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DISCUSSION DRAFT

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● DISCUSSION DRAFT ●

**Actuarial Standards of Practice
for Enterprise Risk Management**

**Developed by the
Task Force on Enterprise Risk Management of the
Actuarial Standards Board**

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TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Enterprise Risk Management

FROM: The Task Force on Enterprise Risk Management of the Actuarial Standards Board (ASB)

SUBJ: Proposed ASOP on Enterprise Risk Management

This document contains two discussion drafts developed by the Enterprise Risk Management (ERM) Task Force of the Actuarial Standards Board (ASB). These two documents are titled *Actuarial Professional Standards for Risk Evaluation* and *Actuarial Professional Standards for Risk Treatment*. The purpose of these two discussion drafts is to share the work that has been done by the ERM Task Force to date and to collect input from interested parties as the work of the ERM Task Force continues. Please note that since these documents are works in progress, many changes and additions are likely.

These discussion drafts are being issued by the ERM Task Force for comment. The ASB has approved the release of these drafts, but has not approved their content. These are not exposure drafts and there is no fixed deadline for comments. However, the ERM Task Force is actively working on this project, so earlier comments are more likely to affect the contents of any eventual exposure drafts. Interested parties will have an additional opportunity to comment once any formal exposure drafts are released.

Please note that these discussion drafts do not follow the standardized ASB format for exposure drafts and final ASOPs in all respects. In particular, these drafts are not arranged into the standard four-section format for ASOPs, and paragraphs are numbered sequentially throughout. This was done to facilitate early release of these discussion drafts and to facilitate review and comments by interested parties. Any exposure draft(s) released subsequently will follow ASB standard format. Also, there are certain topics identified in the discussion drafts that are not yet fully developed into actual guidance to ERM practitioners. However, the ERM Task Force believes that the content of these discussion drafts is sufficiently developed at this point to obtain meaningful input from interested parties in order to facilitate the further development of ERM standards of practice.

The ERM Task Force expects to develop exposure drafts that will draw on the ideas and concepts in these discussion drafts, modified by discussions with and comments received from interested parties, and by unfolding developments. The ERM Task Force also may address additional issues in any exposure drafts that are not addressed directly in these discussion drafts. Any exposure drafts will go through the normal ASOP development process.

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Objectives

The ERM Task Force's objectives in developing actuarial standards of practice for ERM are as follows:

1. Identify essential elements for what can be considered appropriate actuarial practice pertaining to Enterprise Risk Management. This will then provide for the following:
 - Basis for professional opinions to a governing board or to a regulator;
 - Possible basis for review by an auditor or regulator;
 - Reference point for actuaries to communicate when they are being asked to deviate from normal practices; and
 - Basis for a disciplinary process.
2. Indicate for various areas of actuarial practice appropriate procedures, techniques, and approaches for enterprise risk management, thereby providing guidance to actuaries to enhance the public's trust in the credibility and completeness of the actuarial work product.
3. Provide a means by which actuarial practice for ERM can be reviewed and updated on a regular basis, so that practice remains current.

Background

The practice of "risk management" has evolved considerably over the past several decades. Forty (40) years ago risk management essentially revolved around such issues as risk mitigation, risk assumption, and risk transfer for traditional insurance types of risks. Twenty (20) years ago risk management expanded into the area of asset/liability management. Yet today, without required regulations or standards, a much more comprehensive discipline and practice has emerged to strengthen the long term sustainability of an organization's core value-added services. This development was driven by various stakeholders' desires to include the long-term value-added functions of risk management.

As a result of these developments, over the past several years the various actuarial organizations have launched a number of different initiatives to foster the development of a vibrant and robust ERM practice. Particularly noteworthy in this regard is the development of a new certification Certified Enterprise Risk Analyst (CERA). This new certification has developed rapidly and is now becoming an internationally recognized credential. The ERM Task Force believes that the existence of actuarial standards of practice is an essential component of a professional CERA credential.

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Today, whether for an insurance company or other financial institution, a prefunded pension plan, a pay-as-you-go social insurance program, or any other organization whether public, private, or not-for-profit, there is an emerging awareness of the need for robust methodologies to review and manage the long term sustainability of the enterprise's programs and of the enterprise itself.

As professional risk managers the expectation is often not to set the risk objectives of the firm, but to help to meet those objectives in a sound and manageable fashion while realizing that there are important cultural and organizational differences that may impact the preferred risk objectives of the firm, program or organization. This makes it even more important to understand and communicate the appropriate disclosures and measures needed to ensure that all who are relying on the firm, program or organization understand its risk position, objectives and management process.

The Task Force believes these standards provide an important opportunity to give guidance on emerging areas of actuarial practice with a well established conceptual framework and practice. This is similar to the concept of managing emerging risks which is covered in the standards attached to this letter.

The actuarial profession is uniquely positioned to provide important structural concepts and techniques for managing risk. Actuaries have been engaged for decades in managing various mechanisms for the pooling of risk and the need to balance diverse interests, incentives, and points of view of various interested parties in a long term sustainable fashion. This practice and experience has served as the foundation for the content of these discussion drafts with the goal that the essential elements of our practice become more transparent and publicly recognized.

Review of Current ASOPs

The Task Force has reviewed the current ASOPs and ERM literature, and has reached the following conclusions about the applicability of ASOPs to ERM practice:

1. Many ASOPs are targeted to specific practice areas and situations, and it is not easy to generalize from them to provide guidance for ERM practice.
2. While ASOPs apply to ERM practitioners, they do not currently cover a significant portion of contemporary ERM practice.
3. Many important ERM topics are not mentioned at all in current ASOPs.
4. Many ASOPs are responsive to regulatory and accounting requirements, yet ERM has largely emerged without these traditional drivers of practice.

