

Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector



Monetary Authority of Singapore

Contents

1	Introduction	3
2	Using This Document.....	4
3	Scope and Definitions.....	5
4	Summary of Principles.....	6
5	Fairness.....	7
6	Ethics	9
7	Accountability	10
8	Transparency	12
9	Acknowledgements.....	14

1 Introduction

1.1 This document contains a set of generally accepted Principles for the use of artificial intelligence and data analytics (“AIDA”) in decision-making in the provision of financial products and services. Compared to human decision-making, the nature and the increasing use of AIDA may heighten the risks of systematic misuse. This may result in impacts which are more widespread, perpetuated at greater speed. When used responsibly and effectively, AIDA has significant potential to improve business processes, mitigate risks and facilitate stronger decision-making.

1.2 Thus, the objectives of this set of Principles are as follows:

- (a) To provide firms providing financial products and services with a set of foundational principles to consider when using AIDA in decision-making
- (b) To assist firms in contextualising and operationalising governance of use of AIDA in their own business models and structures
- (c) To promote public confidence and trust in the use of AIDA

1.3 This set of Principles has been co-created with the financial industry and other relevant stakeholders. In developing this set of Principles, MAS has worked closely with key industry stakeholders through the Fairness, Ethics, Accountability and Transparency (FEAT) Committee. MAS has also sought feedback from a range of financial institutions and companies, who have offered their diverse perspectives and inputs. Please refer to the Acknowledgements in Section 9.

1.4 In developing this set of Principles, MAS has worked closely with the Personal Data Protection Commission (PDPC), Infocomm Media Development Authority (IMDA) to align the Principles with IMDA’s AI governance initiatives which include the Advisory Council on the Ethical Use of AI and Data and an overall AI Governance Framework. These initiatives aim to help businesses develop and deploy AI technologies in a responsible manner. PDPC’s Discussion Paper on AI and Personal Data¹ is complementary to this document, and provides additional illustrations and guidance on areas such as selecting appropriate organisational governance measures and adopting good data management practices.

¹ <https://www.pdpc.gov.sg/Resources/Discussion-Paper-on-AI-and-Personal-Data>

2 Using This Document

2.1 This document sets out Principles for firms to consider when assessing existing or developing new internal frameworks to govern the use of AIDA. This set of Principles is not intended to replace existing relevant internal governance frameworks. Firms should continue to comply with all applicable laws and requirements.

2.2 This set of Principles is not intended to be prescriptive. Examples provided in this document are purely illustrative. Nonetheless, through the process of ongoing industry engagement, there is scope for MAS to identify areas where more specific or technical guidance would benefit the industry, with this set of Principles serving as a foundational framework for consideration and discussion.

2.3 Across all of the Principles set out in this document, firms can calibrate actions and requirements under their internal governance framework based on the materiality of the AIDA-driven decisions. The following list provides non-exhaustive and indicative examples of considerations that may be used when determining materiality:

- (a) Extent to which AIDA is used in decision-making;
- (b) Complexity of AIDA model;
- (c) Extent of automation of process of AIDA-driven decision-making;
- (d) Severity and probability of impact on different stakeholders, including individuals;
- (e) Monetary and financial impact;
- (f) Regulatory impact;
- (g) Options for recourse available.

2.4 As the Principles relate to and reinforce each other, readers are encouraged to view the Principles in totality.

3 Scope and Definitions

3.1 This set of Principles can guide all firms using AIDA to provide financial products and services.

3.2 “AIDA” refers to artificial intelligence or data analytics, which are defined as technologies that assist or replace human decision-making. While this definition is broad, the Principles in this document can apply to both complex and straightforward AIDA techniques. Firms using AIDA are encouraged to calibrate their internal governance frameworks based on considerations of materiality, as outlined in Section 2.3.

3.3 The following definitions are used in this document:

- (a) “AIDA” refers to artificial intelligence or data analytics, which are defined as technologies that assist or replace human decision-making.
- (b) “AIDA Firms” refers to firms that use AIDA to provide financial products and services.
- (c) “AIDA-driven decisions” refers to decisions and decision outcomes made or supported by AIDA.
- (d) “AIDA-driven decision-making” refers to the process of making decisions using AIDA.
- (e) “Data subjects” refers to individuals and/or firms who are or may be affected by AIDA-driven decisions.
- (f) “Models” refers to the specific AIDA algorithms and algorithmic processes used to arrive at AIDA-driven decisions.

