Equity-Based Insurance Guarantees Conference

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Updates on PBR for Annuities (VM-21 and VM-23)

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EQUITY-BASED INSURANCE GUARANTEES CONFERENCE
CHICAGO, NOVEMBER 11, 2019

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MARSH & McLENNAN COMPANIES

Agenda

1 VM-21 overview

2 VM-21 key revisions

3 VM-21 implementation considerations

4 VM-23 updates

Section 1 | VM-21 overview

VA statutory reform background

Evolution of VA statutory requirements

1 Past

- Reserves were formulaic (AG 33, AG 34 and AG 39)
- RBC was factor-based
- Did not reflect market risks inherent in variable annuities, particularly with regard to GMxBs
- Did not reflect company-specific portfolio risks, hedging practices and the degree of ALM mismatch

2 Present

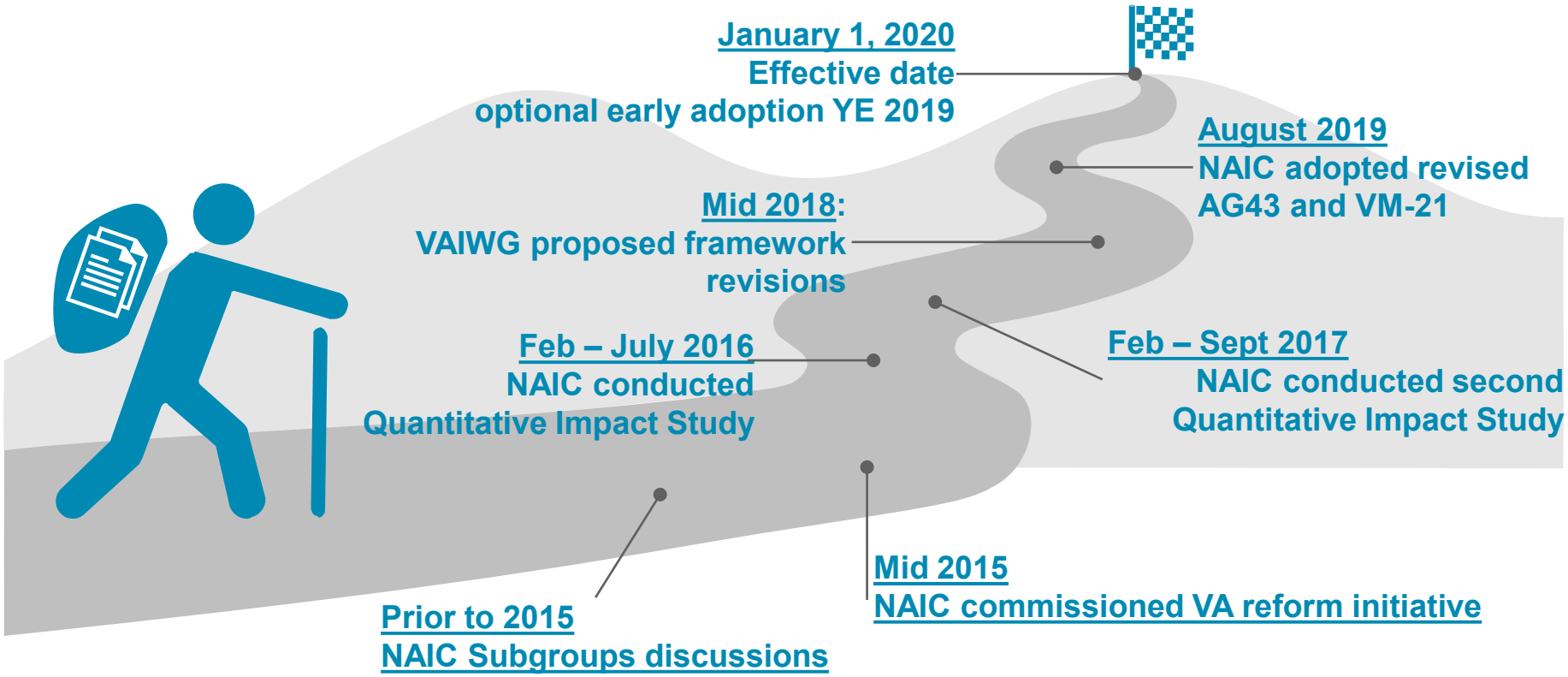
- **C 3 Phase II** enacted in 2006
- **AG 43** enacted in 2009
- Both are principle-based approach utilizing stochastic projections, subject to a standard scenario floor
- Attempts to address equity risk, interest rate risk and expense recovery risk associated with VA's
- Key shortcomings in the current framework surfaced over time and caused companies to seek captive solutions
- NAIC commissioned the initiative in 2015 to identify changes

3 Future

- Revised statutory reserve and C3 framework, effective 1/1/2020
- Revisions address key issues in the current framework while largely maintaining the current statutory construct

