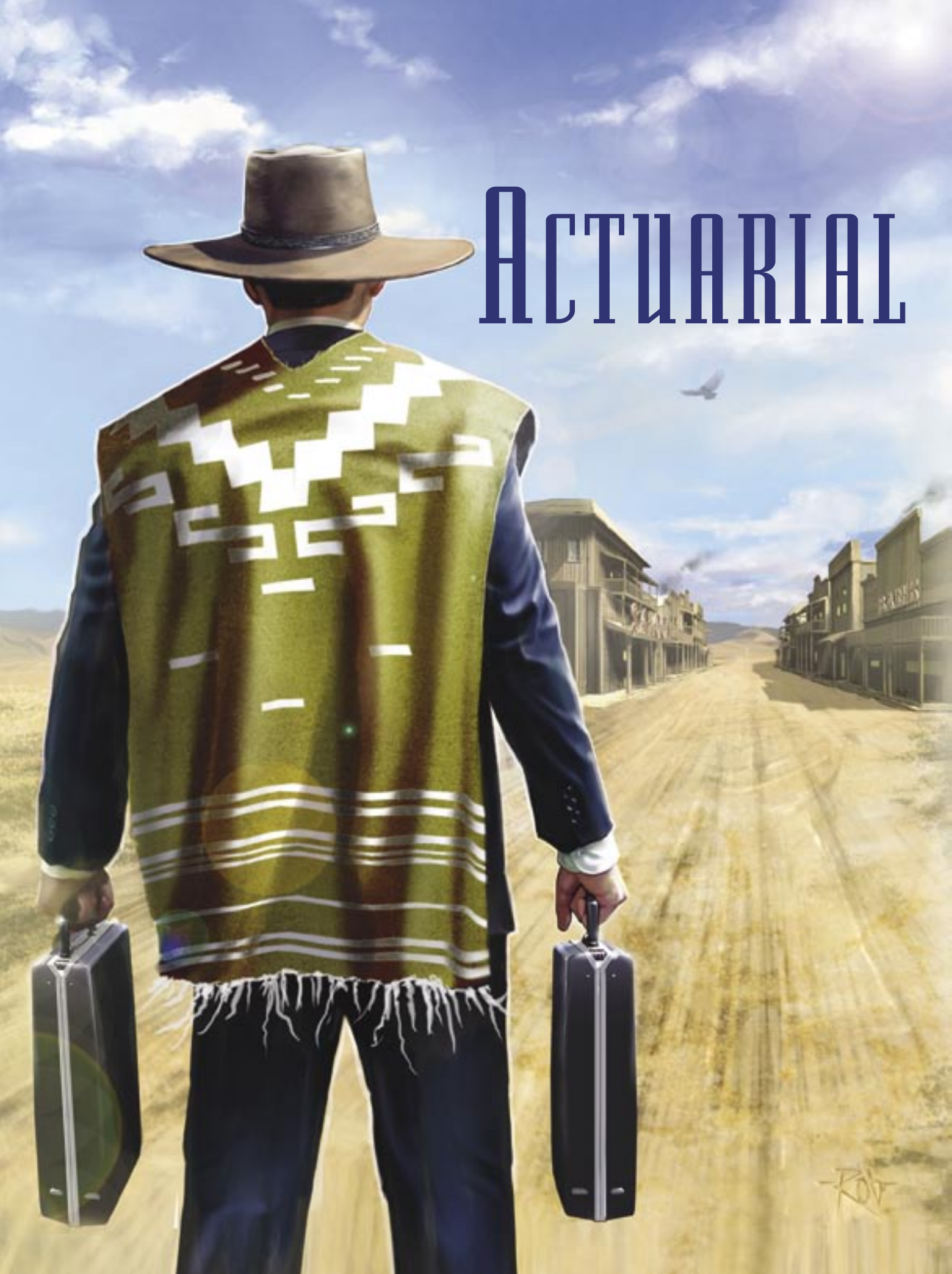


# ACTUARIAL



ROY

# ENTERPRISE RISK MANAGEMENT FOR INSURERS:

# THEORY PRACTICE

**ERM is the Wild West, and actuaries are the new folks in town.  
Some feel at home there, others don't quite get it yet.  
And the townsfolk tend to be suspicious of newcomers.  
One thing is certain, though: Actuaries are here to stay.**

**BY JAMES E. RECH**



**O**PPORTUNITY IS RISK, for without risk there are no financial rewards. The primary role of management is to evaluate opportunities in light of their attendant risks and to develop a complete risk profile, an ambitious undertaking for any organization. Enterprise risk management (ERM) is the tool managers use to identify, analyze, mitigate, and monitor risk.

