Vectice White Paper

# Model Risk Management

Addressing the Challenges of Model Risk Management:
Solutions and Strategies

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vectice

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As Artificial Intelligence (AI) becomes increasingly integrated into various aspects of our lives and its impact on society can be significant. AI can be used to make decisions that affect individuals, such as hiring or credit decisions, and can also be used to influence what information we see online.

# 1. Challenges in Model Risk Management

Greater adoption of ML in financial institutions has led to a significant increase in the expectations from MRM and is compounded by three key challenges:

a. **Increasing Model Complexity**
b. **Rapidly Growing and Changing Regulations**
c. **Lack of Model validation Efficiency**

## 1.a Increasing Model Complexity

The field of finance, including banks and insurance companies, is increasingly turning towards machine learning (ML) models to improve the accuracy of their decision-making. **However, the increasing complexity of ML models and the need for iterations during the validation and model risk management process presents significant challenges for Modeling and Risk teams.**

Smaller to midsize banks often need to develop many models, particularly for stress testing, which is required for compliance and auditing purposes. In large financial institutions, adopting machine learning models is often slow due to the trade-off between complexity and interpretability. Regardless of the size of the bank, model documentation is essential for regulatory compliance.

For particular use-cases, the generative AI is also entering the space. This type of models come with an extra layer of complexity.

# 1.b Rapidly Growing and Changing Regulations

Not only is the increasingly increased model complexity a challenge for these institutions to navigate.

**The challenges of effective model risk management practices, includes rapidly changing and growing regulatory requirements and will be location-based**, which will add an additional layer of complexity to organizations' compliance efforts. This is particularly challenging for companies that operate across different regions, each with its own set of regulations.

One of the proposed regulations applied to Artificial Intelligence (AI) is the EU AI Act, a proposed European law on artificial intelligence and is the first law on AI by a major regulator anywhere.

**The EU AI Act is intended to address the potential risks associated with AI by categorizing different applications and systems based on their level of risk and implementing appropriate legal requirements.**

The EU AI ACT is the first law on AI by a major regulator anywhere. The law assigns applications of AI to three risk categories:

1.  Applications and systems that create an unacceptable risk such as government-run social scoring.
2.  High-risk applications, such as a CV-scanning tool that ranks job applicants, are subject to specific legal requirements.
3.  Applications not explicitly banned or listed as high-risk are largely left unregulated.

> — Source: [European Union AI Act](#)

By doing so, **the EU aims to ensure that AI is developed and used in a way that is safe, trustworthy, and respects fundamental rights.** Additionally, the EU AI Act could become a global standard for AI regulation, similar to the impact of the EU's General Data Protection Regulation (GDPR) on data protection laws worldwide (Source: [EU AI Act](#)).

To meet this challenge, institutions need to be prepared with the necessary tools and processes between the modeling teams and the risk teams to navigate this complexity and ensure their models can be thoroughly validated.

## 1.c Lack of Model Validation Efficiency

The current environment of heightened expectations is compounded by a significant shortage of resources. **To effectively manage model risk, firms require a combination of first-class modeling, technology, and governance expertise.** However, attracting, developing, and retaining such talent is a challenging task, even for firms with well-established Model Risk Management (MRM) capabilities. It is even more arduous for firms with limited modeling and MRM experience.

Compared to traditional statistical models, the expectations for the development, testing, and deployment of new Machine Learning (ML) models or recalibrating existing ones are much more aggressive. While a model for calculating regulatory capital or liquidity requirements may require months of internal and/or external validation, such timeframes are impractical for fraud detection or operational automation models that require frequent refinement.

# 2. The Impact on Financial Institutions

These challenges affect financial institutions as a whole and cross-functional partners needed to consult and satisfy gets larger and larger, sapping the ability to execute quickly. This impacts financial institutions across the board:

   a.   **Modeling Teams**
   b.   **Risk Teams**
   c.   **Financial Institutions**

## 2.a Impact on Modeling Teams

The way modeling teams currently operate has resulted in less time being devoted to their primary task of constructing models, and too much time being spent responding to inquiries (interruptions, meetings, emails with more questions) from various stakeholders such as business stakeholders and risk teams.

