CPCU SOCIETY INSURING YOUR SUCCESS

Underwriting Trends

UT

Volume 19 Number 4 December 2007

Message from the Chairman

by J. Brian Murphy, CPCU, ARM, ARe, AMIM

J. Brian Murphy, CPCU, ARM, ARe, AMIM, is vice president of reinsurance for Brokers' Risk Placement Service, a managing general underwriter and reinsurance intermediary located in Chicago. His responsibilities include the marketing and placement of reinsurance for commercial clients. His experience includes underwriting roles in two of the largest commercial insurers spanning more than 25 years, and recently on the brokerage side of the business.

Murphy received his bachelor of arts degree from Central Connecticut State University, and his master of arts from the University of Connecticut, both in economics. He frequently teaches the Insurance Institute of America's General Insurance (INS) course to new members of the insurance community. He serves on the board of the Association of Lloyd's Brokers, which provides information, education, and business contacts to Lloyd's correspondents and coverholders in Illinois.

He also serves on the board of the Elmhurst City Centre in Elmhurst, IL; is a director of the CPCU Society's Chicago Chapter; and is the new chairman of the CPCU Society's Underwriting Interest Group Committee.

A Reflection on the Past Year

The year 2007 was a productive year for the Underwriting Interest Group. In March we presented the Society's first webinar on "Emerging Issues in Insurance Coverage" featuring Dom Yezzi, CPCU, vice president of ISO as the speaker. The topics addressed were nanotechnology, food litigation/GMOs, and electromagnetic fields. Early in 2008 we will offer another webinar to the Underwriting Interest Group free of charge as a benefit of membership.

At the CPCU Society's Annual Meeting and Seminars in Honolulu, we developed a seminar: "Decision Management: Advances in Real-Time, Risk Driven, Rule-Based Underwriting Decisions." Please see the accompanying article and photographs by committee member Lamont D. Boyd, CPCU, outlining the speakers' presentations. The articles, speaker PowerPoint presentations, and more photos are posted on the Underwriting Interest Group web site at http://underwriting.cpcusociety.org.

The Underwriting Interest Group also hosted a very successful breakfast meeting that was attended by approximately 100 CPCUs. Eduard Pulkstenis, CPCU, senior vice president and chief underwriting officer, Selective Insurance Company of America, was the speaker. Pulkstenis, also a 2007 CPCU designee, addressed the future direction of the underwriting profession. A summary of his presentation is also included in this edition of *UT*. A special thanks goes to Anne M. Crabbs, CPCU, CIC, and her team for this very successful event. Photos of the meeting are on our web site.

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What's In This Issue

Message from the Chairman

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The Underwriting Interest Group was awarded the Circle of Excellence—gold level recognition at the Annual Meeting and Seminars. What this means is that the interest group delivered on its goals ranging from stewardship, getting the CPCU message out, education delivery, and active participation in the Annual Meeting.

The Underwriting Interest Group has four strategic goals. These are to provide our membership with:

1. timely information
2. educational materials
3. career development tools
4. networking tools

We are developing an initiative with the American Institute for CPCU to determine how the Underwriting Interest Group can reach out to the Associate in Underwriting (AU) completers and offer value-added services. More to come on this in future issues of *UT*.

During the next year we will have a few vacancies on the Underwriting Interest Group Committee. The commitment entails participation at the Leadership Summit meeting in April, and the Annual Meeting and Seminars in September. If you are interested in learning more about this, please contact me at murphyb@brps.com. ■

The Underwriting Interest Group Committee

We put the YOU in underwriting.

The importance of this slogan is that insurance is still a people and relationship business. People make the difference.

Make sure to put the YOU in the underwriting process.

Decision Management: Advances in Real-Time, Risk-Driven, Rules-Based Underwriting Decisions

by Lamont D. Boyd, CPCU

It was a beautiful Honolulu Monday morning, and yet the room was filled to capacity with a large number of new designees and a number of us "older" designees.

These folks enjoyed the information (and, in some cases, the humor) that was shared by our panel of experts on rules-based decision system development, implementation, and operation.

J. Brian Murphy, CPCU, ARe, ARM, AMIM, chairman of the CPCU Society's Underwriting Interest Group opened the session thanking everyone for attending and acknowledging Fair Isaac Corporation as the seminar sponsor. **Lamont D. Boyd, CPCU,** served as moderator for the seminar.

Patrick Madigan, assistant vice president, underwriting, Kemper Auto and Home, initiated the presentation, discussing his firm's work with Fair Isaac developing and implementing its own rules-based decision system.

