NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

Generator of Economic Scenarios (GOES) Model Governance Framework

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I. Background

A. Purpose of the GOES Model Governance Framework

The Generator of Economic Scenarios (GOES) Model Governance Framework is designed to mitigate risk by providing governance and controls for models producing scenarios used in calculations of life and annuity Statutory reserves according to the *Valuation Manual* (VM-20, VM-21, and VM-22) and capital under the NAIC RBC requirements (C3 Phase 1, C3 Phase 2). The requirements of the Model Governance Framework also apply to ancillary tools (e.g. scenario selection tool) and models that produce scenario statistics.

Actuarial Standard of Practice No. 56, *Modeling* (ASOP No. 56) defines **Model Risk** as "The risk of adverse consequences resulting from reliance on a model that does not adequately represent that which is being modeled, or the risk of misuse or misinterpretation."

The ASOP No. 56 defines **Governance and Controls** as "The application of a set of procedures and an organizational structure designed to reduce the risk that the model output is not reliably calculated or not utilized as intended," and states that the actuary should use, or, if appropriate, may rely on others to use, reasonable governance and controls to mitigate model risk.

This document is intended to provide a comprehensive governance framework including appropriate controls, monitoring, and oversight to ensure the quality of the GOES models so they can be trusted and relied upon for their intended use.

B. Importance of a Model Governance Framework

A model governance framework is critically important for the GOES and ancillary tools for several reasons:

1. Many companies will be using the GOES scenarios, and they may have a material financial impact.

2. The framework will implement and provide documentation of controls designed to prevent or mitigate human error.

3. The transparency of the framework should aid in understanding any model limitations, so that conclusions drawn from model results are properly informed.

4. The framework should ensure that models meet their intended purpose. ASOP No. 56 defines **Intended Purpose** as "The goal or question, whether generalized or specific, addressed by the model within the context of the

assignment." Section 3.1.2 of the ASOP states that "When selecting, reviewing, or evaluating the model, the actuary should confirm that, in the actuary's professional judgment, the model reasonably meets the intended purpose."

The framework includes a process for model selection and scheduled reviews. There are also off-cycle reviews (where necessary) intended to ensure that models continue to meet their intended purpose throughout their life cycles.

5. The framework should improve efficiency, avoiding re-work and confusion regarding expectations. Documented processes and procedures will enable model developers and reviewers to implement changes more quickly.

6. There is a possibility that unexpected issues will occur, despite best efforts. The framework provides a process for identification, escalation, and resolution of issues if they arise.

C. Components of the GOES Model Governance Framework

Components of the Model Governance Framework include:

1. Roles and Responsibilities
   The roles and responsibilities of all stakeholders involved in the implementation and maintenance of the model are documented (see Sections II and III). Parties are designated to act as Model User, model developer, model owner, and model steward. In addition, there is a model governance oversight function. The roles and responsibilities include separation of duties where appropriate. One of the key aspects of a successful governance function is that it is independent.

2. Signoff Protocols
   Model controls and other items requiring signoffs are identified (see Section II.B), along with the parties responsible.

3. Risk-Ranked Model Inventory
   All models are catalogued and ranked according to their risk (see Section IV). This is intended to ensure the time and effort required for compliance with governance standards is consistent with each model's risk level. Generally, the most robust validation procedures will apply to the riskiest models, while less rigorous methods (e.g. peer review) may apply to those that have less risk.

4. Model Selection and Validation Processes
   Section V includes criteria for model selection along with details on the model validation process and independent review.

5. Scheduled and Off-Cycle Model Updates
   Section VI provides details on routine, scheduled monthly and annual updates, as well as off-cycle model updates.

6. Process for Handling Model Findings
   Section VII provides a process for identification, escalation, and resolution of issues if they arise.

7. Change Management Process
   The change management process includes procedures to ensure that model change requests are documented, communicated, prioritized, formally approved, and implemented in a controlled manner (see Section VIII).

8. Documentation
   Various forms of documentation are required throughout the governance process (see Section IX).

9. Access Controls
   To avoid the possibility of unauthorized changes, write access to models and model governance spreadsheets (e.g. model inventory file) is granted only to individuals requiring access. Section X provides details on the level of access granted to stakeholders (i.e. Read, Write, or No Access).

II. Governance Roles and Sign-off Protocols

A. Governance Roles

For the GOES Model Governance Framework, parties are designated to serve the roles of model developer, model owner, and model steward. There is also a model governance oversight function. High-level descriptions of the responsibilities of each party are shown in the table below.

There are additional stakeholders involved in the implementation and maintenance of the models (e.g. Model Users). See Section III for details on all stakeholder responsibilities, including key deliverables.

Role	High-Level Responsibilities
Model Developer: Conning's GEMS® Software Development Team	The GEMS® software development team will incorporate change requests from the Model Steward into the GEMS® software and will be responsible for all ongoing GEMS® maintenance. Conning is also responsible for developing and maintaining ancillary tools, including the scenario selection tool and utility to produce statistics. The model developer role will also be responsible for performing model validation, managing modeling environments, conducting testing of model changes, and completing change request documentation.
Model Owner: Conning's Professional Services Team	Conning's Professional Services team will own the model and the production environment, ensuring that monthly models are properly parameterized and calibrated, and that results and associated analyses are available on a timely basis. This team will utilize GEMS® automation features and commonly available tools to develop and maintain the automated monthly workflow. The Professional Services team will communicate requirements to the Model Developer, perform user-acceptance testing of any new code required for software to meet NAIC model specifications, and design and oversee the monthly production process. Conning's scenario file production processes are organized such that: 1) each process has a primary owner and a designated reviewer; 2) model updates and processes are automated where practical to do so; 3) reviewers use GEMS® native change management and audit tools to independently verify model updates and processes; and 4) scenario summaries and reports illustrate the reasonableness of results.
Model Steward: GOES (E/A) Subgroup, with NAIC Staff Support	The GOES (E/A) Subgroup manages the development of the GOES model, ensures that the model governance framework is followed and that models meet standards set by the NAIC and is fit for use. The GOES (E/A) Subgroup requests any changes to the GOES to meet regulatory objectives, with input from interested parties. Meetings of the GOES (E/A) Subgroup are attended by member regulators, NAIC staff, interested parties, and representatives from the ACLI and American Academy of Actuaries, which include subject matter experts.