Furthermore, **modeling teams must recall and manually record all the techniques** they employed throughout the model development process, including technical and non-technical assumptions about the model, at the end of the project lifecycle. This leads to **significant amounts of time wasted** in bringing the model development process to completion on top of the fear of investing a lot of time and effort before failing to pass validation tests.

## 2.b Impact on Risk Teams

Risk teams often face challenges related to the timing of information, as they may receive critical information too late in the process of validating models, which can hinder their ability to make informed decisions. Additionally, there are increased time-to-market expectations and pressure to deliver quickly, which can further exacerbate the situation.

Another issue is the lack of visibility into the modeling process, which can lead to misunderstandings and errors in the risk assessment. **Without a clear understanding of the modeling assumptions and techniques used, it can be difficult for risk teams to replicate the model and accurately assess the potential risks associated with the model.**

Moreover, risk teams may **have difficult access to the technical and non-technical assumptions made by the modeling teams** throughout the model development process, which can impact their ability to fully evaluate the risks associated with the model. The same struggle applies to the access to artifacts such as models, datasets, graphs.

Overall, these challenges can result in significant issues for risk teams, including inaccuracies in risk assessments and an increased likelihood of potential risks going unnoticed.

## 2.c Impact on Banks & Financial Institutions

The impact of lacking model documentation can result in notices such as Matters Requiring (Immediate) Attention (MRA/MRIA) that affect reputations, delays approval to use the model, or offer the product or service to customers for up to several years. This impacts the model and risk team financially, as they are responsible for discovering and remediating the issue. For the bank, this could lead to loss of reputational status and lead to increased capital requirements to cover up for the exposed models.

The consequences of failing stress tests such as the Comprehensive Capital Analysis and Review (CCAR) can be severe for banks of any size. In addition to limiting shareholder returns, **a failed stress test may require a bank to increase capital requirements to cover its exposure, prohibit stock buybacks, and subject it to regulatory pressure and negative publicity.**

These consequences represent a trifecta of risks for banks, comprising financial, regulatory, and reputational risks. Therefore, banks must prioritize, reduce, and efficiently manage risk and exposure by ensuring the proper model documentation and validation is accessible to mitigate these risks and ensure their long-term success and stability.

# Introducing

**vectice**

# The interface between modeling & risk teams
# for Validation on Demand

The concept of Validation on Demand is a solution that aims to address the challenges faced by modeling and risk teams. It involves:

- **Synchronizing the validation process between model and risk teams**
- **Allowing teams to work iteratively to facilitate model development and documentation**
- **Ensuring compliance with regulatory requirements and managing the increased complexity of models.**

One key feature of Validation on Demand is that it provides modeling teams with a code-based interface that is technology-agnostic, allowing them to work efficiently and effectively. At the same time, it offers risk teams a smarter graphic interface that provides them with a single pane of glass of the models, enabling them to monitor and validate the model in real-time.

**This approach offers both teams increased visibility into the modeling process, allowing them to identify and address potential issues quickly.**

Validation on Demand is a solution that provides a more efficient interface for modeling and risk teams, ensuring that models are developed, validated, and documented accurately and efficiently.

By synchronizing the validation process and providing the right interfaces for each team, it offers a solution that addresses the challenges associated with increased regulatory scrutiny and uncertainty and increased model adoption and complexity.

To address these challenges in model risk management, **Vectice provides a comprehensive solution for risk teams to streamline their MRM processes, from model development to model validation and regulatory compliance.**