Key points included:

- steps in Kemper's move from an underwriter review of all new business submissions to rules-based underwriting decisions
- project team approach, focused on business ownership, clearly defined deliverables, and ongoing communication among all stakeholders (business and technology interests)
- development of rules—credit-based insurance score usage, knock-out rules, cat management rules, tier placement rules, referral rules
- agent notification, training, and deployment via corporate web site
- results/benefits include:
  - –consistent application of underwriting guidelines
  - –incorporation of external data elements
  - –process efficiencies—up to 75 percent of risks processed through decision support system without underwriter referral
  - –underwriter focus on book and agency management versus individual risk underwriting
  - –quick response to market conditions

Michael W. Koscielny Jr., CPCU, CIC, outlined rules used in implementing a rules-based decision system for Fair Isaac.

Ian Turvill, senior director at Fair Isaac, shared thoughts from leaders in the industry about operational enhancements/approaches being utilized to help maintain competitive and information advantages.

Key features of rules-based decision system utilization included:

- **Precision**—"More precise underwriting helps us segment customers, better match the premiums individuals pay for the risks they represent, and win profitable market share." (Allstate quote)
- **Consistency**—"Mercury's ongoing success as it continues its expansion to even more places, maintaining its highly competitive positioning in its markets, and adhering to underwriting standards that allow for growth, but not at any price." (Mercury quote)
- **Agility**—"We continue to refine our tiered pricing models, which include our Strategic Risk Management (SRM) tool, adding new and enhanced variables as competitors continue to adopt tiered rating programs." (Allstate quote)
- **Speed**—"Everything we do recognizes the needs of busy consumers who are cost-conscious, increasingly savvy about insurance and ready for easy, new ways to quote, buy, and manage their policies." (Progressive quote)
- **Cost**—"Another way to prosper . . . is to be the low-cost operator. Among auto insurers operating on a broad scale, GEICO holds that cherished title." (GEICO quote)

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Decision Management: Advances in Real-Time, Risk-Driven, Rules-Based Underwriting Decisions

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Michael Koscielny, CPCU, CIC, assistant vice president at American Modern Insurance Group, offered his perspective of rules-based decision system implementation with Fair Isaac while he was with AAA Michigan.

Key points included:

- Rules development strategy:
  - –rule alignment by state
  - –reusability of rule template and rule flows
  - –multiple templates for rule tasks/ rule sets
  - –actionable, mutually exclusive rule usage only
  - –rigorous testing as part of deployment
- Rules creation—rule mining is a significant task that should not be taken lightly
- Developed rule functionality:
  - –knock-out rules, merit point determination, tier assignments, data validation edits, referral rules, rules reporting
- Rules maintenance—allowing for effective coordination and implementation
- Rules engine benefits:
  - –profitability and risk mitigation
  - –efficiency and cost reduction
  - –improved process management and business agility

Our seminar attendees asked a number of very good questions to the following responses.

Biggest challenges surrounding development, implementation, and utilization of a rules-based decision system included the need to effectively communicate the purpose for rules-based decisioning and to consistently monitor results for reporting of benefits derived.

Our panelists shared that while rules-based decision systems have been focused primarily in personal lines of insurance, benefits of such efforts are now being seen in other areas requiring consistent, objective decisions such as claims handling and small commercial lines underwriting and pricing. The ultimate goal should be one of enterprise-wide decision management . . . automating all high-volume operational decisions, improving the quality of all decisions through predictive analytics and decision optimization, connecting across channels, lines of business, systems, and customer lifecycle.

The Underwriting Interest Group would like to express its appreciation to each of our seminar speakers for their contribution to the CPCU Society's 2007 Annual Meeting and Seminars. ■

■ *More than 180 attendees attended the Underwriting Interest Group's seminar "Decision Management" where panelists discussed the biggest challenges surrounding developing, implementing, and using a rules-based decision system.*

Identifying and Controlling Risk in the Information Technology Industry

by Stephen Douglas, CSP, ARM

■ **Stephen F. Douglas, CSP, ARM,** is risk control director of CNA Technology, which provides insurance and risk control solutions to businesses in information technology and Internet services, telecommunications, and electronic component and hardware manufacturing. He has worked in risk control for 11 years, and has also worked as a production engineer in electronics manufacturing. Over the past year, he has presented courses on privacy and computer network security risks across the country as part of CNA's School of Risk Control Excellence and as a speaker to trade and insurance organizations. Douglas earned a bachelor of science degree in mechanical engineering from Tennessee Technological University.

 For a more detailed report on CNA's IT claim survey, go to Risk Control's page at www.cna.com.

The information technology (IT) industry has grown to become one of the dominant economic engines of our society. As this industry expands, common sources of loss are becoming more clearly identified. Much of this information is derived from insurance claims.

CNA, seventh largest U.S. commercial insurer, is a long-time provider of insurance to IT companies. In this article, we will review the results of an IT claim study by CNA, and conclude with suggested practices to manage risk in the IT industry.

For the purposes of the study, IT companies were defined to include:

- custom programmers, software manufacturers, system integrators, providers of computer consulting, and other computer-related services
- Internet access and service providers
- providers of web hosting and web design services
- managers of computer facilities
- computer processing and data preparation
- computer maintenance or repair

At the highest level, this industry segment includes consulting, services, and software products related to the storage, handling, manipulation, and transmission of information in the form of electronic data.

