LLOYD'S

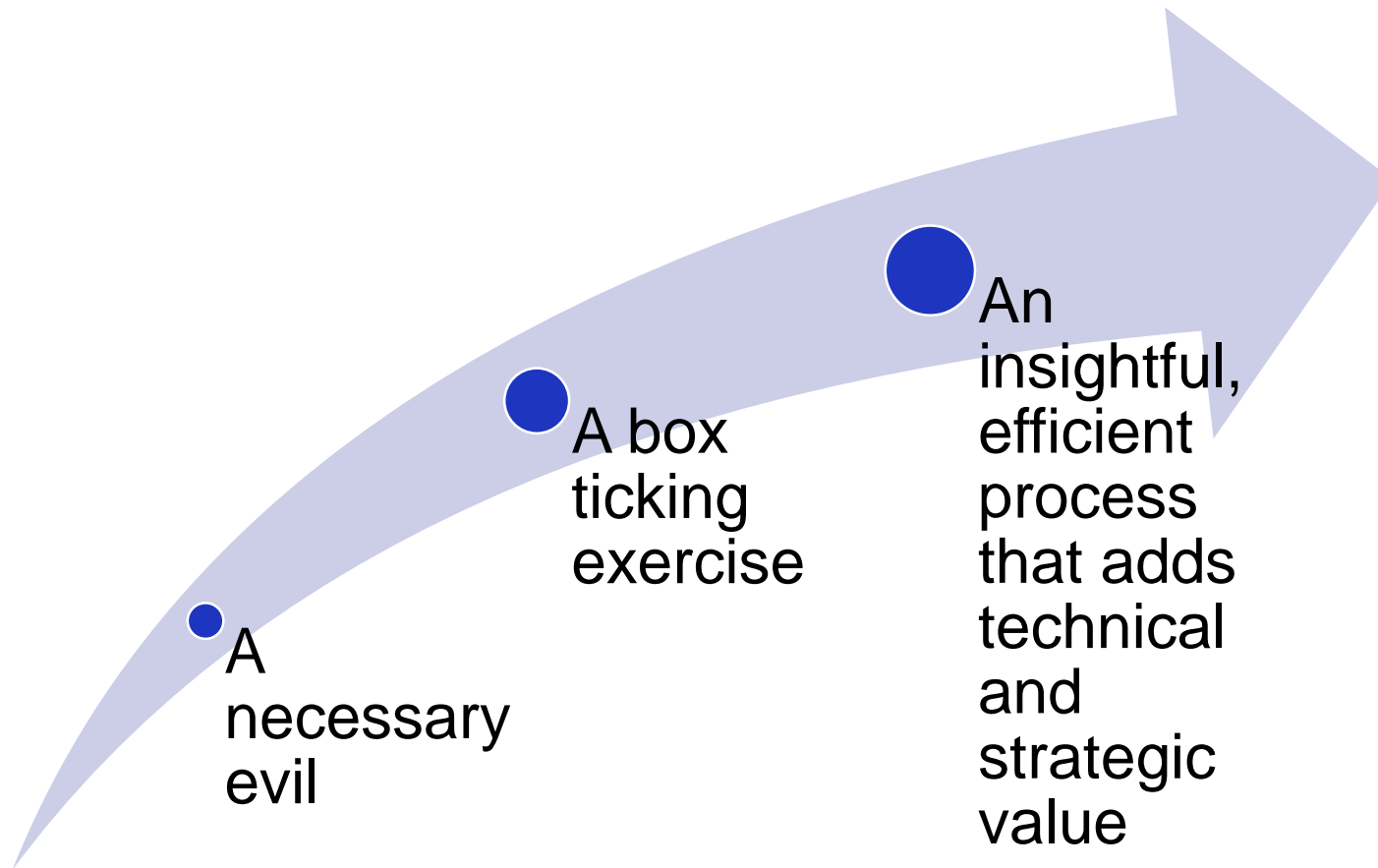# Internal Model Validation
Market Workshop

2 May 2019

Agenda

1. Evolution of Validation
2. 2019 Observations
3. Moving Forward
4. Summary

1. Evolution of Validation

Evolution of Validation

The aim of today is to discuss where we are and how we move forwards

A necessary evil

A box ticking exercise

An insightful, efficient process that adds technical and strategic value

Validation – a necessary evil?

- Validation is required by the Solvency II regulation to provide **robust, independent scrutiny** on the model output

- **Validation is for the board**, to allow them to gain comfort on the numbers provided

- Validation will be considered by regulators as part of demonstrating the appropriateness of model calculation and governance (including use test): both are **required for Solvency II compliance**

- It takes time when it is at a premium…

Validation – a box ticking exercise?

- **Box ticking**

  noun UK USUALLY DISAPPROVING

  The fact of doing something just because there is a rule that says that you must do it

- **Lots of tests to complete**

- **Substantial reporting to produce/update**

- **Lloyd's review template uses lists/boxes**

- **The model is approved and the change seems sensible/implementation has been tested and so should be fine**

- **Validation has only just seen the number…**

Do you like box ticking?

☐ yes

☐ no ✓

How do we evolve?

We need a solid foundation to build from

- Get the basics right:
  - Risk profile links, profit and loss attribution, SSTs and RSTs. These are the most valuable type of test
  - There should be management/board buy-in. The use test should help with this

- Take time to think
  - Spend time away from the model, considering what the risks to your business are and how they are incorporated into the model
  - Be curious about change in the model: what movements does it cause, do they make sense? (This includes the one-year)
  - Spend time defining a test schedule that manages risk and adds value – if a test will always pass or will result in no adjustment should it be run?

