

Best Practices in Model Risk Management

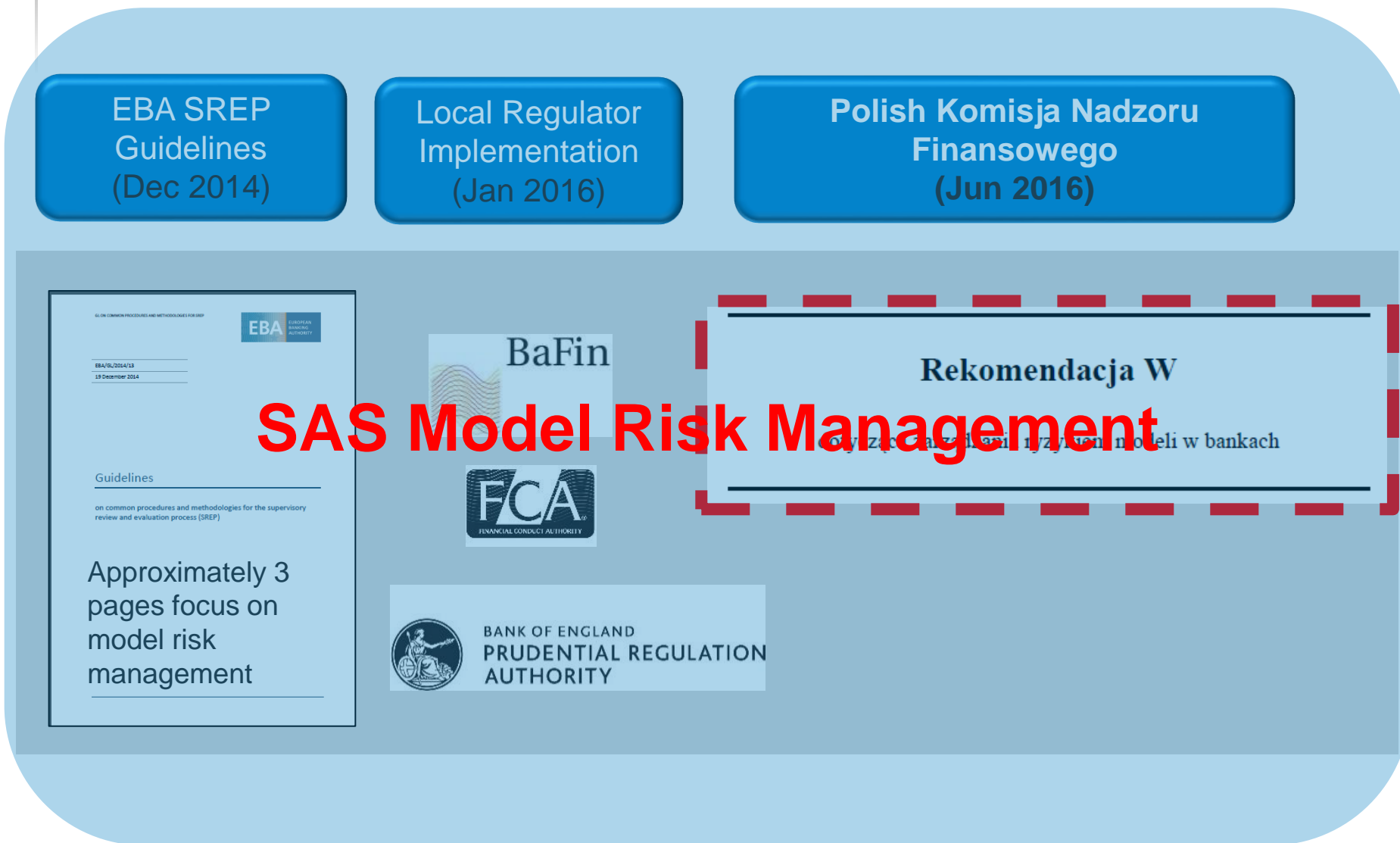
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SAS Institute, North Carolina, USA

MEETING REGULATORY GUIDELINES GLOBALLY AND LOCALLY

- Model risk management Regulation tightened first in US
- EMEA is now following





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PRACTICAL CUSTOMER ISSUES

MODEL RISK MANAGEMENT

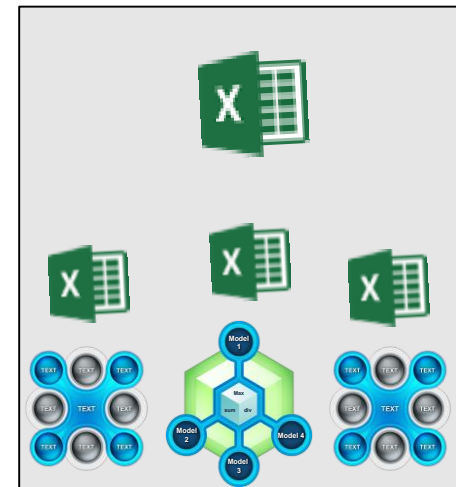
CUSTOMER ISSUES: GAP ANALYSIS VS CURRENT APPROACH

Model Inventory - No consolidated record of potentially 1,000+ material models

MRM Procedures- Multiple model validation and review processes across the Group (and of variable quality)

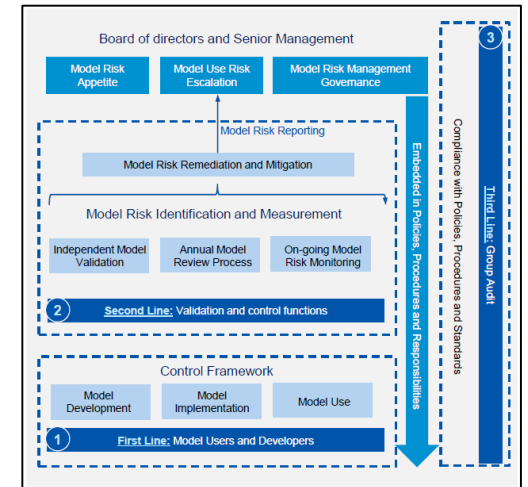
Compliance Documentation - Lack of documentary evidence of MRM processes across group & model lifecycle

