
CECL and Model Risk Management



May 10, 2024

Your Speaker Today



Ryan Michalik, CFA, CRC

Principal
Model Risk Consulting

Agenda

1

Overview of ASC 326

2

A Model Risk Management Primer

3

CECL Model Validation

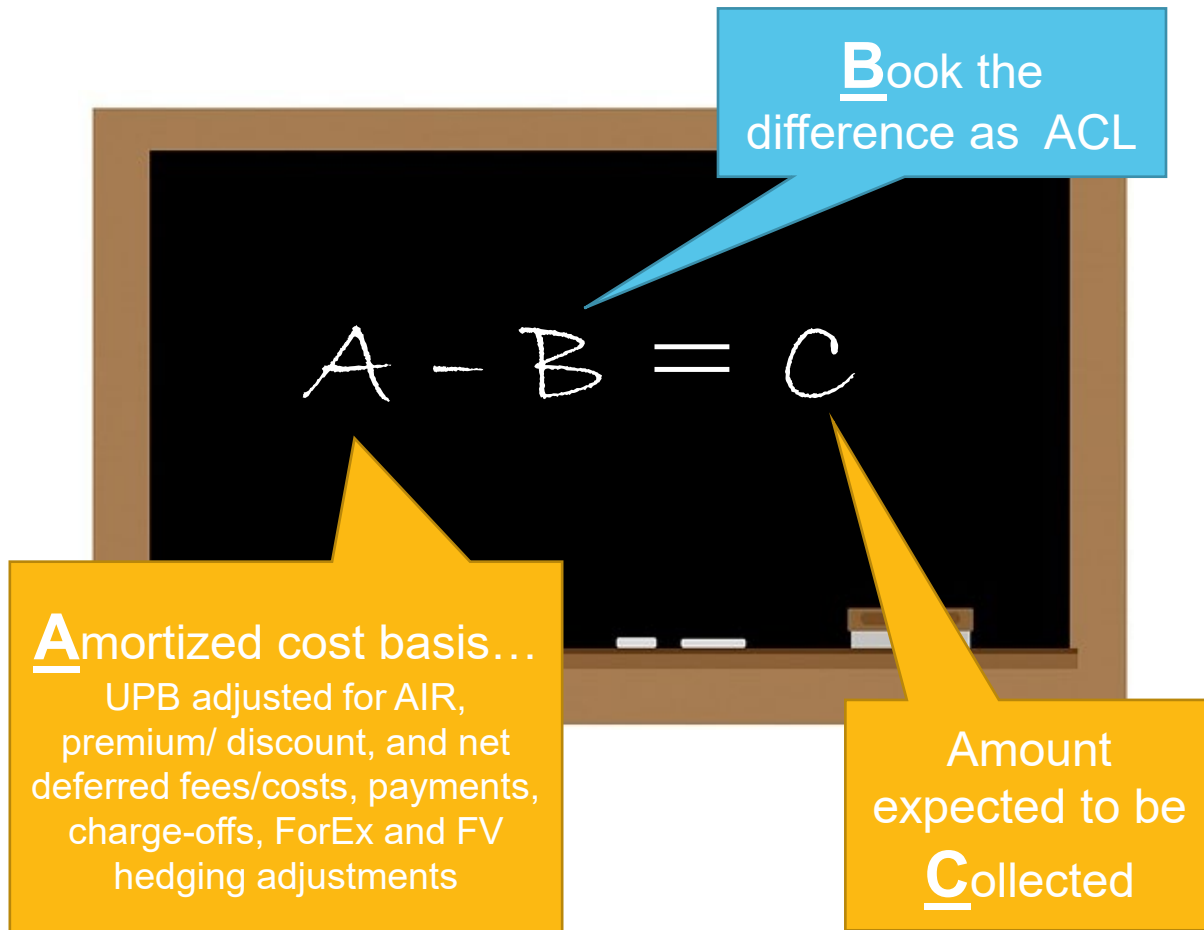
1

Overview of ASC 326



Top 10 Things to Know About ASU 2016-13

No. 1: CECL: A Simple Principal



Allowance for Credit Loss is...

- A valuation account
- Deducted from the amortized cost
- To present the net amount expected to be collected

- Changes in the ACL flow through credit loss expense



No. 2: It's Not Just Loans

- The CECL methodology is applicable to more than just loans here are some common financial institution balances that are scoped in... as well as some that are scoped out.

In Scope

Financial receivables (i.e., Loans)
HTM debt securities
Net investments in lessor leases
Off-balance sheet credit exposures (i.e., unfunded loan commitment, undrawn LOCs, etc.)
Receivables that relate to repurchase agreements

Out of Scope

AFS debt securities
Financial assets measured at FV-NI
Loans held for sale

While AFS is scoped out of CECL, ASU 2016-13 made targeted improvements to the AFS impairment model.

1 2 3 4 5 6 7 8 9 10

No. 3: One Methodology, Various Methods

- The allowance for credit losses may be determined using...
 - Various methods
 - For example, discounted cash flow methods, loss-rate methods, roll-rate methods, probability-of-default methods, or methods that utilize an aging schedule.
 - Not required to utilize a discounted cash flow method
 - Exception: Must use a DCF method to measure the value of a concession given to a borrower in a troubled debt restructuring if the value of that concession cannot be measured by any other method.



No. 4: Estimate Loss Over Contractual Term

- Expected credit losses shall be measured over...
 - Contractual term, considering estimated prepayments
 - Contractual term shall not be extended for
 - Expected extensions and renewals (unless extension or renewal option is included in the contract at the reporting date and is not unconditionally cancelable by the borrower – since these are included in the contract, they are part of the “contractual term”).
 - Expected modifications, unless a TDR is anticipated (determined at the loan-level)



Poll Question #1

What asset is not included in the scope of ASC 326?

- A. Loans
- B. AFS Debt Securities
- C. HTM Securities
- D. Off-Balance Sheet Loan Exposure



No. 5: Collective Assessment Is the Starting Point

- Expected credit losses shall be measured on...
 - Collective (pool) basis if asset shares similar risk characteristics with other financial assets
 - Examples of similar risk characteristics may include (not all inclusive)
 - Credit scoring/rating (internal or external), asset or collateral type, size, effective interest rate, term, geographical location, borrower industry, vintage, historical or expected loss patterns, reasonable and supportable forecast period
 - An individual basis if asset does not have similar risk characteristics with other financial assets

Key point: Impaired loan classification and related disclosures go away under CECL.

**Impaired
Loans**



No. 6: Historical Loss Information Is Still the Basis

- When estimating expected credit losses....
 - Historical credit loss experience of financial assets with similar risk characteristics generally provides a basis for the estimate of expected credit losses (though cannot rely solely on past events to estimate credit losses)
 - Historical loss information can be internal, external or a combination of both
 - Must consider adjustments to historical loss information for
 - Asset-specific risk characteristics (Example: difference in underwriting standards or changing portfolio mix)
 - Differences in contractual term
 - Different economic conditions
 - Consider available information relevant to assessing collectability
 - Information may include internal information, external information, or a combination of both
 - Not required to search all possible information that is not reasonably available without undue cost and effort
 - An institution may find that using internal information is sufficient in determining collectability

More info on the next slides



Asset-Specific Adjustments

- Per ASC 326-20-30-7 (excerpted, emphasis added):

Adjustments for asset-specific differences

An entity shall consider relevant qualitative and quantitative factors that relate to the environment in which the entity operates and are specific to the borrower(s).

