Life insurers are used to operating in a challenging environment, but today carriers often feel buffeted from different directions at the same time. A soft and lagging economic recovery has put strain both on generating new business and profitably managing inforce business. Demand for products continues to change as we see older Baby Boomers retiring, while younger Millennials expect more technology-driven interaction. Companies face increasing urgency to maximize the investments they have made in technology-enabled underwriting solutions and analytics, even as the regulatory environment remains ambiguous.

SCOR is working with our clients to understand the implications of these and other issues critical to the growth of your business and effective inforce management. Our mortality and lapse experience database allows us to move towards stochastic modeling of risk. While this modeling approach will be fundamental under a principles-based regime, we can use this power today to help our clients model potential outcomes based on proposed product or marketing changes.

We are taking great efforts to be a best-in-class source for innovative underwriting solutions. Our combination of technology, data management and underwriting expertise is helping clients profitably write business in the middle market. We have just rolled out a new, more user-friendly and robust underwriting manual to assist clients in risk assessment. Additionally our dedicated staff of underwriting researchers have projects underway to quantify how changes in underwriting criteria affect business blocks. Their research includes how alternatives to some tests for fully underwritten may affect underwriting results.

Demographic changes mean new challenges – and new opportunities. We are actively working with clients to address issues, such as end-of-level period lapse, managing longevity risk, and financing both new and existing business through efficient reinsurance mechanisms. Our commitment to reinsuring group risk remains paramount, with a dedicated staff of group professionals in Minneapolis.

Just as the insurance industry helps customers manage life’s uncertainties and plan for the future, we work with our clients to build opportunities and manage their business profitably. I welcome your thoughts on how we can work together.

∞

By J.C. Brueckner
Head of US Life Reinsurance, SCOR Global Life Americas
jcbrueckner@scor.com

By Terry Dickinson
Senior Vice President, Group Reinsurance

By David N. Wylde
Pricing Research Actuary, Life Solutions

By Michael Failor
Modeling Actuary, Life Solutions
Group reinsurance plays a vital role in the industry in assisting direct writers in managing volatility and exposure risk from group plans. SCOR offers a broad portfolio of group solutions. Companies involved in the group market know firsthand that it takes a unique set of skills to effectively price, underwrite and market group products.

Our experienced team in Minneapolis collaborates with clients in developing innovative and competitive approaches to addressing group risk in the US. SCOR's global group operations complement these capabilities through the sharing of best practices worldwide.

SCOR offers a number of group solutions for US clients.

**Group Life and AD&D Reinsurance**
SCOR has a dedicated team of actuaries, underwriters and risk management professionals in Minneapolis to address group solutions, supported by the company's additional capabilities in Charlotte and Kansas City. The Minneapolis team has decades of combined experience servicing our clients' group reinsurance needs. At its core is reinsurance and risk management expertise.

SCOR's group reinsurance team prides itself on its flexible approach to addressing specific client needs. Whether risk mitigation, underwriting support, or solutions to reinsurance administration issues, our team is prepared to explore strategies to address carrier-specific needs and objectives.

**Accidental Death Carve Out Reinsurance**
SCOR offers a comprehensive solution to address a life insurer's most volatile aspect of group mortality – accidental death. Accidental Death Carve Out Reinsurance responds to both adverse frequency as well as severity in a company's accidental death claim experience.

**Specialty AD&D Reinsurance**
In addition to more traditional AD&D products offered by our clients, we provide reinsurance solutions to address a variety of business lines including voluntary AD&D, standalone AD&D and other products, such as AD&D benefits written through affinity groups, worksite marketing or direct-to-consumer marketing programs.

**Bulk ADB Reinsurance**
This solution effectively can transfer up to 100 percent of a company's accidental death benefit rider risk, typically the most volatile aspect of an ordinary life writer's exposure.

**Reinsurance for a Life Insurer’s Self-insured Employee Group Life Plan**
For a life insurer that exclusively writes ordinary life insurance, ironically its own employee group often poses the single biggest concentration risk within its portfolio. We offer solutions reinsuring up to 100 percent of the risk for carriers that self-insure.

