

2017 CAS

PREDICTIVE ANALYTICS MARKETPLACE



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A SUPPLEMENT TO ACTUARIAL REVIEW



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 But we can help you leverage the
 wealth of **new information** out there.

$f_j c_{ij}$
 $E(c_{ij+1} | c_{ij}) = f_j$
 $Var(f_j) = \sigma_j^2 / \dots$
 $E(c_{ij+1} | c_{ij}) = f_j c_{ij}$
 $\sqrt{E(d_{ij})}$
 $Var(Y) = E(Var(Y^2 | Z)) + E(E(Y | Z)^2) - (E(Y | Z))^2$
 $F_{ij} = c_{ij+1} / c_{ij}$
 $E(c_{ij+1} | c_{ij}) = f_j$

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Do Your Data Analytics Team Members Speak the Same Language?

BY NANCY BRAITHWAITE, FCAS, MAAA, CPCU

Each member of the data analytics team brings professional strengths but may not define terms the same way as another team member.

The world is constantly changing, and as an actuary, I probably view these changes differently than most people. In my world, all of the advancements in new and innovative technology that have made our lives more convenient also present more complex risks.

From an insurance perspective, new and more prevalent technologies like mobile payments and drones require more complex risk-management tools. Previous methods for quantifying and managing risk — such as using past data to price insurance products — may no longer be sufficient. At the same time, the digital revolution, led by smartphones and wearable devices, is giving us more data than ever before. Insurers need to embrace and mine the increasing volume of data, finding new techniques to evaluate and produce insights.

The good news is that a lot of new data is readily available — the not-so-good news is that insurers and their analytical teams may not know what to do with this data.

Everything from the sheer volume of data to the nature of how it is stored and processed can make it hard to sift through and find information that will be useful. Due to this

[T]hose working on data analytics teams need to have a strong sense of causality when evaluating data, knowing how it plays into the larger business context of the problem they’re trying to solve.

— those handling the data in insurance companies need to fully understand the business context in which it lives. One variable of data may represent something that is not legal or socially acceptable to actually use in practice, or, data may

say something that makes no sense at all — for example, that women with red hair have more auto accidents (when anyone can dye their hair). So those working on data analytics teams need to have a strong sense of causality when evaluating data, knowing how it plays into the larger business context of the problem they’re trying to solve.

Bridging the Communications Gap

There is no prescribed composition for an effective data analytics team — it can have a mix of data scientists, actuaries, statisticians, and others. Each professional brings something to the discussion, and increasingly the “team” approach to analytics results in success. However, those same professionals need to understand each other’s perspectives — they need to be able to speak the same language in order to communicate and collaborate. Ideally, members of the team will have a certified set of predictive analytics skills, which can help set a standard and bridge the communication gap that exists.

For employers, this lack of common “language” in the predictive analytics environment can also affect their recruitment. Position titles such as “data scientist” or “modeler” do not have a consistent description or industry standard. Last year, when the Casualty Actuarial Society (CAS) conducted market research with insurance company executives on the subject, employers cited recruiting/hiring as one of their greatest challenges in predictive analytics. In fact, 76

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percent of those surveyed noted that a certification would be beneficial to employers seeking to hire specialists in predictive modeling.

Becoming a Certified Predictive Analytics Specialist

This is one of the many reasons that The CAS Institute, a subsidiary of the CAS, recently launched its Certified Specialist in Predictive Analytics (CSPA) credential. The credential, created for data professionals with several to many years' experience, requires that candidates demonstrate evidence of applied knowledge in predictive analytics by passing a series of four assessments. The program draws from the history and strength of the CAS, whose high-quality educational standards and credentialing programs for actuaries have been recognized globally for over 100 years.

The curriculum of the CSPA credential is overseen by an expert panel comprising industry specialists working in predictive analytics. The four required assessments cover:

- The fundamentals of property and casualty insurance;
- How data works, including the forms it can take;
- How to present and work with data, including building models; and
- How to apply these skills to a real-life scenario.

The final assessment also asks candidates to complete data analysis and a report based on an assigned scenario. The candidate is required to integrate and apply all knowledge from the previous three assessments in order to achieve success.

Final projects will vary so as to reflect real-world-type predictive analytics scenarios. For example, one project might have candidates working to improve claims department operations, such as identifying potential high-severity claims, or controlling claims department costs. A marketing-focused project could ask candidates to improve sales through methods such as matching product offerings to customer type, or targeting new or optimal customer segments. CSPA candidates may also use their predictive analytics skills in scenarios involving underwriting, pricing, or even operations. This

“case study” project helps round out the CSPA curriculum by testing the candidates’ ability to use their predictive analytics skills in the workplace.