VA statutory reform timeline

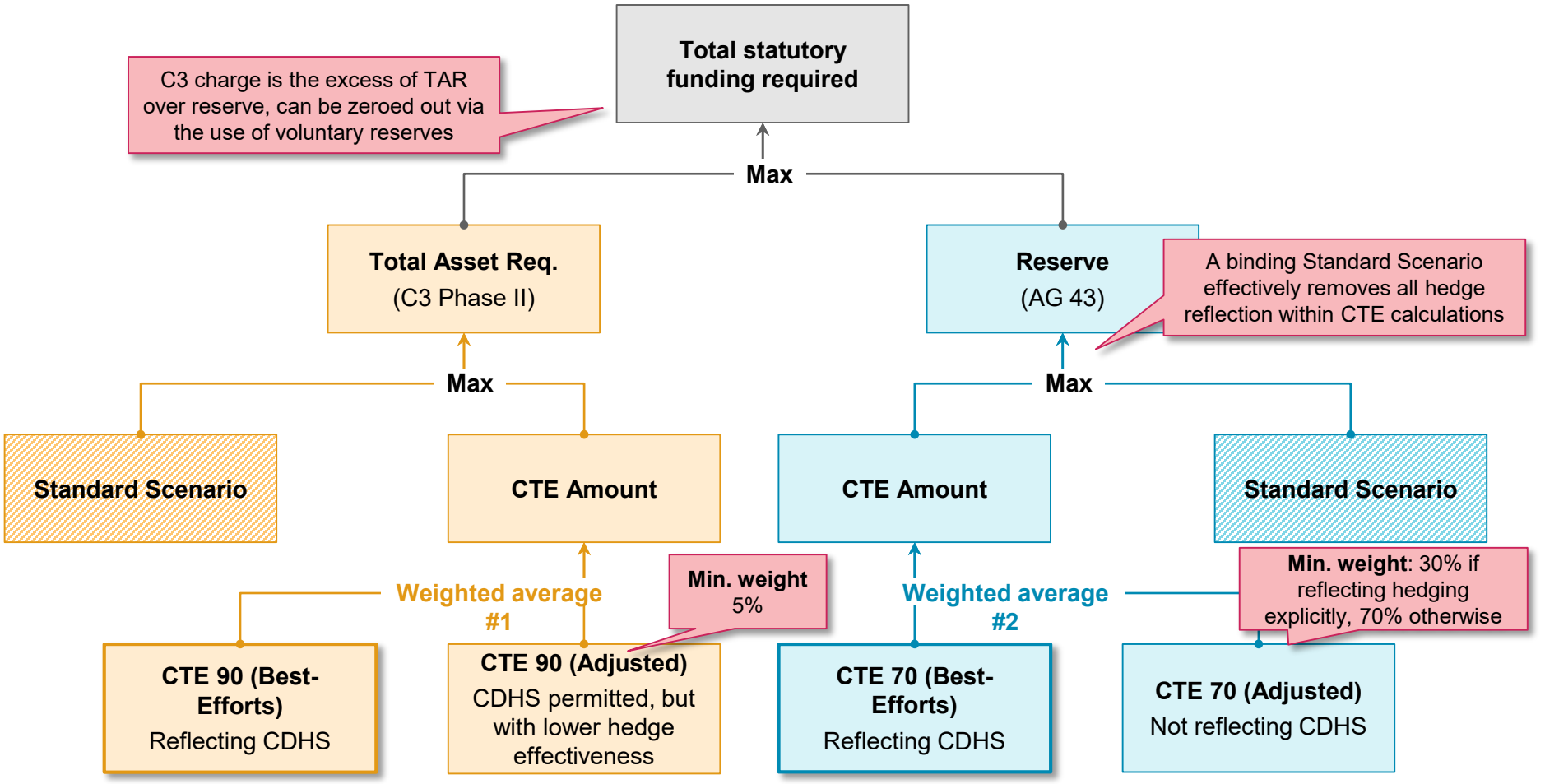
The reform is the result of a multi-year NAIC initiative to improve VA statutory accounting



The revised AG43 and VM-21 have been formally adopted at the 2019 NAIC Summer National Meeting

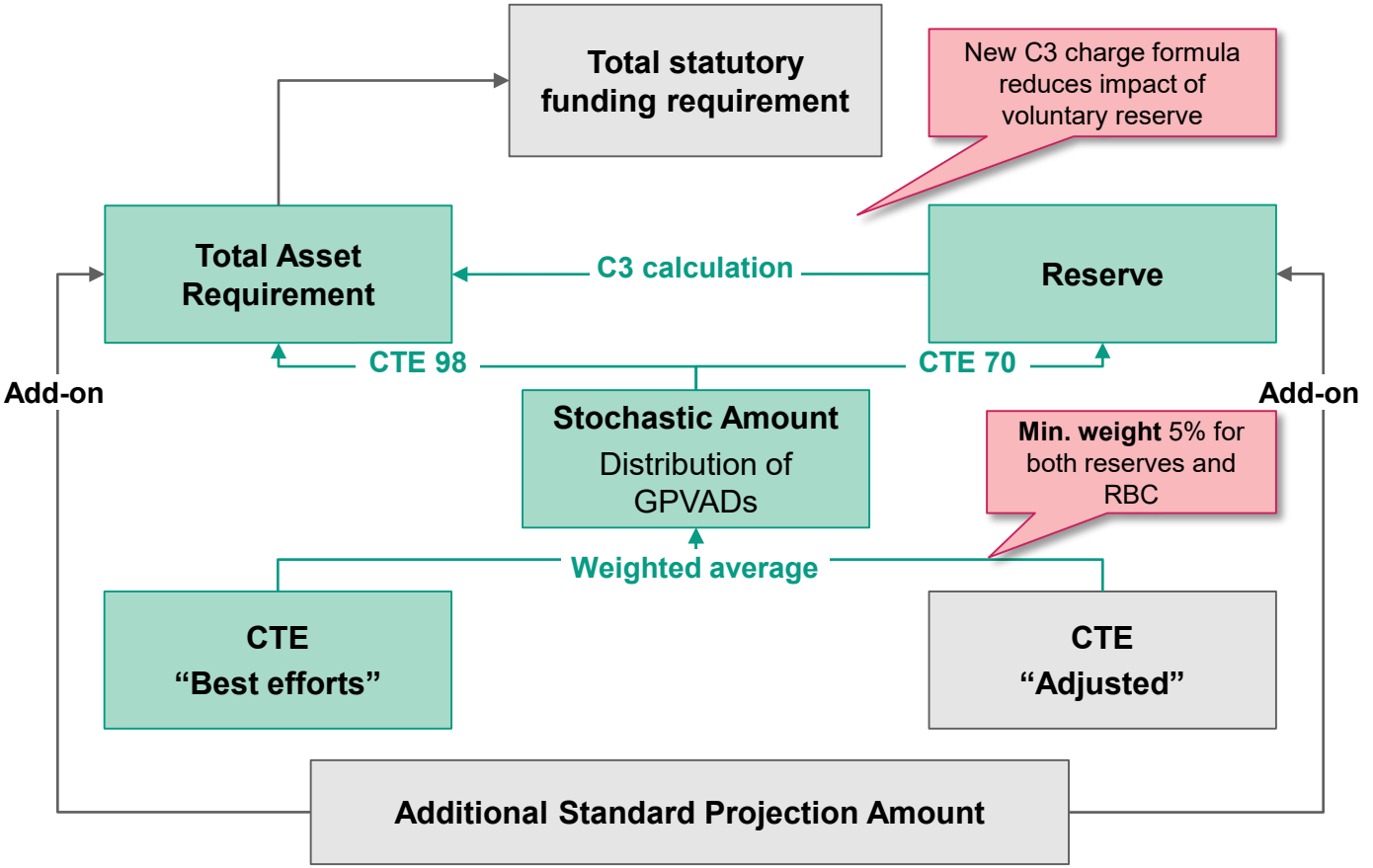
Current VA statutory framework

Structural misalignments between the stochastic and standard scenario and between AG 43 and C3 Phase II produce unintended results



Revised VA statutory framework

Standard projection is aligned with CTE adjusted; reserve and TAR follow the same stochastic distribution



Revised framework reduces disincentive to hedging and lowers balance sheet volatility with better alignment between asset and liability

