Compliance. Transformed.

AI/ML use in Risk Management and Compliance

PwC Actuarial, Risk & Quants
14 April, 2021
# Contents

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growth in AI/ML Adoption - PwC AI Predictions Survey 2021</td>
</tr>
<tr>
<td>2</td>
<td>Global use of AI/ML adoption in Risk Management and Compliance</td>
</tr>
<tr>
<td>3</td>
<td>AI/ML success enablers - themes emerging</td>
</tr>
<tr>
<td>4</td>
<td>Local AI/ML initiatives and challenges in Risk and Compliance</td>
</tr>
<tr>
<td>5</td>
<td>Role of Risk and Compliance in an AI driven world</td>
</tr>
<tr>
<td>6</td>
<td>Summary and Key Takeaways</td>
</tr>
</tbody>
</table>
1. Growth in AI/ML - PwC AI Predictions Survey 2021
Overview of the PwC AI Predictions Survey 2021

Research Objectives

PwC’s AI Predictions Survey explores the use of AI activities, strategies and attitudes towards AI, as well as understanding the impact of COVID-19 on US business.

Methodology

We gathered 1,032 responses utilizing an online panel, targeting business and technology executives across a range of industries in the US with revenues of $500m+.
COVID-19 Impact - Revenue
Almost three quarters of companies have experienced a decrease in revenues due to COVID-19

- Decreased revenue by less than 10%: 17%
- Decreased revenue by 10% - 24.9%: 30%
- Decreased revenue by 25% - 49.9%: 14%
- Decreased revenue by more than 50%: 8%
- Decreased revenue of unknown magnitude: 3%
- No impact: 8%
- Increased revenue: 18%

Q9 Which of the following AI and analytic applications will be most important to your company in 2021? All Respondents 1032.
COVID-19 Impact - AI Initiatives

However, over half have seen an acceleration in their AI approach due to the pandemic.

- 52% Yes - it has accelerated it
- 35% Yes - it has caused delays
- 13% No - it has had no impact
- 1% Not sure

Q9 Which of the following AI and analytic applications will be most important to your company in 2021? All Respondents 1032.
**Most critical applications of AI/ML**

Managing risks, fraud and cyber threats, as well as improving AI ethics explainability and bias detection will be the most important applications.

- **Managing risk, fraud, and cybersecurity threats**: 31%
- **Improving AI ethics, explainability, and bias detection**: 27%
- **Helping employees make better decisions**: 25%
- **Analyzing scenarios using simulation modeling**: 25%
- **Automating routine tasks**: 25%
- **Gathering forward-looking intelligence**: 24%
- **Improving document classification and management**: 23%
- **Creating effective governance models and oversight**: 23%
- **Performing predictive maintenance**: 22%
- **Identifying trends in historical corporate data**: 22%
- **Improving image recognition and management**: 21%
- **Automating the processing of language from audio and text**: 20%

**2020 results**

1st: Managing risk, fraud - 38%
2nd: Automating tasks - 35%
3rd: Helping employees make better decisions - 31%

Please note: Chart is showing % ranked 1-3.
AI/ML Priorities for 2021

Responsible AI tools will be the top priority for clients in 2021

2020 results
1st: Developing AI models and data sets - 51%
2nd: AI upgrades to existing applications such as CRM - 42%
3rd: Intelligent interfaces that understand emotions - 39%

Please note: Chart is showing % ranked 1-3
2. Global developments in AI/ML use in Risk and Compliance
Figure 8: Level of engagement with AI tools for Risk Management

AI tools for risk management activities, by level of organizational awareness/engagement (%), n=101

- **Visual Analytics**: 18.8% Aware, 41.6% Using in limited use cases, 21.8% Using in multiple use cases, 14.9% Core component
- **Cognitive RPA**: 40.6% Aware, 39.6% Using in limited use cases, 13.9% Using in multiple use cases, 4.0% Core component
- **NLP**: 28.7% Aware, 38.6% Using in limited use cases, 21.8% Using in multiple use cases, 8.9% Core component
- **Evolutionary Programming**: 42.6% Aware, 35.6% Using in limited use cases, 14.9% Using in multiple use cases, 5.9% Core component
- **ML**: 23.8% Aware, 35.6% Using in limited use cases, 20.8% Using in multiple use cases, 16.8% Core component
- **Graph Analytics**: 29.7% Aware, 31.7% Using in limited use cases, 25.7% Using in multiple use cases, 7.9% Core component
- **Segmentation**: 29.7% Aware, 44.6% Using in limited use cases, 13.9% Using in multiple use cases, 5.9% Core component

**Question 13**: To what extent is your organization engaging with the following AI tools for risk management activities? (Select one option)

