

ECB's Targeted Review of Internal Models (TRIM) - Webinar

April 2018

Agenda

1. Trends and the market outreach
2. Common themes and learnings across TRIM banks
3. Addressing the problem

1. Trends and the market reach

Industry Growing Demand with Model Risk

A need for credible and adequate internal model framework



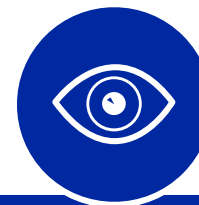
Regulatory Pressure

One of the most persistent and important drivers for model risk management across financial services is regulatory pressure



Stakeholder Pressure

Stakeholders are paying closer attention to the process of managing risk, especially **the use of risk models** and **the management of business volatility**



Managing Reputation

Firms realize that model failures could cause significant reputational damage and want to be able to include reputation as part of model risk assessment

“ Targeted Review of Internal Models (TRIM) is aimed at **enhancing the credibility and confirming the adequacy** and appropriateness of approved Pillar I internal models permitted for use by significant institutions when calculating own funds requirements. ”

(ECB, Guide for the Targeted Review of Internal Models, 2017)

Market outreach: pain points

Targeting and address the problems

Banks main pain points

Lack of data for estimation, in particular for LDPs

Uncertainty around **model conceptual soundness and design**

Disperse and **costly model governance** framework

Need for model **inventory** concerns over model misuses and implementation errors

Challenging regulatory assessment and **RWA impact**

Addressing the problem

Industry leading datasets across default, recovery and financial information

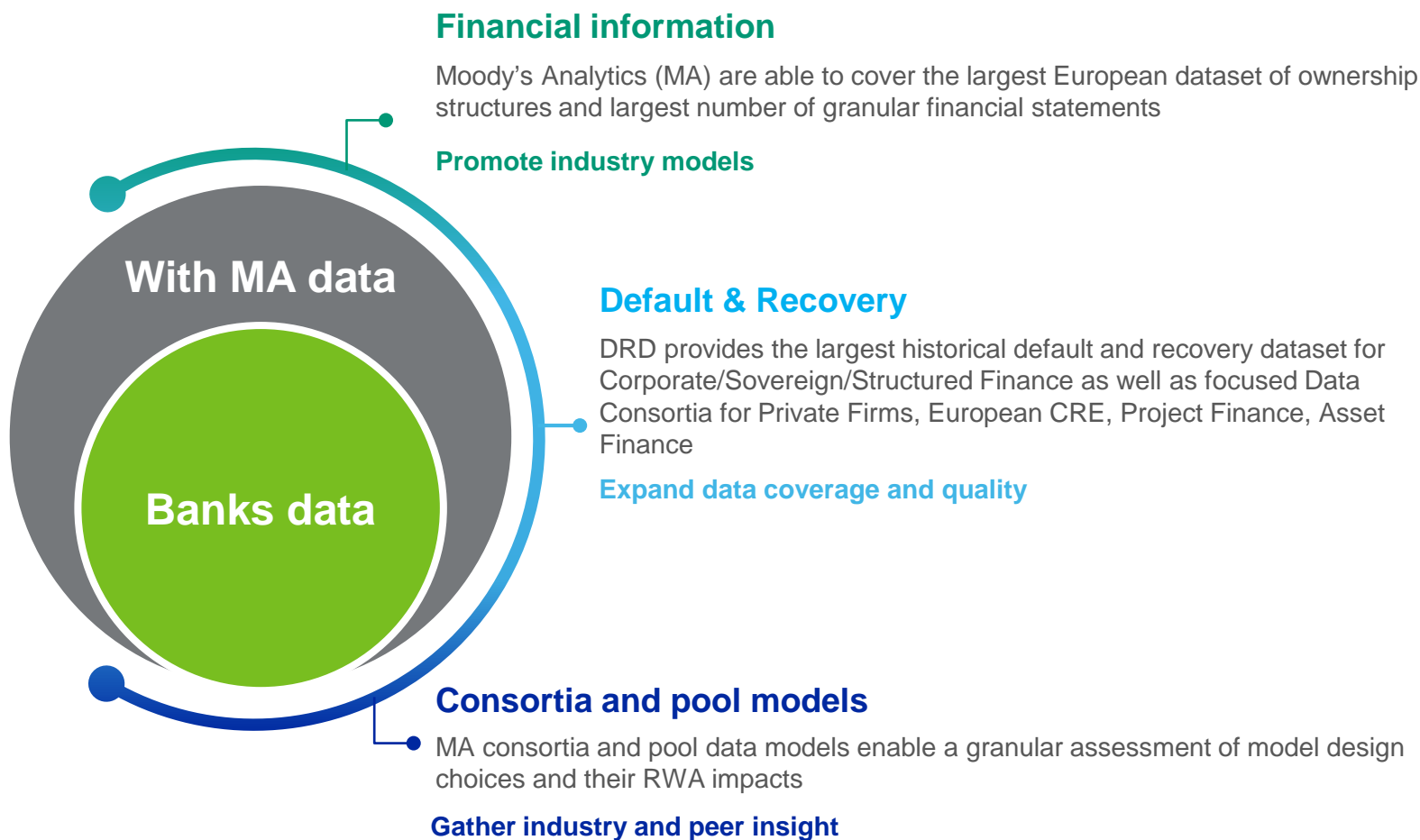
European wide benchmark models, especially for the Low Default Portfolios as per CRR Art185c

