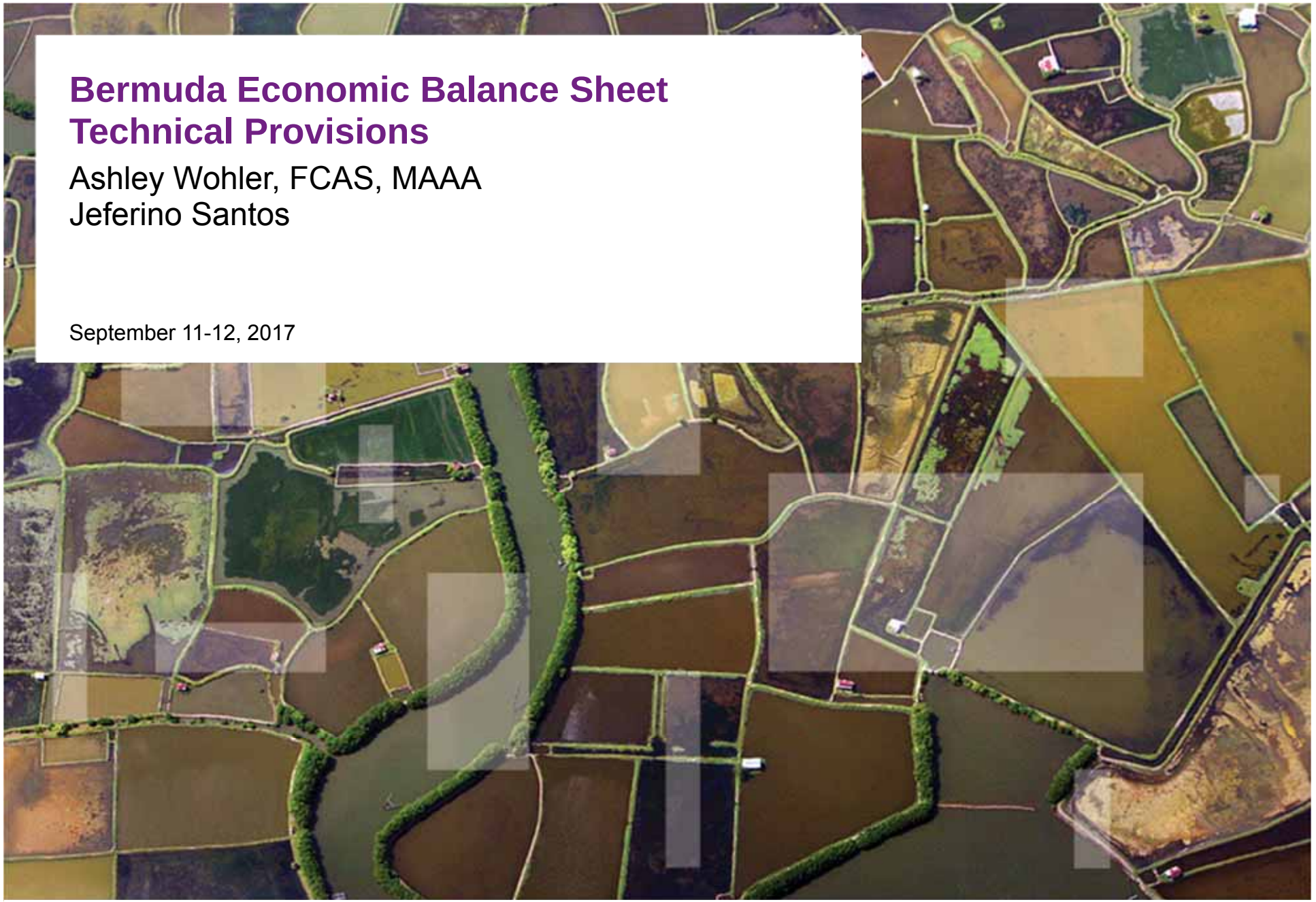

Bermuda Economic Balance Sheet Technical Provisions

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Jeferino Santos

September 11-12, 2017

Willis Towers Watson

Bermuda Economic Balance Sheet

Technical Provision

PANELIST

Ashley Wohler
Willis Towers Watson

Ashley is a consultant with Willis Towers Watson specializing primarily in property casualty claims reserving for Bermuda based captives, insurers, and reinsurers. Ashley is a key member of the internal working group responsible for calculating EBS technical provisions.

PANELIST

Jeferino Santos
Bermuda Monetary Authority

Jeferino is an Assistant Director for the Bermuda Monetary Authority who works on the evaluation of Internal Models and advises on capital adequacy, insurer reserving practices, solvency self-assessments and compliance with applicable legislation, codes and guidance.

Bermuda Economic Balance Sheet Technical Provision

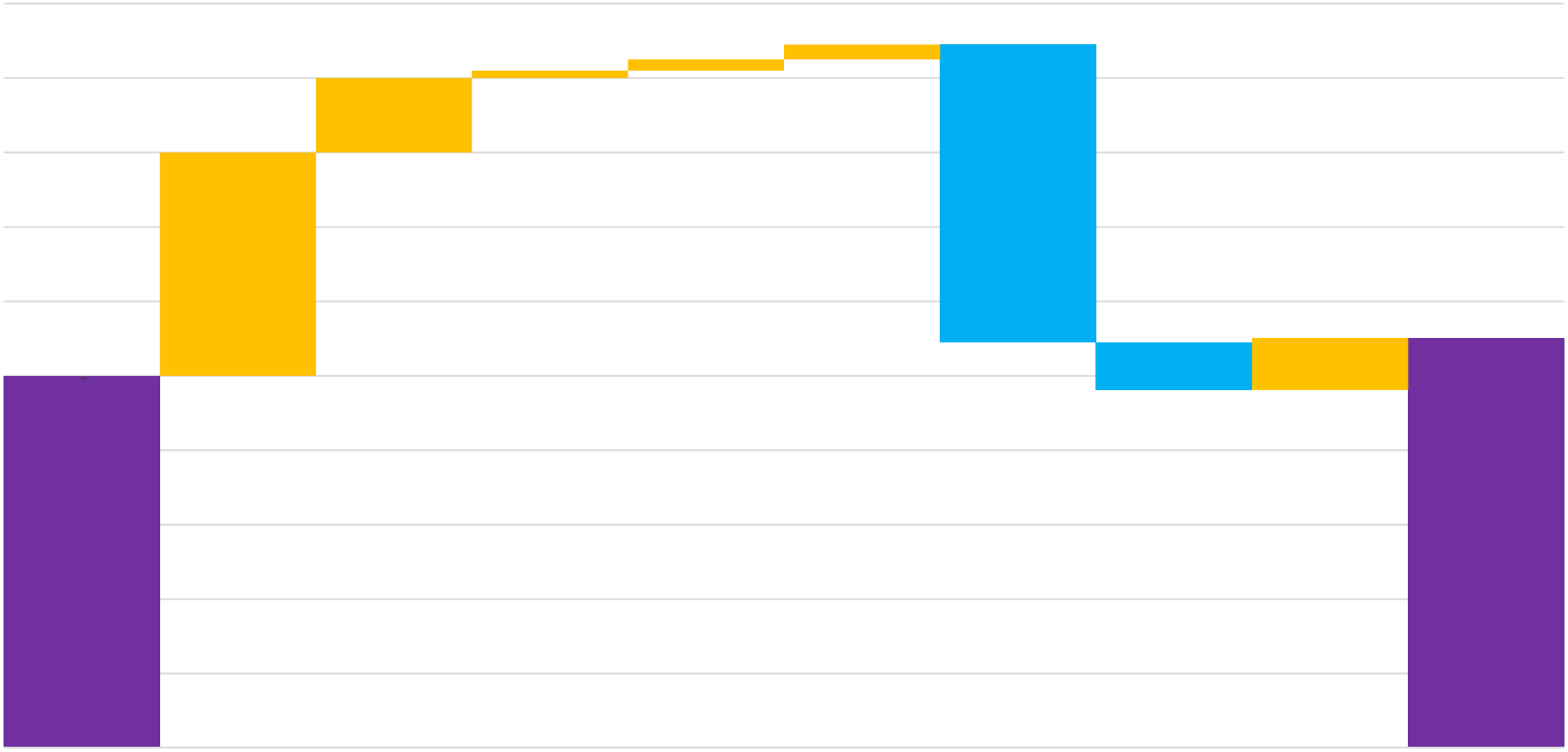
AGENDA

- Introduction to EBS Technical Provisions
  - Components to move from GAAP to EBS
  - Components of the technical provision on Form 1EBS of BSCR
- Common issues seen across the industry, consultant's perspective
- BMA's perspective on EBS Technical Provisions
- BMA question and answer session

