Regulatory Notice

Military Aviation Authority
MAA

8 February 2024

MAA/RN/2024/01 - Use of Artificial Intelligence within Safety Critical Systems operating on Military Air Systems

Issue

1. The proliferation of Artificial Intelligence[1] (AI) and Machine Learning[2] (ML) technologies used in digital control Systems and decision support tools has led to the requirement to clarify the position with respect to use of such technologies in Military Air Systems and Air-supporting Systems operated in the Defence Air Environment.

Scope

2. This Regulatory Notice (RN) is intended as an informative correspondence for the whole Regulated Community (RC), providing guidance on the use of AI / ML within Safety critical Systems and digital architectures that have direct influence on the flight path, Propulsion Systems or Safety features of Military Air and Air Supporting Systems.

Implementation

3. This guidance is effective immediately and represents the MAA's current position with respect to AI / ML technologies. Further regulatory guidance and specific aviation appropriate Assurance standards will be distributed in due course.

Background

4. The rapidly evolving field of AI / ML technology presents challenges when utilized in Safety critical Systems that require a high degree of reliability and Assurance. Due to the inherently non-deterministic[3] nature of these technologies, Air Systems and Systems supporting or enabling air activities operating AI / ML in components that are likely to affect the overall platform Airworthiness, such as Propulsion, flight management and flight control Systems, will be required to demonstrate appropriate levels of reliability and robustness, including fail-safe modes. This assessment should be correlated with the classification of associated failure conditions and assigned Safety objectives as part of the System Safety approach.

5. The pace of technological growth has resulted in a lack of necessary specific standards that can be used to support certification and / or Assurance of Safety critical systems utilizing AI / ML in aviation. The MAA is working alongside the RC to deliver a comprehensive suite of standards and benchmarking material for the Assurance of AI / ML in order to be proportionate and coherent with existing Assurance

[1] The Defence Artificial Intelligence Strategy (June 2022) defines AI as: "A family of general-purpose technologies, any of which may enable machines to perform tasks normally requiring human or biological intelligence, especially when the machines learn from data how to do those tasks".
[2] The Defence Artificial Intelligence Strategy (June 2022) defines ML as: "Computer algorithms that can 'learn' by finding patterns in sample data and then apply this to new data to produce useful outputs, often using neural networks".
[3] The Defence Equipment & Support (DE&S) policy statement "Ambitious, Safe, Responsible" (June 2022) states that a key challenge associated with adopting AI for Defence is "The unpredictability of some AI systems, particularly when applied to new and challenging environments, increase the risks that unforeseen issues may arise with their use [and] …present new challenges for the testing, evaluation and certification of such systems."

tools. In the interim, the MAA's existing principles and Assurance frameworks[4] that minimize Risk to Life (RtL) and deliver outcomes that are As Low As Reasonably Practicable (ALARP) and Tolerable, remain the most appropriate methodology. Where compliance cannot be demonstrated due to lack of suitable AI / ML standards, or the difficulty posed by the unpredictability of the AI involved, the exposition of the fundamental regulatory principles articulated in the Air System Safety Case and supporting evidence remains valid such that evidence is gathered through rigorous trials, testing and evaluation processes, as a means to assuring safe and environmentally responsible capabilities.

Summary

6. The core principles used in the MAA's existing Assurance and certification processes should continue to be applied to Air Systems utilizing AI / ML within Safety critical Systems until suitable bespoke AI / ML standards are issued. As an evolving issue, the RC are encouraged to engage with the MAA as early as possible in the design process.

Queries

7. Any observations or requests for clarification on the content of this RN should be submitted by email to DSA-MAA-MRPEnquiries@mod.gov.uk.

Head Regulation and Certification
MAA

[4] Such as, but not limited to: Manual of Military Air System Certification (MMAC), Defence Standard (DefStan) 00-970, DefStan 00-55, DefStan 00-56, Radio Technical Commission for Aeronautics (RTCA) DO-178C, RTCA DO-356.