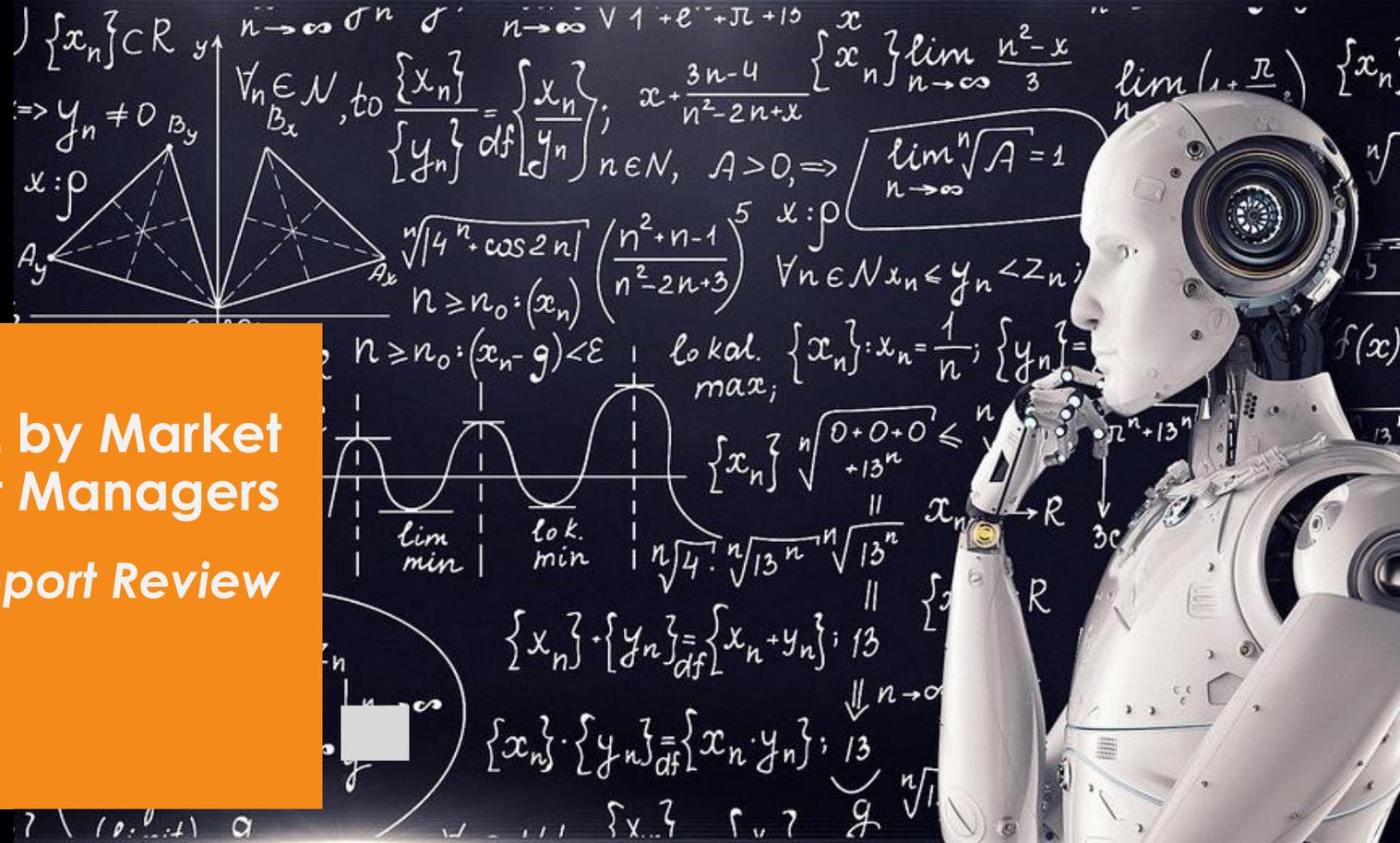


Just in Time

The Use of AI and ML by Market Intermediaries and Asset Managers

IOSCO Final Report Review

Oct 2021



Executive Summary

IOSCO about the use of AI and ML by Market intermediaries and Asset Managers identifies:

- **6 Main Risk and Harms**
- **5 Potential Mitigations**
- **6 Measures to tackle the risks**

What emerges from the Final Report is a **guidance** that seeks to **address the potential risks and harms** that may be caused by the use of AI and ML by market intermediaries and asset managers.

