How will banks respond to ECB validation reporting and Model Risk Management requirements?

Prometeia Survey

November 2019

prometeia

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Prometeia's approach to Enterprise Risk Management is based on the development of quantitative models and advanced analytics. The design of highly specialized software solutions combines cutting-edge technologies and data science techniques with the knowledge of our subject matter experts and our ability to successfully respond to the growing demands of international regulation. Our deep understanding of financial markets, derived from proprietary economic research, adds a unique element to Prometeia's business model and value proposition.

Foreword

Significant institutions' internal validation plays a key role in the European Central Bank's assessment of the **reliability and accuracy of their internal models**. At the same time, it serves as an important input to the ECB's assessment of the quality and regulatory compliance of internal models.

As part of its ongoing review of the regulatory compliance of the internal ratings based (IRB) approach, the ECB requires significant institutions that have permission to use the IRB approach to calculate their own funds requirements for credit risk to provide information on their PD, LGD, CCF models and the slotting approach.

The ECB requires this information in order to be able to assess:

- whether models under the IRB approach effectively capture the credit risks to which institutions are exposed so they can adequately calculate their own funds requirements for credit risk;
- whether institutions have robust systems in place to validate the accuracy and consistency of rating systems, processes and the estimation of all relevant risk parameters.

The information from the **validation reporting on internal models for credit risk will be crucial** in the ECB's future supervision of institutions' internal models, enabling the ECB to:

- enhance the prioritisation of on-site and off-site model reviews;
- monitor the completeness of validation reports prepared according to the annual validation cycle;
- monitor and challenge the results of the internal validation reports over time using transparent statistical measures and tests.

The European Central Bank now also requires IRB banks to activate a process of annual reporting of their IRB credit risk models' validation results. Starting from October 2019, institutions are obliged to deliver to the ECB, on an annual basis (for each internal IRB approved model, following the finalization of the yearly validation process), a **pre-defined set of templates which aims at evaluating, in a harmonized way, the quality of the banks' IRB models**.

This requires banks to **standardize and automate the reporting of quantitative results of internal models**, as current validation units will need to face an additional burden to meet ECB requirements, while the number as well as the complexity of models in place will make even more difficult for validators to carry out all the required activities.

On the other hand, the ECB is requiring banks to **comply with the Model Risk Management (MRM) framework**, by setting up sound framework and processes in order to properly manage Model Risk, given that the proliferation of internal models (IRB, IFRS9, managerial) represents a significant source of risk for all institutions.

Following this regulatory wave, **Prometeia's industry survey involved Validation Units and CRO areas** to understand whether and how banks are approaching ECB recent requirements and to identify best practices in preparation for compliance.

We hope you will find our findings insightful and useful. Enjoy your reading!

The survey

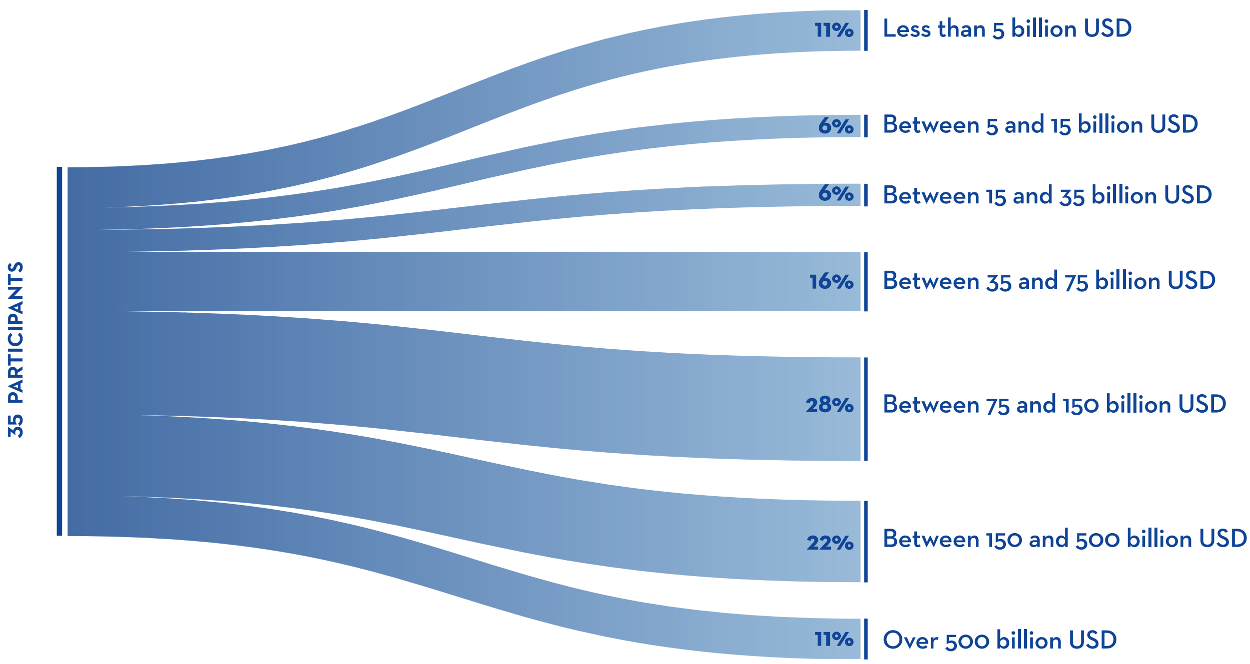
Participants and timing

Survey conducted in September and October 2019.

35 banking groups, mainly located in the European Union (then subject to the ECB requirements), plus other EMEA countries, ranging from small (less than 5bln USD in total assets) to the largest institutions (over 500bln USD).

Majority of respondents were **Head of Model Validation** or come from **Validation functions**.

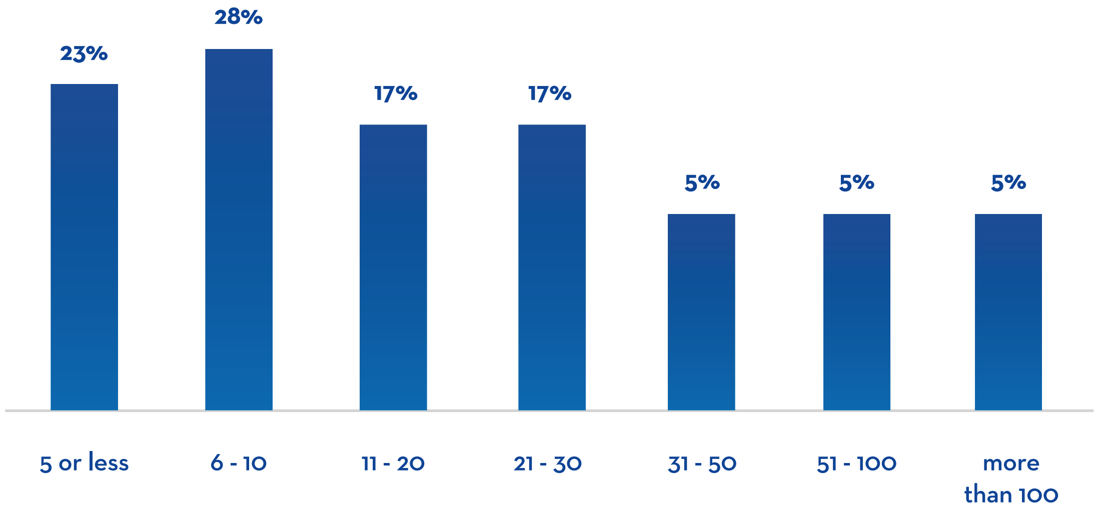
Answers about ECB requirements have just been processed from financial institutions formally subject to ECB supervision.