Components of the Technical Provision

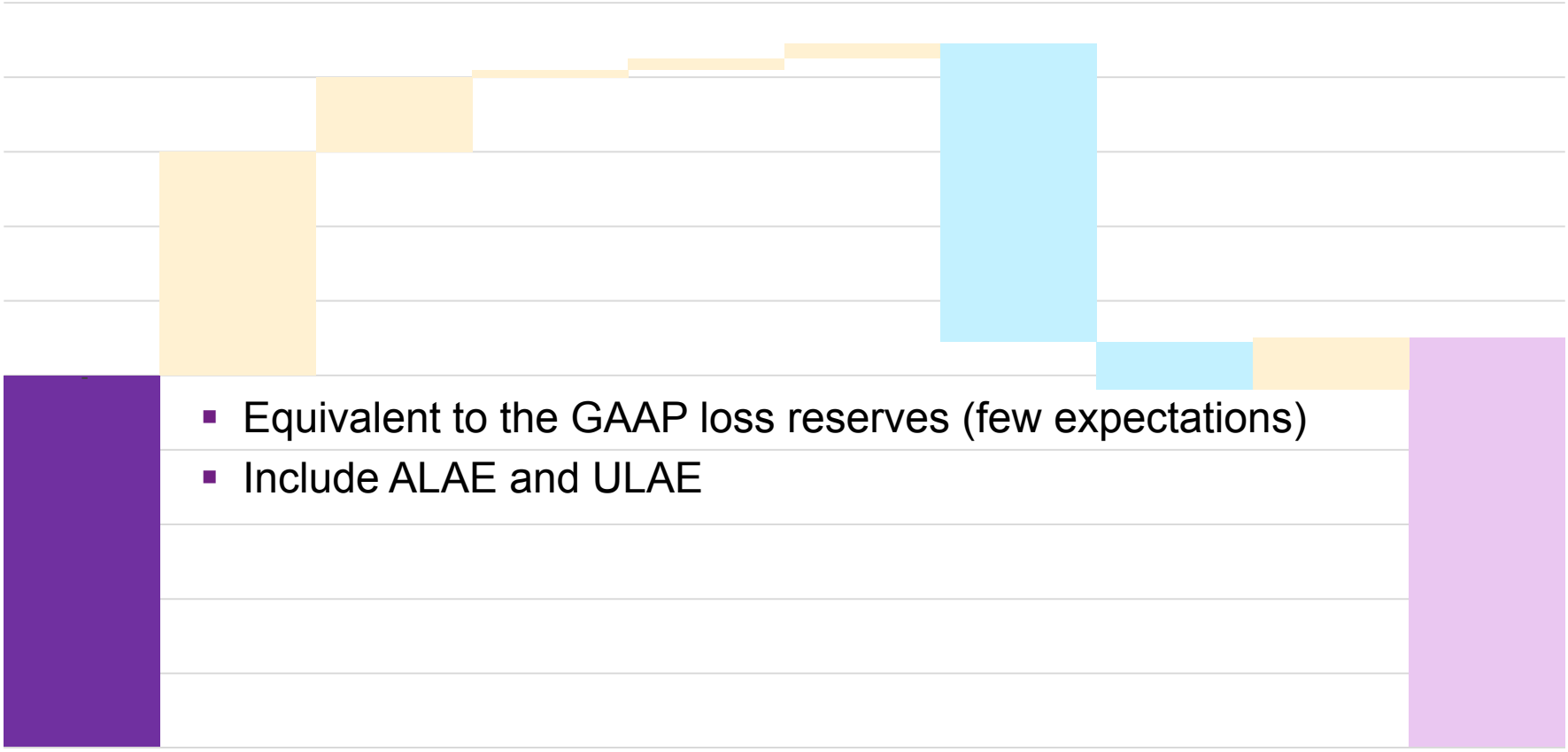
Bermuda Economic Balance Sheet

Technical Provision Components



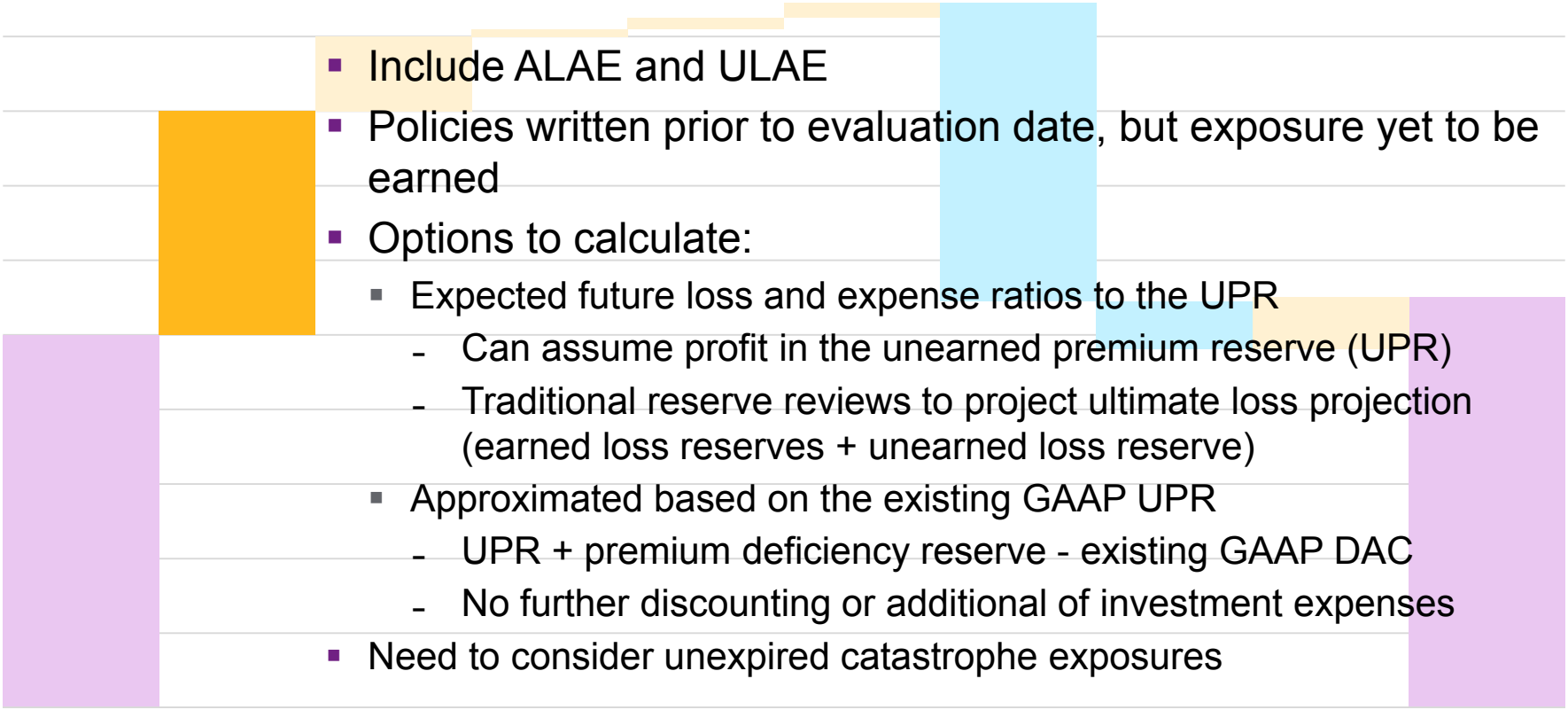
Bermuda Economic Balance Sheet

Technical Provision Components: Earned Loss Reserves



Bermuda Economic Balance Sheet

Technical Provision Components: Unearned Loss & LAE Reserves



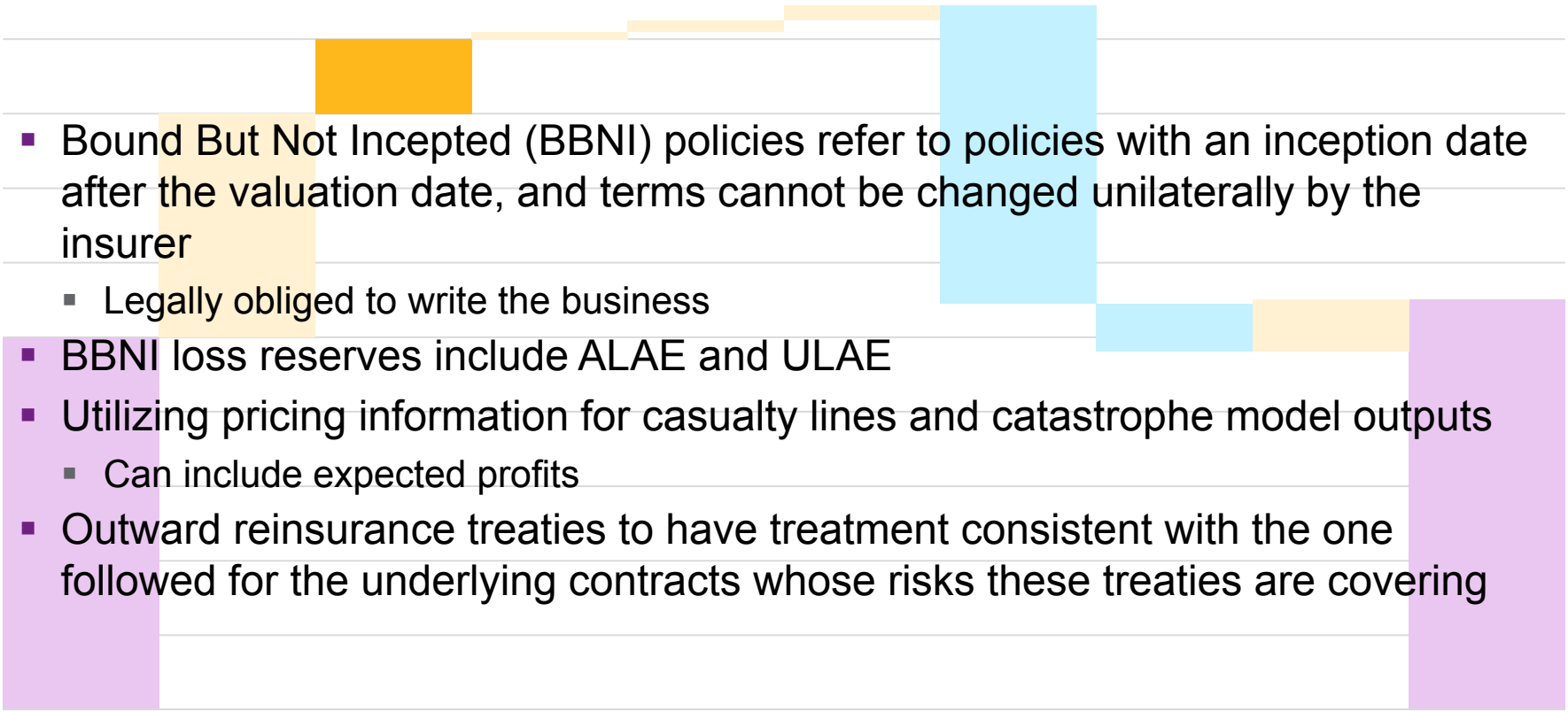
- Include ALAE and ULAE
- Policies written prior to evaluation date, but exposure yet to be earned
- Options to calculate:
  - Expected future loss and expense ratios to the UPR
    - Can assume profit in the unearned premium reserve (UPR)
    - Traditional reserve reviews to project ultimate loss projection (earned loss reserves + unearned loss reserve)
  - Approximated based on the existing GAAP UPR
    - UPR + premium deficiency reserve - existing GAAP DAC
    - No further discounting or additional of investment expenses
- Need to consider unexpired catastrophe exposures

Earned Loss & LAE Reserves | Unearned Loss & LAE Reserves | BBNI Loss & LAE Reserves | Uncollectible Reinsurance | ENID Provision | Expenses | Premium Receivables | Discounting | Risk Margin | Technical Provision