- Per ASC 326-20-30-8 (excerpted, emphasis added):

Historical credit loss experience of financial assets with similar risk characteristics generally provides a basis for an entity's assessment of expected credit losses.... An entity shall consider adjustments to historical loss information for differences in current asset specific risk characteristics, such as differences in underwriting standards, portfolio mix, or asset term within a pool at the reporting date or when an entity's historical loss information is not reflective of the contractual term of the financial asset or group of financial assets.



Current Condition Adjustments

- Per ASC 326-20-30-9 (excerpted, emphasis added):

Adjustments for environmental differences

When an entity uses historical loss information, it shall consider the need to adjust historical information to reflect the extent to which management expects current conditions and reasonable and supportable forecasts to differ from the conditions that existed for the period over which historical information was evaluated. The adjustments to historical loss information may be qualitative in nature and should reflect changes related to relevant data (such as changes in unemployment rates, property values, commodity values, delinquency, or other factors that are associated with credit losses on the financial asset or in the group of financial assets).



Factors Affecting Collectability

- Per ASC 326-20-55-4 (excerpted, emphasis added):

To adjust historical credit loss information for current conditions and reasonable and supportable forecasts, an entity should consider significant factors that are relevant to determining the expected collectability. Examples of factors an entity may consider include any of the following, depending on the nature of the asset (not all of these may be relevant to every situation, and other factors not on the list may be relevant):

Qualitative factors from 326-20-55-4

- (a) The borrower's financial condition, credit rating, credit score, asset quality, or business prospects
- (b) The borrower's ability to make scheduled interest or principal payments
- (c) The remaining payment terms of the financial asset(s)
- (d) The remaining time to maturity and the timing and extent of prepayments on the financial asset(s)
- (e) The nature and volume of the entity's financial asset(s)
- (f) The volume and severity of past due financial asset(s) and the volume and severity of adversely classified or rated financial asset(s)

- (g) The value of underlying collateral on financial assets in which the collateral-dependent practical expedient has not been utilized
- (h) The entity's lending policies and procedures, including changes in lending strategies, underwriting standards, collection, writeoff, and recovery practices, as well as knowledge of the borrower's operations or the borrower's standing in the community
- (i) The quality of the entity's credit review system
- (j) The experience, ability, and depth of the entity's management, lending staff, and other relevant staff
- (k) The environmental factors of a borrower and the areas in which the entity's credit is concentrated

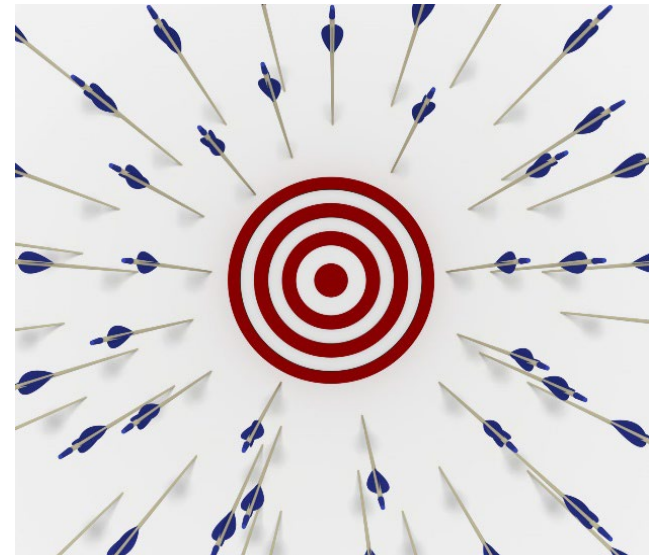
FASB Q&A Issued on this
Topic on July 17, 2019

https://fasb.org/cs/Satellite?c=FASBContent_C&cid=1176172971977&pagename=FASB%2FFASBContent_C%2FGeneralContentDisplay

No. 7: Forecasts and Reversion

- Cannot solely rely on past events to estimate expected credit losses over the contractual term, but must consider reasonable and supportable forecasts
 - Not required to develop a forecast that covers the entire term, although some entities may be able to do so
 - Intent of incorporating forecasts was to ensure that timely, available information was included in the estimate
 - BC51 notes that the FASB considered this portion of the estimate to be one of the most subjective aspects of the estimate
 - Although forecast must be reasonable and supportable at the time it is made, there is no requirement to back-test the forecast for accuracy
 - “Estimates of credit losses may not precisely predict actual future events and, therefore, subsequent events may not be indicative of the reasonableness of those estimates.” (BC50)
- For contractual terms extending beyond the time frame of R&S forecast, revert to historical loss experience.

More info on the
next slides



1 2 3 4 5 6 7 8 9 10

Poll Question #2

What is the primary CECL calculation approach used by your financial institution?

- A. Weighted Average Remaining Maturity (“WARM”)
- B. Discounted Cash Flow (“DCF”)
- C. Vintage
- D. Other



Reasonable & Supportable Forecasts Adjustments

- Per ASC 326-20-30-9 (excerpted, emphasis added):

An entity shall not rely solely on past events to estimate expected credit losses. When an entity uses historical loss information, it shall consider the need to adjust historical information to reflect the extent to which management expects current conditions and reasonable and supportable forecasts to differ from the conditions that existed for the period over which historical information was evaluated...

...Some entities may be able to develop reasonable and supportable forecasts over the contractual term of the financial asset or a group of financial assets. However, an entity is not required to develop forecasts over the contractual term of the financial asset or group of financial assets.



Reversion

- Per ASC 326-20-30-9 (excerpted, emphasis added):

...For periods beyond which the entity is able to make or obtain reasonable and supportable forecasts of expected credit losses, an entity shall revert to historical loss information determined in accordance with paragraph 326-20-30-8 that is reflective of the contractual term of the financial asset or group of financial assets. An entity shall not adjust historical loss information for existing economic conditions or expectations of future economic conditions for periods that are beyond the reasonable and supportable period. An entity may revert to historical loss information at the input level or based on the entire estimate. An entity may revert to historical loss information immediately, on a straight-line basis, or using another rational and systematic basis.



No. 8: Collateral-Dependent Financial Assets

- When foreclosure is probable, the measurement of expected credit losses must be based on the fair value of the collateral at the reporting date
 - Cannot project future changes in collateral values. Rather a change in the fair value of the collateral should be recorded in the period in which it occurs
- As a practical expedient, the fair value of collateral may be used to estimate the allowance for credit losses when repayment is expected to be provided substantially through the operation or sale of the collateral and when the borrower is experiencing financial difficulty based on the institution's assessment at the reporting date.
 - Fair value of collateral should be adjusted for costs to sell, as applicable



No. 9: Off-balance sheet credit exposures

- Expected credit losses for off-balance sheet (OBS) credit exposures shall be measured...
 - Over the period the institution is exposed to credit risk via a present contractual obligation
 - Unless unconditionally cancelable by the issuer, in which case no credit losses shall be recorded
 - Considering the likelihood funding will occur and the amount expected to be funded over the estimated life of the commitment.
- Allowance for credit loss on OBS exposures should be recorded in other liabilities and established through a provision for credit loss expense.
- Practice Note: Certain regulated institutions likely already had a liability for OBS credit exposures established; to the extent that some of those institutions have unconditionally cancelable commitments, those liabilities may decrease under CECL.



No. 10: What's Not Changed

- Income recognition
- Nonaccrual policies
- Charge-off policies
- Importance of qualitative factors (although how assessed and applied may change)



2

A Model Risk Management Primer

What is a Model and Model Risk?

Models are simplified representations of real-world relationships.

Model risk is the risk of loss resulting from decisions based on incorrect or misused model outputs and reports.

The process of a Model can be simplified into 3 main components:



Information and input

The model must have data and assumptions as inputs.