- Practical improvements:
  - Define a timetable that creates space where possible – validating close to the deadline is the time that is under most pressure
  - Think about the reporting suite – could it be updated in sequence/tiered/have a better split between technical and not

Sounds great, but we're really busy ticking boxes…

Feedback suggests that validation cycles are not having the intended impact of focussing work
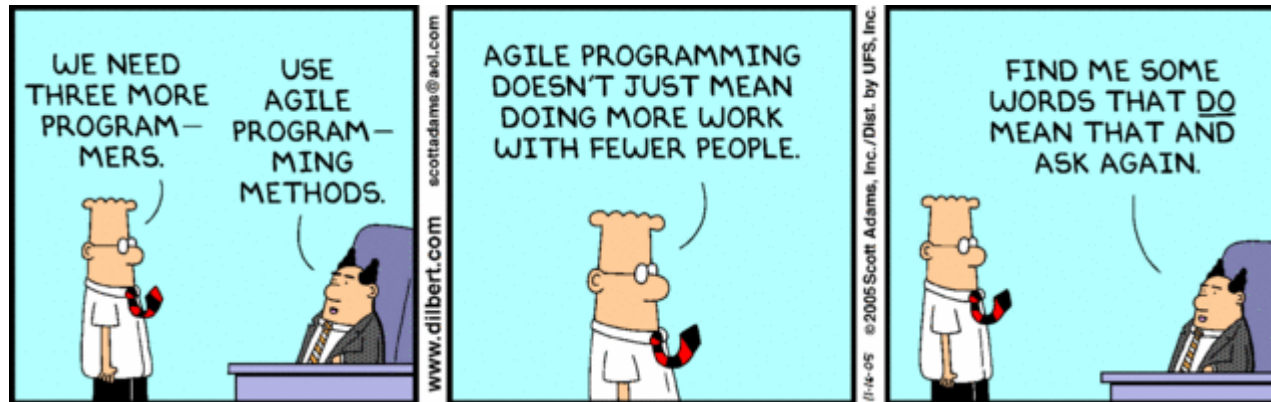
The aim was to:

- do less tick box ticking every year
- free up time/resource to look into answering value adding questions
- encourage focus on areas of emerging risk/change

Successful implementation requires clearer guidance, confidence and self-direction:

- Testing for the need to test takes time
- Market to consider whether "core" validation is proportionate, Lloyd's to clarify guidance on this
- Market needs to be clearer in articulation of what has been considered and why

To add value the market needs to change some views on validation and we aim to support, but not prescribe, this!

2. 2019 Observations

2019 YoA validation report reviews

Process

- Risk based approach taken to reviews across syndicates

  - 43 syndicates reviewed in detail (light reviews in progress)

- The template continues to have 4 broad sections

- Minor changes to the template

  - More focus on validation of dependencies
  - A check on whether risk profile changes have been considered when validating changes in capital
  - Emphasis on validating the post diversified contribution to capital, in particular market risk
  - Attention given to check validation of cyber attack risk

- More focus on validation of Special Purpose Arrangements (SPAs)

- Specific sections of validation reports continue to be used during capital review

Validation report content	Components of validation
Key validation tests	Thematic issues
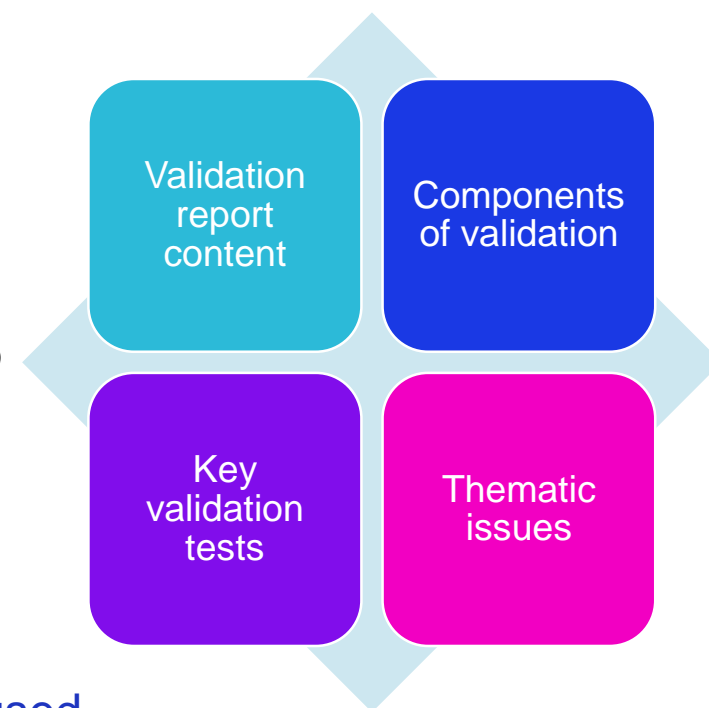
2019 YoA validation report reviews

Categorisation changes

Last year…

- Issues were categorised into **material** and **developmental**
    - The difference being that material issues were to be **addressed immediately** and developmental issues **considered**

This year….

- We listened to CALM who did not want to receive developmental points
- We reduced the number of issues to be **addressed immediately,** by creating a new **Critical** category and allowed longer time to address **Material** issues

Critical Issues: addressed immediately. Validation report does not meet Lloyd's Minimum Standards. If not resolved, these issues would result in a **Solvency II load** (for March CiL)

Material Issues: addressed by the next submission | **Definitions**

- As part of the recategorisation, some **developmental** points were raised to **material**

- Overall, this **reduced** the number of issues to be addressed immediately but **increased** the number of issues to be addressed by next submission

2019 YoA validation report reviews

High level findings (1)

The top 5 issues across all 2019 YoA validation report reviews, split into critical and material

Top 5 critical issues	
1	Reverse stress test
2	P&L attribution (historic and prospective)
3	Dependencies
4	Stress and scenario tests
5	Testing against experience

| Top 5 material issues	
1	Reverse stress test
2	Expert judgements
3	Board report content
4	Limitations
5	Validation pack content

- Reverse stress tests appear top of both categories

- The critical issues will be discussed via examples. Further details on the material issues are in the appendix

2019 YoA validation report reviews

High level findings (2)

Comparison of number of issues raised this year compared to last year - Issues which HAD to be addressed