Bermuda Economic Balance Sheet

Technical Provision Components: BBNI Loss & LAE Reserves

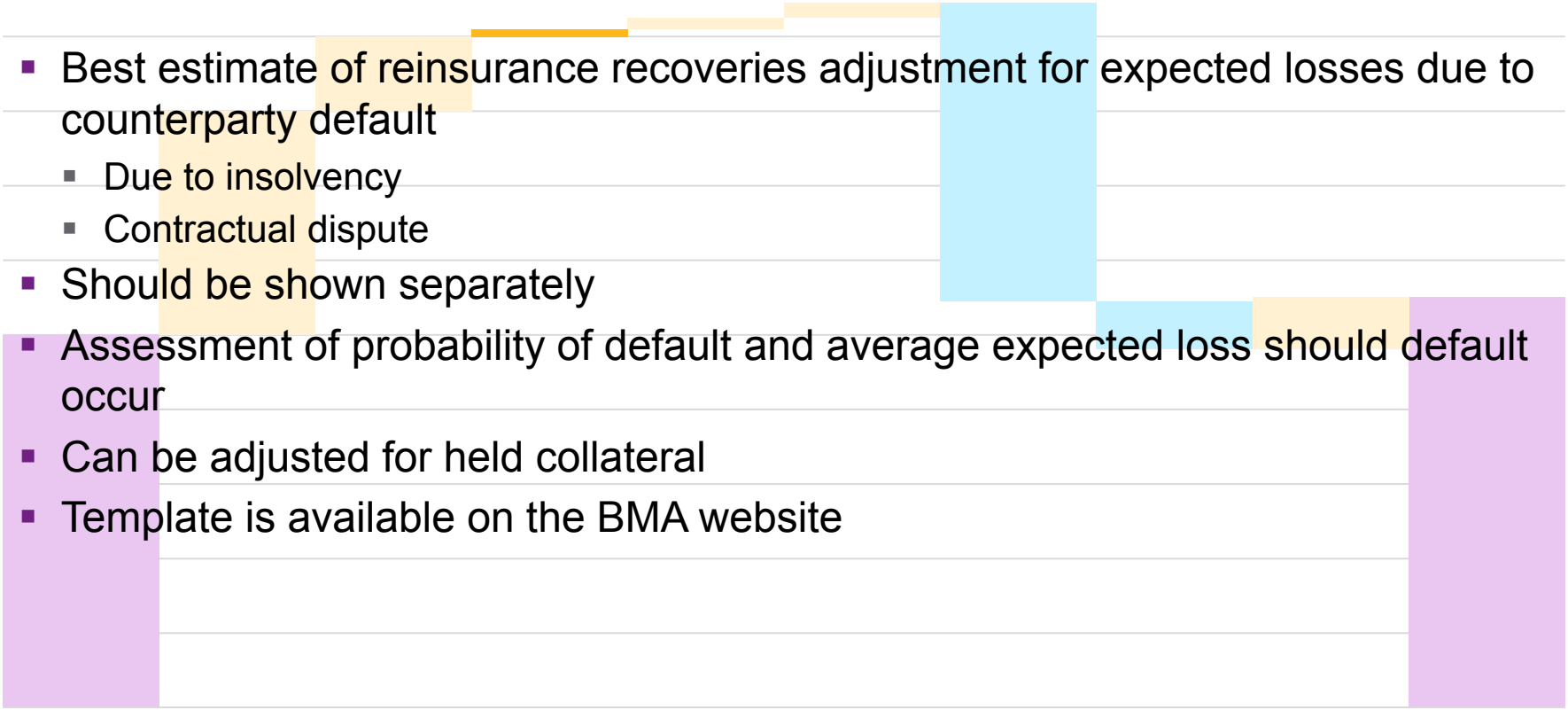
- Bound But Not Incepted (BBNI) policies refer to policies with an inception date after the valuation date, and terms cannot be changed unilaterally by the insurer
  - Legally obliged to write the business
- BBNI loss reserves include ALAE and ULAE
- Utilizing pricing information for casualty lines and catastrophe model outputs
  - Can include expected profits
- Outward reinsurance treaties to have treatment consistent with the one followed for the underlying contracts whose risks these treaties are covering



Bermuda Economic Balance Sheet

Technical Provision Components: Uncollectible Reinsurance

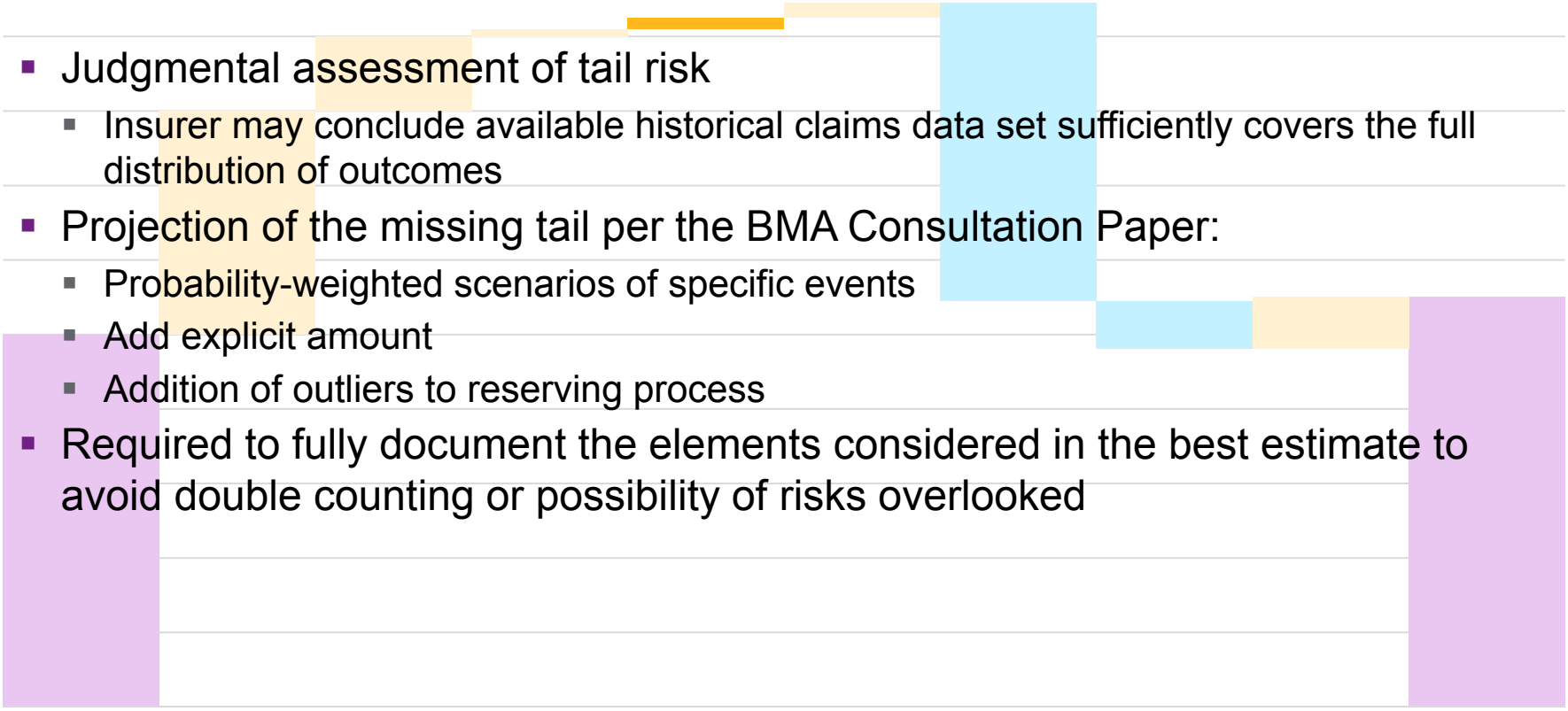
- Best estimate of reinsurance recoveries adjustment for expected losses due to counterparty default
  - Due to insolvency
  - Contractual dispute
- Should be shown separately
- Assessment of probability of default and average expected loss should default occur
- Can be adjusted for held collateral
- Template is available on the BMA website



Bermuda Economic Balance Sheet

Technical Provision Components: ENIDS Provision

- Judgmental assessment of tail risk
  - Insurer may conclude available historical claims data set sufficiently covers the full distribution of outcomes
- Projection of the missing tail per the BMA Consultation Paper:
  - Probability-weighted scenarios of specific events
  - Add explicit amount
  - Addition of outliers to reserving process
- Required to fully document the elements considered in the best estimate to avoid double counting or possibility of risks overlooked



ENIDS

What are we missing?

Property

- Model risk
- Frequency of event assumptions

Casualty

- Legislation changes
- Next “asbestos” event

ENIDS

Industry Perspective

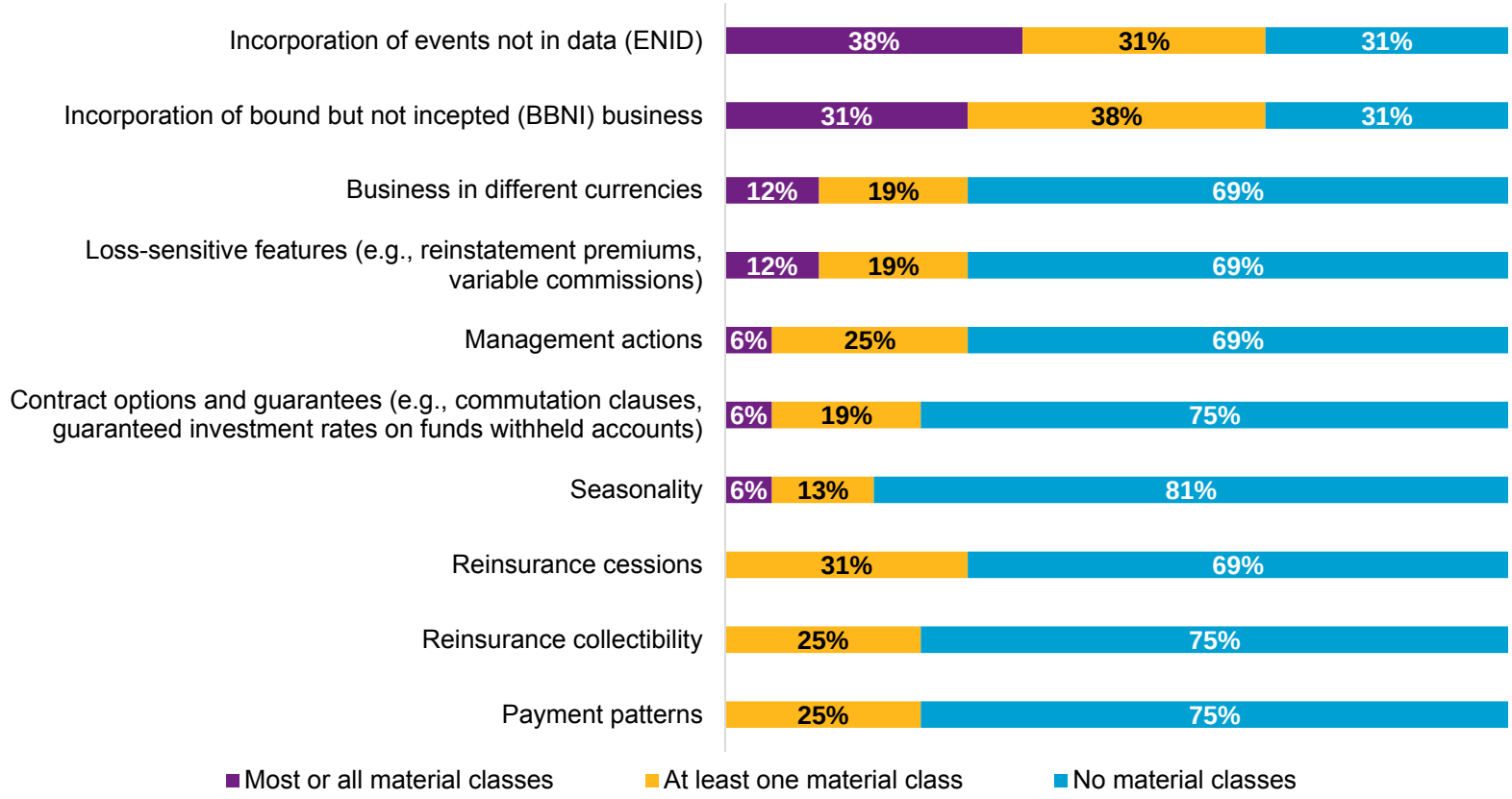
- We reviewed industry ENIDS estimates and found little variation in the ENIDS provision