Processing

The model, using a quantitative method, transforms inputs into an estimate.



Reporting

The model should be used repetitively and in support of business decisions.

Models are applied in a multitude of ways.



Credit risk

- Probability of Default (PD)
- Loss Given Default (LGD)
- Risk Rating Matrix
- Stress Testing



Finance models

- Profit & Loss (P&L) attribution
- Cash flow analysis



Compliance models

- Anti-money laundering (AML)
- Anti-fraud



Market and liquidity models

- Asset Liability Management and liquidity risk
- Value at Risk (VaR)
(increased stressed VaR,
Incremental Risk Change)



Insurance models

- Loss forecasting
- Reserving models



Other models

- Machine Learning Models
- Corporate finance Models
- End-User Computing

Model risk can arise from many sources and have major consequences if mismanaged

What can happen if a model is **incorrect, misinterpreted, misused, or lacks data integrity?**



2007 Subprime Crisis

- Rating agencies continued to rate securities AAA as credit approval documentation standards deteriorated.
- By September 2008, write-downs totaled \$523 billion.
- The U.S. Financial Crisis Inquiry Commission cited the flawed models of the credit rating agencies as a contributing factor



London Whale

- JP Morgan Chase Bank's CIO was responsible for low-risk hedging against a possible economic downturn.
- Portfolio grew from \$4 billion in 2010 to \$157 billion in 2012 before losing over \$6 billion.
- An error was found in a spreadsheet resulting in the risk being understated by 50%.



Long-Term Capital Management

- 90's hedge fund founded by some of the smartest minds on Wall Street.
- Lost \$4.4 billion due to the 1998 Russian financial crisis.
- Funding models did not perform adequate stress tests to capture the risks of volatility and return distribution assumption.

What regulatory context affects models?

Supervisory Guidance on Model Risk Management

This guidance discusses recommended elements for risk management when making decisions based on quantitative models. Beyond that, it includes best-practices for model risk management policies, procedures, and Model validation

NCUA Examiner’s Guide

“A credit union should validate its CECL methodology to compare differences between estimated losses and actual, subsequent charge-offs.”

“The party that validates a credit union’s CECL methodology should be independent from the ACL calculation and credit approval processes.”



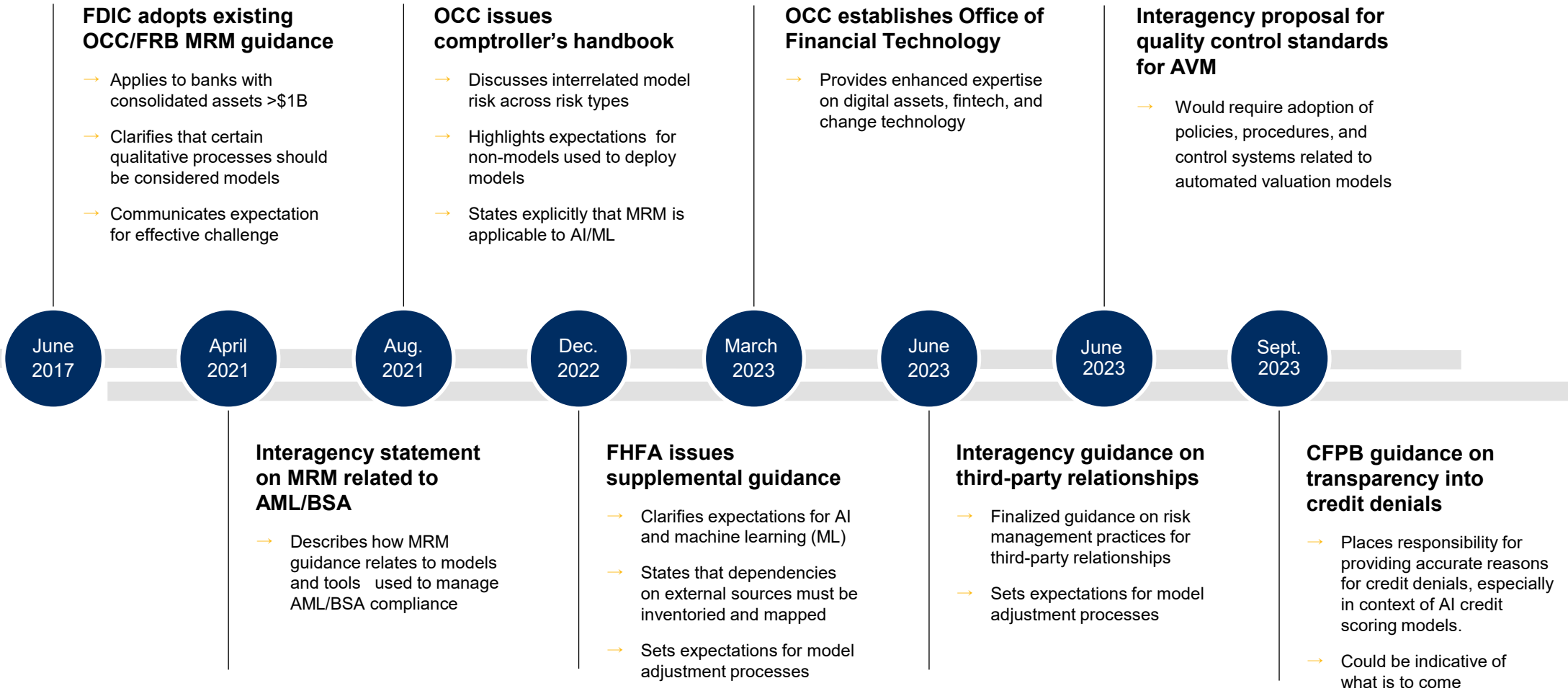
3 primary areas of regulatory focus

Model development, implementation, and use

Model validation

Model governance, policies, and controls

The recent evolution of regulatory guidance



What are the roles and responsibilities across MRM?

Board of directors (through risk management committee)

ERM or MRM committee

First line of defense

- Owns the model risk
- Documents and tests during development
- Maintains model documentation
- Establishes controls
- Conducts ongoing monitoring

Second line of defense

- Establishes model risk management policies and procedures
- Owns the model inventory
- Provides tools, templates, and technology to facilitate the program
- Validates the models
- Reports to the model risk committee

Third line of defense

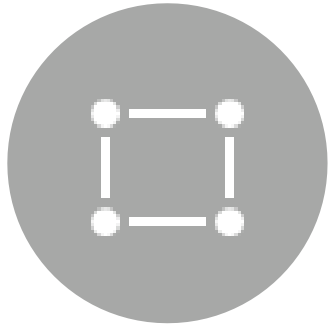
- Audit Function
- Provides independent assurance and oversight of the overall model risk management process.

Governance

Typical Evolution of a MRM Program

A sound, comprehensive governance framework and related program elements provide the foundation and help drive speed to compliance with MRM guidance and examiner expectations.

