

## Appendix 2

### Comments and Exposure Draft Responses

The first exposure draft of this proposed ASOP, *Modeling*, was issued in June 2013 with a comment deadline of September 30, 2013. Forty-eight comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. Some commentators submitted multiple letters. For purposes of this appendix, the term “commentator” may refer to more than one person associated with a particular comment letter. The Modeling Task Force carefully considered all comments received, reviewed the exposure draft, and proposed changes. The General Committee and the ASB reviewed the proposed changes and made modifications where appropriate.

Summarized below are the significant issues and questions contained in the comment letters and responses.

The term “reviewers” in appendix 2 includes the Modeling Task Force, the General Committee, and the ASB. Also, unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the first exposure draft.

<b>TRANSMITTAL MEMORANDUM QUESTIONS</b>	
<b>Question 1: Does the proposed standard provide sufficient guidance to actuaries working with models?</b>	
Comment	Some commentators felt that there was good guidance; some commentators felt there was insufficient guidance; and some commentators felt there was too much guidance (and would prefer there be no standard from the ASB). Some preferred that the information in the draft standard be put in the form of a practice note rather than a standard.
Response	The reviewers believe a standard on modeling is important because modeling is so widely performed in all actuarial practice areas. The reviewers have clarified the guidance in light of the comments summarized throughout this appendix. Given the wide range of models and situations using models, the reviewers believe the level of guidance as reflected in this ASOP is appropriate.
Comment	One commentator wanted the standard to state explicitly that a model is only an approximation of reality, not the reality itself. The concern is that a model is always in some sense “untrue” or “incorrect,” and discussing models as though they were or could be exact representations of reality is misleading. An “exact model” is actually just a calculation or determination that does not involve modeling at all.
Response	The reviewers agree and have included this concept in appendix 1. The reviewers believe that nothing in the definitions and guidance implies that models represent perfect representations of reality.
Comment	Some commentators proposed that any guidance already present in any other standard, and any guidance that could be used also for non-modeling work, be deleted from this standard.
Response	The reviewers believe that, since this standard applies to all actuarial work involving models, unlike existing standards that generally apply to specific applications of models, no change was made.

Comment	Many commentators answered this question by suggesting changes to particular items, which are summarized in the relevant sections below.
Response	The responses of the reviewers depend on the specific comment, as listed below.
<b>Question 2: Is the proposed standard sufficiently flexible to allow for new developments?</b>	
Comment	Some commentators felt there was sufficient flexibility; some commentators felt there was insufficient flexibility; and some commentators felt there was too much flexibility.
Response	The reviewers believe there is sufficient flexibility at this time and made no change.
<b>Question 3: The draft ASOP starts with a wide scope, but allows the actuary to use professional judgment to identify those instances (such as those involving minimal reliance by the user, or resulting in a non-material financial effect) where some guidance described in this ASOP is not appropriate or practical. Is this clear and appropriate?</b>	
Comment	Some commentators felt this was clear and appropriate; some commentators found it unclear; some commentators felt the scope was still too wide; and some commentators accepted the wide scope and felt it was inappropriate to allow the actuary to make a judgment that some guidance is not appropriate or practical.
Response	In light of the questions and comments received, the reviewers reconsidered the scope issue and reaffirmed the approach in the standard (i.e. with application using professional judgment) as the best way to provide appropriate guidance in this wide area of practice.
Comment	Some commentators believe that the exposure draft's definitions and examples tended to make more sense for projection models than for predictive models, which are more akin to experience (or interrelationship) studies, while other types of models vary in other ways.
Response	The reviewers have clarified definitions and examples so that they are broadly applicable.
Comment	One commentator felt work covered by ASOP No. 4 should be excluded from the scope of this standard.
Response	The reviewers believe that this standard should apply to all practice areas and made no change.
<b>Question 4: In those instances where some guidance described in this ASOP is not appropriate or practical and the deviations from guidance are "not material," the actuary does not need to disclose these deviations. Is this clear and appropriate?</b>	
Comment	Some commentators felt this was not only clear but also appropriate; some commentators found it unclear; some commentators felt the disclosures were too burdensome; and some commentators felt it was inappropriate to allow the actuary to make a judgment that some disclosure of immaterial deviations is not needed.
Response	The reviewers believe the guidance is appropriate and reflects the wide range of models in scope. (See related comments and responses below in section 1.2, Scope.)
<b>Question 5: Appropriate documentation simplifies later use and development of current models as well as allowing easier review by principals and other actuaries. Section 3 contains guidance with regard to documentation. Is this guidance clear and appropriate?</b>	
Comment	Some commentators felt this was not only clear but also appropriate; some commentators found it unclear; some commentators felt the documentation was too burdensome; some commentators suggested changes in placement of the guidance.
Response	As described in the sections below on documentation, this guidance was clarified. The reviewers narrowed the situations in which documentation is required.