Advanced technologies for data and model governance over the model life-cycle

Advisory expertise and experience with **model validation of LDPs**

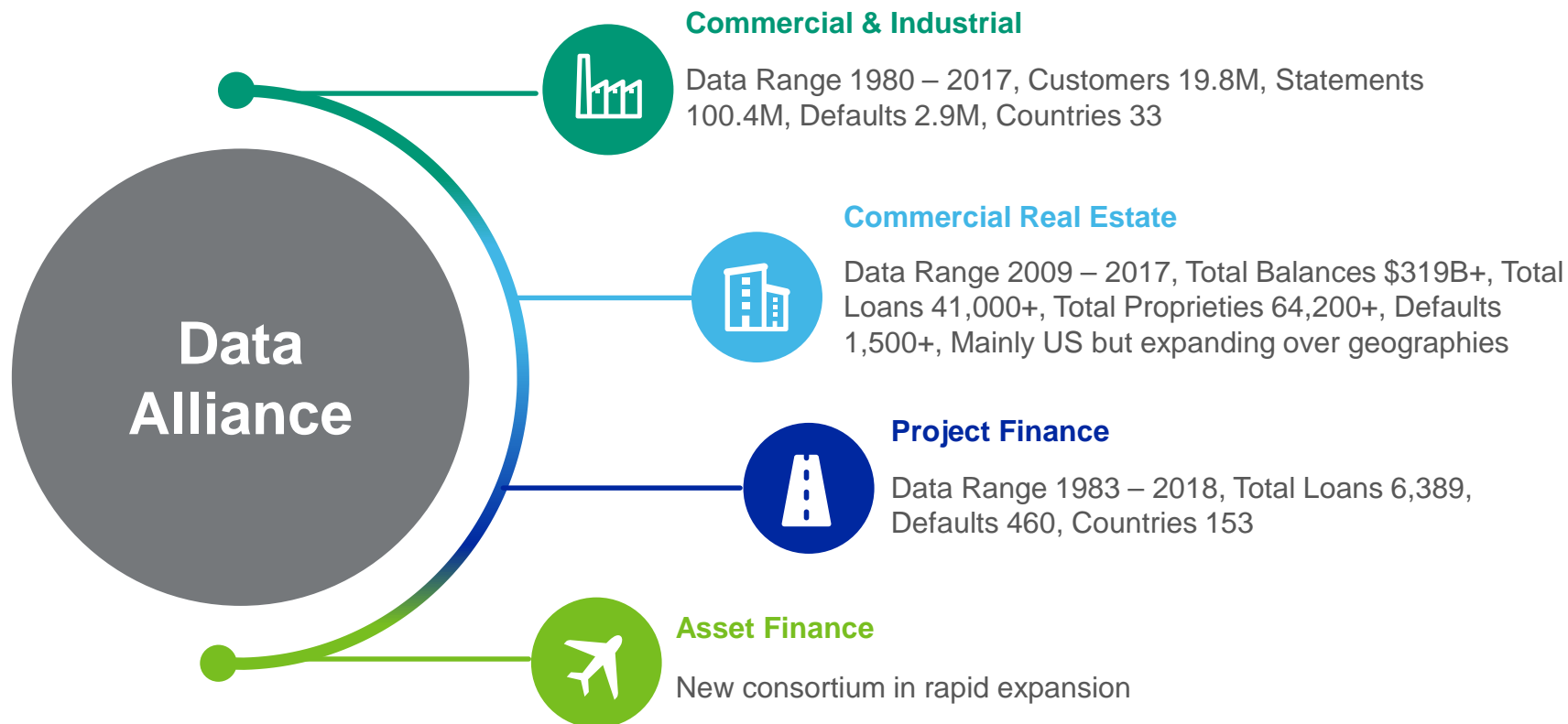
Data – Expand Coverage for Risk Governance

Tackle the lack of data challenge from the beginning



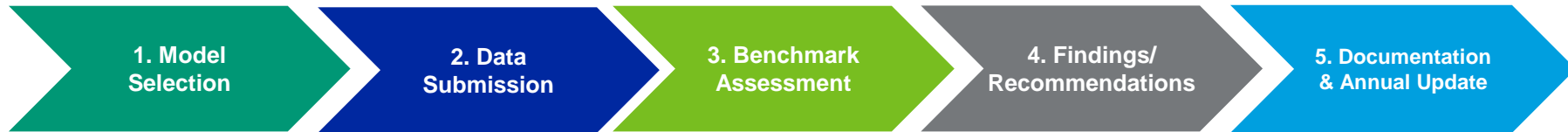
Data for Low Default portfolios

Leveraging data for broad asset class coverage



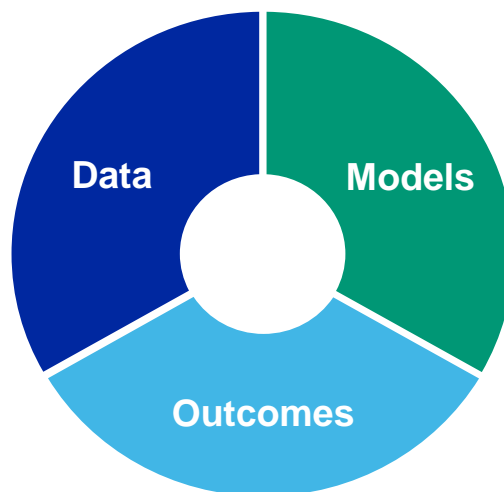
Validation of Internal Estimates via Benchmarking (CRR Art. 185 c)

Moody's Analytics providing the services to facilitate internal rating model benchmarking via Challenger Models and comparisons with relevant external data sources.