IT companies face the traditional loss exposures of service businesses, such as employee injuries, automobile accidents, liability claims, and property losses, as well as unique exposures related to their operations in the information realm.

The following is a review of those exposures based on an analysis of claims incurred by IT companies insured by CNA between January 1, 2001, and December 31, 2006, and from industry data as indicated for some exposures where CNA data does not exist.

This data indicates that the types of incidents most likely to cause worker injuries are manual handling and physical stress; slips, trips, and falls on the same level; and repetitive motion. These three incident types also represent the highest severity of claims.

Property claims data show burglary and theft as the most frequent type of loss, and fire as the highest severity.

Analysis of auto claims reveals one of the most preventable types of accidents, rear-ending other vehicles, as the leader in terms of frequency and severity.

More than half of the liability claims are related to an organization's operations or products causing loss or damage to the property of others. Although claims against organizations alleging bodily injury caused by their operations or products occur at just under half the rate of those incidents causing property damage only, the severity of these claims represents 70 percent of the total incurred costs.

Technology Errors and Omissions

Information technology companies face an evolving array of risks arising out of their product and service offerings. Software code can contain security vulnerabilities that allow hackers to penetrate customers' networks. Allegations of software copyright infringement are increasingly common. Defects in software, components, and devices can cause customers to lose revenue or incur significant financial expenses.

Errors and omissions incidents may arise for a variety of reasons associated with emerging technological innovation, customer expectation, or legal

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Identifying and Controlling Risk in the Information Technology Industry

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Workers Compensation Claims

By Type of Incident Causing the Injury, Shown as a Percentage of Total Claims

Incident Type	Percent of Total Claims
Manual Handling/Physical Stress	23
Slips/Trips/Falls on the Same Level	22
Repetitive Motion	18
Struck By or Against	10
Vehicle Accident	10
Falls from Elevation	6
All Others	11
Shown as a Percentage of Total Claim Dollars	
Incident Type	**Percent of Total Claim Dollars**
Slips/Trips/Falls on the Same Level	23
Manual Handling/Physical Stress	22
Repetitive Motion	21
Vehicle Accident	12
Falls from Elevation	8
Struck By or Against	6
All Others	8

Property Claims

By Type of Incident Causing the Loss, Shown as a Percentage of Total Claims

Incident Type	Percent of Total Claims
Burglary/Theft	53
Damaged or Lost in Transit	10
Water Damage	7
Fire	7
Wind Damage	6
Fidelity	3
All Others	14
Shown as a Percentage of Total Claim Dollars	
Incident Type	**Percent of Total Claim Dollars**
Fire	57
Water Damage	9
Fidelity	8
Burglary/Theft	8
Wind Damage	8
Damaged or Lost in Transit	4
All Others	6

interpretation of obligations. Common reasons for such disputes include:

- misunderstanding between buyer and seller
- misrepresentation by vendors
- acceptance of unrealistic specifications or changes in existing specifications without study or written agreement
- acceptance of customers' risk through hold-harmless agreements
- failure to state performance obligations in contracts with the buyers
- incompatible hardware or software
- unusable recommendations by vendors
- delays in project completion
- failure to maintain disaster recovery plans or failure to back up, maintain, or retain source code as required to protect buyer source data
- security errors
- violation of statutes or regulations, including intellectual property disputes that bar delivery of products or services as specified

Technology Errors and Omissions Loss Analysis

CNA data indicate a variety of complex causes of errors and omissions (E&O) claims with elements of the reasons listed above. The data also indicate that the average E&O claim for this industry is $783,435. The following charts compare E&O losses with those related to other types of exposures. While E&O claims are low in frequency, they can have a significant impact on a company's bottom line.

Information Risks

Information risks include threats to information technology systems, the intangible property handled by them, and consequences of failure of these systems. These risks include first-party losses that would be sustained by the organization or third-party losses related to liability to others. Some examples of these risks are given below.

Auto Claims

By Type of Incident Causing the Loss, Shown as a Percentage of Total Claims

Incident Type	Percent of Total Claims
Rear-ended Other Vehicle	28
Struck by Other Vehicle	25
Lost Control of Vehicle—Left Road	8
Failed to Yield	6
Turned Left in Front of Oncoming Vehicle	4
Theft of Vehicle	3
Hit Pedestrian	1
All Others	25
Shown as a Percentage of Total Claim Dollars	
Incident Type	**Percent of Total Claim Dollars**
Rear-ended Other Vehicle	28
Hit Pedestrian	22
Struck by Other Vehicle	13
Turned Left in Front of Oncoming Vehicle	9
Lost Control of Vehicle—Left Road	5
Failed to Yield	4
Theft of Vehicle	2
All Others	17

First-Party Risks

- loss of data
- loss of business income
- denial of service
- virus/hacker/sabotage
- theft of system resources
- extortion

Third-Party Risks

- theft/disclosure of or damage to someone else's data
- privacy injury liability
- network security liability
- content liability

These are events that may compromise the confidentiality, integrity, or availability of an organization's electronic data or otherwise cause a loss of system resources. These same events may create liability to others in regard to data of others that is stored, handled, or processed by an organization. As this is an emerging source of loss, there is little insurance claim history that can be used for analysis. However, there is a growing public record of incidents related to security breaches of databases and the private information they contain. The following analysis was created from a database of these public notices.