**All Packaged with Value-added Services**
We constantly seek to increase client satisfaction by improving the value proposition to our clients. SCOR provides a wide range of actuarial consulting, facultative services (including medical underwriting assistance) and market research services, but we do this in a unique way.

Our highly adaptable service model can complement a ceding company's unique culture, level of internal resources and the desired level of collaboration with us. Some companies desire the reinsurer to have a close partnership with the company's various operational disciplines; others prefer a more strategic consultative relationship. We make your business growth a priority by serving as an unobtrusive business partner and a valued resource to support you in growing your direct group business.

**Conclusion**
SCOR is committed not only to supporting current group clients but also expanding our relationships with our individual life clients to provide a more comprehensive set of solutions. By adding group solutions to an already robust menu of risk and financial management approaches for individual life, SCOR becomes a more involved partner in our clients' overall risk management strategy.

For more information on how we can help your company manage your group exposures, please contact me. ∞
As SCOR has worked through the integration of the Charlotte and Kansas City operations, one major issue needed to be addressed involved the life underwriting manual. Would ratings in SCOR’s existing manual prevail, or would the new company defer to opinions in The Guide from Generali? How will the new underwriting manual feel? We ultimately decided the best approach would be to take the best components and features of both manuals, using this review as an opportunity to assess any rating differences and their causes.

**Better Access, Currency and Relevance of Content**

The revised life underwriting manual for clients in the Americas is called SOLEM, the brand name used by SCOR underwriting manuals across global markets. As users become acquainted with the new underwriting manual (and SCOR’s SOLEM brand), several features should become evident quickly.

*User Friendly:* The #1 reason underwriters use the manual is to search for ratings. Search functions are improved, and once client underwriters select a particular impairment, they are taken immediately to the ratings, presented in a consistent format across impairments. Other information, under tabs, is available related to the topic, but the driver is the impairment and its associated rating. Additionally, ratings updates will be made in real time.

*Enhanced Financial Chapter:* The section on financial underwriting has been improved in both content depth and breadth. This is of particular interest to the Canadian market, but with the changes in estate tax law in the US we can certainly see value in this section for our US clients.

*Reinforces the Focus on the Americas:* We have designed the new manual to be a single primary source for every client of SCOR Global Life Americas. Companies can now access ratings not only for the US mortality-based products but also some of the products supported by, for example, SCOR Canada or Brazil (e.g., Disability or Critical Illness).

*Competitive Ratings:* The acquisition of The Guide presented an opportunity for our larger and more experienced underwriting and medical staff to approach the manual with a fresh perspective. We reviewed all major impairments to evaluate the currency of the ratings, given the latest information and medical developments available. As a result we have been able to offer the most competitive ratings based on our vast mortality data and our expanded medical and nonmedical knowledge.

*A Truly Global Effort:* While the medical and underwriting staff in the US led the project to update the manual, we received valuable input from a number of colleagues in other SCOR Global Life offices, including staff in Canada, Latin America and Europe. Tapping into this cross-border talent helped assure the production of a best-in-class manual.

*Access to Additional Information:* The user can immediately access ratings for an impairment simply by typing the condition in a search field or choosing it from a drop-down list. While the rating is the primary driver for any underwriting manual use, we also have included

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**Figure 1 – Welcome Page for New SOLEM**

After logging in, the home page provides the user direct links to the most common impairments, the user’s ten most frequented pages, and the most recently updated information.

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(Continued last page)
Stochastic Modeling Is on the Rise – Part 1
By David N. Wylde, FSA, MAAA, CLU, ChFC
Pricing Research Actuary, Life Solutions – dwylde@scor.com
By Michael Failor, ASA, MAAA
Modeling Actuary, Life Solutions – mfailor@scor.com

Editor’s note: In this two-part series, David Wylde and Michael Failor discuss the application of stochastic modeling in the life insurance industry. In Part 1, they discuss its increasing utilization and the need for continued research. Part 2 will cover the design and implementation of a practical model for stochastically projecting death benefits from a fully underwritten life insurance portfolio.