Even if **not yet binding**, the **framework is strongly encouraged** to ensure a **robust** and **efficient governance**



At a Glance



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01

Background and Scope

IOSCO Workstreams

Artificial Intelligence and Machine Learning Definitions

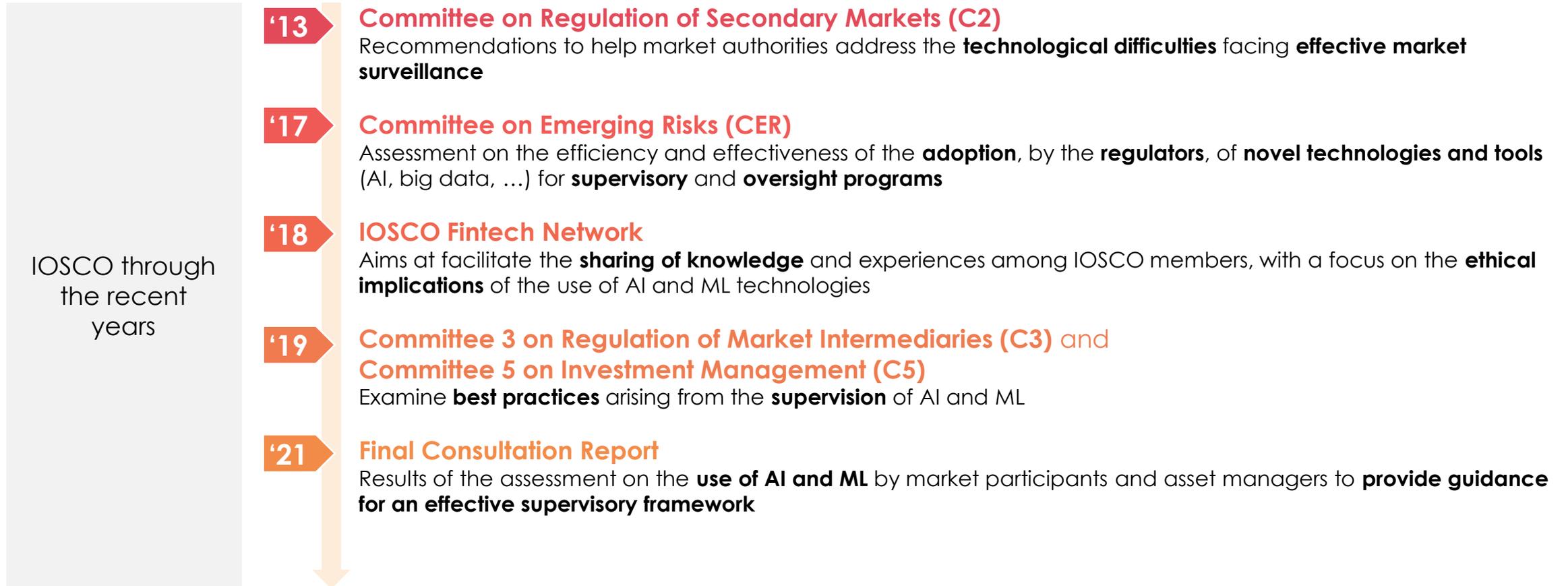
AI and ML Adoption in Financial Services



Background and Scope 1/3

IOSCO Workstreams

This IOSCO Final Report comes after a **number of different workstreams** that have been undertaken in the recent years and aims to propose a governance framework that **covers the numerous applications** that AI and ML have in the financial industry



Background and Scope 2/3

Artificial Intelligence and Machine Learning Definitions

Artificial Intelligence (AI): It is defined as “**the science and engineering of making intelligent machines**”, or simply, the study of methods for **making computers mimic human decisions** to solve problems. AI includes tasks such as learning, reasoning, planning, perception, language understanding and robotics.

Machine Learning (ML): The term Machine Learning is a **subset and application of AI**, which **focuses on the development of computer programs**, designed to learn from experience without being explicitly programmed to do so.

There are **three categories of ML algorithms**, supervised learning, unsupervised learning and reinforcement learning, based on the type of data available and the level of human intervention required in providing feedback:

1. **Supervised learning:** the algorithm is fed an initial set of data that has been labelled. Based on this training set, the algorithm will learn classification rules and predict the labels for the remaining observations in the data set
2. **Unsupervised learning:** the algorithm detects patterns in the data by identifying clusters of observations underpinned by similar characteristics – it uncovers the structure of the data on its own
3. **Reinforcement learning:** the algorithm is fed an initial set of data that has not been labelled and is asked to identify clusters of observations underpinned by similar characteristics; as it chooses an action for the data points, it receives feedback that helps it learn

Background and Scope 3/3

AI and ML Adoption in Financial Services

The increasing use of AI and ML **can alter the firms' business models**:

- Creating **significant efficiencies** and **benefits** for firms and investors (*increased execution speed, reduced cost of investment services, ...*)
- But at the same time **creating** or **amplifying certain risks**, with potential impacts on financial markets efficiency, resulting in **consumers harm**

The **main areas of adoption** of AI and ML by market intermediaries and asset managers can be identified mainly in:



Advisory and
Support Services



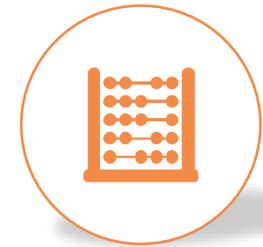
Risk
Management



Client Identification
and Monitoring



Selection of Trading
Algorithms



Asset and Portfolio
Management

The **usage** of AI and ML **varies widely among industries**, with **more advanced** stage of adoption in **front-roles** and **investment** processes rather than in automation of compliance or risk management

02

Potential Risk and Harms

IOSCO Outlined 6 Main Concerns for the Adoption of AI
and ML
In Detail



Potential Risk and Harms 1/3

IOSCO Outlined 6 Main Concerns for the Adoption of AI and ML

The **increasing adoption and evolution of AI and ML** in the financial industry, along with many benefits, can lead to a number of **potential risks and harms** to both **service providers** and **final customers**.

IOSCO, in the analysis carried, outlined **6 main concerns** that should be appointed properly



Potential Risk and Harms 2/3

In Detail 1/2



Governance and Oversight

- **Governance** framework **not tailored** to manage **specific risks** introduced by **AI** and **ML** models
- **Risk Management** and **Compliance** involved primarily on development and testing phases, instead of being actively engaged through the **model lifecycle on a continuous basis**
- Often the lines of defense **lack the needed skills** to accurately challenge, test and monitor the deployed models



Algorithm Development, Testing and ongoing Monitoring

- **Development** and **testing** frameworks are **not tailored** for **AI** and **ML** models, but are borrowed from traditional ones
- AI and ML algorithms **mutate** and **evolve** through time due to **new patterns in the data**, requiring robust and **on-going monitoring** and **validation** frameworks to periodically assess the validity of the models



Data Quality and Bias

- **Sourcing** of sufficiently large dataset in order to train the applications
- **Bias** in the data can impact the model outcomes, leading to **discriminative** and **undesirable outcomes**
- Assessing the **quality of the data** is of paramount importance, before and after the pre-processing steps since **bias** could be, inadvertently, **introduced** in the cleaning phase
- **Spurious correlation** can be confused with **causation**

Potential Risk and Harms 3/3

In Detail 2/2



Transparency and Explainability

- Models have to be **understandable** and **explainable** by firms, market participants and regulators; some models are “*black boxes*”, making the oversight and *ex-ante* comprehension challenging
- **Appropriate** level of **transparency** is required in order to guarantee **public understanding** and **confidence**, avoiding on the contrary **excessive disclosure** which, in turn, could **harm** the **competitiveness** of the model developer/ user



Outsourcing

- **Concentration of expertise** in the AI and ML spaces if there is reliance on a small number of firms
- Firms can leverage on **third party providers** on different extents, from **data pooling, model vendors** and **cloud computing** providers; the companies should be able to **challenge the providers** and put in place **robust service level agreements** with **clear accountabilities**
- Data **privacy, cyber security, operational** risk and **concentration risk** to specific third party providers



Ethical Concerns

- **Discrimination** against certain segment of the population can arise from **biased data** fed in the models
- Automated **trading bots** can **react too fast** for a human controller, risking to harm other the market and its participants
- Leveraging on “black box” models may lead to **less control** on the **outcomes** and their **fairness**

03

Potential Mitigations and Guidance

Mitigations

Six Measures to Tackle the Highlighted Risks and Harms



Potential Mitigations and Guidance 1/4

Mitigations

Few jurisdictions have **requirements** for the **use of AI** and **not all** the ML techniques are **compliant** with the **existing legal and regulatory frameworks**.

Through IOSCO's engagement with financial intermediaries and providers, **5 main pillars** have been identified as key to **tackle** the **risks** underlying the adoption of new technologies and methodologies

Culture

Fairness, diligence and transparency should be **promoted** starting from the **senior management**

Appropriate level of **knowledge** and **expertise** should be coupled by **adequate challenge** and **accountability** across all the **lines of defence**

Accountability

Accountability can **promote fairness and trust** in the financial services, **providing clear and binding obligations** for model developers, owners and users

Adequate oversight is needed across the **entire model lifecycle**, from the development to the continuous monitoring

Knowledge, Expertise and Skills

Adequate **knowledge** and **expertise** should be **required** and **sponsored** within the firm, coupled with **up-skilling** of existing personnel

Appropriate knowledge is **key** also to **challenge**, on a continuous basis, solutions of **third party providers**

Operational Resilience

Due to new interconnections between firms (from financials to non-financials), operational resilience is **key to preserve financial stability**.