<b>Question 6: Does the use of bold font to identify defined terms improve the readability and clarity of the standard? If not, what suggestions do you have to improve the recognition of defined terms in the standard?</b>	
Comment	Some commentators supported the bolding of defined terms while others did not. Other commentators suggested including italics, capitalizing, quotation marks, and hyperlinks.
Response	The reviewers note the style of bolding defined terms is in accordance with current ASOP format and made no change.
<b>SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE</b>	
<b>Section 1.1, Purpose</b>	
Comment	Several commentators suggested replacing “professional services” with “actuarial services” to be more consistent with ASOP No. 1, <i>Introductory Actuarial Standard of Practice</i> .
Response	The reviewers agree and made the change.
Comment	One commentator suggested that the application of the standard should be limited to actuarial models.
Response	The reviewers disagree since many actuaries perform actuarial services with respect to models that are not traditionally considered actuarial. Therefore, no change was made.
<b>Section 1.2, Scope</b>	
Comment	One commentator suggested adding “reviewing” to the list of stated activities. Another commentator suggested adding “evaluating” to provide guidance to actuaries who are responsible for evaluating, but not otherwise using, models.
Response	The reviewers agree and added both “reviewing” and “evaluating.”
Comment	One commentator suggested changes to the third paragraph to improve clarity.
Response	The reviewers disagree that the suggestions would improve clarity and, therefore, made no change.
Comment	Two commentators suggested that the complexity of a model should be added to “reliance by the user” and “financial effect” as an additional consideration for determining whether services with respect to a model are in scope.
Response	The reviewers considered this recommendation but believe that complexity in itself does not automatically make a model any more nor any less in scope. Actual applicability of the guidance is based on professional judgment, which can take into consideration whether and how the complexity of the model may relate to such applicability. Therefore, no change was made.
Comment	One commentator stated that it is unclear why the standard would be needed in the case of straight-forward calculations—even if they were relied upon and had a material financial effect—and recommended that the scope of the standard be scaled back.
Response	The reviewers spent a considerable amount of time discussing the scope of the standard and, after considering all suggestions, clarified the guidance where appropriate but made no change to limit the scope of the standard.
Comment	One commentator suggested that the language stating “where some guidance described in this ASOP is not appropriate or practical,” is unnecessary since the choice to apply the guidance is covered by the “deviation” language included in this and other ASOPs.
Response	The reviewers disagree and note that the aspects covered by deviation are not identical to the aspects covered by the judgment that certain guidance is not warranted and therefore not applicable (see section 3.1).

<b>Section 1.3, Cross References</b>	
Comment	One commentator suggested modifications to the last sentence in this section to improve clarity.
Response	The language in this section is used consistently in ASOPs, and the reviewers disagree that the suggestion would enhance clarity. Therefore, no change was made.
<b>Section 1.4, Effective Date</b>	
Comment	Several commentators suggested that an effective date four months after adoption by the ASB may be too short a time period given the timelines of certain modeling projects that may be underway at the time of approval. One commentator suggested six months after approval, and another suggested twelve months.
Response	The reviewers have selected a transition period of nine months after adoption by the ASB.
<b>SECTION 2. DEFINITIONS</b>	
Comment	One commentator felt that the definitions of input, parameter, assumptions, and data appear to be circular.
Response	The reviewers eliminated certain examples that did not improve clarity and believe the revised definitions are appropriate for the use of the terms in this ASOP, and made no further changes.
Comment	Two commentators identified a selection of terms used in this ASOP that would benefit from explicit definitions.
Response	The reviewers considered each term and determined that the terms were generally understood and, therefore, made no change.
Comment	Two commentators suggested removing the terms “specification,” “implementation,” and “realization,” since these were not commonly used terms.
Response	The reviewers removed references to “realization” to improve clarity. However, the reviewers left in the terms “specification” and “implementation” since these are common modeling processes, but modified the definitions to improve clarity.
<b>Section 2.1, Assumptions</b>	
Comment	Two commentators suggested adding that assumptions may be prescribed.
Response	The reviewers agree and modified the definition.
Comment	Several commentators suggested that assumptions may not be inputs to a model.
Response	The reviewers believe the revised definition is appropriate for the use of the term in this ASOP and made no change.
Comment	One commentator suggested that assumptions are also based on experience.
Response	The reviewers believe the revised definition considers experience as the basis for “expectations” and made no change.
Comment	One commentator suggested that assumptions should not be limited to those based upon “professional judgment” and another commentator thought that the definition should be on “data and professional judgment.”
Response	The reviewers believe the reference to “professional judgment” is appropriate whether the assumptions are based strictly upon data or are more broadly determined and, therefore, made no change.

