

MANAGING NEXT GENERATION ARTIFICIAL INTELLIGENCE IN BANKING

A NEW PARADIGM FOR MODEL MANAGEMENT

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EXECUTIVE SUMMARY

1. BANKING ON AI

Financial services executives view artificial intelligence (AI) with a powerful mix of excitement and concern. With new proofs of concept, innovation labs and investments in technology appearing every day, financial institutions are eagerly exploring AI to improve business decisions, customer experiences and risk management outcomes. While AI promises great opportunities for financial services firms to work faster and smarter, it faces substantial scepticism among stakeholders, including bank regulators — due to the “black box” nature of some techniques and the speed with which the models are developed and changed. The spread of AI through financial services will be severely hampered unless users overcome this scepticism by adopting a systematic approach to managing AI models through their life cycle, from cradle to use to retirement.

Financial institutions need to recognize the causes of the concern associated with AI and take steps now to pave the way for the adoption of these rapidly advancing techniques. If your institution has started an AI program, it is time to make sure that your model management program is adapted to address the unique challenges of AI. Even if your institution is only starting to think about AI, it is time to start contemplating how you will manage the development of, and risk associated with, AI-based modelling approaches.

Among financial services firms, banking is an especially heavily regulated industry with rigorous model management programs that were established after years of trial-and-error with the necessary activities and organizational structures.

In leading practice banks, model management starts with controls requiring transparent model selection and model development, followed by rigorous review and testing of results from the model development stage by independent experts, followed by controlled deployment subject to tight change management and ongoing testing and monitoring.

However, existing model management frameworks were developed around traditional econometric-modelling approaches. Since AI-based approaches tend to be notably different than traditional modelling — in terms of the underlying data, methodology, technology, and performance measures — they may not thrive under the current model management frameworks. Without appropriate adjustments to traditional model management practices, discipline and culture, the extent to which financial institutions can effectively and sustainably embed AI in their operations and decision-making is limited. Therefore, enabling the successful adoption of AI and reaping its benefits requires a paradigm shift in model management.

In the following sections, we discuss some use cases of today’s AI in the industry, how AI models differ from traditional approaches, and the concerns arising from these differences. We then present seven paths that financial institutions need to start exploring now in order to lay the foundation for addressing these concerns and enabling the new age of analytics. By starting down these paths, banks can establish a high-level framework within which this rapidly evolving and complex modelling can be addressed systematically and responsibly. We developed a framework following the paths established in this document —to balance the optimism and scepticism associated with navigating AI’s complexities.

2. HOW IS AI DIFFERENT

AI is such a broad category that it defies simple description, but typically refers to a suite of modelling techniques that bring together some combination of the following: huge data sets, non-traditional (i.e., including unstructured and changing) data, demonstrating complex relationships between variables sometimes result in opaque (“black box”) models, and models with rapidly time-varying structures. As AI provides previously unknown insights, banks are implementing AI models in order to increase revenue or reduce cost through better and faster decision-making. Customer segmentation, fraud detection, price optimization, compliance monitoring, and loss forecasting are only a few examples of areas where financial institutions have built models using a range of approaches such as clustering algorithms, deep neural networks, and sentiment analysis.



We recognize that traditional models such as linear regressions are special cases of artificial intelligence, which covers a wide range of supervised and unsupervised methods such as classification, cluster analysis, dimension reduction and regression. In order to keep terminology simple for the purposes of this document, we use the terms “AI” or “next generation AI” to refer to unsupervised machine learning and more complex supervised machine learning techniques such as some neural network models.

The technical details of these methods are outside the scope of our discussion. Instead, our paper focuses on how today’s model management practices need to be re-thought to accommodate AI-based approaches, which are fundamentally different from traditional econometric models. The table on the next page presents typical characteristics of traditional models and AI models to highlight these differences.

Exhibit 1: Comparing Traditional Models with Next Generation AI Models

	TRADITIONAL MODELS	NEXT GENERATION AI MODELS
Inputs	<ul style="list-style-type: none"> • Structured, curated and cleaned up • Small datasets usually stored in traditional databases • Mostly traditional data such as internal business, finance and risk data 	<ul style="list-style-type: none"> • Unstructured, unfiltered and messy • Massive datasets requiring distributed storage and processing • May include non-traditional sources such as social media, email, chat logs, etc.
Processing	<ul style="list-style-type: none"> • Relatively straightforward and common techniques such as regressions and simulations • Low dimension models • Transparent with clear components • Generally run on traditional computers 	<ul style="list-style-type: none"> • More complex techniques, such as unsupervised machine learning models that are more challenging to grasp • Input variables identified by the algorithm, potentially resulting in very high dimension models • Opaque approach with “hidden layers” • Significant processing power required
Output	<ul style="list-style-type: none"> • Aims to identify causal relationships between independent and dependent variables based on predetermined hypotheses • Maximizes statistical power for a given development period 	<ul style="list-style-type: none"> • Aims to identify general trends and correlations without predetermined assumptions around the relationship between inputs and outputs • Algorithms are designed to improve own performance over time through learning

Over the past few decades, model management frameworks were designed around traditional models, and today, AI models present challenges for those existing frameworks. For example, current model management practices generally rely on regular model validations, scheduled or based on “material changes,” which work well for traditional approaches as they are generally updated annually or bi-annually. However, how would a model that is updated daily or even in real-time fit in this validation framework? Data is another example. Within the traditional framework, model development generally begins once a cleaned up and curated dataset (with outliers, missing and invalid data points accounted for) is ready for review by model risk management. Within the AI paradigm, datasets can be so large that such a degree of curation may not be feasible or necessary. How will model risk management review and provide a validation outcome for such datasets?