Effectively this means Vectice solves a critical challenge in model risk management by providing the key interface in between modeling and risk teams::
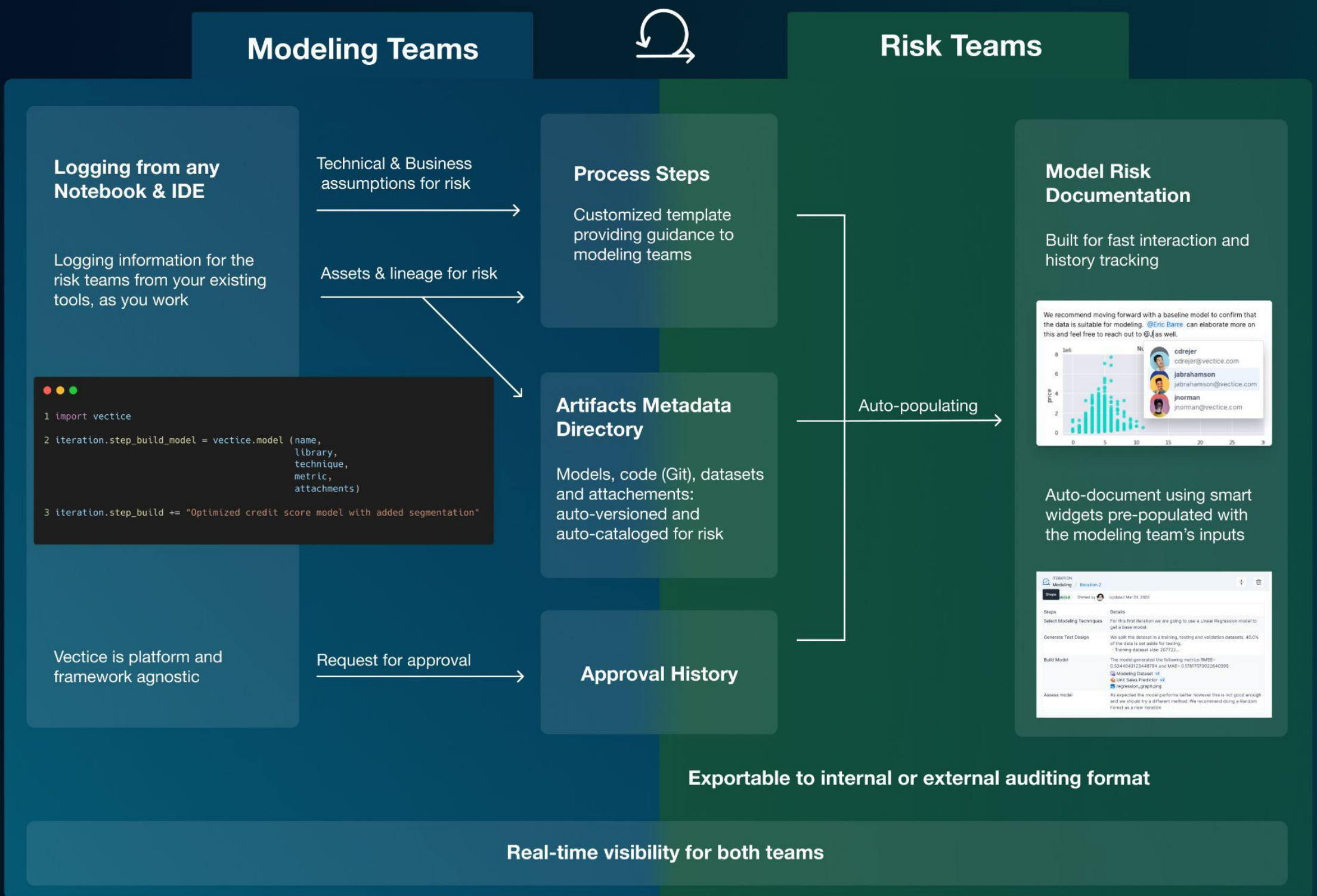
## Processes & guidance for the modeling team

With Vectice, the modeling teams follow processes established by the risk team in order to effectively manage Model Risk Management for AI and develop trustworthy ML models.