MRM Framework: Policy / Program



Provides disciplined, consistent, prescriptive approach for overall MRM framework and model governance

Model Inventory Standards



Provides methodology for model determination and risk tiering, inventory, and governance and documentation standards

MRM Program Standards



Apply MRM Framework to develop consistent standards for key models (i.e., AML, Credit) and/or processes, such as Validation and Development

MRM Program Implementation



Develop prioritized tactical & strategic road maps for program implementation. Develop or enhance desktop procedures for key model management activities

Program Operation



BAU operation, monitoring and reporting. Operate, adapt and refine key program elements, procedures and reporting



2

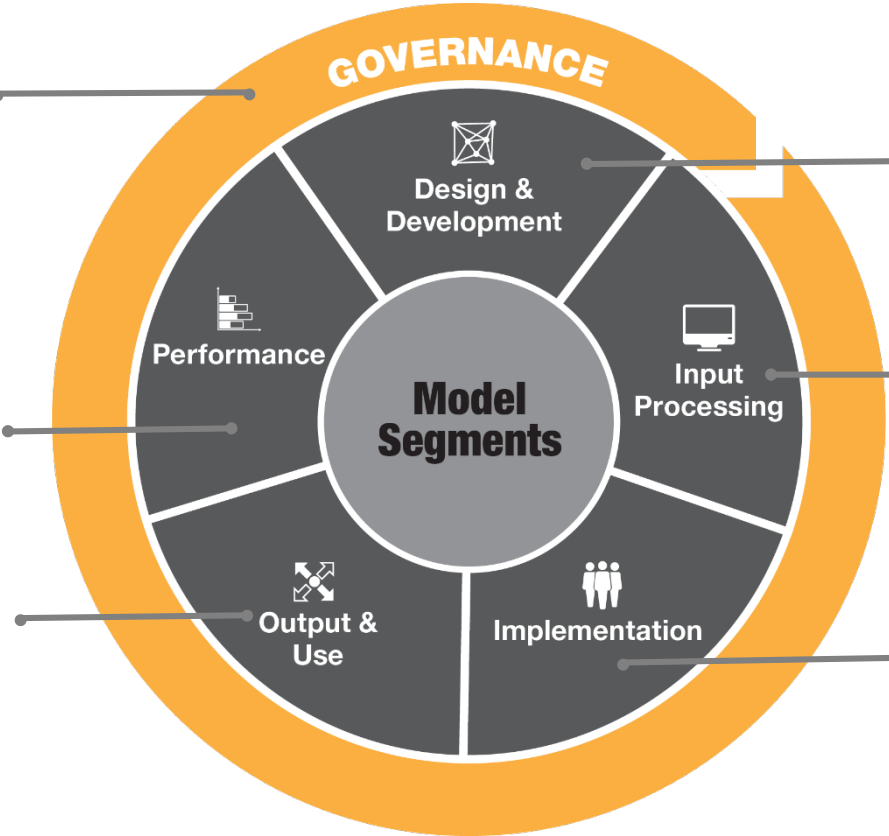
CECL Model Validation

What Does a Validation Cover?

The governance surrounding the ongoing support of the model is evaluated throughout each of the five model segments.

Validates the procedures and processes utilized to prioritize and evaluate the effectiveness of the model's outputs and assesses the ability to calibrate and optimize the model performance over time.

Assesses the reasonableness of the model's estimate or forecast through back-testing, sensitivity testing, and benchmarking.



Validates the intended purpose of the model, the model logic and functionality, alignment of the model to the purpose, assumptions and limitations of the model, and methodology used to design and develop the model.

Validates the inputs relied upon by the model including the accuracy and completeness of the model data as well as the ongoing maintenance of inputs.

Validates the integration of the model's design and functionality into the institution's business-as-usual processes and technology. Model versions and parameters tied to specific BU's, geographies, and products are assessed.

Common Model Errors of Banks



Data quality

The risk of missing values, outliers, inconsistencies. Can lead to improper model inputs.



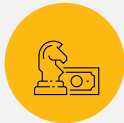
Not following and adhering to Assumptions

The risk of inappropriately accounting for assumptions or not adhering to them. This may lead to improper use of the model and basing decisions on wrong information.



Ineffective validation/testing

The results of inadequate testing can lead to overfitting, underestimation of risk, failure to account for important factors. This can lead to ineffective model outputs.



Overreliance

The risk of not considering the impact of limitations and utilizing models where it may not be proper. This leads to relying on models to make business decisions without the application of management oversight and challenge.



Lack of governance

Deficiencies in controls and management of the models can lead to model malfunctions, ineffective use and application of the results, and can result in unknown decisioning.

Design and development

- Business purpose
- Model methodology
- Assumptions and limitations
- Regulatory or business alignment
- Model documentation



What are assumptions and limitations?

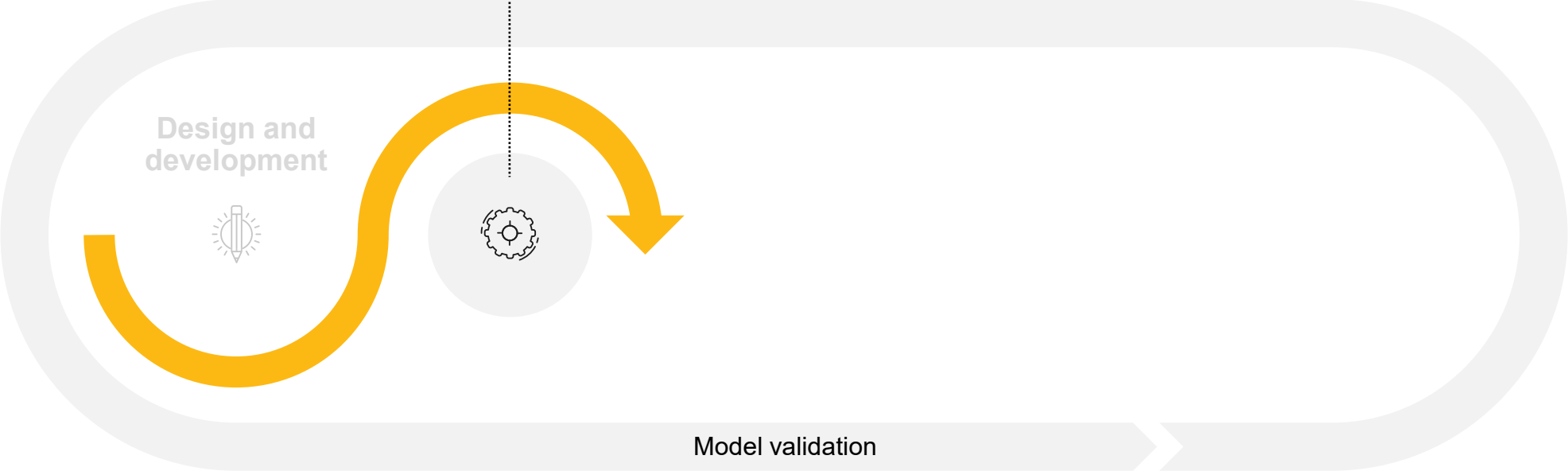
- Foundational conditions that are made during the development and application of a model
- Necessary simplifications or approximations that allow the model to function and produce meaningful results
- Help define the boundaries and limitations of the model and guide its interpretation

Key Modeling Assumptions	
1	Bank policy, credit standards, and loss mitigation practices over the forecast horizon are assumed to be consistent with history.
2	The selected look-back period is predictive of estimated expected losses.
3	The model assumes that loans in the same loan segment share similar risk characteristics.
4	The peer group is assumed to share similar risk profiles and is an appropriate proxy for modeling when the Bank's data is insufficient.
5	Prepayment amounts each month are calculated based on the balance prior to any adjustment for scheduled principal payment or default.

Key Modeling Weakness/Limitation	
1	Some segments have low default counts and, therefore, rely on peer data, which may not capture the unique risks of the Bank.
2	The DCF approach can be very sensitive to various modeling assumptions.
3	The WARM approach does not take into consideration risk characteristics outside of the primary segmentation.
4	The current economic variables are based on national data which may not capture all the risks of a regional institution.