Privacy and Network Security Liability

According to data available from the Privacy Rights Clearinghouse, physical theft, hacking into systems and accidental release are indicated as the leading causes of these breaches of sensitive or non-public information. (Source: "A Chronology of Data Breaches." Privacy Rights Clearinghouse. May, 4 2007. www.privacyrights.org/ar/ChronDataBreaches.htm.)

Physical Theft and Lost Media

Physical theft of desktop PCs, laptops, PDAs, tapes, disks, USB drives, or other devices and media create significant risks to the information stored on these devices. These incidents are the most frequent cause of privacy breaches and, as indicated previously, physical theft is the most frequently occurring property loss. Physical theft also ranks second in terms of cost of these breaches. The expanding use of portable devices and rapid increases in storage capacity warrant significant attention to how these devices and the data they contain are secured. It should also be noted that the exposures related to lost media are the same as for physical theft. The separate category for lost media constitutes incidents related to poor tracking and physical control of media, such as back-up tapes. Unless steps are taken to protect the data on such misplaced media, the data they contain are vulnerable to unauthorized access.

Hacking

Unauthorized access to networks by hackers represents almost half of all records breached during the time period represented in the charts. Hacking ranks second in terms of frequency of occurrence. In addition to theft of information that can create privacy concerns, once unauthorized access is gained to a system, a hacker can perform a variety of malicious activities. These activities may include theft of an organization's intellectual property, destruction of data, sabotage, and theft of system resources.

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Identifying and Controlling Risk in the Information Technology Industry

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Liability Claims

By Type of Incident Causing the Loss, Shown as a Percentage of Total Claims

Incident Type	Percent of Total Claims
Damage to or Loss of Property of Others	55
Bodily Injury Caused by Operations or Products	24
Personal Injury	11
All Others	10
Shown as a Percentage of Total Claim Dollars	
Incident Type	**Percent of Total Claim Dollars**
Bodily Injury Caused by Operations or Products	70
Personal Injury	18
Damage to or Loss of Property of Others	9
All Others	3

Exposure	Average Incurred Loss
Technology Errors & Omissions	$783,435
Property	$34,549
Liability	$28,488
Auto	$24,825
Workers Compensation	$19,873

Incident Frequency by Cause of Security Breach—All Industries

354 Recorded Privacy Breaches	
Physical Theft	36%
Hacking	26%
Accidental Release	20%
Lost Media	11%
Employee Act	6%
Social Engineering	1%
Records Exposed Approximately 102.1 Million Total	
Hacking	47%
Physical Theft	37%
Lost Media	11%
Accidental Release	3%
Employee Act	2%
Social Engineering	<1%

Accidental Release

Our study of the data on security breaches shows that accidental releases of non-public information occurred in a variety of ways. Much of the data was released in electronic form via the Internet, an organization's web site, or e-mail. Other releases are related to discarding equipment or media that was not properly sanitized to remove all traces of non-public information. Loose editorial and content controls can allow these types of breaches to occur, and can also create other types of liability related to content published electronically. This includes liability related to claims of libel, slander, and intellectual property rights infringement.

Employee Acts and Social Engineering

Some of the breaches cited indicate specific involvement of rogue employees who gained unauthorized access to systems and information, or misused authorized access privileges. Similarly, social engineering techniques in which employees or others are manipulated into performing acts that facilitate a breach or divulging confidential information are also indicated. While the frequency and severity of incidents in which these techniques are the primary cause of a breach is shown to be low, the overall impact should not be underestimated.

Relationship of Privacy Liability Data to First- and Third-Party Losses

The data used in the preceding analysis are specifically related to security breaches that resulted in or had the potential to result in liability related to identity theft. As already mentioned, there is a direct correlation between the hazards and controls related to these breaches and the exposures that can also cause first-party losses such as loss of data, loss of business income, denial of service, theft of system resources, virus/malicious code incidents, and extortion.

In addition to first-party losses, there are liability issues related to the spreading of viruses or malicious code from an organization's systems to systems of customers, vendors, or others also are possible.

Suggested Practices

The analysis of claim data presented here suggests basic practices that could be effective in reducing losses across exposure areas and specific practices that will reduce risk within a given exposure area.

It is essential to address both the traditional "real-world" exposures and those affecting the industry's working medium, which is information. This makes sense not only because of information's central role to the industry but also in a broader sense. Increasingly, the information realm or "cyberspace" has become enmeshed with the real world of tangible objects. With powerful mobile devices, broadband wireless networks, GPS-enabled search engines, nearly ubiquitous access to the Internet and other technologies that seem to emerge daily, the border between the two worlds is becoming increasingly blurred.