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5. There is growing discussion and expectation of possible future regulatory requirements pertaining to ERM.
6. There are other groups outside the actuarial profession that are beginning to develop and promulgate professional standards related to ERM, but these standards generally do not adequately address the key actuarial issues involved in ERM practice.

As a result of this review, the Task Force believes that a compelling case exists for the actuarial profession to develop ERM standards of practice. Moreover, the Task Force believes that ERM practice has developed sufficiently into a mature area of practice for which ERM standards are both feasible and desirable.

Request for Comments

The Task Force welcomes comments on any matters relating to the development of actuarial standards of practice for ERM. In particular, the Task Force would welcome comments on the following issues:

1. Is the structure of two discussion drafts dealing with “risk evaluation” and “risk treatment” separately appropriate or should the Task Force consider some other organizational structure for any possible ASOPs?
2. Would standards along these lines integrate well with the existing body of ASOPs or would there be overlaps, inconsistencies, etc.?
3. Would such standards adequately cover contemporary ERM practice? For example, would the standards adequately address the various types of risks (i.e. contingencies, financial, operational, strategic, etc.) that are currently addressed in a comprehensive ERM study?
4. Do the standards cover core elements satisfactorily, while still allowing for the future emergence of new elements of ERM practice?
5. Would such standards create any conflicts with internal policies and procedures that various firms are currently utilizing in their ERM activities?
6. Are the drafts too prescriptive or not prescriptive enough? Are they clear or are there ambiguities?
7. Could these standards be applied to entities outside of the traditional practice areas for actuaries?

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8. Would these standards provide adequate guidance for CERA practitioners? Would they encourage the right behaviors and discourage wrong behaviors?
9. Would such standards be helpful in dealing with situations in which ERM work is being reviewed by auditors or regulators?
10. Although ASOPs are developed for U.S. practice, are there additional issues the Task Force should consider with respect to international practice?

Please review this discussion draft and give the Task Force the benefit of your comments and suggestions. Comments will not be posted to the ASB website and will not receive individual responses; however, they all will receive appropriate consideration by the Task Force in preparing the exposure draft for approval by the ASB. Comments can be sent to discussion@actuary.org. Comments will be reviewed as they are received, but are suggested they be sent by June 15, 2011.

If you wish to use conventional mail, please send comments to the following address:

ERM Discussion Drafts
Actuarial Standards Board
1850 M Street, Suite 300
Washington, DC 20036

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ACTUARIAL PROFESSIONAL STANDARDS FOR RISK EVALUATION

Purpose and Scope

The purpose of this standard of practice is to set forth guidelines for actuaries in designing, using, and reviewing risk evaluation systems. The process of risk evaluation is a part of risk management systems that are found in insurers, pension plans, in other financial service firms and in most businesses or organizations. The act of operating a business includes taking risk through specialized resources to create a competitive advantage in the market place.

Risk management should be aligned with the objectives of the organization. In many circumstances Enterprise Risk Management is focused on balancing risk and opportunity, wherein organizations do not seek to eliminate all risk but instead strive to optimize their position along the risk/reward spectrum. It is a value added process for prioritizing the use of limited resources to ensure the long term sustainability of the organization. It is not about predicting a future, but about identifying what can or needs to be done to be prepared for whatever future may arise. While the level of acceptable risk is a decision to be made by each organization, the successful use of ERM allows the levels of risk taken to be more transparent to all stakeholders. In other circumstances organizations are faced with risks that do not contain opportunities for rewards commensurate with the risk. In such circumstances the primary objective for risk management is the minimization of risk. In all cases, risk evaluation should consider the context of the organization's objectives and the range of contingent futures of the organization with and without possible risk treatment alternatives.

Organizations may want to internally evaluate whether their risk management systems are operated at a level that meets or exceeds professional standards. Regulators in some industries may want similar evaluations. For example, insurance regulators in some jurisdictions require a professional opinion regarding the risk management systems of the insurance company. One

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purpose of this standard is to guide the actuary in complying with such requirements and requests.

Organization of This Standard

This standard will focus on three aspects of risk evaluation: Economic Capital, Emerging Risks and Other Risk Evaluations. Risk treatment is also a key actuarial task in the risk control cycle. Each organization will address these aspects at a level of detail that is appropriate for their unique circumstances and reflecting their prioritization of risks. For example, while a large international financial services organization may invest its resources in an Economic Capital model to better understand the risks accepted, or to meet a regulatory requirement, a small chain of restaurants may address its risks in a qualitative manner. A highly complex technological firm may focus on an Emerging Risk such as critical information infrastructure while a ski resort might direct their focus to an Emerging Risk such as climate change. Standards for activities related to risk treatment are considered in [other SOP].

Definitions

1. Economic Capital—Amount of capital needed for an organization to survive over a specified period of time at a selected confidence level given its Risk Profile.
2. Emerging Risk—New or evolving risks which may be difficult to manage since their likelihood and/or frequency are highly uncertain.
3. Environmental Scanning—Process of gathering, analyzing, and dispensing information from external sources for tactical or strategic purposes.
4. Futurism—A discipline that systematically explores what we can know about the future of human systems, and how we can use that knowledge to attain desirable futures.
5. Risk Appetite—The maximum amount of risk that an organization chooses to take during a specified time period in pursuit of its objectives.
6. Risk Budget—A quantification using a specific measure (for example., Value at Risk (VaR),

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Conditional Tail Expectation (CTE)) of the degree of risk an organization is willing to accept for a specific outcome (such as annual profit or net assets at the end of a defined future period). These measures may be accumulated by risk or by organizational structural unit.

