

**Comment #19 – 2/27/15 – 2:48 p.m.**

Please consider the following comments on the Second Exposure Draft of the ASOP on Modeling.

A. General overall comments

I fully agree that this new ASOP is needed in the current environment of increasing reliance on complex and powerful models. Actuaries should be reminded specifically of the importance of their professional obligations in designing and modifying models, and their obligations when performing work that is based on the use of models, even if the standard of care may already be implied by existing more general standards or other guidance.

B. Responses to questions raised by the ASB

1. Section 3.1.1 discusses situations when the actuary judges whether full guidance is or is not warranted. Is this section clear and appropriate? If not what changes would you suggest?

I found Section 3.1.1 clear and appropriate.

2. Section 3.1.3 discusses the actuary's responsibility when the actuary is part of a modeling team. Is this section clear and appropriate? If not what changes would you suggest?

I don't recall other standards discussing how professional standards should be applied to an actuary doing work within a team. The team may have other actuaries and/or non-actuaries. The team may be doing any of the listed modeling tasks or work that uses results from a model. The actuary must make sure that the work to which he is contributing has followed due guidance as may be relevant, either by his own knowledge or by reasonable reliance on another actuary. Can an actuary rely on a non-actuary to ensure that the model is fit for purpose? Maybe the words "knowledgeable professionals" or "another actuary" should be inserted in 3.1.3? This issue is included in editing suggestions made below.

3. Section 3.3.1(a)(2) describes the degree of checking as being dependent on a list of possible factors, and this list includes both the "intended application" and the "project objective," which apply in different stages of modeling, rather than just referring to the "intended purpose," which encompasses either. Is this separate mention of the two possible stages of purpose helpful? Would the guidance be clearer if only the term "intended purpose" was used?

The single phrase “intended purpose” is used in the first paragraph of Section 3.3.1 Validation, and I don’t think that referring to the two individual interpretations in 3.3.1a2 is helpful or necessary. However, Section 3.3.1a is confusing in general and should likely be expanded to be more clear and complete as explained in comments below.

#### 4. Does the proposed standard provide sufficient guidance to actuaries working with models?

Is there any guidance missing?

- The discussion of model validation needed to mitigate model risk may be too limited and since this issue is so important I think it could be expanded to be more helpful and understandable.
- The guidance on documentation seems limited to the disclosure of model concerns or limitations for the benefit of users of a report, and could be expanded to clarify the need to document work done on investigating, understanding, testing and validating the model, for the benefit of subsequent model users, and other model uses. This suggestion is repeated below.

#### C. Specific comments and wording suggestions

##### 1. Use of the phrase “model meeting the intended purpose”

The two most important and central guidance principles within the ASOP are (1) the need to confirm whether a model is appropriately designed and built considering the purpose for which it is to be used, and (2) the need to understand and mitigate all significant sources of model risk. Accordingly there should be careful attention paid to the choice of words that express these concepts.

The current draft uses the phrase “confirm that a model *meets the intended purpose*” and variations on this wording. I am uncomfortable with the phrase “meeting a purpose” as it seems to me an unconventional or unusual use of the word “meet”. Webster-Merriam dictionary indicates that a relevant usage of the word *meet* would be: “to conform to especially with exactitude and precision <a concept to *meet* all requirements>”. However the intended purpose for a model, especially if it is a project objective, is not an explicit need with stated requirements, and as such it seems unlikely that a model alone could “meet an intended purpose”, although it can be suited for or consistent with an intended purpose. I do note that Sections 3.2.1 states “the actuary should confirm that the capability of the model is consistent with the intended application” and 3.2.4b asks whether “the model can fulfill its intended purpose”.

In my opinion, *is fit for purpose*, and *suits the intended purpose* are more appropriate and meaningful phrases for this guidance than *meeting a purpose*.

2. Definition 2.8 - A model includes its specification, implementation and one or more model runs.

The definition of Model in definition 2.8 articulates the important concept that a model is composed of three key components: specification, implementation, and one or more model runs. In some places within the standard, the word “model” is used by itself, whereas the specific guidance given is actually most relevant to one of the three components. The clarity of the standard would be improved in these situations if the specific component of model referred to is clearly stated.

The distinction is important because the task of confirmation of fitness for purpose may require consideration of all three of these model components. For example, it would be useful to include review and validation of the model specifications, as a separate suggested action under Section 3.3.1 Validation, which seems to focus more on validation of model runs.

Furthermore, model risk includes the risk that there is unintended inconsistency between the three components, which risk should also be addressed under Section 3.3.1 by reviewing the model implementation and testing the model implementation for consistency with the specifications. Section 3.3.2 which deals with appropriate governance and controls, could apply separately to the model implementation as it is modified over time, as well as to model runs.