	NAIC staff supports the GOES (E/A) Subgroup as noted throughout this document (e.g. reviewing controls, independently producing and reviewing monthly scenario statistics, maintaining the model inventory and other spreadsheet governance tools, etc.).
Model Oversight Group: GOES (E/A) Subgroup and NAIC Committee Structure	The GOES (E/A) Subgroup has oversight responsibilities and reports to other groups in the NAIC Committee Structure that provide further oversight as described in Section III.A.
Model User: US Insurance Organizations, State Insurance Regulators	Model Users report issues to GOES (E/A) Subgroup and request enhancements. When changes are made to the GOES (e.g. 5-year review and recalibration), Model Users volunteer for field testing/User Acceptance Testing.

B. Sign-Off Protocols

For routine model updates necessary for monthly scenario production, as well as routine annual changes (if any), Conning and NAIC staff have signoff responsibilities as described in the table below. All other model updates require additional signoff from the GOES (E/A) Subgroup.

Party	**Sign-Off Responsibilities**
Conning	Reviews and signs off on: 1. Model access controls, ensuring that only individuals authorized to work on the models have access. 2. Inclusion controls, ensuring that data inputs to the model are complete and have been updated as required. 3. Change management controls for all model updates, with appropriate separation of duties (i.e. signoff from development team to advance the model from the development environment to the testing environment; signoff from the testing team that testing was completed and reviewed; and signoff that the tested model was moved successfully to the production environment). 4. Model validations. 5. Attestation document will be provided to NAIC staff that the above controls were performed, along with any findings. The attestation document will include initials beside each control to indicate signoff. See Section VII for details on how findings will be handled.
NAIC Staff	NAIC staff produces scenario statistics independently (including acceptance criteria), reviews, and provides sign off via email to Conning that scenarios are acceptable and ready to be posted to

	the Conning website for use by Model Users. Documentation of the NAIC produced statistics and how they are calculated is available at [link TBD]. NAIC staff will also check that the intended scenarios were correctly posted on Conning's website. The NAIC's scenario review workpapers will be provided
GOES (E/A) Subgroup	Reviews and signs off on: 1. All material non-routine updates to the model, such as model recalibrations. 2. Any changes to acceptance criteria. 3. Any changes to the GOES Model Governance Framework. Ahead of changes to any of the three items above, public exposure of changes will occur followed by adoptions in a public meeting. Communications of changes will occur through the GOES (E/A) Subgroup distribution list.
NAIC Committee Structure	Reviews and adopts *Valuation Manual* amendments and changes to RBC instructions.

C. Fallback Plan

A fallback plan can define expectations in the event of a disruption to the monthly scenario generation, validation, and publication process. While not all circumstances that could lead to a disruption in the posting of scenario files can be foreseen, this section will lay out broad categories of potential causes of disruption along with a corresponding mitigation plan.

1. Quarter-End and Year-End Scenario Files
    a. Quarterly and Year-end scenario files have greater importance to insurance company financial reporting. Therefore, more robust fallback procedures will apply to the posting of these quarter-end and year-end files.
    b. For month-end scenario files that do not fall on a quarter- or year-end, any delays to the posting of scenario files will be communicated along with an expected timeframe for resolution.
2. Communication of Scenario File Posting Disruption
    a. The distribution list for the GOES (E/A) Subgroup will be utilized to communicate disruptions in the posting of scenario files.
    b. All members, interested regulators, and interested parties will receive notice of the disruption.
3. Mitigation Plans by Category of Disruption

Category	**Description**	**Mitigation Plan**
Minor Validation Error – Caught Prior to Posting	This situation would occur when an issue was found during the validation process by either Conning or the NAIC and the issue could be addressed such	NAIC Staff would communicate the issue as soon as it is discovered on the first business day following the month-end,

	that scenarios could be posted by the second business day following the previous month-end.	along with a timeframe for when scenarios are expected to be posted.
Major Validation Error – Caught Prior to Posting	This situation would occur when an issue was found during the validation process by either Conning or the NAIC that is unable to be addressed such that scenarios can be posted by the second business day following month-end.	NAIC Staff would communicate the issue as soon as it is discovered on the first business day following the month-end. Companies would be instructed to utilize prior month-end scenarios with adjustments as necessary for the current month's valuation. Model governance enhancements to avoid the issue would be developed, adopted by LATF and the LRBC WG, and implemented following the issue.
Minor Scenario Error – Caught after Posting	This issue could occur when a user of the scenarios discovers an error with the scenario set after they have been posted to the scenario website that is expected to have an immaterial impact on company valuations.	NAIC Staff would communicate the issue as soon as it is discovered. Model governance enhancements to avoid the issue would be developed, adopted by LATF and the LRBC WG, and implemented following the issue.
Major Scenario Error – Caught after Posting	This issue could occur when a user of the scenarios discovers an error with the scenario set after they have been posted to the scenario website that is expected to have a material impact to company valuations.	NAIC Staff would communicate the issue as soon as it is discovered. A meeting of the GOES (E/A) Subgroup would be scheduled to fully disclose the issue and discuss potential remedies. If the scenario set fell on a quarter- or year-end, additional guidance may be given by regulators to address the handling of the error (e.g. guidance to estimate a top-side adjustment to reserves, utilize a scenario set from a previous month). Model governance enhancements to avoid the issue would be developed, adopted by LATF and the LRBC WG, and implemented following the issue.
Conning Scenario Website Down	The website https://naic.conning.com/scenariofiles is down and companies are unable to download scenario files.	NAIC Staff would communicate the issue as soon as it is discovered. Scenario files could be posted to the GOES Sharepoint site as an alternative for companies to download.
Conning unable to generate scenario files	Conning is unable to generate scenario files due to and issue such as cloud outage or other business continuity event.	NAIC Staff would communicate the issue as soon as it is discovered, and a revised timeline for posting scenarios could be provided. The GEMS® software would be used by NAIC Staff to generate the scenarios.