The panel

Number of IRB approved models in place

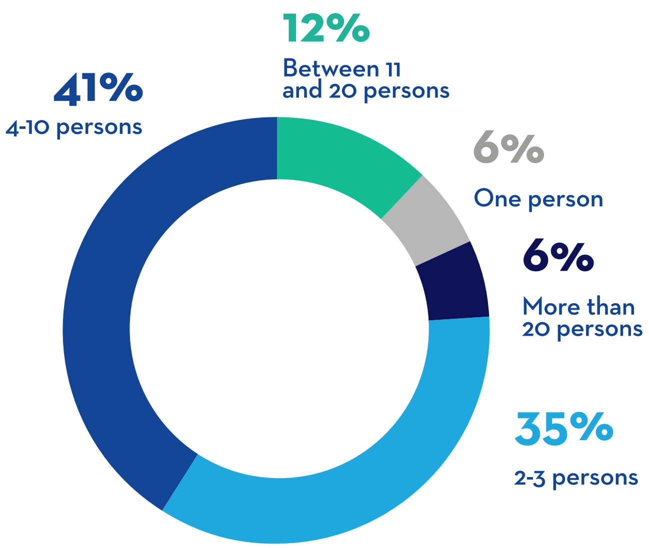
The banks contributing to the survey are diversified, in terms of total asset, complexity of the portfolio mix or jurisdictions of their business: as a consequence, the numerosity of approved IRB models varies from few models to more than one hundred.



Internal models validation activities' FTE annual deployment

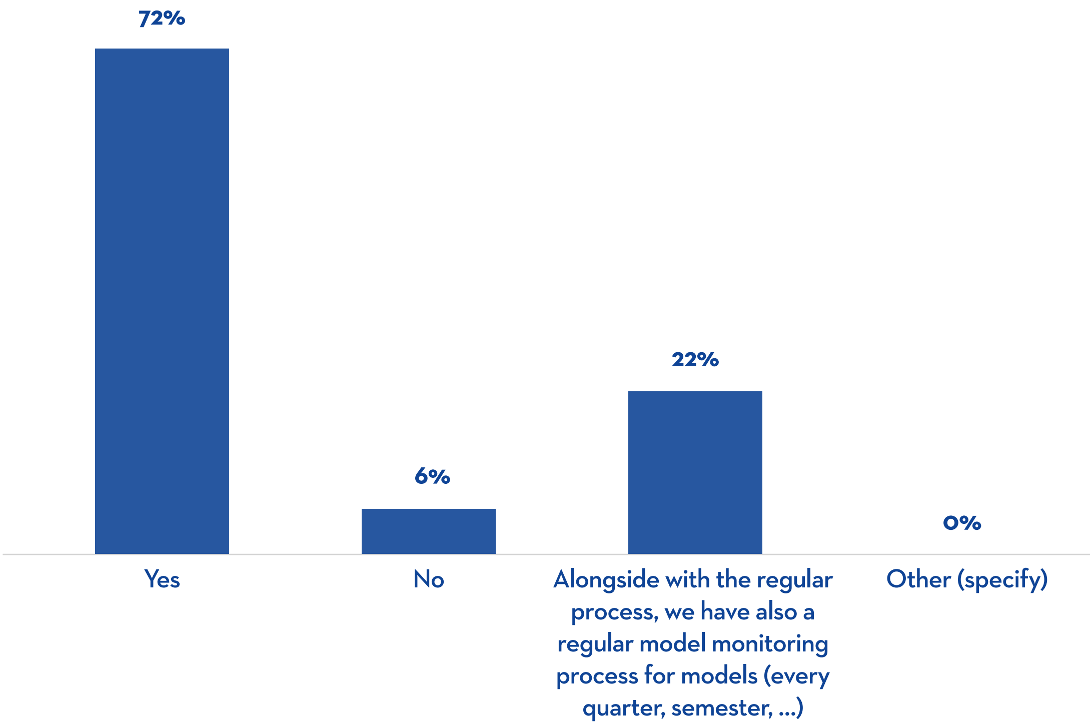
The number of persons involved every year in validation activities is aligned across the banks, with a particular trend between 5 and 10 persons involved.

External support not considered



ECB requirements

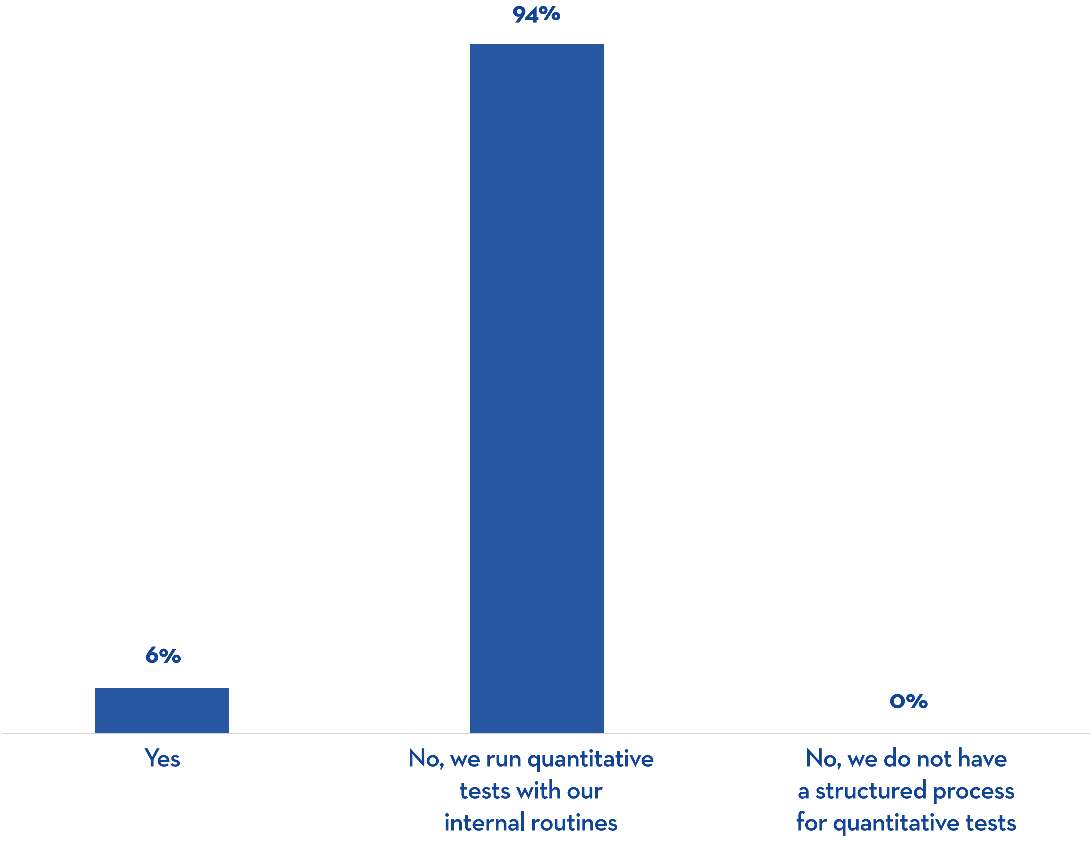
As of today, has your institution in place a regular process (at least annual) for validating internal IRB models?