Section 2 | VM-21 key revisions

Summary of VM-21 updates

Stochastic (CTE)	Standard scenario (SS)	C3 & other topics
1 Remove working reserves when calculating scenario GPVAD	5 Align AG43/VM-21 SS calculations with CTE "adjusted"	6 Calculate C3 as difference between total statutory reserve and CTE 98 on same distribution
2 Discount deficiencies at net asset earned rate on additional assets	Remove C3 Phase II standard scenario	Permit smoothing to be conducted on the C3 charge, but not on TAR
3 Use VM-20 scenario generator for interest and SA returns; only allow proprietary scenario generator when it does not materially reduces TAR	Refresh prescribed PH behavior assumptions to align with industry	Various disclosure requirement changes
Introduce principles to govern implied volatility scenario generation	Use SS construct to govern model choices & actuarial assumptions only	
4 Follow VM-20 guidance on GA asset projections	Project SS on an aggregated basis	
Permit immediate liquidation of current hedges in CTE "adjusted" and non-reflection of MTM hedge gains or losses	Calculate SS based on company-specific market paths, select from a panel of standardized paths	
Reduce minimum allowable CDHS "error factor" but require back-testing for chosen factor	Allow SS amount to be calculated as a CTE amount with prescribed assumptions	
Align conservatism margin for reflecting non-guaranteed revenue sharing income with historical experience		

1 Remove Working Reserve (WR) from the GPVAD calculation

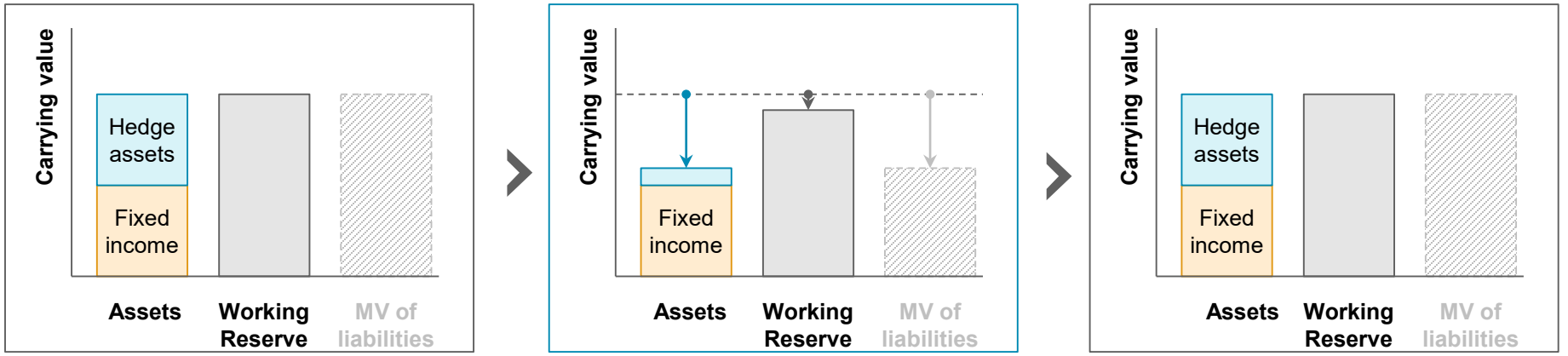
Under the current framework, changes in the market conditions result in B/S volatility as hedge gains and losses are not offset by change in WR

Balance sheet at time 0

Balance sheet at time 1
Favorable market conditions

Balance sheet at time 2
Return to *time 0* market conditions

Projected balance sheet under the existing framework



- Insurer hedges on a FV basis; hedge losses offset decrease in FV of liabilities
- Statutory reserves are less market-sensitive and respond more slowly
- May create a deficiency in market conditions favorable to the liability

- Carrying value of assets and liabilities return to levels close to time-0 values
- However, point of greatest accumulated deficiency may have already been reached by previous hedge cash flows

The revision removes the Working Reserve from the projection and aligns more closely with other statutory frameworks such as VM-20 and Cash Flow Testing

2 Discount rates for accumulated deficiencies

Net asset earned rate (NAER) on additional assets is used to calculate the greatest present value of accumulated deficiency (GPVAD)

Current framework

- Current AG 43 guidance is relatively ambiguous with respect to the starting asset amount and the discount rate for deficiencies
- As a result, two different practices are observed in industry:

Approach	Implied assets backing reserves
A Set starting assets as CSV or prior quarter's reserves, then add the CTE 70 of GPVADs	Starting assets included in projection, plus cash available for immediate reinvestment
B Iteratively solve for starting assets such that the CTE 70 of GPVADs is zero	Assets modeled in the final iteration of starting assets

Revised framework

- Allow both approaches, but require accumulated deficiencies to be discounted at the **Net Asset Earned Rate** (NAER) on Additional Assets
- NAER is defined as earned rate on a "closed portfolio" of general account assets available on the valuation date that do not constitute a part of starting assets
- Intended to capture reinvestment, in line with the company's investment policy, of coupon and maturity payments of the initial additional asset portfolio
- NAER provides an approximation of approach B without requiring computationally-intensive starting asset iterations

New methodology promotes more accurate reflection of ALM and yield characteristics of assets, and aligns practices across the industry and with VM-20

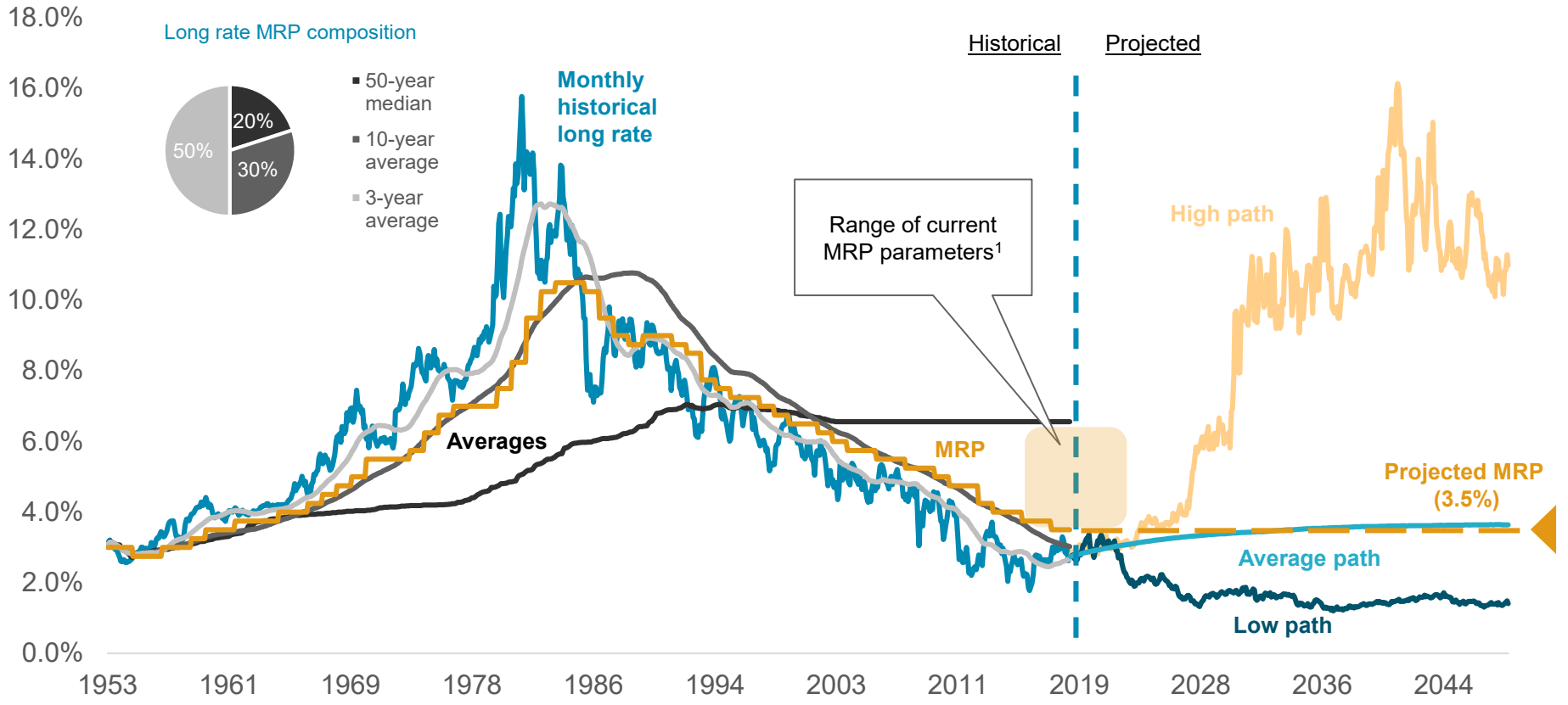
3 Changes to scenario generation (1/2)
New framework promotes greater consistency and comparability for market participants