- » Mapping of the Bank's asset classes to Moody's Analytics (MA) proprietary internal rating models for PD and LGD estimations
 - » MA proprietary models "Challenger Models" will be considered, such as, RiskCalc for Corporates and Banks, Project Finance Scorecards and Commercial Real Estate Scorecard.
- » The Bank will share its internal rating grades including PiT and TTC PD and LGD estimates for selected counterparts and facilities
 - » The Banks will provide the necessary ratios and inputs required into Moody's models
 - » Alternatively, the Bank will provide the last three (3) years' worth of credit files for selected counterparts and facilities.
- » MA will conduct the benchmark assessment for selected obligors and facilities from the Bank's portfolio, using its proprietary credit risk models
 - » The outcome of the benchmark, comparison between internal PD/LGD to Challenger, includes:
 - » Correlation and Discriminatory Power if possible
 - » Comparison of PD and LGD levels
 - » Comparison of Model Stability through time
- » Where deviations in PD and LGD values between Internal and Challenger Models are significant MA will investigate the reason for the deviation and assess its significance.
 - » MA will provide recommendations to remediate any detected problems.
- » MA will document the outcome of the benchmarking
 - » MA can provide an annual update service or provide the Benchmarking tools via the Collaborative Analytics Platform (CAP)

TRIM Low Default Portfolio - Model Refinement and Validation

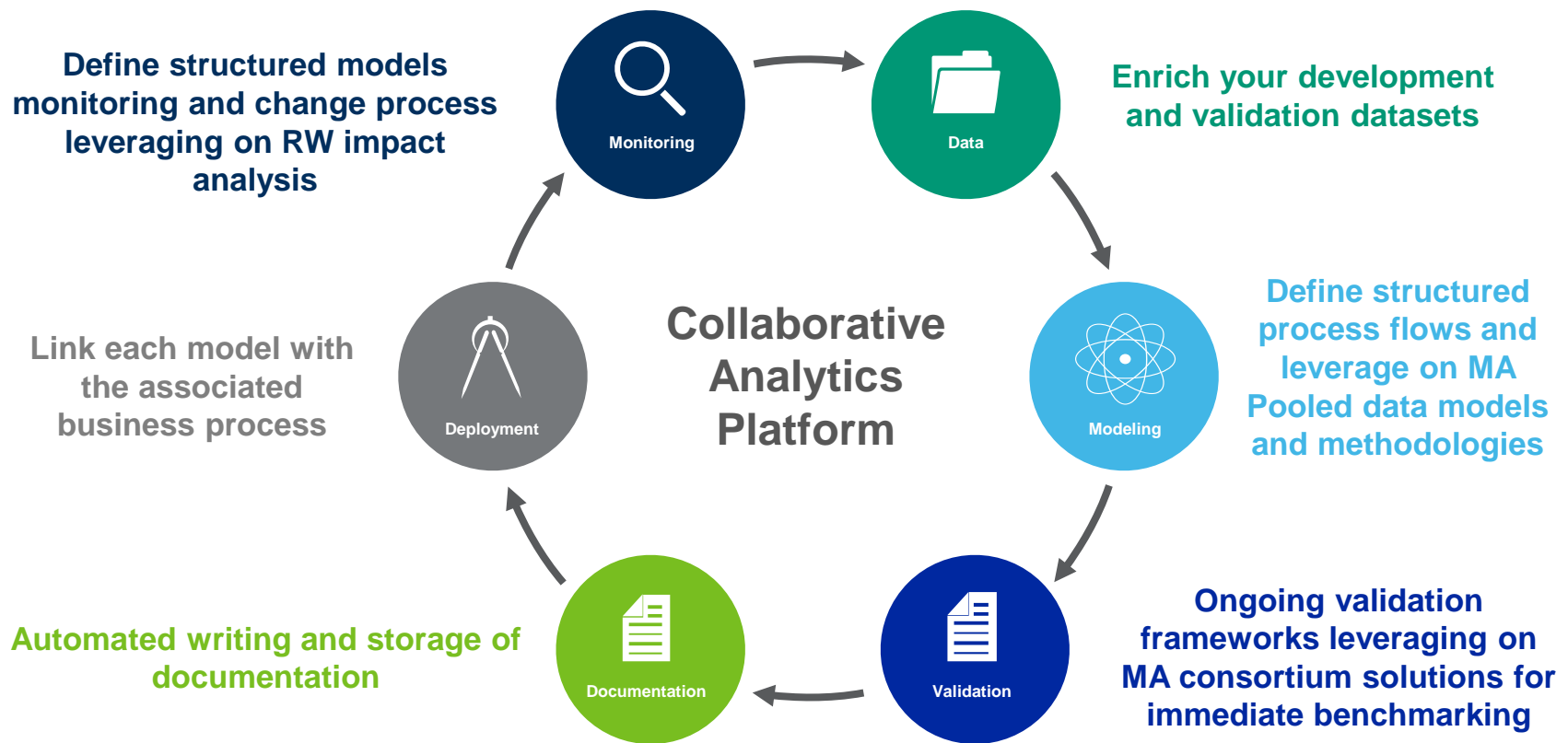


Task	Description
Model Conceptual Soundness Review	Model purpose and use, model framework, assumptions & limitations, model methodology, variables and comprehensiveness
Data, Inputs and Sources	Data quality and integrity, segmentation review, sampling process and applicability
Model Replication	Variable selection & model estimation, model performance and testing
Outcome Analysis	Model outputs review, scenario and sensitivity analysis, review of benchmarking and back testing if applicable, mapping and calibration
Implementation Testing & Governance	Implementation inputs, implementation outputs, consistency with credit policies and guidelines
Documentation	Documentation of review process, finding and recommendations



Technology – Manage the models lifecycle & data

Robust data architecture and integrated platforms



2. Common themes and learnings across TRIM banks

Current Challenges observed

Feedback from clients

Task	Description
Timeliness	Timely availability of the data and the documentation requested
Materiality	Data specific to Low Default Portfolios, specific asset classes
Regulation	Impact of finalisation of Basel III (“Basel IV”)
Execution	Approach to TRIM review of the portfolios PMO and Administrative focus
Risk differentiation	Reduce the risk differentiation
Data (specifically on LGD)	Usage of proxies from certain portfolios.