**This enables modeling teams to focus on generating business value** while risk teams set up customized process templates to mitigate the greater use of ML models.
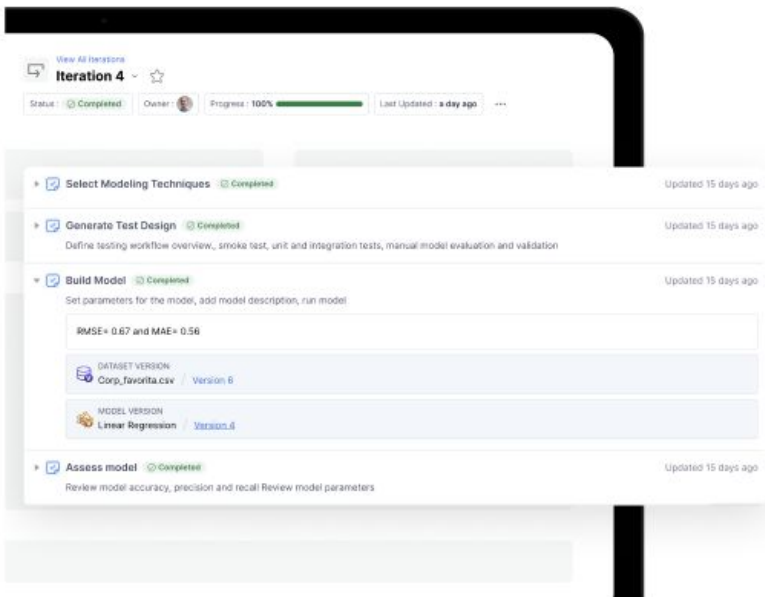
## Context and assets pushed through code

With just **one line of code**, modeling teams can easily push their technical and non-technical assumptions and any relevant artifacts and attachments without having to leave their notebook or IDE.

The modeling team know what they need to work on by using Customized templates.
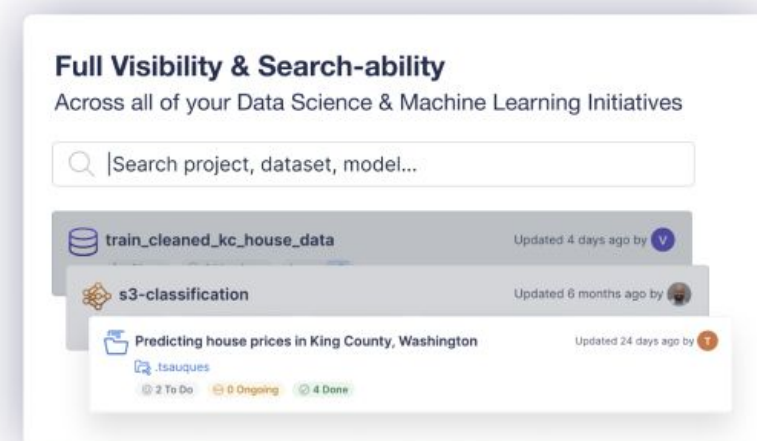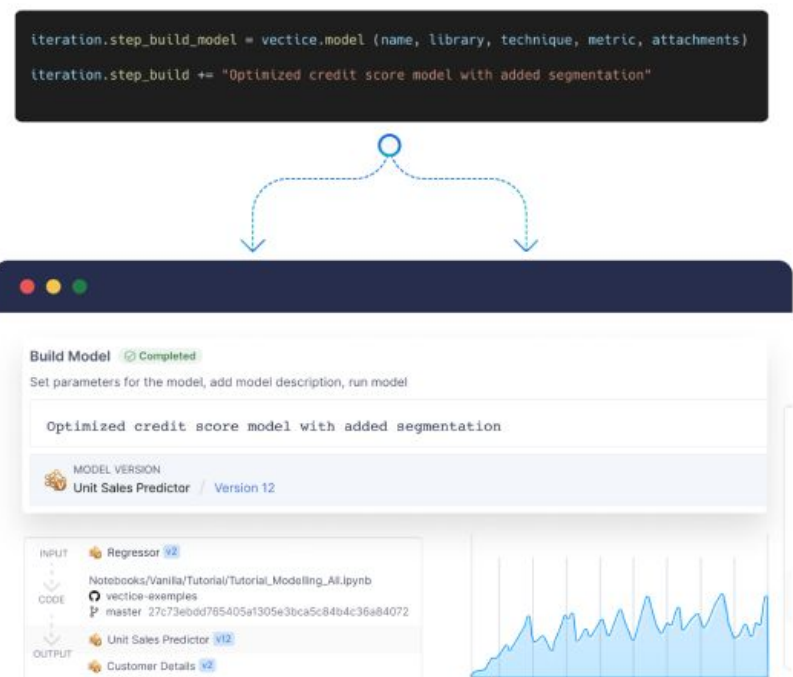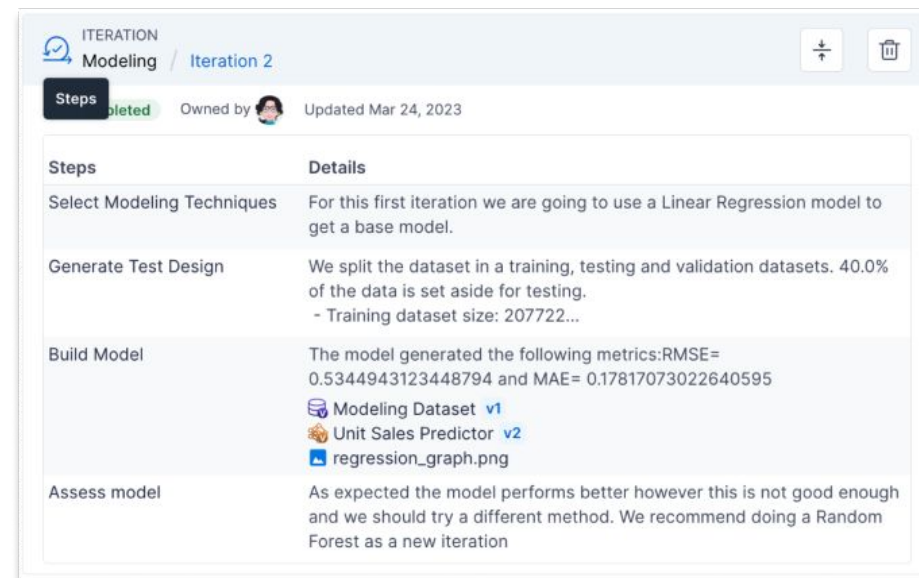
## Asset Catalog, auto-documented

