Model Risk Management Solutions, 2024

Quadrant Update

This report outlines Chartis' view of the vendor landscape for model risk management (MRM) solutions, and updates **our previous research** in this area. Our accompanying **Market Update** analyzes the latest trends and developments in the MRM market, and how financial institutions are seeking out solutions to suit their specific requirements.

Our quadrant analysis in this iteration of our MRM research highlights increased complexity in the space. As the lines between products, services, governance and validation have become less distinct, vendors have expanded across these areas, reaching out and maturing in different quadrants.

For details of Chartis' research methodology, click **here***.*

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Executive summary

Our quadrant analysis in this iteration of our model risk management (MRM) research highlights increased complexity in the space. As the lines between products, services, governance and validation have become less distinct, vendors have expanded across these areas, reaching out and maturing in different quadrants. The key differentiation remains between firms that are model providers (shown as orange dots in the validation quadrants), which have validation and governance as an integral part of their offerings, and those that provide stand-alone validation and governance capabilities (shown as purple dots in the validation quadrants).

Across the three primary quadrants analyzed in the report, we observe the following:

● **Model validation solutions and services (derivatives)**. In this quadrant, success often depends on offering advanced quantitative modeling and explicable frameworks to manage complex processes. The line between

model providers and validation specialists is becoming blurred as model providers enhance their offerings.

- **Model validation solutions and services (credit)**. As more firms have matured in this space, the distinction between point solution providers and platform vendors has narrowed, with machine learning (ML) and automation driving innovation.

- **Model governance solutions**. The model governance space demands increasing specialization. Vendors that survive and thrive differentiate themselves with integrated solutions and automation capabilities. Artificial intelligence (AI)-driven tools for documentation, regulatory reporting and metadata management are becoming essential differentiators.

This report uses Chartis' RiskTech Quadrant® to explain the structure of the market. The RiskTech Quadrant® employs a comprehensive methodology of in-depth independent research and a clear scoring system to explain which technology solutions meet an organization's needs. The RiskTech Quadrant® does not simply describe one technology solution as the best; rather, it has a sophisticated ranking methodology to explain which solutions would be best for buyers, depending on their implementation strategies.

This report covers the following providers of model validation and governance solutions and services:[1] Acadia (acquired by LSEG), Analytics Boutique, BCT Digital, Bloomberg, CIMCON Software, CRISIL, DataRobot, Evalueserve, Finastra, FIS, Genpact, IBM, ICE Data Services, Infosys, KPMG, MathWorks, MatLogica, MetricStream, Mitratech, Numerix, Prometeia, PwC, RiskSpan, SAS, TCS, TurinTech, ValidMind, Wipro, Wolters Kluwer and Yields.

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Overview

The MRM space remains highly diverse, represented by a number of different players across both validation and governance. Vendor types include:

- **Specialized validation and testing firms.**These firms focus on providing in-depth model validation and testing services, often with expertise in specific model types (e.g., credit risk, market risk and fraud detection). They use both automated and manual techniques to test adherence to industry

standards. Validation firms may also specialize in such areas as stress testing and back testing, which are particularly relevant for financial and regulatory compliance.

- **Specific model governance solution providers**. These vendors offer tools primarily for model governance, enabling companies to document model policies, track usage, manage access controls and oversee model approvals. Governance solutions often include features to maintain model inventories, establish model approval hierarchies and track version history, making it easier to oversee the model lifecycle from a compliance and audit perspective.

- **Data and AI/ML model management platforms**. These vendors address the requirements of AI and ML models, providing tools to manage, monitor and validate them. Their solutions focus on such aspects as version control, explainability and bias detection. They often integrate with existing MRM systems to streamline model tracking and compliance, especially for models in production environments.

- **Consulting and advisory firms**. Large consulting firms offer MRM, governance and validation as part of their broader risk management and regulatory compliance services. They provide tailored assessments, process design and implementation support for MRM programs. These firms often combine technical expertise with regulatory knowledge, making them valuable partners for organizations that are subject to complex regulatory requirements or need a custom MRM strategy.

