A&MPLIFY
BY ALVAREZ & MARSAL

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING MODEL FORENSICS

UNVEILING FIRMS' AI & ML MODELS THROUGH INDEPENDENT VALIDATION AND EVALUATION FOR ACCOUNTABILITY AND TRUST IN TRANSACTIONS

Companies could be making decisions based on AI and ML models that are inaccurate, unethical and untrustworthy.

INTRODUCTION AND MOTIVATION

In today's data-driven world, the adoption of artificial intelligence (AI) and machine learning (ML) models by companies has become increasingly prevalent. These models are leveraged to make critical business decisions, optimize processes, enhance customer experiences and predict future trends. The allure of AI and ML lies in their ability to transform vast amounts of data into actionable insights, thereby promising heightened efficiency and profitability. However, this growing reliance on AI and ML models also raises critical concerns, including their transparency, fairness and accountability.

AI and ML models are now integral components of many industries, including finance, healthcare, marketing and logistics, to name a few. Yet, their complex and often inscrutable nature has given rise to the need for independent validation and forensic analysis — especially in the cases of bankruptcy, mergers and acquisitions, private equity, turnaround, restructuring, partnership, vendor management and more. In other words, firms seeking to take advantage of AI and ML models, in particular from external and third parties, open the door to risk of unknown consequences with unproven AI assets, without proper vetting and validation of models' performance. Therefore, as these models shape our world and influence pivotal outcomes, the demand for transparency, fairness and accountability becomes paramount.

This paper delves into the growing field of AI and ML model forensics, with a specific focus on independently validating the performance and value of models used by companies. We will explore:

- The necessity and challenges of model forensics and independent validation

- The methodologies and frameworks that can be employed to ensure that AI and ML models used by companies are not only accurate but also ethical and reliable

- How A&MPLIFY by Alvarez & Marsal can help you navigate the challenging and nuanced waters of AI and ML validation and evaluation so you can make the best decisions for your organization

THE NEED FOR MODEL FORENSIC AND INDEPENDENT VALIDATION

A forensic analysis is essential for organizations looking to expand their portfolio or operations with AI and ML models. From bankruptcy committees attempting to restructure assets and mergers and acquisitions with AI-driven firms, through partnerships and alliances with external parties to leverage their models, it is prudent for stakeholders to have the means to assess the accuracy, reliability and ethical compliance of the AI technology underpinning the target company's value. Forensic analysis provides crucial insights into the performance, potential risks and ethical implications of AI models, helping organizations make informed decisions and mitigate unforeseen liabilities.

Government Regulations

Government regulations play a pivotal role in the need for AI and ML model forensics. Regulators recognize the potential risks and ethical implications associated with these models, especially when they are used to make important decisions. Laws like the European Union's General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) include provisions related to the transparency and accountability of automated decision-making processes. Such regulations require companies to provide explanations for AI- and ML-driven decisions, thereby emphasizing the importance of understanding and validating these models.

> **In mergers and acquisitions, regulatory bodies often scrutinize how AI and ML models are used for risk assessment, pricing and compliance. A robust model validation framework must be in place.**

In the context of bankruptcy, mergers and acquisitions, and other corporate scenarios, regulatory compliance is of paramount importance. For instance, in mergers and acquisitions, regulatory bodies often scrutinize how AI and ML models are used for risk assessment, pricing and compliance, making it crucial for companies to have a robust model validation framework in place.

Ethical Concerns

Ethical concerns surrounding AI and ML models are multifaceted and extend to a wide range of corporate scenarios. Harmful or hidden bias, fairness and transparency are some of the core ethical concerns. Models trained on biased data can perpetuate inequalities and reinforce existing stereotypes, which is a concern in bankruptcy, mergers and acquisitions, and private equity transactions, where decisions can affect the livelihood of individuals and communities.

Ensuring the ethical use of AI and ML models in the context of turnaround, restructuring and partnerships is vital. These scenarios often involve challenging decisions, such as layoffs or resource allocation, where ethical considerations are central. Companies need to validate their models to ensure that decisions made using AI and ML technologies are just, hidden or harmful biases are handled appropriately and in line with ethical principles.

> **Independent forensic analysis and validation address ethical issues such as hidden or harmful bias, fairness and transparency.**

Implications for Typical Due Diligence Processes

Due diligence is a standard practice in scenarios such as bankruptcy, mergers and acquisitions, private equity, turnaround, restructuring, partnership and vendor management. Due diligence includes a thorough assessment of a company's assets, liabilities, operations and risks. In this era of AI and ML, the process must also encompass an evaluation of the AI and ML models in use.