III. Stakeholder Responsibilities

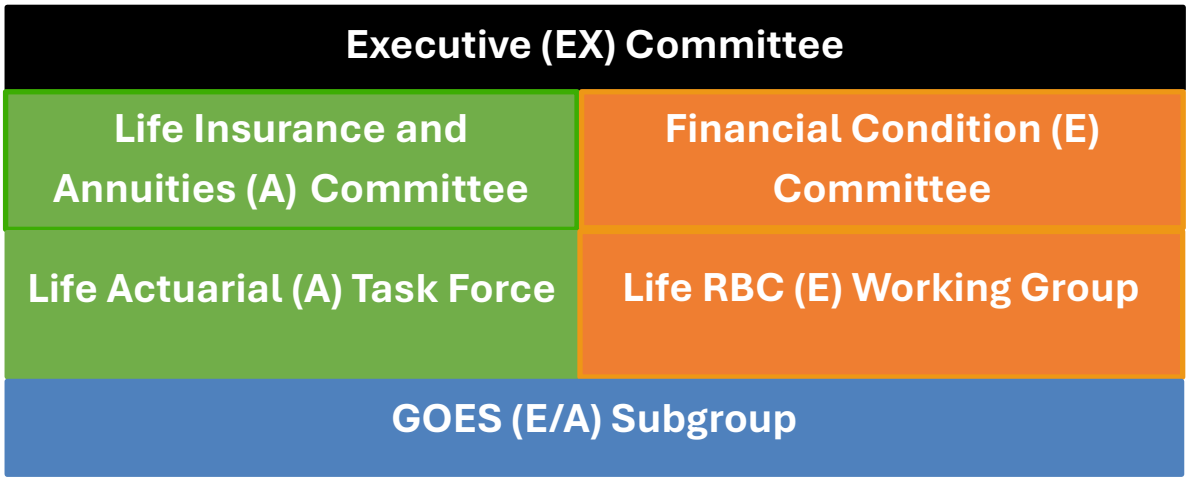
A number of stakeholders are involved in the implementation and maintenance of the model. Specific responsibilities are described in this Section.

A. NAIC Committee Structure

The NAIC Committee structure is shown in the graphic below. The GOES (E/A) Subgroup's roles and responsibilities are discussed in Section III.B. The Subgroup is subordinate to both the Life Actuarial (A) Task Force (LATF) and the Life RBC (E) Working Group (LRBCWG).

The Life Insurance and Annuities (A) Committee is the parent committee for LATF, while the Financial Condition (E) Committee is the parent committee for LRBCWG. Recommended changes to the *Valuation Manual* and Life RBC Blanks/Instructions related to the GOES will be considered for adoption by LATF and LRBCWG before being considered by their respective parent committees.

In addition to having final approval on changes adopted by the subordinate groups, the Executive (EX) Committee has allocated funding to support the NAIC GOES initiative.



B. GOES (E/A) Subgroup

The GOES (E/A) Subgroup will own the GOES Model Governance Framework and be responsible for the approval of all updates to the Framework. As the Model Steward, tthe Subgroup will direct NAIC Staff as necessary to effectuate aspects of the Framework. The Subgroup will organize public calls where technical issues can be

discussed and feedback can be received from Subgroup members, interested regulators and interested parties. All regulator-only sessions will follow the NAIC's Policy Statement on Open meetings.

The Subgroup has the following 2026 Charges:

1. Monitor that the economic scenario governance framework is being appropriately followed by all relevant stakeholders involved in scenario delivery.

2. Review material economic scenario generator updates, either driven by periodic model maintenance or changes to the economic environment and provide recommendations.

3. Regularly review key economic conditions and metrics to evaluate the need for off-cycle or significant economic scenario generator updates and maintain a public timeline for economic scenario generator updates.

4. Support the implementation of an economic scenario generator for use in statutory reserve and capital calculations.

5. Develop and maintain acceptance criteria that reflect history as well as plausibly more extreme scenarios.

C. NAIC Staff

NAIC staff responsibilities are as follows:

1. Act under the direction of the GOES (E/A) Subgroup to support the implementation of the economic scenario generator as well as implement and monitor the model governance framework.

2. Bring any governance issues to the GOES (E/A) Subgroup for consideration.

3. Monitor the effectiveness of Conning's controls and validation procedures and recommend changes to the GOES (E/A) Subgroup as necessary.

4. Develop and maintain a process to efficiently produce and review scenario statistics (independent from Conning) for each monthly scenario release to evaluate whether scenarios are acceptable before providing them to Model Users.

D. GOES Vendor (Conning)

Under the terms of the Professional Services Agreement Between Conning, Inc. and the National Association of Insurance Commissioners, Effective September 30, 2020,

Conning has responsibility for model development, routine and more extensive model updates, monthly production of scenarios, maintenance of documentation, user support, and other items. Conning's specific responsibilities are described below.

1. Customization of the Models

   Conning will customize the GEMS Scenario Files features and calibration of parameters to reflect any modifications adopted by state regulators to produce real-world interest rate, equity, and bond fund return scenarios for use in calculations of life and annuity Statutory reserves according to the *Valuation Manual* (e.g., VM-20, VM-21, VM-22) and capital under the NAIC RBC requirements (e.g., C3 Phase 1, C3 Phase 2). The resulting customized scenario files are referred to as the Basic Data Set. Scenario sets produced from the Basic Data Set are referred to as the NAIC Economic Scenario Files.

2. Maintenance of Conning Scenario Website

   The NAIC website will contain a link to the Basic Data Set, validation reports, statistics, related tools, documentation, and training materials located on Conning's website. Access will be provided for Model Users regardless of whether they have licensed Conning's software. Model Users means users of the scenarios, including NAIC staff, state regulators, insurance companies, third-party consultants retained by state regulators and insurance companies, and any other person who makes use of the scenarios.

3. Monthly Production of Scenarios, Scenario Statistics, and Validation Reports

   The month-end production items Conning is responsible for are listed in the Model Inventory File (see Section IV.C). The production process must be completed in time to post these deliverables by 4:00 PM Central Time on the first business day of the following month.

   Companies have stressed the importance of meeting this deadline so that valuation work will not be delayed. Conning and NAIC staff will collaborate on creating efficiencies to prepare for this. The process of producing and reviewing all monthly deliverables, including execution of controls, will be tested and practiced before the GOES scenarios are adopted and become effective, with monthly scenario releases planned to begin 10/1/25 .