Formal contract and project management procedures should be utilized to control technology errors and omissions and information risks in a similar manner to other liability exposures. IT companies offer products and services that are constantly evolving and on the leading edge of technological innovation. Errors and omissions incidents typically arise for reasons associated with potential unexpected consequences of the utilization of these technological innovations, customer expectation, or legal interpretation of obligations. Contracts, license agreements, and service agreements can help to define these expectations, provide protection from liability, and limit damages.

Additionally, organizations can be liable for damages or privacy injury related to information entrusted to service providers or any third party allowed to access networks. Risk transfer techniques and management of contractual relationships can also be used to limit liability in these situations.

Implementation of a comprehensive safety program that addresses employee safety, and the safety of others, is key to reducing workers compensation, liability, auto, and property losses.

- **Workers compensation.** Manual handling, physical stress, and repetitive motion injuries are indicated as loss leaders in the analysis. An ergonomics program can protect workers from these types of injuries and increase productivity.
- **Liability.** An effective safety program also helps to control and eliminate hazards that may cause bodily injury or physical damage to others or their property. The scope of the safety program should address premises exposures, as well as the exposures created by off-site operations, such as computer repair, installation, and system integration services.
- **Auto.** Our claim study indicates accidents in which the insured driver rear-ended another vehicle as the leading loss source. A fleet safety program that includes minimum driver qualifications raises driver safety awareness, and implements driver accountability procedures can have a tremendous impact on this type of preventable accident.
- **Property.** A program for managing property risks is crucial in the prevention and mitigation of potentially catastrophic property losses. The claim study indicates that high-severity claims account for the majority of total incurred property losses for this industry segment. Property protection programs include emergency response plans, self-inspection procedures, and other special procedures related to maintenance of fire protection systems and control of ignition sources. Areas in which special emphasis is warranted include emergency response plans and physical/information security.

As the IT industry continues to evolve, so too will the risks it incurs. Nonetheless, the data available right now suggests a range of risk management strategies that can contribute to an IT company's safety, security, and bottom line. ■

Have You Considered Volunteer Leadership Opportunities?

The CPCU Society membership is what makes the CPCU Society one of the most thriving and successful organizations in the industry today. As a member of the CPCU Society and your local chapter, you'll find many opportunities to contribute to the success of the Society—while developing your leadership skills and giving something back to the industry.

How can you get involved?

- At the local chapter level by:
  - –Serving on a chapter committee or task force.
  - –Step up and express interest in becoming an officer or chapter leader.
  - –Volunteer to coordinate a chapter Good Works project, such as a joint event with a community organization.
- At the Society level by (filling out an Application for CPCU Society Service):
  - –Apply to serve on a task force.
  - –Reach out to an Interest Group Committee and inquire about possible opportunities to become a committee member.

Interest Group Committee involvement offers unique one-of-a kind networking, learning, and fellowship opportunities that can translate into career advancement and allow you to give something back to the organization and industry. ■

Get Exposed!

We're always looking for quality article content for the Underwriting Interest Group newsletter. If you, or someone you know, has knowledge in a given insurance area that could be shared with other insurance professionals, we're interested in talking with you. Don't worry about not being a journalism major; we have folks who can arrange and edit the content to "publication-ready" status. Here are some benefits of being a contributing writer to the Underwriting Interest Group newsletter:

- Share knowledge with other insurance professionals.
- Gain exposure as a thought leader or authority on a given subject.
- Expand your networking base.
- Overall career development.

To jump on this opportunity, please e-mail either Stephen W. White, CPCU, at steve.white.bnbg@statefarm.com or Gregory J. Massey, CPCU, CIC, CRM, ARM, PMP, at greg.massey@selective.com.

"The Future of Underwriting" Breakfast Meeting Recap

Eduard Pulkstenis, CPCU, FCAS, MAAA, senior vice president and chief underwriting officer of Selective Insurance Group of America, kicked off his presentation with a slide show by Karl Fisch and Scott McLeod from The Fischbowl Blog (http://thefischbowl.blogspot.com); the actual slide show, Shift Happens, can be viewed at http://www.glumbert.com/media/shift. The Shift Happens slide show is one that you will watch a few times, the first time in awe at the speed of change going on around us—and across the globe. A few fascinating excerpts from the slideshow included.

- Twenty-five percent of the population of China with the highest IQ . . . is greater than the total population of North America; in India, it's 28 percent.

  –Translation: They have more honors kids than we have kids.
- China will soon be the #1 English speaking country in the world.
- During the course of this 10-minute slide show presentation…

  –60 U.S. kids will be born

  –244 in China

  –351 in India
- Today's learner will have 10 to 14 jobs by the time they are age 38.

Eduard Pulkstenis, CPCU, FCAS, MAAA, emphasized the need to understand generational diversities and the changing workforce in order for an organization to succeed.