- **RegTech firms**. Regulatory technology (RegTech) firms offer specialized solutions for regulatory compliance and reporting that include aspects of model validation and governance. These tools are particularly valuable for firms that have to meet stringent regulatory standards, like those in the financial services sector, where frequent audits and reporting are required. RegTech providers focus on automating reporting, maintaining regulatory documentation and providing stress testing and scenario analysis capabilities.

- **Niche analytics and risk vendors**. These vendors provide analytics and risk management tools that often include model validation and governance features as part of a broader risk analytics suite. These tools may focus on specific areas, such as market risk, credit risk or portfolio analysis, offering in-depth validation and testing functionalities tailored to particular risk domains.

Quadrant dynamics: What kinds of firms are winning

Figures 1 to 3 and Tables 1–6 present Chartis' view of the vendor landscape for model risk management solutions, covering three areas:

- Model validation solutions and services (derivatives): Figure 1, Table 1 and Table 2.

- Model validation solutions and services (credit): Figure 2, Table 3 and Table 4.

- Model governance solutions: Figure 3, Table 5 and Table 6.

In our validation quadrants (Figures 1 and 2), to highlight the differentiation between types of vendor we have used the following color coding:

- Model providers, which have validation and governance as an integral part of their offerings, are shown as orange dots in Figures 1 and 2.

- Firms that provide stand-alone validation and governance capabilities are shown as purple dots in Figures 1 and 2.

Model validation solutions and services (over the counter [OTC] derivatives)

In this segment, we have seen significant movement from one quadrant to the other. For example, CRISIL has introduced automation tools to streamline validation while gradually expanding into governance, which has traditionally been outside its core focus. TCS is also diversifying, offering validation services as part of its broader suite and moving beyond pure service offerings.

For the key capabilities in the derivatives validation quadrant, we focus on how well the vendor is addressing the unique complexities and risks associated with these financial instruments, including advanced quantitative modeling and ongoing monitoring tailored to the market. Success has often entailed providing the methodological frameworks and structures that enable complex validation processes to be managed within an explicable and quantifiable structure.

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As the lines between products and services in this space have blurred, a key dynamic remains: the distinct difference between firms that are model providers and those that specialize in validation for models. These roles serve complementary but fundamentally different purposes. Some firms design and implement models for specific applications, such as pricing exotic options, and provide validation as a complementary part of the process. Other firms do not offer models, but provide validation capabilities for them.

As the market has matured, we have seen more firms from the 'model provision' side begin to develop their capabilities. For example, Numerix has developed tools and expertise that support efficient model validation, which has moved the company toward a category leadership role.

Table 1: Assessment criteria for vendors of model validation solutions and services (derivatives), 2024

Completeness of offering criterion	What good looks like
Organizational depth and personnel	Expertise, experience and capacity to meet complex regulatory and technical demands are important. This includes the qualifications and certifications of team members, their track record in the financial industry and their familiarity with over-the-counter (OTC) derivatives and regulatory frameworks. The vendor should demonstrate sufficient staffing to support scalability, ongoing maintenance and timely delivery of services.
Supporting tools	Key considerations include the ability to automate data ingestion, model testing and reporting while ensuring accuracy and auditability. Tools should offer robust document management systems with secure storage, version control and traceability. Discovery capabilities should support advanced analytics, data visualization and the identification of model weaknesses or biases. Also important are scalability, integration with existing systems and the vendor's responsiveness to regulatory updates and organizational needs.
Methodological frameworks and structures	Adherence to best-practice frameworks, including SR 11-7 and Basel guidance, and the rigor of validation methodologies (such as sensitivity analysis, back testing and benchmarking against market standards) are important. The ability to handle complex derivatives pricing models, incorporate stress testing and evaluate model assumptions is key.
Data handling/approach	Key capabilities include being able to: efficiently process large, complex datasets with robust extract, transform, load (ETL) capabilities; ensure data lineage and traceability; and implement effective data-quality controls. Vendors should demonstrate expertise in managing structured and unstructured data, with scalable architectures that support real-time processing and secure storage.
Dashboarding and visualization	Key factors include the clarity and comprehensiveness of visualizations, support for real-time data updates, and the ability to drill down into granular details or aggregate high-level trends.