   Validation reports and additional statistics are expected to be delivered simultaneously with the NAIC Economic Scenario Files. A "dashboard" of how the

scenarios compare with acceptance criteria will be included with the statistical reports. See Section V.B for details on the validation process. A sample set of reports will be shown in Appendix A.

Conning will sign off on the controls listed in Section II.B and provide an attestation to NAIC Staff that they were performed, identifying any findings. NAIC Staff will produce and review statistics independently, and review the reports, attestation, and findings to determine whether the scenario set is acceptable. This must be done before posting the scenario files and validation report with each monthly scenario release.

10,000 scenario sets will be posted alongside the scenario selection tool and scenario picking data to allow Model Users to produce subsets. As background, Conning developed an Excel-based tool to create scenario subsets. The tool can select scenarios based on the same methodology used in the AIRG (i.e. based on a significance measure calculated from the 20-year UST) or a gross wealth factor (GWF) based on the Large Cap (S&P 500) equity fund. However, other methodologies to select scenarios may be more appropriate for companies exposed to other risks. For example, a writer of VA products may be more exposed to equity risk. The VM allows companies to use alternative scenario selection methodologies if they meet certain requirements (e.g. documentation that reserves and TAR are not materially understated) or biased downward.

Conning can calculate the UST significance measure and the Large Cap gross wealth factors by scenario and provide that information with each scenario set to use as inputs for the tool.

In the event a scenario set is deemed unacceptable, NAIC staff and Conning will work together to resolve the matter and provide timely communications to stakeholders according to the Fallback Plan documented in section II.C.

4. Parameter Updates

   Conning will develop parameter updates at a frequency determined by the GOES SG. The steps in this process are outlined in Section VI.

5. Documentation

   Conning will provide documentation as described in Section IX.

6. Training Materials

Conning will provide robust training materials for use by Model Users and update these materials periodically as needed.

7. User Support
   Conning will provide help desk support to Model Users of the NAIC Economic Scenario Files who have not licensed the software. This will include phone support as well as e-mail at **naicscenarios@conning.com** to allow the NAIC, state regulators and other Model Users to submit questions.

8. Field Testing

   Conning will provide necessary support for field testing of the NAIC Economic Scenario Files under regulatory reserving and capital frameworks. Additional field testing could be necessary if a large change is made to the GOES (e.g. five-year recalibration) or if significant changes are made to an NAIC reserve or capital framework.

9. Additional Information to be Provided Annually

   Conning will provide the following information annually:

   a. Back-testing report comparing the NAIC Economic Scenario Files projected results to what actually happened over the previous year.

   b. Summary information of the number and types of questions submitted to Conning via the support e-mail address, and steps taken to address these concerns (e.g., additional documentation created).

E. Subject Matter Experts and Interested Parties

Subject matter experts and interested parties play an important role in model governance. Industry involvement is critical, as companies will be users of model output and thus could identify issues, propose solutions and scope out testing that may not be readily apparent to regulators and NAIC staff.

Activities may include but are not limited to:

1. Bringing any model or governance issues to the GOES (E/A) Subgroup for consideration.

2. Reporting any issues with scenario delivery and user support to the GOES (E/A) Subgroup and NAIC Staff.

3. Reviewing results of planned model updates (see Section VI.A – VI.C) and providing independent feedback in public sessions of the GOES (E/A) Subgroup.

4. Recommending off-cycle model recalibrations where necessary (see Section VI.D), reviewing the results, and providing independent feedback in public sessions of the GOES (E/A) Subgroup.

IV. Models Subject to the GOES Model Governance Framework

A. Model Definition

ASOP No. 56 defines a model as follows:

"A simplified representation of relationships among real world variables, entities, or events using statistical, financial, economic, mathematical, non-quantitative, or scientific concepts and equations. A **model** consists of three components: an information **input** component, which delivers **data** and **assumptions** to the **model**, a processing component, which transforms **input** into **output**, and a results component, which translates the **output** into useful business information."

Under this definition, all items listed in the Model Inventory File (see Section IV.C) are models.

B. Model Risk Rating

The GOES (E/A) Subgroup assigns models a risk rating (high, medium, or low) depending on their complexity and materiality in terms of financial impact. Any models classified as high risk are subject to all aspects of model governance, while those classified as lower risk may be subject to more limited requirements. This risk-based focus promotes efficiency.

At this time, all models listed in the Model Inventory File are ranked as high risk for the following reasons:

1. The life insurance industry, regulators, and other stakeholders rely on the model output for reserve and capital calculations and issues with the GOES are therefore systemic.

2. Model errors may cause material financial impacts.

3. The models are highly complex.

C. Model Inventory File

The Model Inventory File is an Excel spreadsheet listing each model subject to the GOES Model Governance Framework, along with the following details:

1. Model ID number

2. Model name
3. Model description
4. Product lines using the model output
5. Model status (active or inactive)
6. Model history, including the date of the last model validation and the date of the last model update
7. A link to model documentation, along with the date of the last documentation update
8. Ownership details (Model Developer, Model Owner, and Model Steward) and key point of contact
9. Risk rating of the model (high, medium, or low) and rationale for the rating

The Model Inventory File will be available on the NAIC website (location TBD). A sample file will be provided in Appendix B. The file will include the following models:

- Models producing the Basic Data Set (Treasury, Equity, and Corporate Bond models)
- SERT tool
- Scenario selection tool
- Conning scenario statistics tool
- NAIC scenario statistics tool

NAIC staff will have access to edit the Model Inventory File. Other model stakeholders will have Read access to the file.

The Model Inventory File will be updated whenever there is a new model, whenever a model is retired, and any time there is a change in one or more of the model details shown above.

V. Model Selection and Validation Process

A. Process and Criteria for Model Selection

The process for model selection is intended to ensure that each model meets its intended purpose. Models producing Treasury, equity, and corporate bond scenarios are selected based on the following considerations:

1. Stylized Facts
   Stylized facts describe qualitative criteria that scenarios produced by the GOES Treasury, Equity, and Corporate Bond models should achieve. A link to the current set of stylized facts is provided in Appendix B.