Current, Siloed Manual Approach

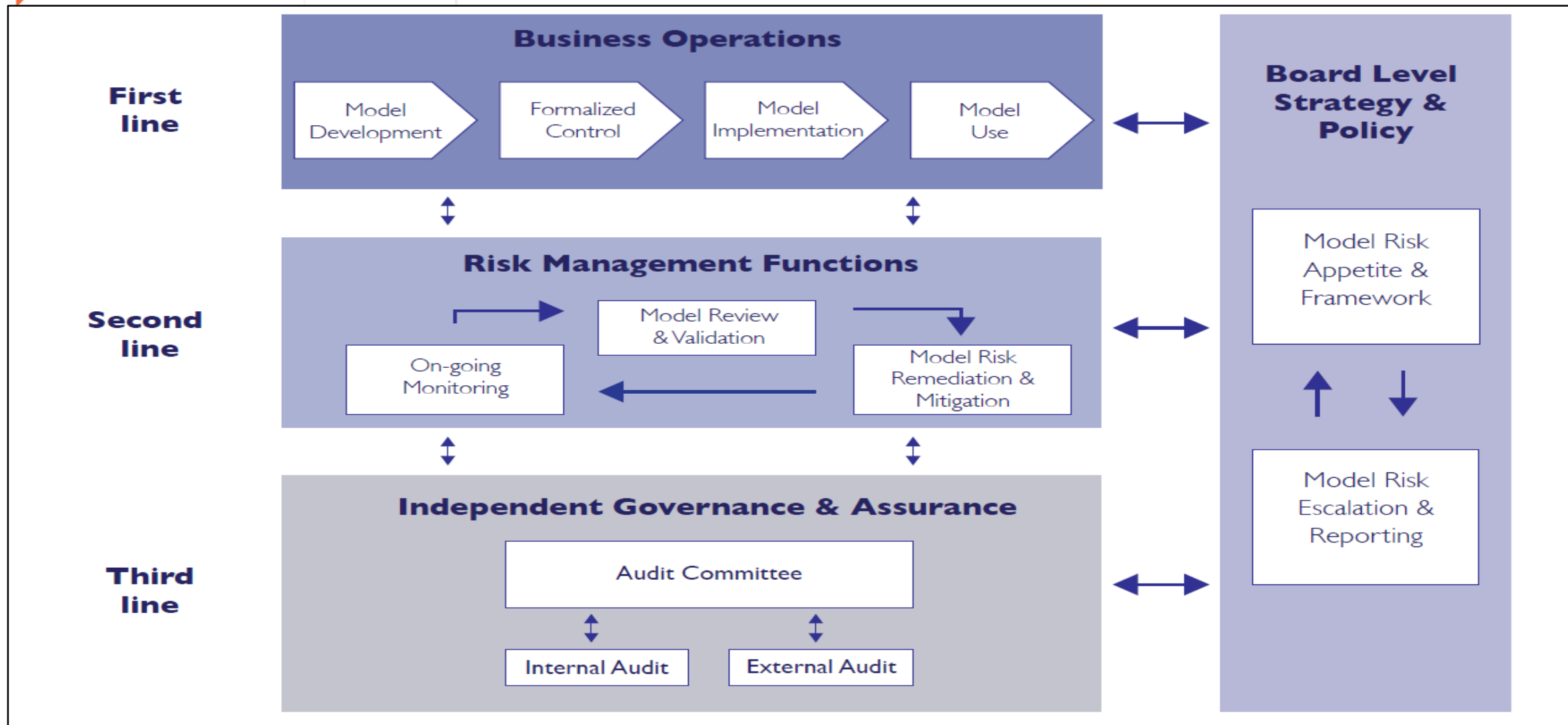


Vs

Integrated Groupwide Target Approach



SAS SUPPORTS ALL FOUR LINES OF MRM DEFENSE



Courtesy: Chartis Research Ltd 2014.

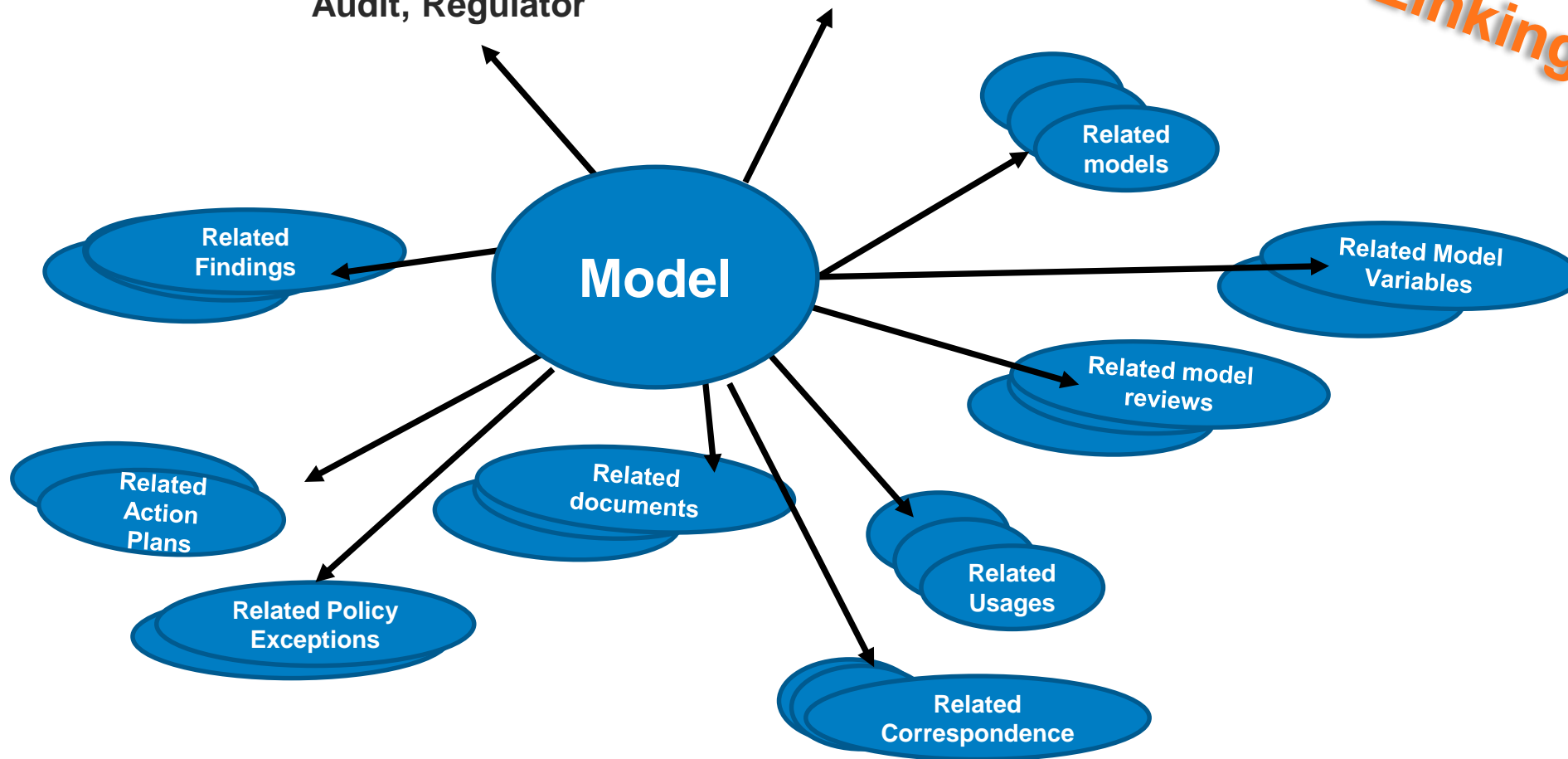


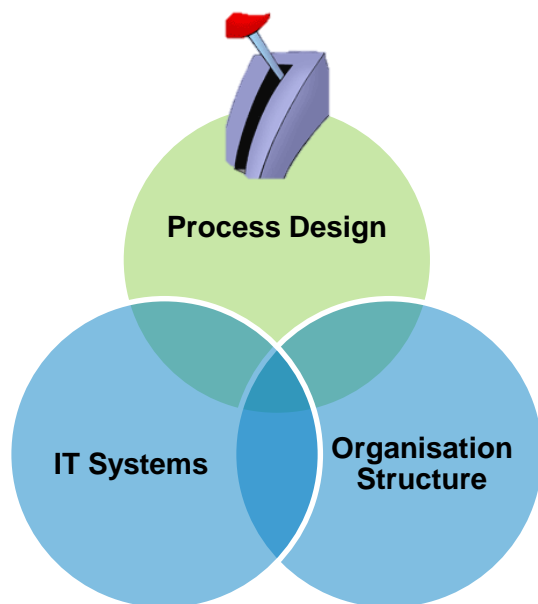
**Model Stakeholders: owner,
developer, validator, MRM
Oversight, Senior Mgt, Internal
Audit, Regulator**