Source: Chartis Research

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Figure 1: RiskTech Quadrant® for model validation solutions and services (derivatives), 2024

Best-of-breed

Category leaders

MARKET POTENTIAL

- CRISIL
- Numerix
- ValidMind
- KPMG
- PwC
- Bloomberg
- MatLogica
- Acadia*
- ICE Data Services
- RiskSpan
- Evalueserve
- Finastra
- Infosys
- Wipro
- TCS
- DataRobot
- MathWorks

Point solutions

Enterprise solutions

COMPLETENESS OF OFFERING

*Acquired by LSEG

Note:
- Orange dots indicate model providers.
- Purple dots indicate model validation providers.

Source: Chartis Research

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Table 2: Vendor capabilities for model validation solutions and services (derivatives), 2024

Vendor	Organizational depth and personnel	Supporting tools	Methodological frameworks and structure	Data handling/approach	Dashboarding	Visualization
Acadia (acquired by LSEG)	****	**	**	**	**	**
Bloomberg	***	**	****	****	**	**
CRISIL	*****	*****	*****	*****	****	*****
DataRobot	**	***	**	****	****	****
Evalueserve	****	*****	****	****	****	****
Finastra	**	**	**	***	***	***
ICE Data Services	****	**	**	**	**	**
Infosys	**	**	**	**	**	**
KPMG	****	****	****	****	****	****
MathWorks	**	****	**	****	****	****
MatLogica	*	**	****	****	****	****
Numerix	****	**	****	***	****	***
PwC	*****	****	***	***	****	****
RiskSpan	****	****	***	****	****	****
TCS	***	**	**	****	****	****
ValidMind	**	*****	****	****	*****	*****
Wipro	****	**	**	**	**	**

Key: ***** = Best-in-class capabilities; **** = Industry-leading capabilities; *** = Advanced capabilities; ** = Meets industry requirements; * = Partial coverage/component capability

Source: Chartis Research

Quadrant analysis

We note that vendors positioned on the far right of the quadrant typically have robust service capabilities, large teams of professionals and deep domain expertise in derivatives. However, domain expertise in derivatives is relatively scarce, as it is a specialized field that requires considerable knowledge. These vendors primarily target large banks. Vendors in the Best-of-breed category tend to be product-focused companies with a narrower perspective on the validation business. These vendors see

validation primarily as a support function for their derivatives software, designed to help institutions more easily adopt and integrate their products, rather than as an independent commercial service offering.

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Model validation solutions and services (credit)

Over the past year, we have observed that the credit risk model validation landscape has matured significantly, with a noticeable shift of vendors into the category leader quadrant, reflecting advances in solution sophistication and market consolidation.

While vendor positioning remains more dispersed than in the OTC derivatives market, the distinction between point solution providers and comprehensive platform vendors has narrowed. Many former point solution providers have enhanced their offerings, integrating advanced ML capabilities, automation and analytics.

Table 3: Assessment criteria for vendors of model validation solutions and services (credit), 2024

