Haiku

Human AI teaming Knowledge and Understanding for aviation safety

Use Case 4: Digital Tower

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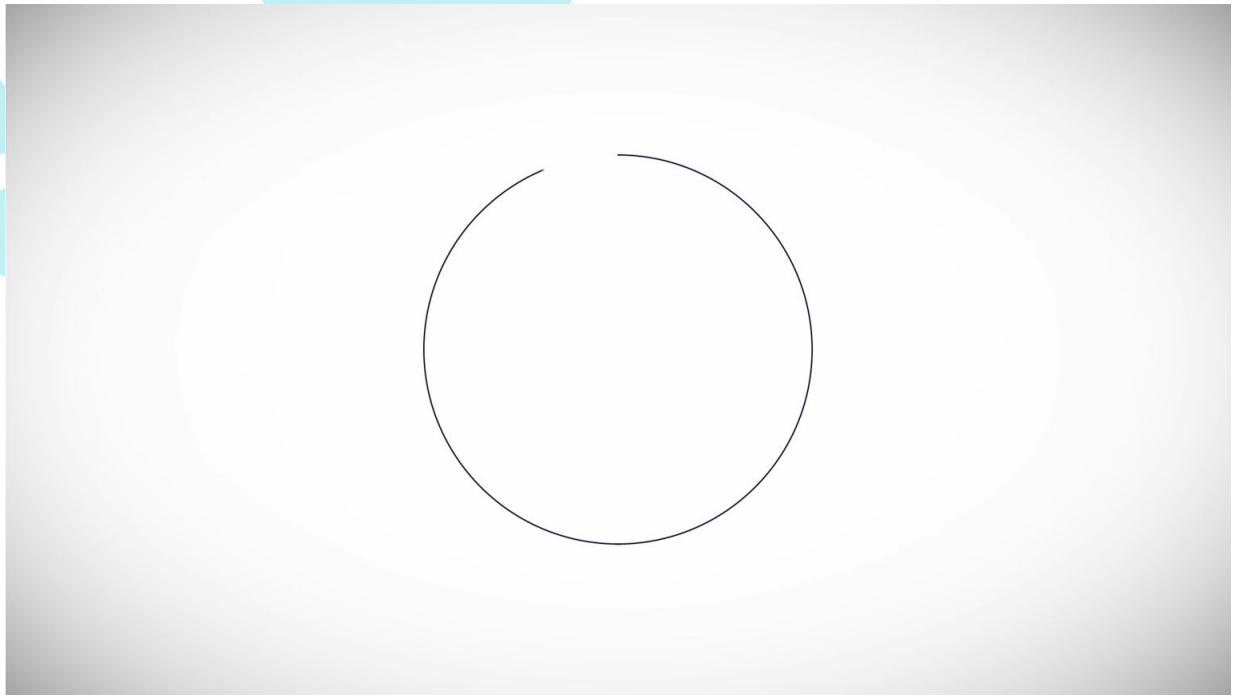
This project has received funding by the European Union's Horizon Europe research and innovation programme HORIZON-CL5-2021-D6-01-13 under Grant Agreement no 101075332

1. Concept overview

ISA (Intelligent Sequence Assistant) aims to **support and enhance decision -making for Air Traffic Controllers in Alicante** . Here's how:



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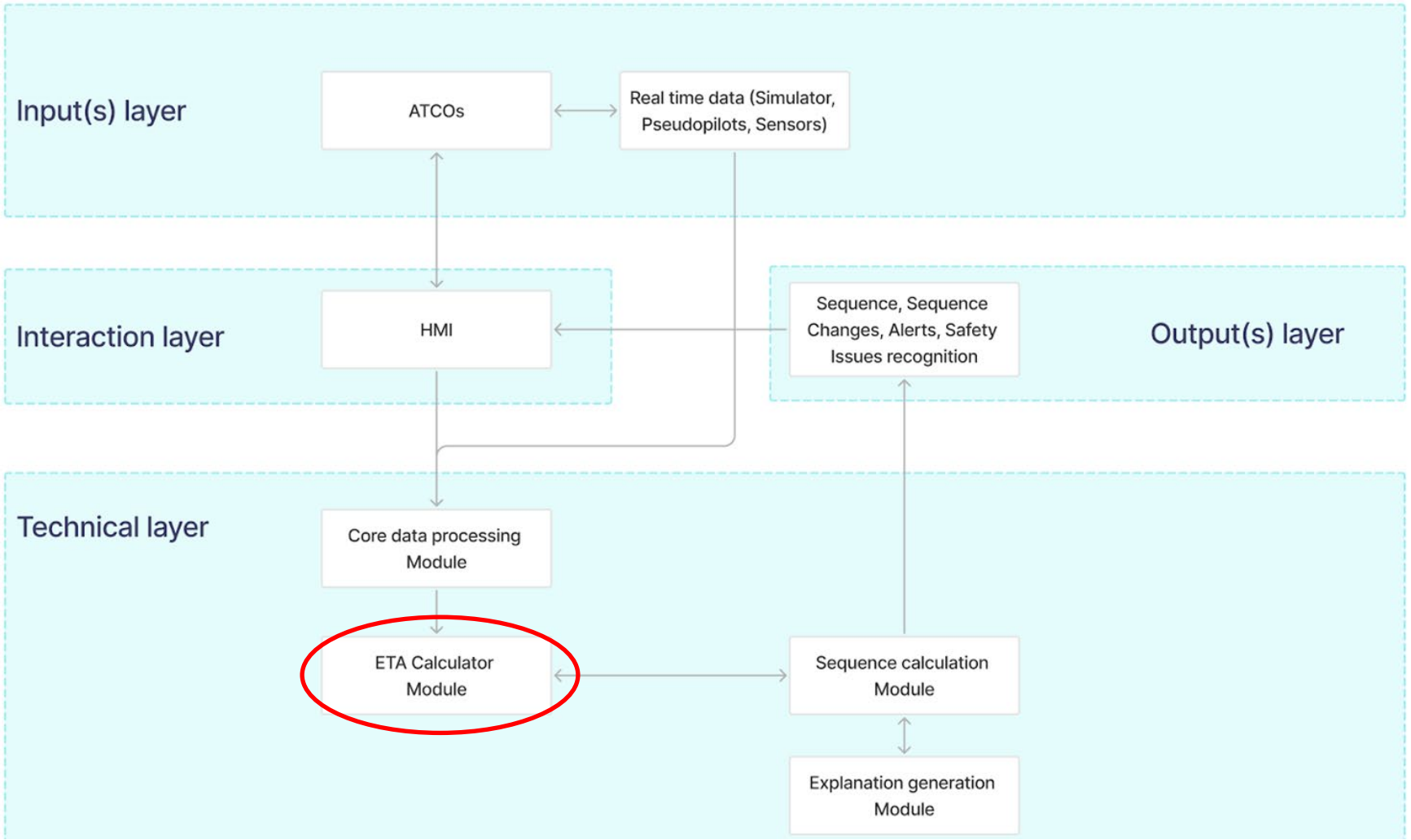
2. Current status

Architecture



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2. Current status

Human - Machine Interface (HMI)

The HMI is intended for seamless integration into Alicante's existing system. It:

- Delivers **real - time sequences** to controllers, highlighting important changes on electronic strips.
- Offers **varying levels of on - demand explainability**, allowing ATCOs to understand AI results in detail or receive a basic explanation when time is limited.

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3. Demonstrator

Here are some pictures of the prototype that was used during VAL 2.

Main points of interest:

- Where ISA provides information on the HMI
- What's the main feature
- Explainability – how is it provided?