A New Professional Community

CSPA credential holders are also required to complete an ethics course and adhere to a standard of professionalism and code of conduct, something not previously required of those in analytics roles.

After traveling all over the U.S. sharing information about our new CSPA credential with employers, we can say that the response has been overwhelmingly positive. Employers are enthusiastic to see a program that can provide professional education and certification to members of their team who have previously been without these types of dedicated resources. Employers now have a reference point when they decide to add predictive analytics professionals to their staff. The CAS Institute also provides its members with a professional community, where those working in this specialized field can connect.

Ultimately the expansion of predictive analytics within the insurance industry has opened doors for new opportunities to improve business performance. In order to maintain momentum and keep up with changes, predictive analytics teams need to make sure they are well-equipped and collaborating effectively to adapt to new technologies and new data. It's only through the improvement and standardization of analytical skills, coupled with the willingness to learn, that we will remain ready to respond to the technological (and societal) changes that still await us. 🚀

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Nancy Braithwaite, FCAS, MAAA, CPCU, is a second vice president and actuary in the Excess Casualty Department at Travelers Insurance Co. She currently serves as president of the Casualty Actuarial Society (CAS). Opinions are the author's own.



The CAS Institute Grants Its First Certified Specialist in Predictive Analytics (CSPA) Credentials



BY KATE NISWANDER

The CAS Institute (iCAS) recognized 32 predictive analytics professionals as the first recipients of its Certified Specialist in Predictive Analytics (CSPA) credential during the 2017 CAS Ratemaking and Product Management Seminar in San Diego.

The CAS Institute is a CAS subsidiary that offers credentials and educational opportunities for professionals working in highly specialized quantitative practice areas. CSPA credential holders possess practical knowledge of applied predictive analytics and data science used in data-intensive industry sectors.

For a number of years, new CSPA Susan Poole, FCAS, MAAA, has seen the expansion of predictive analytics in the insurance industry. “The CSPA credential combines a solid insurance foundation with predictive analytics to allow the practitioner to effectively tackle insurance-specific challenges,” said Poole, a data scientist at SECURA Insurance Companies. “Attaining the CSPA credential has helped me to tailor my career path to incorporate an emphasis on predictive analytics,” she said.

From the moment he first learned of the CSPA designation, Ron Lettofsky, ACAS, knew that it was something he wanted to pursue. Lettofsky, a newly credentialed CSPA, is a senior actuarial manager of claims analytics at Allianz Global Corporate & Specialty. “People who see the CSPA designation will know that I also have proven skills in predictive analytics and data management,” he said.

The CAS Institute is accepting applications for the CSPA credential from experienced practitioners through November 30, 2017. For more information about the CSPA education program and the experienced practitioner application process, visit the iCAS website at thecasinstitute.org.



Kate Niswander is the marketing and communications manager for the CAS.

Certified Specialists in Predictive Analytics Recognized in March 2017



Seated, left to right: Louise Francis, Susan Poole, Guangjin (Jim) Xiao, Stephen Stone, iCAS Leadership Advisory Council Chair Robert Miccolis, Ravi Kumar, Todd Lehmann and Cheng-Sheng Peter Wu.
Standing, left to right: CAS President-Elect Brian Brown, Christopher Monsour, William Frierson, Jeffrey Kinsey, Hernan Medina, Trent Goughnour, Gregory Hayward and Andrew Sutcliffe. Photo credit: Crown City Photography.

The CAS Institute and its Community of Practice

The CAS Institute held its first-ever Community of Practice Event on March 27, 2017, in San Diego.

Designed to bring together advanced practitioners in predictive analytics and data science, the one-day event featured sessions on machine learning, external data, model design and deployment, ethics and risk governance.

Discussions at the event were led by distinguished practitioners in the disciplines of predictive analytics and data science, many of whom serve as subject matter experts for The CAS Institute.

In addition to the educational sessions, participants had opportunities to network and connect with others in the field.



Peter T. Bothwell speaks on a panel concerning ethics and risk governance at the Community of Practice Event. Bothwell is vice president, data science for The Hartford and a member of the iCAS Leadership Advisory Council.



A pioneer in data-mining, Louise Francis lends her expertise to a Community of Practice Event panel on external data. Francis serves as an iCAS subject matter expert and is president of Francis Analytics.

Keep Current: Join iCAS

For notices about future events for predictive analytics professionals hosted by The CAS Institute (iCAS), become a member of iCAS at TheCASInstitute.org/membership. Dues are waived through September 2017.

Participants of The CAS Institute's Community of Practice Event, held in San Diego on March 27.