Proposals and updates

Comments from the market on communication to/from ECB

Proposals

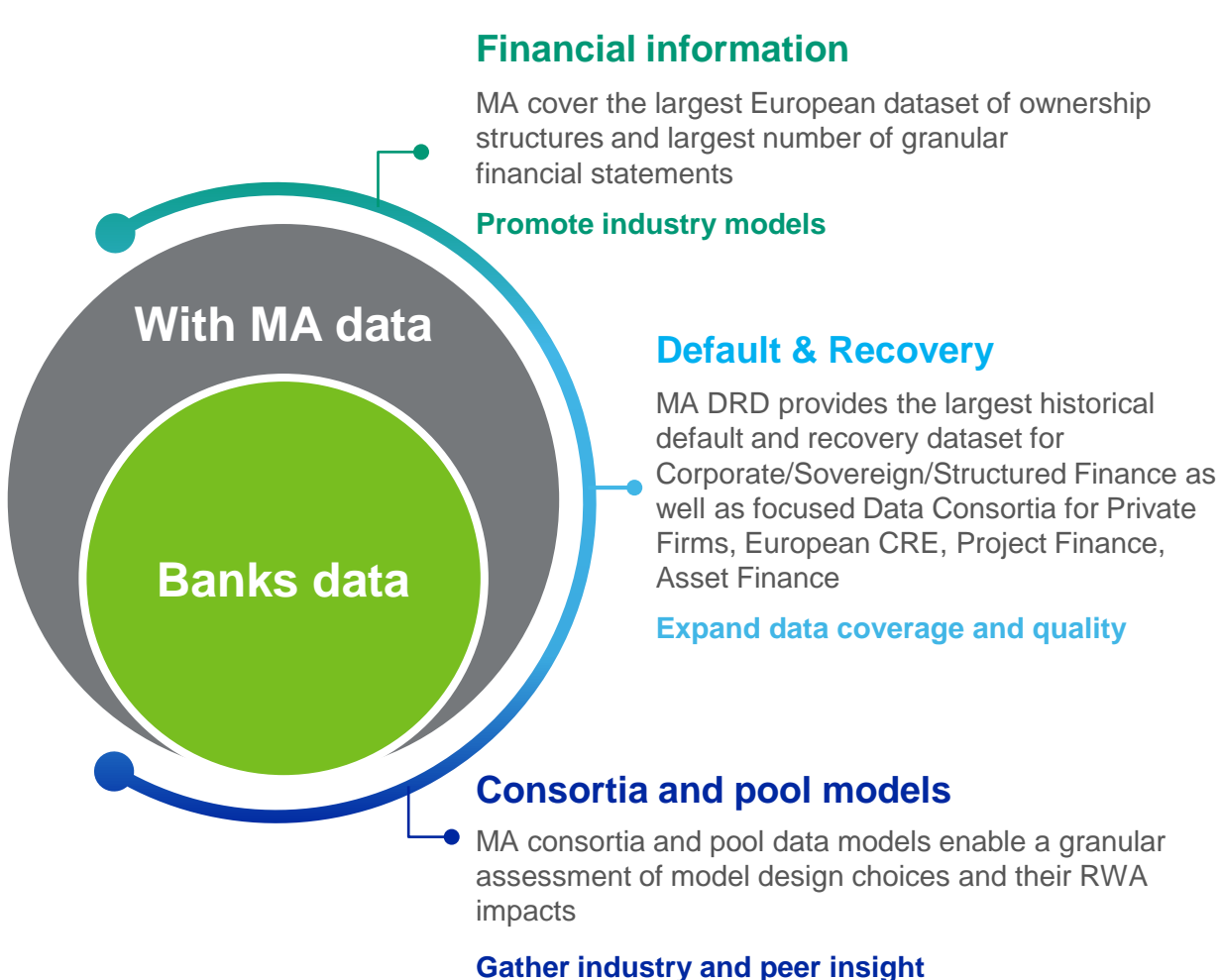
1. Data templates not fitting internal model structures (in terms of granularity)
 - a. Adjust templates
 - b. Release early
2. Provide path to reviews, timelines a lot earlier on

Update/Feedback

1. Model and Risk Governance focussed
2. Materiality and relevance of data
3. Update to the TRIM guidelines

Data – Expand Coverage for Risk Governance

Tackle the lack of data challenge from the beginning



MA approach

- » Assess portfolio coverage, internal data gap analysis, model landscape and complement with MA data sets
- » Provide data integration for model estimation and validation
- » Data management solutions to establish a reliable framework in line with relevant regulatory requirements (e.g. TRIM, BCBS 239)
- » Support fine-tuning and validation processes with respect to best practices and data consortia solutions