# of critical + material 2019 YoA vs material 2018 YoA issues

Top 5 issues from 2018 YoA review

■ 2018 YoA
■ 2019 YoA
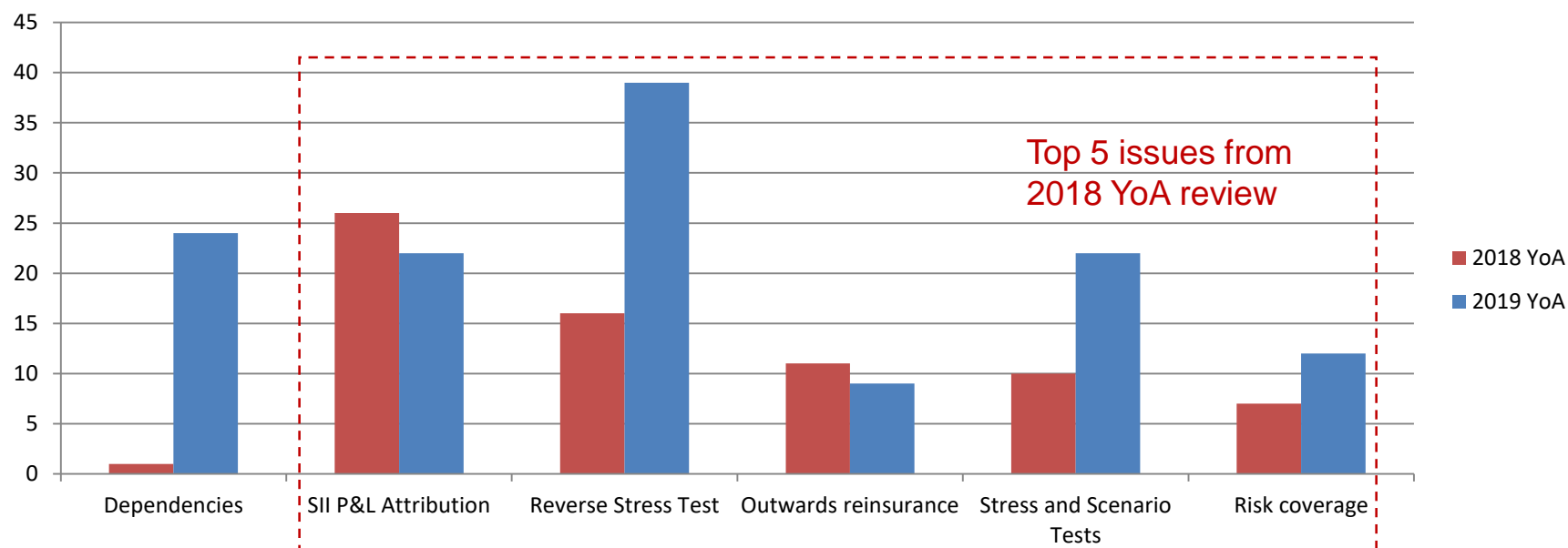
- More issues were raised around RSTs and SSTs in particular, as well as on adequacy of validation of non-calculation component (risk coverage). However, of these issues, fewer were to be addressed immediately
- Improvements seen in other areas, e.g. P&L attribution and outwards RI
- More focus this year on validation of dependencies, which falls short of expectations

2019 YoA validation report reviews

Thematic feedback (1)

Other thematic findings from 2019 YoA validation reviews are:

- Post diversified contribution to capital (ultimate and one year)
  - needs to be validated, by risk category level and lower granularity if need be (e.g. by class)

- Validation on SPAs need to be improved; SPAs should receive the same level of validation as a syndicate
  - It is acceptable to use the host test results, as long as sufficient justification is provided on the credibility of this
  - Solvency II test requirements must be met for SPAs

- Escalation process
  - It needs to be more clear what happens to tests which passed with limitations or failed
  - Who looks at these, what is the outcome of the escalation, what changes has this review made?

2019 YoA validation report reviews

Thematic feedback (2)

- **Aggregation of test results to risk category and across risk category to overall capital was quite weak**

  - This high level rating should be provided to the Board to allow them to make decisions on capital adequacy

  - Consider the materiality of individual tests which pass with limitations/fail within a risk. What impact do these collectively have for that risk?

  - Given the risk category ratings, what impact do these have collectively for the overall uSCR (and OY SCR)? What level of confidence does the Board then have on overall SCR?

SCR standard formula

- **Validation around dependencies can be improved**

  - Make use of RST, SSTs and sensitivity tests;

    - Look at scenarios which affect multiple classes or multiple risks

    - Use sensitivity tests to determine materiality (ST1) and quantify uncertainty (ST2)
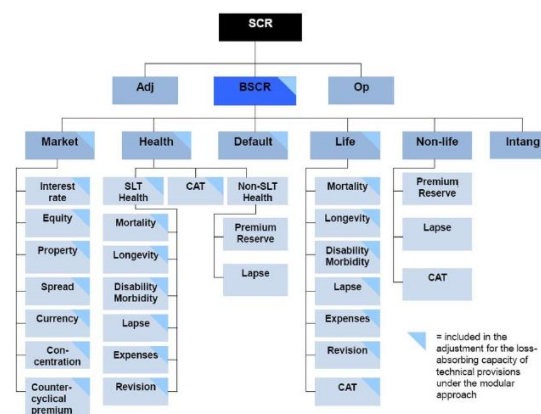
2019 YoA validation report reviews

Feedback on Critical Issues

The main critical issues are around the level of top down validation

- That is, those tests which require actions or thinking outside the model and then comparison to the model output

This can be achieved by RSTs, SSTs and P&L attribution

- **An RST focuses on scenarios causing unviability**

  - The description of what causes unviability was not always given
  - Usually a 1 in 200 RP but can be lower or higher

- **SSTs are similar to RSTs but focus on more likely scenarios**

  - That is twice or once in a career e.g. RP of 1 in 25 or 1 in 50
  - The range of return periods assessed should be increased

