SUPPORTED BY sesar JOINT UNDERTAKING

Co-funded by the European Union

HUCAN

Advancing the future of ATM certification: HUCAN achieves key milestones in its first year

The project proposes a novel and holistic approach for the certification and approval of AI-enabled ATM airborne and ground systems

[Rome, Italy, 18/12/2024] – The HUCAN project, funded by the SESAR 3 Joint Undertaking, is conducting its research to align advanced automation and AI-based solutions with certification requirements from early stages of the development, with the final goal to fostering a holistic certification approach for these technologies in aviation and Air Traffic Management (ATM). As the project progresses, several key achievements have been realized.

- **State of the art: challenges of advanced automation for aviation towards AI certification**

AI is anticipated to play a pivotal role in advancing automation in aviation. In its first year of research, HUCAN has delivered **three state-of-the-art reports** - *Advanced Automation in Aviation*, *Certification methods and automation: benefits, issues, and challenges* and *Innovative approaches to approval and certification* - outlining the emerging innovation challenges in civil aviation, examined existing certification methods, and investigated innovative regulatory approaches for a trustworthy AI. The analysis emphasizes that while AI is a primary enabler of advanced automation, it is not the sole contributor. The adaptive nature of these technologies presents unique certification challenges, yet this is only part of the broader safety concerns associated with higher levels of automation.

The state-of-the-art on current certification methods evaluates the limitations of available approaches for advanced automation and AI technologies in ATM, which are unable to fully address their complexity and dynamic interactions. Working on the guidelines provided by the EASA AI Roadmaps and the novelties introduced by the AI

Act, HUCAN explores the evolution of the current regulatory framework and detects the main issues that urge the attention of the rule makers.
To foster a holistic design approach that integrates certification principles from the outset of research, HUCAN addresses technical, human, and ethical dimensions within a unified framework. This includes promoting transparency and trust in human-AI collaboration while tackling accountability and liability challenges. The project is developing a methodology to support the gradual alignment of advanced automation concepts and solutions, testing the relevance and applicability of EASA objectives across various stages of the SESAR pipeline development.

- **Development of the Certification Glossary**

Advanced automation and AI-based solutions present tremendous opportunities for the aviation sector. To fully realize these benefits, fostering effective communication among all stakeholders, including aviation professionals and AI experts, is essential. The first step toward achieving this goal is to **create and adopt a shared vocabulary that enhances mutual understanding and collaboration**, driving progress and innovation within the industry.

To this end, the HUCAN project has developed the ***Glossary of Essential Terminology for AI and Advanced Automation in Aviation***. Designed to support the SESAR community, this tool [you can download it here] offers a clear, comprehensive and accessible guide to help navigate the complexities of these cutting-edge topics. The release of the glossary marks a significant achievement of the HUCAN project, as it also offers a guideline that helps AI-based projects meet EASA's certification requirements for new technologies, starting from the early development stages. The document brings together in a single framework the official definitions from key regulatory initiatives for AI in aviation at the European level, including the **AI Act (2024)**, **GDPR**, and the **EASA AI Roadmap**, while also integrating insights from the **SESAR AI Framework** and the **EU HLEG-AI Ethics Guidelines for Trustworthy AI**.

The glossary is organized into three sections:
Automation and AI: technical definitions related to AI technologies.
AI Regulation and Certification: requirements and lifecycle roles for AI systems.
Society and Ethics: social and ethical considerations, including privacy and fairness.

- **Definition and mapping of automation levels in the chosen case studies**

As HUCAN aims to develop ready-to-use guidelines, the Consortium is adopting a case study-based approach to test the effectiveness of its holistic certification approach. In light of this, **four case studies** are used to support the design and the validation of the holistic and unified approach to certification defined by the project. The analysis conducted produced a comprehensive report that highlights (I) the **purpose, objectives and the automation role** of each case study, (II) the **human factors impact** of the reference ATM solutions, (III) the **level of automation** of the reference ATM solutions, and (IV) a preliminary **liability analysis** for each case study. It highlights significant impacts on operator roles, responsibilities, and tools, with varying human impacts across cases. Ambiguities in defining automation levels are noted, particularly for decision-support and automated detection functions.

- **Ongoing engagement with key stakeholders through workshops and networking events**

HUCAN has actively engaged stakeholders through significant workshops:

May 2024 Workshop in Rome. This event convened key stakeholders from the SESAR research community to discuss certification challenges associated with advanced automation and AI in ATM. The workshop facilitated the identification of certification issues pertinent to emerging technologies.

November 2024 AI Flagship Workshop in Rome. During this session, HUCAN's coordinator and deputy coordinator moderated a roundtable discussion, furthering dialogue on the integration and certification of AI technologies in ATM.

SESAR Innovation Days 2024. HUCAN also participated in the SESAR Innovation Days, where the project's coordinator, Paola Lanzi, presented the paper *"Challenges and New Directions for the Certification of AI and Advanced Automation in Civil Aviation."* The paper explores certification challenges and opportunities for AI-based systems in ATM. It outlines the research conducted in the project's first phase, focusing on technical reliability and human factors for integrating highly automated systems into ATM. The findings evaluate innovative certification approaches, propose refinements in automation levels, and suggest new directions aligned with EASA's guidance to advance a holistic certification framework.

SUPPORTED BY sesar JOINT UNDERTAKING

Co-funded by the European Union

CONTACTS

Deep Blue srl

mail to:

Serena Fabbrini serena.fabbrini@dblue.it

LINK

HUCAN website

LinkedIn