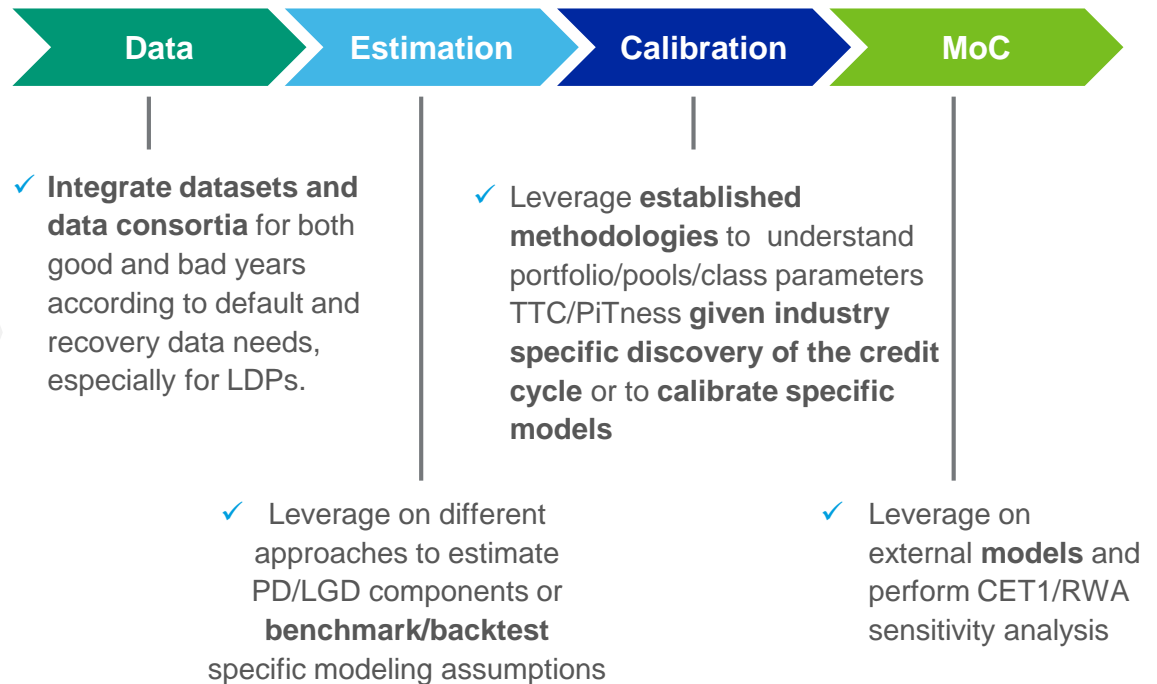
Models – Model Risk Management

A TRIM framework leveraging Models, Data and insights

Key components

Key elements to model management approach is structured over 5 relevant milestones:

- Model Governance
- Data**
- Model design**
- Model performance**
- Documentation



MA experience

Through experiences across **European Tier1/Tier2 banks** through full development or refinement of specific model components for both HDPs and LDPs



Models – Model Risk Management

Main data related challenges



Quality Framework

- » Understanding of data quality issues with respect to (a) completeness (b) accuracy (c) consistency (d) timeliness (e) uniqueness (f) validity (g) availability/accessibility (h) traceability

Integration

- » Integration of external sources of historical series (estimation/calibration) reflecting banks portfolio/experience
- » Evaluation of alternative set of risk indicators
- » Collection of shadow/expert ratings
- » Analysis of country/segment specific workout periods
- » Collection of 20 years of economic indicator historical data

Comparison

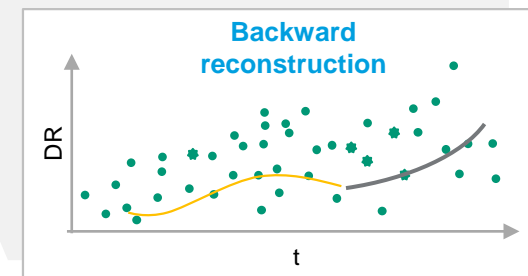
- » 1 year / long run PDs (LGDs) Vs DRs (LRs)
- » Build portfolio for out of sample/time performance analysis

Credit Cycle

- » Identification of the credit cycle for specific segments
- » Downturn scenarios
- » PiT / TTC mapping tables

MA provides **Data Analytics insights** leveraging on **established methodologies** aimed to assess backward and forward looking credit risk estimates.

Low data context can leverage on **MA data consortium** initiatives





Models – Model Risk Management

Main estimation related challenges



Estimation samples

- » Homogeneity of default definition
- » Impact of changes in lending practices
- » Reflection of the long run experience
- » Bias introduced by the sampling criteria
- » Performance of representativity analysis
- » Relevance of model segmentation
- » Identification of overlapping / non-overlapping samples
- » RDS assessments

Estimation criteria

- » Backing up of expert based judgement
- » Relevance of the predictive power
- » Assessment of risk differentiation across segments and rating buckets
- » Identification of economic indicators dependencies for subportfolios

MA provides **Data Analytics insights** leveraging on **established methodologies** aimed to assess backward and forward looking credit risk estimates.