Stochastic modeling is on the rise in the life insurance industry due to a coalescence of regulations on the horizon and an increasing demand for stochastic analysis in many internal modeling exercises. While regulatory developments across the globe certainly have played a part in this increased interest, there are plenty of other reasons why stochastic modeling proficiency is growing among both actuarial modelers and those who interpret stochastic results.

This topic continues to garner attention as the industry increasingly relies upon stochastic models to value its business, design its products, and manage its portfolios. It appears that stochastic models gradually are becoming the industry norm for internal metrics since deterministic models often cannot adequately quantify the risk profile of the industry's increasingly complex business.

Stochastic Modeling Proliferation
As with many other industry trends, regulatory considerations will play a pivotal role in the increasing interest in stochastic modeling. Regulatory bodies in both the European Union (EU) and the United States continue to propose new stochastic modeling requirements, joining efforts from other nations worldwide. The EU is internally aligning its capital requirements under Solvency II, and the NAIC has introduced VM-20 to address life insurance statutory reserve requirements. Each approach permits the use of internal stochastic models. VM-20 calls for stochastic modeling of economic risks, but does not require stochastic modeling of mortality risk (however, a company may elect to do so). Each of these regulations, when fully implemented, will significantly expand the use and importance of stochastic models.

Leaving aside these looming regulatory changes, however, companies are discovering stochastic models’ value to an organization’s cash flow projections and risk management activities. Insurers are expanding their use of internal stochastic models as available tools and computing power make this modeling more feasible. Companies are implementing stochastic models not only to determine economic capital, but also to use in product development areas. In reinsurance units, non-proportional reinsurance programs such as stop-loss and catastrophic coverages may necessitate stochastic modeling for both pricing and valuation.

Need for Continued Research
Given these and other reasons for the ongoing proliferation of stochastic models, the life insurance industry still has room to expand its stochastic modeling knowledge and techniques. While the stochastic modeling of market and credit risks is fairly well established, stochastic modeling of mortality is not as fully developed. In fact, most published research regarding stochastic mortality modeling either has been across general population segments where there are no underwriting selection effects, or has been conducted on longevity risks covering pensioners or annuitants.

Both of these approaches pose challenges. Research on general populations, pensioners and annuitants does not carry over well to the stochastic modeling requirements of fully underwritten life insurance. These insured populations have distinctly different mortality characteristics that require partitioning by product, underwriting class, distribution channel, policy issue year, and policy duration. Similar to deterministic modeling, such partitioning should consider the level of credibility within the partitioned segments when determining stochastic distribution metrics such as means and variances. Adjoining segments may need to be combined when segmented credibility is low.

Another consideration that affects fully underwritten portfolios is policyholder lapsation. For example, lapse rates are typically very high at the end of level period for term life insurance products. These rates are difficult to model because they depend upon a number of factors, most of which are highly dependent upon post-level period premium increases and the insured’s health status. This is typically not a concern when stochastically modeling general population segments or annuitants.

A good introductory resource addressing stochastic mortality for underwritten life portfolios is a document
produced by Ernst & Young LLP entitled “Stochastic Analysis of Long-Term Multiple-Decrement Contracts” published by the Society of Actuaries in 2008. This report evaluates stochastic modeling of life insurance nonmarket risks (i.e., mortality and lapse). It lays out the primary issues and describes potential modeling solutions. However, it also recognizes the need for an increased understanding of the sensitivities associated with stochastic mortality model design. Suggested areas of research are selection of stochastic variable probability distributions, stochastic variable correlations, and other relatively unchartered terrain for fully underwritten life insurance.

**Conclusion**
The benefits of stochastic modeling cannot be overstated. We have touched on only a few of these benefits, but certainly could have extended the discussion into various areas of pricing, valuation and stakeholder interest.

Last but not least, ratings agencies have been increasingly supportive of the improved risk management metrics derived from stochastic modeling, making it even more vital that companies continue to develop their internal stochastic models to keep pace with what is rapidly becoming an industrywide best practice.

Having set the stage as to the “why’s” of stochastic modeling our next article will discuss some of the “how’s,” presenting a practical example of designing a stochastic model of death benefits on fully underwritten life insurance.