7. Risk Environment—The level and degree of volatility and reliability of risk estimates that exists for various risks over a specified time period. The time periods considered may include both short term and long term. A Risk Environment may be defined with respect to the risk of failing to achieve goals for a specific product or for the whole organization.
8. Risk Limit—A threshold used to monitor the actual risk exposure of a specific risk or activity unit of the organization to ensure that the level of actual risk remains within the Risk Tolerance.
9. Risk Mitigation—Action that reduces frequency and/or severity of a risk, often with the expectation that profit and volatility will be reduced. This action may increase the frequency and/or severity of a different risk (such as counterparty risk when entering into an insurance or derivatives contract).
10. Risk Profile—The risks an organization faces over a specified period of time.
11. Risk Preferences—A statement of the specific risks that an organization will or will not accept. In effect, Risk Preferences can be viewed as statements regarding whether the organization is willing to set a non-zero Risk Limit for a specific risk or activity.
12. Risk Tolerance—The level of risk to which an organization is willing and able to be exposed, taking into account its financial strength and the nature, scale and complexity of its business and risks, the liquidity and transferability of its business, and the physical resources it needs to adequately manage its risks.
13. Scenario Analysis—Considers the impact of a combination of many factors affecting an organization and usually reflects common to extreme ranges of those factors as well as historical scenarios which are analyzed in the light of current conditions. Scenario analysis may be conducted deterministically using a range of specified scenarios or stochastically, using models to simulate many possible scenarios, to derive statistical distributions of the results.
14. Stochastic Models—An approach used to simulate a distribution of possible outcomes that

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reflect random variation in model inputs. These distributions may be based on historical data, statistical distributions or futurism techniques.

15. Stress Testing—Measures the financial impact of stressing one or relatively few factors affecting the insurer. Stresses will typically occur over a short period of time. A test of a parallel 2% change in the risk free yield curve would be an example of a stress to a factor.

Economic Capital

There are many tasks related to Economic Capital and Economic Capital modeling that an actuary may be called upon to perform. Examples of such tasks include the following.

16. Assist in the determination of the time horizon and confidence level underlying an organization's definition of Economic Capital.
17. Design, build, operate and/or report on the findings of an organization's Economic Capital model.
18. Develop, review or validate the assumptions and methodologies underlying an Economic Capital model.
19. Modify the Economic Capital model to satisfy new uses or requests.
20. Provide an independent third party review of an organization's Economic Capital model.
21. Provide documentation relating to an organization's Economic Capital model.
22. Develop a model control environment for an organization's Economic Capital model.
23. Analyze the impact of a strategic decision on an organization's Economic Capital.
24. Recommend allocations of Economic Capital to units with an organization.
25. Opine on the appropriateness of an organization's Economic Capital model relative to the organization's risk profile, risk tolerance, risk appetite and/or risk limits.
26. Communicate the purpose, use(s), results and limitations of an Economic Capital model to both technical and non-technical audiences.

Considerations

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In performing the above, the actuary may wish to consider some or all of the following:

27. The appropriateness of the selected time horizon and confidence level underlying an organization's definition of Economic Capital. The selected time horizon should be closely linked to the time horizon used by management when making strategic and tactical decisions. The confidence level – and the metric chosen to measure it – should be relevant to the decisions faced by the organization. The appropriateness of both should be examined relative to
 - 27.1. the organization's Risk Profile;
 - 27.2. the organization's goals, both short term and long term; and
 - 27.3. the interests of all relevant stakeholders.
28. The degree to which the Economic Capital model captures all material risks of the organization in a consistent manner.
29. The degree to which the Economic Capital model is dynamic and flexible in nature, robust, reproducible and adaptable to new risks.
30. The appropriateness of an Economic Capital modeling framework that doesn't allow for Stress Testing and Scenario Testing. Many organizations face risks that are not amenable to stochastic modeling; if these risks are material to the organization in question then the actuary should consider supplementing the stochastic model with Scenario Tests and Stress Tests.
31. The degree to which the Economic Capital models reflect the nature, scale and complexity of the organization. Practical considerations for models include usability, reliability, timeliness, process effectiveness, systems and cost efficiency. Models will always have their limitations, and can never be expected to fully replicate the real world.
32. The degree to which the methodology and supporting assumptions underlying an Economic Capital model are identified, supported and documented. Relying on the professional work of others is acceptable provided that such reliance is disclosed and the assumptions underlying such work are well understood. Furthermore, care should be taken to determine if the assumptions underlying distinct analyses used as input into the Economic Capital model are consistent with one another. For example, reserve analyses and projections of future asset

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values may be done by others; one would not expect duplication by the risk modeling actuary.

33. The quality, accuracy, appropriateness and completeness of data underlying an Economic Capital model.
34. The appropriateness of manual data entry and duplication of effort versus automation. Manual data entry and duplication of effort related to an Economic Capital model adds a level of risk to the modeling process; where possible the actuary should strive for automatic data flows from an audited database with controls for reasonableness. This is not always possible or feasible; resource and expense constraints should be considered when determining how data will flow into and out of an Economic Capital model. Manual data entry should not be used for “significant” blocks of business and should only be a short term accommodation.
35. The appropriateness of the methodologies for Economic Capital model validation and calibration. In particular, the actuary should review the logical and conceptual soundness of the Economic Capital model, compare its methodologies and results to other models used by the organization and compare the predictions of the Economic Capital model to real-world events (for example, historical events during design and implementation of the Economic Capital model and subsequent events that occur after the model is in use).
36. The appropriateness of the methodology for modeling dependencies and interactions between risks. Linear correlation approaches are not always appropriate; other methods carry challenges as well. Care and attention is required to avoid overstating or understating the impact of risk dependencies.
37. The appropriateness of the Economic Capital model relative to its intended use.
38. The appropriateness of the risk measure underlying the selected confidence level in the organization’s definition of Economic Capital relative to the organization’s Risk Profile and Risk Appetite.
39. Reference to and reliance on accounting frameworks in an Economic Capital model should be consistent throughout the model and appropriate for the model’s intended use. Transparency regarding use of cash flows, accrual items and accounting regimes should

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occur.