Completeness of offering criterion	What good looks like
Organizational depth and personnel	The qualifications and experience of personnel, particularly in validating such models as probability of default (PD), loss given default (LGD) and exposure at default (EAD), are key. The vendor's ability to provide a multi-disciplinary team with quantitative, statistical and industry-specific expertise is critical. Scoring should also assess the depth of leadership, the vendor's capacity to scale resources for large or complex validations, and its commitment to ongoing professional development to address evolving credit risk and regulatory challenges.
Supporting tools	Key considerations include the ability to automate data ingestion, model testing and reporting, while ensuring accuracy and auditability. Tools should offer robust document management systems with secure storage, version control and traceability. The solution should support advanced analytics, data visualization and the identification of model weaknesses or biases. Other important capabilities include scalability, integration with existing systems and the vendor's responsiveness to regulatory updates and organizational needs.
Methodological frameworks and structures	Adherence to such best-practice frameworks as SR 11-7, Basel III/IV and International Financial Reporting Standard (IFRS) 9 is important. Key factors include the rigor of validation methodologies, including stress testing, back testing and benchmarking against industry standards. Vendors should demonstrate strong governance structures, independent validation practices and comprehensive documentation to ensure regulatory compliance. The ability to evaluate complex credit risk models, such as PD, LGD and EAD, while assessing assumptions, limitations and model performance, is also key.
Data handling/approach	Adherence to data integrity, security and governance standards is critical to credit risk assessment. Key factors include the ability to handle large, diverse datasets with robust extract, transform, load (ETL) processes, ensuring data lineage, traceability and consistency. Effective data-quality controls, including the detection and remediation of anomalies, are essential. Vendors should demonstrate expertise in managing structured datasets (such as credit histories) and unstructured data (including alternative credit signals) with scalable systems that support real-time updates and secure storage. Scoring should also evaluate firms' compliance with credit risk regulatory frameworks.
Dashboarding and visualization	These capabilities include the clarity and comprehensiveness of visualizations, support for real-time data updates and the ability to drill down into granular details or aggregate high-level trends.

Source: Chartis Research

Figure 2: RiskTech Quadrant® for model validation solutions and services (credit), 2024

A RiskTech Quadrant chart with axes MARKET POTENTIAL (vertical) and COMPLETENESS OF OFFERING (horizontal), divided into four quadrants: Best-of-breed (top-left), Category leaders (top-right), Point solutions (bottom-left), Enterprise solutions (bottom-right).

Category leaders quadrant:
- ValidMind
- CRISIL
- Evalueserve
- Genpact
- ICE Data Services
- KPMG
- RiskSpan
- Prometeia
- MathWorks
- PwC
- Acadia*
- BCT Digital
- TCS
- Wipro
- Yields
- DataRobot
- Infosys
- SAS

Point solutions quadrant:
- FIS
- Analytics Boutique
- TurinTech

*Acquired by LSEG

Note:
● Orange dots indicate model providers.
● Purple dots indicate model validation providers.

Source: Chartis Research

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Table 4: Vendor capabilities for model validation solutions and services (credit), 2024

Vendor	Organizational depth and personnel	Supporting tools	Methodological frameworks and structure	Data handling/approach	Dashboarding	Visualization
Acadia (acquired by LSEG)	****	****	****	****	**	**
Analytics Boutique	**	**	**	**	**	**
BCT Digital	****	****	****	*****	*****	*****
CRISIL	*****	*****	*****	*****	*****	*****
DataRobot	***	***	****	****	****	*****
Evalueserve	****	****	****	****	****	****
FIS	**	**	****	**	**	**
Genpact	*****	*****	*****	*****	*****	*****
ICE Data Services	****	***	****	****	****	****
Infosys	****	****	****	****	****	****
KPMG	*****	*****	*****	*****	*****	****
MathWorks	**	***	****	****	****	*****
Prometeia	*****	*****	*****	*****	*****	*****
PwC	*****	***	****	****	****	****
RiskSpan	****	***	**	*****	****	****
SAS	****	*****	*****	****	****	****
TCS	*****	****	****	****	*****	*****
TurinTech	**	***	**	**	**	**
ValidMind	**	*****	****	*****	*****	*****
Wipro	****	***	**	***	****	**
Yields	****	****	*****	*****	****	****

Key: ***** = Best-in-class capabilities; **** = Industry-leading capabilities; *** = Advanced capabilities; ** = Meets industry requirements; * = Partial coverage/component capability

Source: Chartis Research

Quadrant analysis

We note that vendors positioned on the far right of the quadrant are typically characterized by their strong service capabilities, large teams with deep

domain expertise in credit and advanced tools. These vendors offer a comprehensive combination of tools and services, with such tools as document generation, document management and acceleration tools designed to streamline and expedite the validation process. These tools complement the services provided, automating validation and making the process more efficient. Along with their robust tools, these vendors also excel in domain knowledge and human resources, with a significant emphasis on both areas.