- **The SII P&L is another way at assessing adequacy of the model**

  - If GAAP is bridged to SII P&L, the SII P&L must be compared to model output

85th percentile
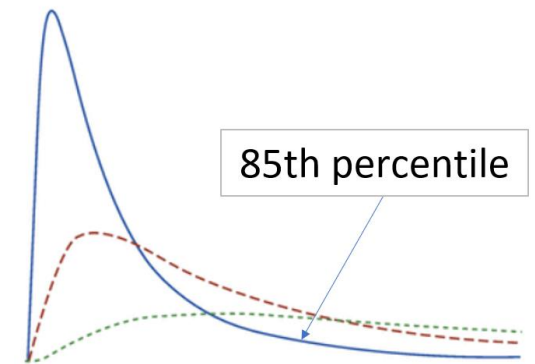
Top Down Validation

Getting the basics right and adding value - Introduction

- **We now go through an example validation investigation of dependencies**
  - Dependencies are hard to validate
  - Example makes use of tests which have to be performed under Solvency II guidance, such as RSTs and P&L attribution
  - We aim to demonstrate how these tests can add value to validation, using a top down approach

- **Example shows test extracts and focuses on ultimate capital, one-year capital should be considered in practice**

- **Any numbers presented are for illustrative purposes only**

Reverse Stress Test

P&L attribution (make use of data)

Stress and Scenario Tests

Sensitivity Tests
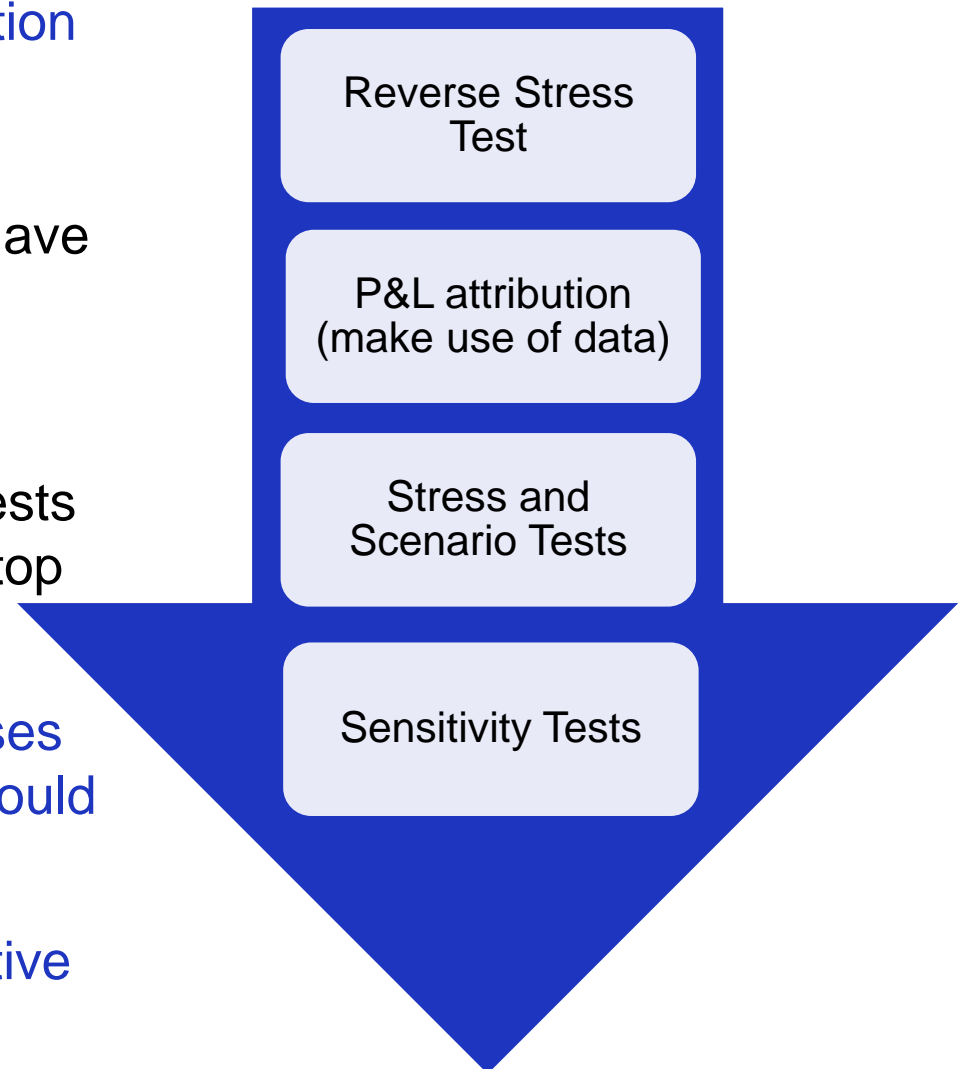
Top Down Validation

Getting the basics right and adding value - Context

- **Risk profile consideration**
  - There has been an increase in US casualty exposure which has resulted in an increase in capital (ultimate and one-year)
  - The Board are aware and have defined a new scenario for the RST to include this, to determine if the model is appropriately capturing this risk profile change
  - Board consideration for RST scenario could be: *"What if you woke up one morning and found that the managing agent had lost £Xbn, what do you assume happened?"*

- **Risk ranking consideration**
  - The main risk categories are ranked, to determine which are the most material risks and hence influence the focus of the validation
  - In this example, catastrophe risk is the dominant risk, followed by reserve risk and non-cat premium risk
  - Therefore, the Board focused on these risk categories for the RST

Top Down Validation

Getting the basics right and adding value: RST (1)

- **Why do a Reverse Stress Test?**
  - It is a Solvency II requirement
  - Involves the Board and Senior Management: used as conversation starter around scenarios that cause unviability and the risk management implications from this
  - High level check on model when little data, especially dependencies between risk categories

Feature	Owner	Question(s)	Response(s)
Unviability	Board	What unviability means for your business and how likely this would be to happen (as a return period)?	For example, a loss of £300m which means we can no longer write business as less capital than MCR. Estimated RP of 1 in 100
Independent estimate	Board	Consider what scenario(s) would lead to unviability?	Loss of £300m: +£200m from a Nat Cat (US WS) and secondary impacts of reinsurer default, +£100m from reserve deterioration of US Casualty class with secondary impact of under-pricing in premium risk
		What secondary impacts of the scenario would occur?	- RI Credit Risk and Premium Risk
		What would be the estimated loss by risk type, by class?	- Catastrophe Risk £175m and RI Credit Risk £25m - Reserving Risk (US Casualty) £75m and Premium Risk (US Casualty) £25m
Pass/Fail Criteria	Validator	Define a suitable range around the return period in terms of the number of simulations, i.e. the collar?	A suitable range around the return period in the model output, e.g. +/- 50 simulations or suitable upper and lower return periods
Compare to model output	Validator	Compare estimate to model output, does the total loss magnitude fall in this range of simulations?	Total loss found in defined collar but insurance risk loss is out of the collar. Results in a Fail and follows the escalation process.
		How does model output compare at the risk category level?	

