

AI proceeds to be in the loop in air traffic control

The AISA project has finished its experiments, investigating how air traffic controllers might cooperate with artificial intelligence.

Although it was less visible in the recent years, there is a capacity problem in the European air traffic management system, especially in the field of air traffic control. Therefore, digitalisation and automation solutions are key to solve this problem. The usage of artificial intelligence is more and more common within automation, and air traffic management as a technology intensive domain cannot be an exemption. The goal is obviously not to replace humans but to the contrary: to ensure that air traffic controllers get more and better tailored information to accomplish their work. One of the projects targeting the future application of AI in air traffic control is AISA: AI Situational Awareness Foundation for Advancing Automation.

The SESAR funded project envisions an intelligent AI-driven, situation-aware system instead of isolated tools such as conflict detection or coordination systems. The AISA project aims to assess whether sharing the same team situational awareness among air traffic controllers and AI will enable the team of AI and Air Traffic Controllers (ATCOs) to reach the same conclusions when confronted with problems as well as to be able to explain the same or similar reasoning behind such decision making.

To explore the project idea, several experiments were conducted in cooperation with Zurich University of Applied Sciences, skyguide and University of Zagreb.

An initial experiment was conducted in November 2021 with twenty licensed air traffic controllers. The aim was to assess the individual ATCOs' situation awareness and subsequently to compare with the artificial situation awareness. Multiple methods were used to measure the ATCOs' situation awareness: subjective rating, gaze analysis by eye-tracking, and implicit measurement of performance. Simulation data gathered in the initial experiment was then used as input for the AI situation awareness system to process and generate machine situation awareness.

A second experiment was performed in January 2022. The outputs of the AI situation awareness system were translated into oral inputs and given to sixteen licensed air traffic controllers. In one scenario, participants were able to freely interact with pilots (interactive condition), for the rest of the scenarios, air traffic controllers observed and implemented actions that were previously recorded in experiment 1 ("watch only" condition). Air traffic controllers were asked to judge the usefulness of AI situation awareness inputs and to provide feedback on their experience interacting with the AI-based tool.

To precisely quantify the accuracy and functionality of the AI situation awareness system's estimations and predictions at the project-level stage of implementation, further simulations were conducted in April 2022. Based on the data collected in the initial experiment, AI situation

awareness system's estimations and predictions for machine situation awareness were re-calculated.

In parallel with the experiments, Universidad Politécnica de Madrid carried out a risk assessment on the planned future AISA system. The work focused on performing a safety analysis by identifying hazards, analysing them and their risks (based on probability and severity) and providing mitigation measures. This risk assessment provides crucial information for further development of the AISA system that could be applied as potential safety requirements.

Project coordinator: Prof. Tomislav Radišić

Email: tradisic@fpz.unizg.hr

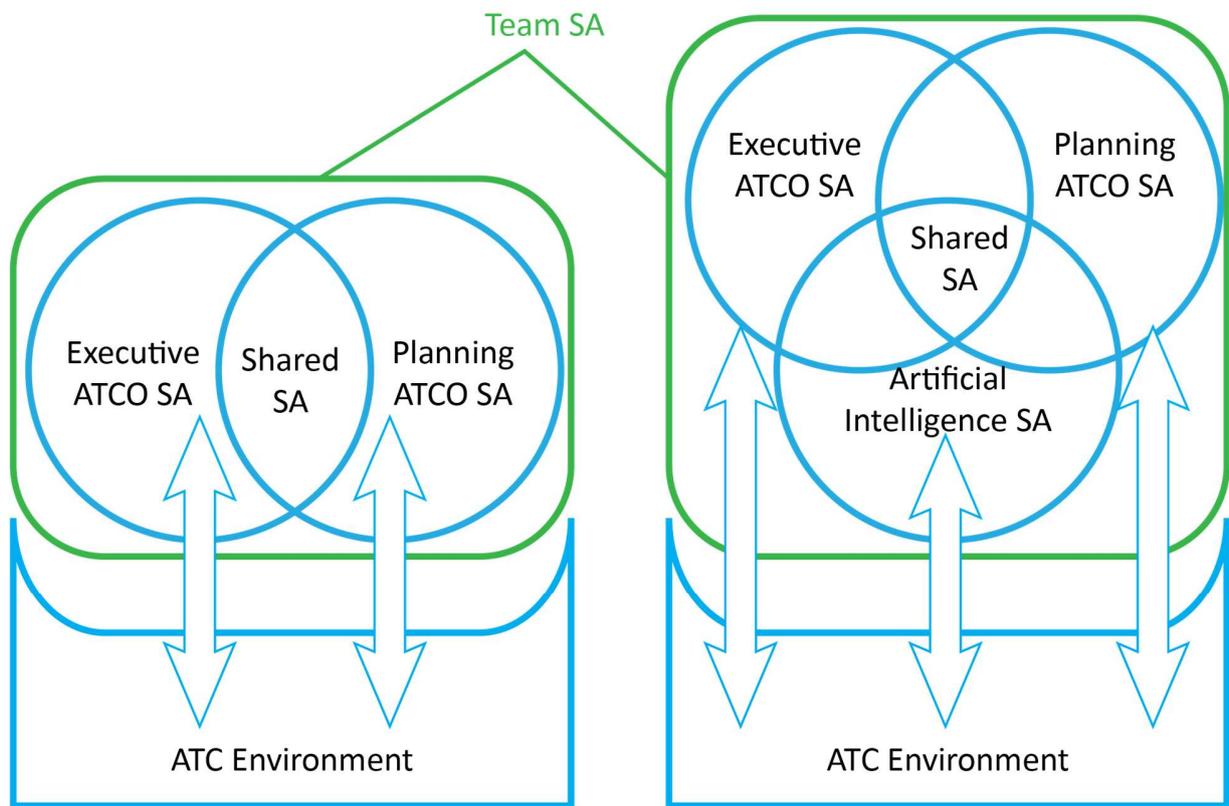
Website: www.aisa-project.eu

This document is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 892618 under the European Union's Horizon 2020 research and innovation programme.

Related picture and drawing:



One of the experiments in Skyguide premises



Current situation

Future Vision

The future vision of AISA on Team situational awareness including AI