More than 100 attendees learned how technology, predictive modeling, and analytics can be used to make better decisions.

- In 2002, Nintendo invested $140 million in research and development; the U.S. federal government spent half as much in research and development in education.
- If MySpace were a country, it would be the eleventh largest in the world.
- It is estimated that a week's worth of *New York Times* information contains more information than a person was likely to come across in a lifetime in the eighteenth century.

This sellout event, with more than 100 people, left the attendees motivated with making lifetime learning a critical component in helping their organizations compete in the world.

Pulkstenis then talked about how technology, predictive modeling, and analytics have been used for quite some time outside of the insurance industry, such as Wal-Mart and Major League Baseball, to make better decisions. He then talked about the relationship among the four generation groups—Mature Americans, Baby Boomers, Generation X, and Generation Y. Each one of these groups is very different, but we need to understand the generational diversities and changing workforce in succeeding as an organization.

The main take-aways were:

- We need to grow in our abilities to turn data into information in assessing risk.
- We need to use new information to make new (and sometimes unconventional) decisions.
- We need to accomplish this with a diverse workforce, which includes diversity of thought.
- We need to better communicate in a timely fashion with the customer, and on the terms acceptable to them.

This sellout event, with more than 100 people, left the attendees motivated with making lifetime learning a critical component in helping their organizations compete in the world.

Why Actuarial Techniques Do Not Work in Pricing Commercial Fire Risk

By Alok K. Jha, Ph.D., and Craig Van Anne

- **Alok K. Jha, Ph.D.,** is the director of fire risk division at RMS currently focused on developing and productizing an insurance industry capability on fire risk analysis. He has more than 10 years of experience in reliability and risk analysis. Jha has played lead roles in developing RMS' capabilities on casualty loss models for earthquake and terrorism hazards, and hurricane loss analysis to offshore oil and gas platforms. Beginning his RMS career as a summer intern in 1994, he joined RMS as a full-time employee in 1999 after a three-year work experience as a structural engineering specialist and project manager at Bechtel, San Francisco. He is an associate member of the American Society of Civil Engineers, a member of the Society of Fire Protection Engineering, and has published several papers in refereed journals and international conferences. Jha has a Ph.D. from Stanford University in civil engineering specializing in structural reliability.
- **Craig Van Anne** joined RMS in 1994 and is the CEO of OYORMS, a joint venture company in Tokyo, Japan he set up in 1998 to address risk management issues faced by the Asian insurance and corporate markets. At RMS, he is in charge of developing a probabilistic risk analysis for fire underwriting serving the insurance market and corporate risk managers. Van Anne has more than 15 years of professional experience in the engineering and insurance industry, providing risk analysis, management and engineering services for utility, telecommunications, petrochemical, and industrial clients in the United States and the Pacific Rim. He has a master of science in fire protection engineering from Worcester Polytechnic Institute, Worcester, Massachusetts and a B.S. in construction engineering from California Polytechnic University, San Luis Obispo, California.

Predictive actuarial modeling techniques fall short of the robustness and transparency necessary to capture a reliable and consistent interpretation of fire risk across a non-homogenous set of commercial occupancy classes. These traditional occupancy classes represent a broad category capturing a range of significantly differing risk profiles, such as "retail," consisting of big-box retail outlets to small strip-mall stores; "light industrial" consisting of metal and plastics to electronics manufacturing plants; or "educational," from a university campus to a single-building elementary school. The large number of homogeneous exposure units and a similarly large set of historical claims that are characteristic of a portfolio of personal lines risks[1] do not exist for commercial fire risks.

Commercial underwriting experience shows significantly less homogenous exposure value, and a relatively small number of claims that predominantly fall within the high frequency, low severity realm. An underwriting large-loss scenario, such as the "PML" event, a cornerstone of commercial risk underwriting, is infrequent by definition, making it impossible to fully understand the influence of its resulting financial loss on an adequate technical price with an appropriate risk load. Issues that make predictive statistical analysis of commercial fire inappropriate are noted as:

- Sparseness and incompleteness of the insurer's pool of reliable claims from which to understand the underlying ensuing financial loss. Categorization of claims into their numerous underwriting occupancy categories further dilutes sub-category claim counts.
- Insurer claim documentation focuses on its payment obligation; data on the claims that are useful for risk analysis are often not, or incompletely, captured. Accessing electronically the information that is captured for extracting underwriting and loss control engineering insights is extremely difficult and inefficient.
- The incidence of claims is significantly understated due to the "non-reporting" of losses under the policy deductible.

These issues result in a statistically insignificant number of claims available for predictive actuarial analysis techniques for deriving reliable pricing, average annual or excess layering, even by broad occupancy classification. An informed underwriting of commercial fire risk not only requires a transparently accurate technical rate reflecting the unique loss characteristics associated with an occupancy, but also the risk of these same characteristics leading to a low frequency-high severity underwriting loss event. The remainder of this article discusses a physical modeling approach, using techniques in commercial building design, yielding a probabilistic underwriting assessment of fire risk based on risk engineering attributes presented by a commercial property account.

