this issue, and the conclusions of this subgroup are summarized below.

### What Has Changed That Could Have Caused This Contraction?

1. Hiring of more capable professionals from other disciplines (for example, accounting, investments, marketing).
2. Advances in technology and the proliferation of software packages that have removed some of the mystique of actuarial calculations.
3. Shifting of focus to:
  - Management skills to produce a "product" at the lowest cost and quick turnaround time with quality being a "given"
  - Business perspective and creativity to differentiate the good from the mediocre
  - Timeliness, responsiveness and good communication skills.
4. In life companies, decentralization and the formation of SBUs have meant that there is no longer a centralized actuarial hierarchy.
5. De-emphasizing traditional life insurance products and the decreasing importance of "actuarial" elements (for example, mortality) in life companies, which have reduced the importance of traditional actuarial skills. A parallel trend in the benefit consulting field is the

growing importance of such areas as health care and compensation.

6. Increased competition among benefit consulting firms and increased proliferation of client census information in machinable form, which have heightened clients' awareness that the technical actuarial requirements can be satisfied adequately by a large number of benefit consulting firms.
7. Increased government legislation, regulation and other compliance requirements have limited the creativity that can be exercised in the design and operation of qualified pension plans and increased their ongoing administrative costs without adding value. An example is the bias in recent pension legislation in Canada, moving sponsors away from defined-benefit toward the simpler defined-contribution plans. In general, companies are consolidating and streamlining their pension plans, thereby reducing the total need for actuaries.

### What Has Been the Result for Actuaries?

1. Actuaries can no longer progress by moving up in a purely actuarial hierarchy; rather, they must progress within their business units or consulting groups.
2. Job security for the actuary is no longer assured by hard working and solid technical skills. Actuaries are at risk unless they have good management skills and/or a good business perspective that leads to increasing the breadth and scope of their activities.
3. As firms "rightsizes," actuarial staffs are reduced and every actuary is re-evaluating his or her net worth based on the new set of requirements.
4. The CFO role in life companies (however titled) is increasingly being performed by nonactuaries.
5. Actuarial services and consulting are not the dominant lines of business in the benefits consulting field any

longer. The growth rates in other areas surpass the growth rate in actuarial services.

### How Might the Actuarial Profession Improve These Results?

1. Attract a different type of actuarial student—business oriented, good communicators, and so on, rather than limited to good mathematical skills.
2. Broaden the basic education of actuaries in a number of ways:
  - Scope, syllabus (more business related, management and communications courses, and so on).
  - Ensure that syllabus changes keep up with developments in the real world, rather than lag behind them.
  - Wider perspective, such as
    - Macro versus micro product pricing
    - More market-oriented outlook
    - Broader "financial" training.
  - Methodology
    - Case studies versus solitary study
    - Make greater use of existing or specially designed university courses
    - Add additional "tracks" similar in concept to the financial track
    - More continuing education after qualification.
3. Change how actuaries are viewed within a company or consulting practice, not as technicians but as broader-based managers or consultants with a strong quantitative base and problem-solving skills that can be used in a variety of ways.
4. Convince management that they can use actuaries profitably in broader areas, and that they are not a unique, scarce resource that must be kept for technical work that nobody else is capable of doing.

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### Protecting and Enhancing Our Core Skills

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#### Conclusion

The profession must address the four possible strategies just discussed: (1) more selective recruiting of new entrants; (2) broadening of basic education; (3) changing how they are viewed by their employers; and (4) convincing managements of their wider skills. In coming to this conclusion, the group is assuming there is indeed agreement with its earlier analysis of what has caused the contraction in the role of actuaries and the results of this trend. Some solutions will lie in basic education, some in continuing education, and others in public relations.

*Michael Rosenfelder, ASA, is Vice President and Corporate Actuary at Confederation Life Group of Companies in Toronto, Ontario.*

#### Editor's Note: Welcome!

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Alan J. Routhenstein, and Leonard E. Tandul, one-year terms.

The newly elected officers are Linda Kahn, Chairperson; Joseph Pacsani, Vice-Chairperson; and Selig Ehrlich, Secretary/Treasurer.

*Linda M. Kahn, FSA, is Director of Program Management at the Pacific Maritime Association in San Francisco and Acting Chairperson of the Actuary of the Future Section Council.*

### How New Actuary of the Future Section Relates to Futurism Section

*continued from page 1*

member-driven tasks needed to bring task force's recommendations to fruition. The Section's mission is "to identify and develop nontraditional roles and future opportunities for actuaries."

The Section's major activities include:

- Identifying Society members with special experience who can help develop new roles and opportunities
- Working with these resources to develop needed showcase illustrations, career path plans, white papers, and research
- Providing liaison with the Society's basic and continuing education activities to ensure that these functions reflect the emerging needs of new actuarial roles and employers
- Defining and recommending desirable research projects
- Encouraging papers and articles to educate both actuaries and nontraditional employers on potential new roles and opportunities
- Providing networking and mentoring opportunities for actuaries interested in nontraditional roles and opportunities
- Encouraging the development of specific programs within the Society to motivate and train people to move into nontraditional roles.

#### Importance of Both Sections

The Actuary of the Future Section and the Futurism Section are crucial to the actuarial profession as it seeks to fulfill its potential. However, as you can see, the two Sections' goals and planned activities are different. The Futurism Section focuses on the theory and application of the "science/art" of futurism. It emphasizes the futurism process and its applications. The AOF Section seeks to provide a forum for defining and developing nontraditional roles for actuaries and for interface between actuaries who have been in such roles and those who seek them.

Because the two Sections' goals and activities are very different, many actuaries should consider joining and contributing to both Sections. In its own way, each Section can help an actuary understand and influence the future of his or her company and career.

*Robert D. Shapiro, FSA, is a member of the Society's Board of Governors and was Chairperson of the Task Force on the Actuary of the Future/the Future of the Actuary. He is President of The Shapiro Network, Inc. in Milwaukee, Wisconsin.*

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