95% of respondents state to have a validation framework which runs at least once a year and in more than 20% of cases it runs more than once a year.

Based on the outcomes, the validation process requires a structured system with specific and automatic routines to perform quickly validation tests and reporting devoid of operational mistakes.

Does your institution use, for regular validation process, any external provider's validation tool package?



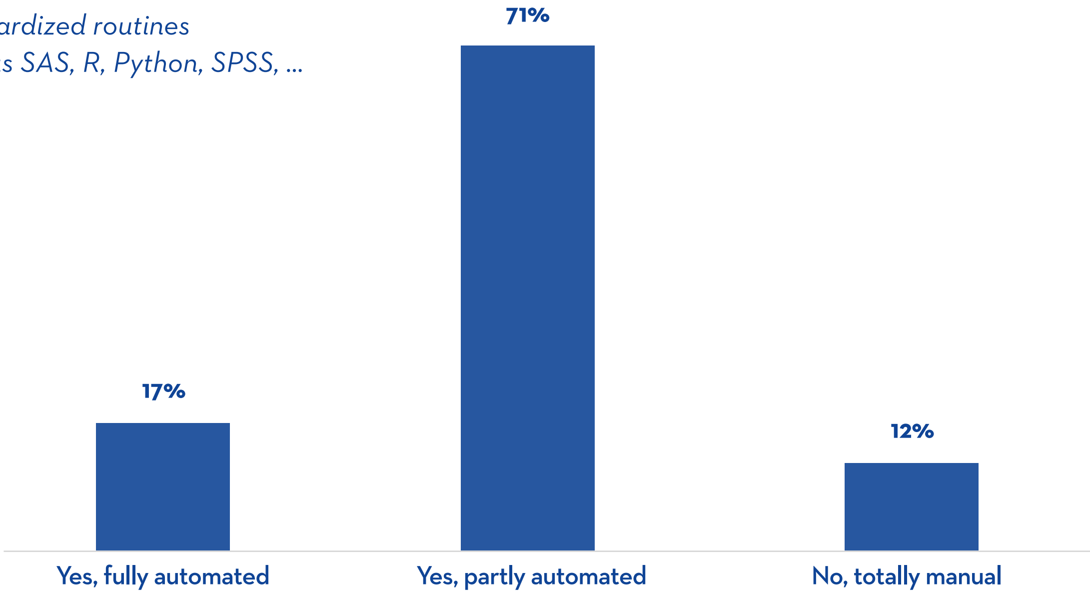
The majority of contributors have stated that the validation process is fully developed in-house, with routines internally managed.

The setup of the validation framework generally moves in coherence with the approach in place for the model development framework, which generally leans on internally defined algorithms, processes and systems.

Although banks aim at automatizing their validation framework with pre-defined algorithms, **a significant portion of the validation process still requires manual interventions from the users**.

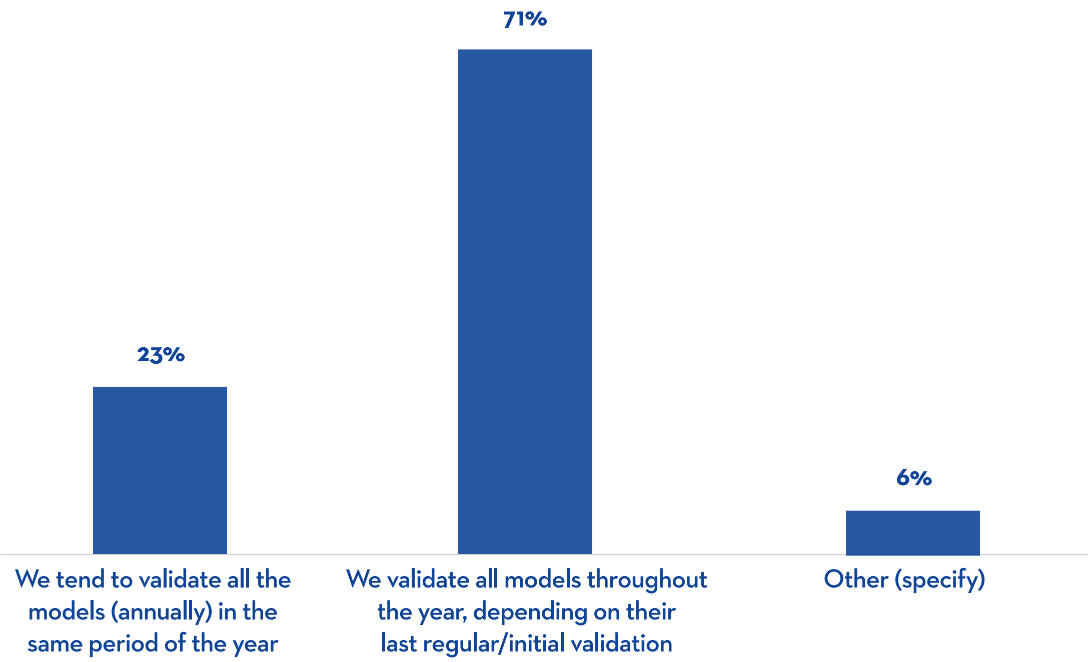
Is the process automated via standardized routines which enable the bank to quickly produce and report the quantitative results of all internal IRB models?

Standardized routines such as SAS, R, Python, SPSS, ...



More than 80% of respondents state not to have an automatic process and the routines used tend to be integrated into a pre-defined and structured flow.
However user interventions in the validation scripts are necessary to catch the specifications of new models or the changes in the current models.

How is the regular validation process organized in your bank?