The Account Fire Model (AFM) provides the underwriting process a view of risk that for the first time incorporates the probability of experiencing a range of losses, taking into consideration exposure characteristics known to influence the extent of fire spread. This advancement in analysis yields new risk management paradigms in account underwriting at the location and portfolio levels. Decision makers can now access risk metrics for a transparently informed view on account selection and risk transfer pricing, as well as the cost-benefit of capital investment in mitigation. An analytical methodology exists under the Account Fire Model, which delivers transparently granular assessment of loss.

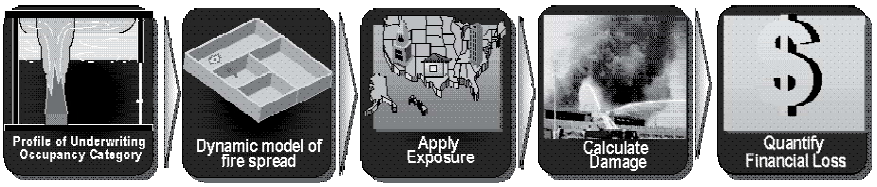
The AFM is a hybrid statistical and physical risk modeling approach for informing the primary insurance underwriting process, facultative and treaty reinsurance management, and business continuity planning. Its

framework is a performance-based methodology developed by RMS with involvement of both fire underwriters, and leading researchers and practitioners in the field of fire protection engineering (See Figure 1).

Loss estimates are presented from two perspectives. In the underwriting scenario view, a loss is reported according to traditional market definitions of specific underwriting events, such as NLE and PML. The second perspective is the return period approach, in which a level of loss is reported according to a "return period" resulting from any possible single fire event. The basis of each of these two loss perspectives is the exhaustive simulation of fire events individually unique according to a modeling of the effectiveness of active and passive fire protection interacting with location occupancy and construction attributes. Under both approaches, new levels of decisioning is available to the risk manager through insight gained from a risk-based assessment of annual probability to experience a specific level of loss.

The AFM design offers two levels of analysis known as the Occupancy Average method and Site-Specific method, where use depends on the level of exposure and hazard information available to the user. Occupancy Average requires minimal information, designed to analyze fire risk based on exposure data readily available to the underwriting process, such as: occupancy, construction, number of stories, zip code for fire department response, sprinkler status, and property values. The Occupancy Average method is a hybrid design in that it relies upon building code and design analysis to describe typical *fire hazards* of a location based on its occupancy class and zip code, with a rigorous application of physical fire modeling in the background to quantify *fire risk*.

Figure 1
Overview of AFM Methodology



Profile of Underwriting Occupancy Category	Dynamic model of fire spread	Apply Exposure	Calculate Damage	Quantify Financial Loss
Physics-based model of "design fire" according to threat attributes characteristic of the occupancy.	Probability of fire spread beyond compartment of fire origin considering automatic sprinklers, fire wall performance, and fire department response.	Apply specifics of exposure at location-level for the account.	Estimate damage resulting from probable fire spread. Identify PML, MFL, etc., event risk.	Technical price vs."walk away" price? Deductible adequacy? Excess layer AAL? Probability of PMS loss? ROE for capacity applied?

The Site Specific method leverages quantitative/qualitative hazard and protection site-determinations made by the risk engineer's assessment of Construction, Occupancy, Protection and Exposure (COPE) attributes. This approach makes use of actual building information to override characteristic assumptions built into Occupancy Average profiles to specifically model the actual spread of exposure and risk across a location.

The scope of the AFM is currently limited to compartment fires in buildings, and geographically, to the United States. The analytical process begins with the characterization of location-level building layout and fire characteristics for a specific occupancy class. Next, fire dynamics solutions are used to forecast time histories of simulated fire events, which are linked to physical damage by developing separate vulnerability curves for structure and contents. These fire simulations are carried out for a wide range of input parameters to develop probabilistic response surfaces, resulting in loss cost sensitivities to the various input parameters. The combination of these dynamic modeling steps yields a conditional loss given a location experiences a fire event. Extending this process to an annual loss cost, insurance claims data and fire incident data are used to determine the ignition frequency by occupancy and location size in square footage. The annual loss cost is then validated against claim loss histories.

Risk Selection and Pricing

Account Fire Model analytical metrics permit the underwriting process to transparently consider a probabilistic profile of risk at the location, account and portfolio levels in terms of granular hazard attributes of each location. Risk profiling offers a new paradigm in considering market driven pricing versus the underwriter's "walk-away price" for meeting minimum capacity allocation or profitability goals. Figure 2 demonstrates the ability to view probabilistically the risk being assumed by any position within the risk transfer contract.

