**Executive Summary**

* Model governance must focus on all stages of a model’s life cycle, including the validation of the conceptual specifications behind the model, the implementation of those specifications, and the ongoing modification and effective implementation and operation of the model.
* A key aspect of model governance is transparency so that it is possible to understand any weaknesses and limitations in the model to ensure that conclusions drawn from the model results are properly informed.
* There are two key aspects: a *governance framework* and a *governance function*.
  + The framework outlines the scope and processes and procedures
  + The governance function is the team that relies on the framework to ensure the governance is appropriate and effective.
* An effective model governance framework includes activities that provide valuable insights and perspective on a comprehensive basis throughout the model’s lifecycle outlined as follows:
  + Initiation, Identify & Define Objectives
  + Model Selection
  + Development & Testing
  + Approval/Sign-Off
  + Implementation
  + Independent Review/Validation
  + Monitoring & Use
  + Model Changes
  + Disposition (Model Retirement)
* Once some basic framework is set up the key activities required to support the framework can be established and applied

**Roles & Responsibilities**

Define and document responsibilities for \*all\* stakeholders involved in the ongoing production of scenarios -

* LATF/LRBC, GOES subgroup
* NAIC staff
* Economic Scenario Generator Vendor, e.g., Conning
  + While the vendor could be critically involved in supporting Governance activity, there needs to be a corresponding measure of independence between the vendor and the Governance Team.
* Subject Matter Experts (industry, Academy, and others)
* Interested Parties

One of the key aspects of a successful governance function is that it is independent. This would probably be best served by a joint committee of NAIC staff, regulators, industry representatives, industry associations (ACLI) and AAA. Due to separation of duties as well as conflicts of interest, the GOES vendor should be limited to providing the necessary output and supporting information required to support the governance requirements. Industry involvement is also critical, as they will be the users of the model and thus could identify issues, propose solutions and scope out testing that may not be readily apparent to regulators and NAIC staff.

**Model Selection and Review Processes**

Establish processes for selecting fit-for-purpose models and for reviewing and validating the model and its outputs –

* There should be policies for initial selection and acceptance of an ESG. This can include key considerations such:
  + SF/AC
  + Model Office Runs
  + Field Testing
* In balancing the considerations above, policies should document when a model is fit for purpose or requires revision before it is accepted as a prescribed model.
* A key requirement is to be able to check results by comparison with standard results or via comparison with results from a reference model.
* Need policies to define when calibration needs to be reviewed/updated.
* Need policies to allow for escalation of concerns from industry if the generator “breaks” due to drastic changes in starting conditions or calibration.

**Sign-off Protocols**

Establish where signoffs need to take place -

* What updates need LATF/ESG subgroup approval vs. are regular updates not approved by LATF/ESG subgroup, as AIRG updates were? A sound governance function would include a set of processes for evaluating updates and issuing approvals. Decision making should be independent of the ESG vendor.
* Updates not being approved by LATF need to follow a LATF-approved specific process. Is there an issue here with any judgment by the vendor?
* Is there a need for a permanent approval body other than LATF – e.g., an ESG subgroup that reviews material updates?

**Change Control Procedures**

Establish processes for authorizing, reviewing, and testing changes to the model and calibration parameters -

* This is a combination of the LATF considerations above, as well as regular ESG vendor controls. This area needs elaboration with respect to what controls Conning will be implementing initially and throughout the GOES model lifecycle. Controls and procedures pertaining to all facet of the GOES Model should be developed and implemented on an independent basis

**Access Controls**

For any aspects of the scenario generation process that are outside of Conning’s control, define processes for limiting access to models or processes through access authorization and periodic access review -

* Would this be about NAIC staff access since it is “outside Conning’s control”?

**Validation**

Validation focuses on the conceptual specifications behind the model, the implementation of those specifications, and the ongoing modification and effective implementation and operation of the model -

* Validation is an integral part of a part of a governance framework and extends well beyond scenario analysis. Key aspects of validation include:
  + Review source data
  + Test interim calculations and final results
  + Evaluate effectiveness of model testing procedures (calculation, sensitivity, stress)
  + Assess the existence, level, and significance of measurement error.
  + Review and evaluate supporting documentation.
  + Validate controls and procedures.
* An independent team should perform the required validation. Proper validation requires expertise in all facets of the model.
* Define who would review and sign off on the validation.

**Implementation**

* Establish a process for change management (evaluating, implementing, facilitating, and documenting proposed model changes)
* Develop a defined mechanism for facilitating the overall review and approval of the model.
* Initiate a mechanism for conducting back testing of results on an actual versus expected basis.