40. The appropriateness of cash flow and discounting methodologies employed by the Economic Capital model. Cash flows should be realistic and reasonable and the model should allow for an appropriate amount of deviation from the expected cash flows.
41. The degree to which the Economic Capital model considers the fungibility of capital across the organization.
42. The appropriateness and impact of management feedback loops that may be incorporated into an Economic Capital model. For example, this could include the risks inherent in the organization's incentive compensation plan.
43. The appropriateness of assumptions made regarding trends. Trend assumptions are frequently made with regards to premiums, reserves, assets, and macroeconomic factors among others. Such trend assumptions and the modeling thereof should be supportable, well documented, consistent with other assumptions, and should allow for appropriate deviations from the expected trends.

Analysis Methods: A variety of analytical methods are available to actuaries for modeling Economic Capital. Most commonly used are stochastic models and stress tests. References to standard measures are also employed (regulatory and rating agency capital models are standard measures of risk of organizations. Definitions of Economic Capital sometimes make reference to required regulatory and rating agency capital).

Emerging Risks

There are many tasks related to the evaluation of Emerging Risks that an actuary may be called upon to perform. Examples of such tasks include the following.

44. Recommend or review recommendation regarding the potential impact of Emerging Risks.
45. Develop methods for measuring the potential impact of Emerging Risks.

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Considerations

In performing the above, the actuary may wish to consider some or all of the following:

46. The type of historical risks accepted by an organization. This may be geographical in nature or driven by the types of activities engaged in by the organization.
47. The current Risk Environment and the long term expectations of the Risk Environment.
48. The long term strategic plans of the organization, especially the plans for future growth.
49. Plausible scenarios that may give rise to Emerging Risks or to magnified interactions between risks.
50. The second and higher order impact of interactions between Emerging Risks.
51. The potential secondary effects from assumed actions in the light of an Emerging Risk crystallizing
52. Regulatory or rating agency expectations for the evaluation of Emerging Risk and the implications of the potential impact of Emerging Risks.

Analysis Methods: A number of analysis methods are available to actuaries to evaluate Emerging Risks. Most commonly used are futurism methods. A sampling of these methods follows.

53. Delphi Method—This forecasting method relies on experts to share their opinions about a specific set of topics. Opinions are shared anonymously, and often discussed, and additional rounds are generated until the distribution of opinions stabilizes. Consensus is not the objective.
54. Scenarios—Various future environments are hypothesized, along with possible outcomes and consequences.
55. Predictive Markets—Commonly used for elections, this futurism technique allows participants to trade assets related to potential events. The market provides information as it trends in reaction to current events.

Assumptions: In addition to selecting appropriate analytical methods, the actuary should select

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appropriate assumptions for the evaluation of Emerging Risks, including adaptation of studies performed internally and by others.

Additional considerations include the following:

56. **Completeness.** The Emerging Risk evaluation should attempt to take into account all of the Emerging Risks that might materially impact the organization. These risks may relate to insurance risks, investment risks, policyholder behavior risks, risks of the future emergence of adverse claims experience, and risks arising due to the non-insurance, non-investment activities of the organization.
57. **Time Horizon.** Emerging Risk evaluation should define the period tested based on likelihood and severity so that, in the actuary's professional judgment, the use of a longer period would not materially affect the analysis.

Other Risk Evaluations

There are many tasks related to other risk evaluations that an actuary may be called upon to perform. Examples of such tasks include the following.

58. Perform or review a risk evaluation of an organization prepared as part of merger and acquisition activity.
59. Perform or review a risk evaluation a portion of an organization's business (for example, business unit or block of business) as part of a decision to buy/sell this portion of the business.
60. Perform or review a risk evaluation by a regulatory agency as part of an audit or investigation.
61. Perform or review a risk evaluation by a rating agency as part of its rating process.
62. Provide independent third party research. This work could be as a stock/bond analyst or as a contractor for a media outlet or think tank.

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Considerations

In performing the above, the actuary may wish to consider some or all of the following.

63. The historical Risk Appetite of the organization.
64. The expectations of various stakeholders for the security of the organization. These stakeholders may include some or all of the owners, board, management, customers, partners, employees, community, and environment.
65. The cost of various levels of security.
66. The current opportunities for returns on risks.
67. The impact of ceasing participation in a risk market in which the organization has future plans to participate.
68. The long term expectations of the board and management for returns for the basic risks of the organization.
69. The opportunities available to mitigate the risks that might be in excess of the amounts that the organization may not want to retain and the effectiveness of those mitigation techniques.
70. Higher order, indirect, risks that may arise as a result of the risk mitigation.
71. Risk Preferences regarding the amount of gross risk before mitigation.
72. The current Risk Environment and the long term expectations of the Risk Environment. The actuary may reflect the organization's opinion about the Risk Environment or may be called upon to use their own opinion for Risk Environment, could use a Risk Environment opinion of a third party or could use the Risk Environment that is implicit in market prices.
73. The long term plans of the organization, especially the plans for future growth.
74. The knowledge and experience of the management and board regarding risk and risk management, as well as the risks inherent in the organization's incentive compensation plan.
75. The various potential definitions of security that may be the primary considerations of the organization, which may include such events as insolvency, loss of market confidence, severe earnings shortfalls, earnings losses or other levels. The actuary should be aware of any regulatory standards for risk levels and the implications of potential risk levels on the continuation of operations as reflected in ratings or other external measures of security.