Proposed changes	Details	Outcomes / implications
1 Use VM-20 generator for interest rates	• VM-20 scenario generator (ESG) and mean reversion parameter (MRP) are prescribed	• Interest rate scenarios are not prescribed under the current framework • Long-term interest assumption varied significantly between participants; prescribing an ESG and MRP promotes consistency across companies • The VM-20 MRP is informed by prevailing conditions and reacts to historical changes in interest rates
2 Use VM-20 generator for separate account returns	• VM-20 scenario generator is prescribed, using the same parameters as those used in VM-20 • Require separate account funds to be mapped to a combination of funds from VM-20 generator	
3 Allow proprietary ESG if and only if they do not materially reduce TAR	• Proprietary generator allowed if – and only if – on an annual basis, the company can demonstrate that use of the proprietary generator produces a TAR not materially less than that produced using prescribed generator	• Limiting use of other ESGs promotes greater consistency and comparability across companies • Requirement for testing ensures robust funding
4 Introduce principles to govern implied volatility, with a prescribed “safe harbor” approach	• Projected implied volatility surface must be arbitrage-free • Relationships between implied volatility, realized volatility, and short-term asset performance should be consistent with historical data • TAR should be not reduced by assumptions of any realized “spread” between implied and realized volatility • Prescribe a “safe harbor” approach for CDHS reflection, where modeled hedge assets comprise only linear instruments not sensitive to implied volatility	• Current framework does not provide adequate guidance on projecting implied volatility • New framework prevents inappropriate scenario generation from producing unrealizable hedge benefits in tail scenarios

3 Changes to scenario generation (2/2)

A wide variety of MRP levels are currently used; adopting the MRP calculation logic prescribed under VM-20 promotes consistency across companies

Historical and projected long (20-year) rate



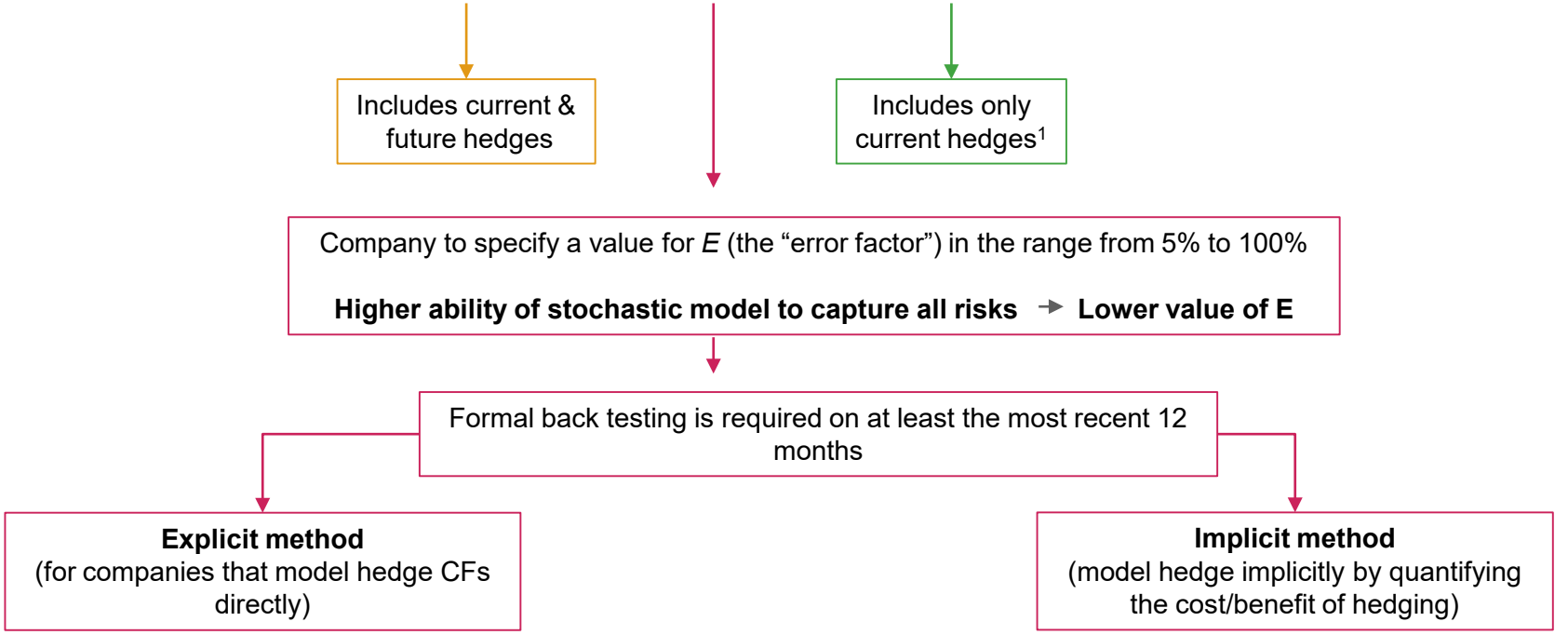
1. Source: "Revisions to AG 43/VM-21 and C3 Phase II, VIAWG Proposal, May 31, 2018

