

The Future of Model Risk Management for Financial Services Firms



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Model Governance Is Integral to Running Your Business

Banks have been using credit scoring models for over five decades, so managing the life cycle of models is nothing new. Most have had some kind of process in place to ensure the models they develop are robust, validated and monitored from a performance perspective and that decision makers have confidence in them.

In recent times, however – partly in response to the credit crisis in 2008 – the discipline of model risk management (MRM) has become more formalized and rigorous, driving the need for enterprise-level model information management systems. The regulatory scrutiny being applied to them is intensifying and spreading globally, with US and European regulators leading the charge. For example, whereas regulators were previously more interested in the numbers they were provided, now more regulators want to have a core understanding of the models banks used to generate these numbers.

To this end, regulators now expect organizations to:

- Identify, estimate, monitor and manage model risk.
- Support effective challenger and independent reviews.
- Employ robust internal controls and effective governance.
- Set up and maintain a model inventory.
- Integrate model risk limits with risk appetite.
- Create a comprehensive and sustainable MRM program.

Going Beyond Compliance for Better Business Management

For banks, the need for MRM goes far beyond compliance. Today, access to trusted, quality models is essential to effectively using enterprise data – now considered a strategic asset – to drive better decision making and business results. Banks are heavily dependent on models to help them make the best decisions and navigate an increasingly competitive landscape. Banking executives, for example, are expected to rely on analytical models – not just gut instinct and experience – when making decisions about deploying capital in support of lending and customer management strategies. Moreover, the stakeholders holding them accountable, including shareholders, board members and regulators, want to know what models their decisions were based on, how robust they are, the degree to which executives understand these models, and more.

So model governance is more than just a compliance process today. It's integral to successfully running a financial services business. Moreover, business decisions must be explained to a wider audience – and models are key to this process. Decision makers are judged not just on outcomes, but on the processes and decision support tools they use to realize them.

Insurance and pension fund industries are very likely to follow banking's lead from a regulations perspective. So these industries will likely be focused on model risk management in the near future.

The Rise of MRM Groups

To meet higher demands for model risk management and manage ever larger numbers of models, larger banks are creating MRM groups responsible for their strategic model assets. MRM groups ensure that all models are fully documented; understood and used correctly by users; performing properly; and updated as business needs and markets change. The quality and effectiveness of this governance function is critical for regulatory compliance and accountable decision-making functions within the bank.

Smaller firms may be able to get by with spreadsheets for model management – but not for long. As these smaller organizations begin to use more models, they too will need to implement more systematic model management processes.

Moreover, as shown in **Figure 1**, dedicated expertise will be needed to help banks overcome upcoming hurdles regarding models. Stronger model governance and model risk awareness spreading throughout the institution – the first hurdle – are quickly becoming a must-have. As explored in this paper, with new regulations being rolled out, banks will need to deploy models faster and ensure high performance so they can handle large volumes of data. They will also need to develop and maintain more models to manage their business and meet new compliance demands.



Figure 1: The hurdles of model management

Impacts of New Regulatory Developments for Banks

The European Banking Authority (EBA) shares this view of data and models as strategic assets that must be cataloged and managed as key inputs to regulatory and risk assessment and business decision making. This is evidenced in the EBA's definition of model risk:

"Model risk comprises of two distinct forms of risk:

- Risk relating to the underestimation of own funds requirements by regulatory approved models; and
- Risk of losses relating to the development, implementation or improper use of any other models by the institution for decision-making."¹

Given this definition, it's clear that the EBA will focus its regulatory efforts on any model that provides information used for decision making.

Increasing regulatory scrutiny should be expected in the following areas:

- Stronger model governance.
- Model lifecycle efficiency and timeliness.
- Demand for more models.
- Increasing MRM awareness.

Stronger Model Governance

A bank's model governance processes must meet key requirements such as having a robust model inventory, a model rating system and overlays, conceptual soundness, guidelines for model usage (including limitations), and data history tracking.² Banks must be prepared to answer a wide range of ad hoc questions from regulators on any aspect or component of their modeling universe, including:

- Where are the models used to produce a particular report or result inventoried? Who validated them, and when?
- Do you understand all the assumptions within a given model?
- Where do you record historical findings?
- Are you able to track who is using models and for what purposes?
- Where, why, how, and who applied and approved overlays?