Item	Low	High	Calculation
ENIDS Claims Provision	0%	4%	ENIDS Provision on Claims Provision / Net Loss Reserves
ENIDS Premium Provision	0%	4%	ENIDS Provision on Premium Provision / Net Future Losses on Premium

- Generally, small provision was included for ENIDS
  - Truncated distribution method
  - Lloyd's truncated statistical approach (See *Binary Events Loading for Solvency II Technical Provisions: Practical Approximations* by Yuriy Krvavych dated 27 August 2015 presentation to the Actuaries Institute ASTIN, AFIR/ERM and IACA Colloquia)
  - Assumed in best estimate

2016 Survey: ENIDS present the most significant challenge to respondents

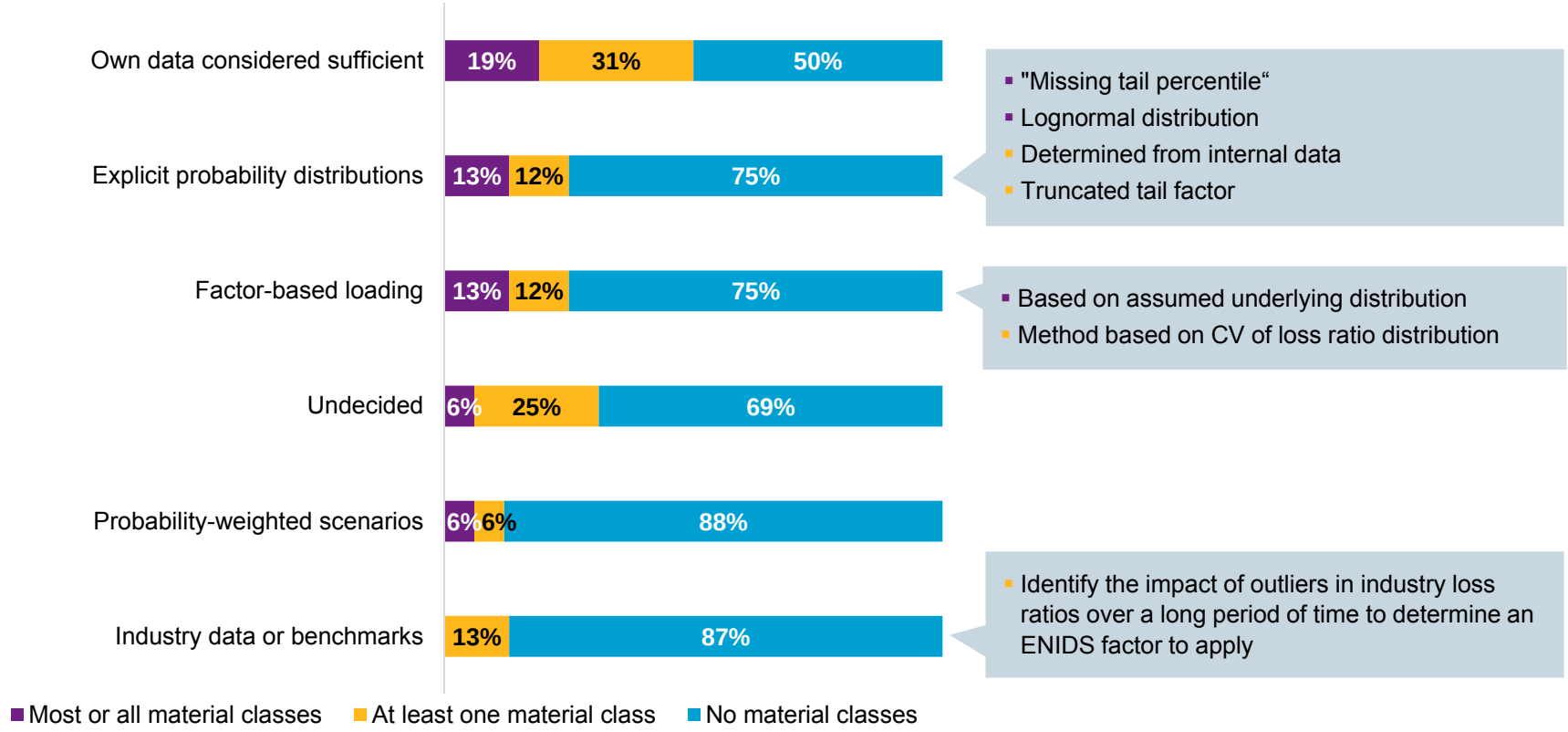
Q.7 For how many of your material classes of business did you encounter significant challenges regarding each of the following items in the determination of your technical provisions?



Base: Total Respondents n = 16.

2016 Survey: The write-in responses indicate the prevalence of ENIDS provisions based on assumptions about the truncated underlying loss distribution

Q.9 For how many of your material classes of business did you use the following approaches to reflect ENIDS in best estimates?



Base: Total Respondents n = 16.

ENIDS

Lloyd's Approximation

- We generally used the two Lloyd's approximations for our technical provision calculations

1. Deriving distribution for unpaid losses

2. Calculate both Lloyd's approximations

3. Select an ENIDS provision

ENIDS

Lloyd's Approximation

1. Deriving distribution for unpaid losses

- Lognormal distribution or distribution-free approach
  - The losses follow a truncated distribution
  - This method attempts to estimate the difference between the mean of the truncated distribution and mean of the "true" distribution.
- For this example, I will focus on the **lognormal distribution**
- Selection of **coefficient of variation (CoV_{tr})** of truncated distribution
  - Judgmental, pricing, benchmark, catastrophe model, fit of low and high selections with percentiles of distribution
  - Selection of attritional vs. catastrophe
  - Selection separate for earned, unearned and bound but not incepted (BBNI)
- Selection of **return period**
  - Generally return period set equal to 100 years (assumption: truncated distribution only includes loss events up to the 99th percentile of the true distribution)

ENIDS

Lloyd's Approximation

2. Calculate both Lloyd's approximations

Lloyd's Formula 1:

$$\frac{p}{\Phi\left(\Phi^{-1}(p)-\sqrt{\ln\left(CoV_{tr}^{\ 2}+1\right)}\right)}-1$$

Lloyd's Formula 2:

$$\frac{1}{\Phi\left(\Phi^{-1}(p)-\sqrt{\ln\left(CoV_{tr}^{\ 2}+1\right)}\right)}-1$$

p = 1 - 1 / Return Period

Φ = standard normal cumulative distribution function

Φ-1 = inverse of the standard normal cumulative distribution function

CoVtr = Coefficient of Variation of the truncated distribution

ln = Natural logarithm

ENIDS

Lloyd's Approximation

3. Select an ENIDS provision

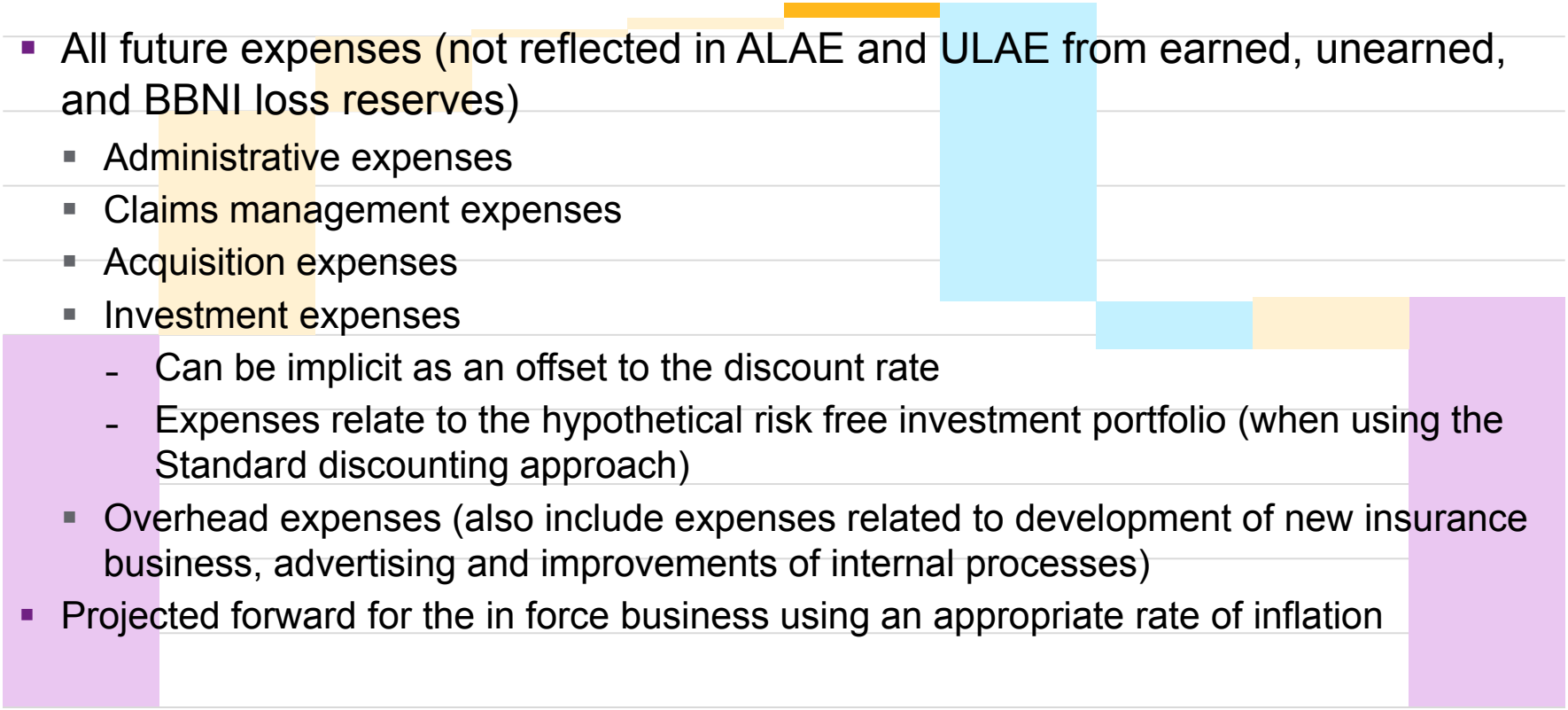
- This methodology is an approximation of the true missing right tail
- The exact value of the ENID load is between the two approximations listed before
  - Lloyd's Formula 1 will understate the ENID load (will be closer to true)
  - Lloyd's Formula 2 will overstate the ENID load