4 Changes to asset and liability projections (1/2)

	Proposed changes	Details	Outcomes / implications
1	Follow VM-20 guidance on general account assets	• Net investment income on reinvestment assets and defaults on general account invested assets follow assumptions prescribed under VM-20	• Net reinvestment spreads are effectively capped at 50/50 A/AA
2	Permit simplified reflection of hedging	• Permit immediate liquidation of currently-held hedge assets in the CTE (adjusted) run • Permit non-reflection of hedge accounting and unrealized hedge gains or losses in all projections	• Allowing hedge liquidation in the CTE (adjusted) run mitigates penalty on long-dated hedges • Reduces high computational burden of continuously calculating derivatives fair values
3	Reduce minimum CDHS “error factor”, but require back-testing to support chosen “error factor”	• Replace the current AG 43 “effectiveness factor” calculation for weighting CTE (best-efforts) and CTE (adjusted) with the C3 Phase II “error factor” calculation • Allow “error factor” to reach as low as 5% • Require formal back-testing to assess how well the model is able to replicate the hedging strategy to support the “error factor”	• Allowing a lower “error factor” better aligns Statutory liability with economic, enabling fair value hedging • Avoids “double-counting” hedge ineffectiveness, as many insurers already reflect hedge ineffectiveness within the best-efforts run itself
4	Align conservatism margin for reflecting non-guaranteed revenue sharing income with historical experience	• Replace current AG43 multipliers with new multipliers that linearly grade from 100% of best-estimate in year 1 to 80% in years 5+ • Remove the 0.25% cap currently within AG43/VM-21 after the sixth projection year	• New margin allows for more revenue sharing to be reflected and is more aligned with historical industry revenue sharing experience

4 Changes to asset and liability projections (2/2)
Reduce minimum CDHS "error factor", but require back-testing to support chosen "error factor"

Stochastic Reserves = CTE70(best efforts) + E x max[0, CTE70(adjusted) – CTE70(best efforts)]

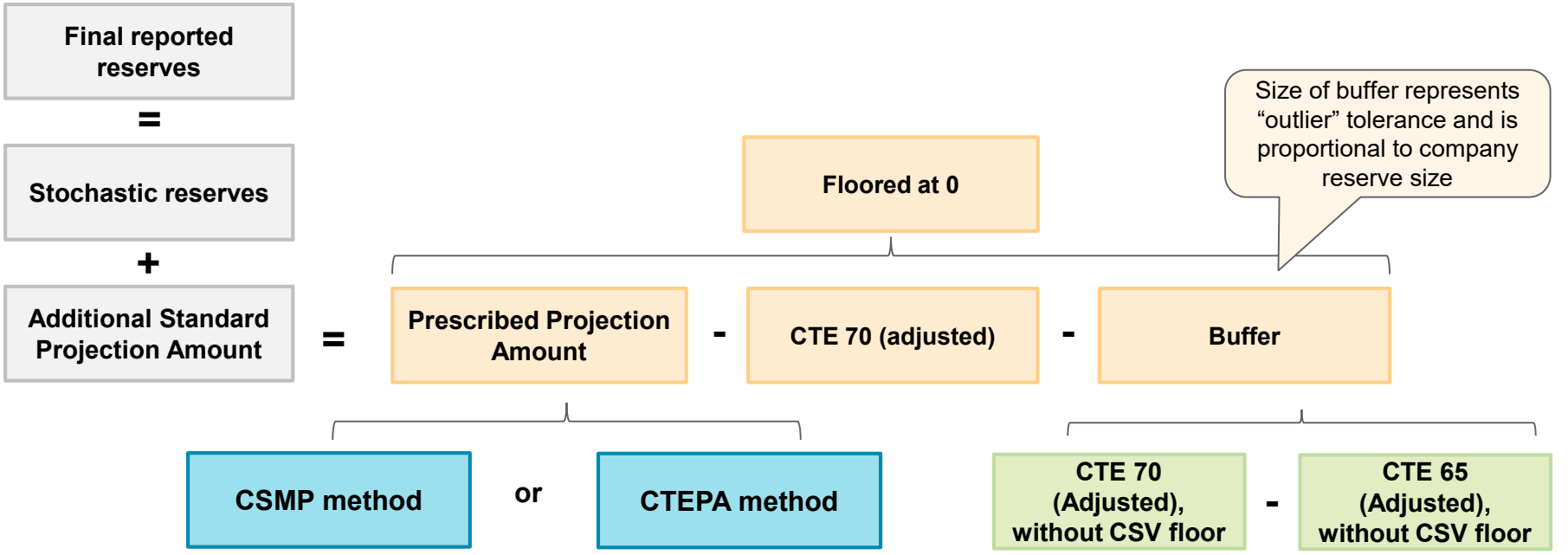


The change eliminates existing misalignment on error factor between reserve and RBC, and allows for more credit from CDHS

1. Allowed to reflect no hedge positions, in which case hedge positions held at valuation date are replaced with cash and invested using company's investment strategy

5 Standard Projection – new framework

Standard scenario was replaced with a new "Standard Projection" framework which aligns the calculation logic with the CTE adjusted run



- Both the CSMP and CTEPA methods use prescribed assumptions calibrated to industry data
- CSMP method uses determinstic market paths while CTEPA uses the same stochastic scenarios as the CTE 70 adjusted run; companies can elect either method

If assumptions are prudently managed, additional reserves are not required

5 Standard Projection – prescribed PHB assumptions (1/2)

Prescribed policyholder behavior assumptions have been refreshed to align with industry experience and are more reflective of product features

Current framework

- Behavior assumptions differentiate between four classes of products:

Product class	General characteristics of behavior assumptions
Standalone GMDBs	No withdrawals and high lapses
GMABs	No withdrawals and low lapses
GMIBs	No withdrawals, moderate lapses, high annuitization
GMWBs	Immediate – or as early as possible – and largely efficient withdrawals; moderate lapses

- Mortality is 70% of 1994 GMDB through age 85 graded to 100% at age 115

Revised framework

- Differentiate assumptions more finely by product type, and reflect industry experience collected and studied extensively during QIS II

Product class	General characteristics of revisions
Non-rollup GMDBs	Moderate withdrawals and moneyness-sensitive lapses
Rollup GMDBs	Lower withdrawals and lapses than non-rollup GMDBs
GMABs	Moderate withdrawals
Traditional GMIBs	Moderate withdrawals and lower annuitizations
Hybrid GMIBs	Overall behavior aligns closely to comparable GMWBs
GMWBs	Withdrawals reflect incentives, prescribe a **withdrawal delay cohort method** More sensitive lapses

- Distinct assumptions for 403(b) business
- Mortality is 2012 IAM Basic with scale G2, with multipliers distinct by with and without VAGLB

Withdrawal delay cohort method imposes implementation challenges

5 Standard Projection - prescribed PHB assumptions (2/2)

Withdrawal assumption uses a cohort-based approach that distinguishes between policies with different withdrawal status

Summary of GMWB / hybrid GMIB withdrawal assumptions

Did the policyholder withdraw in the previous policy year?