Vendors positioned to the left of the category leader section are still strong in human resources and domain expertise, but lack the specialized tools or breadth of tools that vendors to the far right have. The vendors to the left offer solid service capabilities, but may not provide the same level of tool integration or automation.

Vendors on the far left of the category leader section typically feature a mix of capabilities. They are often product companies or validation service providers with a lighter focus on domain expertise and a stronger orientation toward process. These vendors may also specialize in validation for their own products and tools, rather than offering a broad range of services.

Finally, vendors in the point solution category are primarily product-focused and occupy a more niche space. While they may offer specific validation tools, their validation services are typically less developed, with fewer human resources capabilities and less emphasis on comprehensive service offerings.

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Model governance solutions

We have observed an important evolution within the model risk governance quadrant. New entrants are bringing fresh capabilities, while others have exited the market entirely, underscoring the increasing specialization required for success in this field. Notably, vendors from the validation quadrants have continued to push forward into the governance one.

We see vendors distinguishing themselves with their ability to combine domain expertise with technological innovation. The barrier to entry remains high due to the specialized knowledge required for effective model risk governance. Further, the expectation that integrated solutions will connect model inventory, lifecycle management, validation and development systems has increased.

We believe that automating labor-intensive processes, such as documentation, compliance reporting and inventory maintenance, is a key differentiator among institutions. AI management has also become increasingly important: solutions offering AI-driven tools for metadata management, automated regulatory reporting and intelligent documentation workflows are gaining traction.

Table 5: Assessment criteria for vendors of model governance solutions, 2024

Completeness of offering criterion	What good looks like
Model coverage	The breadth and depth of models supported across relevant risk categories and use cases is important. Key factors include the vendor's ability to validate diverse model types (such as statistical, machine learning [ML] and hybrid models) and their applicability to such areas as credit risk, market risk, operational risk and liquidity risk. Coverage should include regulatory models, such as probability of default (PD), loss given default (LGD) and stress-testing models, and business-driven models, such as pricing and capital allocation. Scoring should evaluate the vendor's capacity to handle complex, high-dimensional models and provide support for emerging methodologies.
Governance and deployment control	The company's approach to lifecycle management, policy management and integration with development and security operations is important. Key factors include robust workflow capabilities that ensure consistent, auditable processes throughout the model development, validation and deployment stages. Vendors should demonstrate clear policies for model approval, version control and periodic reviews, ensuring compliance with regulatory standards and internal risk management guidelines. Scoring should assess the vendor's ability to integrate with development operations (DevOps) and security operations (SecOps). Additionally, the vendor should provide mechanisms for monitoring model performance post-deployment and managing model updates, ensuring ongoing validation and security.
Data management	This includes the ability to manage data integration, document management and overall data governance in a way that ensures consistency, transparency and compliance. Key factors include the vendor's capacity to integrate data from various sources – both structured and unstructured – while ensuring data accuracy, traceability and governance throughout the model lifecycle. The ability to establish robust data pipelines (e.g., ETL processes) and maintain high-quality, auditable data to support model development, validation and ongoing monitoring, is important. Document management should ensure secure, version-controlled storage of critical model-related documentation, including model assumptions, validation reports and audit trails. Additionally, the vendor should demonstrate strong data governance practices, including data stewardship, access controls and compliance with regulatory requirements (e.g., General Data Protection Regulation [GDPR] and data privacy laws) to safeguard data integrity and mitigate risk.
Model inventory	This assessment looks at the capacity to maintain an up-to-date model inventory that enables discovery, tracking and categorization of all models. Scoring evaluates the robustness of control mechanisms in place to ensure that all models are documented, reviewed and subject to appropriate validation and approval processes. Vendors should provide tools for managing model metadata, version control and model performance monitoring, with clear tracking of any model changes, updates and usage. Additionally, vendors should offer capabilities for linking models to business processes, risk management activities and regulatory requirements, ensuring that the model inventory supports efficient governance, compliance and auditability.
Dashboarding and visualization	This assesses the clarity and comprehensiveness of visualizations, support for real-time data updates and the ability to drill down into granular details or aggregate high-level trends.