**Source**: Chartis Research and TCS
Usage of AI tools by risk type

Figure 3: Use of AI tools to address a range of risk management challenges

Usage of AI tools, by area (%), n=96, with 219 responses

- Market Risk - Trading Book: 22.9%
- Market Risk - Banking: 9.4%
- Credit Risk - Trading Book: 13.5%
- Credit Risk - Banking: 13.5%
- Credit Risk - Retail: 17.7%
- Fraud Risk & FinCrime Risk: 42.7%
- Behavioral Analytics & Risk Profiling: 24.0%
- Non-Financial & Operational Risks: 29.2%
- GRC: 31.3%
- Other: 24.0%

Question 6: In which of the following areas of risk management and compliance are you using AI tools? (Select all that apply)
Source: Chartis Research and TCS
Cognitive RPA and Embedded AI trends

With the rapid innovation and investment in supporting capabilities AI/ML applications in production will keep on proliferating. These applications will be increasingly embedded within the client experience and user interfaces, products, operational processes and applications.

1st Generation RPA applications are non-models. These tend to be purely rules-based with limited modelling and no machine learning.

2nd Generation RPA has ML models embedded. Use algorithms to transform inputs into quantitative estimates and produces responses, decisions and outputs based on probabilistic estimates.

Given the advanced maturity of local RPA deployments in Financial Services, this technology creates a platform for enhancing RPA solutions with AI algorithms to perform more complex tasks. Cognitive RPA applications will likely become part of the regulatory model definition.
3. Adoption enablers and effective AI/ML Risk Management
Critical enablers of adoption

**Governance of AI implementation**
- Enabling data governance for big data use
- Articulated AI use risk appetite aligned to business strategy
- Clear accountability for AI performance
- Effective implementation governance structures

**MRM enhancement**
- Identify the incremental risks of AI/ML
- AI risk appetite driven MRM framework
- Clear procedures for assessing and mitigation of AI specific risks
- Ethics policy and bias risk tolerance
- Use of quantitative tools to inform AI risk assessments

**AI tools and techniques**
- Clear strategy around AI use
- Open source software use policy
- Algorithm research resourcing.
- Fit for purpose algorithm standards per problem domain
- Documented algorithm use policy
- Process for regular policy refresh

**Effective upskilling**
- Specialist roles for ML models
- Skills inventory and targeted training
- Embedding data scientists within risk
- Senior decision maker informed by subject matter expert
- Guiding ‘cook book’ for building and deploying ML models
4 Steps to Transforming MRM Practices for AI/ML

1. Develop an enterprise-wide AI/ML model definition to identify AI/ML risks
2. Enhance existing risk management and control frameworks to address AI/ML-specific risks
3. Invest in capabilities that support AI/ML adoption and risk management
4. Design and implement an operating model for responsible AI/ML adoption
What others are doing - ML Governance

Figure 1: What is the process of model governance currently in place for ML?

68% of respondents have machine learning models in production. 50% of respondents either completed or are in the process of adapting MRM frameworks for ML.

4. Local AI/ML initiatives and challenges in Risk and Compliance
Observations of local use of AI/ML in FS Risk Management

- Local adoption of AI/ML has been fragmented
- SA FS firms are lagging leading international FS firms
- Nevertheless, there are several initiatives underway

**Adoption activities of note include:**

<table>
<thead>
<tr>
<th>Banks</th>
<th>Insurers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Risk</strong></td>
<td><strong>Claims Fraud</strong></td>
</tr>
<tr>
<td>- Application scorecards</td>
<td>- Claims fraud detection models</td>
</tr>
<tr>
<td>- Credit collections scorecards</td>
<td></td>
</tr>
<tr>
<td>- Large exposure monitoring</td>
<td></td>
</tr>
<tr>
<td><strong>Financial Crime</strong></td>
<td><strong>Forecasting</strong></td>
</tr>
<tr>
<td>- Fraud detection</td>
<td>- Big data econometric models</td>
</tr>
<tr>
<td>- Anti-Money Laundering detection</td>
<td></td>
</tr>
<tr>
<td><strong>Policy Lapses</strong></td>
<td><strong>Lapse prediction models</strong></td>
</tr>
</tbody>
</table>

PwC Building trust and confidence in AI-enabled business transformation
What (else) is holding back local AI/ML adoption in Risk Management and Compliance?

- Lack of certainty on regulatory position around AI/ML models
- ‘Black box’/Model Explainability concerns
- AI/ML’s ability to create algorithmic bias
## What do regulators expect?

<table>
<thead>
<tr>
<th>New regulation</th>
<th>Systemic benefits</th>
<th>Existing guidance</th>
<th>Core principles</th>
<th>Going forward</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 April 2021 - Publishing of European Commission legislation on high risk applications</td>
<td>The US Fed has reinforced the relevance and applicability of existing regulatory guidance</td>
<td>The relevance of existing guidance highlights the importance of demonstrating that AI/ML model use conforms to the SR 11-7 standard.</td>
<td>Core regulatory principles suggest broader AI/ML risks not explicitly captured in MRM should be considered within other risk management frameworks.</td>
<td>We anticipate that regulators will turn their focus more toward the interconnected and dynamic nature of AI application risks and the operational resiliency of the overall AI/ML ecosystem.</td>
</tr>
<tr>
<td>MAS recently concluded successful pilot of requiring FEAT principles to be implemented for credit scoring and customer marketing</td>
<td>US regulators have acknowledged the benefits that AI/ML can provide, such as compliance with AML regulations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SR 11-7 MRM guidance: AI/ML interpretation

Excerpts

Model is “a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into a quantitative estimate.