Dashboard

**Models have
360 Linking**



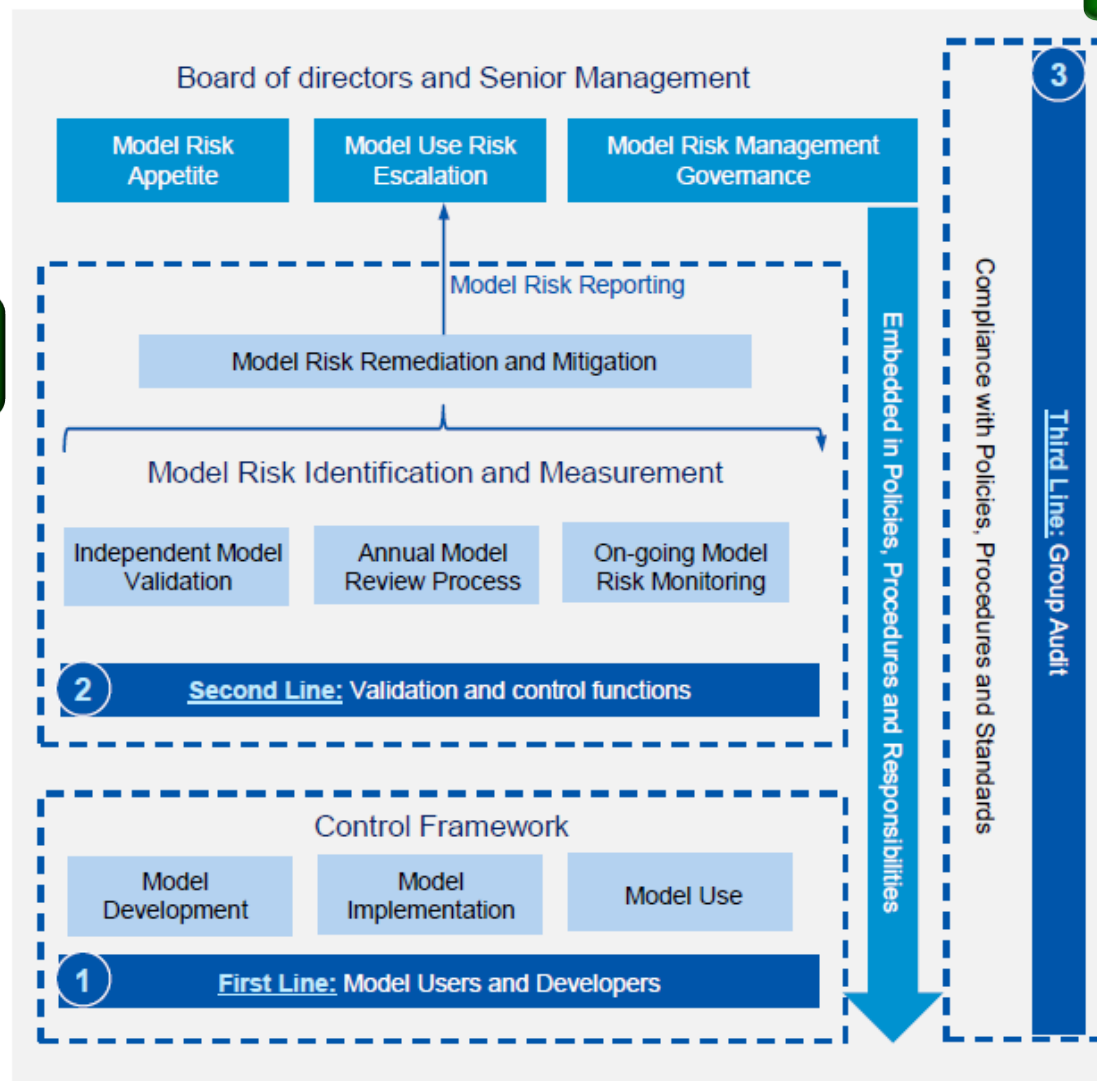


PROCESS FRAMEWORK*

 = Process area

Governance & Control

Operational Model Lifecycle

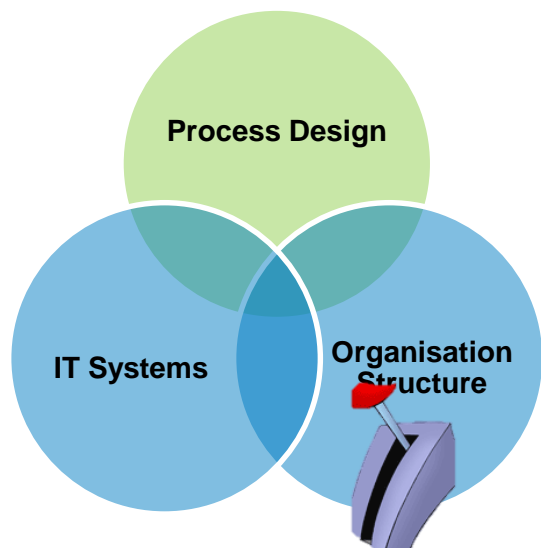


Independent (periodic) Audit

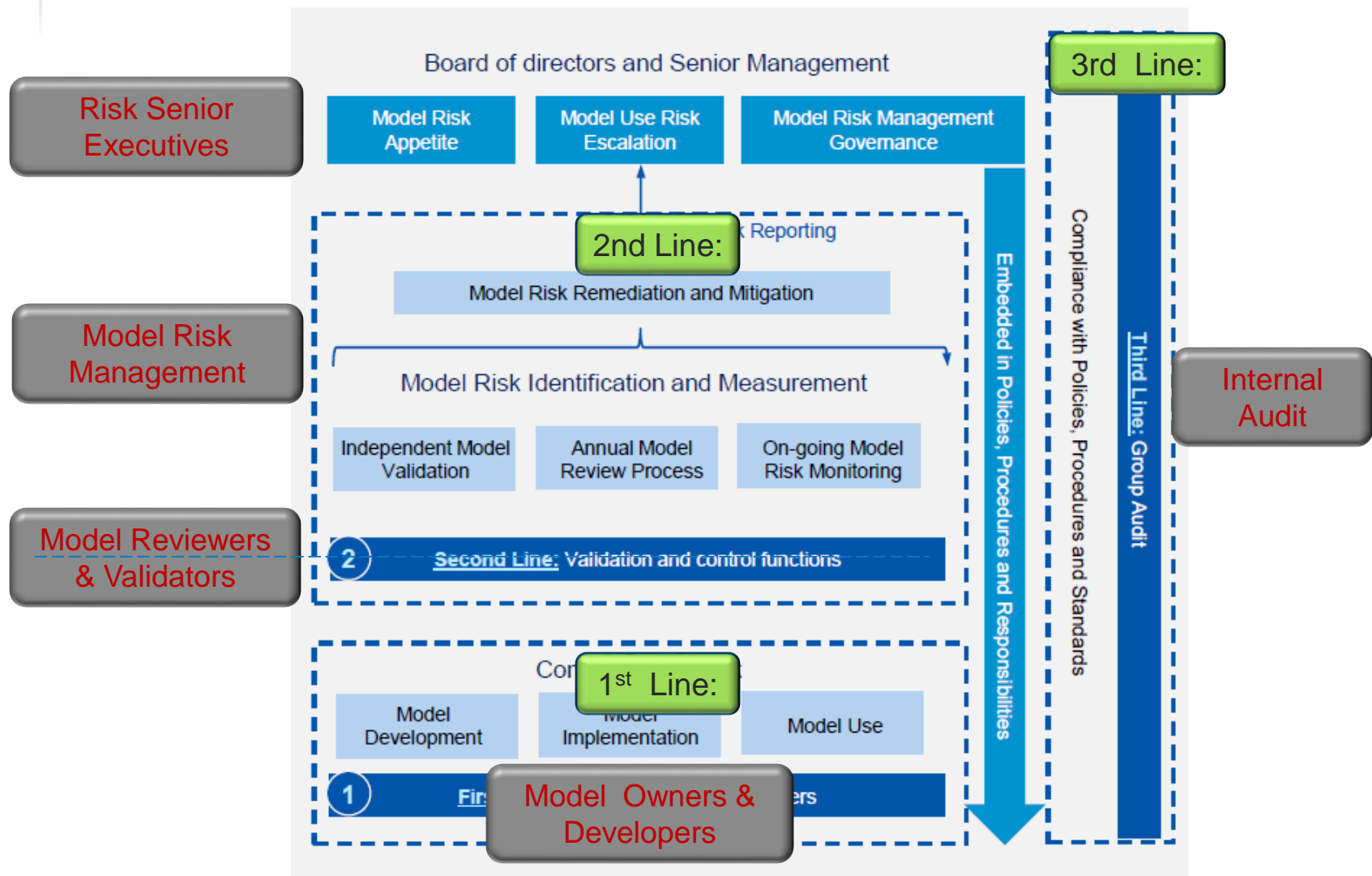
* Source: Bank Risk Conference presentation in April 2015 by Konstantina Armata (Head of Global Model Validation & Governance at Deutsche Bank)

ORGANIZATION*

 = Functional team




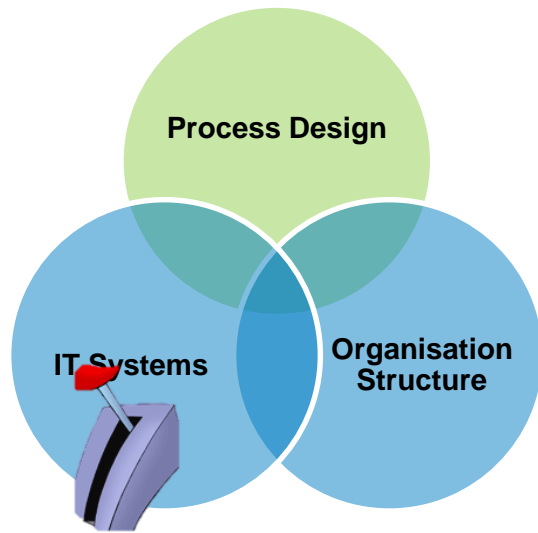
- Functional teams structured in 3 lines of defence



* Source: Bank Risk Conference presentation in April 2015 by Konstantina Armata (Head of Global Model Validation & Governance at Deutsche Bank)

SYSTEMS DESIGN FOR MRM – SCREEN VIEWS

 = Process area

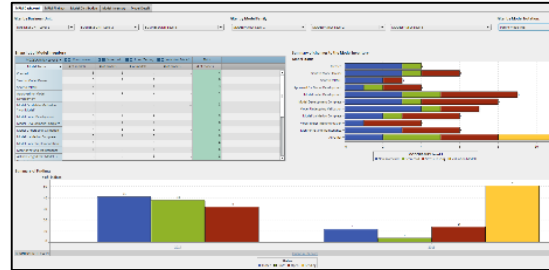


Governance & Control Processes

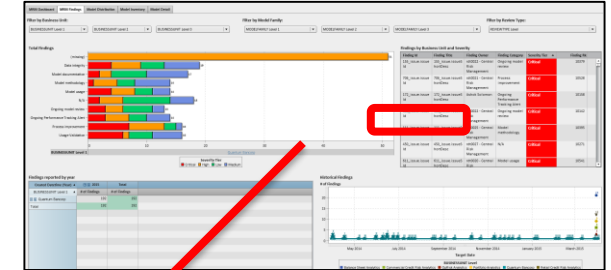
Operational processes

Systems Processes

MODEL PORTFOLIO



FINDINGS ANALYSIS



MODEL INVENTORY

A screenshot of the 'MODEL INVENTORY' screen. It shows a table with columns for 'Model ID', 'Model Name', 'Status', and 'Date Created'. The table lists several models with their respective details.

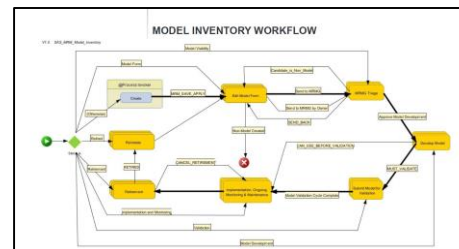
MODEL DETAILS

A screenshot of the 'MODEL DETAILS' screen. It provides a detailed view of a specific model, including its configuration, parameters, and associated data.

MODEL REVIEWS

A screenshot of the 'MODEL REVIEWS' screen. It displays a table with columns for review details, including reviewer information and dates.

WORKFLOW



SCREEN DESIGNER

A screenshot of the 'SCREEN DESIGNER' interface. It shows a form for configuring the layout and content of a screen, with various fields and options for customization.

DATA LOADER

A screenshot of the 'DATA LOADER' interface. It shows a table for loading and managing data, with columns for data source, status, and dates.