4 Summary of Principles

Fairness

Justifiability

1. Individuals or groups of individuals are not systematically disadvantaged through AIDA-driven decisions unless these decisions can be justified.
2. Use of personal attributes as input factors for AIDA-driven decisions is justified.

Accuracy and Bias

3. Data and models used for AIDA-driven decisions are regularly reviewed and validated for accuracy and relevance, and to minimize unintentional bias.
4. AIDA-driven decisions are regularly reviewed so that models behave as designed and intended.

Ethics

5. Use of AIDA is aligned with the firm's ethical standards, values and codes of conduct.
6. AIDA-driven decisions are held to at least the same ethical standards as human-driven decisions.

Accountability

Internal Accountability

7. Use of AIDA in AIDA-driven decision-making is approved by an appropriate internal authority.
8. Firms using AIDA are accountable for both internally developed and externally sourced AIDA models.
9. Firms using AIDA proactively raise management and Board awareness of their use of AIDA.

External Accountability

10. Data subjects are provided with channels to enquire about, submit appeals for and request reviews of AIDA-driven decisions that affect them.
11. Verified and relevant supplementary data provided by data subjects are taken into account when performing a review of AIDA-driven decisions.

Transparency

12. To increase public confidence, use of AIDA is proactively disclosed to data subjects as part of general communication.
13. Data subjects are provided, upon request, clear explanations on what data is used to make AIDA-driven decisions about the data subject and how the data affects the decision.
14. Data subjects are provided, upon request, clear explanations on the consequences that AIDA-driven decisions may have on them.

5 Fairness

5.1 It is important that AIDA-driven decisions do not disadvantage any particular individual or groups of individuals without justification. Today, offering differential treatment to different groups of people is an existing practice and part of current business models. While the use of AIDA could enable analysis based on segmentation and clustering of data, this also means that differentiation between groups could take place at a greater scale and faster speed. The use of AIDA may also create the ability to identify or analyse new types of differentiation that could not previously be done. This could perpetuate cases of unjustified differentiation at a systemic level if not properly managed.

5.2 AIDA Firms may have internal governance frameworks in place to assess and set standards of appropriate levels of justifications behind AIDA-driven decisions, including use of specific data attributes. Such internal governance frameworks may also have processes which assess data and models used for AIDA-driven decisions for accuracy, and may be calibrated based on the materiality of the decisions.

5.3 The principles of Fairness focus on two key aspects – firstly, the justifiability and secondly, the accuracy and bias of AIDA-driven decisions.

Justifiability

1. Individuals or groups of individuals are not systematically disadvantaged through AIDA-driven decisions, unless these decisions can be justified.
2. Use of personal attributes as input factors for AIDA-driven decisions is justified.

5.4 Illustration 1: An AIDA Firm uses AIDA to decide whether to approve an increase in a customer’s credit card limit, based on a variety of factors. The Firm provides justifications to internal approving authorities for the rationale for using each factor according to their internal governance framework. The Firm also justifies how each factor or combinations of different factors with varying weightages may affect the decision. Based on these justifications, some customers may receive approvals for an increase in their credit card limits while others may not.

5.5 Illustration 2: An AIDA Firm uses AIDA for customer segmentation to provide more relevant product offerings for different customer groups. This may include using a customer’s age, a personal attribute, as an input factor to decide whether to offer retirement-related financial services and products. Based on the AIDA Firm’s internal governance framework, the use of age as an input factor for this AIDA-driven decision may be justified, given the relationship between age and retirement.

Accuracy and Bias

3. Data and models used for AIDA-driven decisions are regularly reviewed and validated for accuracy and relevance, and to minimize unintentional bias.
4. AIDA-driven decisions are regularly reviewed so that models behave as designed and intended.

5.6 Illustration 3: Based on an internal governance framework, an AIDA Firm puts in place requirements for model validation exercises and testing for errors or unintentional biases. The frequency of exercises or tests depends on the materiality of the decision and the complexity of the model. For particularly material and complex deep learning models, an AIDA Firm requires more frequent validation and testing. Conversely, for less material and more straightforward models, quarterly, annual or even less frequent validations and tests suffice.