- Select an **uplift factor** between the two results
- Multiply best estimate by the uplift factor to get the **ENIDS provision**

Bermuda Economic Balance Sheet

Technical Provision Components: Expenses

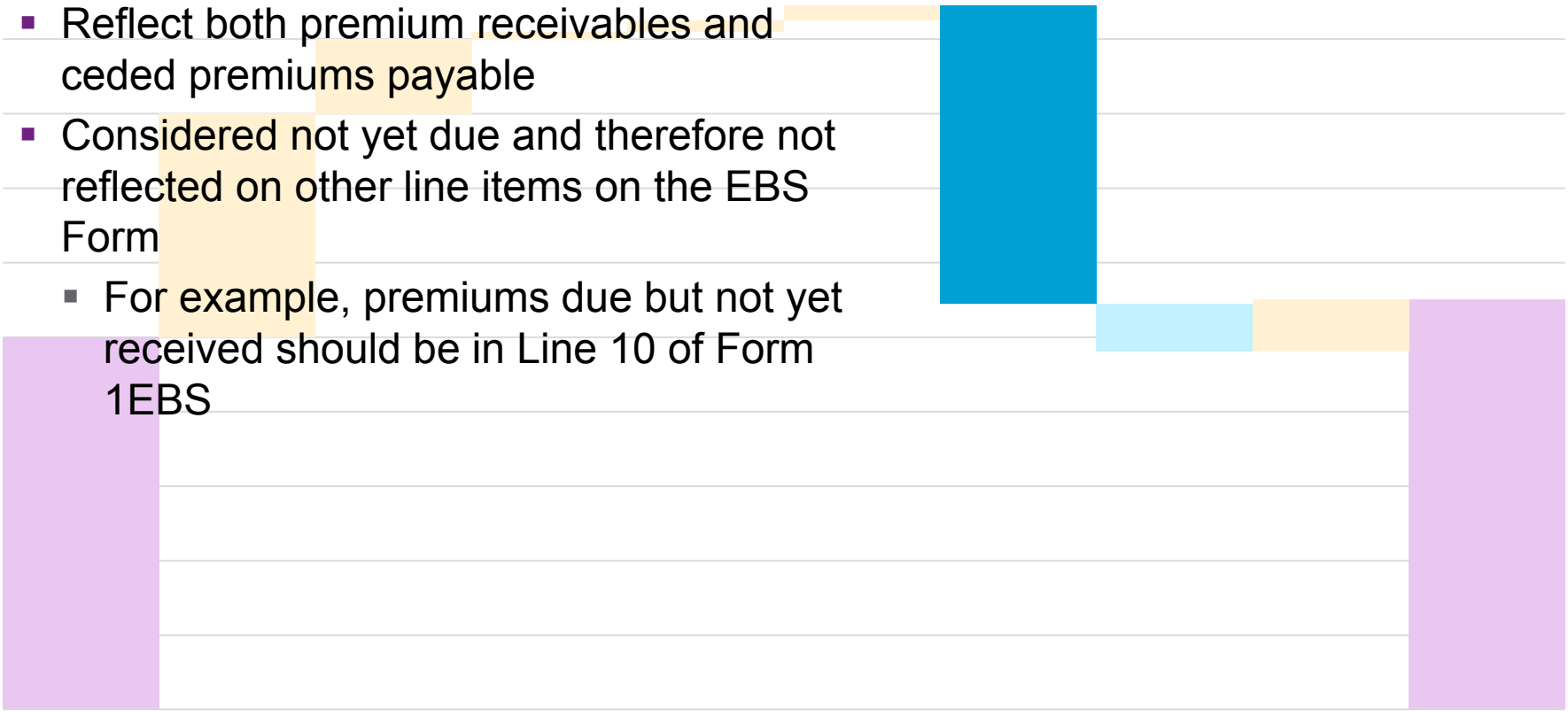
- All future expenses (not reflected in ALAE and ULAE from earned, unearned, and BBNI loss reserves)
  - Administrative expenses
  - Claims management expenses
  - Acquisition expenses
  - Investment expenses
    - Can be implicit as an offset to the discount rate
    - Expenses relate to the hypothetical risk free investment portfolio (when using the Standard discounting approach)
  - Overhead expenses (also include expenses related to development of new insurance business, advertising and improvements of internal processes)
- Projected forward for the in force business using an appropriate rate of inflation



Bermuda Economic Balance Sheet

Technical Provision Components: Premium Receivables

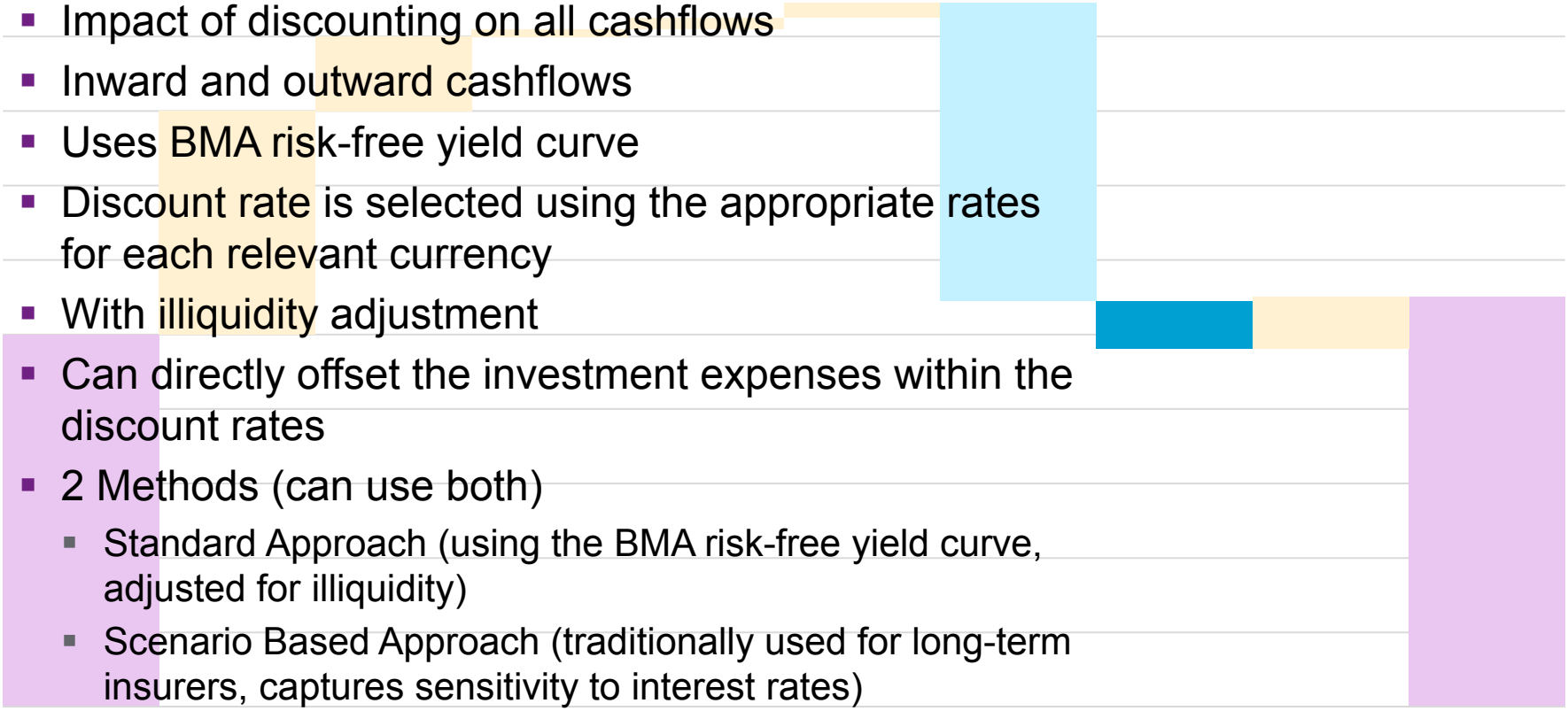
- Reflect both premium receivables and ceded premiums payable
- Considered not yet due and therefore not reflected on other line items on the EBS Form
  - For example, premiums due but not yet received should be in Line 10 of Form 1EBS



Bermuda Economic Balance Sheet

Technical Provision Components: Discounting

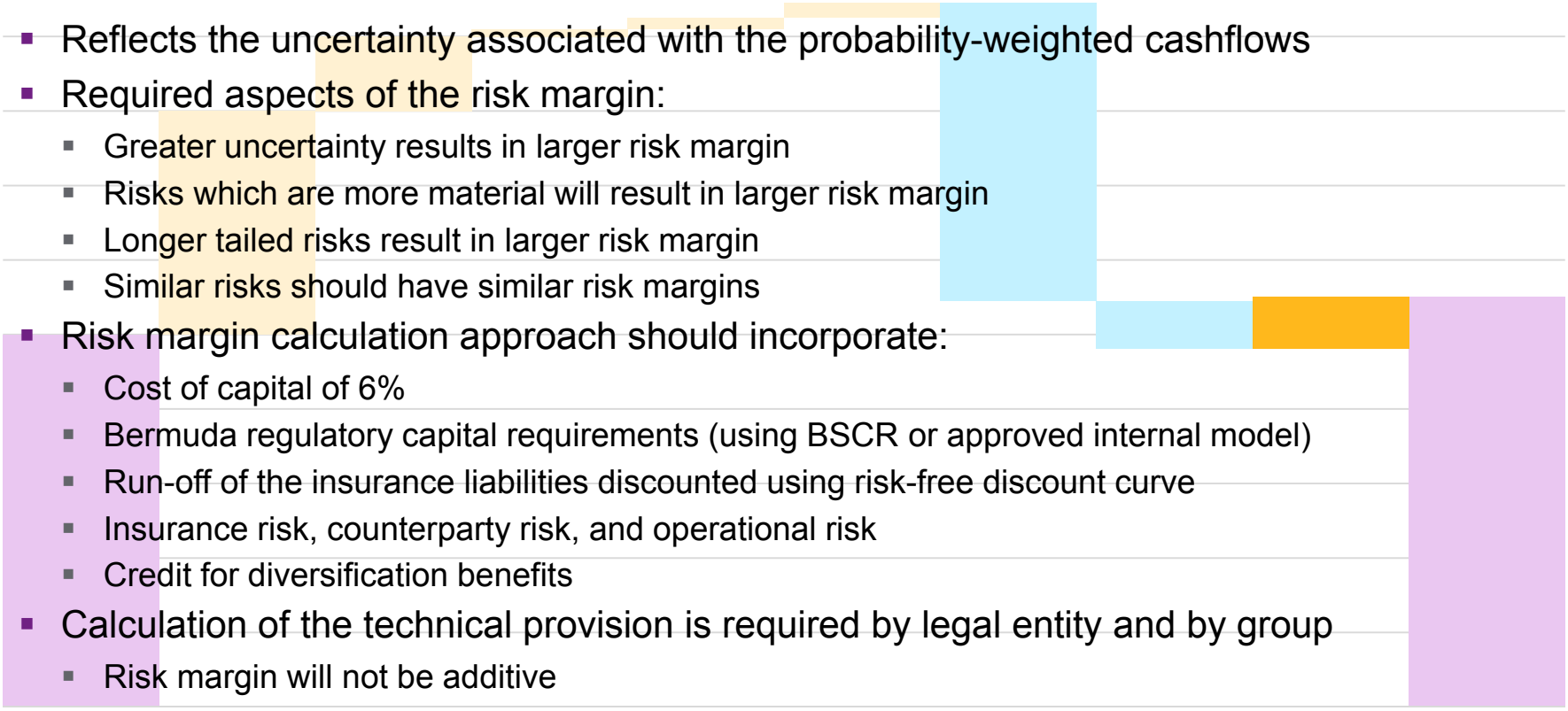
- Impact of discounting on all cashflows
- Inward and outward cashflows
- Uses BMA risk-free yield curve
- Discount rate is selected using the appropriate rates for each relevant currency
- With illiquidity adjustment
- Can directly offset the investment expenses within the discount rates
- 2 Methods (can use both)
  - Standard Approach (using the BMA risk-free yield curve, adjusted for illiquidity)
  - Scenario Based Approach (traditionally used for long-term insurers, captures sensitivity to interest rates)