When organizations cannot adequately answer these questions within a reasonable timeframe, regulators will naturally come back with more questions and potentially could apply punitive measures.³

¹ (SREP guidelines, December 2014).

² (US: SR 11-7, SR 15-18; EU: SREP, Model Quality Review.)

³ For example, the SREP guidelines introduced the possibility to impose capital add-ons for model risk either within Pillar 1 (regulatory capital models) or as part of the Pillar 2 assessment (any other models).

Model Lifecycle Efficiency and Timeliness

Model lifecycle (which relates to everything from data preparation and model development to validation and model deployment) efficiency and timeliness are getting increased attention from regulators. For example, a number of large banks have received regulatory requests to:

- Significantly decrease the duration of their end-to-end process.
- Reduce the number of error-prone manual handovers and bottlenecks.
- Ensure appropriate model execution times.

To comply with these requests, affected banks have had to significantly restructure the management of their model lifecycle process – in many cases, by augmenting their technology infrastructure by implementing a [centralized modeling environment](#) shared by developers, owners, validators, operations and oversight teams.

Given regulatory expectations and recent advances in enabling technologies, it now makes perfect sense for banks to pause and reassess their current way of thinking about the [entire model lifecycle environment](#).

Demand for More Models

To comply with changes in parallel regulations, banks will need to develop additional models. For example, in a number of jurisdictions, [stress testing is becoming the primary regulatory tool](#) for capital requirements monitoring. Stress testing results and the underlying process can be used to impose capital add-ons, thus pushing banks to move from the traditional, expert judgment-based approaches to more analytics-based methodologies (in other words, use of models).

At the same time, the introduction of the [IFRS 9 Impairments standard](#) is demanding that banks use a new set of credit risk models; these models must be developed, deployed and maintained, which will literally double the number of Basel models to manage. For “lucky” banks that need to do US GAAP (FASB CECL) in parallel with IFRS 9 compliance, they will likely need to clone these models once again and create yet another set of parallel models, tripling the total number of models they need to manage. Furthermore, under IFRS 9/FASB CECL, credit risk models will have a direct and stronger impact on P/L volatility, which will put them under the spotlight of the bank’s statutory auditor and other key bank stakeholders.

So being able to manage ever-growing numbers of models is absolutely critical. To better understand why, consider the challenges introduced by the new IFRS 9/FASB CECL impairment model, which are summarized in **Figure 2**. Each of these points will lead to a direct or indirect impact on the bank’s existing modeling related processes – and force banks to step up their game.

Impact of IFRS 9 on MRM is expected to be significant



Figure 2: Challenges of the IFRS 9 Expected Credit Loss Impairments approach

Increasing MRM Awareness

With the introduction of the [SREP Guidelines](#) in Europe and [SR 15-18 regulation in US](#), more attention will be placed on institutional MRM awareness. New guidelines advise local regulators to challenge executives to take responsibility. They are asking, in effect, if senior bank management fully understands the degree of model risk that they are exposed to in running the bank. Any gaps in awareness introduce risk to the bank – and the financial system itself.

But there are barriers to achieving this awareness. Most organizations maintain information about their models in silos, buried in tech environments. So there's no straightforward way of providing information as a whole to those who need it.

A robust MRM reporting framework, complete with model risk key performance indicators, and continuous monitoring, helps by enabling the MRM group to translate data into holistic, usable information. It brings together information about models and makes it understandable so everyone – not just data scientists – can see how models were created; as well as how they are performing, by whom and for whom, in what contexts; and what the level of model risk across the organization is. A solid and transparent model risk quantification framework is vital to deliver strong MRM reporting.

Growing Dependency on Models

As stated previously, MRM is not isolated to the regulatory and risk space of organizations. Models are increasingly driving important decisions within businesses. For example, banks are relying on analytical models to steer their client portfolios and future growth by:

- Deriving missing information about customers (for example, income estimates for dormant current account customers).
- Estimating and making pre-approvals of the next best offer.
- Choosing the right channel and timing to proactively approach the customer with the best offer.

These are just some of the ways that banks are moving toward more innovative, analytically driven sales initiatives like [credit limit optimization](#), which increases their model dependence, and thus their exposure to model risk, even further. For these reasons, executives should be concerned with the quality of the information all their models are producing.