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### Figure 1 – Uses of Internal Stochastic Models

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<th>Uses of Internal Stochastic Models</th>
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<tr>
<td>Tail Risk Analysis</td>
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<td>Hedging Strategies</td>
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<td>Product Pricing and Design</td>
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<td>Business Mix Optimization</td>
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<td>Risk-Adjusted M&amp;A Pricing</td>
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<td>Evaluation of Reinsurance Programs</td>
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<td>Risk Structure Optimization</td>
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<td>Calculation of Diversification Effects</td>
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<td>Corporate Strategy Development</td>
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<td>Risk-Adjusted Performance Measurements and Targets</td>
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<td>Management Compensation Strategy</td>
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<td>Satisfying Parent Company Requirements</td>
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The benefits of incorporating stochastic modeling enterprisewide expand well beyond simply preparing for possible regulatory changes. Though we mention a dozen in this list, we easily could have included many more.
Pandemic risk is the largest tail risk for many insurers and reinsurers. My colleague, Doris Azarcon, and I have been studying this risk extensively over the past 5 years. In early May the Centers for Disease Control reported the first confirmed case of Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) in the United States, joining at least 19 other countries reporting cases (Figure 1). At least one additional case has now been reported in the US. First discovered in Saudia Arabia in 2012, MERS-CoV severely disrupts respiratory functions, leading to pneumonia, shortness of breath, coughing, and fever. Based on recent World Health Organization data, about 40 percent of reported cases have resulted in death.

While prevalence remains statistically negligible (571 reported cases globally as of May 2014) incidence has increased noticeably since the beginning of the year (www.who.int/mediacentre/multimedia/mers-transcript.pdf?ua=1). Moreover, the presence of the virus reminds risk managers of the many challenges in monitoring, managing and mitigating the effects of highly contagious diseases. While just a handful of individuals currently may exhibit symptoms, we do not know how many others latently carry the virus.

The US typically has demonstrated resiliency to severe infectious disease. If we examine the US insured population as a subset of the general population we find that pandemic effects are even less pronounced. Many factors may help explain this phenomenon (such as those listed under “Prevention” in Figure 2).

Understanding the Risk
As part of an effective enterprise risk & return management (ERRM) process, we must consider the catastrophic effects a pandemic may have on not only the population in general but the insured population in particular. Several factors come into play.

A Life Insurer’s Product Portfolio. Pandemics pose significant risk for mortality and morbidity coverage. The mortality component is fairly cut and dried: a virulent pandemic has the risk of killing many afflicted insureds, leading to excessive mortality claims. However, depending on the severity and persistency of a pandemic, morbidity claims originating from costly and chronic medical interventions may affect cash flow much more quickly and severely. Individuals diagnosed with a pandemic illness may survive in ICU-like environments for relatively long durations at considerable cost. The population-wide nature of the pandemic can create strain on supplies available to properly treat patients, raising costs even more.

Perhaps the greatest risk for life insurers occurs when a life insurer covers both the mortality and the morbidity risk on a group of lives, especially if these lives are concentrated in a specific region. The insurer risks paying excessive claims on medical expenses related to treating the infection (as well as any related complications, such as pneumonia), in addition to death benefits. Certain other risks may also be aggravated. We should expect higher-
than-planned disability and long-term care claims in debilitating pandemics. Carriers have addressed these concerns somewhat by offering accelerated benefit riders, where the living benefit (chronic illness or long-term care) is a portion of the death benefit. Cash flow implications should also be considered, however.

**Longevity Risk Components.** Annuity and retirement products can help hedge some of this risk. A carrier with a diversified risk portfolio (morbidity, mortality, longevity) may have more success in managing a spike in claims arising from a pandemic.

**Risk Classification.** Companies that establish and adhere to strict preferred underwriting guidelines may manage their losses more effectively than other carriers. Preferred underwriting involves in-depth review of an applicant’s individual health and personal and family history to eliminate those risk factors that present higher probabilities of dying. While pandemics are generally indiscriminate in their infection of individuals, we would expect that, under identical conditions, someone who exhibits preferred-class mortality and morbidity should have a much higher chance of not only surviving the disease, but also recovering more quickly to full health.