2. Acceptance Criteria
   Acceptance Criteria are quantitative metrics that Treasury, Equity, and Corporate Bond scenarios generally should pass to be considered fit for their intended purpose. If one or more metrics fail the criteria, it may indicate that a revision to the model is necessary. However, judgment is required in making this decision. A criterion overall is not necessarily failed just because some subset of a table of criteria are outside their targets. A link to the current set of Acceptance Criteria is provided in Appendix B.

3. Model Office Testing
   To aid in the initial selection of the Treasury, Equity, and Corporate Bond models, model office testing was done for Variable Annuities, Universal Life with Secondary Guarantees, and Term Life.

   The GOES (E/A) Subgroup may consider the use of model office testing prior to implementation of material model updates.

4. Industry Field Testing
   To aid in the initial selection of the Treasury, Equity, and Corporate Bond models, two industry field tests were done.

   The GOES (E/A) Subgroup may consider industry field testing prior to implementation of material model updates. However, model office testing may be determined to be preferable depending on the resources, time, and cost required for a field test.

B. Model Validation

Conning and NAIC Staff will perform validation procedures on all models used to produce output used in company on a monthly basis to ensure that model output is accurate. Any findings that arise from the model validation process will be handled as described in Section VII.

Key components of model validation include:

1. Input Validation
   Input validation may include a review of source data, review of the initial treasury curve fit, assumption benchmarking, month-to-month model parameter comparisons, and spot checking.

2. Calculation Validation
   Validation of calculations may include an independent full model replication, independent sample calculations, process approximation, formula inspection, testing of interim calculations, and testing of results. In addition to the Model

Developer's calculation validation, the Model Owner will perform user acceptance testing for any software modifications required to implement the NAIC model.

3. Output Validation
   Output will be validated based on reports produced monthly along with the scenario sets (see Appendix A for sample reports). NAIC Staff will produce a "dashboard" included with the scenario statistics to compare the acceptance criteria and stylized facts, where relevant to monthly validation, to summarized scenario output. Thresholds and modifications to acceptance criteria for alternative starting environments will be considered as a "Day II" item after the initial implementation of the GOES.

   When the GOES is recalibrated (e.g. resulting from five-year recalibration), scenario sets under multiple, varied, starting environments will be produced. The resulting statistical packages will be created and shared publicly ahead of approval of the new calibration.

4. An evaluation of the effectiveness of model testing procedures

5. Validation of controls and procedures
   A detailed form including checklists and names of owners and reviewers for each key step will be used to ensure compliance with the sign-off responsibilities documented in Section II A.

VI. Model Updates and Review

This section describes the types of scheduled model changes that will occur monthly, annually, and every 5 years, as well as off-cycle model changes. All model changes are subject to the change management process detailed in Section VIII.

A. Monthly Model Updates

The Treasury model will be updated monthly to reflect starting conditions. This is documented in [GOES Model Documentation Placeholder]. Initial values for equity indices, equity volatilities, and corporate spreads will also be updated monthly.

B. Annual Model Review and Update (If Necessary)

At the beginning of each year, Conning and NAIC Staff will undertake an annual review of the GOES and provide a back-testing report comparing the projected results to the actual previous year's data. Model findings that occurred over the past year would be included in the review along with an associated recommendation. Conning and NAIC Staff will make a recommendation as to whether the model parameters should be

revised or left unchanged. The back-testing report, along with the recommendation, will be posted on the NAIC/Conning scenario website in the first quarter of the year and provided to GOES (E/A) Subgroup leadership. If there is a recommendation to change the model parameters, a public discussion of the GOES (E/A) Subgroup will be called to discuss and determine a course of action. More complex changes, such as changes to the model form, are outside the scope of the annual model review.

Updates to the GEMS® software version used to produce the monthly GOES scenarios will also be considered during the annual review process. As part of Conning's normal course of business, they fix bugs and/or make enhancements to their software on a roughly monthly basis. However, all clients have the option of running previous versions of the software. During the annual process, Conning and NAIC Staff will perform testing of the GOES using the latest version of the software to determine whether there were any impacts to the scenarios. Results of the software version testing along with a recommendation on acceptance of a new version of the software will be posted to the NAIC/Conning Scenario website and provided to the leadership of the GOES (E/A) Subgroup. If there are any changes to the scenarios as the result of the software update, a meeting of the GOES (E/A) Subgroup would be held to discuss and determine a course of action.

To facilitate user acceptance testing, scenario sets using both the proposed and current GOES parameterization would be provided, with no fewer than 30 days granted for interested parties to provide comment. NAIC Staff will also prepare model office analyses to quantify the impact from annual model updates. All changes resulting from the annual model review would be targeted to go into effect for the June month-end.

C. 5-Year Model Recalibration

Conning will perform a periodic GOES recalibration process every five years. This will include the following steps:

1. Conning will conduct research on potential changes as requested by state regulators.

2. Conning will document and present potential changes to state regulators for exposure and adoption, and attend meetings as needed to respond to questions/comments received during the exposure period no less than 30 days. Materials to be provided for consideration of changes should include:

    a. discussion on how changes were vetted for complex interactions between parameters,

    b. attribution analysis showing the impact of each change,

c. model office analysis to understand the potential impact prepared by NAIC Staff, and