Next Steps for Model Risk Management

Given the context provided, it's clear that banks will have to:

- Create and manage more models – a lot more.
- Do more model risk management, and do it more often.
- Improve institutional model risk awareness.
- Address more model regulations across the entire model life cycle – and with more models in scope.

The big question is, how can banks deal with all of this? Large banks have already started aggressively recruiting new modeling resources. In Europe, regulators themselves have more than 7,000 models to review, and they are struggling to meet their announced timelines. This is putting a lot of new demand on the modeling job market, as skilled resources are becoming increasingly scarce and more expensive.

However, staffing is only a part of the equation. Due to the interdependency between the models, their components, stakeholders, findings, policy exceptions, variables, action plans, usages and other variables, monitoring 200 models is exponentially more difficult than 100 models. To effectively address this growth, banks will need to change their existing processes and underlying technology.

And as shown in **Figure 3**, no model is an island. Models have many interactions within a business, multiple stakeholders, and varying requirements. Businesses need a 360-degree view of all models within a unified modeling universe that allows them to understand how models affect one another and all aspects of business functions across the organization.

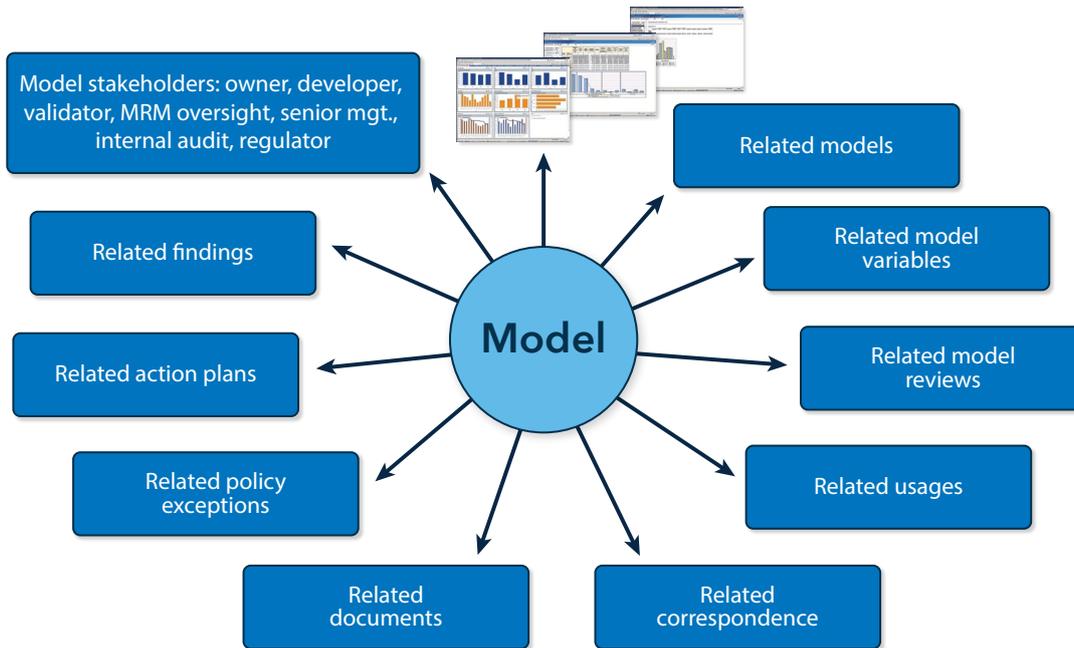


Figure 3: No model is an island. What's needed is a 360-degree view of models within the modeling universe

In the end, institutions should aim to achieve a proper balance between:

- Modeling and MRM human resources.
- Robust MRM processes.
- Flexible MRM technology that can be fine-tuned by the MRM group, and enable the efficient utilization of the available resources.

Five Essential Features of MRM Technology

The following sections overview five MRM technology features that can help banks effectively address the challenges discussed above.

1. Support for the Whole Model Life Cycle, With Full Stakeholder Involvement

Banks need their MRM technology to track models across each stage of their life cycle – all while following their institution's governance workflow for approvals, versioning, documentation, validation process, management of findings and stakeholder

communication and involvement. As shown in **Figure 4**, business users can use MRM technology to capture and maintain various information at each stage of the end-to-end model life cycle.