It is important that life insurers develop and maintain appropriate selection criteria and implement controls to ensure strict adherence to their risk classification guidelines. “Tainting the pool” through stretch criteria or table shaves can create unexpected volatility in mortality and morbidity experience. Alternatively, the insurer should properly compensate for its marketing strategy. Companies that allow flexibility in their preferred classes, or that target market segments that typically fall outside of preferred, must factor this strategy into their pricing.

**Capital Effects**
Regulatory regimes and ratings agencies continue to modernize how companies determine appropriate risk-based capital levels. Past “turn the crank” formulaic approaches are gradually giving way to more dynamic principles-based modeling. Internally, many companies already calculate recommended capital targets based upon their views on enterprise-wide risk, incorporating the entire range of risks to which companies are exposed (Figure 3). A key component to many capital models, however, is estimating catastrophic or tail risk. Pandemics can be the top catastrophic risk to a life insurer – and the industry.

**Tools to Mitigate Pandemic Risk**
The life insurance industry, in conjunction with other financial services companies, has developed a number of solutions to help individual companies manage their exposure to pandemics and other catastrophic risks. Swaps, the exchange of one asset (or liability) for another of equal expected value (loss), have been used effectively in helping life insurers manage both mortality and longevity risk. Other insurers have issued contingent-triggered bonds to manage mortality, morbidity and catastrophic risk. Contingent capital structures provide carriers with access to capital in the event of a variety of situations. Each of these financial structures carries varying costs and basis risk.

Alternatively, reinsurance may be an effective risk and capital management tool that may eliminate basis risk and usually ties the interests of the company assuming the risk to those of the ceding company.

**A Commitment to Understanding and Managing Pandemic Risk**
As a global organization, SCOR monitors pandemic risk as a key consideration in our ERRM process. SCOR has sponsored global forums where academicians, epidemiologists, industry experts and other stakeholders can come together to discuss looming challenges and best practices. Our team of pandemic analysts around the world consult frequently with each other on events in their respective regions and any implications they may have to progress from outbreak to pandemic. We continuously and conservatively model potential pandemic outcomes to our block of business.

As a result of this diligence, SCOR has entered several financial transactions, such as the Atlas IX mortality bond, to manage pandemic and other catastrophic risk for the benefit of ourselves, and ultimately our clients. If you would like to learn more about SCOR’s approach to pandemic risk or to enterprise risk & return management in general, or receive literature that our experts have produced on these topics, please feel free to contact us. ∞
SCOR's SOLEM – New and Improved Life Underwriting Manual (cont.)

background information that provides more detail on the condition and the risk implications. SOLEM uses tabs to allow a client underwriter to conduct further research on the topic while remaining one click away from the ratings.

A Refreshed Look and Feel
Content is of paramount importance, but the delivery of that information must be intuitive and easy to follow. We examined the underlying technology and user appearance of both manuals with a goal of creating a system that is both readable for the user and flexible enough to be revised as needs arise.

For former users of SCOR's RS Guide, the look will appear familiar. However, we have incorporated client suggestions and realigned some of the content to make it easier to view in a smaller window when comparing ratings or working on a complex case. In addition, we have eliminated much of the white space, allowing the user to have more information on-screen at any point to reduce scrolling.

Former users of The Guide will find the look and feel a bit different. We are continuing a series of online demonstrations to help former users of The Guide navigate the new manual, and expect that once these clients become familiar with the new layout, they will appreciate the functionality.

The key area where client underwriters may see some material change is in some of the ratings. While many ratings remain the same, others for the most popular impairments have changed in the client’s favor based on new insights gained from our growth in expertise.

Conclusion
There’s a joke in the industry: If you ask a life insurance specialist what one plus one equals, the answer will depend on whom you ask. The insurance accountant will confidently reply, “Two, of course!” The actuary will predicate a long reply with “Well, that depends…” Meanwhile the underwriter will quickly answer, “Three!”

The underwriter’s justification is that experience demonstrates that conditions compound each other, creating an effect greater than the two in isolation. That’s the view we have taken about the new manual: we have achieved a “three” from two separate manuals. We are excited to share the new guide with you and look forward to your feedback. ∞