<b>Section 2.2, Data</b>	
Comment	One commentator suggested that the meaning of the term “experience” is not commonly understood, and that the examples provided should also include experiments and surveys.
Response	The reviewers agree and modified the definition to clarify that the data sources noted are examples. The definition was further clarified by adding “experiments” and “surveys” to the language.
<b>Section 2.3, Granularity</b>	
Comment	Several commentators suggested that models with greater granularity may result in less credible results.
Response	The reviewers agree that greater granularity will not always improve results and note that “may” was included in the definition for this reason.
Comment	Several commentators felt that the definition of granularity was not clear, particularly the use of the term “cell.”
Response	The reviewers agree and simplified the definition, including eliminating references to the term “cell.”
<b>Section 2.4, Implementation</b>	
Comment	One commentator felt that the examples were of models, not of implementations.
Response	The reviewers agree and removed the examples.
Comment	Several commentators suggested that a model is not implemented until it is in use for its intended purpose.
Response	The reviewers disagree and made no change.
<b>Section 2.5, Input</b>	
Comment	Two commentators suggested that the definition of input should be modified to reflect “information fed into a model to get output.”
Response	The reviewers agree and modified the definition.
Comment	Two commentators suggested that the definition of input should not include assumptions as they “generally refer to the structure of the model.”
Response	The reviewers believe the revised definition is appropriate for the use of the term in this ASOP and made no change.
Comment	One commentator suggested modifying the definition to reflect an “including but not limited to” descriptor before “assumptions, data, or parameters” given that this list may not include all information included within a model (for example, a random number generator.)
Response	The reviewers agree and modified the definition to include “information such as” before “data, assumptions, or parameters.”
Comment	One commentator suggested that certain models produce parameters as output.
Response	The reviewers agree but believe this fact does not affect the meaning of the definition and, therefore, made no change.
<b>Section 2.7, Intended Purpose</b>	
Comment	Two commentators suggested adding the role of “reviewing” to the list of actuarial roles.
Response	The reviewers agree and made changes to better recognize the roles of modifying, reviewing and evaluating.

<b>Section 2.8, Margin</b>	
Comment	Several commentators suggested adding conservatism as an additional reason for introducing a margin beyond compensating for a lack of credibility.
Response	Based on other comments received, the reviewers removed the definition. The reviewers agree with this specific comment and added the word “conservatism” to new section 3.2.7(b).
Comment	Several commentators suggested that the definition include reference to the cost of bearing risk.
Response	The reviewers removed the definition of margin but included the phrase “an adjustment for the cost of bearing risk” in new section 3.2.7(b).
Comment	Two commentators suggested that margins are added to assumptions and not to data as potentially implied by the definition.
Response	The reviewers removed the definition of margin and clarified the discussion of margin in new section 3.2.7(b).
<b>Section 2.9, Model</b>	
Comment	Two commentators suggested that “scientific” be added to the set of concepts and equations listed.
Response	The reviewers agree and made the change.
Comment	One commentator suggested that implementations are not always achieved solely through mathematical formulas, but may be achieved through logic and algorithms.
Response	The reviewers agree in part and made changes to include “logic and algorithms” in the definition of “specification.”
Comment	Several commentators suggested that the definition of a model is too broad. One of the commentators suggested that it should be narrowed to focus on business models.
Response	The reviewers believe the revised definition is appropriate for the use of the term in this ASOP and made no change.
<b>Section 2.10, Modeling</b>	
Comment	Three commentators suggested adding “reviewing” to the list of actuarial roles when modeling.
Response	The reviewers agree and made the change, and also added “evaluating.”
Comment	One reviewer suggested removing “using” from the list of roles.
Response	The reviewers disagree given the use of the term in the ASOP and made no change.
<b>Section 2.11, Model Risk</b>	
Comment	Two reviewers suggested replacing the words “a flawed model, inappropriate inputs, or misapplication of the model” with the language “the model not reasonably representing the situation (reality) under study.” Several other commentators did not think the examples provided covered all sources of model risk and felt that the definition was too narrow.
Response	The reviewers agree that the examples did not improve clarity nor did they cover all sources of model risk and, therefore, modified the definition to be similar to the suggested language.
Comment	One commentator offered that this definition was inconsistent with the definition of “model risk” within ASOP No. 43, <i>Property/Casualty Unpaid Claim Estimates</i> , which separately defines “process risk,” “parameter risk,” and “model risk.” Another commentator felt that the three separate definitions would be useful.
Response	The reviewers disagree given the use of the term in this ASOP and made no change.