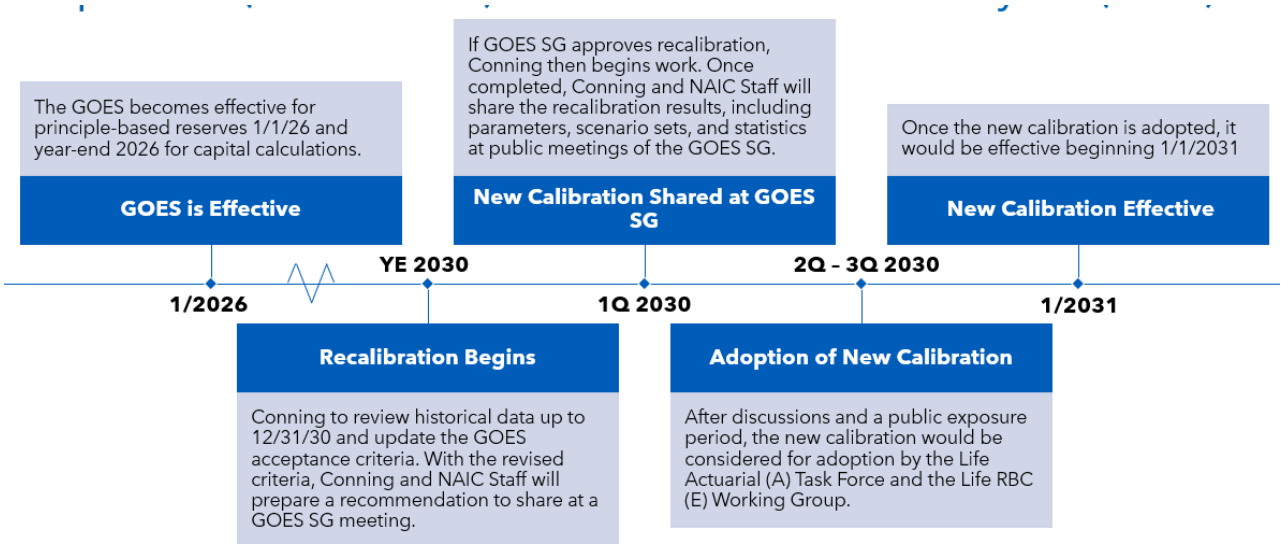
d. documentation on the above in sufficient detail to allow independent review.

3. After discussion and approval at the GOES (E/A) Subgroup, the new calibration will be considered for adoption by the Life Actuarial (A) Task Force and the Life RBC (E) Working Group prior to going into effect at the beginning of a new 5-year recalibration cycle. As part of the approval process, the GOES (E/A) Subgroup, Life RBC (E) Working Group, and Life Actuarial (A) Task Force will consider whether the model is still fit for purpose.

4. NAIC staff will modify model governance documents (Appendix B) as needed to reflect final adopted updates in a timely manner. Conning will provide evidence to the NAIC that changes were made appropriately.

5. Conning will update documentation impacted by any changes.

Exhibit 5.C: 5-Year Recalibration Cycle



D. Off-Cycle Model Updates

As noted in Section III.B, one of the charges of the GOES (E/A) Subgroup is to review key economic conditions and metrics to evaluate the need for off-cycle or significant economic scenario generator updates and maintain a public timeline for economic scenario generator updates. The process for off-cycle model updates would be similar to that of the 5-year model recalibration, with Conning performing research

and preparing a recommendation followed by public discussions, exposures, and necessary approvals by the Life RBC (E) Working Group and the Life Actuarial (A) Task Force.

Items that may trigger an off-cycle update include, but are not limited to the following:

- A significant change in economic conditions
- A change in Federal Reserve policy
- Model findings
- Failure to meet a certain number or type of acceptance criteria, a trend towards failure of meeting an acceptance criterion, or GOES (E/A) Subgroup directed revisions to acceptance criteria.
- Change in insurance product offerings available on the market that requires new GOES functionality or emphasis on certain risk drivers.

E. Model Update Oversight

As noted in Section III.B, one of the charges of the GOES (E/A) Subgroup is to review material economic scenario generator updates, either driven by periodic model maintenance or changes to the economic environment and provide recommendations.

F. Software Update Procedures and Controls

Conning's formalized development process incorporates current philosophy regarding quality assurance and good engineering practices. Each step of Conning's process is formalized and monitored to ensure that our functionality is efficient and error-free. Requirements are carefully outlined, and the results are reviewed to confirm that each has been addressed. Conning goes through many iterations of testing and development to ensure that software updates achieve the goals that we have set forth.

Development of new functionality is governed by a product planning process that incorporates feedback from the marketplace, commitments made to customers and prospects, and internally generated enhancement ideas. These enhancements are prioritized to determine release content and a release calendar. Fixing bugs takes priority over new development when allocating resources.

All bug reports and enhancement requests are managed using software project management and service desk tools, regardless of whether the requests are coming from customers, prospects, internal software testing, or the product planning

process. The tools support issue tracking and agile project management, helping Conning plan, track, and manage their work efficiently. Source code is managed using a distributed version-control system for tracking changes during software development. Source code management tools facilitate tracking the sources and reasons for all code changes, allows reconstruction of any code branch at any point in time, facilitates merging of code changes from one code branch to another, and generally enhances the ability of multiple developers to simultaneously work on one code branch. Git is also linked into Conning's automated test system.

G. Software Enhancement Validation Procedures

Conning uses a combination of automated and manual testing to maintain code quality. Conning uses two separate automated testing systems. The first is a custom-built test platform which controls a set of dedicated machines (currently 25 in the pool) and uses them to run a series of automated tests on daily and weekly test cycles. Each automated test installs an up-to-date copy of our software from our revision control system and then runs a series of end-user test cases. The test cases use automated end-user interaction with the software user interface. Over 70 model input definition files are available for use in the automated test process, and these collectively test many different combinations of modules, model choices, parameter values, etc. Conning does not use client data for testing without permission.

Some of the automated testing involves running simulations in previously released versions of the software, then re-running the same simulation (using the same definition file) in a release-candidate version or a development version and then finally testing to see that the results are identical, ensuring backward compatibility and reproducibility. Other test cases exercise Definition Editor functionality via record-playback, while yet others test grid functionality. Some test cases run performance benchmarks to guard against the accidental introduction of performance bottlenecks. In addition to the automated testing, major releases go through extensive manual testing of the new functionality (for which automated tests may not yet have been created). Quantitative release criteria related to defect discovery must be met before the release is considered ready to ship.

The second test system is based on a DevOps platform that provides a comprehensive set of tools for testing, building, and deploying our software. The DevOps platform performs web-based tests and unit tests comprising a suite of 800 (and growing) web-based tests and over half a million-unit tests split into over 50 categories.

Conning maintains a repository of all previous versions of the software. Additionally, Conning software is designed to be backwards-compatible, so users can always reproduce results generated in prior versions using their currently installed version. Furthermore, Conning has secure primary and backup data centers where files and data are replicated daily.

VII. Process for Handling Model Findings

While every effort will be made to avoid errors in model calculations, inputs, and methodologies, it is possible that issues will be identified. "Model findings" refer to any issues discovered during model governance procedures or identified by a Model User or other stakeholder that have a financial impact for users of the model output. Model findings may be identified by any model stakeholder. Model Findings that occur during the monthly scenario generation and validation process have additional treatment detailed in section 2.C "Fallback Plan".