MA support banks through **asset specific expertise**

	MCB 1	MCB 2	MCB 3	MCB 4	MCB 5	MCB 6	MCB 7	MCB 8	MCB 9	MCB 10	MCB 11	MCB 12	MCB 13	MCB 14	MCB 15	MCB 16	MCB 17	MCB 18
Oct-14	13.5%	15.5%	18.5%	19.1%	19.7%	20.8%	21.3%	21.6%	22.3%	22.5%	23.6%	23.2%	23.4%	23.7%	23.9%	24.1%	24.3%	24.4%
Nov-14	13.7%	17.1%	18.2%	18.6%	20.7%	21.2%	21.5%	22.0%	22.4%	22.8%	23.3%	23.6%	23.8%	24.0%	24.2%	24.3%	24.5%	24.6%
Dec-14	13.8%	17.4%	19.2%	19.6%	21.7%	22.2%	22.5%	23.0%	23.4%	23.8%	24.3%	24.6%	24.8%	24.9%	25.0%	25.1%	25.2%	25.3%
Jan-15	14.1%	17.4%	19.5%	19.9%	21.9%	22.4%	22.7%	23.2%	23.6%	24.0%	24.5%	24.8%	24.9%	25.0%	25.1%	25.2%	25.3%	25.4%
Feb-15	14.3%	18.7%	19.8%	20.2%	22.2%	22.7%	23.0%	23.5%	23.9%	24.3%	24.8%	25.1%	25.2%	25.3%	25.4%	25.5%	25.6%	25.7%
Mar-15	14.5%	19.1%	20.1%	20.5%	22.5%	23.0%	23.3%	23.8%	24.2%	24.6%	25.1%	25.4%	25.5%	25.6%	25.7%	25.8%	25.9%	26.0%
Apr-15	15.5%	19.4%	21.7%	22.1%	24.1%	24.6%	24.9%	25.4%	25.8%	26.2%	26.7%	27.0%	27.1%	27.2%	27.3%	27.4%	27.5%	27.6%
May-15	15.8%	19.7%	22.0%	22.4%	24.4%	24.9%	25.2%	25.7%	26.1%	26.5%	27.0%	27.3%	27.4%	27.5%	27.6%	27.7%	27.8%	27.9%
Jun-15	16.0%	20.0%	22.3%	22.7%	24.7%	25.2%	25.5%	26.0%	26.4%	26.8%	27.3%	27.6%	27.7%	27.8%	27.9%	28.0%	28.1%	28.2%
Jul-15	16.2%	20.3%	22.6%	23.0%	25.0%	25.5%	25.8%	26.3%	26.7%	27.1%	27.6%	27.9%	28.0%	28.1%	28.2%	28.3%	28.4%	28.5%
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Nov-15	17.2%	21.5%	23.8%	24.2%	26.2%	26.7%	27.0%	27.5%	27.9%	28.3%	28.8%	29.1%	29.2%	29.3%	29.4%	29.5%	29.6%	29.7%
Dec-15	17.5%	21.8%	24.1%	24.5%	26.5%	27.0%	27.3%	27.8%	28.2%	28.6%	29.1%	29.4%	29.5%	29.6%	29.7%	29.8%	29.9%	30.0%
Jan-16	17.7%	22.1%	24.4%	24.8%	26.8%	27.3%	27.6%	28.1%	28.5%	28.9%	29.4%	29.7%	29.8%	29.9%	30.0%	30.1%	30.2%	30.3%
Feb-16	18.0%	22.4%	24.7%	25.1%	27.1%	27.6%	27.9%	28.4%	28.8%	29.2%	29.7%	30.0%	30.1%	30.2%	30.3%	30.4%	30.5%	30.6%

Models – Model Risk Management



Main calibration related challenges



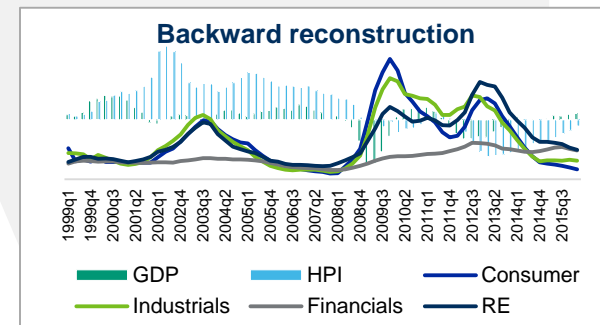
Calibration criteria

- » Definition of a suitable historical series over economic cycles
- » Identification of the central tendency
- » Understanding of the risk grades classification
- » Performance of the PD calibration criteria
- » Predictability of the default rates
- » Homogeneity of the default definition
- » Identification of overlapping / non-overlapping windows
- » Downturn estimation (e.g. Macroeconomic / reference)

Calibration philosophy

- » Relevance of the migration across risk grades
- » Granular identification of yearly default rates
- » Understanding of the overall rating model PiT/TTCness through scenario sensitivity analysis
- » Relevance of the dynamics and volatility of capital requirements

MA provides **Data Analytics insights** leveraging on **established methodologies** aimed to assess backward and forward looking credit risk estimates.





Models – Model Risk Management

Main MoC related challenges

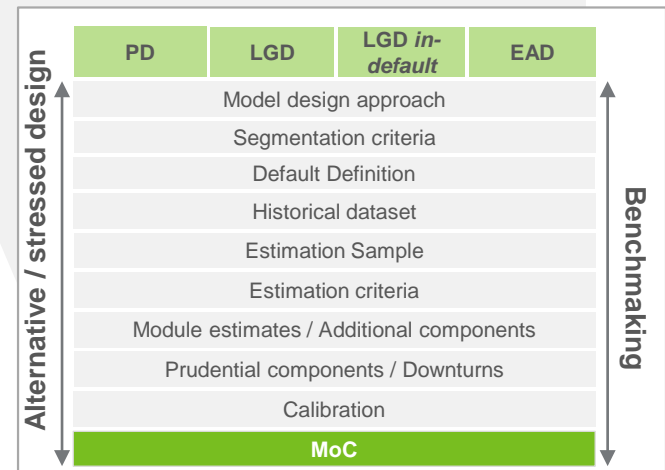


Prudential components

- » Assessment of sensitivities of risk parameters estimates to main model inefficiencies
- » Identification of appropriate adjustments and associated MoC
- » Setting up of a MoC framework aimed to manage the model risk ongoing