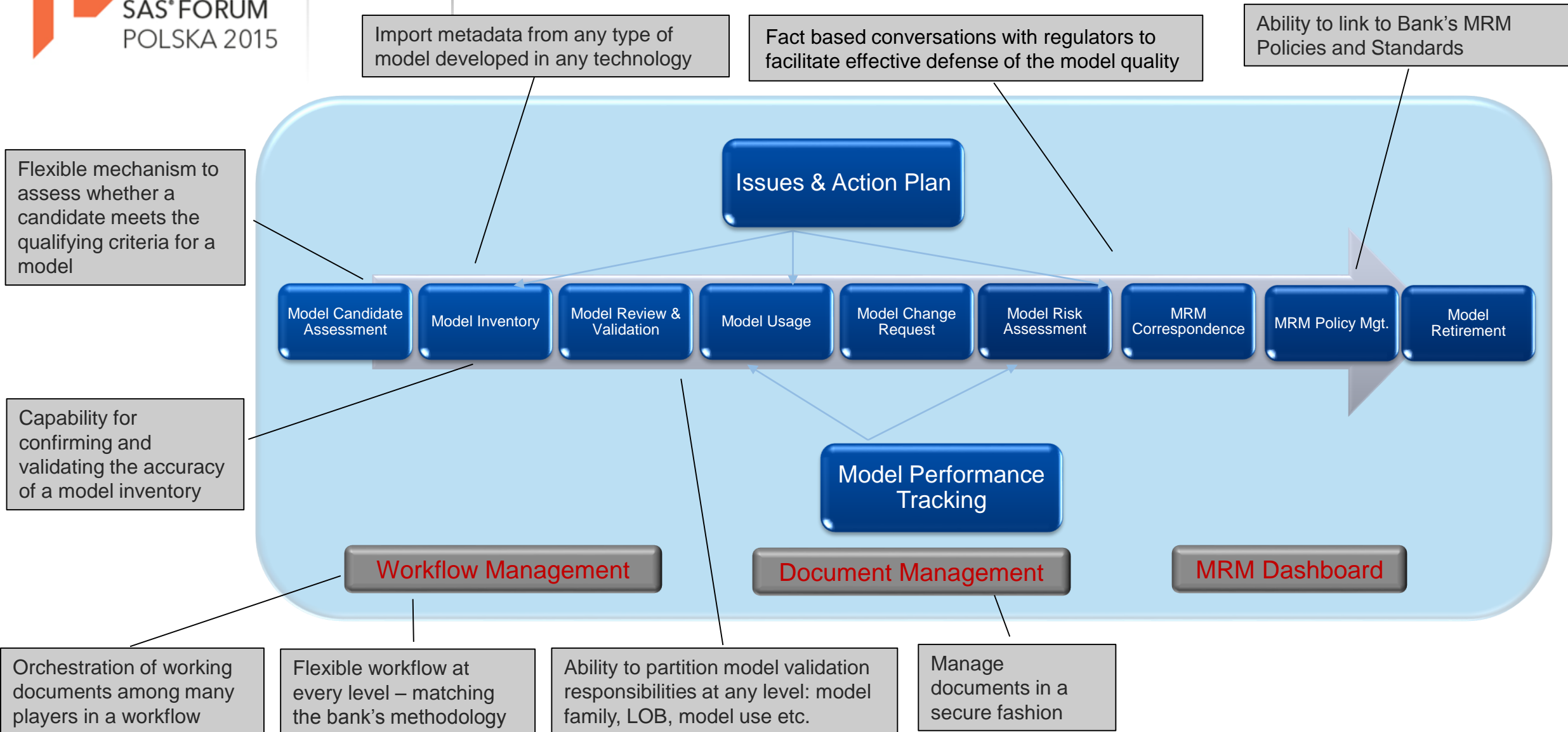


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MODERN MRM SYSTEM

KEY CAPABILITIES

KEY FUNCTIONAL REQUIREMENTS





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MODEL LIFECYCLE WORKFLOW

EXAMPLE WORKFLOW

SAS Model Risk Management • Edit Model • Commercial PD - Obligor Risk Rating

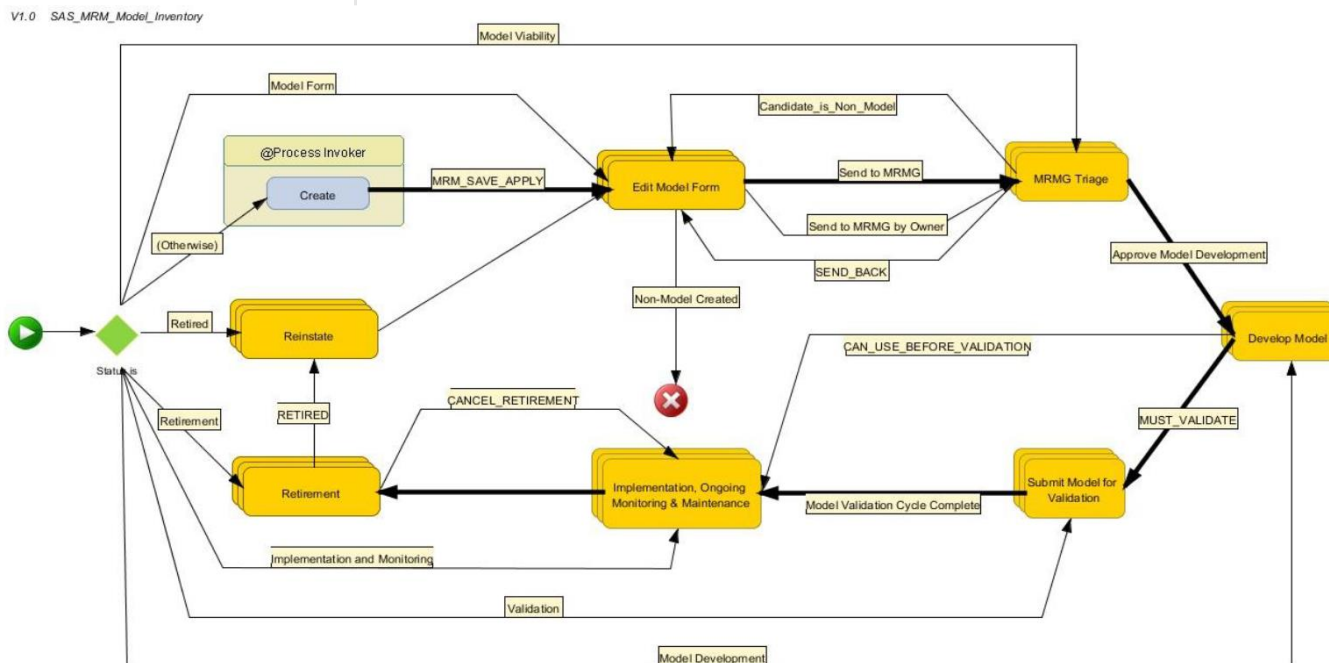
Save Apply Approve Reject... Cancel

Expand All Sections



Model Status: Sent to Model Owner
Workflow Activity: Model Owner Approval

MODEL INVENTORY WORKFLOW



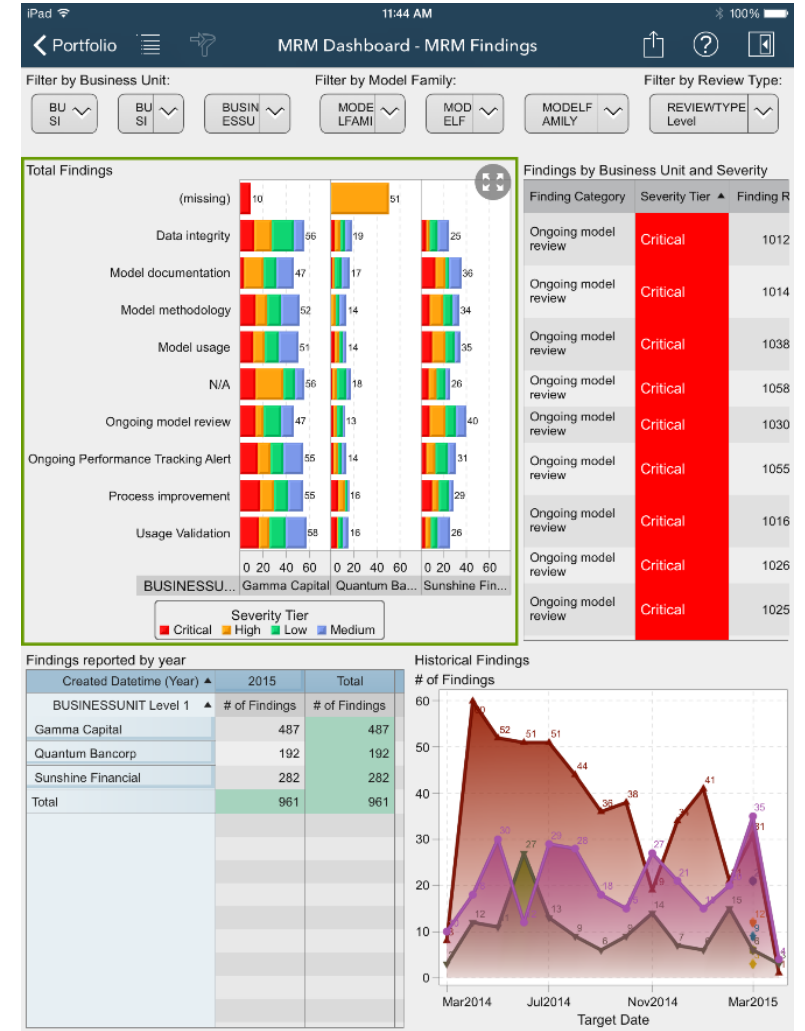
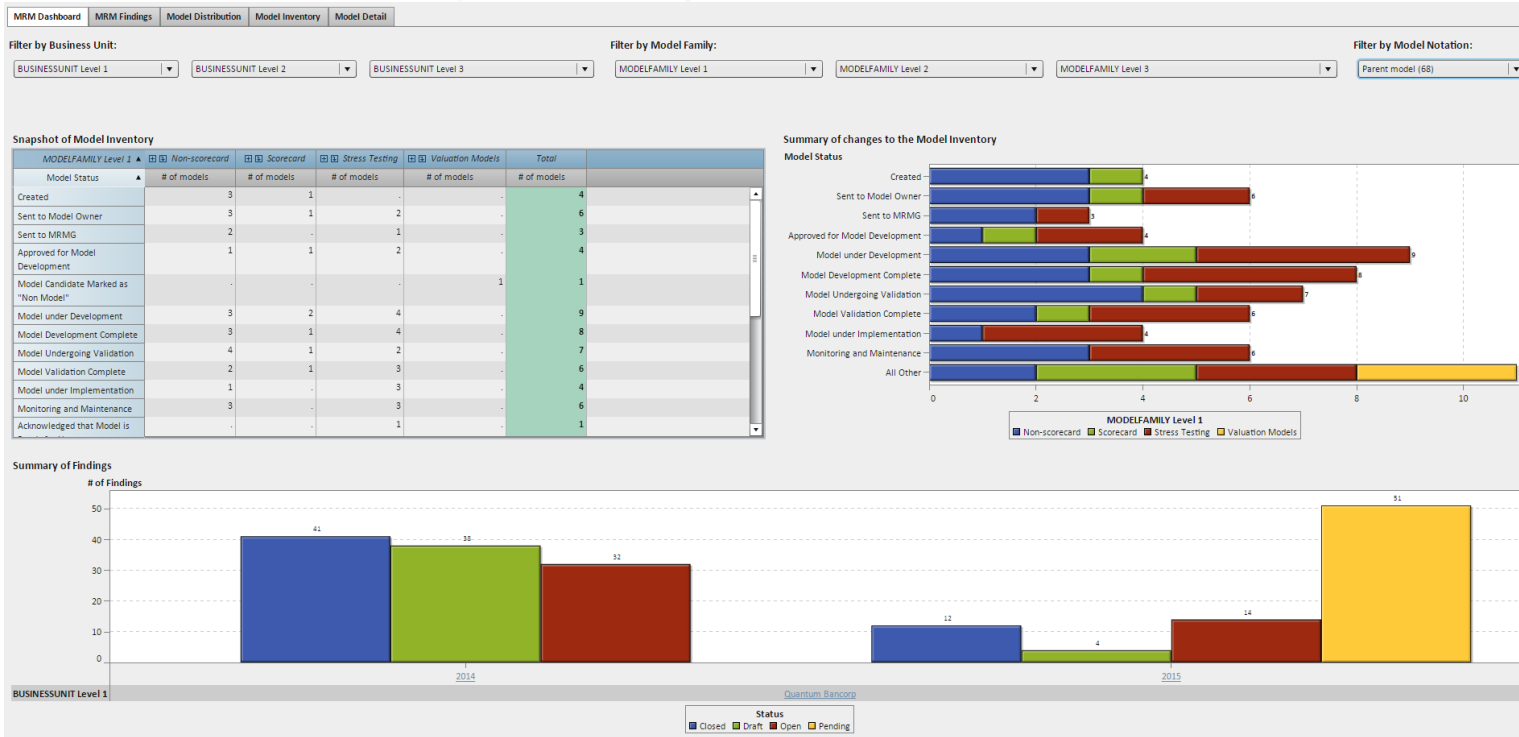


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AGGREGATE VIEW OF MODEL LIFECYCLE

DASHBOARDING

ENTERPRISE DASHBOARD REPORTING



EXAMPLE REPORT

[MRM Dashboard](#) | [Model Inventory](#) | [Model Details](#) | **[Models by Status](#)** | [Findings Summary](#) | [Finding Details](#) | [Action Plans Summary](#) | [Action Plan Details](#) | [Model Review Calendar](#) | [Model Reviews](#) | [Model Risks](#) | [Other MRM Info](#)

Filter by Business Unit: Quantum Bancorp (241) | BUSINESSUNIT Level 2 | BUSINESSUNIT Level 3
 Filter by Model Type: MODELFAMILY Level 1 | MODELFAMILY Level 2 | MODELFAMILY Level 3 | MODELNOTATION Path

Model Status

Model Status	Frequency
Model Undergoing Validation	27
Model under Development	25
Model Development Complete	22
Monitoring and Maintenance	22
Sent to Model Owner	21
Model Validation Complete	20
Created	17
Model under Implementation	17
Sent to MRMG	16
Approved for Model Development	14
Approver 2 Assignment	4
Sent Back to Model Developer	3
Acknowledged that Model is Ready for Use	3
Lead Validator Review	3
Retired	3
Model Candidate Marked as "Non Model"	2
Completed	2
MRM Analyst Review	2
Retirement Initiated	2
Business Technology Review	2
Model Governance Manager Review	2
MRM to Retire	2
Pending MRMG Approval	2
Create Model Form	1
Model Implementation Complete	1
Validation	1
Pending Model Owner Approval	1
Retirement Approved	1
Lead Validation Manager Review	1
Legal Approver Review	1
Team Lead QA Review	1