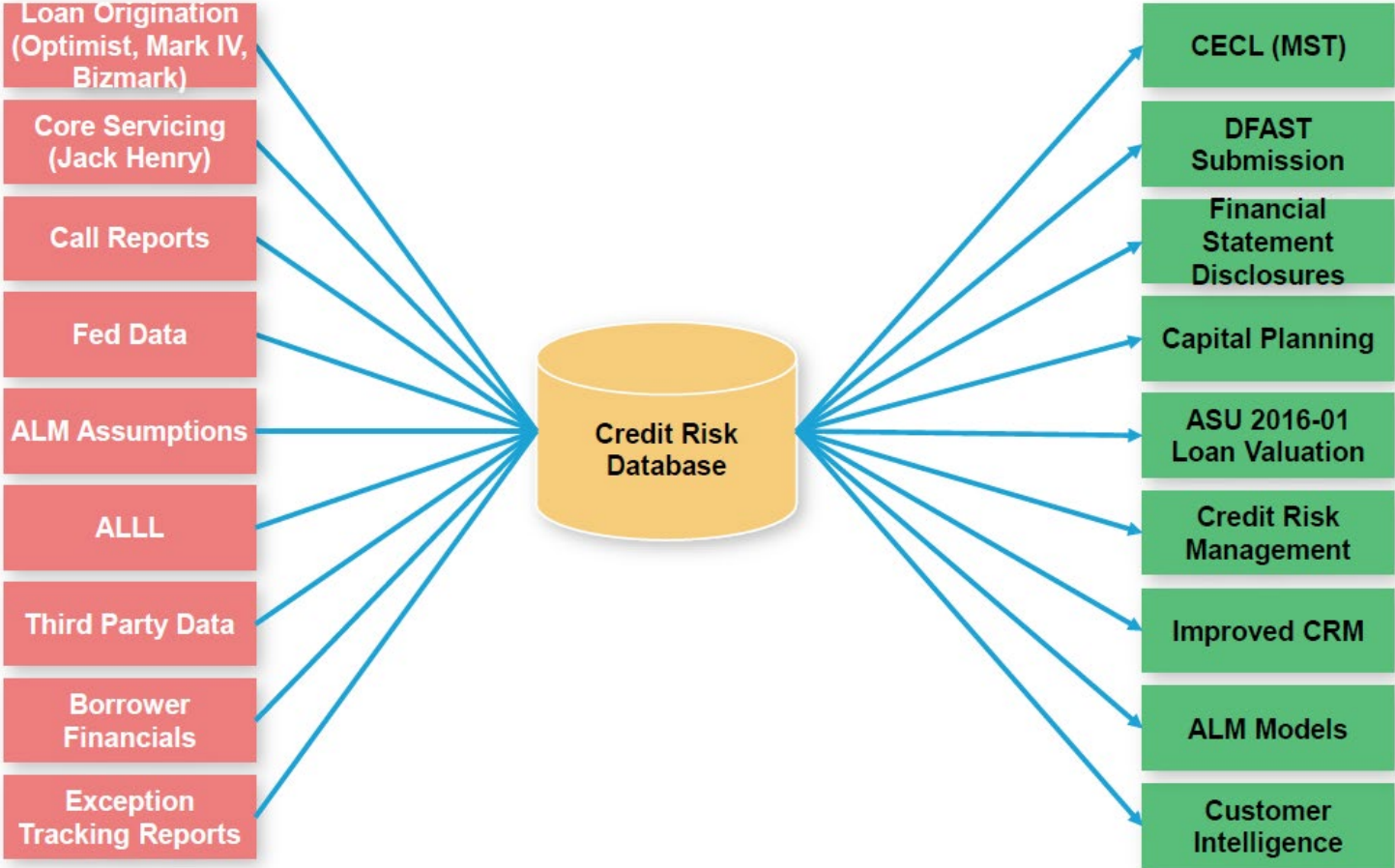
Input processing

- Inventory source data feeds
- Quality and comprehensiveness of data
- Applicability of data and use of data proxies
- Data transfer



Inventory Source Data Feeds

- Understand the data lineage and data governance in place.



Types of Data Testing

- Data testing is a critical step in ensuring the quality and reliability of the data used in models.
- It involves assessing the accuracy, completeness, consistency, and validity of the data.

Data Accuracy Testing:

Verifying the accuracy of the data by comparing it against trusted sources or manual verification.

Examples: cross-referencing data with external sources, conducting manual data checks.

Data Quality Testing:

Assessing the quality of the data by evaluating its conformity to predefined standards or business rules.

Examples: validating data ranges, checking for outliers, ensuring data consistency across sources.

Data Integrity Testing:

Verifying the integrity of the data by checking for missing values, duplicates, or inconsistencies.

Examples: checking for null values, identifying duplicate records, validating data formats.

Data Completeness Testing:

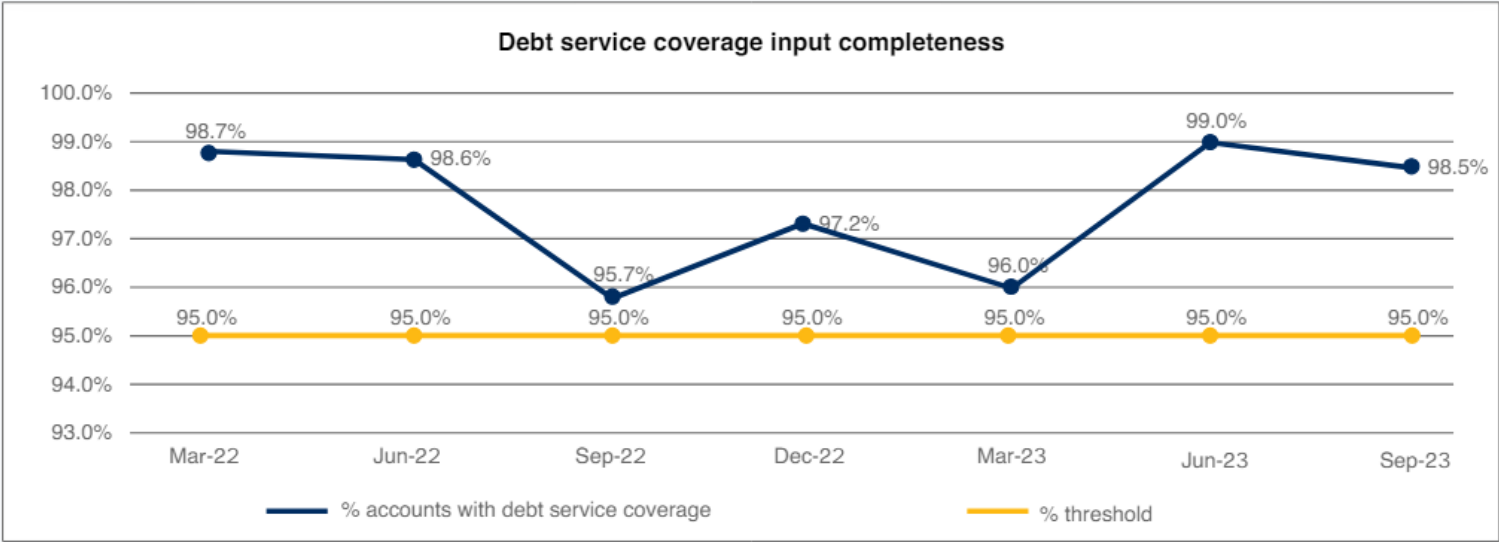
Ensuring that all required data elements are present and accounted for.

Examples: checking for missing values, validating mandatory fields.

Data Completeness Testing

Data completeness testing can hold importance not just for the model the data directly feeds into, but every downstream model as well. Models can rely on the outputs of upstream models much like a game of telephone, so the initial data message provided should be as clear and accurate as possible.

