



Model Risk Management

Introduction to Model Risk Management

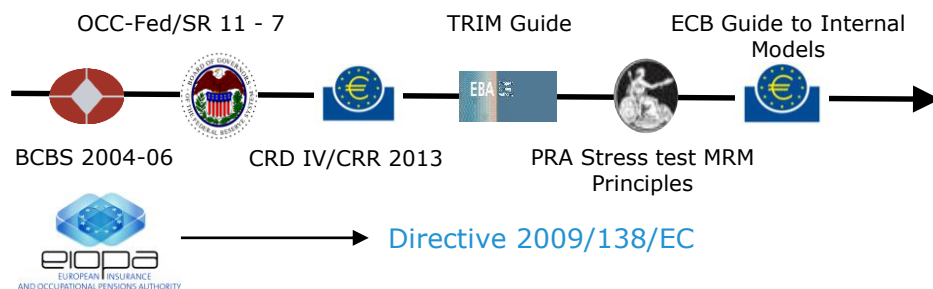
Regulatory expectations

Why does Model Risk matter?

1 Misuse
Model misuse can lead to unplanned losses for financial institutions

2 Misunderstanding
A misunderstanding of the model calibration or underlying data can lead to false results and unplanned losses

How do regulators bring solutions to model risk related issues ?



What are regulators' main expectations ?

Organization, governance and understanding of the models at a Board and senior management level.

A continuous follow-up and review of the models.

Comparable models and stability between contributors.

ECB TRIM Guide

- Credit Risk
- Market Risk
- Credit Counterparty Risk

ECB Guide to Internal Models

- (c) MRM policies
- (d) Model Inventory
- (e) Model Risk Mitigation
- (f) Model Risk Assessment and Quantification
- (g) Model Risk Communication and reporting
- (h) Roles and responsibilities

PRA – MRM principles for stress testing models

1. Model definition and inventory
2. Governance set up, model procedures and controls
3. Policies for model lifecycle
4. Model validation and independent review

In Europe, regulators confirmed that banks must implement a model risk management framework

Illustration of Market Practices

Main MRM objective Pillars

Organisation and Governance

- Existence of a **Model Risk Management** that has been approved by the **Board**, who receive periodic **reports** regarding compliance.
- Existence of a **Model Risk function** that **reports directly to the CRO** and is responsible for the MRM framework and the governance.
- Existence of a model validation **function** responsible for the **independent validation of models**.

Model Risk Quantification

- **Quantitative techniques for model risk mitigation** (beyond regulatory requirements) regarding:
 - **Data**, sensitivity to errors or absence of variables;
 - **Estimates**, sensitivity of estimates (maximum impact, alternative models);
 - **Uses**, predictive power evolution, impact of erroneous use, etc.

Model Risk Management Processes & Technology

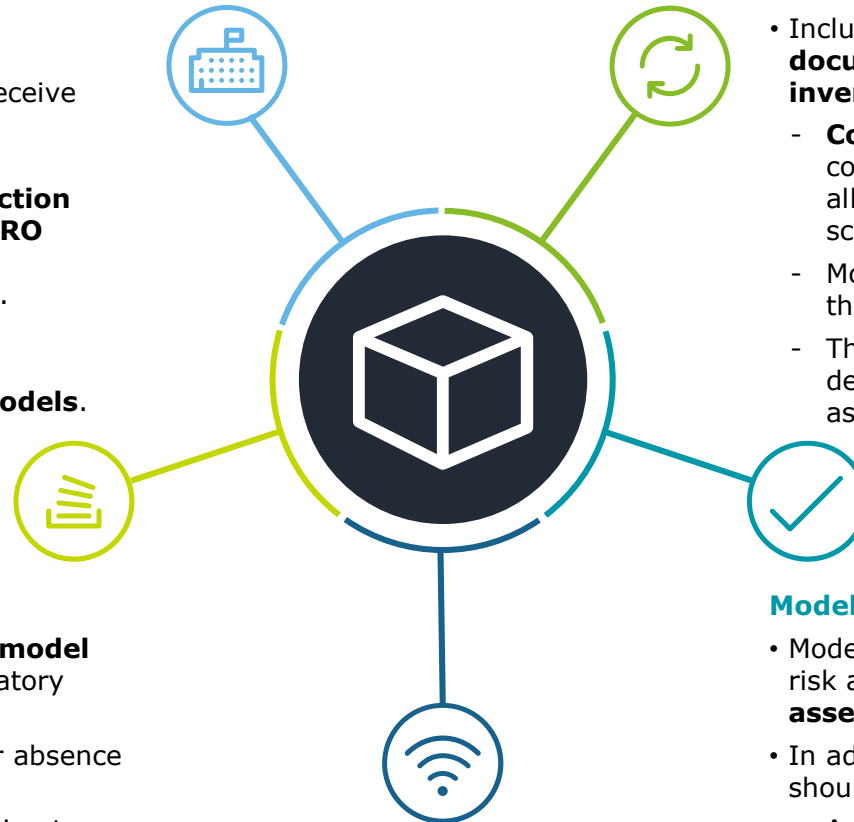
The MRM framework should be supported by optimized processes and a technological platform.