How Can Insurers Find Real Value in Their Predictive Models?

BY CLAUDINE MODLIN, FCAS, MAAA

Experiment thoughtfully with practical implementation top of mind

There's a lot of conversation about new modeling approaches and novel sources of data poised to revolutionize insurance. This extraordinary industry transformation actually began about a decade ago. Analytical methods such as generalized linear models (GLMs) and decision trees were combined with new data sources, including credit attributes and prior insurance history, to improve pricing and underwriting sophistication. More recent developments, including vastly improved technology (e.g., hyper-scale computing and distributed storage), and an influx of new talent and availability of open-source programming languages and libraries, are providing even greater opportunities to explore what insights can be extracted from an increasingly wide array of data sources and formats. Are these influences triggering a revolution or evolution in insurance analytics? And how can insurers find real value in their predictive models?

Revolution or evolution? You decide.

Much of the buzz in insurance analytics circles is centered on investigating new analytical methods. Some of the techniques that are getting the most attention right now include gradient boosting machines (GBMs), penalized regression methods, neural networks, genetic algorithms and ensembles of different methods (Figure 1). While these methods are quite exciting, it's equally important for insurers to recognize the potential impact of new data sources. Including more diverse yet relevant data assets to an analysis adds far more predictive power than using more complex algorithms on existing data, as evidenced by usage-based auto insurance.

Additionally, insurers need to explore what types of problems different methods can address. No single method is perfectly suited to every business problem, and a variety of methods can add value at different stages of the modeling process. For example, topic modeling can help create new data features from unstructured text such as claims adjuster notes. Elastic nets can be useful in selecting factors for consid-

eration in modeling. GBMs can help detect higher order interactions, and multivariate adaptive regression splines can help identify model hierarchies that capture complexity via a greater number of simpler models on well-defined segments. The end result is a more robust analysis. In fact, many interviews with Kaggle competition winners suggest that they do not necessarily credit their successes to the primary model-

Figure 1

P&C insurers use a variety of modeling techniques

Non-GLM modeling methods are expected to gain momentum

	Now*	Two years
Generalized linear models (GLMs)	96%	100%
Decision trees	43%	63%
Model combining methods	37%	57%
Machine learning	17%	56%
Penalized regression methods	22%	46%
Random forest	19%	41%
Other ensemble methods	19%	41%
Gradient boosting machines (GBMs)	24%	39%

*Survey fielded September 7 – October 24, 2016.

Source: Willis Towers Watson 2016 U.S. Predictive Modeling and Big Data Survey

ing method, but rather, to methods that enable better model inputs or corrections to the primary methods.

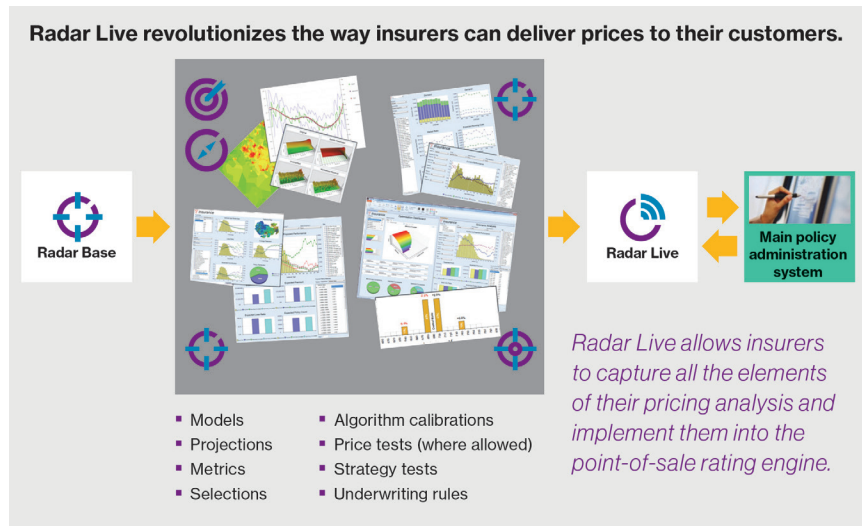
The inevitable question from the top: Where's the value?

As insurance company management hears more about advanced analytical methods, it begs the question of how these new methods really add value — or more specifically, how you even measure value.