A. Tracking and Communication of Model Findings

All findings must be documented in the Model Findings Inventory, which tracks findings, estimated impacts, and remediation activity. When findings are remediated, the impact to model outputs must be documented and communicated to Model Users and the GOES (E/A) Subgroup.

B. Risk Classification

To ensure effective monitoring and remediation priority, each finding will be assigned according to each of the risk categories below in the Model Findings Inventory.

1. Error vs. Refinement

   Errors are model findings where the scenario results deviate from the intended or expected results due to inappropriate inputs, software coding, or other factors. Refinements are model findings that involve a known model limitation, simplification, or desire to capture an emerging best practice. Errors should be communicated and addressed as soon as possible, and a review of controls should be performed to identify the root cause of the error and mitigate for future scenario releases.

2. Materiality

   Materiality will be driven based on the potential dollar and/or percentage impact on reserves, surplus, and risk-based capital. This will also include an assessment of whether it will impact a broad segment of the industry or a relatively small number of companies. An immaterial finding would be one that does not currently have a material financial impact and is expected to only decrease in materiality over time. Other factors influencing the consideration of materiality could include reputational impact and operational efficiency.

3. Complexity and Resources Required to Address

The model findings inventory will provide insight on how resource intensive and complex a given finding will be to address.

C. Remediating Findings

Material findings can be considered remediated if:

- It has been determined why the finding occurred;
- Any necessary changes to requirements have been determined and communicated to Model Users; and
- A model change is implemented to remove the finding.

D. Model Findings Inventory

The Model Findings Inventory will be available on the NAIC website (location TBD). A sample file will be shown in Appendix B. The Model Findings Inventory will include the following information for each model finding:

1. Finding ID
2. Finding Status (Open, Deferred, Closed)
3. Date finding was identified
4. Finding type (Error, Simplification, Data Limitation, Model Limitation)
5. Risk classification (Material Complex Finding, Material Simple Finding, Immaterial Finding)
6. Detailed description of the finding
7. Model ID
8. Model name
9. How the finding was identified
10. Estimated impact of finding
11. Determination of why the finding occurred
12. Necessary changes to requirements because of the finding
13. Description of model change implemented to remove the finding
14. Date finding was last reviewed

NAIC staff will have access to edit the Model Findings Inventory. Other model stakeholders will have Read access to the file.

The Model Findings Inventory will be updated whenever there is a new finding, whenever a finding is remediated, and any time there is a change in one or more of the details shown above.

E. Emergency Model Findings and Expedited Process

Material errors discovered in the GOES scenarios could necessitate the need to be classified as an "Emergency Model Finding" and undergo an expedited process for remediation. Under this situation communication and quick public discussion of an issue would be important to determining rapid corrective action. If necessary, membership of the Life Actuarial (A) Task Force could consider a "Waiver of Task Force Procedure" under the Valuation Manual Section 1.A.4.

F. Incident Documentation and Remediation (Postmortem Reports)

After an incident of model error or operational error, the model owner will write a report documenting the incident, the resolution, the root causes, and follow-up actions taken to prevent it from happening again (i.e. "Postmortem"). Postmortems should include specifics about the effectiveness of controls and any changes to controls. The report will be available to all interested parties.

VIII. Model Change Management

Model change management is the process to ensure that model changes are controlled and accurate. Three tools will be used to facilitate the change management process: 1) a Model Change Request Template, for submitting change requests; 2) a Model Change Request Inventory, to keep track of all change requests and their status; and 3) a Model Change Documentation Template, to ensure that changes are documented and made in a controlled manner. These tools are described in sections B and E below.

A. Model Change Categories

Each model change will be classified into one of the following model change categories, which determines the level of governance required.

Model change category	**Definitions**	**Level of governance**
Routine change	Scheduled updates, e.g. to update monthly starting conditions	Full governance, except that model change requests and tracking are not required

Model enhancement	Implementation of new methodology, incorporation of updates to existing requirements (e.g., VM-20 or VM-21 updates), etc.	Full governance
Model correction	Remediation of model issues identified through model validation, result analysis, external feedback, etc.	Full governance
Cosmetic updates	Updates to model coding or structure which do not impact model outputs	See "Software Enhancement Validation Procedures"

"Full Governance" means that the governance process will include:

- Tracking of the issue in the model change log
- Development of a recommendation for an enhancement by Conning and NAIC Staff
- A public exposure period of no shorter than 30 days prior to public discussion and consideration of adoption.
- Validation and demonstrations to confirm the validity of the model change.
- Updates to documentation, as necessary.

B. Model Change Requests and Tracking

Routine model changes supporting monthly production of scenarios do not require a formal change request, tracking, or consideration by the GOES (E/A) Subgroup.

Other model change requests may be initiated by members of the GOES (E/A) Subgroup, Interested Regulators, or Interested Parties. Requests may be made by completing a Model Change Request Template and sending it to the NAIC staff support person for the GOES Subgroup. The Model Change Request Template will be available on the NAIC website.

The Model Change Request Template is intended to be used as a mechanism for sharing and escalating concerns. For example, it may be used when Model Users feel the model is generating inappropriate results or is causing unusually large impacts.

Model change requests will be tracked in the Model Change Request Inventory, which will be maintained and kept up to date by NAIC staff. The Inventory will indicate which models are impacted by the requested change, along with an expected resolution date.

Material model changes will be considered by the GOES (E/A) Subgroup, and if adopted through the NAIC committee structure, will be carried out by the Model Developer, with oversight by the Model Owner and Model Steward.

Only NAIC staff will be given access to edit the Model Change Request Inventory. Other model stakeholders will have Read access to the file. The Model Change Request Inventory will be available on the NAIC website (location TBD).

C. Handling of Material Model Changes

There may be events that warrant significant changes to the GOES models, assumptions, and calibrations. In these situations, the GOES (E/A) Subgroup may consider the use of model office testing and/or field testing to analyze the impacts prior to implementation. This is not expected to be necessary for routine model updates.

Field testing is time-consuming and can be expensive. Where possible, model office testing may be considered as an alternative.