Use of MA **models** in order to calibrate MoC components

Leverage on MA expertise in order to identify **model adjustments**



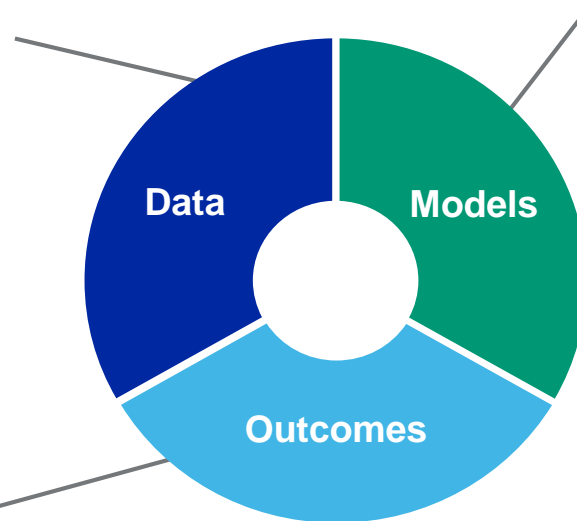


Model – In-depth Validation framework

Country and model agnostic perspective

Datasets

- » Use specific external Risk Datasets to:
 - Structure **alternative validation samples**
 - Assess the degree of availability and up-to-date nature of necessary inputs
 - Challenge model assumptions
 - deep dive on model errors



Model challenge

- » Leverage on **Pool data models** to assess consistency across:
 - Segmentation criteria
 - Data treatments and drivers selections
 - Representativity analysis
 - Full benchmarking
- » Leverage on **external PD & LGD models** to compute:
 - Segment-specific correlation analysis
 - Advanced backtesting
 - Credit/recovery cycle backtesting

Consortia

- » Leverage on **Data Consortia**
 - Obligor/Segment level consistency checks with 90+ partnering financial institutions
 - Benchmarking the risk parameters excess/unexpected volatility with series from 1990
 - Deep diving on consensus estimates across asset types (e.g. C&I, SME, CRE, PF, ..), **especially LDPs**

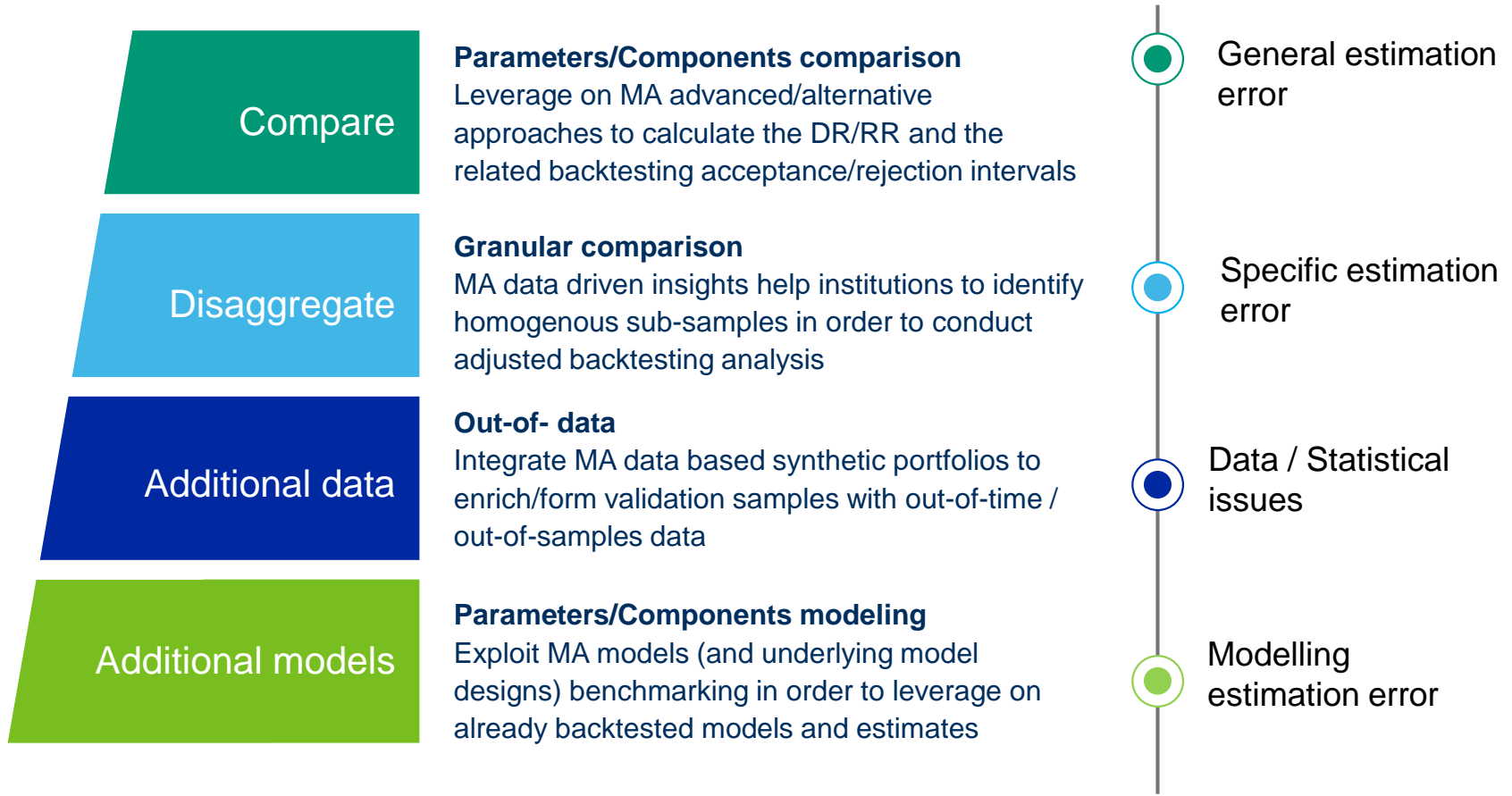
MA experience

Through experience across a large panel of **European Tier1/Tier2 banks** through full validation and benchmarking of specific model components for HDPs and LDPs