<b>Section 2.12, Neutral</b>	
Comment	Many reviewers were uncomfortable with the definition or thought it unnecessary.
Response	The reviewers agree and eliminated the definition and its use in section 3.4.3.
<b>Section 2.13, Organization</b>	
Comment	One commentator thought a definition of organization was unnecessary.
Response	The reviewers agree and removed the definition.
Comment	One commentator thought it was not common usage to refer to a benefit plan as an entity.
Response	The reviewers agree and removed the definition.
<b>Section 2.14, Parameter</b>	
Comment	One commentator suggested adding the term “scientific” to the list of types of model input included within the definition.
Response	The reviewers agree and made the change.
Comment	Several commentators suggested that referring to a parameter as an input may be confusing.
Response	The reviewers removed the last sentence in the definition since it did not appear to improve clarity. The reviewers believe the revised definition is appropriate for the use of the term in this ASOP and made no further change.
<b>Section 2.15, Principal</b>	
Comment	One commentator noted that because the definition was consistent with the definition in the <i>Code of Professional Conduct</i> (Code), that a reference to the Code would be sufficient.
Response	The reviewers believe that including the definition within the ASOP is useful to the user and, therefore, made no change.
<b>Section 2.16, Project’s Objective</b>	
Comment	One commentator noted that there may be more than one objective of a model.
Response	The reviewers agree that there may be more than one objective of a model. However, the reviewers believe that the definition is appropriate for the use of the term in this ASOP and, therefore, made no change.
<b>Section 2.17, Realization</b>	
Comment	Many reviewers were uncomfortable with the definition as written.
Response	The reviewers agree and eliminated the definition and its use in this ASOP, replacing it with “model run.”
<b>Section 2.18, Reproducible</b>	
Comment	One commentator thought the definition could be eliminated since the term was only used once in the guidance and could be removed.
Response	The reviewers agree, and removed the term and the reference to it.
<b>Section 2.19, Specification</b>	
Comment	One commentator noted that the definition was inconsistent with how the term was used in the definition of a model.
Response	The reviewers agree and removed the inconsistent language.

Comment	One commentator thought the definition was too broad.
Response	The reviewers removed certain inconsistent language and believe that the resulting definition is appropriate for the use of the term in this ASOP, and made no further change.
<b>SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES</b>	
Comment	One commentator suggested that the exposure draft be modified so that it emphasizes the importance of the actuary's knowledge and understanding of the principal's situation at the time the actuary is constructing, validating, documenting, and analyzing the output of the model.
Response	The reviewers agree and have clarified the guidance in section 3.1.1 to address this concern.
Comment	One commentator expressed concern that the actuarial work covered by this standard may be compromised by limited time or budget. The commentator was concerned that this might be inconsistent with Precept 1 of the Code.
Response	The reviewers believe that the guidance in the standard is consistent with Precept 1. However, some revisions were made to the standard to improve clarity.
<b>Section 3.1, Application of ASOP Guidance</b>	
Comment	Two commentators indicated that this sentence was confusing as it was in potential conflict with the wording in section 3.1.1.
Response	The reviewers made changes to this section to improve clarity.
Comment	One commentator indicated the application of the guidance belongs in the scope section of the standard, as it addresses scope and does not provide guidance.
Response	The reviewers believe this section provides guidance by calling for professional judgment by the actuary when applying this standard.
Comment	Two commentators suggested that guidance in this ASOP be limited to actuarial models.
Response	The reviewers intend the broader application and made no change.
<b>Section 3.1.1, Model Reliance and Financial Importance</b>	
Comment	One commentator disagreed with the guidance provided in the last sentence of the second paragraph and felt that the resources committed should be consistent with the project objective, which should be influenced by, but not solely determined by, the degree of reliance and financial importance of decisions.
Response	The reviewers believe that determination of resources is a matter of professional judgment and have deleted the last sentence of the second paragraph.
Comment	One commentator indicated that full application of the guidance should apply in situations that do not have material financial effect.
Response	The reviewers disagree and made no change.
Comment	Two commentators indicated that "material financial effect" was not clear. One of these commentators suggested alternative wording to provide more clarity and the other questioned the party to whom the phrase applied.
Response	The reviewers agree and clarified the language.



Comment	One commentator suggested adding an example where full application of guidance was appropriate.
Response	The reviewers agree and added examples.
Comment	One commentator asked how the guidance in this section should be applied if the actuary who uses a model that is not reliable leaves his or her employer before documenting that fact.
Response	The reviewers note that the answer to this question depends on the facts and circumstances and, therefore, made no change.
<b>Section 3.1.2, Models Developed by Others</b>	
Comment	One commentator suggested adding “or possible” to the end of the first sentence. Another commentator liked the section but indicated that the addition of “or possible” would be an improvement.
Response	The reviewers clarified the guidance, including deleting the phrase “and, therefore, full application of the guidance in this ASOP may not be necessary.”
Comment	Some commentators objected to a perceived lower standard of practice for an actuary who may lack understanding of the underlying workings of the model, creating a possible double standard.
Response	The reviewers believe that different guidance is warranted for actuaries using models developed by others.
Comment	Two commentators questioned why the actuary had to comply with sections 3.1.2 and 3.1.3 in all situations where the model being used by the actuary was developed or validated by someone else within the same firm.
Response	The reviewers agree with the commentator’s concern and added new section 3.1.3 to address such a situation.
Comment	One commentator indicated that the last sentence and the three items listed are not clear.
Response	The reviewers made clarifying changes to the language.
Comment	One commentator suggested replacing in section 3.1.2(a) “the basic workings of the model” with “the intended application of the model.”
Response	The reviewers made clarifying changes to the language.
<b>Section 3.1.3, Responsibility of the Actuary</b>	
Comment	One commentator suggested adding “or not possible” after “appropriate.”
Response	The reviewers clarified the guidance for circumstances when applying some or all of the guidance is not warranted, or is warranted but the guidance is not followed, because it is impractical or for other reasons. The guidance exposed as section 3.1.3 was moved into section 3.1.1.
Comment	One commentator felt that requiring the actuary to disclose the deviation where such deviation is material was too loose.
Response	The reviewers note that this is a standard requirement for disclosure of a deviation and made no change. The reviewers also note that “material” is defined in ASOP No. 1.
Comment	One commentator indicated that the language should be clarified that a judgment that “some or all of the guidance is not appropriate” is different from a material deviation from the standard.
Response	The reviewers have clarified that limiting the application of the guidance because of professional judgment is not a deviation from the standard.