The model/methodologies should be explained in detail with particular attention to merits and limitations. Developers should ensure that the components work as intended, are appropriate for the intended business purpose, and are conceptually sound and mathematically and statistically correct.

AI/ML implications

Model definition:

- New use cases
- Embedded in IT applications
- Open source and vendor algorithms

Conceptual soundness:

- Explainability and transparency
- Robust and reliable
- Algorithmic bias free

Existing MRM guidance can already be interpreted for AI/ML model implications
Unpacking the ‘black box’

The ‘black box’ nature of AI/ML can be countered using:

- Interpretability techniques such as surrogate models; or
- Using new generation interpretable algorithms such as glass box algorithms
AI driven de-biasing

Although AI algorithms can magnify bias in data, there are now also powerful AI bias mitigation algorithms available that can optimise the bias vs accuracy trade-off effectively.

AI adversarial debiasing algorithm increase fairness for race to 88% (from 36%) with a corresponding reduction in model accuracy of only 82% (from 85.2%).
5. Role of Risk and Compliance
AI/ML adoption by Risk Management & Compliance

Why start now?

- Maturing tools and techniques for AI risk management.
- Relevance to business. Demand for data scientists.
- Learning curve. Risk of losing talent.
- AI/ML importance in digitisation.
- Use benefits. Wide use potential.
AI Implementation and the risks of the CRO and Risk function

We believe that the CRO and Risk function has 2 key roles in AI adoption:

**Enabler of the enterprise wide adoption**
- MRM framework enhancement to control risk of AI use and enhance trust in AI
- Ensure the necessary tools for effective AI/ML Model Risk management are available
- Ensure the necessary skills are available to control the risks associated with AI/ML

**Overseeing the strategy for AI/ML use in risk management and compliance**
- AI can be an effective tool in enhancing risk management and compliance effectiveness
- Many potential uses - early warning, monitoring, data management, extracting insights from text, prediction accuracy improvement, decision optimisation, etc.
- Leading AI use strategy setting and execution, CRO’s can play a key role in accelerating AI adoption in risk and compliance functions.
Risk management across the development lifecycle

1. **AI Adoption Strategy**
   - AI use
   - Risk appetite
   - Objectives
   - Strategy alignment
   - Governance
   - Strategy communication

2. **Control Framework**
   - AI definition
   - AI model inventory
   - Risk tiering
   - Ethics policy
   - Operating model
   - Validation standards

3. **Use case/POV**
   - Algorithm classes
   - Use case - Problem definition
   - POC build
   - Value est
   - Investment case

4. **Data Eco systems**
   - Data privacy
   - Cloud use
   - Alt data
   - Data pipelines
   - Security
   - Data assets
   - Data govern
   - Open API’s

5. **Techniques & Tools**
   - Cloud tools
   - Open source policy
   - Algorithm standards
   - MRM tools
   - Experiment orchestration

6. **Solution development/integration**
   - Build pipeline
   - Validation metrics
   - Deployment pipeline
   - Change control
   - IT integration
   - Pipeline reviews

7. **Operate & Monitor**
   - Data drift
   - Concept drift
   - Bias drift
   - Guard rails
   - Kill switches
   - Dynamic recalibration
   - Retraining alerts

---

**Development Activities**

- Articulated AI use risk appetite.
- AI adapted MRM framework and practices.
- AI fit for purpose. Investment risk control.
- Data governance standards. Big data risk management process.
- Algorithm standards. Vendor AI solutions.
- Deployment controls. Model governance.
- Model monitoring standards. Model change management.

---

**Risk management enablers**
PwC accelerators to assist with AI implementations
6. Summary and Key Takeaways
Key takeaways

1. Despite COVID, AI/ML initiatives continue to progress well under current conditions.

2. South African FS risk and compliance functions’ use of AI/ML appear to lag international counterparts.

3. ResponsibleAI is top of the agenda of early AI/ML adopters and lessons can be learned from adopting ResponsibleAI early.

4. Given the importance of AI in a future digitalised world, we believe AI adoption should be high on the Risk agenda, actively led by the CRO.

5. The Risk function and CRO should play a key role to enable innovation with confidence as well as overseeing AI use innovation initiatives in risk management and compliance.
Contacts

Junaid Khan
junaid.khan@pwc.com
Partner

Andre Blaauw
andre.blaauw@pwc.com
Director

Henk van Biljon
henk.van.biljon@pwc.com
Manager
Thank you