To provide a meaningful answer for management, the analytics team should examine both statistical and financial value measures. Statistical measures, such as the Gini coefficient or Mean Absolute Error (MAE), have meaning among actuaries and data scientists but often don't provide management with an intuitive sense for value added. Moreover, the measures themselves don't often agree when ranking the

accuracy of various methods. Financial measures are imperative for getting buy-in and gaining confidence from management. For example, when exploring new methods or new data for pricing and underwriting, estimating the loss ratio on actual out-of-sample claims can more effectively engage company management. We work with companies to design the right financial measures, including sensible underlying assumptions, to provide forecasts that make sense. In fact, in areas of the insurance company where data-driven solutions are relatively new, it's even more important to prove the financial value of the models to leadership.

Figure 2



Need help unlocking your analytical potential?

Willis Towers Watson offers advice to hundreds of P&C insurers globally, including carriers of different sizes that write many products and operate through different distribution channels. We pioneered the use of GLMs in pricing, and continue to innovate, harnessing new techniques to meet new challenges. We help companies assess the suitability of methods across a variety of dimensions, including not only predictive power but interpretability, ease of implementation, relative effort and execution speed. Methods such as GLMs are well-accepted in areas such as pricing because of their transparency, ease of implementation (in traditional table-based rating engines) and execution speed. Other insurance applications place different values on the various dimensions. For example, producing direct mailing lists based on expected profitability and likelihood to buy does not require high levels of transparency, and implementation requires a list of addresses rather than inputs to table-based engines.

We help companies explore and find value in new data, methods and applications in a variety of ways:

- Evaluate new data assets.
- Train client teams in machine learning techniques for a defined problem of choice.
- Deploy machine learning techniques to sharpen existing (traditional) models.
- Assist with machine learning in applications that may not require high transparency (e.g., topic modeling adjuster notes to create new structured fields, and examining voice data for opportunities in improved customer satisfaction).
- Streamline modeling processes and introduce hierarchies.

Software that addresses the entire pricing workflow

Willis Towers Watson’s trusted pricing software, used by many of the world’s largest insurance groups, can support your entire pricing workflow, including deployment. Radar Base, which is used to assess and compare model results and perform dynamic impact analysis on real customer data, can now import a variety of model forms built in other programming environments.

Adding to the Radar platform, Radar Live provides a single, holistic environment for analytics and deployment, undiluted by systems constraints (Figure 2). Radar Live is more than an external rating engine. It enables a wide range of analytics to be deployed in real time at point of sale — from traditional rating structures to complex pricing algorithms with sophisticated embedded risk models. Any risk classification, rule, model or calculation programmed in Radar Base can be uploaded into the Radar Live production environment via a preproduction and testing stage. This not only provides great pricing flexibility and responsiveness to market developments but also creates material operational efficiencies and reduces the risk of costly errors in programming rates in multiple environments.

What’s needed to change?

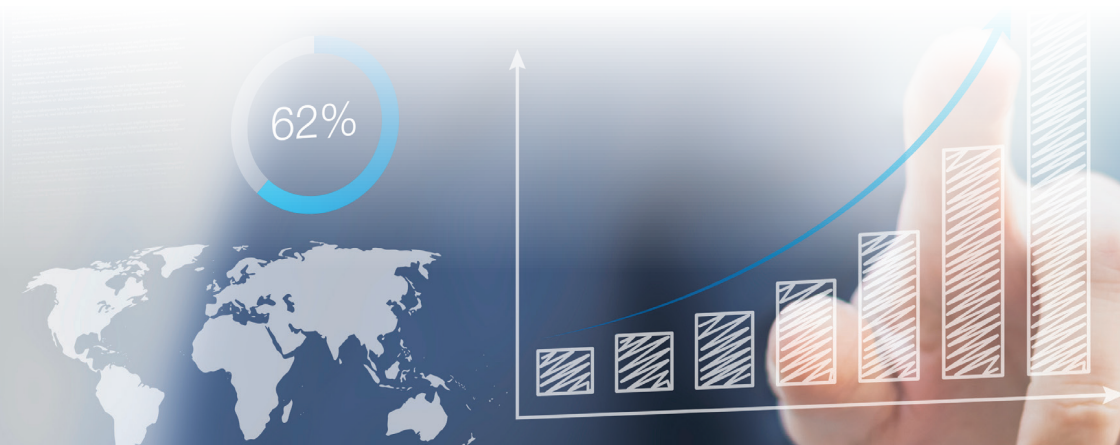
Analytics are transforming the insurance industry. However, this requires thoughtful experimentation and constant consideration of implementation requirements.

For more information, email claudine.modlin@willistowerswatson.com.



In Partnership with The Institutes

Become a Certified Specialist in Predictive Analytics (CSPA)



Why a Credential from The CAS Institute?



SPECIALIZED

Our credential recognizes expertise in the highly specialized area of predictive analytics for property and casualty insurance applications.



