



## SGRisk Newsletter No. 2

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### [Message From Jim Stergiou](#)

5/8/2017

Dear Clients and Friends,

Many of you told us you really liked Newsletter No. 1 and we believe you will also enjoy this issue.

Predicting the future is something we are trying do all the time, whether in terms of our finances, the weather, or for me, the very important area of...sports!!! So, in this

issue, we introduce a newer area of actuarial practice that many of you have probably already at least heard of: Predictive Modeling (a.k.a. Predictive Analytics).

Our senior consultant, Jon Evans, gives a brief introduction. Then we have an in depth interview with longtime actuary Gary Dean, who built the commercial predictive modeling unit at Travelers Insurance Company. If you are interested in the kind of predictive modeling services that SGRisk can provide, please contact Jon at [jevans@sgrisk.com](mailto:jevans@sgrisk.com)

Also, in this issue, Ben Newville describes some of the other valuable services provided by actuarial consultants. For more information about these services, please contact Ben at [benjaminnewville@gmail.com](mailto:benjaminnewville@gmail.com).

We conclude with a brief commemoration of Alan Kennady, a 31 year veteran of SGRisk's staff and my dear friend, who passed away on April 1, 2017. Alan was a fine person, a great family man, and a fantastic actuarial technician. We miss Alan but we were blessed to have known him for so long.

My Very Best To You Always!

Take Care!

Hope To See You Soon!

Jim

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# [Intro to Predictive Modeling \(a.k.a. Predictive Analytics\)](#)

[by Jon Evans](#)

We are all constantly trying to predict the future. What will the weather be like during our picnic this weekend? What investments will perform best in the next 10 years? Which college will work out best for our children? How much income will we have in the future so we can choose what size house to buy today? Who will win the Super Bowl next year?...

If we were good enough at this we could probably have anything we wanted, but alas, as the famous saying goes, "It's difficult to make predictions, especially about the future."

Today, with powerful computers and huge amounts of data (sometimes called "Big Data") widely available, much more can be done to better predict many of these things than in the past. We can see this most dramatically in how much better weather predictions have become over recent decades, particularly the vitally important predictions for life threatening hurricanes.

A fascinating and fun example is the true story behind the critically acclaimed 2011 movie Moneyball. In the movie, Brad Pitt portrays Billy Beane, the general manager of the Oakland Athletics baseball team. Beane is struggling with a small budget to put together his team for the 2002 season. His assistant Peter Brand (played by Jonah Hill) analyzes in depth statistical data for baseball players. Specifically, Brand looks for highly undervalued players. The data shows that while these players are paid relatively little, their skills contribute much more to actually producing a winning team. In other words, conventional wisdom prevalent for paying baseball players focused on superficial perceptions and did a poor job at measuring the true value of players. Using Brand's predictive analysis, Beane puts together the 2002 season team which goes on to astound the sports world by winning 20 straight games!!!

Beyond simply exploiting bigger computers and more data, modern predictive modeling focuses on the best ways to predict the future. Traditionally, statistical methods have been

more focused on describing what was going on in the past when data was collected. That is to say, methods were more focused on understanding what was going on in 2016 than directly attempting to use data from 2016 to predict what will happen in 2018 as accurately as possible. We are all used to the warning "Past performance is not an indicator of future results." This statement as a legal disclaimer is obviously too strong, as the data from the past almost always says a little bit about the future. Predictive analysis attempts to maximize the useful indications of future outcomes based on past data. Actuaries have always aimed for this when estimating rates, reserves and other important financial numbers; but much more powerful tools are increasingly available for us to do so.

For more information about SGRisk's predictive modeling services, please email Jon Evans at [jevans@sgrisk.com](mailto:jevans@sgrisk.com).

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## [Interview With Predictive Modeler and Actuary Gary Dean](#)

(Interviewer: Jon Evans)

Curtis Gary Dean has been the Distinguished Professor of Actuarial Science at Ball State University in Muncie, IN, since 2001. During 2006 - 2007 Gary went on leave to serve as Vice President of Commercial Actuarial Strategic Development at Travelers in Hartford, CT. There he helped build Travelers highly successful commercial lines predictive modeling unit. Prior to 2001, Gary had been an actuary at American States (which later joined Safeco) in Indianapolis, IN. At Safeco he helped create a business plan for the development of predictive models in business insurance. He served as a Board Member of the Casualty Actuarial Society and the chair of the CAS exam committee.

Q: What is predictive modeling?