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Communications and Disclosures

Disclosures and communications regarding actuarial work on risk evaluation should contain descriptions of the following items:

76. As regards Economic Capital and Economic Capital models
 - 76.1. Model Results—The actuary should document and communicate the results of the Economic Capital model and their intended use.
 - 76.2. Model Limitations—The actuary should disclose any known limitations of the Economic Capital model including an assessment of the potential impact of these limitations on model results and their use.
77. As regards Emerging Risks, the actuary should disclose the Environmental Scanning process and futurism techniques used in the analysis.
78. Sufficient detail should be shown to permit another qualified actuary to assess whether the risk model used is reasonable. Disclosures should be documented in a manner appropriate for the intended audience to understand the implications of the disclosure and to make appropriate use of the actuarial communication. If the intended audience is composed primarily of decision makers then such disclosure should be documented in a manner that will allow them to make use of such information in their decision making.
79. Changes in System/Process—The actuary should disclose any material changes in the system/process from those previously used for the same type of measurement. The general effects of any such changes should be disclosed in words or by numerical data, as appropriate.
80. Prescribed Process—The actuarial communication should identify and state the source of any prescribed Environmental Scanning process or futurism technique.
81. Purpose of the actuarial communication.
82. Expected users and usage of the actuarial communication as well as limitations of the actuarial communication, including the ways it cannot be used.
83. Credentials and expertise of actuary performing the evaluation.

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84. Statement of adherence to other specific actuarial standards as well as any departure from actuarial standards and reasons for such deviation.
85. Discussion of data used for the analysis
86. The reasonableness of any prior data, studies, analyses, or methods; key assumptions and rationale behind them;
87. Any forward-looking assumptions and the rationale behind them.
88. Assumptions—The actuary should disclose each material assumption used in the analysis, and include a description of other possible methods and assumptions that were not selected and the rationale thereof. Sufficient detail should be shown to permit another qualified actuary to assess the appropriateness of the assumptions and to understand the provision made for future conditions. If the actuary assumes present conditions will hold throughout the time period considered by the risk evaluation, or a portion thereof, then the actuary should state that no provision was made for future change in risk conditions. In addition, disclosures should be documented in a manner appropriate for the intended audience to understand the implications of the selected assumptions and to make appropriate use of the actuarial communication. If the intended audience is composed primarily of decision makers then such disclosure should be documented in a manner that will allow them to make use of such information in their decision making.
89. Any material changes in the assumptions from those previously used for the same type of evaluation. The general effects of any such changes should be disclosed in words or by numerical data, as appropriate.
90. All material events that would have materially changed any of the assumptions selected or are otherwise likely to affect the analysis up to the date that an actuarial communication regarding risk evaluation is issued. The likely effect of any such change should also be described. The actuary has an obligation to be reasonably informed about such events. The actuary's reliance, if any, on representations of company management regarding subsequent events should be disclosed.
91. Any validation or peer review of models used in the evaluation and any peer review of any other aspect of the risk evaluation.

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92. Risk dimensions used in the risk evaluation, in whole or in part, such as accounting constructs, economic values, stand-alone or portfolio views of risk, among others.
93. Ranking of various risks by risk measures, as appropriate for the particular risk evaluation. Comparisons of different risk measures can illustrate differences in ranking of risks changes based upon differing risk measures. Actuarial communications should also explain why these differences arise, and whether one particular risk measure and the resulting ranking are more indicative of the nature of a particular risk than another. The actuary may also wish to discuss which rankings are qualitative, which are quantitative.
94. The actuary should disclose if the modeled future economic conditions have been reviewed and the results tested for reasonableness.
95. The actuary should disclose if any determination has been made as to the conditions under which liabilities such as reserves currently being held are adequate.
96. Disclosure of the sensitivity of the results to changes in the assumptions or target criteria. For stochastic analysis, the specific scenario that represents the target criteria (for example, the 99.5th percentile result) should be identified and the reasonableness of the result for that scenario verified. The basis of any such judgment should be documented.
97. Any anticipated future actions by management to manage or mitigate risks identified by the actuary should be considered in any risk evaluation. The assumed results of any such actions should be analyzed, quantified where possible, and documented.
98. Deviation from the Guidance in the Standard – The actuary should disclose any deviation from the guidance set forth in this standard. The actuary should also disclose reliance on assumptions or methodologies selected or prescribed by others. Actuarial work products and communications that deviate from the guidance set forth in this standard may meet professional standards provided that the scope of the work is disclosed and in the actuary's professional judgment the work product meets the needs of the organization for which the work was performed.

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**ACTUARIAL PROFESSIONAL STANDARDS
FOR RISK TREATMENT**

Purpose and Scope

The purpose of this standard of practice is to set forth guidelines for actuaries in designing, using, and reviewing risk treatment systems. The process of risk treatment is a part of risk management systems that are found in insurers, pension plans, in other financial service firms and in most businesses or organizations. The act of operating a business includes taking risk through specialized resources to create a competitive advantage in the market place. Insurance and pension plans specialize in offering products that accept risk for a pooled group of participants. Much of their emerging ERM practice has focused on managing the financial and insurance risks associated with their specialized products.