Potential acquirers, investors or partners need to examine the AI and ML models employed by the target company, including model documentation, performance metrics, data sources and validation processes. This due diligence ensures that the models align with the company's objectives and ethical standards. In bankruptcy and restructuring, due diligence may identify opportunities for optimization or potential risks related to AI and ML model-driven decisions.

Ensuring model transparency, fairness and accountability is essential to navigate these scenarios successfully and make informed, ethical and compliant decisions. In an environment where ethical considerations and public perception are crucial, companies that excel in transparency and accountability will have a competitive advantage. Businesses that can demonstrate the fairness and reliability of their AI and ML models will be more likely to attract investors, partners and customers.

A&MPLIFY'S FRAMEWORK FOR INDEPENDENT VALIDATION

Process for Validation

A&MPLIFY provides organizations with a five-step approach to conducting independent evaluations of AI and ML models using forensic analysis techniques:

1. UNDERSTAND BUSINESS REQUIREMENTS OR CONCERNS

+ Work closely with all stakeholders to understand the scope and chief concerns or requirements of the AI model forensic analysis

+ Ensure required access is given to code, data and cloud assets, as well as pertinent staff (technical and/ or SME) from the developing firm to assist the data and code discovery and assessment phase

2. DATA AND CODE DISCOVERY AND ASSESSMENT

+ Verify that access to all required assets is sufficient for the scope of the investigation

+ Create inventory and conduct quality assessment of all data, code, etc., assets used within the context of the AI model under validation

+ Quickly gather questions, additional access requests, etc., to ensure all pertinent information is provided for the period of the investigation

3. REVIEW AND REPRODUCE MODEL

+ Process can include the following options: conduct literature review of the modeling approach under investigation to understand market differentiation and novelty, trends across industries and use cases, and ideate additional methods for model validation

+ Using provided means and resources, reproduce the model, training cycles and datasets to feed performance benchmarking

4. PERFORMANCE BENCHMARKING

+ Compare the reproduced model's results to at least three separate sources of truth to provide comprehensive and holistic view into the validity of the model under investigation. These can include any combination of the following: firm-reported metrics, standard dataset/task benchmarks, industry standards, comparison to literature, lift from other models, ablation, etc.

5. STAKEHOLDER COMMUNICATION

+ Timely, objective and actionable findings and recommendations provided to all parties and stakeholders

+ Findings and recommendations are not only technical assessments of the model, data, etc., resources using The A&MPLIFY Scorecard, but also answer key business requirements or questions outlined in the initial stages of the process

The A&MPLIFY Model Forensics Scorecard

During the forensic analysis of an AI or ML model, A&MPLIFY AI experts score the model and requisite assets according to 11 unique evaluation criteria and metrics:

Novelty and Defensibility: A comprehensive evaluation of the model's unique characteristics, innovation and its ability to withstand competition and challenges in the rapidly evolving field of artificial intelligence

Reproducibility by Competitors: Examination of the robustness of model documentation, code availability and the extent to which the model's design and methodologies are openly disclosed, facilitating or inhibiting the model's replication by others in the competitive landscape

Integrability: The examination of the model's compatibility, adaptability and ease of integration into existing systems, workflows and technologies within an organization

Maintainability and Documentation: An assessment of the ease with which the model can be maintained, updated and improved over time, as well as the quality and comprehensiveness of the provided documentation

Model Architecture and Design: This assessment aims to determine the efficiency, scalability and suitability of the model's design for its intended purpose

Cross-Validate Performance: A rigorous assessment of the model's capabilities, comparing its results with predefined benchmarks or established performance metrics specific to the organization, or against established benchmarks, methodologies and findings documented in the relevant academic or industry literature

Ethical Considerations, Fairness and Bias: A comprehensive examination of the model's behavior and decision-making processes with respect to ethical principles, fairness and potential hidden or harmful biases

Security: A thorough evaluation of the model's vulnerability to security threats, data breaches and adversarial attacks

Privacy: A comprehensive review of how the model handles sensitive or personal data and its compliance with privacy regulations and best practices

Regulatory Compliance: Verification that the AI model complies with legal requirements specific to its domain, such as data protection regulations (e.g., GDPR or CCPA), industry-specific guidelines and any other applicable rules

Code Quality: Evaluation of the code's robustness, readability, maintainability and adherence to coding standards and best practices. This assessment is critical for ensuring that the AI model's software components are well-structured, efficient and free from vulnerabilities

### Select Independent Validation Use Cases

- **Fintech Bankruptcy:** Leveraging Alvarez & Marsal's firmwide network and subject matter expertise, we partnered with a fintech firm's unsecured creditors' committee in a multi-billion-dollar bankruptcy protection case to assess the validity and novelty of various AI models essential to the company's business, to best enable the committee to make informed asset allocation recommendations.