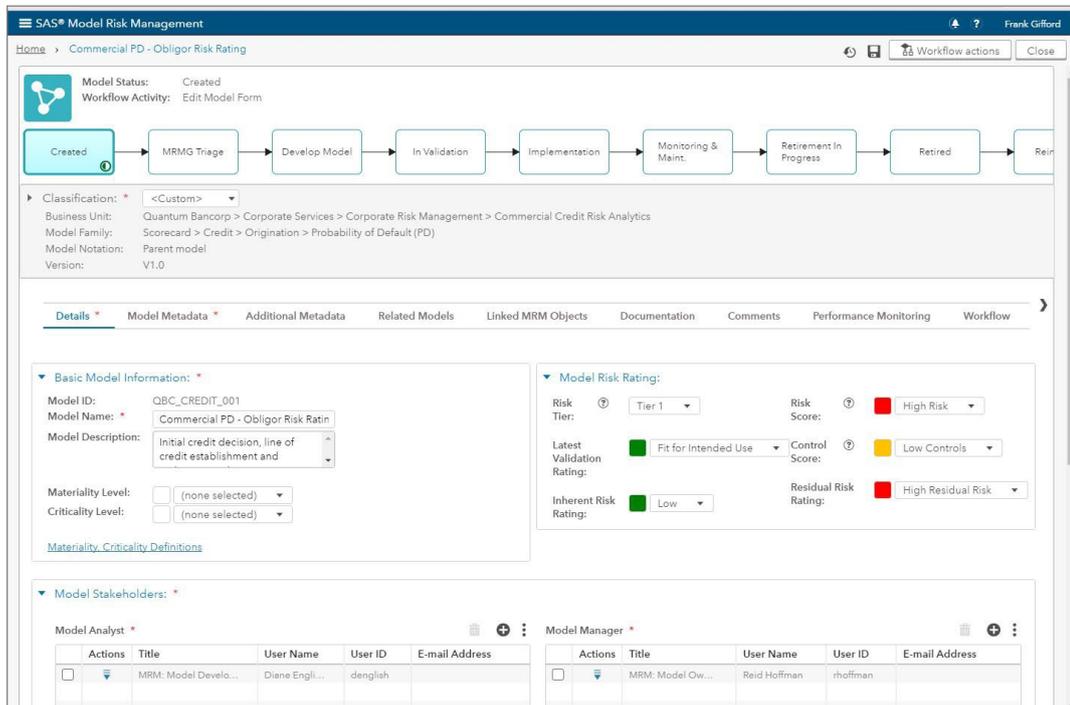


Figure 4: Coverage of the whole model life cycle

2. 360-Degree View of Models and the Entire Model Universe

Having a static list of models will no longer be enough. Banks need a constantly updated inventory of their models, as well as the ability to react promptly to changes related to a particular model, group of models or elements of models. All model information should be easily accessible to the right people at various levels, including model lineage, linkages, version, business line, usage and more. This requires a dynamic view of model inventory that shows how models are working in relation to one another. A simple, static list of models does not show, for example, how the removal of a particular model would affect related models across the entire model universe.

3. Model Risk Management Insights and Model Risk Quantification

Banks need a way to analyze thousands of data points – using both quantitative and qualitative data – to gain greater insight into their organization's model risk concentrations. To this end, MRM technology should support custom reporting and interactive visualizations that help tell the model risk story clearly and accurately; this is critical to broadening institutional awareness and facilitating appropriate, board-level oversight. Creators and consumers of visualizations should be able to easily drill down through the reports to better grasp the MRM content and learn the real story.

Figure 5 provides an example of interactive dashboards for executive management using a straightforward and transparent model risk quantification framework.