Risk management should be aligned with the objectives of the organization. In many circumstances Enterprise Risk Management is focused on balancing risk and opportunity, wherein organizations do not seek to eliminate all risk but instead strive to optimize their position along the risk/reward spectrum. It is a value added process for prioritizing the use of limited resources to ensure the long term sustainability of the organization. It is not about predicting a future, but about identifying what can or needs to be done to be prepared for whatever future may arise. While the level of acceptable risk is a decision to be made by each organization, the successful use of ERM allows the levels of risk taken to be more transparent to all stakeholders. In other circumstances organizations are faced with risks that do not contain opportunities for rewards commensurate with the risk. In such circumstances the primary objective for risk management is the minimization of risk. In all cases, risk evaluation should consider the context of the organization's objectives and the range of contingent futures of the organization with and without possible risk treatment alternatives.

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may want similar evaluations. For example, insurance regulators in some jurisdictions require a professional opinion regarding the risk management systems of the insurance company. One purpose of this standard is to guide the actuary in complying with such requirements and requests.

Organization of This Standard

Risk treatment is most often performed through a control cycle. Within a typical risk control cycle, risks are identified, risk measures are determined, risk appetites are chosen, risk limits are set, and actions to be taken when limits are breached are defined. Risks are monitored and reported as they are taken and as long as they remain an exposure to the company.

The essence of the control cycle is a feedback loop to enhance the management of risk over time. The reporting process allows for the “testing” of the risk hypothesis originally assumed and for an improved defining of the risks taken and managed. Thus, there can be an evaluation at the end of the reporting cycle to see what additional risk insight has been gained to improve the next movement through the control cycle. Thus, while some risks, such as emerging risks, may not be included in the original outlined control cycle, the effective use of the control cycle will more quickly bring them to the monitoring process.

This standard will focus on three aspects of risk treatment: Risk Tolerance/Appetite/Limits, Risk Mitigation, and Emerging Risks. Risk measurement and monitoring are also key actuarial tasks in the risk control cycle. Standards for those activities are considered in [other SOP].

Definitions

56. Basis Risk—The residual risks that are retained by a firm that arise because the risk mitigation payoff amount is determined as something other than a pure offset to the loss being mitigated. Basis risk is a residual risk that results from an imperfect risk offset or

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transfer process. For example, there is basis risk from hedges that payoff based upon an index while the exposure is an investment in a managed selection of individual stocks, or when a capital market hedge based upon industry-wide losses is used to offset an insurer's specific storm exposure.

57. Counterparty Risk—The risk that the party providing the risk offset or accepting the risk transfer will not be able to fulfill their obligations, throwing seemingly mitigated risks back on the original firm. Counterparty risk also arises from loans or bonds.
58. Emerging Risk—New or evolving risks which may be difficult to manage since their likelihood and/or frequency are highly uncertain.
59. Environmental Scanning—Process of gathering, analyzing, and dispensing information from external sources for tactical or strategic purposes.
60. Inherent Risks—Risks taken by a firm before any risk mitigation activities; also called gross risk.
61. Residual Risks—Risks retained by a firm net of any Risk Mitigation activity; also called net risk or retained risk.
62. Reverse Stress Test—The determination of a stress scenario that causes the failure of a firm – also known as “stress to failure”
63. Risk Appetite—The maximum amount of risk that an organization chooses to take during a defined time period in pursuit of its objectives.
64. Risk Avoidance is a risk management technique that involves seeking to avoid taking a certain class of risk. A Risk Preference statement could detail the risks that are to be avoided.
65. Risk Budget—A quantification using a specific measure (for example, Value at Risk (VaR), Conditional Tail Expectation (CTE)) of the degree of risk an organization is willing to accept for a specific outcome (such as annual profit or net assets at the end of a defined future period).
66. Risk Environment—The level and degree of volatility and reliability of risk estimates that exists for various risks over a specified time period. The time periods considered may include both short term and long term. A Risk Environment may be defined with respect to the risk of failing to achieve goals for a specific product or for the whole organization.

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67. Risk Limit—A threshold used to monitor the actual risk exposure of a specific risk or activity unit of the organization to ensure that the level of actual risk remains within the Risk Tolerance.
68. Risk Mitigation—Action that reduces frequency and/or severity of a risk, often with the expectation that profit and volatility will be reduced. This action may increase the frequency and/or severity of a different risk (such as counterparty risk when entering into an insurance or derivatives contract).
69. Risk Mitigation Policies—Documentation by a company of the types of risk mitigation activities that they expect to undertake, of the circumstances under which those activities will be optional and when they will be mandatory, and of the authorities for who can initiate risk mitigations and who can override the policy.
70. Risk Preferences—A statement of the specific risks that an organization will or will not accept. In effect, Risk Preferences can be viewed as statements regarding whether the organization is willing to set a non-zero Risk Limit for a specific risk or activity.
71. Risk Target—The optimal level of risk that an organization wishes to take in pursuit of a specific goal.
72. Risk Tolerance—The level of risk to which an organization is willing and able to be exposed, taking into account its financial strength and the nature, scale and complexity of its business and risks, the liquidity and transferability of its business, and the physical resources it needs to adequately manage its risks.

Risk Appetite, Limits, and Tolerance

There are many tasks related to Risk Appetites, Limits, and Tolerance that an actuary may be called upon to perform. Examples of such tasks include the following:

73. Recommend or review a recommendation regarding the organization's Risk Appetite, Risk Limits, Risk Preferences, Risk Targets and/or Risk Tolerances.
74. Design, build, operate and/or report on the findings of a system that monitors the accumulation of actual risk exposures in comparison to limits.

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75. Design, operate and/or report on a system of intermediate checkpoints for risk accumulations as part of a risk limit system.