But risk is a chameleon; it can look quite different when management limits its view to a specific internal application rather than expanding the view to include multiple stakeholders. This multiple view of risk is the focus of ERM, leading to a better understanding of the interplay between risk and success.

Historically, actuaries have played a critical role in managing risk for individuals, businesses, and government. Actuarial analysis allows for more informed decisions in today's increasingly transparent business climate.

## **Changing Landscapes**

Insurance companies assume the common risks of individuals, businesses, and government: fortuitous losses resulting from ill health, disability, and catastrophic events such as earthquakes, hurricanes, and conflagrations; liabilities arising from certain actions, retirement, or death. Insurance allows people, businesses, and government to take risks they couldn't afford to take without it—and society is advanced.

Since insurance is so instrumental to the economic fabric of our society, regulations are needed to make sure insurers are effective and efficient. Insurance is of no help to anyone if the risks insurers assume put them out of business.

Globalization of insurance products and services complicates matters, leading to a world of new and different risks. In addition, more stakeholders are driving a greater emphasis on

making market, credit, and operational risks more transparent, pushing for improvements in corporate governance. These newly awakened stakeholders include federal and state legislators and regulators, rating agencies, capital markets, competitors, consumer groups, customers, and insurers themselves.

**CHANGES IN LEGISLATION.** In the United States, a critical landscape change occurred with the passage of the Gramm, Leach, Bliley Financial Services Modernization Act (GLB) in 1999. This legislation introduced three important ERM issues for insurers.

First, GLB legalized the convergence of banking and insurance. Second, it provided a single format for the National Association of Insurance Commissioners (NAIC) to license insurance agents. Third, GLB introduced new privacy constraints on financial institutions. These constraints were promoted by consumer advocacy groups concerned with the rapid expansion of personal information being collected and used, not only within a company but also among businesses. Insurance carriers that aren't careful risk their reputations. We've already seen several recent failures of consumer privacy with the loss of personal data by Citigroup's CitiFinancial division, Time Warner, Bank of America, and others.

Corporate governance issues came to the forefront with the enactment of Sarbanes-Oxley in 2002. Today, financial transparency is a common mantra among regulators, the capital markets, and consumers. Financial reporting and accounting should provide management and boards of directors with a

clear view of the risks associated with business opportunities and the growth of stakeholder value.

Finally, the perceived operational inefficiencies and redundancies of state regulation will drive structural revisions for insurers such as federal charters for insurance companies.

**CHANGES IN REGULATION.** In 1999, the International Association of Insurance Supervisors (IAIS) began to develop a set of seven principles and one cornerstone paper relating to the regulation of international insurance activities. Central to the IAIS's approach is the development of internal rating models representing insurers' unique risks. The risk measures of the future will be based on the company's specific risk profile, not on the industry as a whole.

The NAIC (a contributing member of the IAIS) is also moving in the ERM direction. Rather than the traditional "tick and tie" audit approach, NAIC audits are advancing the capital adequacy, asset quality, reserves, reinsurance, management, earnings, and liquidity (CARRMEL) approach. CARRMEL is a top-down surveillance process that enables regulators to focus on high-risk areas of concern, interview senior management, and assess external and internal audit functions.

Both the IAIS and the NAIC approaches to insurance regulation are beginning to run parallel with the three regulatory pillars found in the Basel II Accord for the regulation of the banking industry: minimum capital requirements, a supervisory review process, and market discipline.

**CHANGES IN INSURANCE FINANCIAL THEORY.** Insurers

have traditionally thought of themselves solely as aggregators of hazard risk. But in a changing environment, this view could very well place the industry at a competitive disadvantage.