D. Modeling Environments

For the GEMS® software, Conning uses three separate modeling environments: a development environment, a test environment, and a production environment. These environments are based in separate work areas, with different permissions granted to users per their roles within the model governance framework.

All model changes occur in the development environment. Models are copied from the production environment into the development environment, where full editing access is available. Using this version of the model, developers make the necessary changes, conduct testing and complete the required change documentation to meet all governance requirements.

After changes are implemented, the model is copied to a distinct testing environment. Specific testing procedures are performed at the discretion of the model developer and model owner. The adequacy of testing will be reviewed by NAIC staff as directed by the GOES (E/A) Subgroup.

Once model development and testing are complete and full governance procedures have been followed to confirm and approve changes, models are promoted back to the production environment. In the production environment, only read access permissions are granted to the model developers to prevent any unintended changes to the production models. It is important to link a detailed description of the model changes to the newly promoted model to ensure clear version control.

E. Model Change Documentation Template

The Model Change Documentation Template (see Appendix B) will be used to ensure that changes are documented and made in a controlled manner.

The model developer is responsible for completing the template for each model change. The template contains the following information:

- Technical details of the changes made in the model
- Summary of the impact of changes on model outputs
- Summary of model testing results
- Model User acceptance testing and validation sign-off
- Any findings identified during the model change process

Only Conning and NAIC staff will be given access to edit the Model Change Documentation Template. Other model stakeholders will have Read access to the file. The Model Change Documentation Template will be available on the NAIC website (location TBD).

F. Model Documentation Updates

Model documentation must be updated to reflect changes made to existing models. Documentation updates are made by the model developer and reviewed by the model owner. The model steward is responsible for confirming documentation updates are made promptly.

G. NAIC Analysis and Review Tools

To facilitate their review of the GOES scenarios, the NAIC maintains the following tools:

- SAS Scenario Statistics Program
- Excel Scenario Statistics Workbook
- Excel Scenario Picking Data Independent Recalculation Tools
- SERT Scenario Review Tool
- GOES Review and Signoff Template

Enhancements and fixes to these tools will be managed via change logs. All changes will be peer reviewed to check for accuracy and documented in the change log. The change logs will be maintained for auditing purposes and available upon request from an interested party.

H. Maintenance of the Governance Framework

The GOES Model Governance Framework will be exposed for routine comments and revisions at least annually. The requirement for routine annual exposures does not preclude the ability to hold off-cycle exposures and revisions. Each new version of the GOES Model Governance Framework that is adopted will be labeled with a version number. Versions will be made available on the same website as scenarios.

IX. Documentation Requirements

Conning will provide documentation on non-proprietary specifications and components of the GEMS Scenario Files used to develop the Basic Data Set and other models listed in the Model Inventory File. Access to this documentation is available to all Model Users. Documentation will be stored on Conning's website. The NAIC's website contains a link to Conning's website which is available to all Model Users.

Conning's Software Documentation Library contains more detailed documentation. It is available to Model Users who:

- Sign Conning's Nondisclosure Agreement, or
- Consultants engaged by a Model User that have signed a Nondisclosure Agreement, or
- Choose to purchase the Robust Data Set, or
- Choose to license Conning's API Tool, or
- Choose to license Conning's software

Additional documentation will be included in the model governance spreadsheets (e.g. model inventory file, model change documentation template, etc.).

X. Access Controls

Access controls are important to prevent unauthorized changes (whether inadvertent or otherwise). The table below summarizes the access granted to models and supporting documents.

	Access Level Granted		
Model or Document	**Conning**	**NAIC Staff**	**Other Parties**
Conning models listed in the Model Inventory File	Read/Write Dan Finn Other Conning staff trained on	None	None

	NAIC model requirements Read Only Other Conning staff trained on NAIC model review requirements		
NAIC Software and Programs Used to Create Model Statistics (for purposes of validating Conning's metrics periodically and after any recalibrations)	None	Read/Write Brian Shade McKayla Doyle Jim Stinson Read Only Scott O'Neal	None
Model Inventory File	Read Only	Read/Write Scott O'Neal Amy Fitzpatrick	Read Only
Model Change Request Form	Read/Write	Read/Write	Read/Write
Model Change Request Inventory	Read Only	Read/Write	Read Only
Model Findings Inventory	Read Only	Read/Write	Read Only
Model Change Documentation	Read/Write	Read/Write	Read Only

XI. Appendices

A. Sample Monthly Model Validation Reports and Statistics

Basic Data Set Validation Reports and Basic Data Set Additional Statistics files are available at https://naic.conning.com/scenariofiles.

B. Supporting Documents

This section will contain links to supporting model governance documents.

Document	**Link**
Stylized Facts	

Acceptance Criteria	
Model Inventory File	
Model Findings Inventory	
Model Change Request Template	
Model Change Request Inventory	
Model Change Documentation Template	

C. Version History

Version Number	Version Date	Description of Document Update	Author
01	9/23/2024	Preliminary draft	Pat Allison, NAIC
02	10/29/25	Second Exposure Draft	Scott O'Neal, NAIC
03	12/7/25	LATF Fall National Meeting	Scott O'Neal, NAIC

D. Reference Documents

The following documents were used as references in the creation of this model governance document:

1. Materials discussed at the 5/1/24 meeting of the GOES (E/A) Subgroup

    a. "A Framework for Developing, Evaluating, and Implementing Economic Scenario Generators (ESGs) – ESG Model Governance" presented by Tony Dardis, Vice Chairperson, Economic Scenario Generator Work Group (ESGWG), American Academy of Actuaries

    b. ACLI document on model governance, presented by Brian Bayerle

    c. "GOES E/A Subgroup – Model Governance", presented by Scott O'Neal, NAIC Staff Support for the Life Actuarial (A) Task Force and the GOES E/A Subgroup

2. “Model Governance Checklist”, published August 2016 American Academy of Actuaries

3. “Model Governance Practice Note”, published April 2017 American Academy of Actuaries

4. “Actuarial Standard of Practice No. 56 Modeling”, December 2019

5. Professional Services Agreement Between Conning, Inc. and the National Association of Insurance Commissioners, Effective September 30, 2020

6. Comments on model governance from GOES field test participants