Yes

Did the policyholder take an excess withdrawal in previous policy year?

Yes

No

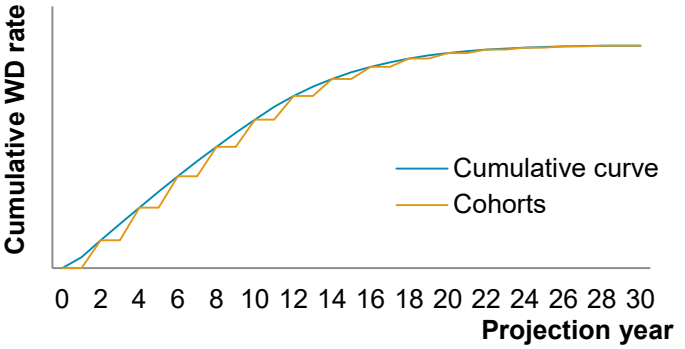
Conforming withdrawers

- Withdraw 70% or 90% of guaranteed maximum annual withdrawal amount until account depletion, then 100% thereafter
- 70% is applied to non-lifetime GMWB
- 90% is applied to lifetime GMWB and hybrid GMIB

No

Non-conforming withdrawers and non-withdrawers

- Use the **Withdrawal Delay Cohort Method** to construct cohorts with an issue-age based cumulative withdrawal curve
  - The curve is discretized into bi-annual withdrawal cohorts, as illustrated below:



- Model the overall contract cash flows as a weighted average of the cash flows from the cohorts

6 RBC C3 charge

Calculate C3 as the difference between stat reserve and CTE 98 on the same distribution of Scenario GPVADs; permit smoothing on C3 charge but not on TAR

Current framework

$$C3 = \max(\text{CTE } 90_{C3P2}, SSA_{C3P2}) - \text{Stat. Reserve}$$

- Setting aside voluntary reserve can effectively eliminate C3 charge
- There are numerous differences between the C3 Phase II and AG 43 calculations (tax basis, reflection of hedging, market path in standard scenario

Revised framework

Macro Tax Adjustment (MTA) Method

$$C3 = 25\% \times \Big((\text{CTE } 98_{\text{Pre-tax}} + \text{Add'l Std Proj Amt} - \text{Stat. Reserve}) \times (1 - \text{FIT}) - \underbrace{(\text{Stat. Reserve} - \text{Tax Reserve}) \times \text{FIT}}_{\text{Capped at amount of non-admitted DTAs attributable to VA portfolio}} \Big)$$

- Modeled cash flows ignore the effect of FIT
- GPVAD for each scenario is the same as that for reserve calculation

Or

Specific Tax Recognition (STR) Method

$$C3 = 25\% \times (\text{CTE } 98_{\text{After-tax}} + \text{Add'l Std Proj Amt} \times (1 - \text{FIT}) - \text{Stat. Reserve})$$

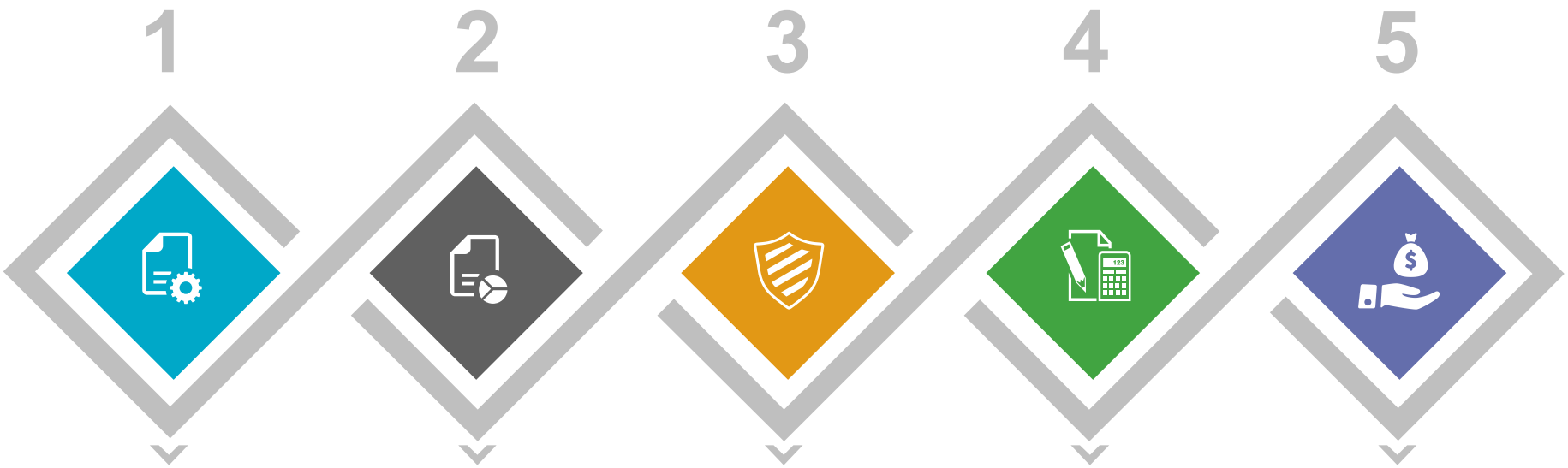
- The effect of FIT is reflected in the projection of Accumulated Deficiencies for each scenario
- Reflect evolution of tax reserves in the projection, taking into account restrictions around the size of tax reserves (e.g. floored at CSV of each contract)

Using a single stochastic distribution reduces non-economic volatility in RBC ratio; use of CTE 98 and ¼ scalar reduces impact of voluntary reserves on the C3 charge

Section 3 | VM-21 implementation considerations

VM-21 implementation considerations - methodology decisions

VM-21 requires companies to make several significant methodology decisions



Discount rate methodology

Direct iteration method or discount at NEAR?

Standard projection method

CMSP or CTEPA?

Hedging reflection

- Adopt CDHS?
- Implicit or explicit method?
- Greeks to hedge

GLWB / GMIB claims modeling

Model cash or payout annuity reserve (VM-22)?

C3 tax methodology

Reflect FIT within or outside the cash flow model?