Bermuda Economic Balance Sheet

Technical Provision Components: Risk Margin

- Reflects the uncertainty associated with the probability-weighted cashflows
- Required aspects of the risk margin:
  - Greater uncertainty results in larger risk margin
  - Risks which are more material will result in larger risk margin
  - Longer tailed risks result in larger risk margin
  - Similar risks should have similar risk margins
- Risk margin calculation approach should incorporate:
  - Cost of capital of 6%
  - Bermuda regulatory capital requirements (using BSCR or approved internal model)
  - Run-off of the insurance liabilities discounted using risk-free discount curve
  - Insurance risk, counterparty risk, and operational risk
  - Credit for diversification benefits
- Calculation of the technical provision is required by legal entity and by group
  - Risk margin will not be additive



Risk Margin

Generally the industry utilized the risk margin template provided by the BMA

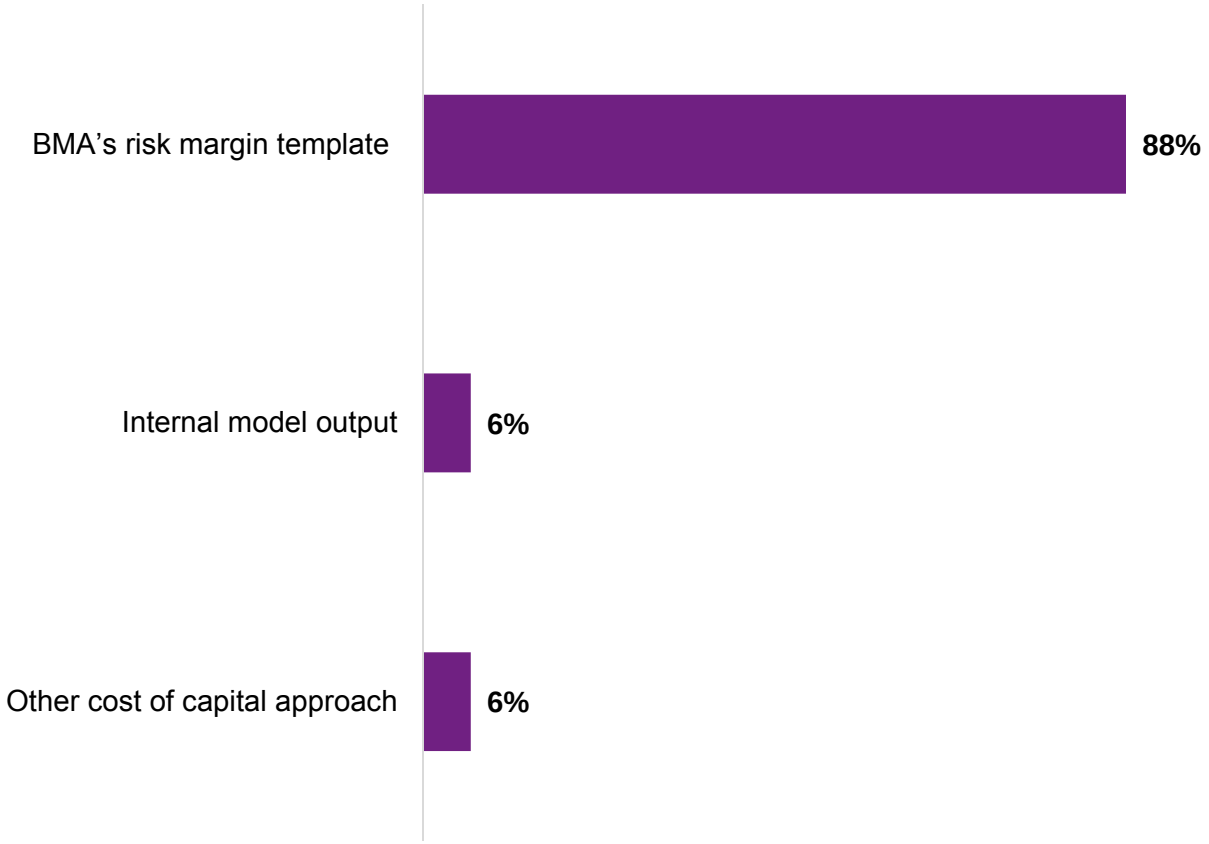
- We reviewed industry risk margin estimates and found for similar companies, little variation in the risk margin
- However, the range below reflects a mix of companies. Insurers with large property catastrophe risk charges tended to be toward the high end of the range

Item	Low	High	Calculation
Risk Margin	9%	20%	$\frac{\text{Risk Margin}}{\text{Technical Provision Excluding Risk Margin}}$

- By removing insurers who predominately write property catastrophe, the range narrows to 9% to 11%
- Some modifications to the risk margin template
  - Risk margin template allows for concentration adjustment based on allocation by BSCR line of business, possible improvements would be diversification benefits to reflect geographic diversification benefits consistent with the BSCR

2016 Survey: The majority of respondents utilized the risk margin template provided by the BMA

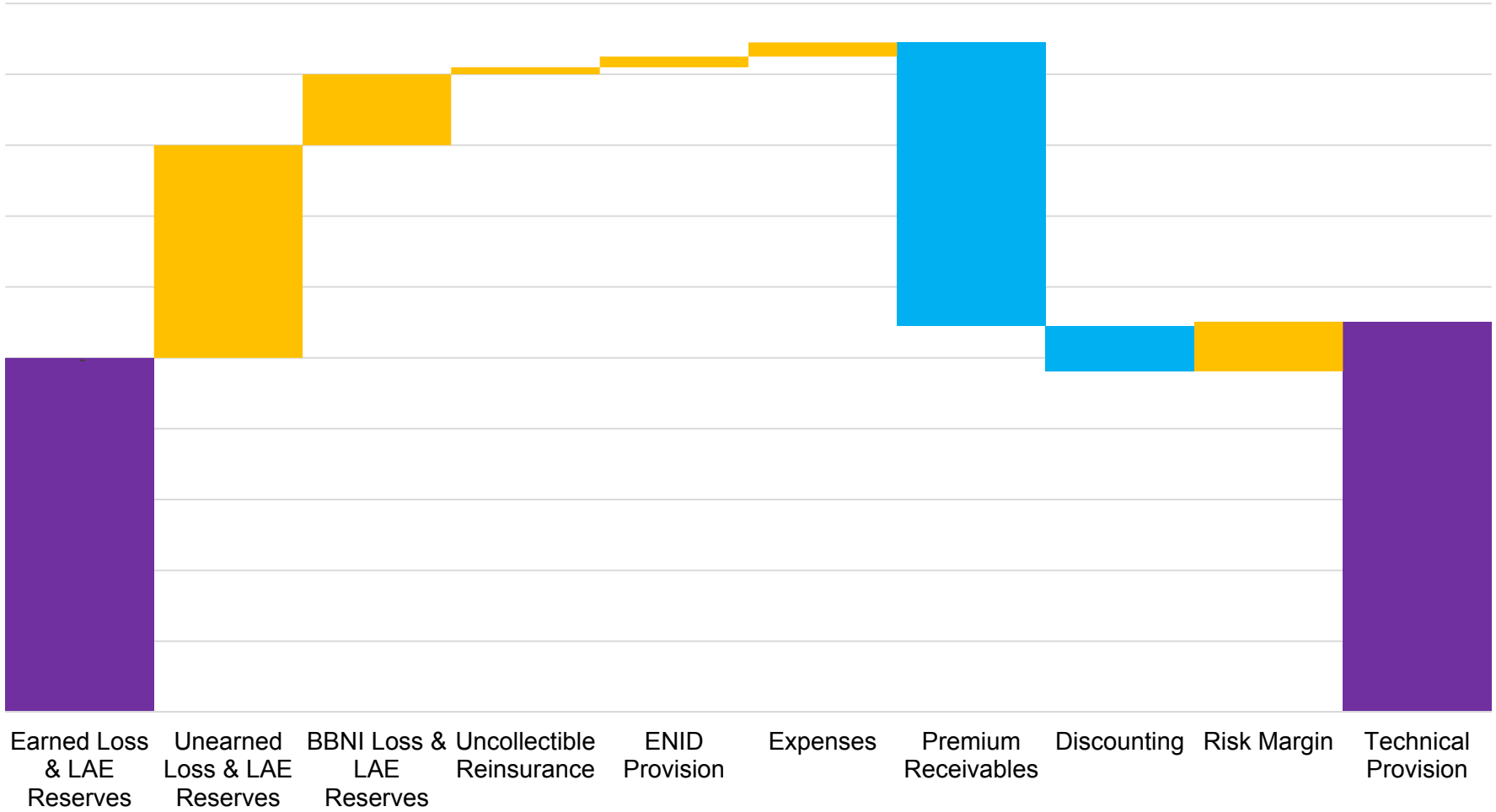
Q.5 What approach will your company take to develop the risk margin?



Base: Total Respondents n = 16.