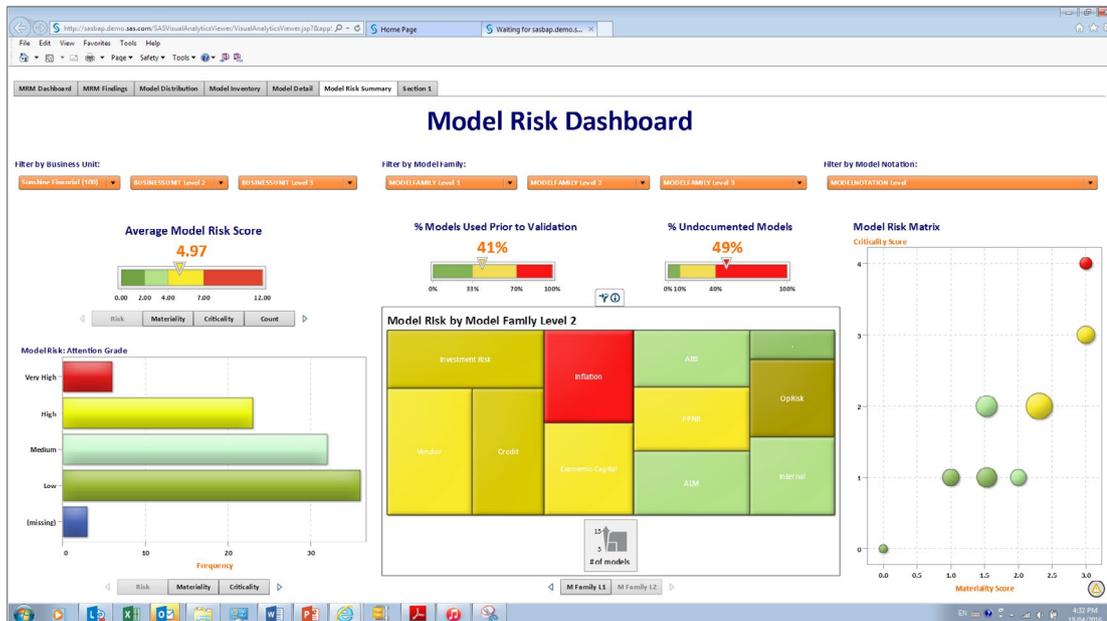
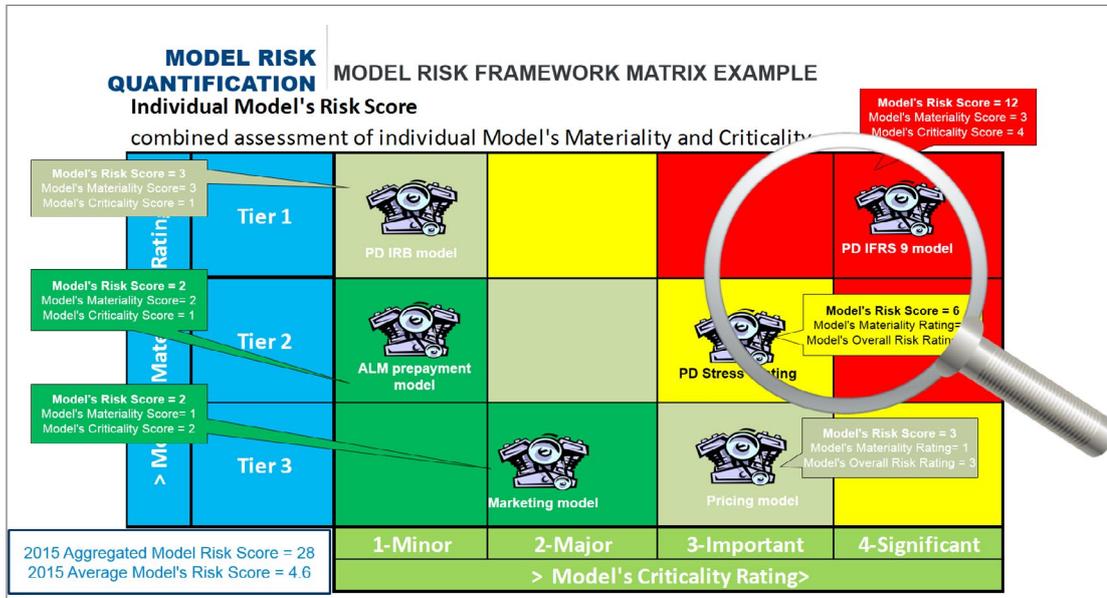


Figure 5: Model risk quantification framework and model risk dashboard

4. Out-of-the-Box Content for Quick-Start Implementations

With all of the external and internal pressures highlighted above, banks will need to respond effectively, efficiently and quickly. But it can take a great deal of time to configure and populate non-MRM-specific software before it can be used. Only tools that come with MRM-specific content available out-of-the-box allow banks to act swiftly. Valuable MRM content that can be included with software includes user roles and workflows, modeling cycle, model metadata, quantification framework, and reports.