Top Down Validation

Getting the basics right and adding value: RST (2)

- The Reverse Stress Test can be used to assess the appropriateness of dependencies between risk categories and classes, as well as for overall capital

- It might be difficult for the board to break estimates down to class level. However, class level, or at least group of classes, should be considered where appropriate, technical experts can give input

		Estimates		Pass/Fail Criteria		Simulations		Result
		Loss	RP	Lower	Upper	#12345	#67891	P/PwL/F
Scenario	Loss severe enough so syndicate is unviable	£300m	1 in 100	1 in 75	1 in 125	1 in 131	1 in 152	Fail
Scenario by class/risk type	Insurance risk	£275m	1 in 75	1 in 65	1 in 85	1 in 102	1 in 127	Fail
	Reserve risk (US Casualty)	£75m	1 in 60	1 in 50	1 in 70	1 in 62	1 in 51	Pass
	Non Cat Premium Risk (US Casualty)	£25m	1 in 60	1 in 50	1 in 70	1 in 69	1 in 57	Pass
	Cat risk (US Property)	£175m	1 in 50	1 in 40	1 in 60	1 in 43	1 in 52	Pass
	RI credit risk	£25m	1 in 70	1 in 60	1 in 80	1 in 61	1 in 74	Pass
	…	…	…	…	…	…	…	…
Initial result	Fail		Escalation?	Yes				
Finding	Loss falls out of range and above the range, so the loss is more remote in the model than is estimated by the Board/Senior management, indicating that the model is underestimating magnitude this scenario							

* other risk categories assumed to be zero for simplification purposes only

The return period for the scenario as a whole fails, but…

- The model RP for insurance risk fails, whilst the more granular risk categories pass
- Does this indicate that the model is not capturing the expected strength in relationship between reserving and premium risk for US Casualty?
- **Such questions were summarised and escalated to the Board who asked for further investigation**

Top Down Validation

Getting the basics right and adding value: P&L attribution

- The P&L attribution can be used to investigate dependencies, between risk categories or between classes, e.g. if there are losses in multiple risk categories or classes

- Actual data is compared to model output distributions, so makes use of data and can be at any level of granularity

- If P&L attribution is done on a GAAP basis and bridged to a SII, the SII P&L attribution should also be compared to model output *(as per 2019 YoA validation feedback)*

- P&L attribution exhibit questions and responses:
  - The actual loss was at the modelled 98th percentile for US property premium risk. Is this explained by an unmodelled catastrophe?

Class	Premium Risk	Reserve Risk
US Casualty	80th	90th
US Property	98th	40th

example P&L attribution extract

  - The premium risk and reserve risk outcome for US casualty were both at high modelled percentiles. Was this from a common cause, i.e. does this highlight a stronger relationship than is currently modelled?

- There is not always a lot of data though, especially in the tail. Continue to look at a specific scenario and compare to model output

Top Down Validation

Getting the basics right and adding value: Stress and Scenario Tests (SSTs) – US Casualty

- **SSTs can help validate dependencies between classes or between risk types, through scenarios which are a combination of losses**

- **SSTs scenarios are expected to occur more often than those for an RST e.g. twice or once in a career, i.e. 1 in 25 and 1 in 50 return period, or once in a lifetime (1 in 80 RP)**

- **SSTs should be performed in the same way as an RST i.e. estimated scenario results are compared to model output**

		Estimates		Pass/Fail Criteria		Simulations		Result
Scenario	Mispricing over a few years	**Loss**	**RP**	**Lower**	**Upper**	**#1145**	**#3367**	**P/PwL/F**
Casualty	Premium and Reserve Risk	£35m	1 in 25	1 in 20	1 in 30	1 in 60	1 in 50	Fail
	Premium Risk	£20m	1 in 40	1 in 30	1 in 50	1 in 42	1 in 31	Pass
	Reserve Risk	£15m	1 in 30	1 in 20	1 in 40	1 in 39	1 in 27	Pass
Initial result	Fail	Loss falls outside range and above so model is underestimating impact						
Escalation	Yes							

- **SST exhibit questions and responses:**
  - Senior management thought of a US Casualty mispricing scenario to test, which failed
  - This indicates that the model is not responding as expected to this scenario and therefore, further investigation carried out
  - What drives this failure? What classes make up US casualty? Which of these classes correlation between reserving and premium risk is most material? Sensitivity tests can help answer these questions

Top Down Validation

Getting the basics right and adding value: Sensitivity tests (1)

- **Sensitivity tests can be used to help validate dependencies**
    - Sensitivity type 1 (ST1) tests can be used to find out which assumptions are the most material. We can use these to assess materiality of correlation assumptions
    - Sensitivity type 2 (ST2) tests can be used to test plausible alternative assumptions, such as correlations. This requires additional effort and senior management input. ST1 test results can help indicate which correlations should therefore be focused on

- **ST1 exhibit questions and responses:**
    - US Casualty is made up of four classes in this example
    - This test shows that the MedMal class has the most material impact on capital
    - This indicated which class correlations should be investigated further via use of ST2

Change in between reserving and premium risk correlations by class		
	Change in correlation	
Impact on capital (H/M/L)	**+5%**	**-5%**
Employees Liability	M	M
Public Liability	M	M
Workers Compensation	L	L
Medical Malpractice	H	H

- **This was communicated to senior management. Their involvement would be needed in coming up with the plausible alternative correlations as part of ST2 testing**

Top Down Validation

Getting the basics right and adding value: Sensitivity tests (2)

- **Sensitivity type 2 (ST2) test**

  - Senior management thought up plausible alternative correlations between reserving and premium risk for MedMal

  - These were implemented by the validators and results fed back to senior management