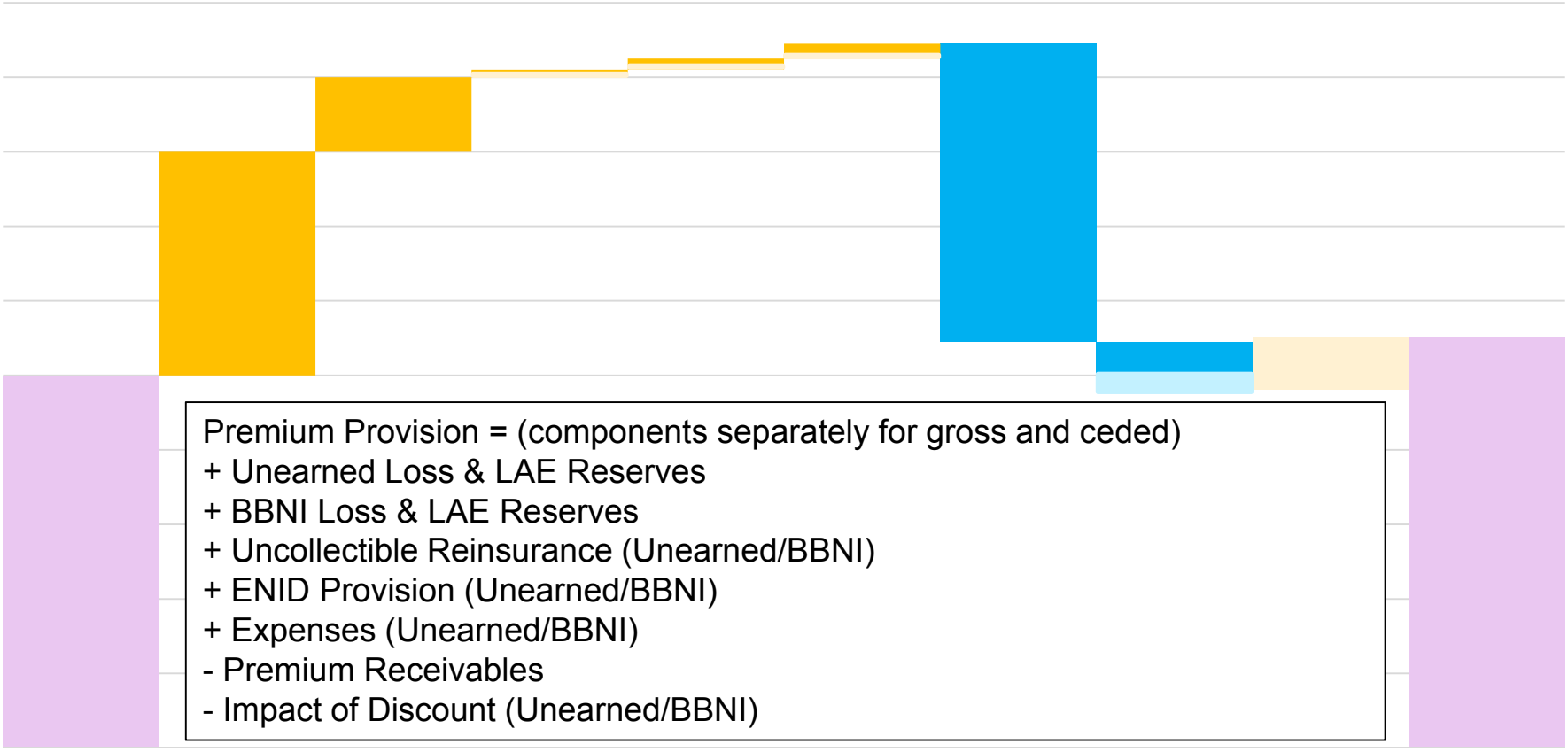
Bermuda Economic Balance Sheet

Technical Provision Components



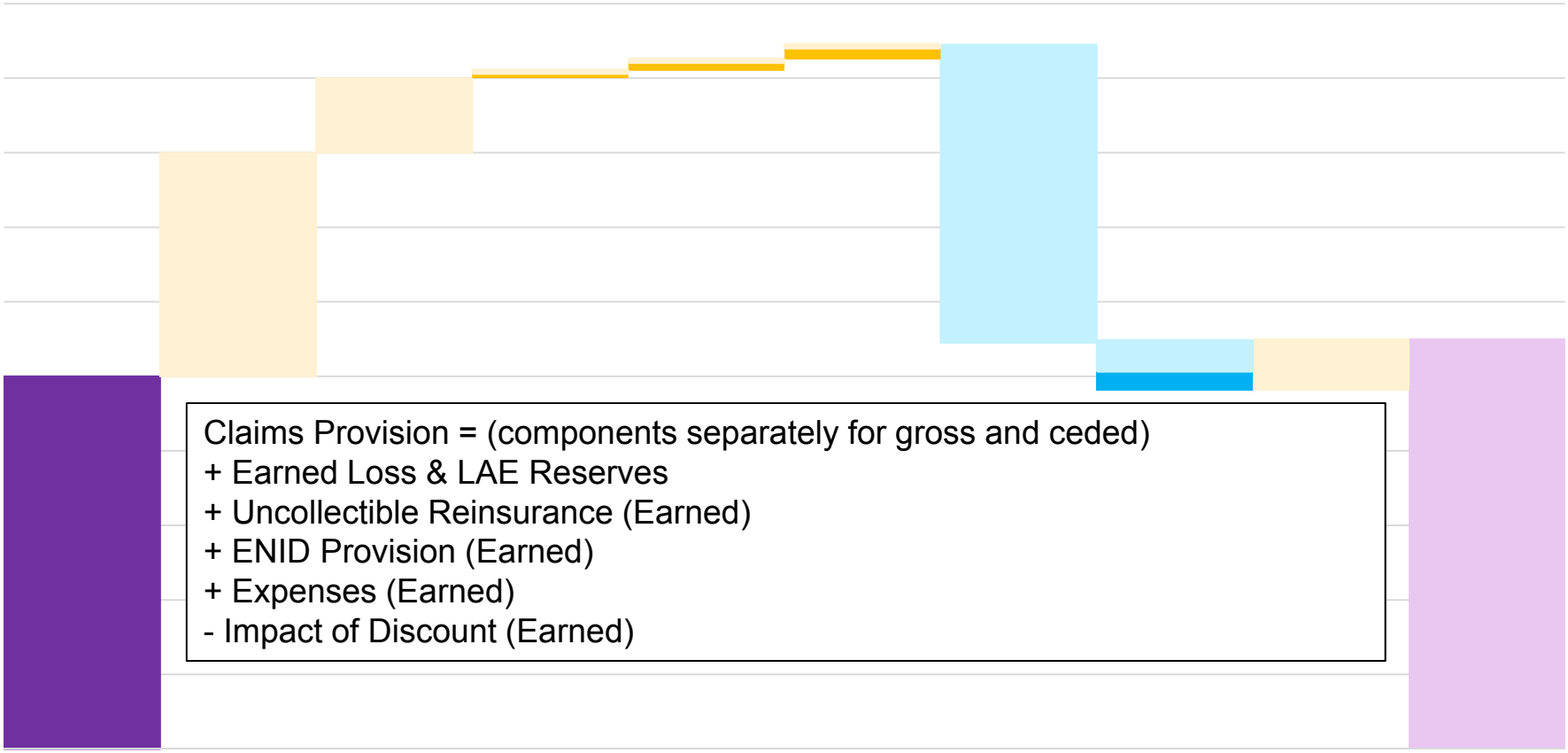
Bermuda Economic Balance Sheet

Technical Provision Components: Line 16 Premium Provision



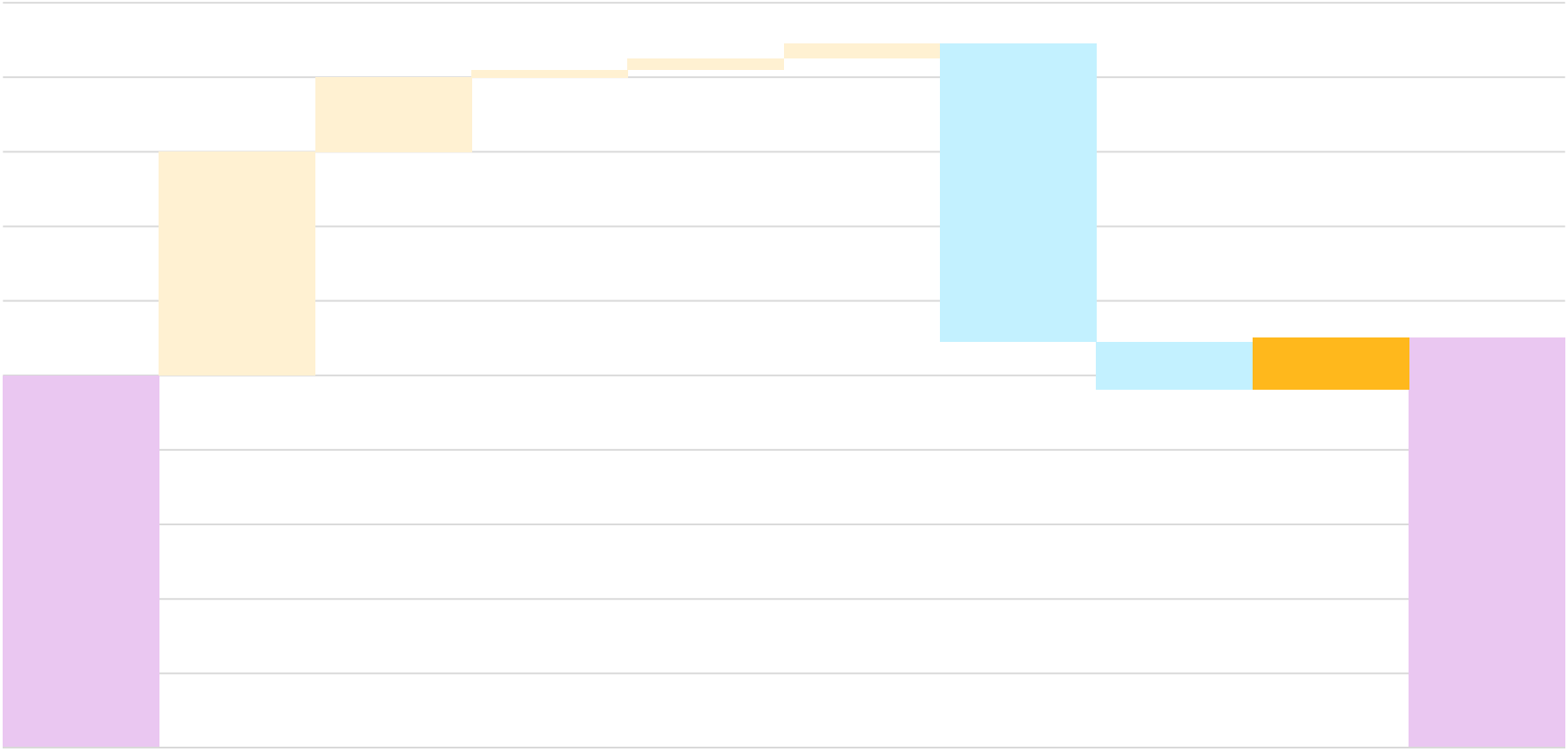
Bermuda Economic Balance Sheet

Technical Provision Components: Line 17 Claims Provision



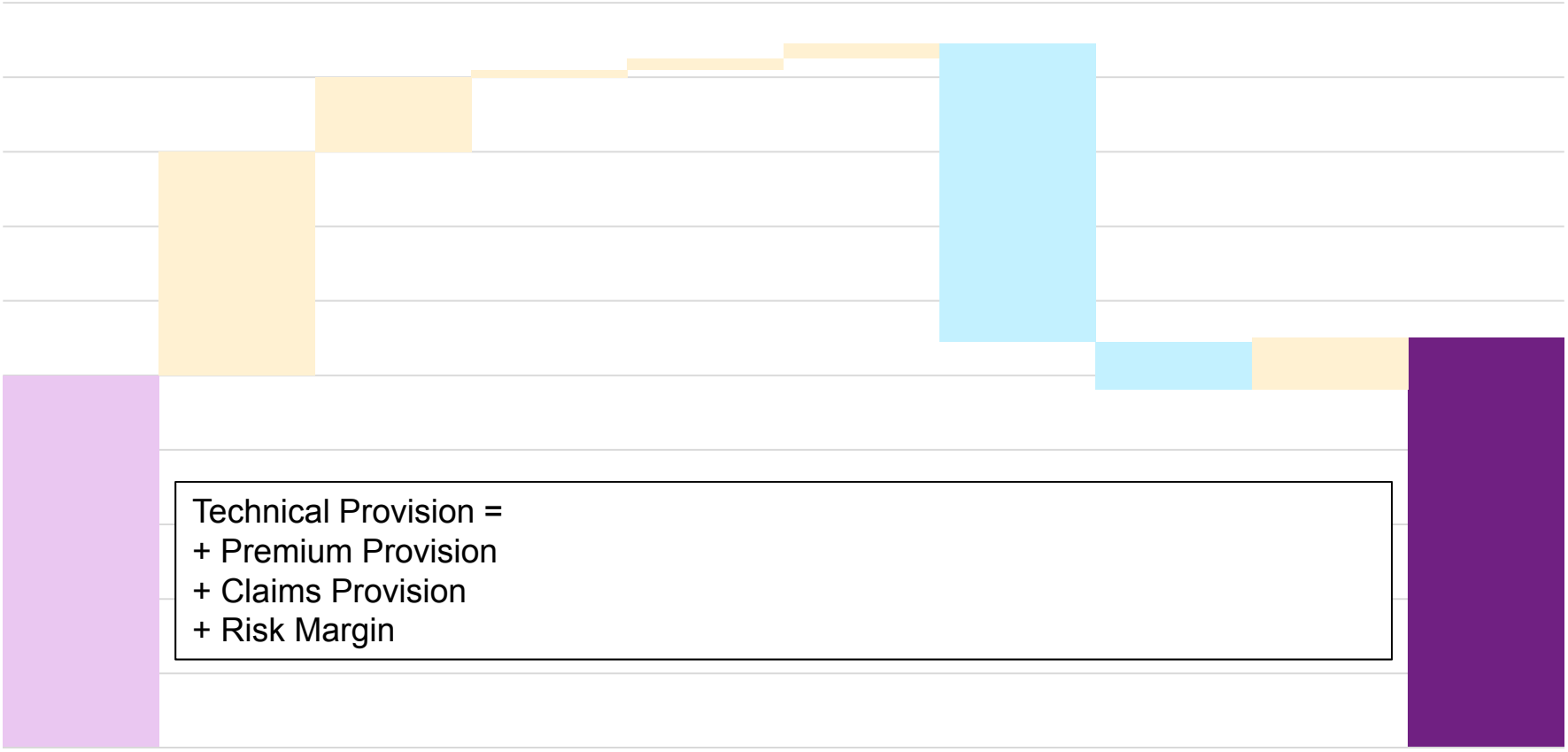
Bermuda Economic Balance Sheet

Technical Provision Components: Line 18 Risk Margin



Bermuda Economic Balance Sheet

Technical Provision Components: Line 19 Technical Provision



Common Issues across the Industry

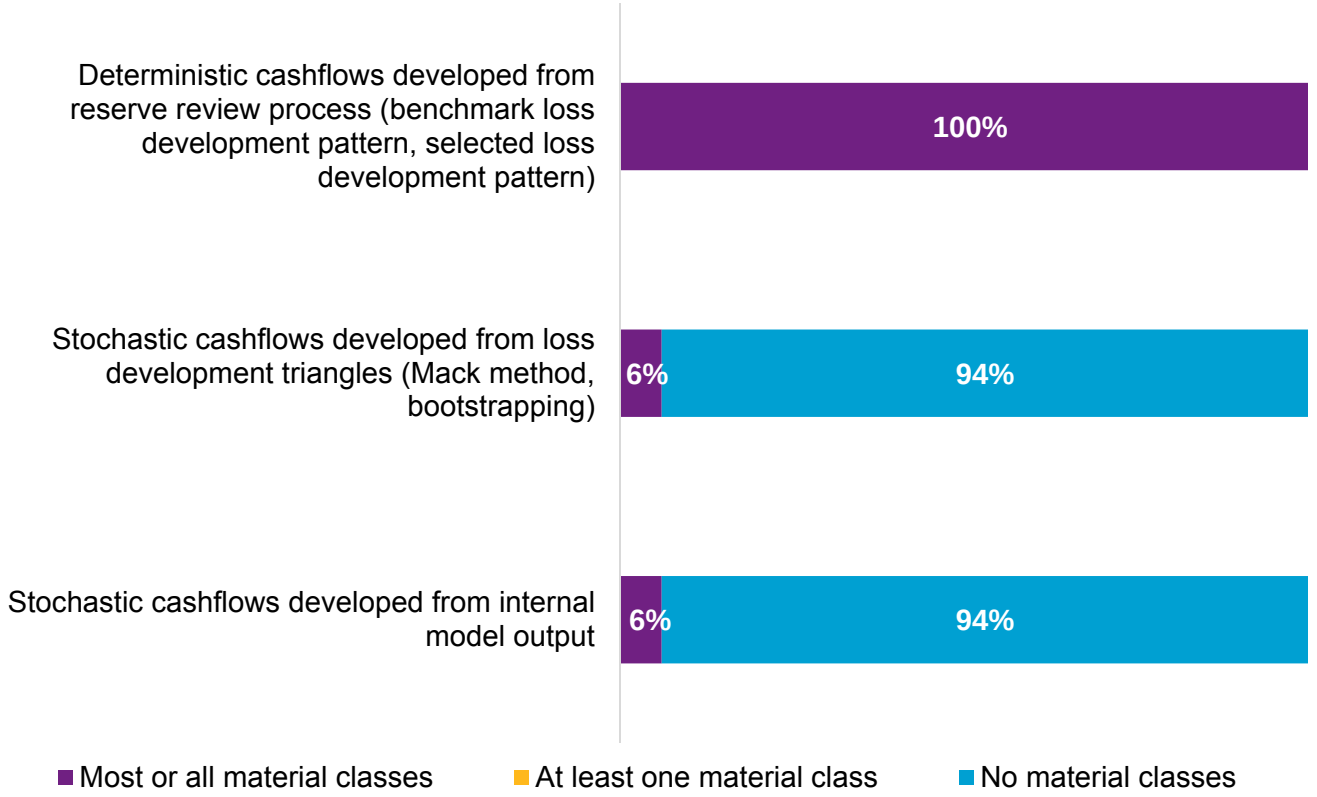
Cashflows

Best Estimate as Probability-Weighed Average of Future Cashflows

- *"Insurance technical provisions would be valued based on best-estimate cash flows, adjusted to reflect the time value of money using a risk-free discount rate term structure"*
- *"…should correspond to the probability-weighted average of future cashflows…"*
  - *"this is an aim, not a requirement"*
  - Guidance states the best estimates do not need to be calculated using stochastic methodology, however the resulting best estimate should be in line with a stochastically determined best estimate
  - However, the guidance also states *"The best estimate should be the average of the discounted cashflows and not the discounted average of the cashflows, where this is different"*

2016 Survey: A small percentage of respondents incorporated stochastic cashflows into their best estimate

Q.6 What approach will your company take to develop loss payment cashflows for material classes of business?



Base: Total Respondents n = 16.

Stochastic Cashflows

Few insurers stochastically estimated cashflows

- Most insurers used a deterministic approach when calculating cashflows
- Some insurers made adjustments to cashflows based on stochastic analysis
- Impacts of stochastic cashflows
  - Impact of management actions and policyholder behaviour
  - Financial and non-financial guarantees and options
- Contractual guarantees and options
  - Profit commissions
  - Sliding scale commissions
  - Commutation options (including experience accounts)
    - Stochastically estimate losses to predict the probability of commutation