Considerations

In performing the above, the actuary may wish to consider some or all of the following:

76. The long term expectations of the board and management regarding the risk/return profile of the organization.
77. The long term business plans of the organization, especially the plans for future growth.
78. The profit expectations of the organization.
79. The knowledge and experience of the organization's management and board regarding risk and risk management.
80. The degree of concentration of the risks of the organization.
81. The historical Risk Appetite of the organization. This may be a stated Risk Appetite or it may be implicit in organization's operations and the amount of risk that was actually retained at some past point in time.
82. The expectations of various internal and external stakeholders of the organization as well as other highly influential parties. These stakeholders and other parties may include some or all of the owners, board, management, customers, partners, employees and neighbors.
83. Stakeholder attitudes towards high frequency/low severity risks and low frequency/high severity risks.
84. The financial strength, nature, scale and complexity of the organization's business and risks, the liquidity and transferability of its business, and the physical resources it needs to adequately manage its risks.
85. The cost of various levels of different risk mitigation options.
86. The current opportunities for returns for risk taking.
87. The impact of ceasing to accept particular risks.
88. The impact of not yet accepting risks that the organization expects to accept in the future.
89. The opportunities available to mitigate breaches of Risk Limits and Risk Tolerances, as well as the cost and effectiveness of such mitigation.

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90. The secondary risks that may arise as a result any risk mitigation, such as counterparty risk and opportunity costs.
91. The preference that the firm may have for the amount of gross risk before mitigation. The relationship between gross (prior to mitigation) and net (post mitigation) Risk Preferences.
92. The current Risk Environment and the long term expectations thereof. The actuary may rely on management's opinions of the Risk Environment, may form an independent opinion of the Risk Environment, may rely on a third party's evaluation of the Risk Environment, or may imply a Risk Environment from current conditions (such as market prices, political climate, etc.).
93. The various potential definitions of security that may be the primary considerations of the organization, which may include such events as insolvency, loss of market confidence, severe earnings shortfalls, earnings losses or other levels. The actuary should be aware of any regulatory standards for risk levels and the implications of potential risk levels on the continuation of business operations as reflected in ratings or other external measures of security.
94. Regulatory or accounting constraints which may affect the Risk Environment, Risk Limits, Risk Targets and Risk Tolerances.

Risk Mitigation

There are many tasks related to Risk Mitigation that an actuary may be called upon to perform. Examples of such tasks include the following:

Recommend or review a recommendation regarding the organization's risk mitigation strategies and/or goals.

95. Recommend or review a recommendation regarding the organization's risk mitigation policies.
96. Recommend or review a recommendation regarding a transaction or other strategy to mitigate a specific risk or set of risks.
97. Recommend allocations of risk mitigation costs for an organization.

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98. Design, build, operate and/or report on the findings of a system that measures or monitors the level of risk.
99. Design or manage a product so that that design or operation actively or passively mitigates some of the potential risks of the product.
100. Design, build, operate and/or report on the findings of a system that monitors the effectiveness of a risk mitigation program.
101. Estimate the dependencies or correlations of different risks.
102. Explain the gross and net risk distributions and the resulting volatility of earnings, losses at a particular likelihood point (for example, 1/250), or results under particular stress tests.

Considerations

In performing the above, the actuary may want to consider some or all of the following:

103. The current and potential future gross risk positions of the firm.
104. The data about those risk positions that is available and the speed at which data reflecting changes in those positions is expected to be available in the future.
105. The accounting and regulatory treatment of the gross risk positions and the risk mitigation program and the degree of actual risk transfer/offset that is accomplished by the program which may be much higher or lower than indicated by the accounting and/or regulatory treatment.
106. The current and potential future costs of risk mitigation actions expected to be needed to reconcile the company's plans for gross risk taking with its risk tolerance as well as the potential variability of the cost and benefit of the mitigation.
107. The current and potential future availability of the entire risk mitigation program or elements of it.
108. The nature and degree of the basis risk that is inherent in the risk mitigation programs.
109. The counterparty credit risk, and corresponding concentrations thereof, inherent in the risk mitigation programs and the intentions for tracking and mitigation of the counterparty risk. In addition, the circumstances under which the counterparty risk might change significantly.
110. The degree of confidence that the risk mitigation process can be maintained or repeated

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over the entire time horizon of the business plans for holding the gross risk.

111. The resilience of the firm under duress caused by common fluctuations as well as from extreme adverse external environmental issues.
112. The operational capabilities of the organization to perform the tasks needed to implement the risk mitigation process.
113. The potential risk to company reputation of both the gross risk and the risk mitigation method. The potential impact of other risks as well as other separate firms in an affiliated group on the company reputation.
114. Interactions, correlations and dependencies among risks and portfolio effects.
115. Granularity of modeling needed to capture the effects of the risk mitigation alternatives as well as the practicalities of achieving that granularity.

Emerging Risks

There are many tasks related to the treatment of Emerging Risks that an actuary may be called upon to perform. Examples of such tasks include the following:

116. Recommend or review a recommendation regarding the organization's process for environmental scanning of emerging risks.
117. Design, build, operate and/or report on the findings of a system that monitors emerging risks.
118. Give advice on potential actions that could be taken in the event of an emerging risk crystallizing.
119. Propose or review a company policy for emerging risks.

Considerations

In performing the above, the actuary should consider the following:

120. The current risk appetite of the organization.
121. The expectations of various stakeholders of the entity. These stakeholders may include some or all of the owners, board, management, customers, partners, employees and

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neighbors.