RIGOROUS

Our credential leverages the integrity and relevance of the CAS's educational standards, which have been recognized globally for over 100 years.



IMPACTFUL

Our credential strengthens analytical teams by providing resources and a practice community for the insurance industry's quantitative professionals.

The CAS Institute is a subsidiary of the Casualty Actuarial Society (CAS) providing specialized credentials to quantitative professionals in the insurance industry.

Learn more at TheCASInstitute.org

Predictive Analytics: What's Next?

BY ROOSEVELT C. MOSLEY JR., FCAS, MAAA, CSPA

A few years ago I delivered a presentation entitled, “Beyond the Credit Score.” By 2010, the use of credit-based insurance scores in personal lines insurance had become standard, yet these scores were still subject to significant regulatory and consumer scrutiny. As a result, many insurance companies began asking questions about alternatives to credit in an effort to develop a plan to move beyond the use of credit score if it ultimately became necessary.

My presentation answered insurers’ questions as to why the use of credit scores was so successful. The three primary reasons were:

- Credit scores provided significant separation of indicated risk differences.
- There was a reasonable distribution of insured risks across the credit-score scale.
- There was not a significant overlap of credit score with existing risk characteristics.

Then, using these three criteria,

I identified the following areas that would provide benefits similar to those observed through the use of credit scores:

- Usage-based insurance (UBI).
- More refined territory definitions.
- More descriptive insured property information (vehicle characteristics, property characteristics, etc.).

Since 2010, significant progress has been made in each of these areas.

But one advancement I discussed has not moved as quickly — the use of predictive modeling techniques beyond Generalized Linear Modeling (GLM) in the development of rating plans.

Insurance companies began to use GLMs in rating plan development in the late 1990s and early 2000s. GLMs were a significant advancement over older techniques as they allowed companies to consider the impact of all factors at once, thus removing the distributional bias from the indication process. This provided a more accurate representation of the impact of each risk characteristic on loss costs.

However, GLMs have their limits. First, GLMs are linear models, despite being generalized. While this linear assumption is generally reasonable for insurance data, it tends to be less accurate at the extremes. GLMs tend to underestimate


the risk potential of policyholders with the lowest expected loss costs, while they overestimate it for those with the highest.

GLMs also assume that the risk associated with a combination of factors is represented purely by the product of the risks associated with each individual underlying factor. For example, the initial assumption built into a GLM for an auto risk is that the percentage increase in expected loss cost for a driver with a prior accident is the same regardless of whether the driver is 17 or 47 years old. This concern can be addressed by the use of interactions, but higher-order interactions are difficult to incorporate into a GLM, and including a full interaction is overkill if you are only interested in its significant portions.

The use of other modeling techniques allows companies to address these issues and find significant lift in their rating plans. These methods include, but are not limited to, Decision Trees, Neural Networks and Gradient Boosting. Applying

these approaches to supplement the power of a GLM yields a more predictive result than can be obtained from either independently.

In analyses including non-GLM techniques, we have been able to consistently achieve results showing a range of indicated relativities of at least 3 to 1. This additional lift was identified over and above what the GLM was able to achieve. This indicated lift rivals that of credit score and is achieved simply by using the information already being considered in a rating plan.

In a world where insurers are looking for “what’s next” in order to gain or maintain a competitive advantage, non-GLM techniques should be one of the answers. Exploration of these approaches can provide insurance companies with a significant competitive advantage. In this case, the next significant move forward in rating could actually come from within. 

In a world where insurers are looking for “what’s next” ... non-GLM techniques should be one of the answers.

Roosevelt Mosley is a principal and consulting actuary with Pinnacle Actuarial Resources, Inc.





CONGRATULATIONS

TO THE RECIPIENTS OF THE CERTIFIED SPECIALIST IN PREDICTIVE ANALYTICS CREDENTIAL

**The CAS Institute recently awarded the Certified Specialist
in Predictive Analytics (CSPA) credential to the following 32 individuals:**

Avraham Adler, CSPA, FCAS, MAAA, CERA — Guy Carpenter & Co. LLC

Joel Atkins, CSPA, FCAS, CPCU — CNA Insurance Companies

Shane Barnes, CSPA, FCAS — The Hartford

Andrew Brown, CSPA — Guide One Insurance Group

Richard Crabb, CSPA, FCAS — University of Wisconsin - Madison

Denise Christophel, CSPA, CPCU — Sentry Insurance

Linhui Dong, CSPA — Munich Re America

Louise Francis, CSPA, FCAS, MAAA — Francis Analytics & Actuarial Data Mining Inc.