Model Lifecycle Management

- Includes the **model development, documentation, classification, inventory** and **follow-up**:
 - **Comprehensive inventory** covering all existing models and framework scope.
 - Models are classified according to the level of risk.
 - The documentation should include description, key variables, assumptions and algorithms.

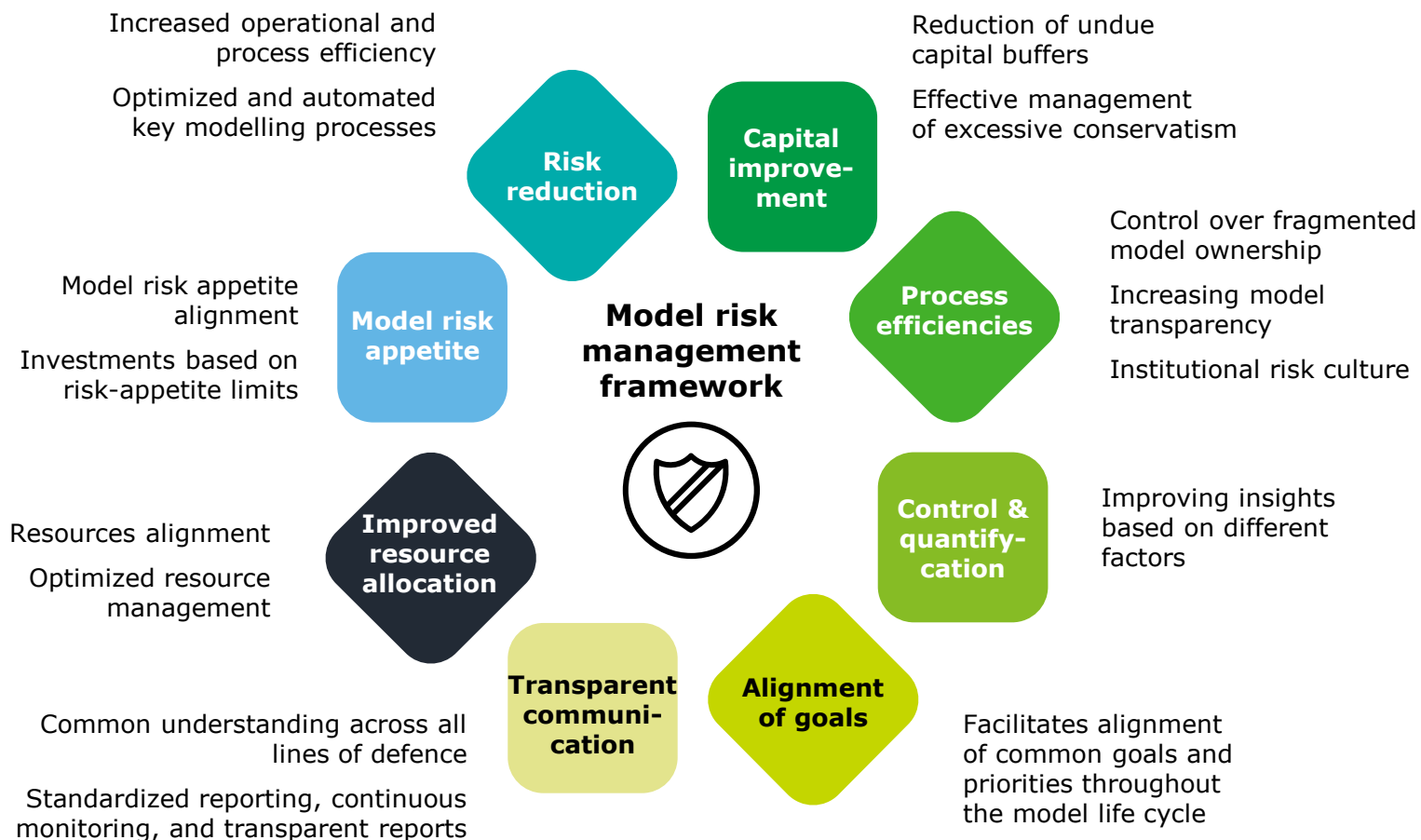
Model Control Framework

- Models assigned the **highest level** of risk are subject to **continuous assessment**.
- In addition to the above, all models should be re-evaluated by Validation:
 - Annually.
 - If they undergo material changes.
- **Before they are deployed to production, they should have been approved.**







Strategic MRM benefits

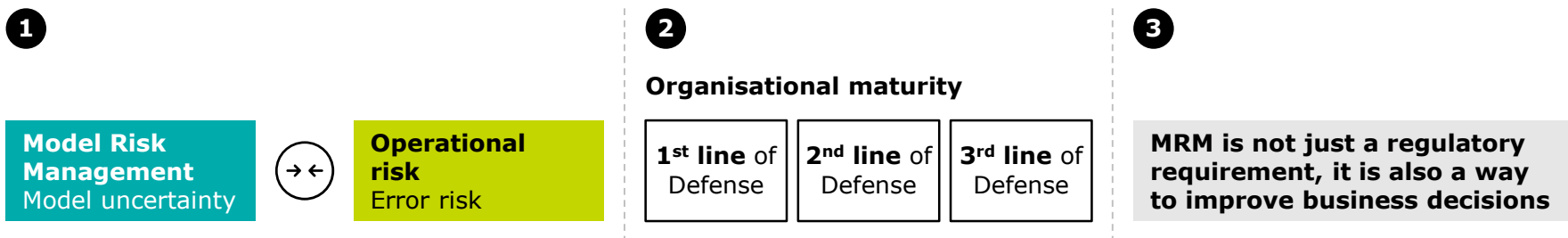
An effective and robust MRM framework improves earnings through cost reduction, loss avoidance, and capital improvement



Implementation of a Model Risk Management framework

Implementing such a framework can be decomposed in 3 steps of maturity

	Stage 1	Stage 2	Stage 3
	Foundation Lay the foundation of MRM framework	Implementation Implement the key functions of MRM	Integrated MRM MRM value creation via integrated platform
 Governance, Policies & Controls	<ul style="list-style-type: none"> • Basic MRM policy • Roles and responsibilities 	<ul style="list-style-type: none"> • Updated MRM control framework and rationalization 	<ul style="list-style-type: none"> • Strategic integration with Model risk appetite • Continuous MRM monitoring • MRM risk awareness & mind-set
 Development Implementation & Use	<ul style="list-style-type: none"> • Model definition • Periodical model discovery • Basic model inventory 	<ul style="list-style-type: none"> • Basic model categorization and model risk quantification 	<ul style="list-style-type: none"> • Continuous model risk quantification enhances MRM analytics and reporting and capabilities
 Model Validation process	<ul style="list-style-type: none"> • Documented validation procedures • Separate model development and validation team 	<ul style="list-style-type: none"> • Periodical coordination between MRM, development and validation processes 	<ul style="list-style-type: none"> • Clear model prioritization throughout organization • Optimal use of process automation / robotics
 MRM platform	<ul style="list-style-type: none"> • Scattered platforms 	<ul style="list-style-type: none"> • Basic, but centralised • Start with tooling requirements and vendor selection 	<ul style="list-style-type: none"> • Integrated MRM platform