5.7 Illustration 4: In addition to periodic reviews, the AIDA Firm’s internal governance framework also identifies specific triggers for review, including unexpected changes that invalidate basic model assumptions. For example, an unexpected court decision on whether an entity has defaulted on its debts might trigger a review of credit risk parameters to see if the parameters need to be revised.

6 Ethics

6.1 All firms using AIDA or not operate in line with their ethical standards. These ethical standards are expressed through many ways, including company values, codes of conduct and mission statements, and may vary across firms and geographies. Adherence to these ethical standards applies equally to the use of AIDA.

- 5. Use of AIDA is aligned with the firm’s ethical standards, values and codes of conduct.
- 6. AIDA-driven decisions are held to at least the same ethical standards as human driven decisions.

6.2 Illustration 5: An AIDA Firm’s human resource department has existing recruitment rules that specify that gender should not be a consideration in making hiring decisions, in alignment with their overall company policy on diversity and fair employment. The AIDA Firm decides to implement a model or algorithm to assist in their filtering and shortlisting of potential employment candidates. Under the AIDA Firm’s internal governance framework, to maintain the same ethical standards as human driven decisions, the model or algorithm does not use gender as an input or derived attribute.

6.3 Illustration 6: An AIDA Firm does not have a clear authority that oversees and maintains its ethical standards, and thus decides to establish an organisation-wide ethical review board. In addition, the AIDA Firm also considers setting up project-specific cross-functional ethical review boards comprising stakeholders of relevant expertise and independent representatives, which report into the organisation-wide ethical review board.

7 Accountability

7.1 It is important that there is clear responsibility for and ownership of AIDA-driven decisions within an AIDA firm, with appropriate internal approving authorities for the use of AIDA. Such accountability applies to all uses of AIDA, whether internally developed or externally sourced.

7.2 AIDA-driven decisions, especially those that could significantly affect data subjects, need to be based on as accurate an understanding of the data subject as possible. Data subjects could provide accurate information about themselves through channels that aim to facilitate communication and seek recourse.

7.3 The principle of Accountability thus focuses on two key aspects – firstly, internal accountability, which is concerned with the AIDA Firm’s internal governance, and secondly, external accountability, which is concerned with the AIDA Firm’s responsibility to data subjects.

Internal Accountability

7. Use of AIDA in AIDA-driven decision-making is approved by the appropriate internal authority.
8. Firms using AIDA are accountable for both internally developed and externally sourced AIDA models.
9. Firms using AIDA proactively raise management and Board awareness of their use of AIDA.

7.4 Illustration 7: A Firm currently has internal approval structures in place for decision-making, which it chooses to rely on when setting approval authorities for AIDA-driven decision-making. For example, currently the Head of Financial Markets approves all decisions related to the trading function. If the function is looking to introduce an AIDA model for the execution of trades, the Head of Financial Markets would similarly approve the use of this model in line with the AIDA Firm’s internal governance framework.

7.5 Illustration 8: When setting approving authorities for AIDA-driven decisions, the Firm’s internal governance framework takes into account materiality and complexity of the decision. The Firm sets approving levels at Chief Executive Officer or Board levels for highly-material decisions, with proper due diligence so that approving authorities have sufficient understanding of the data and model logic used for decision-making.

7.6 Illustration 9: An AIDA Firm updates the Board on the use of AIDA within the Firm on a periodic basis, so that the Board maintains a central view of all material AIDA-driven decisions. As a good-to-have, the Firm organises regular Staff Town-halls to raise awareness of the use of AIDA within the Firm, which may include department case studies, or sharing of learning points.

External Accountability

- 10. Data subjects are provided with channels to enquire about, submit appeals for and request reviews of AIDA-driven decisions that affect them.
- 11. Verified and relevant supplementary data provided by data subjects are taken into account when performing a review of AIDA-driven decisions.

7.7 Illustration 10: When informing a data subject of a AIDA-driven decision, the AIDA Firm includes a contact number and email address so that data subjects can enquire about the decision and provide a reasonable basis for review. The Firm adapts existing frameworks for handling customer enquiries, to assess the materiality of the issue at hand, and the practicality of responding to such requests.

7.8 Illustration 11: The AIDA Firm provides the data subject with online data management tools such as privacy or personal data dashboards. Through these dashboards, data subjects may opt to review, update or edit their information for accuracy and relevance.