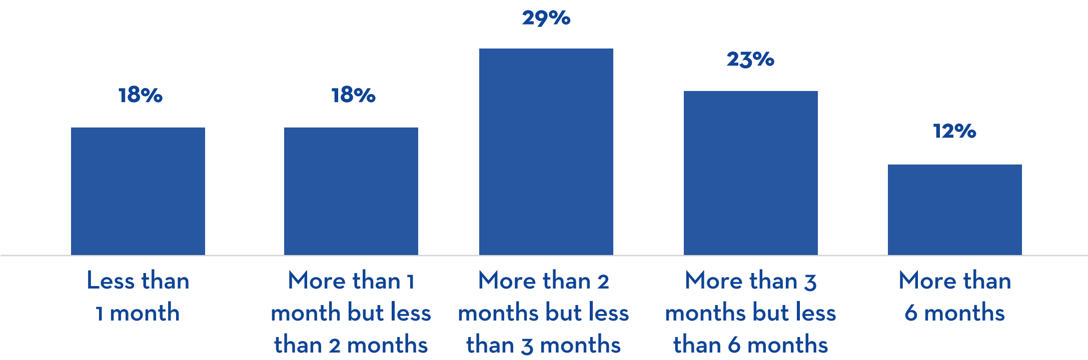


Banks generally prefer to plan the validation activities for the internal models based on the timing of the model deployment. This is beneficial for the allocation of the validation team to multiple activities during the year.

Only a smaller portion of banks prefer to execute the validation process across all portfolios IRB in scope at the same time.

On average, how long does the validation of each model take?

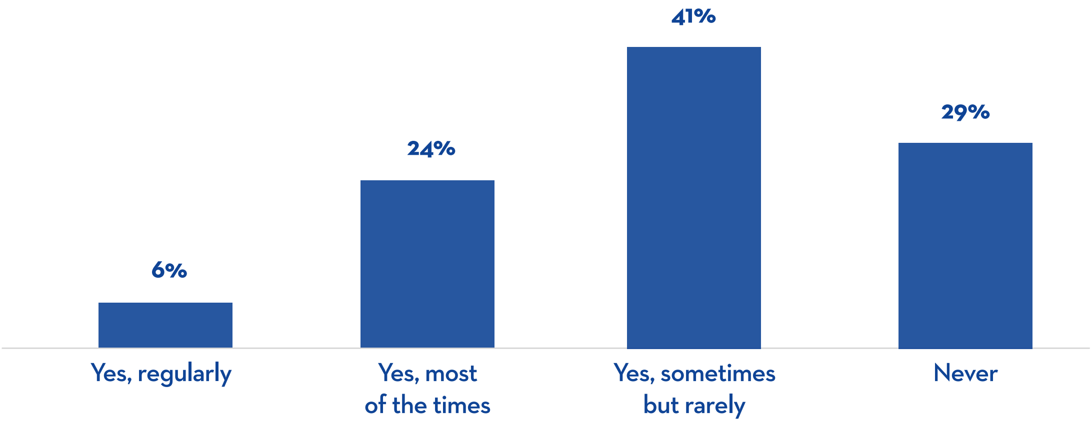
Validation includes controls, data preparation and documentation



The average time of execution of the validation activities for one model is deeply diversified across banks and **apparently a standard practice among even similar banks does not hold**.

In general, it depends on the complexity of the model and how much the bank is experienced. Usually PD models have a much structured process, while LGD or CCF models for large corporates suffer from much more uncertainty and require longer time.

Does your institution use external support for the regular validation process?

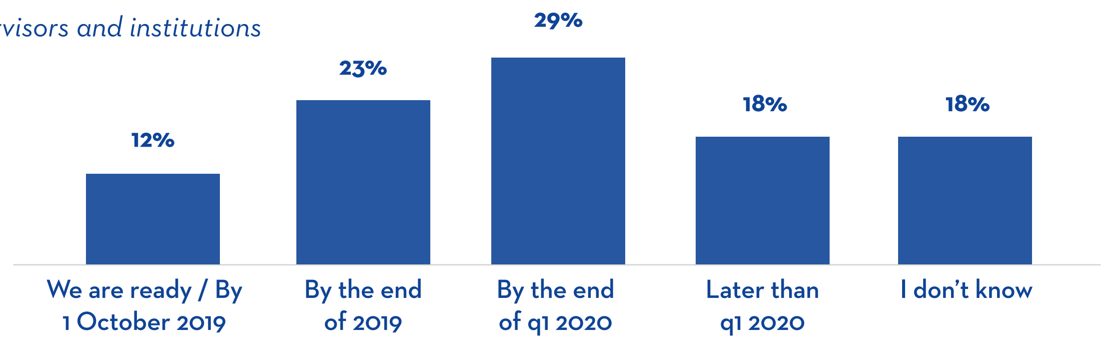


Most banks usually are supported by external companies, however the validation framework is fully in-house (see page 9) and the support is diversified with different level of magnitude.

Generally, the external support stands either in the case of managing the admission of new models in the IRB validation process, in order to acquire competence or to manage specific workload peaks, i.e. periods when many models have to be delivered together.

When do you expect to be ready to deliver results to the ECB, according to the pre-defined templates?

Specific deadlines are negotiated between supervisors and institutions

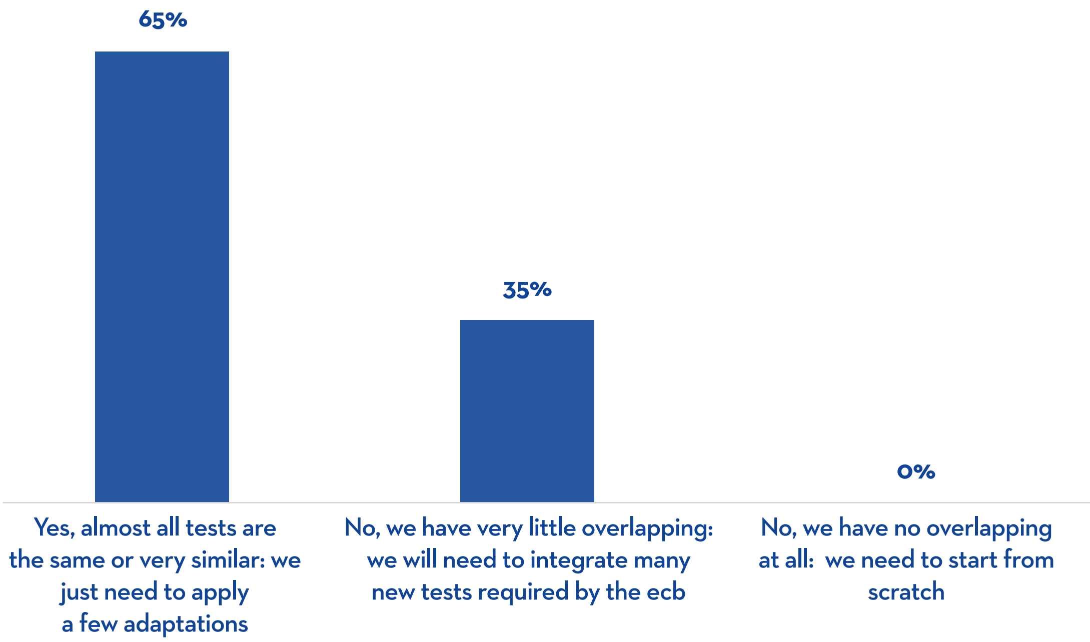


The compliance of European banks in delivering the ECB validation report is different across institutions, with a peak of 30% of the sample around Q1 2020.