Comment	One commentator indicated that the standard should not force the actuary to defend why this standard is inappropriate.
Response	The reviewers do not intend for the actuary to have to show that the standard is inappropriate and clarified the guidance.
<b>Section 3.2, Model Meeting the Intended Purpose</b>	
Comment	One commentator questioned whether the standard provided any more guidance than already provided in the Code to “perform work with skill and care and take reasonable steps to avoid being misleading.”
Response	The reviewers disagree and believe there is a need for a standard on modeling.
Comment	Two commentators suggested adding “reviewing” to the scope of the standard.
Response	The reviewers agree and revised the language.
<b>Section 3.2.1, Designing, Building, or Developing the Model for the Intended Application</b>	
Comment	One commentator suggested adding “The actuary should consider the environment in which the model will be used, and develop a model that will be robust within that environment” to this section, as the standard is silent on the need to design and build models to prevent or minimize the likelihood of inadvertent corruption, misunderstanding, or unintentional misuse.
Response	The reviewers agree with the importance of considering the environment in all actuarial work, but sometimes the design work for the model is done before the environment is set. The reviewers believe that the guidance in the standard appropriately addresses these considerations. Therefore, no change was made.
Comment	One commentator suggested eliminating section 3.2.5 and moving relevant items to section 3.2.1.
Response	The reviewers note that the examples provided are meant to illustrate a principle but are not intended to be exhaustive. The reviewers do not believe that re-organizing the sections or adding the examples from section 3.2.5 would aid clarity and did not make the change.
Comment	One commentator suggested eliminating section 3.2.3 and expanding 3.2.1 to cover modification of the model.
Response	The reviewers intend section 3.2.1 to be applicable to actuaries creating a model and section 3.2.2 to be applicable to actuaries using an existing model. Section 3.2.3 concerns modifications and directs the actuary to either section 3.2.1 or section 3.2.2. Therefore, no change was made.
Comment	One commentator suggested the word “causal” be removed. Some relationships are correlative, not causal, in nature.
Response	The reviewers agree and removed the word.
Comment	One commentator noted the last sentence of the section lists required considerations for all designing, building, or developing work, so the commentator recommended that the list be a list of possible considerations depending on the application.
Response	The reviewers agree and added the words “if applicable” to improve clarity.
Comment	One commentator suggested adding ability to meet regulatory requirements and model scalability to the list.
Response	The reviewers note that examples provided are meant to illustrate a principle but are not intended to be exhaustive and, therefore, made no change.

Comment	One commentator thought there were too many examples listed.
Response	The reviewers thought some examples would help illustrate the guidance but simplified the examples for further clarity.
Comment	One commentator suggested adding “If the actuary is aware of other models run for other purposes for the same entity, the inputs and assumptions for the same business should be the same or there should be a documented explanation for the difference.”
Response	The reviewers believe that section 3.2.7 of this ASOP (and other ASOPs) give appropriate guidance, and made no change.
<b>Section 3.2.2, Selecting or Using the Model for the Project’s Objective</b>	
Comment	One commentator suggested adding “When possible, the actuary should consider alternative or new methods and modeling solutions prior to selecting the final model for use.”
Response	The reviewers believe the standard sufficiently guides the actuary to confirm that the existing model meets the current project objective, and, therefore, made no change.
Comment	One reviewer recommended adding the phrase “and should be documented.”
Response	The reviewers believe that sections 3.4.1, 3.4.2, and 3.6 adequately cover documentation of this point and made no change.
<b>Section 3.2.3, Modifying the Model</b>	
Comment	Two commentators suggested adding “and Reviewing” to the section title.
Response	The reviewers note that “reviewing” is now covered in sections 3.2.1 and 3.2.2 to which the actuary is directed by this section 3.2.3. Therefore, the reviewers made no change.
<b>Section 3.2.4, Understanding the Model</b>	
Comment	One commentator suggested adding another responsibility to the existing list, such as “Consider documenting that tests used in the model produces expected results.”
Response	The reviewers note that “validating” and “documenting” are covered in section 3.3.1 and section 3.6, and made no change.
Comment	One commentator suggested moving items requiring the actuary to consider documenting certain items to section 3.6, Documentation. Another commentator suggested that the requirement was redundant with guidance in section 3.4.1(c).
Response	The reviewers agree and removed section 3.2.4(c) and 3.2.4(d), noting that sections 3.4 and 3.6 cover actuarial reports and documentation.
Comment	Several commentators suggested the guidance in section 3.2.4(c) should state “should document” rather than “should consider documenting.”
Response	The reviewers agree but believe that documentation and disclosure are better addressed in sections 3.4.1, 3.6, and 4.1.
Comment	One commentator suggested adding an additional requirement to “understand any elements of the model not developed by the actuary, such as stochastic economic scenarios and software package built-ins, like random number generators and statistical analyses.”
Response	The reviewers disagree and note that section 3.1.2 requires the actuary to have a basic understanding of a model developed by others and, therefore, made no change.
<b>Section 3.2.5, Model Structure</b>	
Comment	Several commentators suggested replacing “a contract or plan” in section 3.2.5(a) with “what is being modeled” or “project.”
Response	The reviewers note that this language is used to illustrate a specific example and made no change.