Continued on page 14

Why Actuarial Techniques Do Not Work in Pricing Commercial Fire Risk

Continued from page 13

This probabilistic understanding of fire risk permits viewing the potential loss from a range of event severities. This insight into risk transfer is achieved through an exceedance probability (EP) curve.

The EP curve provides the ability to analytically develop loss costs for different layers, including any specific excess layer of interest, representing reproducible consistency yielding a transparent mechanism as an alternative to layering scales used in the industry (e.g., Lloyd's scale[2]) of unknown reliability and source. This transparency into the risk profile of an account will facilitate facultative and treaty reinsurance negotiations by consisting communicating the qualities the account or portfolio to parties in the risk transfer process.

Summary

The commercial fire line involves exposure values and loss driving attributes that are significantly greater and more varied than personal lines. The insureds making up the personal line market form a generally homogenous group of exposure units, such as homeowner fire, life or auto; this homogenous nature is not present in commercial fire underwriting. The non-homogenous nature of the *commercial* fire market is further exasperated by a tendency of specialty and excess loss underwriters, as well as the primary underwriter, each implements their own loss control knowledge of risk characteristics unique by occupancy class.

The AFM levels the risk assessment playing field between the different players in the risk transfer food chain removing the vast uncertainty today in understanding the fire risk, and permits the players to focus on the business at hand, namely, covering the risk appropriately and pricing it appropriately and profitably. ■

Figure 2
Probabilistic Loss Profile

- Loss of given event is borne by multiple participants.
- Variability around mean drives potential loss to higher layers.
- Exceedance probability curves can be generated for each participant.
- A new risk paradigm—Standardized loss estimate from large-loss underwriting event PML, MFL, etc.

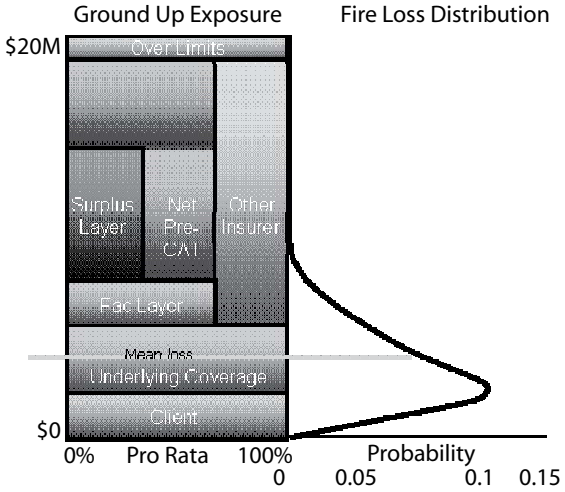
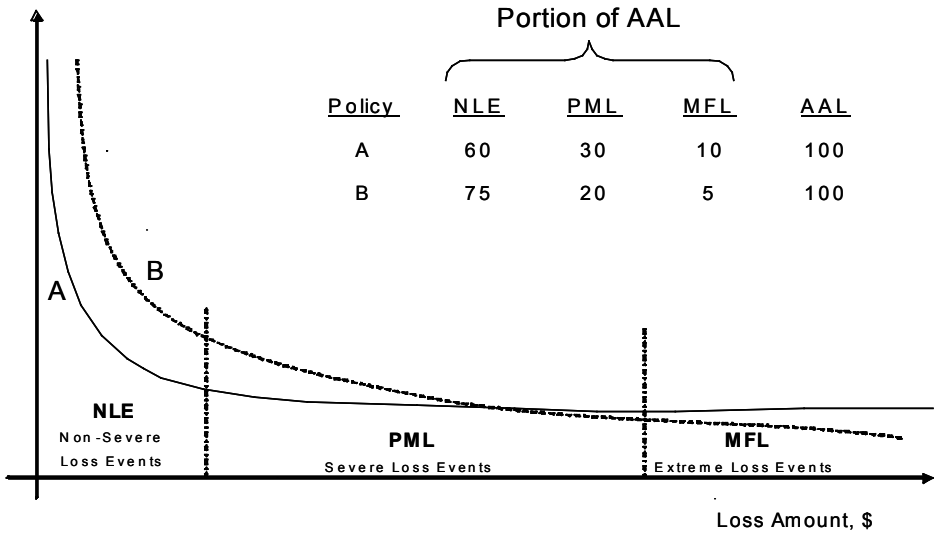


Figure 3
Premium De-aggregation by Loss Layers Based on the EP Curve



Endnotes

1. A "risk" in this context refers to a single exposure unit.
2. Note that Lloyd's scale is simply a curve that represents contribution of the total premium charged by various retention limit values. This scale does not give any regard to location attributes such as construction class or existence of sprinklers. The AFM on the contrary explicitly accounts for in any layer the influence of the primary location characteristics such as occupancy class, construction class, existence of sprinklers, fire department response, etc.

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Underwriting Trends is published four times a year by and for the members of the Underwriting Interest Group of the CPCU Society. http://underwriting.cpcusociety.org

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Underwriting Trends
Volume 19 Number 4 December 2007
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