The EU banking system looks partially equipped for the delivery of the exercise, only around 35% of banks are able to deliver it by the end of the 2020.

However, still almost the 20% of respondents still do not know when they can deliver the ECB reports.

Is the regular validation process in place in your bank overlapped with the new ECB requirements in terms of tests and reporting?



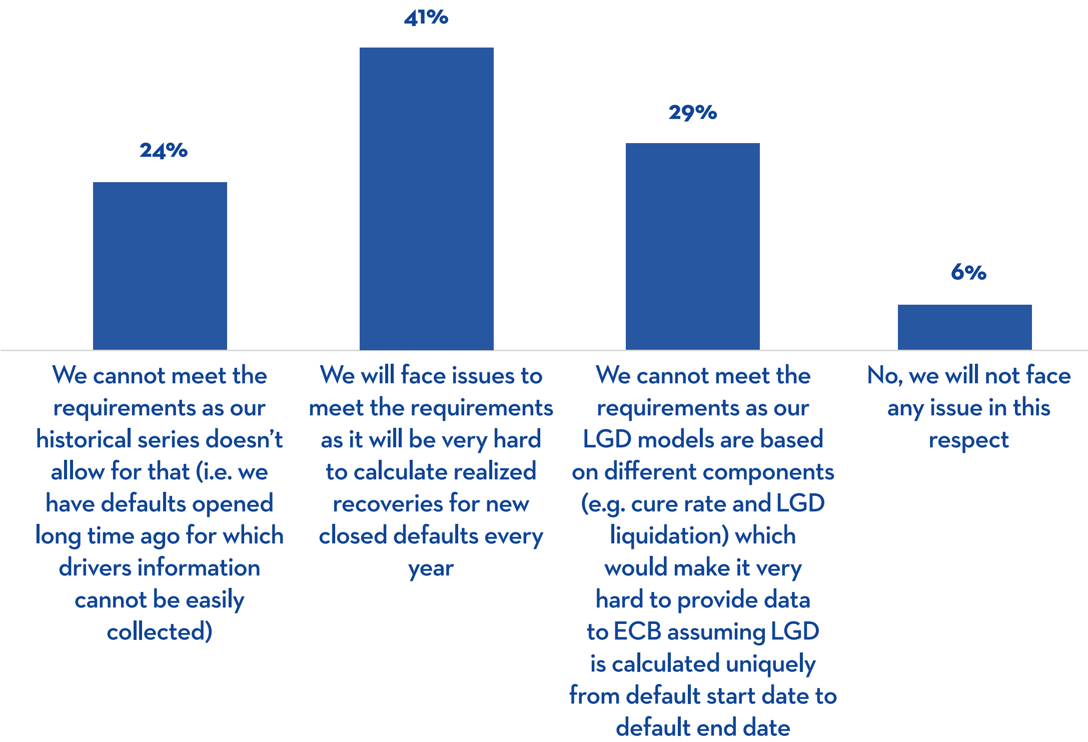
The majority of banks has a validation process mainly in line with the new validation reports requested by the ECB.

The biggest portion of banks with smaller overlapping belongs to institutions with a total asset in the range of 75-150bln USD, proving that **even significant banks might be affected by the ECB validation requirements**.

The fullfilment of the report is however a topic that has to be faced by all banks, regardless the compliance of the current validation system with the tests required for reporting.

Do you think your institution could face issues in delivering results for LGD, LGD In Default or ELbe, given ECB requirements?

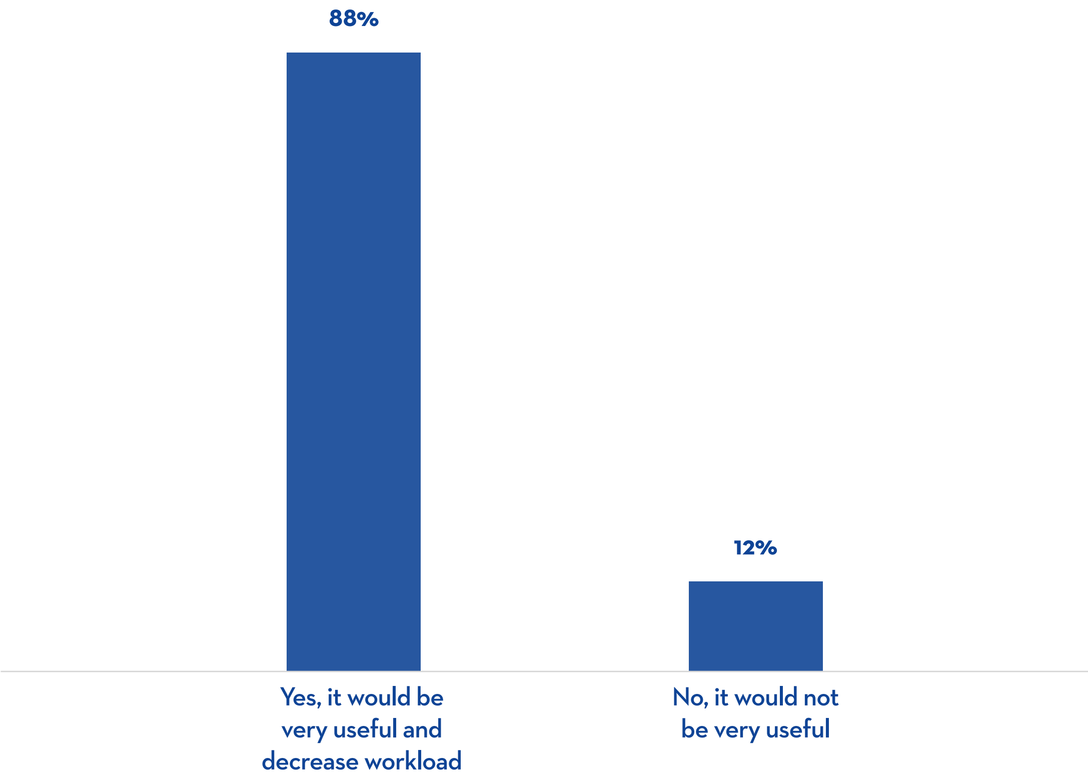
ECB requirements include attribution of the predictors one year before default and at default start date and comparison of estimated and realized LGD



More than 90% of respondents will face trouble in delivering the validation reports regarding the LGD models (or sub-components of the LGD models).

The nature of the model can affect significantly the results, in particular when the banks prefer to have a modular structure of the LGD, e.g. modelling the cure rate separately.

Could it be helpful to have a tool that automatically, quickly fills all the templates required by the ECB according to a pre-defined input data structure?