Methodology decisions should consider financial impacts and balance sheet stability as well as ease of implementation

VM-21 implementation considerations - Standard Projection

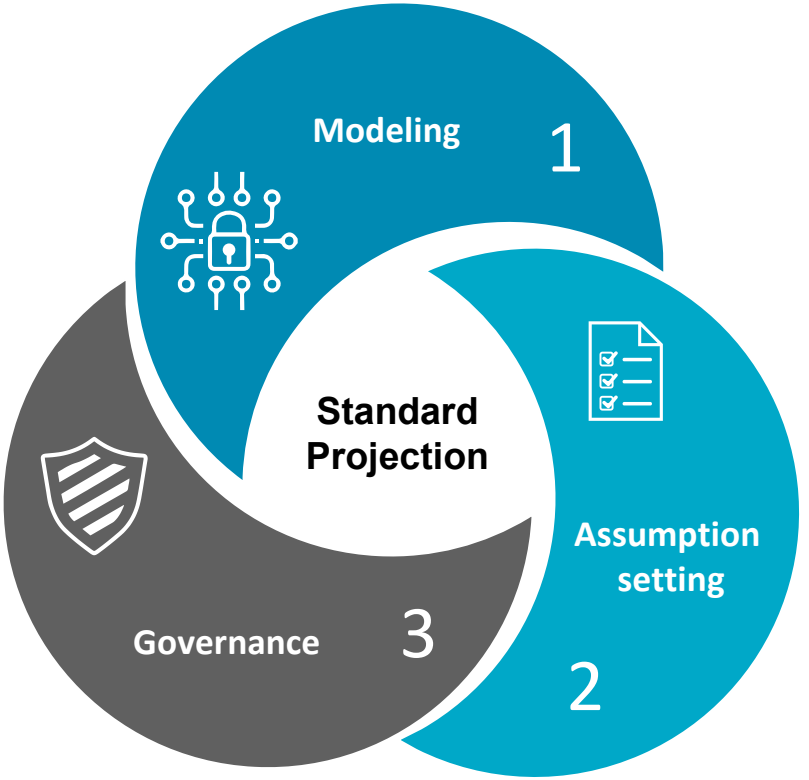
Prescribed assumptions for Standard Projection impose challenges to modeling, assumption setting and governance

Modeling:

- Need capability to use alternative set of assumptions
- Accurate calculation of GAPV for various GLB riders
- How to model the withdrawal delay cohort method

Governance:

- Complexity of modeling imposes governance challenges
- How to ensure model accuracy



Assumption setting:

- How do company assumptions compare to prescribed assumptions
- What to do about the assumption gap

Section 4 | VM-23 updates

Causes of AG 33 redundant reserves and the need for VM-23

Conservative prescribed assumptions lead US statutory reserves to be higher than "economic reserves"

AG 33 RESERVES

1 Policyholder utilization

- Optimal policyholder utilization
- Maximum present value of all benefit streams

2 Discount rates

- Prescribed by regulation
- No connection to the "actual" portfolio earned rate

3 Mortality assumption

- Mortality assumption has lower mortality than typical company pricing assumptions

VS

ECONOMIC RESERVES

1 Policyholder utilization

- Based on company pricing assumptions
- Experience is limited for GLWB benefits (can look to VAGLB)

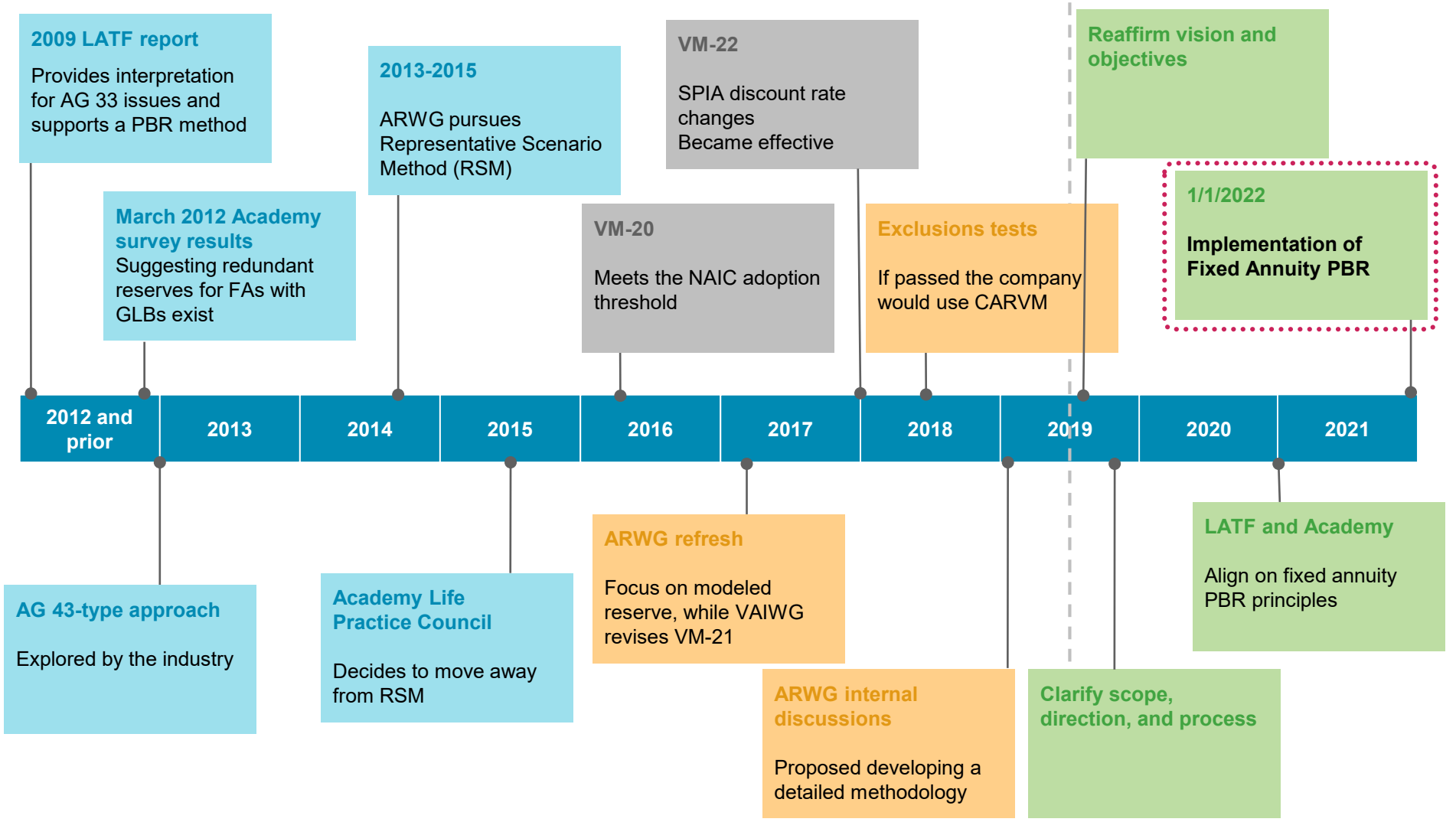
2 Discount rates

- Related to the portfolio earned and expected reinvestment rates
- Responsive to current interest rate environment