Activity	Description	Threshold	Frequency	First testing date
Data completeness	The purpose of the test is to assess the level of completeness for the key input: debt service coverage.	95%	Monthly	9/31/2023



Source-to-Model Testing

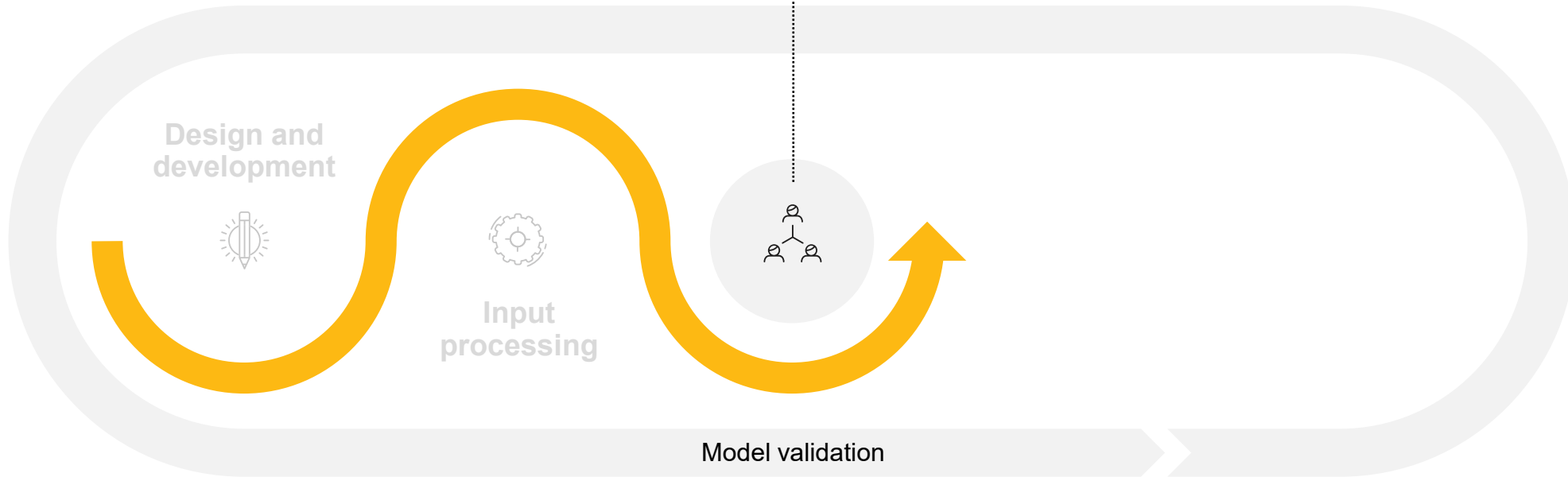
Source-to-Model testing can assess if source fields map and translate to the Model as expected, ensuring integration precision and early error detection.

<u>Mappings</u>		<u>Segment Translations</u>	
Core Source Field	----->	Model Field	call code -----> Segment
Name ID	----->	Customer Number	132 -----> 1c2a - 1-4 Family
payment	----->	Payment Amount	241 -----> 1D - Farmland
Credit Score	----->	FICO	160 -----> 1c1 - Revolving
call code	----->	Segment	996 -----> 4A C&I

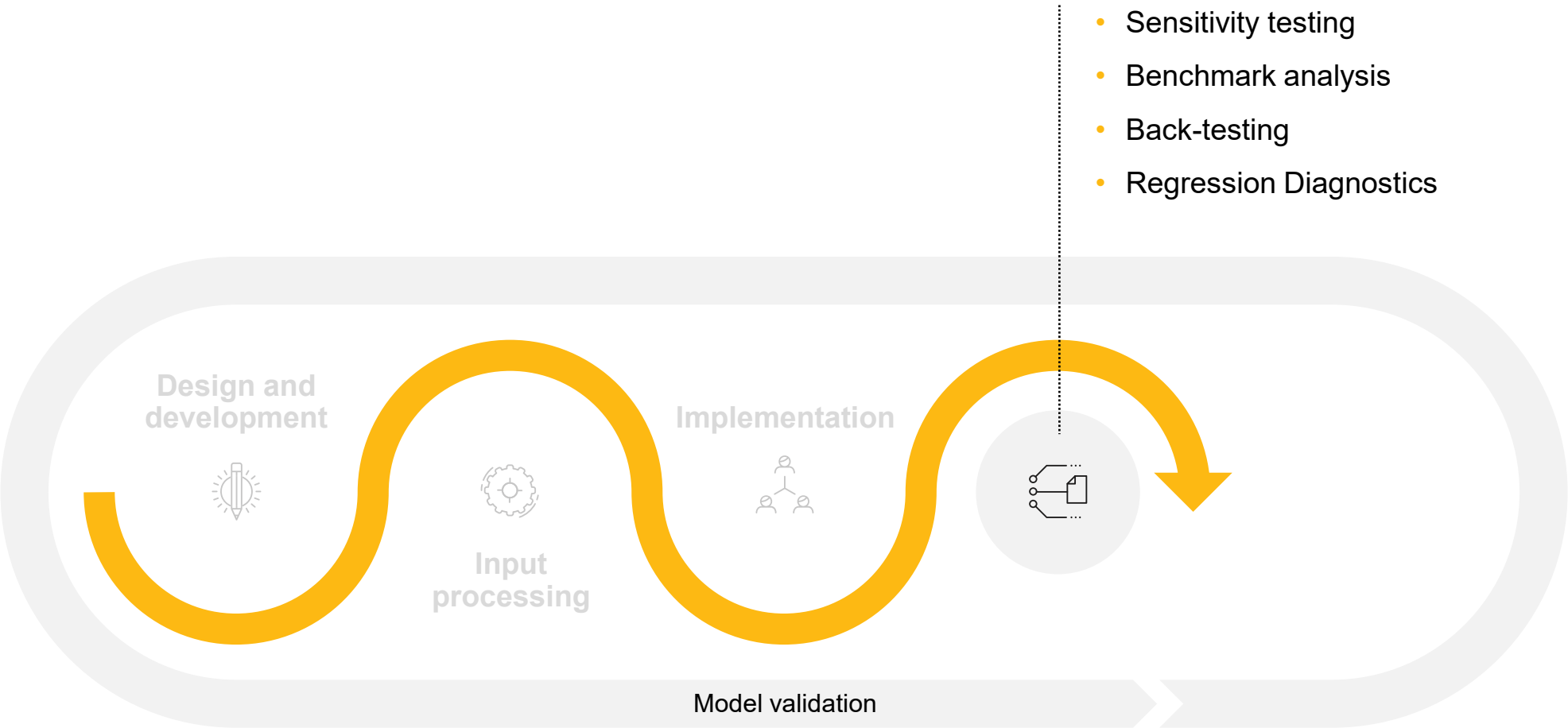


Implementation

- Model calculation accuracy
- Implementation of elections
- Model procedures
- Change control procedures
- Model controls