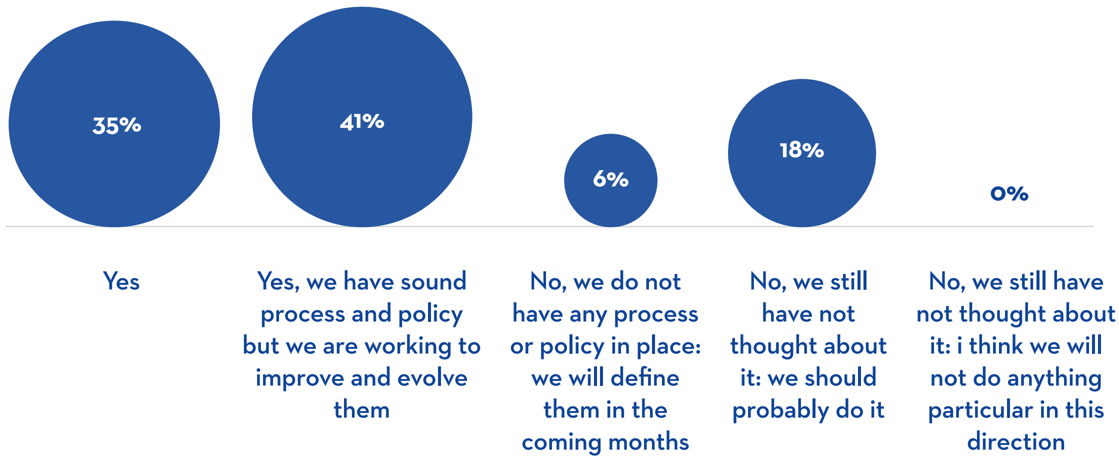


The 90% agrees that is necessary to have a specific tool for the fulfillment of the reports required by the ECB, proving that although the EU banking system looks solid in managing the validation procedures with internal algorithms, banks are still struggling in filling the ECB validation reports efficiently.

The main benefits in using a tool is to lower the involvement of validation resources on reporting activities as well as to avoid possible operational errors in the reporting process.

Model Risk Management

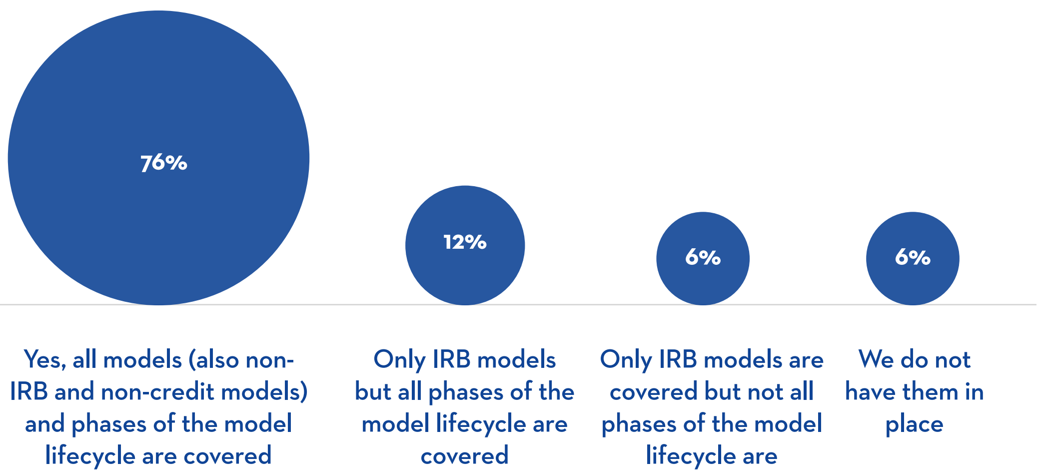
Does your institution have a sound and structured Model Risk Management (MRM) process in place?



The majority of respondents declared extensive knowledge of MRM processes, that are already reflected in internal policies or under finalization. This is not a prerogative of bigger banks: the panel shows that this condition is common to banks of any size.

Late movers planned or have in mind to design specific policies and procedures and there are no respondents at all that are neglecting MRM, confirming this topic is already on top of CROs' agenda.

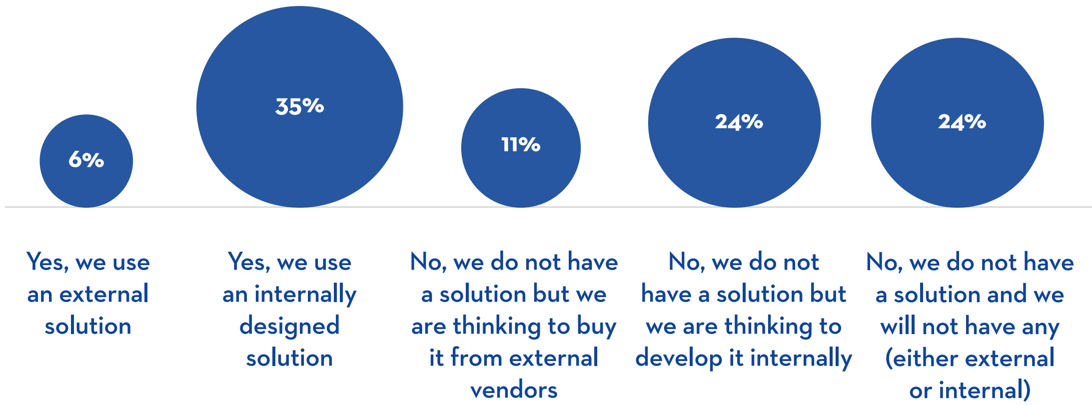
If you have MRM process and policies (or you will have soon) in place, do they cover all the phases of the model lifecycle and do they also cover non-IRB models or non-credit risk models?



Despite the expectation that banks prioritize IRB models, due to the strong impact onncapital management, accounting and operations, **the principles of MRM are (already) applied to all models**, or at least the most relevant ones.

Anyway IRB models are usually approached with a higher level of accuracy, due to the long term experience that banks accrued in IRB model control and validation.

Does your institution use any tool package for MRM?



Despite a good awareness of MRM topics, **the majority of respondents** (around 60%) **have no tool in place supporting MRM operations**.

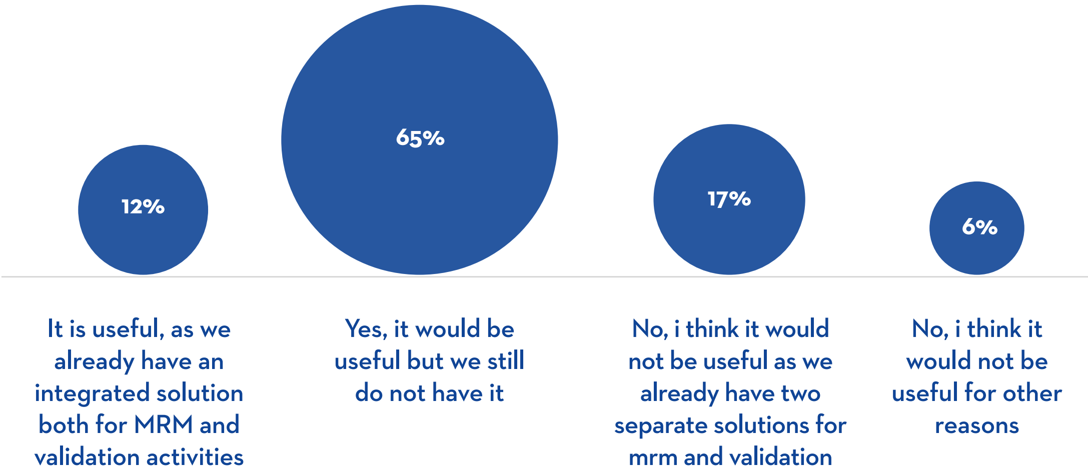
There are banks that have approached MRM with internal solutions that, in some cases, are at their early stage and will require relevant improvements.