Another way to view the insurance industry is to restate its function in terms of modern portfolio theory. Translating from insurance to financial terms, Don Mango of GE Insurance Solutions has characterized the insurance transaction as illiquid, long-duration "put" options on real property. An insurance "put" option provides the insured with the right, but not the obligation, to sell the insurer his financial "loss." For example, should a fire destroy an insured home, a fire insurance policy allows the insured to sell the amount of the fire damage loss to the insurer.

The advantage of such a view is that it strategically combines assets and liabilities into a common framework, generating market innovation and significant industry structural change. However, with this strategic tie also comes increased management emphasis on the risks and complexity of the insurance business.

Financial markets are always looking for ways to improve capital efficiencies. Quite simply, the financial markets don't reward companies or investors for holding diversifiable risks. Traditionally, reinsurance was the only mechanism allowing insurers to diversify their insurance risk portfolios. Future innovations into securitization, however, may provide additional risk management tools for the insurance portfolio.

On the asset side, derivatives have been very successful in introducing both yield enhancement and risk management opportunities. As a yield enhancement, covered call options

## Finite Risk and Securitizations

When it comes to the new financial services landscape, traditional views can sometimes result in professional blinders. One prime example is finite insurance coverages. The current view seems to hold onto age-old industry bias that insurance is strictly an underwriting activity. Under this view, the insurance portfolio represents only one cost driver—the probability of underlying insurance underwriting loss.

The convergence of banking, investment, and insurance, however, has resulted in greater emphasis on alternative views: the insurance company as a financial entity and the insurance transaction as a financial put. Under this financial view, the portfolio characteristics for any accumulation of insurance puts retain two types of cost drivers—the probability of underlying insurance underwriting losses and payment/yield risk.

Where do actuaries fit into this discussion? Actuaries layer the aggregate loss distributions into insurance "tranches"

for which appropriate risk loads are developed.

In the lower layers, there may be little insurance risk but high investment-yield risk. At higher layers of the aggregate loss distribution, pure insurance risk may dominate. Actuaries can define the risk/reward relationships for each of these transactions.

The reason that this issue is important to insurers is that future market securitizations of insurance risks are at stake. Finite reinsurance and securitizations are very similar in concept. Assume a bank wants to issue a residual mortgage-backed security (RMBS). Under the RMBS, several tranches are developed, each with significantly different risk characteristics. For example, the risk associated with early tranches may be based solely on the timing of interest payments during the first five years of the MBS. Here, default risk is minor, and the return reflects a high-grade investment-yield rate. On the other end, the highest tranche (known as the

"equity" tranche) may assume the majority of loan default risk, an insurance-type risk.

When securitization tranches are issued, there's no question of whether the risk is due to interest rate, default, or repayment. The financial markets price these risks within each tranche. So why do insurance regulators become overly concerned with insurance risk vs. payment/yield risk? In developing the financial markets of the future, regulatory care must be taken to assure that what's good for one financial entity (banks) should also be acceptable for another (insurance).

Actuaries currently have the analytical skills to provide management, investors, and regulators with the needed risk/reward/correlation information essential to the development and use of these two risk management tools whether the tool is a finite reinsurance coverage or a securitization of risk within the financial markets.

can increase investment returns. When used as hedging instruments, derivatives provide significant additional security. They can also be used to develop synthetic financial instruments that replicate specific cash flows or affect portfolio duration.

But these industry structural innovations also significantly increase regulatory risk. Although too few managers or regulators currently understand the opportunities and risks of these instruments, they're still an efficient and effective way to manage an insurer's risks.

External stakeholders such as rating agencies are also using ERM to evaluate an insurer's investment rating quality. In January 2005, for example, *Standard & Poor's* stipulated that by the end of fiscal year 2005, an insurer's ERM program will be a critical component in its rating methodology for insurers. To support this position, S&P has hired David Ingram, one of the foremost actuaries in the developing ERM field, to lead the charge. While S&P's initial thrust for ERM program evaluation will be concentrating on life insurers, ERM program considerations for P&C carriers won't be far behind. In addition to S&P, *Best's*, *Moody's*, and *Fitch* are adjusting their rating methodologies to factor in the quality of insurer ERM programs.