Output and Use



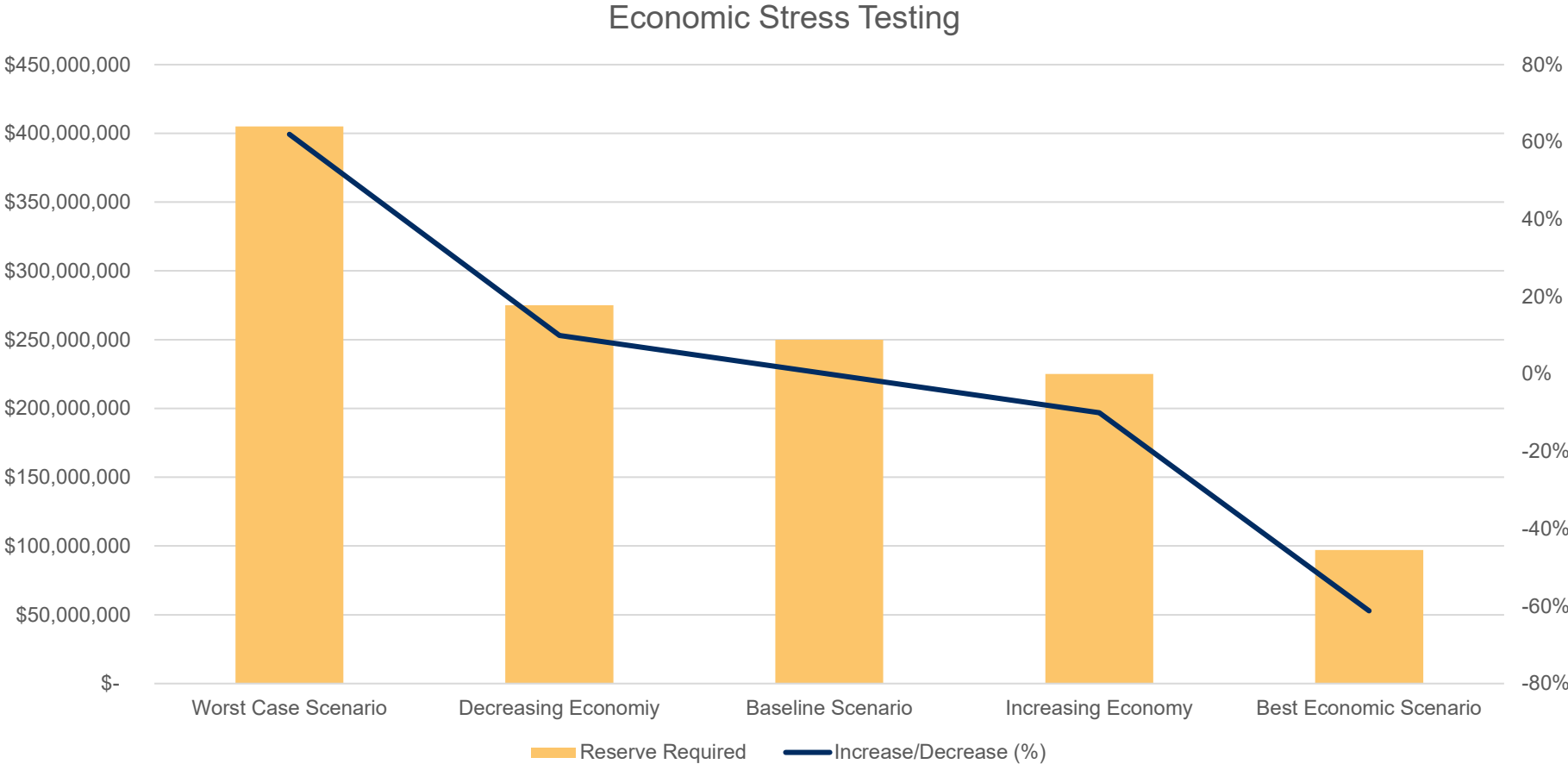
Poll Question #3

The review of assumptions and limitations is typically part of what validation testing segment?

- A. Design and Development
- B. Input Processing
- C. Output and Use
- D. None of the Above



Sensitivity Testing

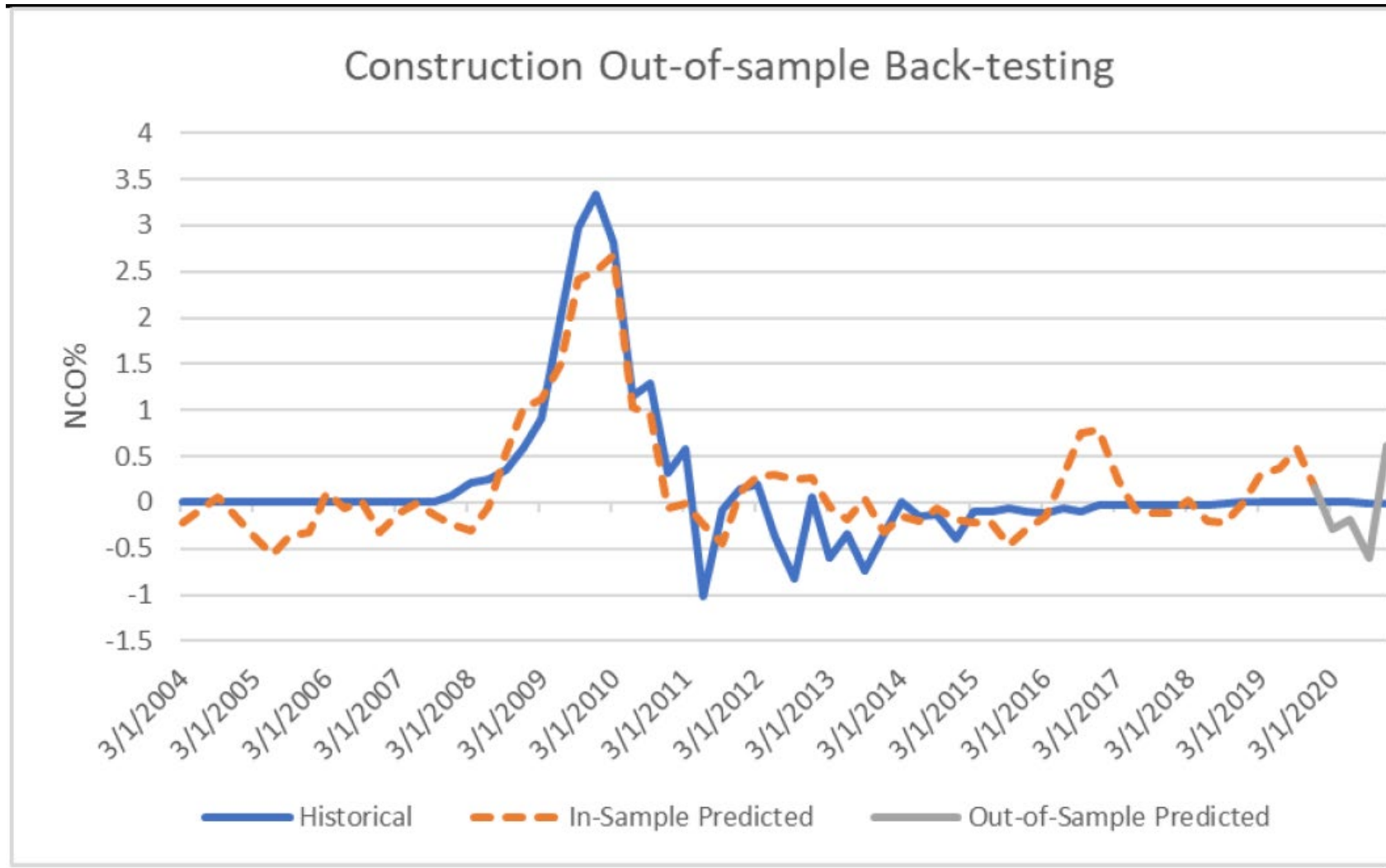


Benchmark Analysis

Peer Groups by Asset		
Peer	Headquarters	Asset Size (000s)
First Bank	Hartford, CT	\$3,500,000
Second Bank	New Haven, CT	\$3,100,000
Third Bank	Stamford, CT	\$3,400,000
Fourth Bank	Waterbury, CT	\$2,800,000
Fifth Bank	Norwalk, CT	\$1,600,000
Sixth Bank	Danbury, CT	\$1,400,000
Seventh Bank	Bridgeport, CT	\$2,000,000
Eighth Bank	Greenwich, CT	\$1,100,000
Ninth Bank	Bristol, CT	\$1,200,000
Tenth Bank	Meriden, CT	\$1,100,000