The overall coverage of all MRM requirements implementation nowadays is anyway quite poor.

Today the role of external solutions appears limited. In our understanding, though, their real success will be clearer in the future when banks, that are now exploring internal solutions, will be totally aware of the complexity in MRM implementation and revert to the market.

The final distribution of external solutions will strongly depend on the success of internal solution implementation and on the level of service vendors will be able to provide, not limited to the solution itself but extended to process reengineering and methodological support.

Could a MRM tool integrated into a validation tool be useful for your activities?

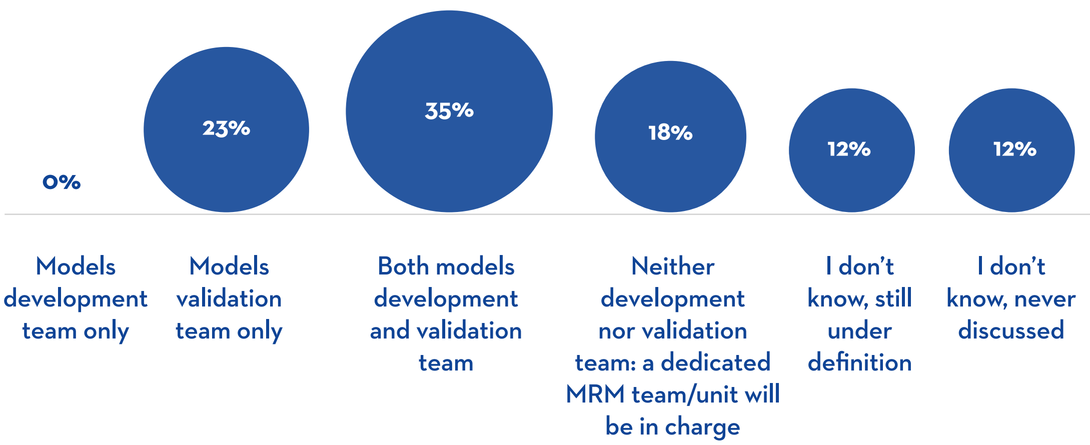


Unquestionably (75%+ of consensus) **any MRM tool requires a strong integration with the validation tool and quantitative controls**.

Our panel highlights that the quantitative area is a cornerstone in MRM implementation: the integration with the outcomes of validation controls will guide the actions on the models impacting on the lifecycle.

Methodological support will thus be crucial in MRM implementation: vendors should include it in their value propositions.

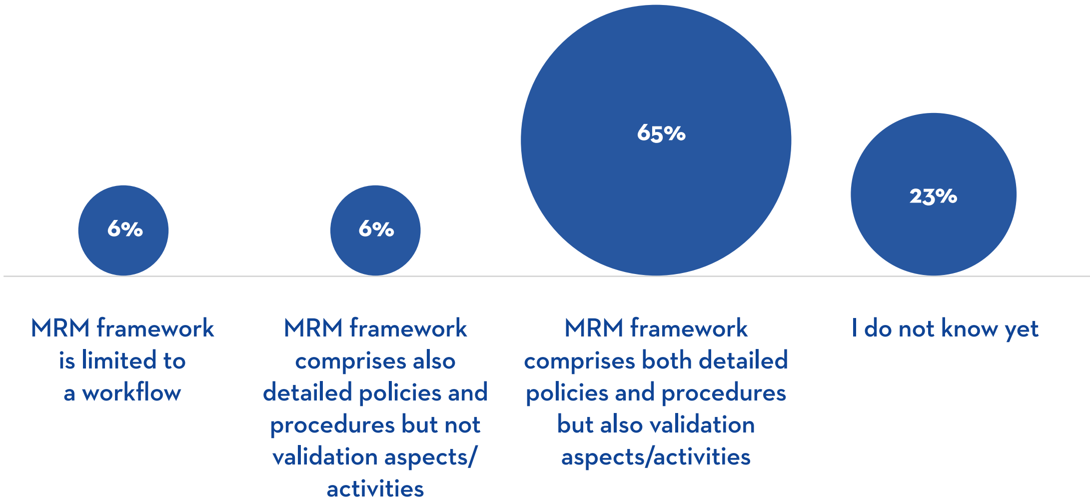
Who is/will be in charge to manage MRM in your institution?



The organization allocation of MRM is not homogeneous. Common criteria, anyway, appear to be the presence of methodological skills (validation and model development units are involved in around 60% of the respondents), while a specific MRM unit is currently not the most frequent solution.

This configuration could change: currently MRM is mainly at its early stage adoption and is nurtured in 'quantitative-oriented' organization structures. After the start up phase, the creation of further MRM units could intensify.

In your institution, is the MRM framework limited to a workflow which manages all the phases of the model's lifecycle or is it a more extensive concept?



The answers confirm that, in the banks' vision, MRM is not only a matter of processes (i.e. the allocation of roles and responsibilities in the model's lifecycle) but it is strongly integrated to quantitative and methodological aspects.

Model validation appears to be an embedded component of MRM.

Key takeaways and conclusions

ECB validation reporting: are banks ready?

The survey shows that the **banking Industry is only partially ready for delivering the ECB validation reports**, fulfilled by all necessary tests requested.

Only 10% of the institutions stated to be ready to apply by Q4 2019, while still **a big portion of the EU banking system is struggling with issues in executing the operational test requested** and almost the 20% of them still does not know when they will be ready.

Gaps in properly delivering the ECB validation reports are detected across all banks, not only those with a less mature IRB experience, usually small or regional banks. **Multinational institutions as well are significantly affected due to their intrinsic credit risk models landscape and the big variety of their portfolios**.

The presence of mainly internal validation tools, together with the assessment that requires several manual activities, **suggests a tendency to move towards more engineered tools**, in order to shift activities from the production of controls to their analysis.

In other words, the banking industry has developed the **necessity to have a specific tool in place, able to industrialize the validation output and automatically fill the ECB validation templates**, decreasing the workload of the resources needed for reporting and avoiding potential operational mistakes in stand-alone algorithms or even manual processes in editing the reports.

What about Model Risk Management?

As well, for Model Risk Management the answer of the survey is clear: **banks are not ready yet**.

MRM is showing itself in all its complexity, made of policies, workflows and methodology. Operations cannot rely on a short-hand solution, due to the huge amount of models (dozens and potentially hundreds) and the connection to quali-quantitative aspects.