OWNER

The group that owns the model or sponsors the model for development, i.e. the first line of defense.



REVIEWER

The group that independently reviews and provides a validation outcome for the model, i.e. the second line of defense.



USER

The group that uses the model output to make business, risk management, marketing or other decisions.

BELOW ARE 3 REPRESENTATIVE EXAMPLES THAT WE HAVE OBSERVED IN THE INDUSTRY:

- “Bank A” ended up not using a deep learning algorithm developed over a multi-month period to identify business growth opportunities because users could not fully understand the intuition or variables behind recommendations, leading to suspicion around output.
- “Bank B” did not put a customer attrition model into production due to fair lending-related concerns associated with the customer segmentation variables identified by the data mining algorithm.
- “Bank C’s” validation of their money laundering detection system was significantly prolonged because the model risk management team did not have the expertise and skillset needed for the specific category of model.

The next section describes the steps banks need to take now in order to pre-emptively address such issues and enable the benefits of AI.

3. ADDRESSING CONCERNS, ENABLING AI

Institutions planning to invest in and implement advanced AI capabilities need to start adjusting their model management framework, and address the concerns of the three groups of stakeholders. It’s a significant effort with multiple layers to get to a state where model management frameworks are modernized to fully accommodate AI and other advanced analytics. Our objective here is not to define a multi-year roadmap to get to this state. Instead, we lay out the seven paths that financial institutions should start exploring in order to start moving in the right direction. With this high-level framework established, our objective is to continue to collaborate with and support our clients in navigating this complex topic.

These discussion points are starting to arise and cause concern in institutions experimenting with AI. In some cases, it is leading to AI models not being put into production. Financial institutions have three groups of stakeholders voicing their worries: the Model Owner, the Model Reviewer and the Model User. We illustrated the concerns of these three groups below.

Exhibit 2: Common Concerns of the Owner, Reviewer and User



OWNER

"We are having trouble getting the Model Risk Management group comfortable with our AI approaches. This is uncharted territory, so getting AI through the MRM process is a burden."

REVIEWER

"Our current Model Risk Management framework is designed around traditional statistical models. Our staff specializes in traditional models. AI is beyond the scope of our current framework and skillset."

USER

"The model is a complete black box to us. We see the results, which seem reasonable, but we don't see the intuition behind the results. We can't make decisions based on something we don't understand."

"We don't know if the regulators will approve our use of AI for certain purposes."

These concerns can have a tangible negative impact on a financial institution as investments in AI can be lost or cost the bank more time and resources while the model is forced through the traditional framework.

Exhibit 3: Moving in the right direction



OWNER

“Build confidence and ease into artificial intelligence”

1 Stay at the boundary initially

- Initially use AI to inform, or as an input to, traditional models as opposed to building a standalone AI model
- For example, determine data segmentation based on AI and then develop traditional model using that segmentation

2 Conduct parallel runs

- Develop AI models as challengers to existing traditional models
- Run models concurrently to understand and demonstrate relative strengths and weaknesses

5 Build the necessary skillset to own and review AI

- Articulate the new technical, process and governance-related expertise and skills that will be required from the Owners and Reviewers as a result of using AI
- Design training programs and hire new staff to fill any gaps
- Consider establishing a group dedicated to AI within the independent review function



REVIEWER

“Modernize approach to model management”

3 Update the tiering framework

- Designate AI as a distinct model type in model risk policy and formalize definitions
- Incorporate AI into existing model-tiering framework and develop associated guidelines and procedures

4 Focus on on-going monitoring

- For AI, shift focus from regular validations to on-going monitoring as primary tool of model risk management
- Heighten expectations and requirements for the Owner to develop robust on-going monitoring plans specific to AI



USER

“Collaborate with the Owners and build AI culture”

6 Host Pilot User sessions

- Identify Pilot Users that will collaborate with the Owners during and after development to inform and understand approach
- Have Pilot Users organically spread the message and educate colleagues

7 Understand the pros and cons

- Focus on thoroughly understanding the strengths and weaknesses of a particular approach (e.g., through sensitivity analysis) instead of the full mechanics, which can be technically challenging
- Design workshops and training to educate users

As the above paths are explored, financial institutions need to keep communication channels open with the regulators to demonstrate plans and progress toward building a robust model management framework which accommodates AI and is resilient to future innovation. This transparency with the regulators will play an important role in identifying and addressing concerns from a regulatory perspective.

IN CONCLUSION

NEED TO START THE JOURNEY NOW

Despite its critical importance, establishing the model management infrastructure that enables the successful adoption of AI has not been getting as much attention as the actual development of AI. Without a framework to manage and govern AI, organizations will not be able to reap its full benefits. Therefore, financial institutions must begin their journey now. Those that move first in this critical transition will establish a long term strategic advantage as their potential to explore and take advantage of the benefits of AI will not be limited by model management, governance and other practical obstacles.

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