Backtesting framework

LDP backtesting is tackled through alternative perspectives

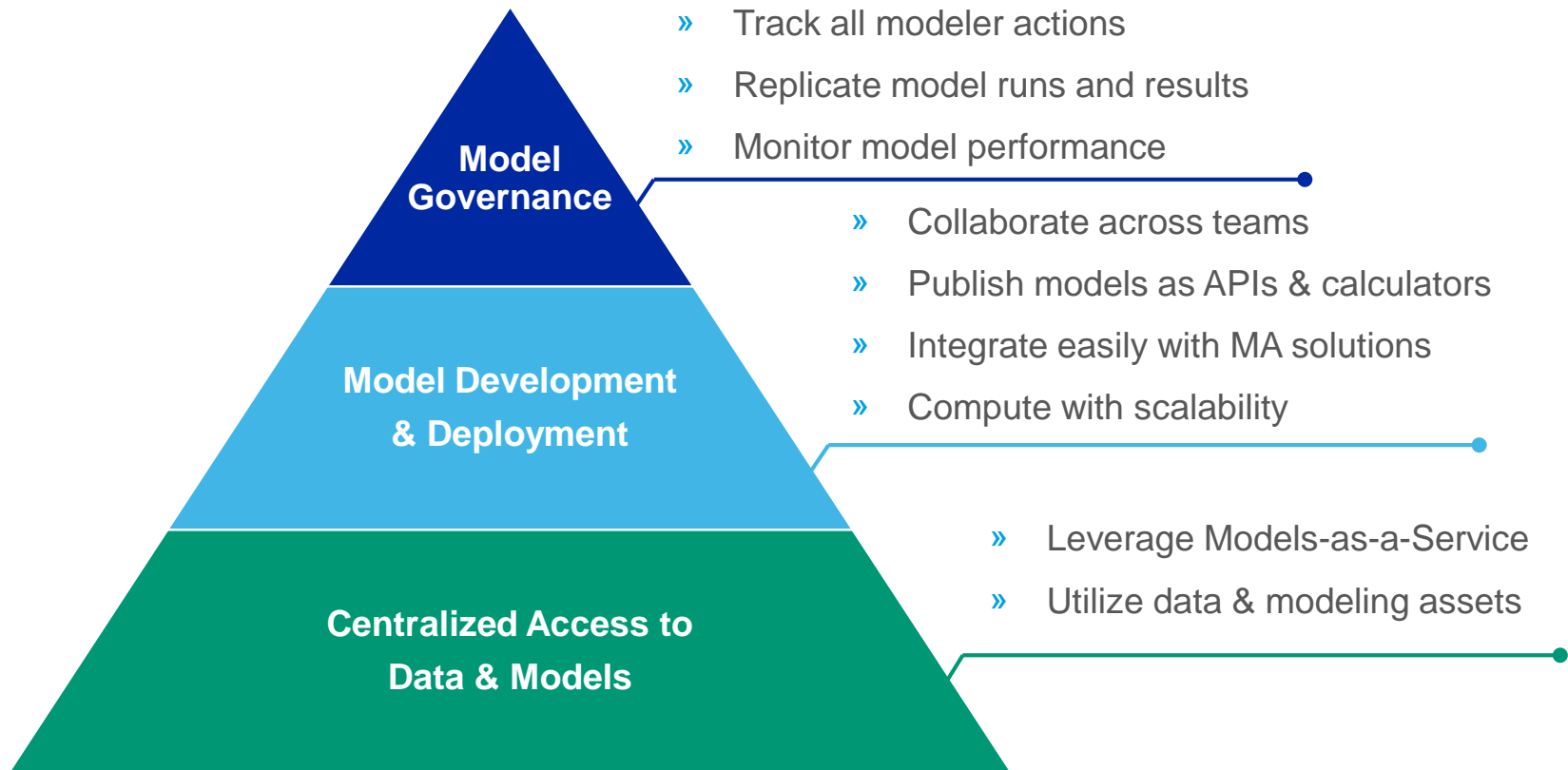


3. Addressing the problem

Technology – Collaborative Analytics Platform



Use case



Data, risk models, processes and resources

Model Risk Management Governance

- » Interaction with other regulatory requirements (e.g. CRDIV, CRR, RTS, SREP)
- » Independent MRM Regulatory Best Practices
- » Alignment of IRB with Capital planning and Pillar II

Data Analytics

- » Data Quality Framework (DQF)
- » Data set for model development, representative of the current obligors or positions
- » Benchmarking of internal model outputs
- » Back-testing, as per Article 185(b) of the CRR

Model Enhancement / Remediation

- » Address ECB's IRB generic or TRIM specific remediation
- » LGD Facility-specific Modelling, including down-turn scenarios, economic indicators and ELBE
- » Integration with lending policies: Credit Policies, Credit approval review



Support on Execution

- » Temporary or permanent resources
- » Econometric Modelling techniques
- » Onshore, near shore, offshore deployment

Infrastructure

- » Model governance, including top-down view
- » Modelling & Reporting Platform
- » RAROC / Pricing tools
- » Origination & Lending Platform

Ongoing Monitoring and Deep-dive

- » Ongoing Portfolio Monitoring via EWS and portfolio checks
- » Validation, on an annual basis, general risk assessment of all aspects of the rating systems in order to define the appropriate internal audit work plan
- » “Deep-dive” in cases of increased risk



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