The process to roll out MRM is still in progress and, under many regards, we can figure that MRM is in its early stage.

The panel highlights that, apparently, MRM is sloping in the first step of its hype cycle curve (according to Gartner's definition), where banks are exploring different solutions and organization structures. In many cases, the 'make or buy' decision for a software solution is still open and current implementations are not mature enough to provide a sharp evaluation.

Though MRM has a heterogeneous level of maturity, **it is strongly present on the agenda of CROs** and is shaping itself as a macro trend.

Market analysis of vendors is not in the scope of the present survey. Anyway, the panel suggests that **out of the box approaches are quite optimistic** (or rather not feasible).

MRM requires indeed an extended level of support from the vendors, including software solutions as well as methodological support. Strong competencies on model development and validation will be crucial for the success of the MRM roll out.

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Why a Model Management software solution

Models are a strategic component of the decision making process. It is crucial to manage their entire lifecycle to reach the target standards in terms of performance and reliability.

The model management issues are related to:

- **Proliferation of models** (specific models for each risk, Pillar1/Pillar2 Accounting/Managerial models)
- **Proliferation of stakeholders** with different prerogatives (setup, validation, monitoring, IT, ...) and included in specific workflows
- **Models at different stages of their lifecycle**, requiring different actions (monitoring, calibration, framework updating, dismissal)
- **Regulatory push** towards a model management framework able to minimize model risk and reduce capital add-ons and margins of conservativism (MoC)

A comprehensive framework including process setup, validation/monitoring controls, specific software solutions is this needed.

As examples, we give evidence of many risk models in the credit risk space:

- **Probability of Default (PD)** - Municipalities/governments, financial institutions, large corporations., Corp, SMES, SB acceptance, SB behavioral, Individuals behavioral, House loan, car loans, credit cards ...
- **Loss Given Default (LGD)** - Performing, In default
- **Exposure at Default (EAD)** - Split by segment/product
- **Managerial models** as Delegation of power per risk segment, Early warning per risk segment, Pricing
- **Accounting** - IFRS9 calibrations, satellite models, transition matrices etc.

Each model has specific owners and stakeholders (senior management, risk management, validation unit, audit, accounting, IT, commercial department, etc.) according to the phase of the model lifecycle: framework definition, data collection, model development, model approval and validation, implementation, monitoring, etc.

This complexity must be managed via ad hoc software solutions.

Prometeia solution

Prometeia developed a modular solution based on:

Model register

- Models inventory/mapping (including all attributes: status, development date, modifications log, phase of model lifecycle)
- Users profiles (roles, prerogatives, access rights, models, controls, resources supervised)
- Association model to users (one-to-many)
- Association model to models (one-to-many)
- Development/monitoring of database info (sources, logical/physical data model)
- IT architecture info (laboratory, test, production environments) and coding info
- Control tree structured in levels
- Control open issues and actions
- Control override and traceability

Validation tool

- Quantitative and qualitative controls collection, differentiated by model type, model vintage, portfolio type (controls implemented in validation tool)
- Import of the outputs of the controls executed externally
- Thresholds setup to transform controls' output into alerts (red, amber, green)

Workflow engine

- Tasks/controls executed/to be executed per user
- Scheduler, reminder, alerts, task notifications
- Workflow definition and implementation (sequence of activities and assignment to the different users) in 'drag and drop' front-end
- Definition of the actions to be taken according to the controls' outputs/ severity
- Actions attribution/removal in override to the standard workflow
- Check of the process' progress (status and owners)

Dashboard

Reporting on:

- Controls' output view (aggregated, drilled down and expected actions according to the thresholds)
- Matrix model's expected status vs current status
- Model performance tracked over time to show trends

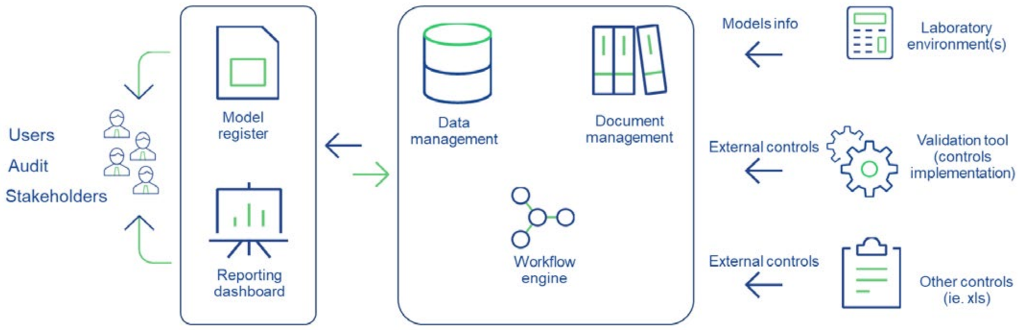
Document management

- Automatic reporting
- Template setup
- Document management (documents upload/download and tagging)

Data management

- Integration with internal/external validation tools
- Data quality/manipulation/storage
- Replicability (freezing of version, model and database)
- Warning in data quality (missing fields, inconsistencies)
- Standard/custom dataset
- Control configurations
- Security
- Audit features

In Prometeia solution, modules cooperate to implement a fully-fledged management of the model lifecycle.



Why Prometeia

- **Engineered solution** coherent to regulatory requirements
- **Part of a more comprehensive and scalable platform** for model implementation/validation
- **Turnkey project**
- **End to end support** (from design to implementation)
- **Unique methodological track record** with experiences in EU market
- **Cost effective**
- Scale in the update of future regulatory requirements

About the authors

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Head of Prometeia's IFRS 9 development team, Christian has a 10+ year experience as a credit risk model developer within the context of worldwide banks as well as non-financial companies, in coherence with the Basel2 and IFRS 9 regulatory compliance. The projects have been executed across retail, SMEs, corporate portfolio and large corporate portfolio, consisting of private individuals/companies, government companies and financial institutions.

Stefano Romano

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A partner at Prometeia since 2015, deputy head of the International business line. A graduate in Engineering Management from Politecnico University in Milan, since 1998, first at Ernst & Young and then at Accenture, he has acquired in-depth expertise on application solutions and business process re-engineering in the area of financial services. He joined Prometeia in 2004. He coordinates projects on Basel 2 and 3 compliance issues at major Italian and international banking groups. He also works on the design and implementation of risk-based software solutions for credit risk. He has developed distinctive competences in the area of capital planning, credit strategies, pricing, Icaap, stress testing and the implementation of risk and management models.

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Partner at Prometeia with 15+ years of experience as international consultant in credit risk modeling/validation and credit processes both with commercial and multilateral development banks (Italy, Austria, Russia, Croatia, Turkey, Tunisia) as well as local regulators. Marco managed several credit risk projects for Top-Tier banks in EMEA, with focus on Basel II and IRB Regulations. He gained experience in development and validation of credit risk models, such as PD, LGD and EAD, for all types of portfolios. He has implemented Basel II plans for compliance with regulatory requirements, including all aspects of processes and use test-related topics as well as supporting IT Systems.

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