122. The extent to which the organization's exposure to emerging risks may differ from its competitors
123. The cost of various levels of environmental scanning available and the level of resources the organization is prepared to devote for this purpose.
124. The expectations of emerging risks across various time horizons (for example, short, intermediate, long).
125. The potential secondary effects from assumed actions in the light of an emerging risk crystallizing
126. The current Risk Environment and the long term expectations of the Risk Environment. The actuary may reflect the opinion about the Risk Environment of the entity or may be called upon to reflect a variety of possible Risk Environments, could use a Risk Environment opinion of a credible third party, or could use the Risk Environment that is implicit in market prices.
127. The long term strategic business plans of the organization, especially the plans for future growth.
128. The expectations of the entity for profits.
129. The knowledge and experience of the management and board regarding risk and risk management.
130. The various potential definitions of Risk Tolerance, Risk Appetite or Risk Budget that may be the primary risk related considerations of the organization, which may include such events as insolvency, loss of market confidence, severe earnings shortfalls, earnings losses or other events.
131. Regulatory or rating agency expectations for the treatment of emerging risk.

Analytical Methods

A number of analysis methods are available to actuaries. Most commonly used are stochastic models and stress tests.

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132. Scenario analysis—Considers the impact of a combination of many factors affecting the insurer and usually reflects common to extreme ranges of those factors as well as historical scenarios which are analyzed in the light of current conditions. Scenario analysis may be conducted deterministically using a range of specified scenarios or stochastically, using models to simulate many possible scenarios, to derive statistical distributions of the results. Scenarios may occur over a longer-period of time than stresses.
133. Stress testing—Measures the financial impact of stressing one or relatively few factors affecting the insurer. Stresses will typically occur over a short period of time. A test of a 2% change in interest rate would be an example of a stress to a factor.
134. Reference to standard measures—Regulatory and rating agency capital models are standard measures of risk of organizations. Risk Limits, Risk Targets and Risk Tolerances are often stated in terms related to one or more of these standard measures.

Assumptions: In addition to selecting an appropriate analysis method, the actuary should select appropriate assumptions. Accepted methods include the following:

135. Adaptation of company experience or industry studies;
136. Use of a deterministic scenario or set of scenarios;
137. Statistical distributions or stochastic methods; and
138. Market implied values.

The actuary should document the assumptions chosen and provide supporting rationale for the appropriateness of the assumptions.

Additional Considerations

Additional considerations with regards to Risk Tolerance could include the following:

139. The Risk Tolerance analysis should take into account all material risks of the firm. These risks include, but are not limited to, insurance risks, investment risks, credit risks, and policyholder behavior risks, risks of the future emergence of adverse claims experience, reputational risks and operational risks.

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140. Risk Tolerance should be tested over a time period that extends to a point at which, in the actuary's professional judgment, the use of a longer period would not materially affect the analysis.
141. The actuary should review the modeled future economic and experience conditions and test results for reasonableness.
142. Analysis should include a determination of the sensitivity of the results to changes in the assumptions or target criteria. For stochastic analysis, the specific scenario that represents the target criteria (for example, the 99.5 percentile result) should be identified and the reasonableness of the result for that scenario verified. The basis of any such judgment should be documented in the supporting memorandum.
143. After testing is completed, the actuary may aggregate risks reflecting the degree to which the different risks of the organization are or are not assumed to be interdependent. The use of assumptions relating to correlation of different risks is usually key to this step.
144. Results from prior years can provide the actuary with valuable insight into the dynamics of the Risk Tolerance analyses, particularly if successive years' results have been reconciled. The actuary should consider using analysis of trends and reconciliation analyses in forming an opinion.
145. Any anticipated future actions by management to manage risks identified by the actuary should be considered in forming an opinion. The assumed results of any such actions should be quantified and documented by the actuary in a supporting memorandum.
146. The actuary should consider all material events that are likely to affect the actuary's analysis up to the date the opinion is signed and disclose those events in the opinion. The actuary has an obligation to be reasonably informed about such events. The actuary's reliance, if any, on representations of company management regarding subsequent events should be disclosed in the opinion.
147. Professional opinions about risk mitigation work can be considered to be consistent with this standard if the scope of the work is limited, those limitations are disclosed and in the professional opinion of the actuary such limitations do not materially compromise the effectiveness of this work in meeting the needs of the organization.

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148. The actuary should consider the interaction of a large number of possibly interrelated and evolving trends that may result from as well as the impact of all of those trends upon the company. In addition, the actuary should consider the unintended consequences of possible future mitigation activity, both by the firm and by others impacted by the risk. Complex system effects are particularly important with regard to emerging risks.

Communications and Disclosures

Disclosures—Communications regarding actuarial work on Risk Appetite, Risk Limits, Risk Preferences, Risk Targets and Risk Tolerances should contain descriptions of the following items:

149. Purpose—The actuary should clearly disclose the purpose of the report, its intended use and the intended recipient of the report.

150. Assumptions and Methodology Used—The actuary should disclose the methodology and each material assumption used in the analysis. Sufficient detail should be shown to permit another qualified actuary to assess the reasonableness of the risk model used. The disclosure of risk assumptions should contain sufficient detail to permit another qualified actuary to understand the provisions made for future conditions.

151. Changes in Assumptions—The actuary should disclose any material changes in the assumptions from those previously used for the same type of measurement. The general effects of any such changes should be disclosed in words or by numerical data, as appropriate.

152. Changes in Circumstances—The actuary should disclose any significant event of which the actuary is aware that has occurred since the measurement date that would have materially changed any of the assumptions selected. The likely effect of any such change should also be described.

153. Change in Methodology—The actuary should disclose any material changes in analytical methodology from that previously used for the same type of measurement. The general effects of any such changes should be disclosed in words or by numerical data, as

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appropriate.

154. Prescribed Assumptions—The actuary’s communication should identify and state the source of any prescribed assumptions.

155. Deviation from the Guidance in the Standard—The actuary should disclose any departure from the guidance set forth in this standard. If the actuary disclaims responsibility for any material assumption or methodology employed in the analysis then this should be disclosed by the actuary.