Many within the insurance industry itself are also beginning to view insurers as financial institutions. Yes, proper underwriting guidelines and good claims handling are still critical, and management still needs to understand its market. But as insurers begin to compete more aggressively with non-insurance entities for market share and capital, they must begin to balance the total mix of assets and liabilities. ERM provides this conduit.

## Actuaries and ERM

Since the turn of the 20th century, actuaries have provided thought leadership in the design and implementation of quantitative methodologies for a wide variety of economic actions. In 1938, for example, Frederick Macaulay, an actuary, independently developed the concept of duration, which remains a key concept in fixed-income portfolio management.

Actuaries have developed a unique set of skills that are very applicable to "real" options. Actuarial leadership has allowed insurers, corporations, and public programs to more clearly understand the risks they assumed, mitigate risks when necessary, increase profitability, and improve the probability of long-term solvency.

**INSURANCE PRODUCT ENGINEERING (IPE).** The insurance industry summarizes the actuarial role as "insurance engineering." This concept reflects an inclusive set of activities in insurance valuations similar to the role financial engineers play in the valuation of financial instruments. Insurers sell long-term (greater than one year) put options, and actuarial evaluation models have led to better understanding of the risks associated with these long-term puts under a wide variety of coverages.

In addition to their traditional role in insurance, actuaries have been instrumental in finding other practical solutions for many of society's risk problems. Our IPE models are a mix of frequency and severity drivers, statistical relationships, econometric modeling, scenario development and testing, and simulation techniques. Where possible, actuaries will use several models in developing their solutions.

**BEHAVIORAL FINANCE.** Over the past decade, actuarial

TABLE 2 Primary Area of Practice—Finance

	Financial Actuaries		AAA Actuaries	Percent
	(6/1/04)	(8/15/05)	(8/15/05)	
FSA/ASA	969	1,014	17,881	5.7%
FCAS/ACAS	27	36	3,982	0.9%
Combined	992	1,050	21,863	4.8%

Source: Actuarial membership in the Society of Actuaries and the Casualty Actuarial Society based on the membership directory maintained by the Society of Actuaries as of Aug. 15, 2005 (see: [www.soa.org](http://www.soa.org))

models have expanded our understanding of why people buy insurance. Models employ the theories of *behavioral finance*, the study of specific insurance-buying decisions that arise from client characteristics and behavioral drivers associated with risk aversion. Understanding that markets aren't always efficient, and that clients don't always act rationally, provides management with new profit centers they were never aware of before.

**OPERATIONAL RISK.** For insurers, insurance risk represents illiquid, long-term put options. In other words, the insured may sell an asset with diminished value back to the insurance company at a specified price. Insurance policies represent options on real assets.

There are many similarities between *real* options and *financial* options. Financial options are characterized by a right, but not an obligation, to purchase a specific type of financial instrument in the future. So are real options, whose characteristics include:

- The underlying asset is often illiquid, not traded in markets (e.g., insurance contracts).
- The option is long term.
- Management of the asset requires time and commitment from appropriate personnel.
- The exercise price may vary at expiration.
- The option has a unique value for the owner.
- The option is difficult to unwind.

The expanded use of real options in the financial services industry introduces managerial flexibility into the valuation process. As a result of potential future actions, there are various options embedded in the analysis of real assets. These characteristics cause unique valuation challenges from traditional discounted cash flow (DCF) models.

Another significant use of real options, beyond insurance risk, is in the valuation of operational risk. While one can't underestimate the complexity of such analyses, actuaries see this as another application of dynamic risk modeling (DRM). Asset managers refer to these results as *intrinsic value*.

**ACTUARIES AS CORPORATE RISK STRATEGISTS.** DRM, including cash flow testing, allows management to test its strategies over a wide variety of scenarios. It doesn't predict the future, but it does provide a glimpse of the future's potential. It allows the analyst to review the distribution of potential results rather than a single-point estimate.

DRM can be used prospectively, before investing in a strategy, or currently, when an economic, political, or regulatory regime change appears imminent. An economic regime change may occur as a result of underwriting, business, or financial market cycles. The discipline required to expand DRM also assists management in developing an activity's cost drivers. This

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- ▷ ADVISE is the only Enterprise Financial Management software platform available on the market today that can scale to aggregate the risks of an entire insurance company.
- ▷ We are focused solely on the insurance industry with collectively over 100 years of domain expertise .
- ▷ We provide a solution that delivers ongoing business value year after year.
- ▷ We are not a consulting company; we offer flexible, scalable, open software that has been optimized for insurance companies, allowing you to see the results of your decisions before you make them.