- **Hospitality Partnership:** A disruptor in the cruise line space worked with members of our team to identify, assess and recommend a multi-million-dollar partnership with AI-based customer data platform providers.

- **Automotive Restructuring:** Our team partnered with a global automotive OEM with underperforming vehicle telemetry models to assess model performance, recommend changes and redevelop models in under eight weeks using custom datasets.

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Future Directions

The field of AI and ML model forensics is dynamic and ever evolving, shaped by advancements in technology, emerging challenges and changing regulatory landscapes. As we look ahead, several key trends and directions are poised to influence the trajectory of this field. The A&MPLIFY team monitors these trends to ensure that we can help mitigate unforeseen liabilities from your organization's exposure to potentially faulty or under-performant AI and ML models:

1. **Enhanced Model Explainability:** One of the critical challenges in AI and ML model forensics is model interpretability. Future directions will likely see the development and adoption of more robust model explainability techniques. This will allow stakeholders to gain deeper insights into how models arrive at their decisions, enhancing transparency and facilitating the identification — and eventual mitigation — of hidden or harmful biases.

2. **Ethical AI Frameworks:** As ethical concerns continue to drive discussions and regulatory changes, future directions will involve the establishment of more comprehensive ethical AI frameworks — of which A&MPLIFY is a champion. These frameworks will provide guidance on ethical considerations in AI and ML model development and deployment. They will be particularly relevant in scenarios involving sensitive decisions, such as those related to healthcare, finance and employment.

3. **Federated Learning and Privacy-Preserving Techniques:** The adoption of federated learning and privacy-preserving techniques is expected to gain momentum. These approaches allow for model training without exposing sensitive data, addressing concerns related to data privacy and security. In merger and acquisition due diligence, for example, these techniques can facilitate the sharing of models without revealing confidential or proprietary information — helping to protect firms' intellectual property while providing an objective and comprehensive validation of AI an ML assets.

4. **Interdisciplinary Collaboration:** The future of AI and ML model forensics will involve increased collaboration between computer scientists, ethicists, legal experts and domain specialists. Interdisciplinary collaboration will be essential in addressing complex ethical, legal and technical challenges, especially in scenarios like vendor management and partnerships, where compliance with industry-specific regulations is crucial. A&MPLIFY is already leading the charge in these collaboration efforts by coordinating validation engagements with SMEs across the global Alvarez & Marsal firm of experts — especially in highly-regulated markets, such as finance, healthcare and insurance.

5. **Regulatory Evolution:** Regulations related to AI and ML will continue to evolve. Governments and international bodies will likely introduce new laws and standards that impact model transparency, fairness and accountability. Companies will need to adapt and ensure that their AI and ML models are compliant. In the context of bankruptcy and restructuring, adherence to evolving regulations will be essential in mitigating legal risks. The A&MPLIFY team continues to monitor pending AI and ML regulations and industry standards throughout the United States and European Union, to ensure compliance is objectively assessed in all validation engagements.

In summary, the future of AI and ML model forensics promises to be both challenging and transformative. A&MPLIFY's approach and framework continues to adapt to technological advancements, navigate evolving regulations and prioritize ethical considerations. By doing so, we harness the full potential of AI and ML while maintaining our clients' trust and ensuring responsible, transparent and accountable use of these technologies across various corporate scenarios.
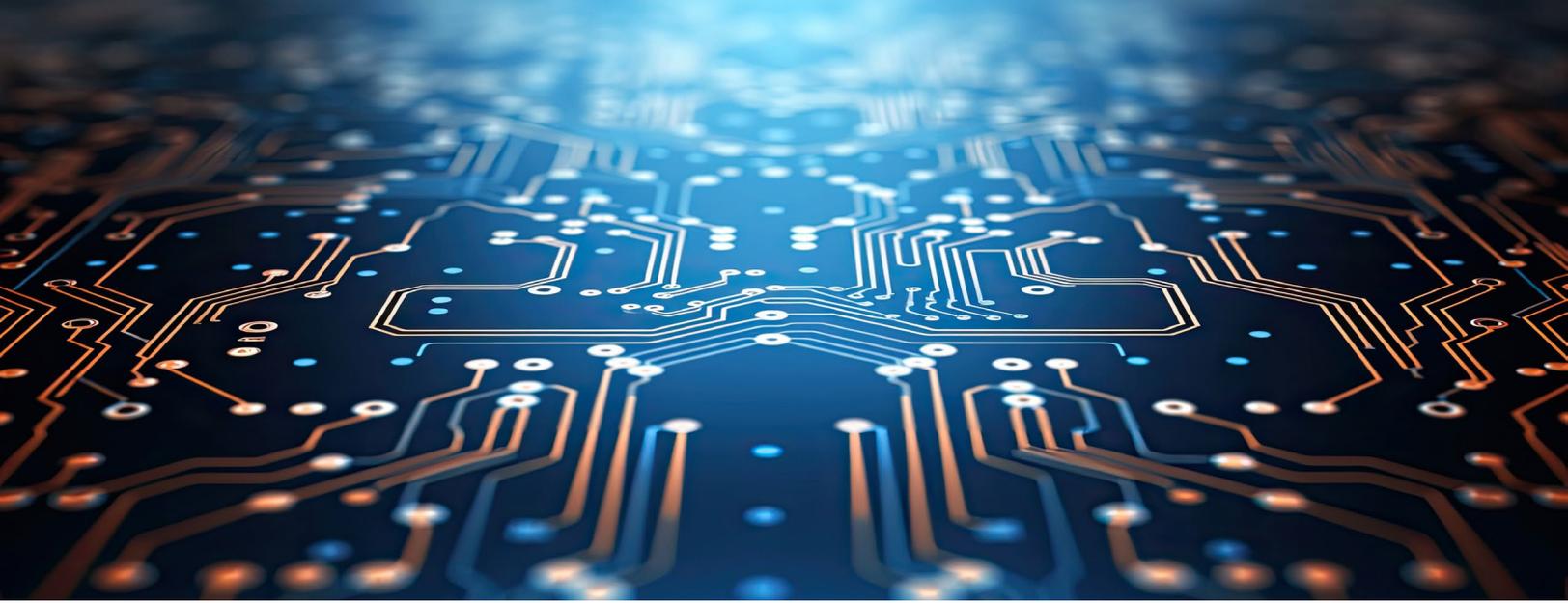
Conclusion

