|  |
| --- |
| IALA Guideline |

G1178

An Introduction to Artificial Intelligence (AI) from an IALA perspective

Edition draft towards 2.0

~~December 2022~~

urn:mrn:iala:pub:g1178:edx.0

Revisions to this document are to be noted in the table prior to the issue of a revised document.

|  |  |  |
| --- | --- | --- |
| Date | Details | Approval |
| December 2022 | First issue | Council 76 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

1. Background 4

1.1. Objective 4

1.2. Scope 4

2. Overview 4

2.1. Bias 5

2.2. Accuracy 5

2.3. Transparency 6

2.4. State of AI when A decision is made 6

2.5. Conflict of systems in the same domain 6

2.6. Patents 6

2.7. Commercial Value 6

3. Benefits and Challenges of AI within the IALA Context 7

4. Audit regime for AI 7

5. Conclusion 7

6. Definitions 8

7. Abbreviations 8

8. References 8

9. Further reading 8

***DTEC4 comments:***

***[add in experiences in use of AI in maritime domain; use cases; able to bring in efficiency/increased safety; environmental, ecological, sustainability factors.***

***Clarify technology – mega / micro trends***

***Map against use cases/how use cases can make benefits from technology changes***

***Recognising / addressing risks – data protection – review existing content/update based on experience.***

***Thinking of the context of trust and liability – example, algorithm for collision avoidance***

***Revisit the ‘audit’ of AI, how to understand decision process – explainable AI***

***Input from all IALA areas – VTS use case, coding, optimisation related.***

List of Figures and Tables

Figure 1 Overview of Artificial Intelligence 5

Table 1 Examples and Challenges of AI in the IALA Context 7

Figure 2 Sample AI Audit Model 9

# Background

~~An artificial Intelligence (AI) system is a machine-based system that can, for a given set of defined objectives, make predictions, recommendations, or decisions. AI systems offer functionality needed to operate with varying levels of autonomy [1].~~

~~Deep learning, machine learning and AI are all related to each other. The learning methods make use of large amounts of data. This results in a performance that often cannot be achieved using classical discrete algorithms. The amount of data needed leads to questions related to data privacy.~~

~~There are concerns that need to be considered by regulators, providers, and users of maritime centric artificial intelligence systems. These are often addressed by policy or guidelines that are organization centric. This Guideline is a living document and seeks to provide guidance in consideration of AI within the IALA domain.~~

***DTEC4 comments:***

***[compare maritime to land world – maritime has much less data on which to train, while land based have significantly more data sets for training]***

***DTEC5 comments:***

* ***To be revised at a later stage, once more comments and inputs are collected.***

## Objective

***DTEC5 discussion on objectives of the task and the GL itself:***

* ***Use Cases and related benefits***
* ***Experiences***
* ***Backgrounds***
* ***Be more specific for the maritime domain, including validation, ensure trust***
* ***(use of AI agents)***
* ***(Liason with other commettees)***
* ***Validation and Verification***
* ***after decsicion supported with AI processed information: conflict of accountability/responsibility/liability AI vs human elements?)***
* ***Addressing worst case scenarios using AI if AI is wrong***

***Proposed update:***

The objective of the IALA guideline G1178 is to encapsulate the latest advancements in AI technology and the practical experiences derived from its application in the maritime sector, highlighting specific use cases, benefits, challenges, and the importance of AI validation and verification to ensure trust. It aims to deliver a thorough and up-to-date introduction to AI from an IALA perspective, ensuring the content is both relevant and actionable for maritime professionals.

## Scope

~~The following topics are in scope of this document:~~

* ~~applications used in maritime environment for AtoN and VTS (within the IALA mandate); and~~
* ~~AI with Machine Learning (ML) and deep learning.~~

~~The evaluation and recommendation of commercial AI and ML solutions are out of scope.~~

***DTEC5 comments:***

* ***To be revised at a later stage, once more comments and inputs are collected.***

# Overview

***DTEC5 comments:***

* ***To be completely renewed at the last stage, once the whole document has been updated.***
* ***The guideline should concentrate on operational aspects, including use cases, benefits, and risks, while providing a technological background in the annex section to support understanding as needed. This approach ensures that the primary focus remains on practical applications and implications, with supplementary technical details available for those seeking deeper insights.***

# Benefits and Challenges of AI within the IALA Context



***DTEC5 comments:***

* ***To be completely renewed after collection of comments and inputs.***

# Audit regime for AI

***DTEC5 comments:***

* ***To be completely renewed after collection of comments and inputs.***

# Conclusion

***DTEC5 comments:***

* ***To be completely renewed at the final stage.***

# Definitions

The definitions of terms used in this Guideline can be found in the *International Dictionary of Marine Aids to Navigation* (IALA dictionary)and were checked as correct at the timeof going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

Additional definitions specific to this document are:

Artificial intelligence An artificial intelligence (AI) system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy.

Machine learning Machine learning (ML) is the use and development of computer systems that are able to learn and adapt without following explicit instructions by using algorithms and statistical models to analyse and draw inferences from patterns in data.

Deep learning Deep learning is a type of machine learning based on artificial neural networks in which multiple layers of processing are used to extract progressively higher-level features from data.

***DTEC5 comments:***

* ***To be continuesly updated as needed in the course of the update.***

# Abbreviations

AI Artificial intelligence

ML Machine learning

OECD Organization for Economic Co-operation and Development

***DTEC5 comments:***

* ***To be continuesly updated as needed in the course of the update.***

# References

***DTEC5 comments:***

* ***To be continuesly updated as needed in the course of the update.***

# Further reading

***DTEC5 comments:***

* ***To be continuesly updated as needed in the course of the update.***



***DTEC5 comments:***

* ***To be continuesly updated as needed in the course of the update.***