**Documentation**

The governance committee should oversee requests for documentation and maintain and update documentation as necessary. Documentation should be available to key stakeholders -

* Key Elements include:
  + The intended purpose of the model
  + The conceptual framework of the model, including methodologies, assumptions, and parameters
  + Model risks and potential limitations, including any approximations and shortcuts used, appropriate for the use case
  + Data inputs, outputs, formats, and reports
  + Processes used to update assumptions, parameters, and other model data
  + Process maps identifying key controls and data handoff points
  + Applicable vendor or third-party documentation and the rationale for the selection of options where options exist
* Documentation of all of the agreed upon processes and procedures should be produced, plus:
  + Appropriate documentation covering each published scenario set
  + Documentation of ongoing model updates and assumption changes
  + Documentation flows throughout the entire governance process. This is achieved through the development of a comprehensive governance framework.
  + Calibration reports and approach including methodology, frequency and data used, data fitting to update calibration, including the criteria when recalibration is warranted.

**Industry Alerts on Updates to the ESG**

* This seems addressed with the way all documentation is being publicly posted.

**Retention of Documents on the NAIC Website**

* There should be a careful record of dates and versions for official exposure documents. Previously some documents have been removed and replaced with no version control record
  + E.g., Have documentation in a single document, with controlled updates and versioning.
* This is fundamental to the successful operation of a successful governance function
* Information provided on the NAIC website should be sufficient to allow interest parties to gain a comprehensive understanding of the model’s current status.
* Document control is important. In fact, if there are to be frequent updates, it might be best to use modules for the documentation.

**Issue Recognition / Resolution**

* Establish a mechanism for the sharing of concerns and the corresponding escalation of issues when the model generates inappropriate or results such as failing to meet established acceptance criteria or generating sudden reserve changes in excess of a prescribed threshold.

**Field Testing**

* As a best practice, on-going field testing should be built into the governance process for where there have been significant changes to ESG models, assumptions, and calibrations before final launch. This can be viewed as a form of impact analysis and would be for updates to account for additional risks, not ongoing maintenance (such as prior ERP updates).
* Should there always be a model office run? Or is there an intermediate level of change warranting model office impact but not field test?
* Not sure whether ongoing filed testing is appropriate. There should be a couple of phases of field testing to support development and implementation. What is important though, as part of the governance function is that metrics are developed that help evaluate model performance. If the metrics show there are performance or output related issues, or major changes to the model have been made, follow-up field testing could be conducted. Field testing is time consuming, takes time to secure and evaluate results, and can be expensive. Consequently, there should be an interim monitoring and evaluation mechanism built into the governance framework.
* Similar to the field testing, should there be an interim review mechanism based on key metrics prior to proceeding with model office runs?

**Additional Feedback/Questions**

**(Suggestions and answers already provided coded in blue)**

* What will final model documentation look like?
  + Conning work product, plus LATF for updating VM
* What reports, statistics, charts, etc. will accompany each scenario set?
  + This is a different type of activity as it speaks to the presentation of results. Documentation focuses on the model type, model operation, key assumptions & parameters, etc. and supports why it is suitable for its intended purpose.
  + Conning or NAIC work product based on reasonable requests (ACLI)? Should we revisit the high-level dashboard summarizing results?
* There needs to be a parallel reporting function set up, by virtue of which results are produced, tested and evaluated.
* Documentation and reporting are related but separate requirements with a governance function.
* There needs to be specification for the reporting function and a corresponding reporting timeline.
* How is “validation” defined and how will scenario sets be validated? What will the sign-off protocols be? What parties will be involved and what will their roles be? How will duties be segregated?
  + Again, SF/AC for validation, along with standard Conning process (should be disclosed, if not already). Is there a LATF subgroup needed for a formal part of certain reviews?
* What happens if a scenario set “fails” the NAIC’s validation, or does something unexpected?
  + Would we continue to use the prior version of the ESG? There needs to be both a set of criteria for evaluating the materiality of a failure, the resulting impact, a mechanism for investigating and understanding why the failure occurred and means for exploring possible remedial, corrective action.
* What aspects of the model will be updated or changed each month, each year? How will changes to the model be performed (formula/algorithm/judgment), controlled, documented, reviewed, and signed off on? For example, what will the process and frequency be for updating long-term mean reversion points?
  + Conning described this as frequent, which is appropriate for not periodically requiring dramatic shifts. How to define and limit scope of judgment without making model updates inappropriate?
* How will changes to initial conditions, and their impact on scenario sets, be monitored?
  + Is this another role for model office testing?
* What is the regular timeline and process for recalibration timeline? What would trigger an “off-cycle” recalibration and how is that monitored, e.g., can a recalibration be triggered by significant changes to initial conditions or Federal Reserve policy that may change forward-looking expectations?
  + This is a good point that we need some concept for what triggers a significant shift, but we need to allow for a subjective NAIC process as well, since we can’t define all conditions in advance. There needs to be both an established regular review schedule and mechanism for facilitating recalibration built into the governance function. What is equally important though is a set of criteria and metrics that can be reviewed and utilized to determine when and why recalibrations are required.
* What comprises user support (“help desk”)?
  + A joint Conning/NAIC/LATF Process?