In a world where AI and ML models have become the driving force behind critical decisions in various industries, the imperative of independent validation, transparency and accountability has never been more apparent. The rapid proliferation of these technologies across corporate landscapes necessitates a rigorous approach to ensure their responsible use, ethical behavior and trustworthy outcomes.

Our aim at A&MPLIFY is to help organizations de-risk from faulty or underperforming AI and ML models. With unwavering commitment to enhancing model transparency, fairness and compliance, we provide businesses and organizations seeking to harness the power of AI a beacon of guidance while upholding ethical principles and public trust.

Independent validation is imperative in bankruptcy, M&A, private equity, turnaround, restructuring, partnership and vendor management. This paper has underscored the multifaceted nature of the challenges that AI and ML models present in these scenarios, from fairness and hidden or harmful biases to regulatory compliance and due diligence.

However, it is not enough to merely recognize the challenges. Adequately leveraging AI and ML model forensics requires proactive steps, continuous vigilance and a commitment to embracing evolving technologies and ethical standards. A&MPLIFY, with its comprehensive framework for independent validation, assists organizations in confidently navigating these challenges. We stand ready to empower you to make data-driven decisions with integrity and trustworthiness.

Evaluate Your AI and ML Models Today

The future of AI and ML model forensics holds great promise. As we strive to create a world where AI and ML models are not only powerful but also fair, transparent and ethically sound, A&MPLIFY is here to help. With the right frameworks, tools and mindset, we can harness the potential of AI and ML while maintaining the values that underpin our society. It is a future worth pursuing — one where technology and ethics harmoniously coexist. A&MPLIFY is leading the way in leveraging these methods with proprietary tools and firm expertise to help you mitigate the risk of your organization's use of new AI and ML models. Take the next step and contact the A&MPLIFY team today.

> **Technology and ethics can harmoniously coexist when AI and ML models are validated.**

KEY CONTACTS

DAN SIMION
Managing Director

+1 973 896 3842
dsimion@alvarezandmarsal.com

JAMIE WHEELER
Director

+1 703 609 3442
jwheeler@alvarezandmarsal.com

JUSTIN GOULD
Manager

+1 248 877-0751
jgould@alvarezandmarsal.com

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Companies, investors, and government entities around the world turn to Alvarez & Marsal (A&M) for leadership, action and results. Privately held since its founding in 1983, A&M is a leading global professional services firm that provides advisory, business performance improvement and turnaround management services. When conventional approaches are not enough to create transformation and drive change, clients seek our deep expertise and ability to deliver practical solutions to their unique problems.

With over 9,000 people providing services across six continents, we deliver tangible results for corporates, boards, private equity firms, law firms and government agencies facing complex challenges. Our senior leaders, and their teams, leverage A&M's restructuring heritage to help companies act decisively, catapult growth and accelerate results. We are experienced operators, world-class consultants, former regulators and industry authorities with a shared commitment to telling clients what's really needed for turning change into a strategic business asset, managing risk and unlocking value at every stage of growth.

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