  - Senior management used their experience to gain more comfort around a higher correlation

    - However, a higher correlation between reserving and premium risk for MedMal only would be inconsistent with such correlations for the other classes within US Casualty

    - This triggered consideration of detailed review of dependency calibration and structure

- **This was escalated to the Board for their involvement and challenge**

Top Down Validation

Getting the basics right and adding value: Conclusion and Summary

Syndicate Conclusion

- This resulted in further action prescribed by the Board with Senior Management support, for the modelling team to carry out a detailed review of the dependency calibration and structure for US Casualty

Summary

- Evolution of validation
  - Using a top down view, an initial RST failure triggered a series of investigations which made use of a number of tests to investigate a dependency issue; P&L attribution, SSTs and sensitivity tests

- Escalation process
  - A clear escalation process was followed, failures were escalated to independent Senior Management/Board, who discussed and evidenced their challenge, influence and conclusions

- Board/Senior Management involvement and influence
  - Involvement was evident from the start, which continued through to resolution
  - Board challenge and understanding demonstrated, as well as influence on validation design

3. Moving Forward

Targeted Validation – 3 Year Validation Cycle

Where are we and how are we doing?

- We are now in the third year of cycle (first year was 2018 YoA)

- Syndicates' 3 year plans have generally been adhered to and deviations from the plan documented in the validation report

- Most syndicates have submitted their deep dives along with validation reports as requested.

  - However, very few submitted their previous years deep dives which was also requested last year

  - More signposting is required – how do deep dives link back to the validation plan and what has been done in the previous years – validation report should make clear to the board what has been done this year/last year/next year

Deep Dive	2018 YoA	2019 YoA	2020 YoA	2021 YoA (planned)
RI credit Risk	Deep dive			Refresh deep dive
Reserving Risk – Risk Margin		Deep dive		
Dependency credit and insurance risk			Deep dive – delayed (model development planned in 2020)	Deep dive
…	…	…	…	…

Targeted Validation – 3 Year Validation Cycle

Feedback from Market

- Targeted validation has increased the amount of validation

- Doesn't add value but encourages box-ticking

- Validate everything annually and then a bit more every 3 years

Current view, in accordance with the market bulletin Y5076, Planned clarifications

- The aim is for validation to focus on particular areas of the internal model at different times CLARIFY: Deep dives into different areas and also allow targeted, in-depth validation activity into thematic areas

- It was not expected to increase resources devoted to validation but better deploy existing resources CLARIFY: We are not expecting LESS validation but SMARTER validation

- A deep dive review of each risk category once every 3 years, with model output on material risk validated annually. CLARIFY: A risk-based validation approach with majority of activity focused on the material risk areas is allowed → Principle of proportionality

- CLARIFY: Ensure validation activity is directed at the areas which have been subject to change, e.g. methodology changes to ensure continuous model development or parameter updates to reflect changes to risk profile

Targeted Validation – 3 Year Validation Cycle

Base level testing

Top-down validation tests need to be performed every year and include:

- Assessing the overall movements in the SCRs, in particular with reference to the underlying movements in the risk profile and validation of ANY model changes
- Risk ranking, and any movements in the ranking compared with the previous SCRs
- Assessment of materiality of parameters (part of risk ranking) in order to assess level of core validation necessary
- Backtesting historical events or near-misses
- P&L attribution
- Stress and Scenario Testing, including Reverse Stress Testing
- Stability/convergence testing
- MODEL OUTPUT MUST BE VALIDATED EVERY YEAR

Whilst these tests need to be performed every year, they should vary depending on the risk profile of the syndicate.

Targeted Validation – 3 Year Validation Cycle

Sensitivity Testing example

From

# of tests	Year				
Risk Category	Core tests	Y1	Y2	Y3	Test bank
Underwriting	24	27	26	29	33
Catastrophe	14	14	14	14	14
Reserving	20	22	24	23	28
Market	6	6	14	6	14
Credit	4	8	4	4	8
Operational	3	3	3	6	6
Dependencies	7	10	7	9	12
Total	78	90	92	91	115

To

# of tests	Year				
Risk Category	Core tests	Y1	Y2	Y3	Test bank
Underwriting	10	20	30	10	40
Catastrophe	10	20	10	10	20
Reserving	10	10	25	20	35
Market	3	15	3	3	15
Credit	2	2	10	2	10
Operational	2	2	2	10	10
Dependencies	5	5	5	30	30
Total	42	74	85	85	160
Thematic Areas		15	10	10	

- Core tests: these are validation tests which are run annually, regardless of any risk profile or model changes. Focus on material areas – Core tests column
- Deep dives: these are considered as extensions of the core tests, which are only necessary to run once within a validation cycle, assuming it has not been subject to either model or risk profile changes – Y1 to Y3 column include different extended tests for different risk types from the test bank
- Additional tests: additional testing carried out in response to breaches of certain triggers – not included in table above
- Thematic areas of validation: Targeted validation to investigate certain issues/question of interest to the board which is not repeated on a regular cycle

