



Maintainance concept of AI/ML Hybrid ATM Systems and ATSEP Training

Addressing the maintenance of Hybrid ATM systems involving AI and Deterministic Elements **before and after Deployment**

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Introduction of AI/ML in Air Traffic Management

Enhanced Efficiency

The integration of AI in Air Traffic Management (ATM) systems promises significant improvements in operational efficiency and capacity.

New Challenges

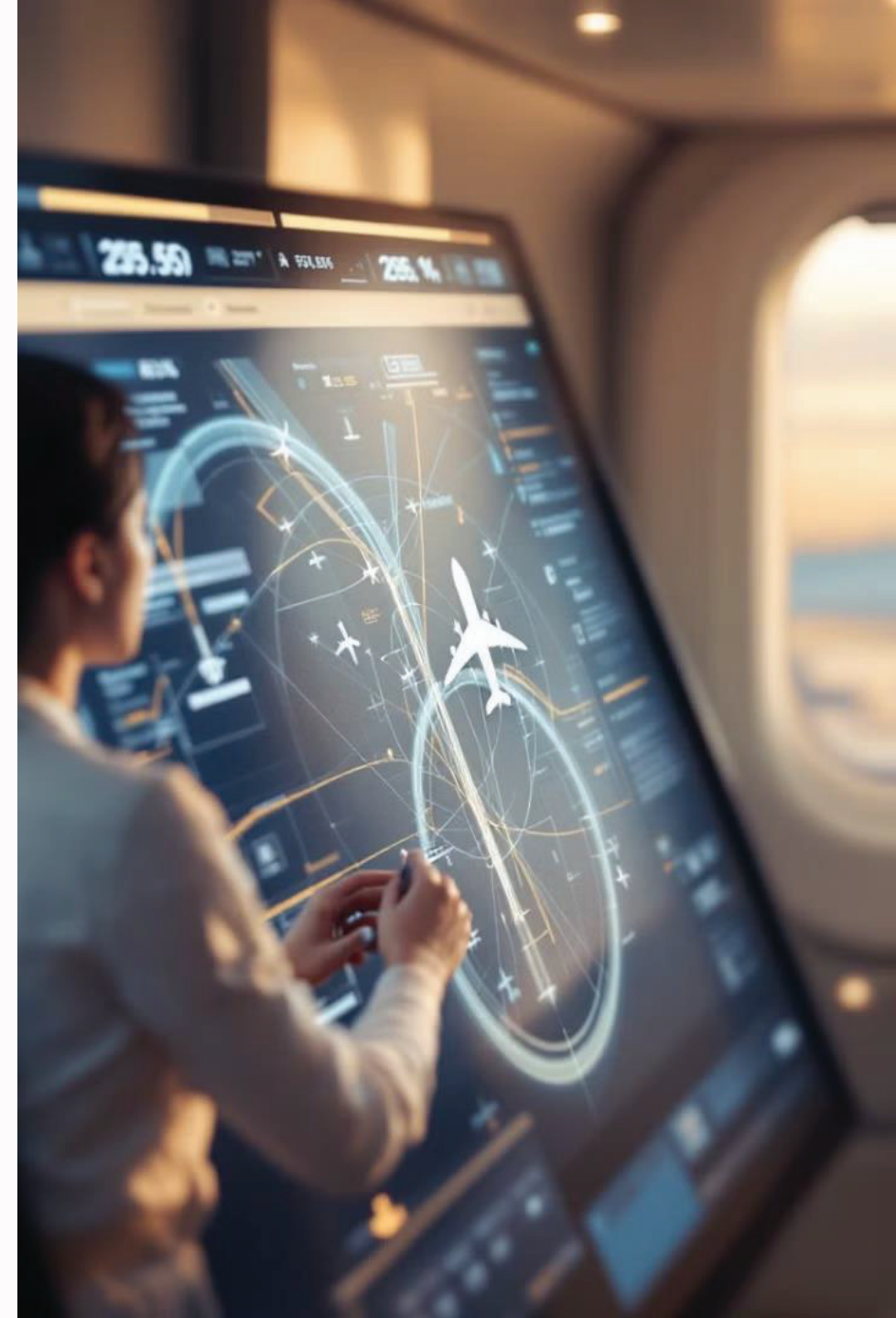
AI implementation introduces unique challenges that must be addressed to maintain the safety-critical nature of ATM applications.

Structured Approach must be followed

A framework combining regulatory compliance, technical validation, and HF upskilling is essential for safe AI integration.

QUESTIONS arising

- What will be the MAINTENANCE Concept for hybrid AI ATM systems?
- What should be the qualifications and Training required for ATSEP?
- How will the emerging lack of ATSEP be addressed?



Problem Definition

Maintenance Concept after Deployment

- Encompasses upkeep and repair concepts and procedures
- AI assisting technical tools for the ATSEP WP

ATSEP Qualifications

- Specialized technical knowledge for AI/ML and continuous professional development

Addressing ATSEP Shortage

Targeted recruitment, incentives and improved training programs

Addressing Certification

Training should prepare ATSEP to participate in the Certification processes and maintain appropriate documentation of system performance and Safety.



Human-AI interaction & Operational Safety

Training & Adaptation

Comprehensive training programs for ATSEP on effectively, operating and maintaining and working with AI-assisted systems and understanding their capabilities and limitations.

How?

- Simulation-based training scenarios (not existent)
- Gradual introduction of AI capabilities
- Accident and incident recording and analysis tools for AI/ML systems

Fallback Mechanisms

Robust **contingency procedures and technical redundancies** that activate when AI systems show anomalous behavior () or fail to perform as expected.

How?

- Graceful degradation pathways
- Independent backup systems and Recording
- Regular testing of fallback procedures
- FMEA analysis

Hybrid AI/ML System Competency

Integration Understanding

Upskilling ATSEP for AI Hybrid Systems:

- [Hybrid system competency training](#) is essential for ATSEP to comprehend the coexistence of deterministic algorithms and AI components in these complex systems.
- The training must emphasize the complementary roles of these technologies in [providing redundancy and implementing fail-safe mechanisms](#).
- Understanding the [critical handoffs between traditional and AI-based systems](#), particularly during degraded modes of operation, is crucial.
- [to ensure the overall safety and reliability of the hybrid CNS/ATM system, they](#) must be able to recognize the strengths and limitations of each approach, and how they work together.

Conclusion and Recommendations

- Update ATSEP Training syllabi in ICAO 10057 and EU 2017/373
- Introduce Simulation tools for ATSEP
- Prepare and involve ATSEP in the Certification process
- Address the ATSEP shortage as other industries are more attractive
- R&D and include AI assistants for Cybersecurity in the ATSEP WP.
- Develop a Maintenance concept for AI/ML Hybrid ATM systems

ATSEPs are crucial for aviation's technological progress. Their expertise ensures safe and continuous air navigation services, enabling the industry to adapt to innovation and demands. As new technologies emerge, the importance of ATSEPs will grow as they shape the future of air traffic management.

ANSPs must invest in ATSEP professionals to secure the industry's long-term resilience and advancement.

THANK YOU!