Comment	One commentator suggested strengthening the requirement in section 3.2.5(d) to document the rationale for grouping data rather than consider whether such documentation is appropriate. Several commentators indicated that documentation discussed in this section should be addressed with other documentation issues in section 3.6. Another commentator indicated that documentation should include the methodology as well as the rationale.
Response	The reviewers believe that these issues are adequately addressed in section 3.6 and removed section 3.2.5(d).
Comment	One commentator suggested that the definition of model needs to clarify that different processes may apply to composite and component models as well as to subsequent interpolation/extrapolation and subjective adjustments.
Response	The reviewers agree that the concept of modeling includes the entire process that the actuary uses to determine a result and point to section 3.3.1 for guidance regarding validation of more complex or composite models. Therefore, no change was made.
Comment	One commentator indicated that it wasn't clear what the distinction was between guidance in section 3.2.5(b) and (c).
Response	The reviewers believe that there is a distinction in some actuaries' work and chose to retain the example.
Comment	One commentator suggested that the term "model structure" be defined for clarity.
Response	The details of model structure depend on the model. The reviewers do not believe that such a definition would add clarity, and made no change.
Comment	Two commentators suggested that the standard needs to provide more clarity with respect to the meaning of "grouping" for the purpose of section 3.2.5(b).
Response	The reviewers note that certain models can use fewer cells to reflect more simplification, involving the grouping of data and the averaging of assumptions. Given that the list is introduced as an example, where applicable and where appropriate, of items to consider, no change was made.
Comment	One commentator suggested adding an additional requirement to consider whether the complexity of the model specification will produce reasonable and reliable results.
Response	The reviewers believe the guidance is clear and made no change.
<b>Section 3.2.6, Inputs to the Model</b>	
Comment	One commentator suggested replacing the word "deriving" with something similar to "...and the quality of."
Response	The reviewers believe the guidance is clear and made no change.
Comment	Two commentators objected to referring the actuary to ASOP No. 23, <i>Data Quality</i> , with respect to assumptions and parameters for the model.
Response	The reviewers note certain models use assumptions and parameters based on studies of data. However, the language was clarified.
<b>Section 3.2.7, Assumptions and Parameters</b>	
Comment	One commentator suggested replacing "should consider" in section 3.2.7(a) with "should use."
Response	The reviewers believe that this change would have been too prescriptive, so no change was made.

Comment	One commentator requested clarity regarding application of sections 3.2.6 and 3.2.7 with respect to data.
Response	The reviewers note appropriate data is covered in section 3.2.6 and appropriate assumptions in section 3.2.7.
Comment	Several commentators questioned the use of the term “credible” in section 3.2.7(a).
Response	The reviewers agree and changed “credible” to “reliable.”
Comment	One commentator questioned whether the standard should state that data should be selected to allow the model to meet the intended purpose.
Response	The reviewers revised current section 3.2.7(e) to refer to “input,” which includes “data” in addition to “assumption and parameters.”
Comment	One commentator suggested adding a requirement to document professional judgment if section 3.2.7(a)(3) applies.
Response	The reviewers believe that the documentation required in this standard is appropriate and, therefore, made no change.
Comment	One commentator suggested replacing “is significant” with “could have a material impact” in section 3.2.7(a)(4).
Response	The reviewers agree and clarified the language in the renumbered section 3.2.7(b).
Comment	A few commentators indicated that the example of considering margin was narrower than a full discussion of margins would require.
Response	The reviewers agree and expanded the example to clarify the possible consideration.
Comment	One commentator suggested that it be clarified that the actuary is responsible for following the guidance only when the actuary was the one using the model.
Response	The reviewers agree and clarified the language.
<b>Section 3.3, Mitigation of Model Risk</b>	
Comment	A few commentators suggested that using multiple models is also an acceptable mitigation method.
Response	The reviewers agree and a change was made to add this as an example in section 3.3.1(b)(4).
<b>Section 3.3.1, Validation, Checking, and Analysis</b>	
Comment	One commentator noted that Validation and Verification (Checking) are lumped together while they are actually separate functions. The commentator suggested the sections be split as Model Verification, Model Validation, and Model Review.
Response	The standard uses (and the reviewers use) “validation” to include a wide range of processes or even perspectives, including checking, recognizing that a wide range of models and terminology to describe them exists. The standard does not have different guidance for the two distinct functions, so this section was not split. The reviewers changed the title of this section and clarified the language.
Comment	One commentator believed that all possibilities mentioned for validation should be mandatory.
Response	The reviewers disagree because not all such examples apply in all situations.
<b>Section 3.3.1(a), Model Integrity</b>	
Comment	One commentator suggested an explicit reference to code review or the checking of subroutines or steps in a run be added.
Response	The reviewers believe that such an expansion would be more detailed than necessary in a standard and made no change.