Source: Chartis Research

Figure 3: RiskTech Quadrant® for model governance solutions, 2024

Source: Chartis Research

Table 6: Vendor capabilities for model governance solutions, 2024

Vendor	Model coverage	Governance	Data management	Model inventory	Dashboarding	Visualization
BCT Digital	***	****	**	****	*****	****
CIMCON Software	**	****	**	****	**	***
CRISIL	*****	****	****	*****	*****	*****
DataRobot	*****	****	*****	*****	****	*****
Evalueserve	*****	*****	****	****	*****	****
Genpact	****	*****	****	****	****	****
IBM	****	****	*****	****	****	*****
KPMG	*****	****	****	****	****	****
MathWorks	*****	****	***	*****	*****	*****
MetricStream	***	*****	****	***	****	****
Mitratech	****	****	****	****	****	****
Prometeia	*****	*****	*****	*****	****	****
PwC	****	****	****	****	****	****
SAS	*****	*****	*****	*****	*****	****
TCS	*****	****	*****	*****	****	****
ValidMind	*****	****	****	*****	*****	*****
Wipro	**	****	**	****	***	***
Wolters Kluwer	****	****	****	****	****	***
Yields	****	****	****	****	****	****

Key: ***** = Best-in-class capabilities; **** = Industry-leading capabilities; *** = Advanced capabilities; ** = Meets industry requirements; * = Partial coverage/component capability

Source: Chartis Research

Quadrant analysis

Category leaders typically have strong foundations in governance, risk management and compliance (GRC) frameworks and are well-equipped to handle key aspects of risk management. However, they may lack the breadth required to address the full governance landscape. They focus on providing solutions that address certain regulatory and operational challenges, yet do not extend their offerings to cover every aspect of model risk. This is particularly true in such specialized areas as advanced AI

validation or more comprehensive integration with cutting-edge technologies. As such, while they provide solid, process-oriented capabilities, they may not have the same level of specialization or breadth as vendors positioned farther along the spectrum of full governance capabilities.

Note

1. Note that references to companies in the text of this report do not constitute endorsements of their products or services by Chartis.
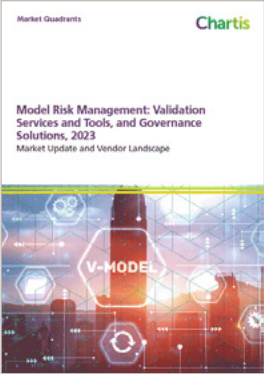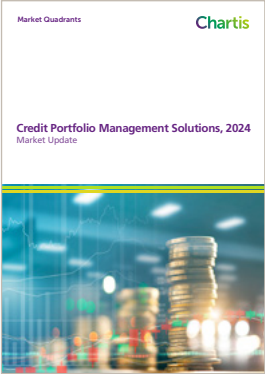
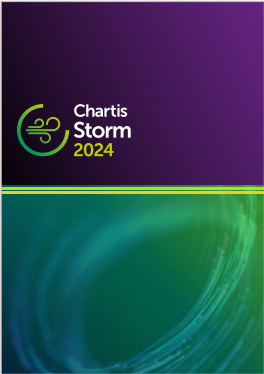**Back to top**

Further reading

Model Risk Management: Validation Services and Tools, and Governance Solutions, 2023; Market and Vendor Landscape
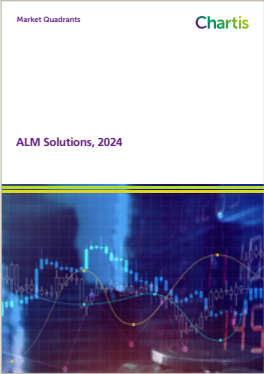
ALM Solutions, 2024

Credit Portfolio Management Solutions, 2024: Market Update

STORM 2024

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