### **What Can This Mean for Your Company?**

- ▷ Substantial increases in shareholder value and return on capital.
- ▷ Dramatic improvements in productivity and transparency.
- ▷ Significant reduction in costs and wasted activity.
- ▷ True competitive advantage in today's rapidly changing markets.

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greater clarity further helps the company not only to do the right things but to do them correctly.

DRM is most frequently used to evaluate the corporate strategies for investment allocation, search for the best reinsurance program, or evaluate the company's surplus strategy through asset liability management.

**FUTURE EVOLUTION OF INSURANCE DELIVERY AND ORGANIZATIONAL DEVELOPMENT.** Insurance companies traditionally aggregate and spread risk internally. But with the development of an insurance securitization market, more traditional insurers may decide to concentrate on risk aggregation and servicing activities, and transfer the underwriting and investment risks to the capital markets. This will allow firms to concentrate on activities that provide a competitive advantage.

As an example, warranty obligators often provide risk aggregation and servicing functions (marketing, underwriting, and claims services). Meanwhile, risk spreading is achieved by insuring (market securitization isn't available) the underlying financial risks to an insurer that guarantees the financial aspect of the warranty product. Similar strategies have successfully been implemented in alternative risk transfer (ART) mechanisms, including managing general agents and risk purchasing groups.

By evaluating each of these activities, ART actuaries can better understand their risk characteristics. As with most insurance operations, the risk measurement requires two views of the organization: the risk within the activity and the risk across activities. Actuaries synthesize these two views of risk.

**GLOBALIZATION OF THE SERVICE INDUSTRY.** The need to diversify insured catastrophic events because of the inflation of asset values is global, and reinsurance has become a common way to spread this risk. Thousands of actuaries are involved with the international reinsurance markets and continue to play a key role in their vitality. Actuaries are commonly responsible for day-to-day management of reinsurers' international risk strategies.

The role of actuaries in ERM will continue to expand for a number of important reasons:

■ **QUANTITATIVE SKILLS.** Actuaries have considerable experience in the design and development of DRM using non-normal distributions. While other professionals develop their risk metrics based on normal distributions, non-normal distributions occur in the tail, which is where ERM issues are centered. Actuaries are familiar with the application of non-normal distributions.

■ **THOUGHT LEADERSHIP.** Strategic thinking involves intuition and creativity. According to the latest Society of Actuaries opinion poll, actuaries are seen as key senior managers and are often considered thought leaders in their organizations. Actuaries use their understanding of the insurance processes—from risk aggregation to risk spreading—to assist in the development of company strategies and tactics.

■ **ETHICS.** Actuaries hold strong ethical beliefs that are essential for a risk officer. Generally, actuarial work doesn't entail advocacy but rather seeks balanced solutions to specific situations.

■ **RISK MANAGEMENT SKILLS.** The risk management mantra of recognition, evaluation, mitigation, and monitoring is basic to actuarial education and activities. Interaction throughout the organization is vital in performing corporate, pricing, and valuation responsibilities.

**TABLE 3 Actuaries With Other Credentials**

	Actuaries With			Total Actuaries
	MBA/CBA	CFA	FRM/PRM	
FSA/ASA	680	556	51	17,881
FCAS/ACAS	152	22	4	3,982
Combined	832	578	55	21,863

Source: Actuarial membership in the Society of Actuaries and the Casualty Actuarial Society based on the membership directory maintained by the Society of Actuaries as of Aug. 15, 2005 (see: [www.soa.org](http://www.soa.org))

■ **COMMUNICATION SKILLS.** As membership in the actuarial profession has expanded, so too have the breadth and complexity of the business acumen and communication skills of business-minded actuaries.

Actuaries involved with ERM have the depth, breadth, and competency associated with a risk-based quantitative education, strong ethical characteristics, and profession support from the actuarial organizations. This combination creates the ability not only to provide strong support for ERM projects, but to lead them as well.