3. Section 3.1.2 – Models Developed by Others

This section addresses the common situation of a third party model where a full investigation and understanding of the model design, construction, and underlying workings may be challenging. Requiring the actuary “to make a reasonable attempt” to reach a basic understanding of the model is not sufficient. If the use of the model is instrumental to performing a calculation or to a project objective, then the model must be understood and its limitations if any appreciated, and model risk must be mitigated, even if different approaches to these tasks are required for third party models vs. in house developed models.

4. Section 3.1.3 – Role of the Actuary on a Modeling Team

This section allows the Actuary to rely on others for the confirmation that the guidance of the standard has been followed. Since the guidance requires actuarial judgement, wording be added to explicitly state the actuary only rely on others with appropriate knowledge of the model and/or actuarial qualifications.

5. Paragraph 3.2.3 - Modifying the Model

Within Section 3.1 “Model Meeting the Intended Purpose”, the first two subparagraphs 3.2.1 and 3.2.2 appear to distinguish between the cases of an actuary engaged specifically on the building or evaluating of a model for a given

application, and an actuary engaged for a project who must select or use an existing model for that project. These paragraphs expand on the duty to confirm model suitability for either the application or the project objective as the case may be.

Paragraph 3.2.3 then adds similar guidance for the case of modifying the model with two sentences that require referring back to each of the first two paragraphs for the actual guidance. This seems unnecessarily awkward and contorted for little additional purpose. A more direct and satisfactory approach would be to just fold 3.2.3 into 3.2.1 and 3.2.2 as follows (changes in red font):

3.2.1 Designing, Building, Developing, **Modifying**, Reviewing, or Evaluating the Model for the Intended Application—The actuary should confirm that the capability of the model is consistent with the intended application when the actuary designs, builds, develops, **modifies**, reviews or evaluates the model. In this confirmation, examples of items that the actuary should consider, if applicable, include but are not limited to the granularity of inputs, the relationships recognized, and the model’s ability to identify possible volatility around expected values.

3.2.2 Selecting, Modifying, Reviewing, Evaluating, or Using the Model for the Project Objective—The actuary should select, use **or modify** the model to **suit** the project objective, **and** review or evaluate the model and its use within this context. In the actuary’s use of the model, efforts to improve the model inputs and formulas, documentation, controls, validation, and presentation of results should be consistent with the project objective.

## 6. Section 3.2.5 – Model Structure

Subparagraph (e) under this Section directs the actuary to consider “whether the projection of future results might be materially influenced by the existence of choices and options available to the entity being modeled, ...”. This wording should be expanded to explicitly state that if such options and choices could materially impact results, the ability of the model structure to reflect those options and choices and any other mitigating action that the entity could reasonably pursue should be evaluated.

## 7. Section 3.3.1 Validation

Model validation is critical to understanding and mitigating model risk and carefully chosen and clear wording of the section is important. Validation should be addressed separately for the specifications, implementation and realization components of the model within this section. For example, the Actuary should validate that the model specifications are appropriate to the intended purpose, and further that the implementation of the model faithfully reflects the specifications.

If examples of validation techniques are to be provided as in subparagraphs 1 to 3, they should be more comprehensive and better examples found. In particular:

- The intent of Subsection 3.3.1a1 is not clear. If it refers to reconciliation of source data to the data actually input to the model, then perhaps this is more appropriately covered as a control than a validation exercise.
- Subsection 3.3.1a2 appears to relate to specific checking of software code, which is often an unreliable method of validating a model and may not be possible in a vendor coded system. If the intent is to validate the internal processing and calculations of the model which implement the methodology in the model specifications, then it is sufficient to state that and leave techniques to educational notes.
- Subsection 3.3.1a3 may be referring to a backwards validation technique useful for certain types of models.

Subsection 3.3.1b3 suggests running test of variations on key assumptions and parameters. An important use of such tests is to evaluate the model results under extreme values of input assumptions, especially when the model is capable of stochastic methods and extreme values may be the most important for the relevant results.

## 8. Section 3.6 - Documentation

This section focuses first on the documentation needed when model results are used in actuarial communications. There is only a short sentence addressing documentation that should be considered when no actuarial report is considered.

This ASOP considers the explicit case of actuaries working on the designing, building, developing, reviewing, or evaluating a model for the intended application without necessarily having a role in a larger project (see Paragraph 3.2.1). There is an obligation to confirm that the model is suited to its intended application, and explicit direction is provided in the ASOP about aspects that need to be considered and validation to be performed to mitigate model risk in this situation. A lack of documentation about work done to satisfy these requirements

places a heavy burden on independent users of that model. Accordingly this documentation section should address that issue more thoroughly.

Regards,

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**VP & Actuary**

**GGY AXIS**