Predictive modeling is a process that uses statistical methods to identify predictors that can be used to forecast outcomes or the probabilities of outcomes. An example we are all familiar with comes from the use of fraud prediction models by credit card companies. Many of us have gotten a call or text message from our credit card

company asking if we are making a certain purchase. Their software has taken into account our personal demographics and buying habits and compared that with the current credit transaction to generate a probability that the transaction is fraudulent.

If that probability is high enough, the credit card company will contact you. The models are built by applying statistical analysis to massive volumes of credit card transactions.

Predictive modeling should be data driven and use statistical methods to create, test, and validate models. By data driven, I mean that modelers need to put their prejudices aside and let the computer and software do their work. The modelers should oversee the process and continually question and test models. Near the end of the model building, there should be a thorough validation of the model against data not used in creating the model.

Q: How did you first become aware of the term "predictive modeling"?

A: I do not recall when I first heard the term "predictive modeling" but I do remember my first exposure to the concept. Contingencies magazine, a publication of the American Academy of Actuaries, summarized a paper "Clinical Versus Actuarial Judgment" by Dawes, et al. In this paper, the authors claimed that actuarial (statistical) models equaled or bested clinical predictions in almost every studied situation.

A clinical prediction is one made by an expert(s) who uses all available information to predict an outcome. The actuarial model as described by the authors is a formula or algorithm that computes a prediction automatically from inputs. The key to the success of the actuarial models was that rigorous statistical methods were applied to empirical data to link known information to outcomes of interest. Although the authors referred to these as actuarial models, today we call them predictive models.

After reading their paper, I soon started working on my own rudimentary predictive models.

Q: What different applications are there?

A: There are many applications. One of the early ones that I learned about in the 1990's was the identification of potentially fraudulent credit card transactions as described above. In the insurance business predictive modeling is being widely used in underwriting and rating. Other applications include identifying customers who are

good candidates for cross-selling; detecting fraudulent claims; and finding reported claims that may need special attention to mitigate loss severity. In the health care area predictive models can help identify which insureds are most likely to be hospitalized, an expensive outcome, providing an opportunity to intervene to possibly head off this costly event.

Q: What role do actuaries, including consultants, play in the process of predictive modeling?

A: In my opinion, actuaries are essential participants for predictive modeling in the risk management and insurance business. Statisticians and data analysts may know the predictive modeling tools but without a deep understanding of insurance underwriting, rating, claims and accounting it is so easy to build defective models.

Consultants with experience in predictive modeling can be especially valuable as a company begins predictive modeling. Or, if a company does not want to make the big investment in a highly skilled predictive modeling staff, consultants can provide the expertise. Consultants may be expensive but the payoff from good models far exceeds the cost. Years ago when I helped put together a business plan for predictive modeling we recommended that our company hire consultants to help us build the first models. We felt that it would take several years for us to develop the in-house expertise to do it on our own and we would need to hire additional staff.

Q: What other professionals play the most important roles in predictive modeling?

A: Statisticians have important roles because of their knowledge of many of the statistical tools that are used in predictive modeling. Computer programmers and data managers are needed to create the large data sets used to build predictive models. Professionals with strong skills in SAS, R, or other data analysis software are essential. When building predictive models in insurance, underwriters and claims professionals should be consulted or included on the team.

Q: All organizations are confronted with the question of what they should do relative to predictive analytics, even if they have done nothing in the past. Do you see danger, competitive or otherwise, in the future for organizations choosing to ignore predictive analytics entirely?

A: That is a hard question! Predictive analytics can give an insurance organization a big competitive advantage in pricing, underwriting, claims handling, and cross-selling.

Companies that are more effective at estimating what it costs to insure risks will be able to offer more appealing prices to better risks and charge higher prices for risks with higher loss potential. A company that foregoes predictive analytics will have to try harder in other areas to keep up with the competition.

Q: You helped build the Travelers' commercial predictive modeling unit and were the unit's first manager. What was that like and what advice would you give?

A: Working on predictive modeling at Travelers was the highlight of my career and I loved it. The first bit of advice should surprise no one: recruit good people. Travelers had a large and strong talent pool within the company that we could draw on and we also recruited outside the company. Another advantage at Travelers was that personal lines already had a well-developed predictive modeling unit headed by Keith Holler. We were able to learn and borrow from them. Travelers already knew the value of predictive modeling before I got there and was willing to make a big investment in commercial lines predictive modeling.

Q: Very large companies, like Travelers, have the resources to dedicate a large highly skilled staff. What can medium and smaller organizations, including self-insured entities, do to utilize predictive modeling?