Status and Risk Tier

Risk Tier	(missing)	Tier 1	Tier 2	Tier 3
Model Status				
Create Model Form	-	-	1	-
Created	-	5	5	7
Sent to Model Owner	1	6	9	5
Sent to MRMG	1	9	3	3
Approved for Model Development	-	5	5	4
Sent Back to Model Developer	-	2	1	-
Model Candidate Marked as "Non Model"	1	-	1	-
Model under	-	9	9	7

High Risk Models

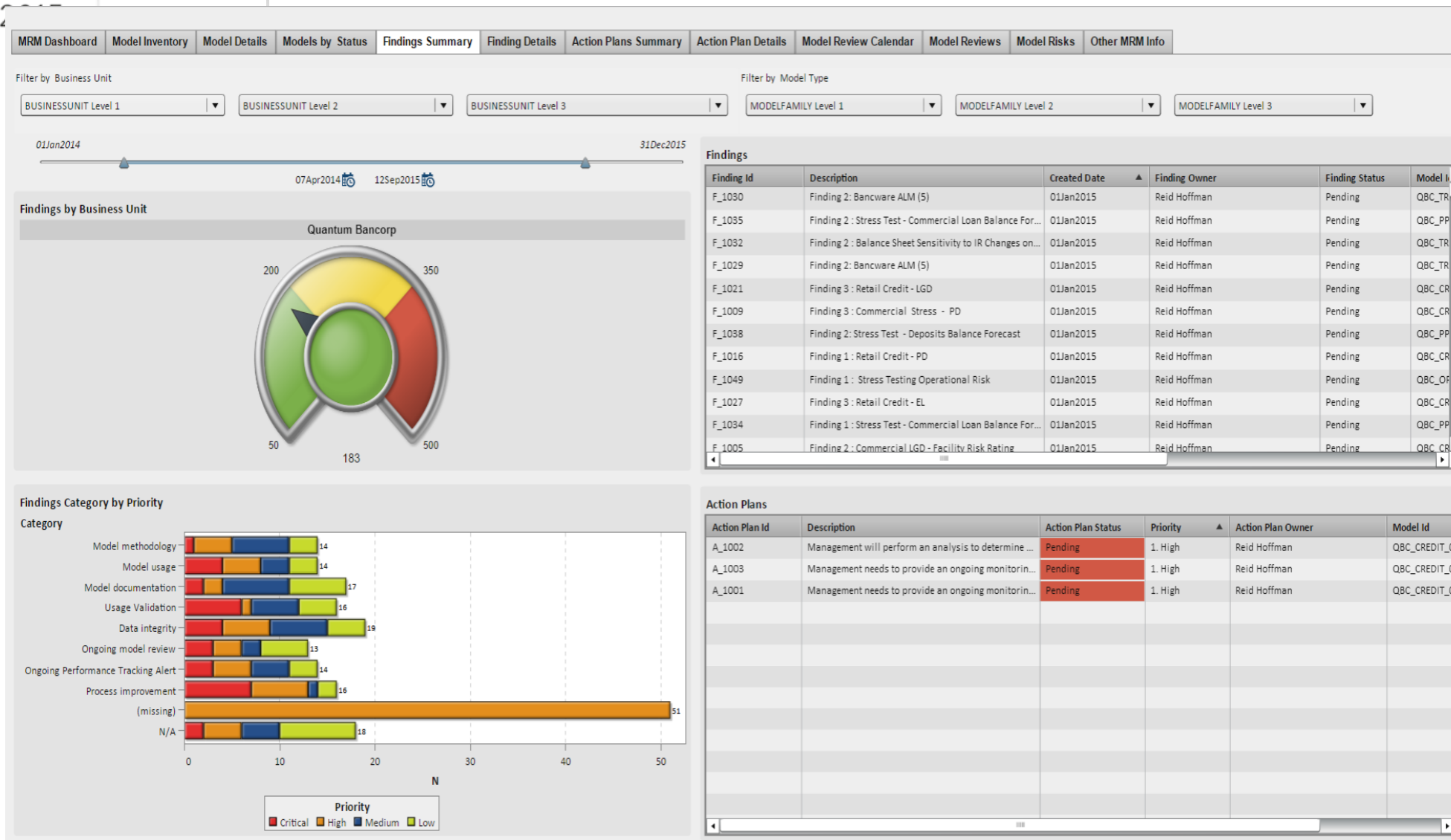
Risk Rating	Frequency
Significant	63
Minor	63
Important	58
Major	53
(missing)	4

Models by Business Unit and Model Family

MODELFAMILY Level 1	Frequency
Gamma Capital	3
Non-scorecard	51
Scorecard	71
Stress Testing	102
Valuation Models	14

BUSINESSUNIT Level 1: [Quantum Bancorp](#)