### Actuarial Skill Sets in ERM

As of Aug. 15, 2005, 1,050 actuaries (approximately 4.8 percent of all actuaries) have described themselves as performing financial activities on a daily basis. This represents a growth rate of 5.0 percent over the past year. Actuaries have already begun to move toward improving their business and financial skills.

In support of their new financial roles, actuaries have acquired multiple credentials. There are 832 actuaries working in the financial area who hold a master of business administration (MBA) or a doctor of business administration (DBA) degree. In addition, actuaries are expanding their knowledge of investments and financial risk management. Some have completed multiple additional designations.

As of Aug. 15, 2005, approximately 550 credentialed actuaries were also CFA charterholders (See Table 3). At a minimum, the CFA Charter represents a three-year time commitment to complete the examinations and experience requirements. It represents one of the key designations for an investment professional and is globally recognized in the financial industry.

While the Global Association of Risk Professionals (GARP) and the Professional Risk Managers International Association (PRMIA) are relatively recent organizations, actuaries have already earned 55 designations from these two organizations. GARP grants the Financial Risk Manager Certification, and PRIMA grants the Professional Risk Manager (PRM) designation. While the number of actuaries in these two organizations appears to be relatively small, their numbers are rapidly growing—33 percent annual growth rate between June 2004 and August 2005.

In addition to expanding outside normal actuarial channels, actuaries continue to develop new skills in statistical theory and predictive modeling. These skills are displayed in the numerous discussions concerning DRM, complex adaptive models, generalized linear models, multiple regression, neural networks, disease management, risk adjusters, and fuzzy logic. These skills represent a general characteristic of the actuarial population—a lifelong pursuit of knowledge in preparing for the continued

**TABLE 4 Actuaries in Investment and Financial Risk Management—Annual Growth Rate**

	Number of Actuaries		Annual Growth
	(6/1/04)	(8/15/05)	
CFA	495	578	13.7%
FRM/PRM	39	55	32.9%
All	534	633	15.1%

Source: Actuarial membership in the Society of Actuaries and the Casualty Actuarial Society based on the membership directory maintained by the Society of Actuaries as of August 15, 2005 (see: [www.soa.org](http://www.soa.org))

identification, evaluation, quantification, and synthesis of risk.

### Actuarial Responses to ERM

All of the U.S.-based actuarial societies are responding to ERM educational challenges. For example, the SOA has been the sponsor for the Asset Liability Management (ALM) Seminar for the past five years. In addition, the SOA, Canadian Institute of Actuaries, and Casualty Actuarial Society are beginning to discuss the potential for an ERM designation upon successful completion of several examinations. The CAS is sponsoring research into the development of a DRM handbook that's expected to be available online by the end of 2005.

The CAS and SOA also co-sponsor the Risk Management Section, which addresses all areas of risk management. In addition, the SOA and CAS have teamed with PRMIA to sponsor the highly successful ERM Symposium. During the 2005 symposium, more than 500 attendees discovered the qualitative and quantitative advancements of ERM for financial entities.

Actuaries involved in the globalization process are supported through their actuarial organizations. The principal area of support is found in the movement within the actuarial societies toward mutual recognition of actuarial credentials across international boundaries. The advantage of this credentialing process is to create consistent worldwide expertise in the ERM process.

The actuarial community is also working on improving business communication for ERM. These communications range from discussions regarding the qualitative perspectives of corporate governance to presenting ERM results to boards of directors.

Other strengths of the profession are actuaries' commitment to ethics and professional standards. As members of an actuarial organization, actuaries conform to standards of practice that assure their work will be completed in a responsible, prudent, and professional manner.

### Conclusion

Actuaries are rapidly gearing up for, and helping to develop, the future of ERM. The leadership of the North American Actuarial Council (NAAC) has moved beyond the discussion of actuaries in ERM to actively supporting this career path. The profession is also enhancing actuarial education, changing the organizational structure of its societies, outlining communication issues, and changing the actuarial profession's public image. ERM is the future, and actuaries are its caretakers. ●

**JAMES E. RECH** is an actuary with GPW & Associates Inc. in Phoenix. He is vice chairperson of the Academy's Risk Management and Solvency Committee and chairperson of the Academy's ERM Task Force.