A: It is more difficult for medium-sized or smaller organizations to do predictive modeling on their own. Yes, they can build their own teams from scratch but this is time consuming, expensive, and risky. Early in the process you must find good managers who understand predictive modeling, can recruit and manage modelers, and who can work well with people outside the unit. Such managers can be hard to find. Although organizations may avoid hiring outside consultants because of cost, I think that predictive modeling is an area where the payoff from consultants can be far, far higher than their fees.

Q: How is predictive modeling related to "big data" and "data mining?"

A: Predictive modeling is an important application within "big data" and "data mining."

Q: What IT resources (software, hardware, etc.) are important to do predictive modeling?

A: For a medium- or small-sized organization, a desktop computer can have enough

processing power for predictive modeling. Cloud computing is also a good option for predictive modeling projects that might be too big to run on the actuary's desktop computer. Of course a company can acquire its own expensive hardware but that should wait until the need is demonstrated. A number of companies use SAS which has been around longer than most software but there are so many choices available today. Just "google" predictive modeling software and you will see many options. I recommend that a company also include R in its tool kit because it is free, versatile, and continually improving.

Q: What are the pitfalls people should avoid in predictive modeling? What separates successful modeling operations from others?

A: One pitfall is not rigorously testing the model that you build. You can always find patterns in data if you look hard enough. There is the saying "torture the data enough and it will confess." Patterns can result from random occurrence. You should validate your predictive model on data that was not used to build the model. You need to keep this validation data set (also called hold-out data) "locked up" so that the modelers cannot access it. The measurement of the predictive power of a model should be done on this validation data or new data not included in the modeling process. There are also cross-validation methods that do not require a hold-out data set but my preference, if feasible, is for a hold-out set.

Another pitfall is building overly complicated models with too many predictors. Modelers should aim for simplicity and only add additional predictors if they give significant lift in the model.

Another pitfall is not understanding the meaning of your data. I once saw a badly constructed model that had neglected to take into account the effect of deductibles on claims sizes and claim frequencies. The model gave completely erroneous predictions.

The modeler should keep in mind a bit of the Hippocratic Oath: "to abstain from doing harm." Thoroughly test and challenge your model to ensure that it is producing valid results.

Q: Some insurance companies have including predictive modeling components in rate filings with state regulators. One problem is that it can be difficult to present detailed predictive modeling analysis in exhibits, and parts of a filing can end up

being a "black box". How do think modelers should explain their analyses to regulators, internal management, and other interested parties?

A: My first reaction to this question is that if you cannot explain your model to others and describe how you got your results then you should reconsider your model – you may not really understand it yourself. Or, maybe you need to work on your communication skills. You can describe the data used, the statistical methods you used (using layman's language), and explain how you arrived at your results.

Internal management probably does not want all of the minute details but the modelers need to develop credibility with management – they need to have faith in your abilities. As for regulators, sometimes the real issue is politics. You may have a wonderful model that you rigorously developed and it is totally sound and well explained but it goes against the current political climate in regulation. Good luck!

Q: Is there anything else that we have not covered, but you feel would be valuable for SGRisk and our clients to know about this topic?

A: Predictive modeling works! You are not always able to build a successful model – I have had failures and had to give up on some models – but many models are being used in insurance and risk management.

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## [Valuable Services Provided By Actuarial Consultants](#)

[by Ben Newville](#)

Actuarial consultants help companies react properly to changes and correct errors. Consultants have different perspectives, are not tied to past management decisions and can focus beyond day to day detail. Some of the areas where consultants can provide valuable services include:

Production

The key to profitable growth is to know which segments are profitable. Growth is

advantageous only if the business is profitable on a sustained basis – not just if it appears profitable for a few years. Metrics that are vital include renewal ratios by segment – business that renews each year usually is more profitable than new business. Renewal business is known and is usually priced more adequately. It is important to compare new business against a profile of existing business to ascertain chances of profit.

### Profitability

Knowing which business is profitable and prioritizing business segments by size and variability are critical for channeling resources to the most appropriate place. Profitability can be distorted by volume and the lag between premium and claims. Price monitoring reports need to be produced to both check on renewal and new business pricing. Care must be taken to assure that underwriters are not sacrificing profit to achieve volume targets.

### Portfolio Management

Portfolio management involves the composition of the book of business by line of business, classifications, locations, coverages, production types and other characteristics. Company results vary considerably according to the resources devoted to each type of insurance.

### Risk Selection

Rating systems developed by bureaus, company or other industry sources account for a fraction of the variables that affect loss. Some examples of other potentially relevant factors include credit scores, size of risk and numbers of customers and subcontractors.