EXAMPLE REPORT: FINDINGS SUMMARY

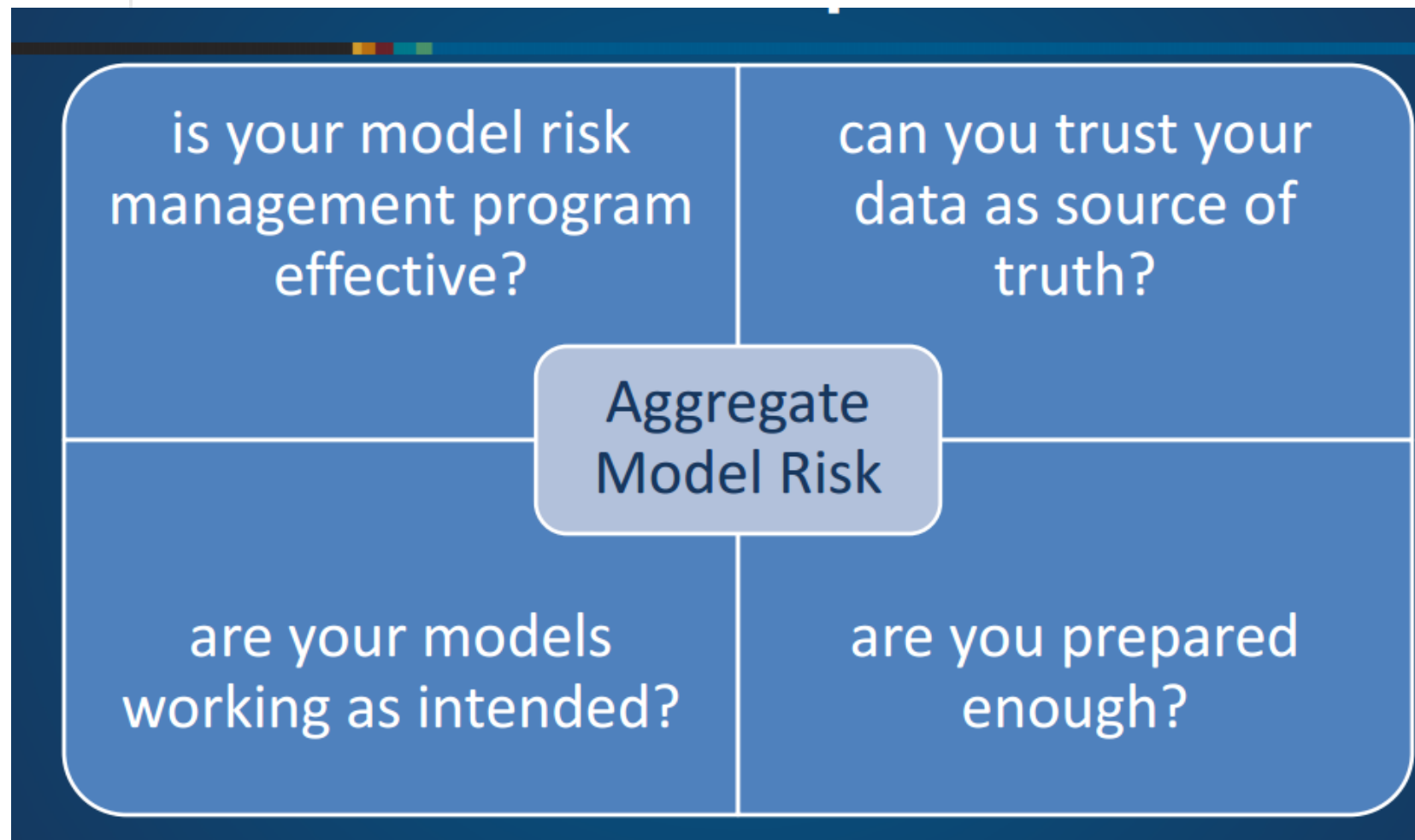




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AGGREGATION OF MODEL RISK

EXAMPLE MODEL RISK ASSESSMENT FRAMEWORK



Courtesy: Badrish Prakash, Discover Financial Services, American Bankers Association, Oct 2014

- 360 degree view of model lifecycle (design, test, independent validation, implementation, monitoring, retirement)
- Any policy exception, escalations
- Misapplication of models
- Vendor models and third party oversight

MODEL RISK ASSESSMENT QUESTIONS

(MODEL-METHOD-GRP) Methodology

Questions to assess Model Methodology

22. (MODEL-METHODOLOGY-1) Who was responsible for model development? [\[Help\]](#)

Standard Vended	Custom Vended	3rd Party Assisted and Maintained	3rd Party Assisted, STI Maintained	In-House
●	●	●	●	●

Justification:

Attachments:

23. (MODEL-METHODOLOGY-2) How complex is the model's methodology? [\[Help\]](#)

Dictated by regulatory guidance	Standard industry practice	One of several commonly accepted approaches	Adaptation of published literature	Cutting edge/No standard approach
●	●	●	●	●

Justification:

Attachments:

24. (MODEL-METHODOLOGY-3) Are multiple teammates familiar with the theory? [\[Help\]](#)

Yes No

Justification:

Attachments:

25. (MODEL-METHODOLOGY-4) How would you describe STI's experience with the methodology/theory? [\[Help\]](#)

In use for extended period w/ well documented performance testing	In use for extended period by more than one group	In use for extended period by one group	First implementation by one group	First implementation by multiple groups
●	●	●	●	●

Justification:

Attachments:

26. (MODEL-METHODOLOGY-5) How would you describe the models primary use? [\[Help\]](#)

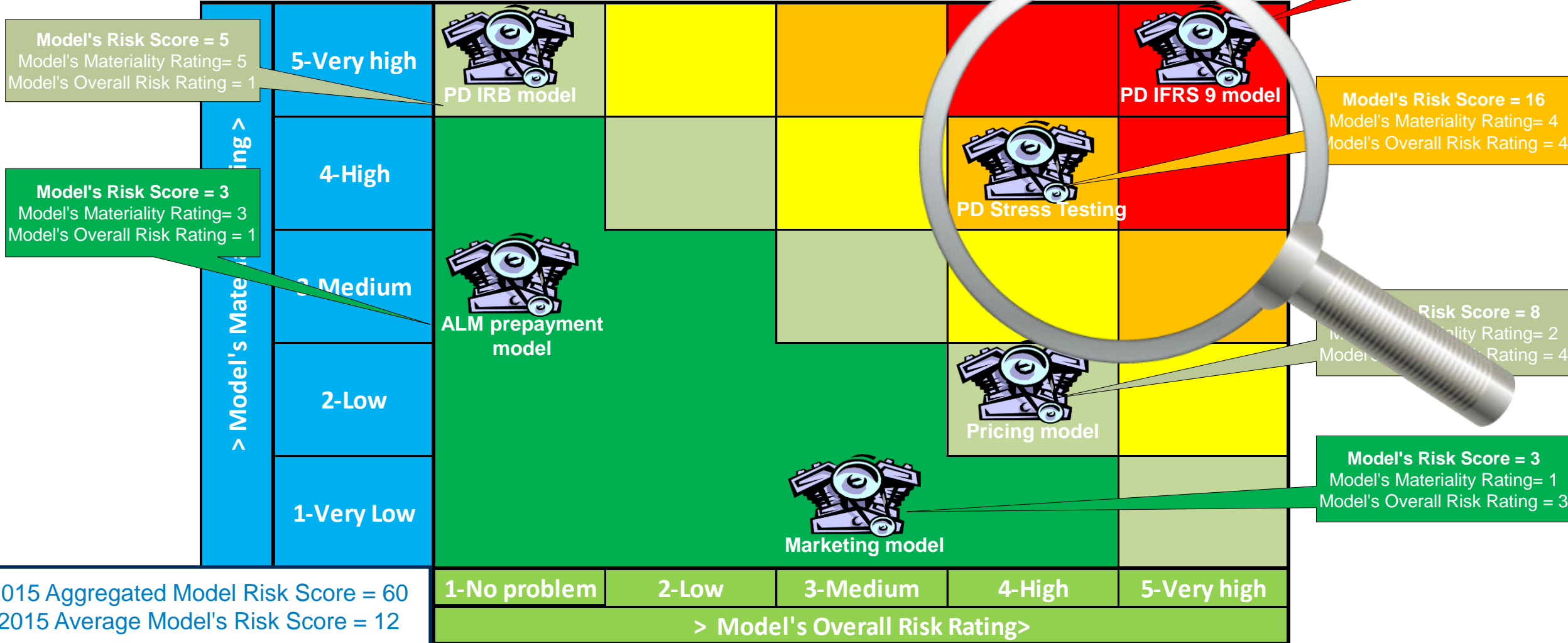
Staffing	Strategic	Forecasting	Regulatory	Trading
●	●	●	●	●

Justification:

MODEL RISK MATRIX EXAMPLE – CORPORATE PORTFOLIO

Individual Model's Risk Score

combined assessment of the Model's Materiality and Model's Overall Risk





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THANK YOU