When companies take advantage of this MRM content that's based on industry best practices, they can dramatically reduce the time needed to roll out their new MRM framework. In fact, they can start realizing value from day one, evolve the framework over time, and eventually make it their own by adapting it for their business needs.

5. Process Flexibility and Adaptability

A robust MRM system has the functionality to enforce model risk management policy, keep pace with dynamic business and regulatory requirements, and be tuned easily by banks for continuous improvement. The question is, who is best positioned to tune an MRM system? Is it the IT department who has the technological background? Is it the software vendor with its solution consultants? Or is it the MRM group, who understands the true objectives and will be using the system and depending on it?

Ideally, it's more efficient and effective to have the business (MRM) group tune the MRM system. There is nothing more frustrating than filling out IT or vendor requirement documents and waiting for them to make it through a prioritization queue. And if their resources are scarce and distracted by many initiatives, wait times can make it very difficult to achieve forward-looking MRM and respond promptly to internal and external requests. In the short term, it may appear to be cheaper to develop or obtain a static solution, but in today's ever-changing environment, functionality can quickly become out of date (for example, when the last customization consultants walk out the door). Costly, ongoing maintenance and updates can easily exceed the initial acquisition costs, so it's wiser to invest in a flexible system.

Figure 6 shows an example of a predefined workflow which can be further configured to a bank's specific processes using a point-and-click-interface.

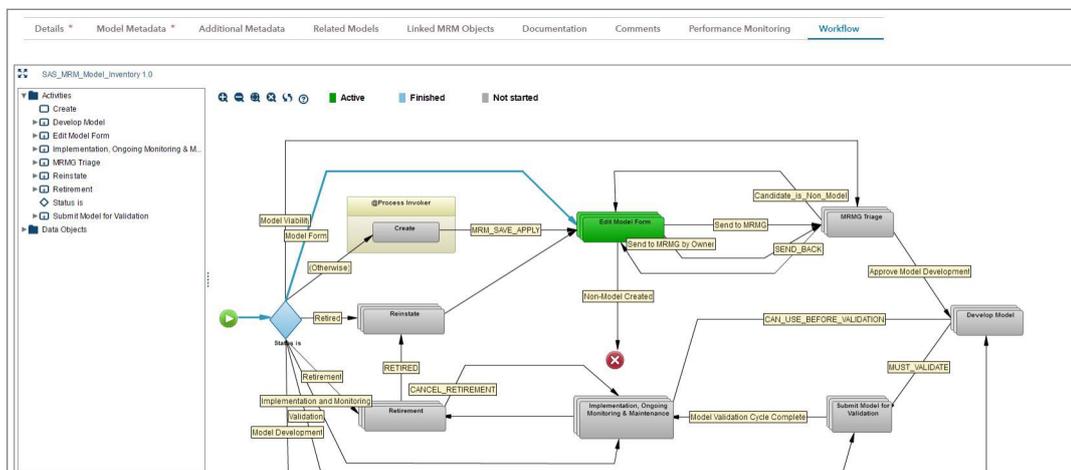


Figure 6: Example of a high-level model-lifecycle workflow

The Future of Model Risk Management

Globally, greater governance of analytical models is now essential to meeting the demands of regulators and business decision makers who need to understand the models supporting business decisions. And regulation of model quality is making sure companies invest in this area. In Europe, for example, the new ECB's model quality review process will continue over the next four years, covering internal models of all banks supervised by ECB. All banks whose model development and/or model validation and monitoring environments are not compliant and up to date will need to invest and improve.

Banks should not only focus on what they need today, but also plan for the future. They should expect increasing regulation and demands by stakeholders to know about the models driving their business. They need to think strategically and prepare in time for new requirements, as well as achieve efficiencies on both the compliance and business sides. They need MRM systems and processes that are flexible and adaptable to meet the evolving demands of internal and external MRM stakeholders. And all this should be done with the MRM team sitting in the driver's seat.

To learn more about how the right technology can help your institution begin an efficient MRM journey, please visit sas.com/en_us/software/risk-management/model-risk-management.html.

To contact your local SAS office, please visit: sas.com/offices