William Frierson, CSPA — WillisTowers Watson

Luyang Fu, CSPA, FCAS — The Cincinnati Insurance Companies

Trent Goughnour, CSPA — Pinnacle Actuarial Resources, Inc.

James Guszczka, CSPA, Ph.D., FCAS — Deloitte Consulting, LLC

Gregory Hayward, CSPA, FCAS, MAAA, FCIA, CERA — State Farm

Jeffrey Kinsey, CSPA, FCAS, MAAA — State Farm

Ravi Kumar, CSPA, ACAS, MAAA — QBE North America

Todd Lehmann, CSPA, FCAS, MAAA — Quincy Mutual Fire Insurance Co.

Ronald Lettovsky, CSPA, ACAS — Allianz Global

Weiting Lu, CSPA — Oliver Wyman Actuarial Consulting

Zachary Martin, CSPA, FCAS, FSA, MAAA — Zurich North America

Hernan Medina, CSPA, CPCU — ISO

Stephen Mildenhall, CSPA, Ph.D., FCAS, ASA, MAAA, CERA — St. John's University

Christopher Monsour, CSPA, FCAS, MAAA — CNA Insurance Companies

Roosevelt Mosley, CSPA, FCAS — Pinnacle Actuarial Resources, Inc.

Susan Poole, CSPA, FCAS, MAAA — SECURA Insurance Companies

Ernesto Schirmacher, CSPA — Liberty Mutual Insurance

Stephen Stone, CSPA, FSA — Agam Capital Management

Andrew Sutcliffe, CSPA — Allianz Global

Rebecca Vessenes, CSPA, Ph.D., ASA — Liberty Mutual Insurance

Cheng-Sheng Peter Wu, CSPA, FCAS, ASA, MAAA — Deloitte Consulting, LLP

Guangjin Xiao, CSPA, FCAS, MAAA — CNA Insurance Companies

Jonathan Zabek, CSPA, MSPA — Franklin Mutual Insurance Company

Ya Zhang, CSPA — One Beacon Insurance Group

Added Values: Breathe Life into P&C Projections

BY STEPHEN URBROCK

Lifetime value (LTV) style calculations may have made their name in life insurance but are now proving their worth to property and casualty (P&C) businesses. Neil Covington, director of solutions management for FIS's P&C business, explains the lure of LTVs — and how predictive analytics can extract even more value from P&C projections.

Why LTVs aren't just for life

Life insurance, term assurance and mortgage contracts typically span decades. So, it has traditionally made sense for life insurers to assign an LTV to their customers — and project the long-term, total value each customer or contract will represent.

P&C policies, by contrast, tend to last no more than a year. But in the first year, the upfront cost of selling a new policy may take a significant portion of income, as companies try more innovative ways to maximize policy retention. This “new business strain” may even exceed year-one profit margins, meaning the more new policies you sell, the bigger your loss over the year.

The answer for many P&C firms has been to look past the first-year accounting period to the income that a policy could bring in over a lifetime — its LTV. From year two onwards, income and margins will soon overtake the initial outgoings — and the longer the policy is renewed, the greater the LTV.

Value your customers

The LTV comes into its own when it is used to reflect the value of not just individual policies but also customers. If a customer has taken out home and auto policies with the same insurer, each contract will carry its own LTV. Added together they will reveal the total value of that customer's relationship with the company and help build a holistic view of their value beyond the balance sheet. This aggregated view will come backed with a wealth of policy rating data that is ripe for predictive analytics.

Empower your projections

Online sales channels, telematics technology and increasingly digital operations make it easier for today's insurers to gather behavioral information on their customers. Predictive analytics can extract more meaning from rating data and use information from all of a customer's policies and other products to forecast future value.

Why, for example, is one customer's LTV higher than another? By applying predictive analytics techniques, you can drill down into the complex combination of factors involved — from age and location to lifestyle choices — and identify which customer segments to target with which products.

As well as informing new business marketing strategies, this approach can help you retain and cross-sell more effectively to existing customers. Given his or her profile, what are the chances of a customer renewing a policy or extending their cover?


“We've certainly seen growing interest from P&C insurers in LTV analysis — and predictive analytics systems are becoming an important part of their risk management toolkit.”

—Derek Chapman, Principal, Merlinos & Associates, Inc.

To answer such questions and build predictive models for LTVs, you can apply the same generalized linear modeling (GLM) techniques often used for pricing. You can also show how an LTV may evolve in the future and the best ways to improve or protect it. And with machine learning, a growing capability of advanced analytics systems, the accuracy (and value) of these projections will only improve over time.