Comment	One commentator doubted the possibility of “eliminating model risk” to address the potential for adverse consequences from a model that is an approximation of reality.
Response	The reviewers agree and revised the definition of “model risk,” thus removing the idea of totally eliminating model risk.
Comment	One commentator asked for clarity on the distinction between sections 3.3.1(a)(1) and 3.3.1(a)(3).
Response	The reviewers note that section 3.3.1(a)(3) focuses on trends in comparison to section 3.3.1(a)(1), which may relate more to a balance sheet or other current data.
Comment	One commentator asked for clarification that a validation is not a “once and done” exercise and the actuary should evaluate the frequency at which the validation of “fit” of the model and model integrity should be performed.
Response	The reviewers note that the guidance refers to “each model run (or set of model runs)” and believe that this language provides adequate guidance. Therefore, no change was made.
Comment	One commentator stated that this section really needs a caution to use “out-of-sample” historical data lest the so-called “validation” simply turn into a self-fulfilling prophecy.
Response	The reviewers believe this is good material for a practice note on certain types of descriptive modeling, but is not appropriate guidance for a broad range of modeling. Therefore, no change was made.
Comment	One commentator believed that section 3.3.1(a)(4) could be eliminated because examining the potential for model risk and undertaking steps to mitigate it is already covered in section 3.3.2, Appropriate Governance and Controls.
Response	The reviewers agree and eliminated this section.
<b>Section 3.3.1(b), Analyzing the Output</b>	
Comment	One commentator stated that it was not clear how the example given parenthetically in section 3.3.1(b)(1) would test the reasonableness of the output.
Response	The reviewers removed the example to avoid confusion.
Comment	One commentator suggested deleting section 3.3.1(b)(2) as its guidance is covered in section 3.6.
Response	The reviewers note that the guidance in section 3.3.1(b)(2) describes a process whereas section 3.6 describes documentation, making both appropriate. However, both were clarified.
Comment	One commentator was concerned about the use of the term “sensitivity test” in section 3.3.1(b)(3).
Response	The reviewers clarified the guidance by removing “sensitivity” and describing the concept differently. The guidance directs the actuary to consider testing that certain functions are operating.
<b>Section 3.3.1(c), Peer Review</b>	
Comment	One commentator suggested that it be documented whether or not a model has been peer reviewed and what type was performed.
Response	The reviewers believe that such requirements would be beyond the range of appropriate guidance, and made no change.

Comment	One commentator suggested adding further guidance as to what is intended as peer review, particularly that the review should involve performing some or all of the activities described in section 3.3.1(a) and (b), and that those activities are also subject to this ASOP.
Response	The reviewers believe the extent of peer review, if any, depends on the intended purpose and the role of the actuary, and should be left to the actuary and the peer reviewer to determine. However, the scope of the standard was expanded to include general review of models.
Comment	One commentator suggested adding that the actuary should consider obtaining a peer review of the reasonableness of model inputs in addition to obtaining a peer review of model construction and of the reasonableness of model outputs.
Response	The reviewers agree and made the change.
<b>Section 3.3.2, Appropriate Governance and Controls</b>	
Comment	One commentator recommended this ASOP be revised to clearly require that the actuary confirm that the results are reproducible or that similar seed produce similar outputs. Three other commentators believed that the example on reproducibility was too specific and should be removed.
Response	The reviewers believe that the emphasis should be on controls so that the actuary knows the results can be reproduced, if the model allows for such reproducibility. Therefore, the reviewers removed the example, and added it as an item in a list of possible controls that are sometimes used in current practice, as stated in appendix 1.
Comment	One commentator suggested expanding this section after the first sentence to include the following:  “These controls may include: <ul style="list-style-type: none"> <li>• Protection of access to use and modify the Model Implementation and Input</li> <li>• Rules for modification of the Model Implementation, Input, Output, and maintenance of audit trails</li> <li>• Specification, documentation, and programming standards for the Implementation</li> <li>• Procedures for secure back-up of the media storing the Implementations and Data</li> <li>• Appropriate staff training or cross-training for continuity of use</li> <li>• Plans for periodic consideration of the organization’s continued ability to access and maintain the Model, including Data, software, staff, hardware, and vendor relationships</li> <li>• Plans for periodic updating of Model input”</li> </ul>
Response	The reviewers believe that detailed background information and examples are often more appropriately addressed in the appendix and, therefore, included these examples in appendix 1 (Current Practices).
Comment	One commentator requested more guidance in the form of a list of things for the actuary to consider such as, but not limited to, implementing a change management process, restricting access to model inputs, model code and calculations, and model outputs.
Response	The reviewers believe the guidance in the first sentence in section 3.3.2 is clear. In addition, the reviewers believe that detailed background information and examples are often more appropriately addressed in the appendix and, therefore, included these examples in appendix 1 (Current Practices)
<b>Section 3.4, Presentation of Results</b>	
Comment	One commentator suggested in the second sentence replacing “any changes” with “any material changes.”
Response	The reviewers agree and made the change.