With auto-versioned and accessible metadata, **risk teams can track and manage models, including version control, documentation, and validation.** Search through previous work, contributions from teams, and assets generated throughout the lifecycle.

Vectice automatically records changes and stores them securely so that risk teams can always access the most up-to-date dataset when reviewing models.

## Auto-documentation with Smart Widgets

**Vectice provides a comprehensive solution for managing and documenting models** with widgets, allowing teams to quickly and easily document all aspects of the model.

This ensures that everyone has access to all assets needed for auditing purposes and internal policies. This helps ensure that the process of building and deploying models involves multiple validators and auditors, each with their own set of requirements and responsibilities.
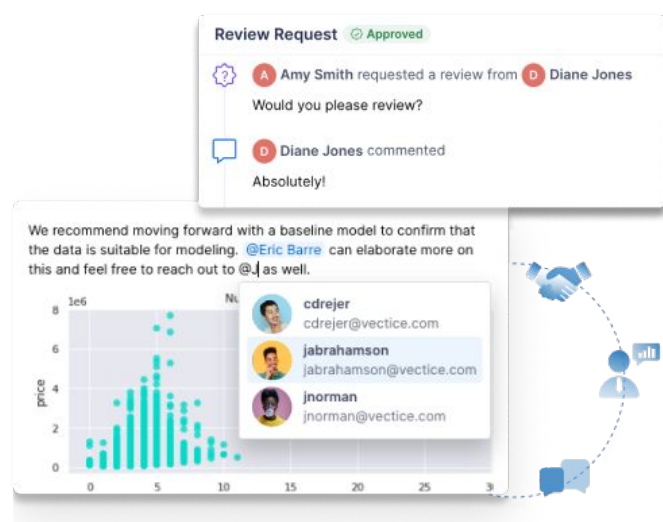


## Approval History

Modeling and Risk teams can quickly review completed steps and add feedback every step of the way.

**Feedback is always stored at the correct phase of the project** and can be viewed by your entire team. This supports the iterative way of working, adding transparency and clarity of the project and the decisions made.