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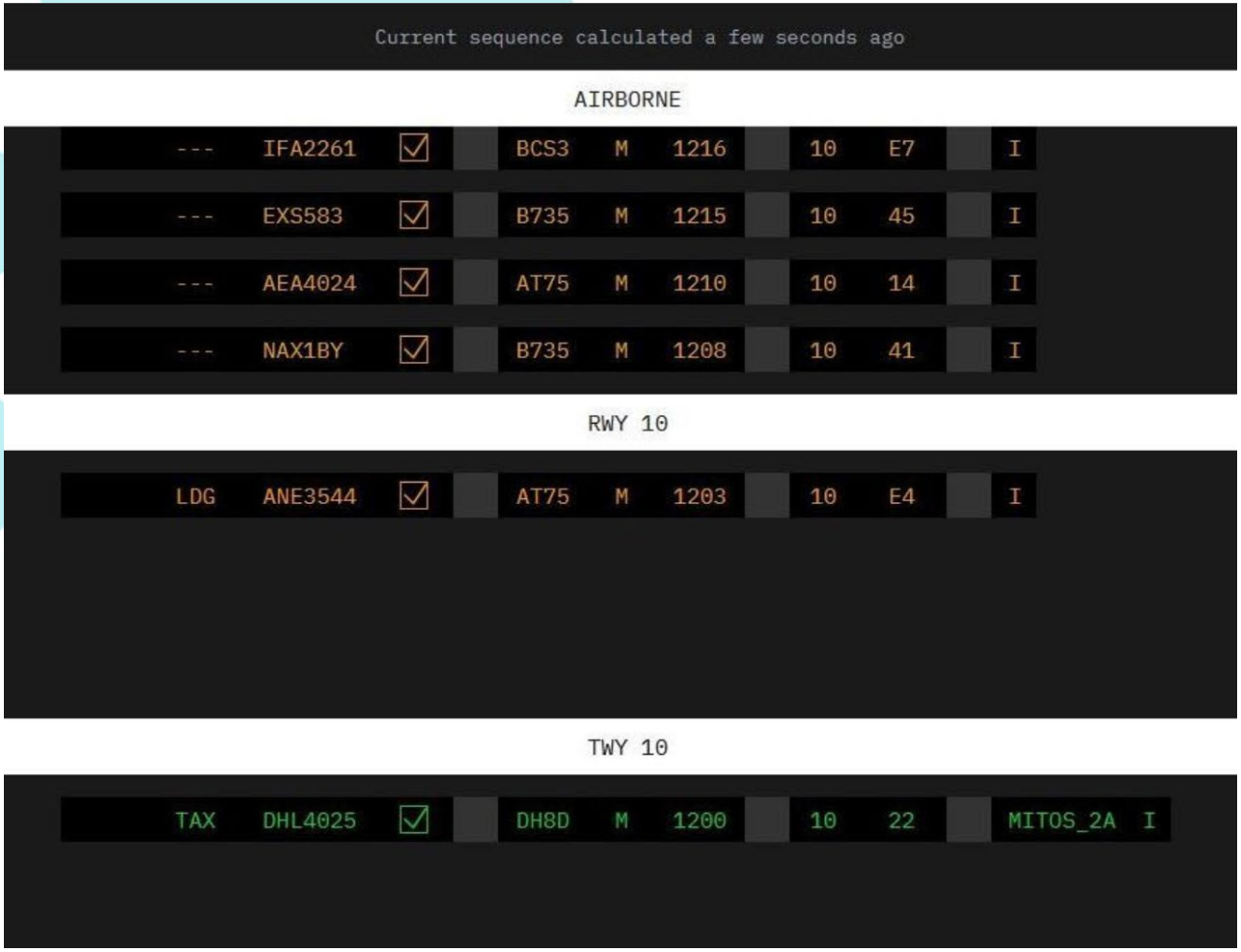
3. Demonstrator

HMI without ISA



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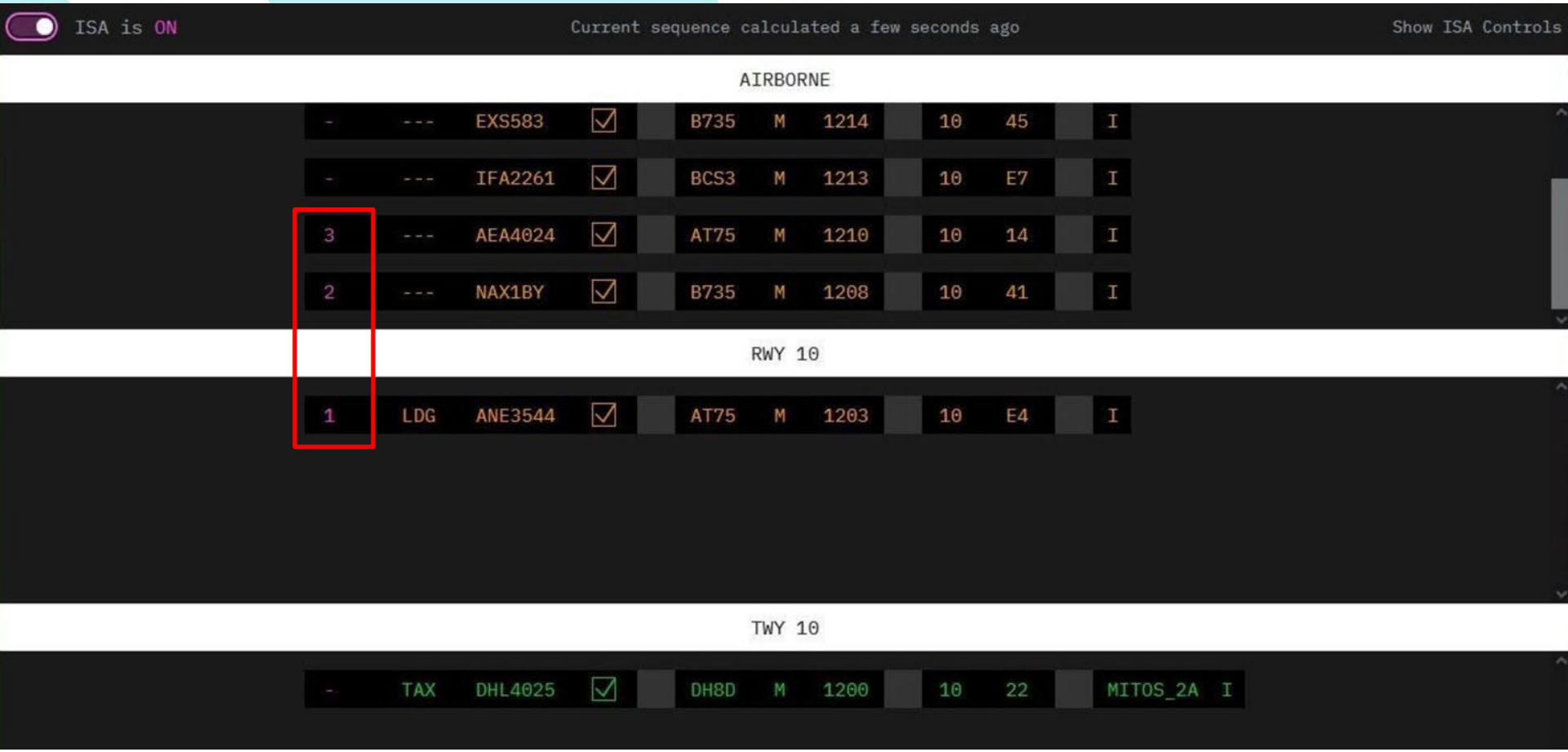