Comment	One commentator noted that explanation of changes from a prior model run may not be relevant or possible.
Response	The reviewers note that section 3.4.2 (now section 3.4.3) addresses this concern. In addition, the reviewers have made clarifying changes throughout this section.
Comment	One commentator suggested this entire section be placed in section 4, Communications and Disclosures.
Response	The reviewers believe section 3 should cover all substantive guidance with respect to modeling, which includes presentations of the results, and made no change.
Comment	Three commentators suggested changing “should consider including” to “should include” in sections 3.4.1, 3.4.2, and 3.4.3.
Response	The reviewers restructured these sections to clarify which items should be included and which should be considered for inclusion.
<b>Section 3.4.1, Explanation of Model in Actuarial Report</b>	
Comment	One commentator suggested it would be helpful if guidance were provided on the situations in which it would be appropriate to include such an explanation.
Response	The reviewers restructured this section as two sections to clarify which items should be included and which should be considered for inclusion.
<b>Section 3.4.2, Reconciliation</b>	
Comment	One commentator stated there should be an emphasis on materiality.
Response	The reviewers agree and made the change.
<b>Section 3.4.3, Description of Judgment</b>	
Comment	One commentator suggested adding to the end of the first sentence “and to the extent margin was included in the assumptions.”
Response	The reviewers disagree, given the guidance in section 3.2.7(b) as well as the guidance in ASOP No. 41, <i>Actuarial Communications</i> , section 3.2. Therefore, the reviewers believe the guidance is clear and made no change.
Comment	One commentator suggested terms such as “conservative” and “optimistic” may not be used, stating they are notoriously ambiguous and routinely lead to confusion.
Response	The reviewers disagree and believe the guidance is clear, and made no change.
<b>Section 3.5, Reliance on Data or Other Information Supplied by Others</b>	
Comment	One commentator questioned whether the reference to sections 4.2 and 4.3 was necessary, as it seems redundant.
Response	The reviewers agree and made the change.
<b>Section 3.6, Documentation</b>	
Comment	One commentator suggested there is nothing in this section that is specific to modeling.
Response	The reviewers agree and made changes to the language to focus the guidance on modeling.



Comment	<p>One commentator suggested adding the following after the first sentence:</p> <ul style="list-style-type: none"> <li>• “Such documentation could include:</li> <li>• How the model meets the intended purpose</li> <li>• Potential limitations of the model</li> <li>• The rationale for grouping data”</li> </ul>
Response	The reviewers agree documentation could include some of these items, and made changes to the standard to improve clarity.
Comment	One commentator questioned what to do if time does not permit documentation prior to an actuary leaving a company.
Response	The reviewers note that the answer to this question depends on the facts and circumstances.
Comment	One commentator requested “practice area” be defined.
Response	The reviewers note this section has been revised and the phrase no longer appears in this section.
Comment	<p>One commentator felt the discussion of “retention” had no parameters and questioned whether it was meant to imply unlimited. The commentator suggested including a reference to requirements associated with “while results are used” or a default of X years.</p> <p>Another commentator noted there are situations where documentation is not permitted to be retained. Therefore, an exemption should be allowed for situations where documentation, by policy or contractual agreements, must be returned or destroyed.</p>
Response	The reviewers believe guidance on modeling does not need to address the retention period for documentation. Therefore, the reviewers changed the guidance to delete reference to “retention.”
<b>SECTION 4. COMMUNICATIONS AND DISCLOSURES</b>	
<b>Section 4.1.3, Inconsistent Assumptions</b>	
Comment	<p>One commentator did not feel it should be a requirement to disclose and discuss inconsistency in situations where assumptions are prescribed by regulation or dictated by insurance regulators. The commentator believes that the actuary should be able to rely on the regulators’ expertise. If the regulator required a particular assumption, the regulator should understand the implications of such requirement.</p>
Response	The reviewers agree and clarified the guidance for situations involving prescribed assumptions, as discussed in section 3.2.7(d).