Your Bank Peer Group Benchmark Statistics				
	Total Assets MRQ (\$)	NCOs / Average Loans MRQ (%)	NPLs / Loans MRQ (%)	Loan Loss Reserves / Gross Loans MRQ (%)
Minimum	\$1,100,000	(0.01)	0.11	0.85
Median	\$1,600,000	0.06	0.55	1.18
Average	\$2,000,000	0.16	0.77	1.25
Maximum	\$3,400,000	0.52	1.94	1.79
Your Bank	\$2,400,000	0.20	0.75	1.40

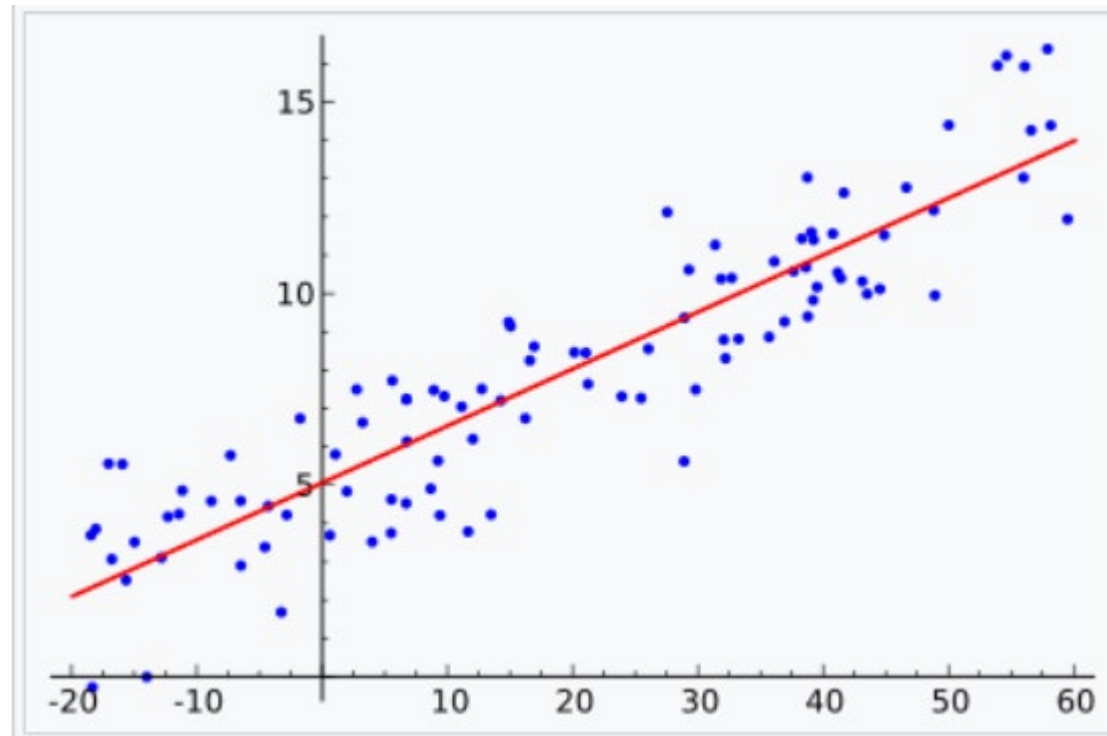
Back Testing



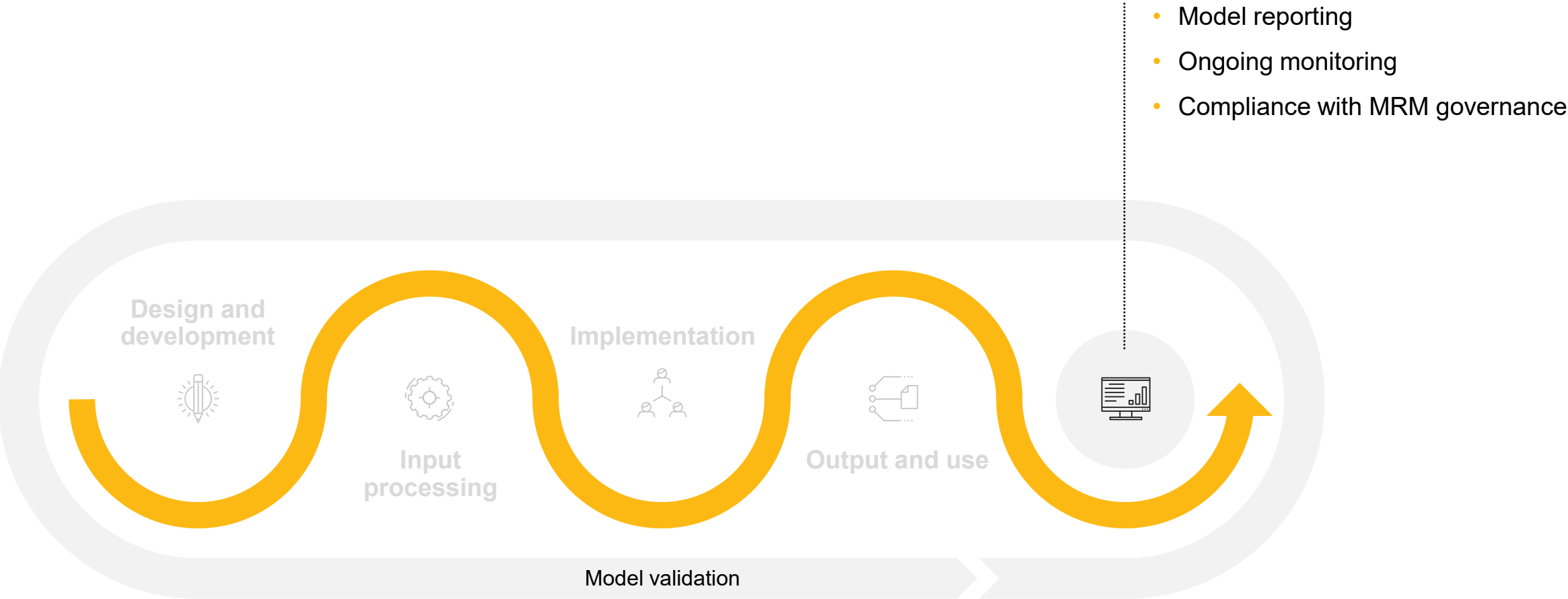
Statistical Testing

- Model validation must have the requisite quantitative knowledge.
- The regression assumptions of the model should be understood and tested.

$$y_i = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip} + \varepsilon_i = \mathbf{x}_i^T \boldsymbol{\beta} + \varepsilon_i,$$



Performance



Ongoing Monitoring Plan

Monitoring Activity Name	Description of Activity	Responsibility	Frequency of Test	Threshold Applied
Provide a short name for the monitoring activity	Describe what the activity measures, how it is measured, how the test will be performed, and who is responsible for conducting the test.	Please provide the name and the title of the person responsible for completing the monitoring activity.	Detail the frequency the test will be performed	Detail the threshold applied to the test (within a range, maximum, minimum, etc..). Any breach will require notification to Operations and Innovation.

Questions