Deloitte MRM Offer

Our proposed services

We have extensive experience in providing MRM services globally. We tailor our global MRM services to our clients. For this project we have taken the **best elements** in our common MRM offerings (as shown in the diagram below) and combined them to provide a **structured and comprehensive approach and methodology** towards performing a diagnostic of the MRM framework and practices that is fit for a large global reinsurer.



Organisation and governance

- **MRM Organisational Design:** Role profiles according to the 3 lines of Defence, Internal Structuration, Outsourcing of some activities (model validation), Change Management, Creation and facilitation of MRM live training/e-learning modules, Peer benchmark assessment, Model Risk Attestation
- **MRM Policy:** Creation of policies, procedures, practices & controls according to regulatory guidance,
- **MRM Program:** Set-up effective MRM program, PMO activities
- **MRM Governance:** Define Model Risk Appetite, MR reporting, Guidelines for model usage and limitations



Model lifecycle management

- **Model Inventory:** Definition and set up of model inventory features, platform set up,
- **Model Classification:** Assistance in classifying models (complexity, sophistication, materiality)
- **MR Documentation:** Standardized documentation templates including MR evaluation, Documentation review, Development of MRM life-cycle process flow charts with narratives
- **Model Follow-Up:** Design of reporting routines & ad-hoc reporting capabilities, Model Monitoring
- **Model Assessment:** Assessment of model implementation



Model control framework

- **Data Quality Review:** Model input data review
- **Validation Approach:** Design of appropriate model validation methodology
- **Model Independent Review:** Perform independent review and deliver model review report
- **Model Control Process Optimization:** Analyze and streamline the existing control processes, Design and adjust processes
- **Model Risk monitoring:** Model performance monitoring, KRI's and KPI's, Model Risk Appetite



Model risk assessment

- **MRA Development:** MR Source identification, Qualitative Assessment: Model Risk Scorecard, Quantitative Assessment: Model Uncertainty measurement and quantification
- **Model Risk Analytics:** Sensitivity Analysis, Measuring MR impact on P&L and Capital
- **Model Risk Mitigation:** Identification of techniques for MR Mitigation



Model risk technology

- **Platform Design:** Set up & implementation of the MRM platform core functionalities & technology infrastructure, workflow process management
- **Platform Selection:** Assistance for choosing a MRM technological solution
- **Data Quality Management:** MRM data quality management for accuracy, consistency & completeness initiatives
- **Automation:** Automation of repeatable areas processes and activities (RPA)

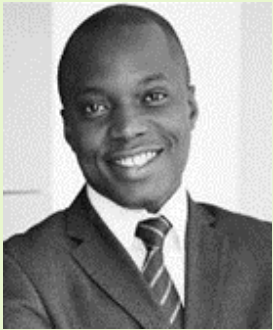
Key Contacts



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Nadège is in charge of offers regarding credit risk and is the leader of Model Risk Management offers in France and in EMEA. She has 19 years of experience acquired in large banks in France and UK in managing quantitative teams and in project management with analytical components. In her intrapreneur role in Deloitte, she has developed a project involving the use of innovative techniques for modelling.



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As a Senior manager within Deloitte France Credit Risk team, Franck has developed skills in banking regulation, process analysis, regulatory impact analysis, operational risk assessment and capital optimization.

He continues his career in the credit risk division where he works on issues of modeling, model validation and credit process optimization. Franck has significant knowledge in organizational and strategy consulting gained during four years in a strategy firm.



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Enver is acting as a manager within our Risk Advisory team. He takes advantage of his 12 years of experience in French and English banks in the credit risk field for Retail portfolios, mainly in acquisition strategies and risk monitoring for unsecured portfolios.

Additionally, during his career he has also acquired a big experience in the Collections strategies and performance monitoring fields.



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