    - Cedant will commute if experience account balance (premiums less payments made to date less margin) exceeds the discounted future expected loss payments plus a risk margin
    - Cashflows are discounted at time of commutation

Opinion Issues

Considerations for the Opinion based on EBS Technical Provision

- Risk of Material Adverse Deviation
  - In the past, we considered the volatility of reserves
  - Under EBS, the RMAD section needs to also incorporate volatility of unearned and BBNI loss reserves, including future catastrophe losses
  - Changes in interest rates
- Reasonability of Technical Provisions
  - In the past, the opining actuary determined if the GAAP loss reserves were “adequate”
  - Now, opining actuary must determine if the technical provisions are “reasonable” and, therefore, need to be between a range of reasonable technical provisions
  - In calculation of the low and high technical provisions, there should be variability around:
    - Loss estimates on earned, unearned, and BBNI exposures (after diversification benefits)
    - Reinstatement premiums
    - Variable commissions
    - Payout Patterns
  - Impact will be seen in:
    - Discount
    - Risk Margin
    - ENIDS

Questions to the BMA

- Expenses: Are expenses intended to reflect run-off of portfolio or incorporate some new business expenses? Line 146 of the guidance (*146. Insurers should consider whether sufficient future new business will be sold to enable existing per policy expenses to be maintained (with an appropriate rate of inflation). For closed books or declining businesses, consideration should be given to whether additional expense reserves are required to reflect increasing per policy expenses as the business runs off.*) leaves some interpretation we need to reflect new business expenses as well.

- Contract Boundary: How are the contract boundary issues addressed? Outward reinsurance contract premiums will reflect an entire year of exposures, but the underlying gross exposures will be mismatched to this, as the outward contract will reflect future written business. Therefore the recoveries will be partial, but the expected premium payments will reflect a full year of exposure. Should the premiums paid reflect a partial year despite the high likelihood of payment upcoming?

Questions

Thank you