## Visibility to the Team

Vectice gives risk teams a comprehensive view of ongoing data science projects, enabling them to **assess progress and pinpoint any obstacles** and get insights about workspace assets, including runs, models, datasets, completed stages, and contributors.

Model teams can report on their experiments and iterations, sharing both successes and failures, while risk teams can assign new phases to follow up. Vectice updates in real-time, allowing for instantaneous identification of bottlenecks, team efforts, progress, and results.
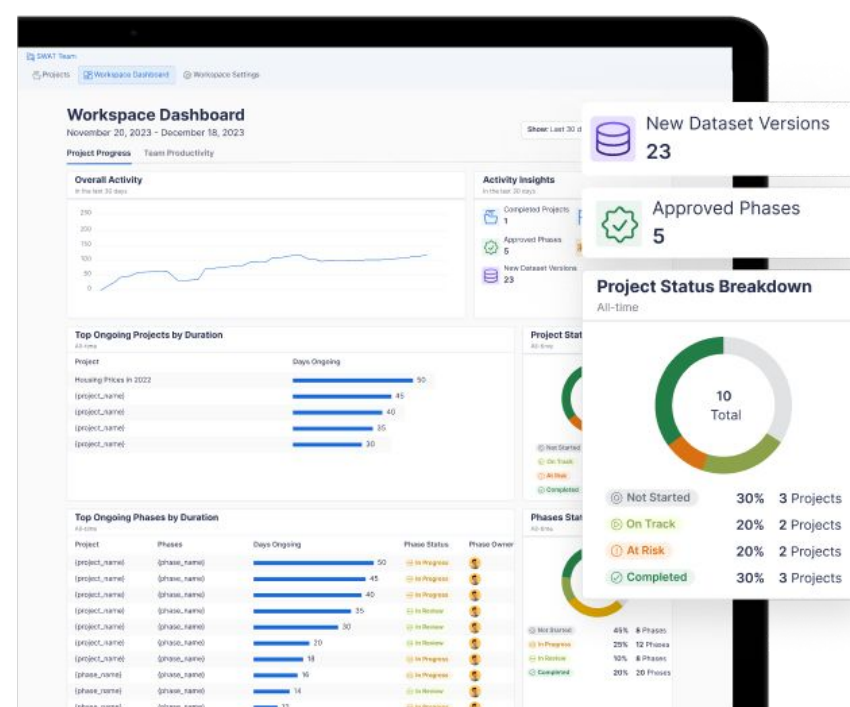
# Exportable Documentation for Internal and External Auditing

Compliance reporting is a critical requirement for many organizations, especially those operating in regulated industries. Vectice makes it easy to export the documentation in a format that can be customized and is suitable for both internal and external auditing purposes.

# For Enterprise

Vectice is compliant with enterprise-grade best practices in security and privacy and is seamlessly integrated into modeling and risk teams' workflow with our deployment tools and access control configurations. Vectice is a technical layer that captures and versions the metadata of artifacts generated by your modeling team along the workflows and processes set by the risk team.



## Vectice for Enterprises

- Private deployments on AWS & GCP
- Access Control & SSO
- SOC2-type 2 certified

# Validation on Demand for Financial Institutions

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Vectice improves the overall quality and reliability of models used for decision-making. This is particularly important in model risk management because errors or omissions in models can lead to incorrect or misleading results, which can have significant financial and reputational consequences for organizations.

**Why financial institutions must act now:**
- Increasing model complexity,
- Rapidly growing and changing regulations.
- Lack of model validation efficiency.
- Regulation and compliance is expensive and the right interface is strategic to financial institutions

**Validation on Demand:**
- Validation on Demand means that teams work synchronously in a short-cycle iterative process.
- Modeling teams push information from the tools they use as they are working.
- All the key information, assets, context, assumptions, get automatically gathered and centralized and is at disposal of the risk team - in real-time.
- Reduce and efficiently manage risk and exposure

With Vectice, financial institutions can effectively manage model risk and ensure their ML models are thoroughly validated, compliant with regulations, and deployed effectively.

## Contact us to learn more!

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