### Loss Reserves

Loss reserves are usually the largest liability on an insurer's balance sheet. Small changes in loss reserves produce large changes in profits and book value. Insureds, coverages, limits of loss and external events and conditions differ from year to year. The skillful actuary compares company changes in loss to industry sources and adjusts for mix of business changes as well as anomalous individual claims. Adequacy of case reserves needs to be monitored. Quarterly loss reserve reviews,

done in a similar manner as annual reviews, serve to reduce surprises.

## Claims Handling

Claims, even when there are no parties to contest judgments, vary from place to place, time to time and company to company. Proper claims handling avoids payment of unmeritorious claims and reduces claim costs. Generally, settling claims early promotes good will and saves the company money as claims inflation does not act on the loss to increase its cost. Consulting actuaries assist by evaluating case reserve metrics such as: size of reserve versus paid loss; case reserve worksheets to produce independent evaluations of loss; and participation in audits, including estimates of sampling sizes.

## Reinsurance

Reinsurance serves to reduce fluctuation in results or provide balance sheet protection. Actuarial consultants can provide additional insight to guide the Company's reinsurance purchasing decisions. Consultants may provide advice on the settlements of reinsurance claims.

## Competitor Analysis

The number and quality of competitors affect Company performance. Consultants extract statistics from annual statements to grade company performance, comparing growth rates, reserve development, liquidity, concentration of risk and leverage. A company should know how it compares to the overall industry and its competitors by balance sheet component.

## Catastrophe Management

Companies need to monitor their accumulations to hurricane, earthquake and other catastrophe exposure. Cyber liability and privacy protection are relatively new concerns. Consultants can work with existing vendor software, meteorologists and other experts to assist in making more informed decisions on catastrophe exposure.

For more information about SGRisk's actuarial services, please e-mail Ben Newville at:

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## [Remembering Alan Kennady \(1955-2017\)](#)

[by Jim Stergiou](#)

It is with great, great sadness for all of us at SGRisk that a long time member of our staff, Alan Kennady, passed away on April 1, 2017 of a heart attack. Alan is survived by his wife, Jane, and two adult children, Augustin and Christina.

He was with our firm for over 31 years, but to me, personally, and to all of our staff here, he was much, much more than an employee. He was both a friend and part of our family here at SGRisk.

Alan's life should have been longer, but his life was very full and accomplished.

He was raised by his grandparents, in a household of modest means, in Berkeley, CA. After graduating high school he served several years in the U.S. Marine Corps. He returned to his hometown to earn his B.A. and Ph.D. in European History from U.C. Berkeley. Alan came to work at SGRisk in 1985 and he had superb talents at analyzing actuarial data and building actuarial reports.

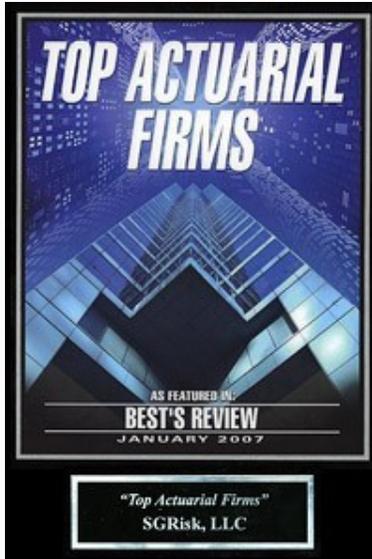
Alan was one of the finest and most honorable and sincere (and most brilliant) men I've ever met. He was my "work brother", as close to me as anyone other than my family.

He was kind, gracious, giving of his time and efforts and most of all, possessed what is called in Greek a good "psihi", a good and kind heart for your fellow man.

All of us at SGRisk will miss Alan very, very, much.

Thank you, Alan, and may God always bless you and your family.

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## About SGRisk LLC

For several decades SGRisk has been ranked by A.M. Best in the top 20 property & casualty actuarial firms, as measured by total dollar volume of client loss reserves. In 2016 SGRisk was ranked 12th on this list. We are an independent, innovative, property-liability consulting service designed to offer complete actuarial and financial expertise in the areas of pricing, reserving, predictive modeling and enterprise risk management. We work with self-insurers, insurance companies, insurance brokers, risk managers, legal firms, third-party administrators, on-shore and offshore captives, municipalities, regulators and legislators.

Ever since our founding in 1980, our philosophy has been to have our clients understand our actuarial methodologies and to remove the mystery surrounding actuarial calculations. Our goals are to clearly explain our assumptions, our methods and our results.

E. James Stergiou and Charles Gruber are the two founders of the firm. They each have more than 35 years of actuarial and insurance experience. They are each Fellows of the Casualty Actuarial Society and Members of the American Academy of Actuaries.

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