Targeted Validation – 3 Year Validation Cycle

The NEXT 3 year cycle – starting from 2021 YoA

After every risk type/area has been deep dived once in the 3-year cycle what is required for the next cycle?
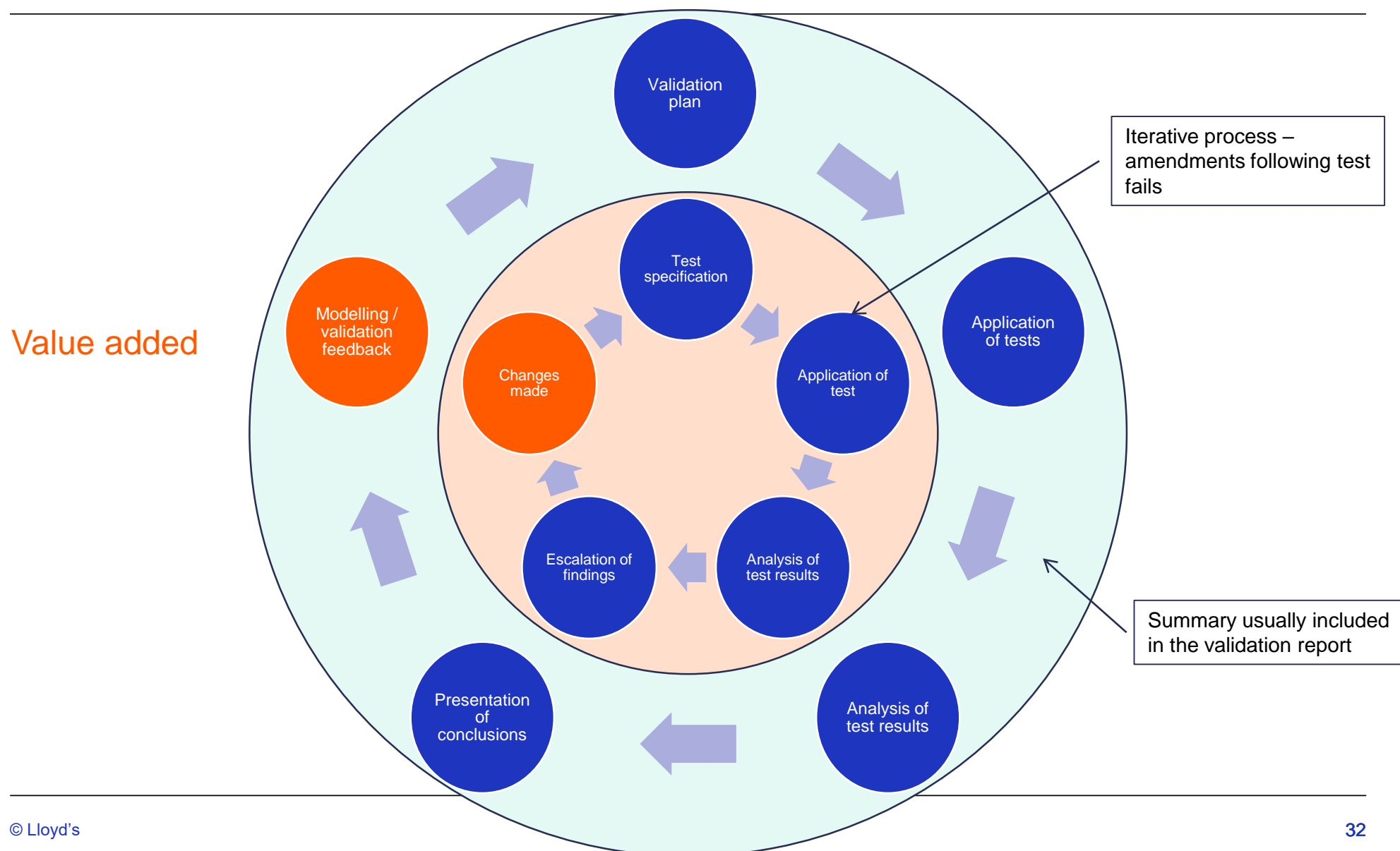
- Validation of modelling methods might be able to be recycled – if the methods haven't been changed and the risk profile hasn't changed in a way to make them inappropriate – suitable justification needed
- The last deep dive can be referenced AND validation should concentrate on changes

However, please include anything relevant from previous deep dives in current validation reports to facilitate review

Validation process – a year-round process

The validation cycle

Value added

Iterative process – amendments following test fails

Summary usually included in the validation report

Classification: Confidential

Validation process – a year-round process

Feedback from Market: Time pressure on validation

- Capital submission needs to be of a fully validated model
- This does not mean that all validation needs to be performed on the last model run – guidance does not state that.
- Agents should create a timetable that creates space where possible.

In practice

- Model changes should be validated as and when they happen
- Deep dives and thematic validation can take place at any point in the year
- Crunch time in Q3 should concentrate on risk profile and parameterisation changes of premium risk due to the new business plan → most other things can be validated before!

Why yes, I am a bit stressed. Why do you ask?

What is Lloyd's focussing on for 2020 YoA review?

- We have collected additional validation information to inform reviews

- We will also request additional signposting from syndicates as part of the validation pack.
  - This will be via a Lloyd's prescribed table of questions for syndicates to provide the relevant page references

- Thematic Areas for Validation 2020
  - Address loadings and other Lloyd's feedback
  - Validation of modelled loss ratios
  - Opening balance sheet: TPs
  - Market risk: negative contribution to SCR
  - Dependencies
  - Non modelled cat risk

Thematic Areas of validation for the 2020 YoA review

Address loadings and other Lloyd's feedback

- Focus should be on addressing any loadings and other feedback from 2019 YoA capital review

- Validation should demonstrate how the syndicate's capital modelling team has investigated and responded to the cause of the loading

- The validator should then justify how they have gained comfort around any changes made in response to the issues causing the load

- Syndicates should aim to work to resolve the issues which caused the load during the summer ahead of September submission – please keep Lloyd's in the loop

- Lloyd's has also collected some market information on the 1/3 and 1/5 and will provide feedback to syndicates where the responses have raised questions – we expect validation to consider these areas

- For syndicates where the SCR and the central view in Lloyd's internal model is very different we are currently investigating the differences with the syndicates – again validation should consider our feedback

Thematic Areas of validation for the 2020 YoA review

Validation of modelled loss ratios

- Loss ratios used in the model should be appropriate and where relevant different to those in the business plan, market bulletin Y5198

- Validation of modelled loss ratios was requested as part of 'Capital setting: key assumption regarding prospective expected loss ratios' email

- Validation received was not adequately able to demonstrate or justify lower loss ratios

- The reserving team will work with syndicates over the next months on this – validation should be involved

- Questions:
  - How sensitive is the SCR to changes in loss ratio assumptions – in particular rate change assumptions and how has this been tested?
  - If the loss ratios used in the model are different from the plan, what is the capital impact of using the different versions?
  - How does the actual loss ratio for a previous year compare to the expected loss ratio for that year?
  - If there was a big difference in actual vs expected by class, how has this fed back into the estimated loss ratio?