Gain a platform for growth

Key to putting projections into practice will be a powerful integrated risk management platform that can support full capital modeling projections alongside individual LTV and customer value calculations. With built-in predictive analytics tools, it will need to handle both GLM and clustering analysis to derive full value from data.

Investing in a solution of this kind will soon pay dividends, by helping you better understand the dynamics of your business and its risks. Above all, it should give you the tools to help better meet the needs of your customers — and improve shareholder value and returns. 

For information please contact:

Stephen Urbrock

FIS Insurance Software

Cell: 404.205.9156

Email: stephen.urbrock@fisglobal.com

www.prophet-web.com

www.fisglobal.com



Predictive Analytics Providers Directory

Organizations providing predictive analytics products and services.

A.M. Best

Douglas Hamadyk
908-439-2200 x5753
www.ambest.com

Actuarial Resources Corporation

Chris Peek
913-451-0044
www.arcval.com

CBIG Consulting

Jim Grosspietsch
800-334-2078
services@cbigconsulting.com
www.cbigconsulting.com

CGI

Kris Komassa
512-791-7328
www.cgi.com

Conning

Lorraine Hritcko
860-299-2403
lorraine.hritcko.com
www.conning.com/products/risk-management

CoreLogic

Stephanie T. Grayson
877-849-1023
www.corelogic.com

DataRobot

Satadru Sengupta
617-301-2471
satadru@datarobot.com
www.datarobot.com/insurance

Decision Research Corporation

Rick Young
800-836-6057
www.decisionresearch.com

Digital Recognition Network

Amanda Kirk
817-710-7789
www.dmdata.com

Earnix

Adi Bar-Lev
972-73-706-7247
adib@earnix.com
www.earnix.com

Easy2Comply

David Leichner
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Ernst & Young

Gary T. Ciardiello
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gary.ciardiello@ey.com
www.ey.com

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Lori Bryenton
604-957-1216
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FIS Insurance Software

Stephen Urbrock
404-205-9156
stephen.urbrock@fisglobal.com
www.prophet-web.com

Gross Consulting

Chris Gross
651-293-8008
chris.gross@cgconsult.com
www.cgconsult.com

Guidewire Software

Tom Kasel
651-470-0748
info@guidewire.com
www.guidewire.com

IBM Algorithmics

Curt Burmeister
914-499-1900
www.us.ibm.com

IHA Consultants, Inc.

Mark Zanecki
919-260-3291
mark.zanecki@ihaconsultants.com
www.ihaconsultants.com

Insight Decision Solutions Inc.

Claudia Wetzell
416-479-0384
info@insightdecision.com
www.insightdecision.com

Insureware Pty Ltd

Adi Kedmi or Sylvia Gooch
61-3-9533-6333
admin@insureware.com
www.insureware.com

KPMG

James Christou
917-756-0589
www.kpmg.com

LexisNexis Risk Solutions

Clare Louise Southcombe
561-212-7375
clare.southcombe@lexisnexis.com
www.lexisnexis.com

Merlinos & Associates, Inc.

Ryan Purdy
678-684-4848
rpurdy@merlinosinc.com
www.merlinosinc.com

Milliman

Brian Brown, FCAS, MAAA
312-499-5660
brian.brown@milliman.com
www.milliman.com

Moody's

Lindsay Hagans
415-874-6350
www.moody.com

Nexus Risk Management

Brianne Krysiak
312-857-4401
www.nexusrisk.com

Numerix

212-302-2220
marketing@numerix.com
www.numerix.com

Octo Telematics North America

Nino Tarantino
617-916-1080
info@octousa.com
www.octousa.com

Pinnacle Actuarial Resources, Inc.

Julie Calmès
309-807-2300
jcalmes@pinnacleactuaries.com
www.pinnacleactuaries.com

PolySystems Inc.