8 Transparency

8.1 While increased transparency in AIDA Firms’ use of AIDA could improve public understanding and confidence in AIDA, excessive transparency could create confusion or unintended opportunities for individuals to exploit or manipulate AIDA models. It is important to balance these considerations in determining the appropriate level of transparency in the use of AIDA. In determining levels of transparency, the materiality of the decision is also relevant.

8.2 Data subjects may seek clear explanations about data used for decision-making, how data affects the decision and the consequences on data subjects. Clear explanations do not necessitate exposure of intellectual property or publishing of proprietary source codes. Clear explanations could instead focus on facilitating the data subject’s understanding of the Firms’ use of AIDA.

12. To increase public confidence, use of AIDA is proactively disclosed to data subjects as part of general communication.
13. Data subjects are provided, upon request, clear explanations on what data is used to make AIDA-driven decisions about the data subject and how the data affects the decision.
14. Data subjects are provided, upon request, clear explanations on the consequences that AIDA-driven decisions may have on them.

8.3 Illustration 12: An AIDA Firm offering car insurance informs customers that they will be using data on driving patterns to review customer premiums. The Firm explains how certain driving patterns may affect premiums. The Firm provides illustrative diagrams and charts to explain the patterns identified and the impact on different customer groups. The Firm also develops a user interface to allow customers to vary potential inputs to get a sense of the impact on premium outcomes. A customer who is charged a higher premium can approach the Firm for a meaningful explanation on the reasons for the increase. The AIDA Firm shares with the customer which customer group he falls into and the corresponding impact on premiums. The AIDA Firm also broadly shares with the customer what data is used to analyse his driving patterns and provide an avenue for the customer to provide more accurate or updated information. In the long term, the customer may choose to change his behaviour and cultivate good driving habits to ensure that his premiums do not increase.

8.4 Illustration 13: An AIDA Firm considers the materiality of the AIDA-driven decision when determining appropriate levels of transparency. For example, the AIDA Firm uses AIDA models for fraud detection and to identify possible “red flags”. Given materiality considerations and concerns of model manipulation or exploitation, an AIDA Firm decides not to share about the AIDA model used, or provide explanations relating to this area. On the other hand, the AIDA Firm deploys an AI phone operator to handle customer calls and engage directly with customers. In this case, the AIDA Firm opts to begin the conversation by informing the data subject that they are interacting with an AI phone operator.

9 Acknowledgements

MAS would like to express our appreciation to the FEAT Committee, for their key role in the creation and development of the FEAT Principles.

Hsieh Fu Hua (Co-Chair), Co-Founder and Advisor, PrimePartners
V K Rajah (Special Advisor), Senior Counsel and Member of Essex Court Chambers Duxton (Singapore Group Practice)
Teo Swee Lian (Advisor), Non-executive Independent Director, SingTel and Non-executive Independent Director, Avanda Investment Management
Raymond Au, Chief Data Scientist and Head of Asia Lab, Allianz
Paul Cobban, Chief Data & Transformation Officer, DBS
Shameek Kundu, Chief Data Officer, Standard Chartered Bank
Richard Lowe, Chief Data Officer, UOB
Donald MacDonald, Head of Group Customer Analytics & Decisioning, OCBC Bank

MAS would like to express our appreciation to the following contributors, for providing valuable inputs and feedback to the FEAT Principles.

(In alphabetical order)

Amazon Web Services	Microsoft
American Express Int'l Inc	Network for Electronic Payments
Asia Cloud Computing Association	(Singapore) Pte Ltd
Aviva Ltd	Oliver Wyman
Barclays Bank PLC	OCBC Bank
CFA Institute	Prudential Assurance Company
CFA Society Singapore	Singapore (Pte) Limited
Citibank NA	Scotiabank
Credit Suisse AG	Securities Association of Singapore
Deutsche Bank AG Singapore	Singapore Exchange
Etiqa Insurance Pte Ltd	Singapore FinTech Association
Great Eastern General Insurance Ltd	Standard Chartered Bank
Great Eastern Life Assurance Co Ltd	The Association of Banks in Singapore
HSBC	The Stephen J.R. Smith School of
Investment Management Association of Singapore	Business at Canada's Queen's University
Kristal Advisors	Tokio Marine Life Insurance Singapore Ltd
Life Insurance Association, Singapore	United Overseas Bank Limited
Lloyd's of London (Asia) Pte Ltd	Yair Zick, National University of
Lu International	Singapore
Mastercard	