Thematic Areas of validation for the 2020 YoA Review

Opening balance sheet: TPs

- Rolled forward technical provisions from Q2 to Q4 were often lower than actual Q4 technical provisions, across multiple prior calendar years

- The internal model relies on the opening balance sheet, and therefore opening technical provisions not being understated, otherwise capital is understated.

- Validation needs to look into the causes of the underestimation and what level of uncertainty this implies around the opening technical provisions

- Where historical roll forward has been inappropriate the methodology should be revised and back tested.

Thematic Areas of validation for the 2020 YoA Review

Market risk: negative contribution to SCR

- Negative contribution to capital from market risk was not allowed during the 2019 YoA capital review and was loaded to zero

- In response to this, a market risk working group has been set up:
  - To understand the causes of the negative contribution
  - To decided if any of the causes are plausible reasons

- Initial topics of focus are:
  1. Should consistent interest rates be used between:
     a) the technical provisions (which use EIOPA rates as prescribed by SII) and
     b) model assets and liabilities which use ESG interest rates
  2. What is the impact of FX at the mean and the causes of this?
  3. What is the impact of the discounting of liabilities and has the mean and volatility been allocated to market risk?

- Validation should include review of justification of a negative contribution to capital from market risk

Thematic Areas of validation for the 2020 YoA review

Dependencies – Market and Insurance Risk

- Syndicates range from implicit dependency (via ESG) between these risk types to including explicit dependency → weak dependency could be one of the reasons for the negative contribution of market risk to capital

- Lloyd's is investigating this dependency in detail for its own internal model

- We will also run tests with the working group around the impact of testing different correlations

- Most obvious contender on the insurance risk side are FinPro classes. Syndicates with material exposure to the segment should investigate dependency, test their 2008 experience and justify if independence is assumed.

Thematic Areas of validation for the 2020 YoA review

Non modelled cat risk

- Lloyd's Exposure Management are looking further into model completeness, i.e. potential "non-modelled" risks

- This work is an ongoing programme, since actual losses for historical events must be compared to the risk representation used. Where event losses have a return period out of line with market expectation, this must be understood, as this may indicate that the representation of risk is not sufficiently complete and does not account for "non-modelled" elements manifesting in actual claims

- Exposure Management have been working with the LMA Exposure Management Working Group to identify market-material potential sources of non-modelled risk, using the ABI non-modelled risks framework

- A data collection template will ask where, and how, particular sources of loss are represented within your modelling framework, and for estimates of their impact

- This is in order to help re-evaluate the central loading for catastrophe non-modelled risks held in the LIM

- Capital expect the cat risk validation to be complete but will not ask for additional work

4. Summary

Summary

- Fewer issues raised than last year but improvements needed on the most crucial tests

- Strong enough, suitable and appropriate top down validation is crucial and RSTs, P&L attribution and SSTs can help with this

- Evidence your thoughts outside the model and the comparisons to the model

- Dependencies are hard to parameterise so more focus is needed on validation of these. Use RSTs, P&L attribution and SSTs

- The aim of the targeted validation is to add value, consider the definition of deep dives and how the 3-year cycle can be adopted in a way that adds value/frees up resource to investigate key/emerging issues

- Validators should look at the thematic validation points raised, take any Lloyd's feedback into account and look at questions raised from within their own organisation

- We will request additional signposting table referencing validation questions

- We will also collect validation test information with the 2020 SCR submission in September

5. Appendices

RST template example

Getting the basics right and adding value: RST

- The following gives an idea of the items expected for an RST. This is not intended to be a prescriptive nor exhaustive list

Test purpose and description	<Adequate purpose and description of RST>	Test ID		SCR01				
		Estimates		Pass/Fail Criteria		Simulations		Result
Item	Description	Loss	RP	Lower	Upper	#12345	#67891	P/PwL/F
Unviability	Loss severe enough so syndicate is unviable							
Scenario	Description: e.g. US earthquake <includes sufficient detail> Owner: <sufficiently experienced and independent>							
Secondary impacts	e.g. RI default, economic uncertainty <includes extra detail>							
Scenario by risk category	Premium risk							
	Reserve Risk							
	Credit Risk							
	Market							
	Op Risk							
	…							
Scenario by class	Class A							
	Class B							
	Class C							
	Class D							
	…							
Pass/Fail Criteria	<Includes rationale for P/PwL/F criteria> e.g. Pre-defined collar (based on number of simulations) at granular levels, with explanation for how selected simulations are chosen to be similar to scenario							
Initial test result		<Description of result>						
Escalation	<yes/no, details of who escalated to>							
Final test result	Pass/PwL/Fail	<Description of result>						
Validation limitations and recommendations	<details of limitation of test and recommendations>							

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Material findings (1)

The top material issues are:

- **Expert judgments** - Key expert judgements need to be summarised in the validation pack by both subjectivity and sensitivity of assumption
  - Poor: Expert judgement log lists assumptions
  - Good: Subjectivity and sensitivity ratings provided for each (e.g. H/M/L). This indicates how uncertain the EJ is and how material the impact of this EJ is on capital
  - Better: Those EJs highlighted which require further validation and prioritised

- **Board Report content** - The combination of test results to give high-level ratings (e.g. by risk category and overall capital) must be assessed and criteria provided to justify the high-level rating
  - Poor: Combination not considered
  - Good: Premium risk test results are a mixture of Pass, Pass with Limitations (PwL) and Fails. Materiality of each PwL and Fail is assessed and considered when all results combined for a premium risk rating
  - Better: Explanation provided on overall result e.g. if PwL and not a Fail

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Material Findings (2)

- **Limitations** – accumulations of less material limitations need to be considered as to whether these would aggregate to a more material limitation
  - Poor: Limitations are simply listed
  - Good: The impact on uSCR (OY SCR) for less material limitations assessed. The combined impact of these limitations is estimated and compared to a pre-defined criteria (if the combined impact is greater than x% of uSCR (OY SCR), then the accumulation of limitations is material)
  - Better: This triggers additional review and validation around appropriateness of these limitations

- **Validation pack content** – The validation pack must consist of:
  - The Board report – enough and sufficient information for Board to form an opinion
  - Technical validation pack – details of test results needs to included
  - Deep dives - including those from previous years
  - Signposting table – to facilitate Lloyd's review