Bob Keating
312-332-5670
www.polysystems.com

PricewaterhouseCoopers

Lisa Slotznick
646-471-4000
www.pwc.com

PRMIA

Janet Tritch
612-216-4017
janet.tritch@prmia.org
www.prmia.com

Red Mountain Technologies

Chris Whipple
205-414-2721
www.redmountaintech.com

Reserve Prism

Hai You
608-239-1670
hyou@reserveprism.com
www.reserveprism.com

Risk Lighthouse LLC

Jasmine Speights
678-732-9112
www.risklighthouse.com

rPM3 Solutions, LLC

Rob Eckels
410-384-9491
reckels@rpm3solutions.com
www.rpm3solutions.com

Salford Systems

Amy Baldwin
619-543-8880
www.salford-systems.com

SAP

Andrew Winick
610-661-7519
www.sap.com

SAS

919-677-8000
www.sas.com

SimErgy

Sim Segal
646-862-6134
sim@simergy.com
www.simergy.com

Ultimate Risk Solutions

Isabella Dumont
845-825-1494
www.Ultirisk.com

Valen Technologies

Kirsten Marr
800-280-3304 x235
www.valen.com

Verisk Analytics/ISO

Chip Chaffee
201-469-2394
www.verisk.com

Willis Towers Watson

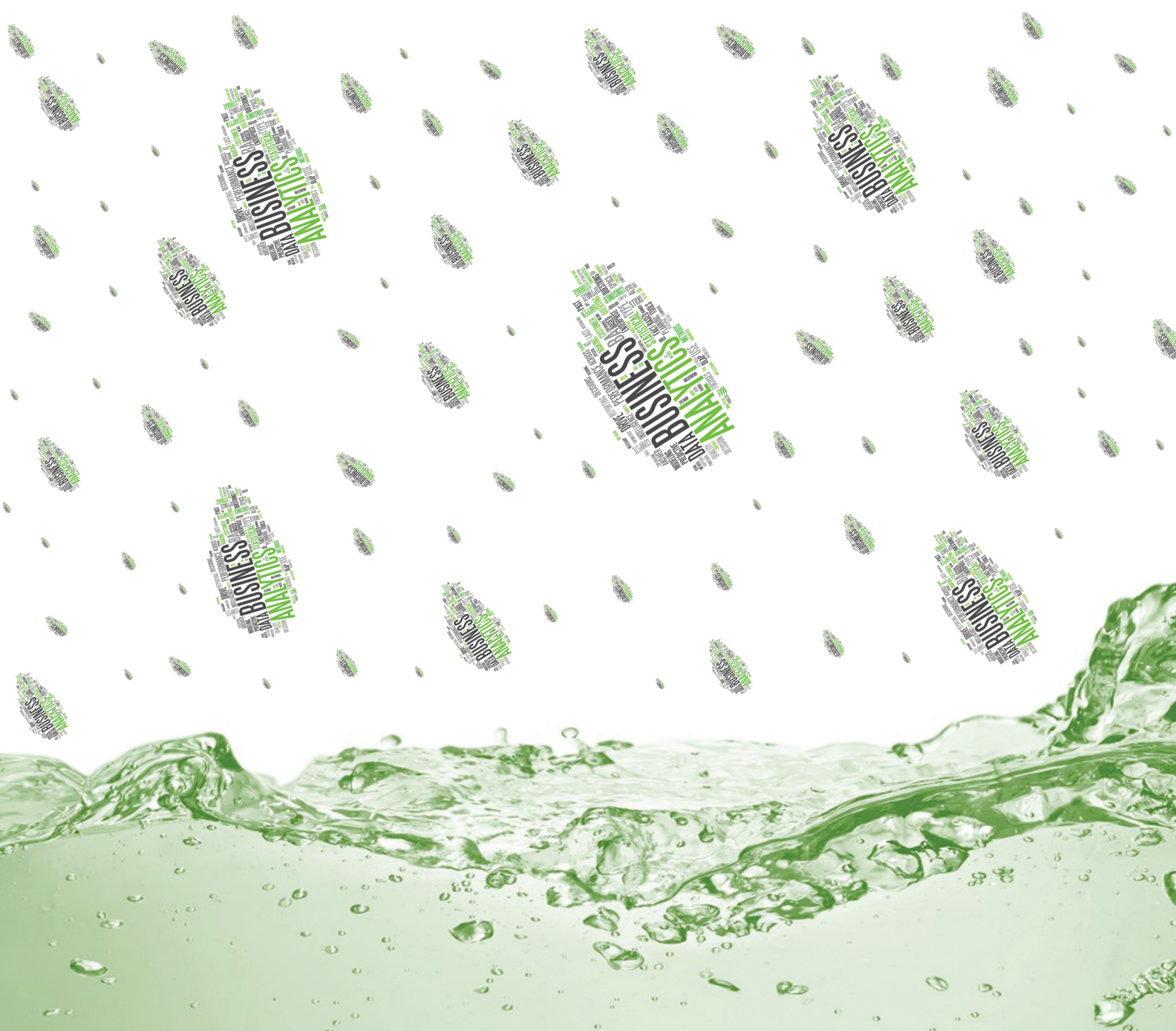
Claudine Modlin
805-499-2164
claudine.modlin@willistowerswatson.com
www.willistowerswatson.com

Wolfram Research

Michael Gamman
217-398-0700
www.wolfram.com

Wystar

800-505-9076
rsmarketing@wystar.com
www.wystar.com



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