3 Mortality assumption

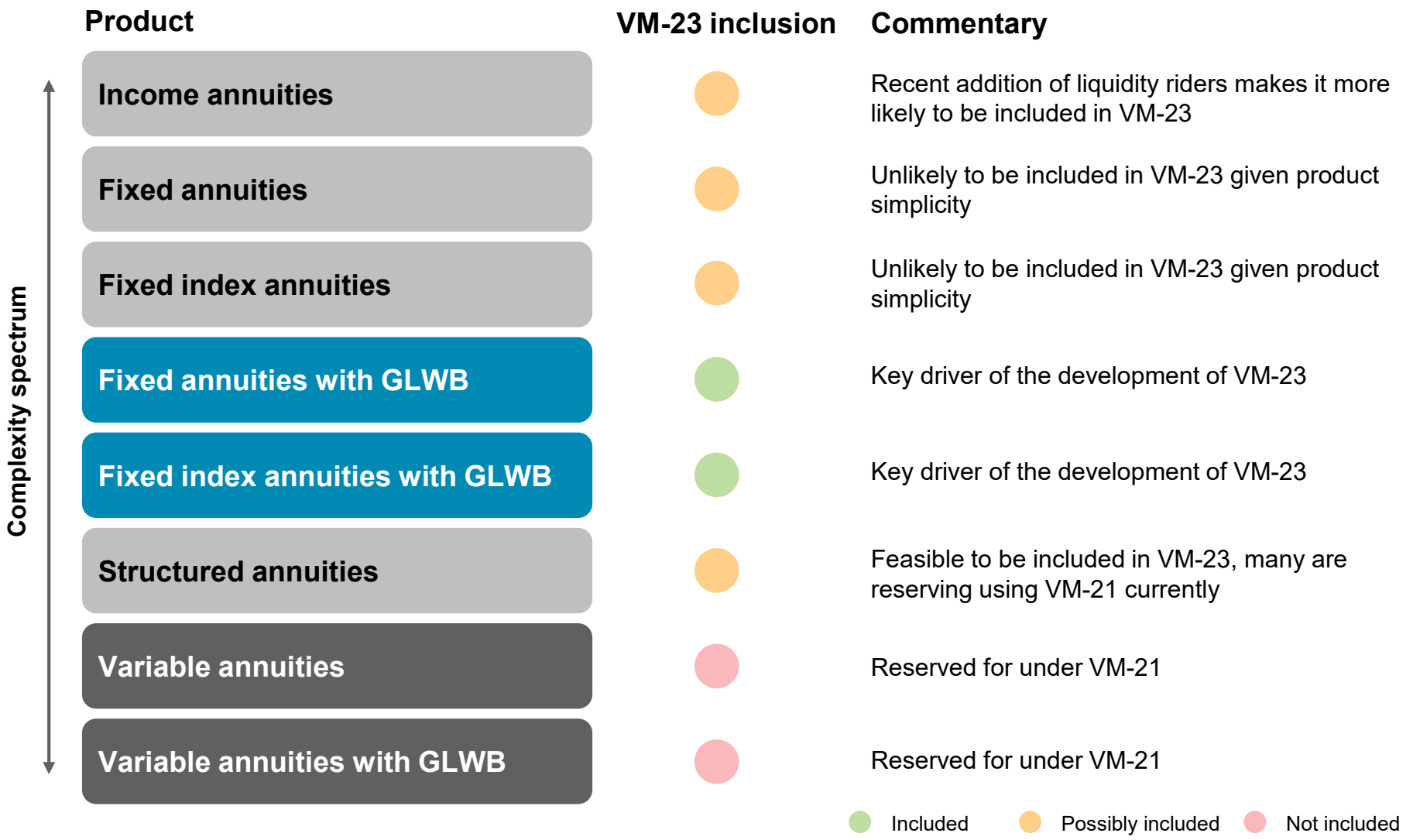
- Based on company experience
- Typically higher mortality than the Annuity 2012 IAR

History of PBR for fixed annuities



Product inclusion under VM-23

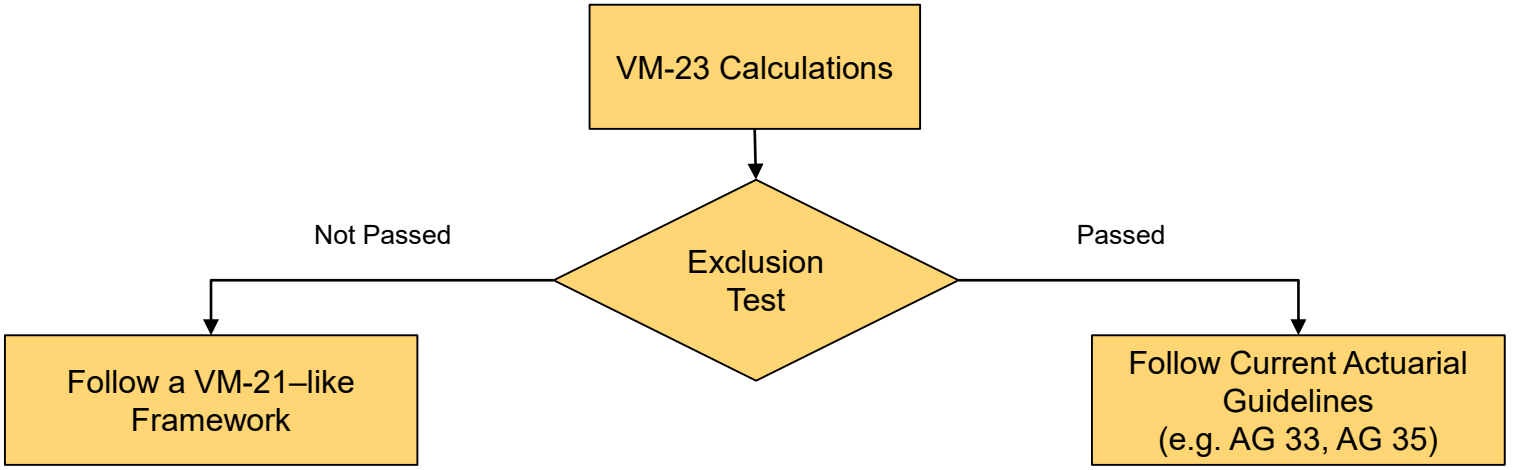
Fixed products with GLWB riders will be part of VM-23, it is not certain if simpler fixed products or structured annuities will be included



Exclusion test

VM-23 will apply to fixed annuities, there is a planned exclusion test that is to be determined

Proposed LATF VM-23 approach



Key considerations in development of VM-23