Appropriate due-diligence on third party solutions have to be accurately performed as **mitigating control**

Client Disclosure

Important to distinguish between different forms of AI. Disclosure can be used to **demonstrate that firms are acting in the client's best interest** when deploying or developing this applications

Potential Mitigations and Guidance 2/4

Six Measures to Tackle the Highlighted Risks and Harms 1/3

As a result of the consultation and the main areas highlighted as key to properly control the risks posed by the use of AI and ML, **IOSCO proposes a guidance** consisting of **six measures** that reflects **expected standards of conduct** by market intermediaries and asset managers adopting AI and ML.

Although the guidance is **not binding**, IOSCO members **are encouraged to consider these proposals carefully** in the context of their legal and regulatory frameworks. IOSCO members and firms should also consider the **proportionality** of any response when considering these proposals

Measures

Expected Outcomes

1 Skilled and Dedicated Senior Management

Designated and skilled Senior Management should be required by the regulators in order to ensure:

- **Responsibility** for development, testing, deployment, continuous monitoring and controls
- A **documented internal governance framework**, with clear lines of **accountability**
- **Appropriate knowledge and skills** across **all the stakeholders**, from data scientist and ML engineers to the front-end users

2 Continuous Testing and Monitoring

A **robust framework** to **oversee** the **model lifecycle** should be required by the regulators in order to ensure:

- **Adequate testing and monitoring** for all the algorithms in order to validate the results of an AI and ML models on a **continuous basis**
- **Correct behavior** of the models (*in a segregated environment and also in stressed conditions*) and **compliance** with the regulatory obligations
- **Appropriate “kill switch”** functionalities as **way out** on undesirable model behavior, especially in automated trading activities

Potential Mitigations and Guidance 3/4

Six Measures to Tackle the Highlighted Risks and Harms 2/3

Measures	Expected Outcomes
<p>3 Skilled Compliance and Risk Management</p>	<p>Skilled personnel should be required by the regulators in all the lines of defense in order to ensure:</p> <ul style="list-style-type: none"> ▪ Properly oversight on the entire models' lifecycle ▪ Adequately use and challenge the models, either being them internally developed or provided by a third party vendor, through appropriate understanding of methodologies and technologies ▪ Multidisciplinary teams, which boost competencies sharing and efficiency in managing both the use and the risks of AI and ML models
<p>4 Reliance and Clear Accountability on Third Party Providers</p>	<p>Regulators, in order to mitigate the risks arising for firms which heavily leverage on third party providers, should require firms to:</p> <ul style="list-style-type: none"> ▪ Have a clear service level agreement and contract in place clarifying the scope of the outsourced functions and the responsibility of the service providers ▪ Put in place clear performance indicators, explicitly determining sanctions for poor performance
<p>5 Disclosure of the Use of AI and ML</p>	<p>To promote a responsible usage of AI and ML, regulators should require firms to:</p> <ul style="list-style-type: none"> ▪ Disclose meaningful information to customers and clients around their use of AI and ML and the expected impacts on the outcomes ▪ Disclose the appropriate information in a language that can be easily comprehensible to the final users and/or impacted clients and investors

Potential Mitigations and Guidance 4/4

Six Measures to Tackle the Highlighted Risks and Harms 3/3

Measures

Expected Outcomes



6 Data Quality and Monitoring

Regulators should require firms to grant **sufficient quality in the data** used to:

- **Prevent biased outcomes**
- **Guarantee a well-founded application** of AI and ML

04

Final Considerations



Final Considerations

The **guidance**, even if not binding, should be **carefully investigated** by **regulators** and **financial firms** in order to **correctly assess, monitor** and **manage** the **risks** underlying the increasing adoption of **AI and ML**.

Proportionality should be considered in the **design** of an **efficient governance framework**:

- Other than the size of the firm to be monitored, also the **type of activities** and their **impacts** on the **financial system** has to be factored in
- **Client facing tools** that relies on AI and ML technologies could have **greater effects on the final customer decision making and outcomes**, hence should be more strictly monitored by the regulators

As proposed, a **robust surveillance framework** have to be **built around 4 major pillars** ...

Appropriate Governance

Controls and oversight frameworks over the entire model lifecycle and with clear accountabilities, from internal stakeholders to third party vendors

Transparency and Disclosure

Appropriate transparency and disclosure to their investors, regulators and other relevant stakeholders



Knowledge and Skills

Personnel with adequate knowledge, skills and experience to implement, oversee, and challenge the outcomes of the AI and ML models

Continuous monitoring and testing

Robust, consistent and clearly defined development and testing processes to enable firms to identify potential issues prior to full deployment of AI and ML

Sources and Literature

[01] **OICV-IOSCO.** [The use of artificial intelligence and machine learning by market intermediaries and asset manager.](#) IOSCO, September 2021.



Company Profile

Iason is an international firm that consults Financial Institutions on Risk Management. Iason integrates deep industry knowledge with specialised expertise in Market, Liquidity, Funding, Credit and Counterparty Risk, in Organisational Set-Up and in Strategic Planning.

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