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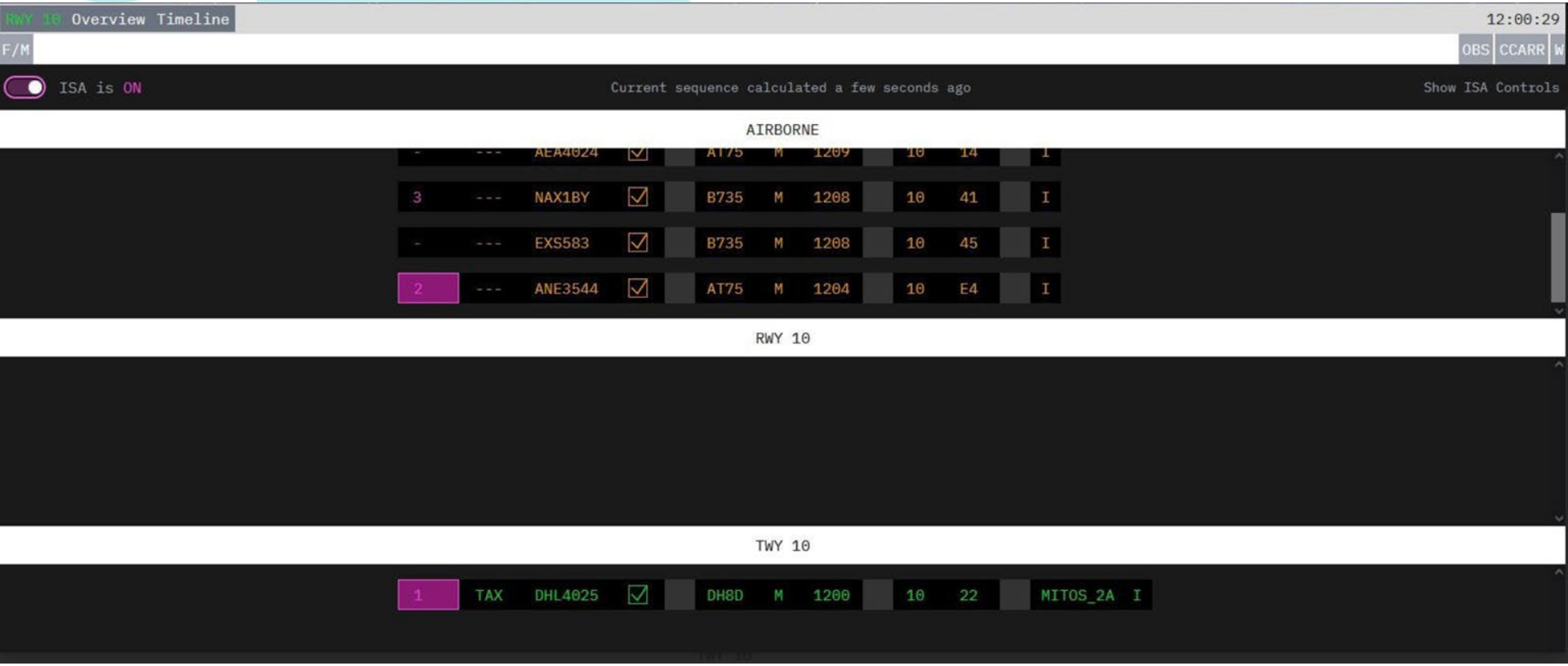

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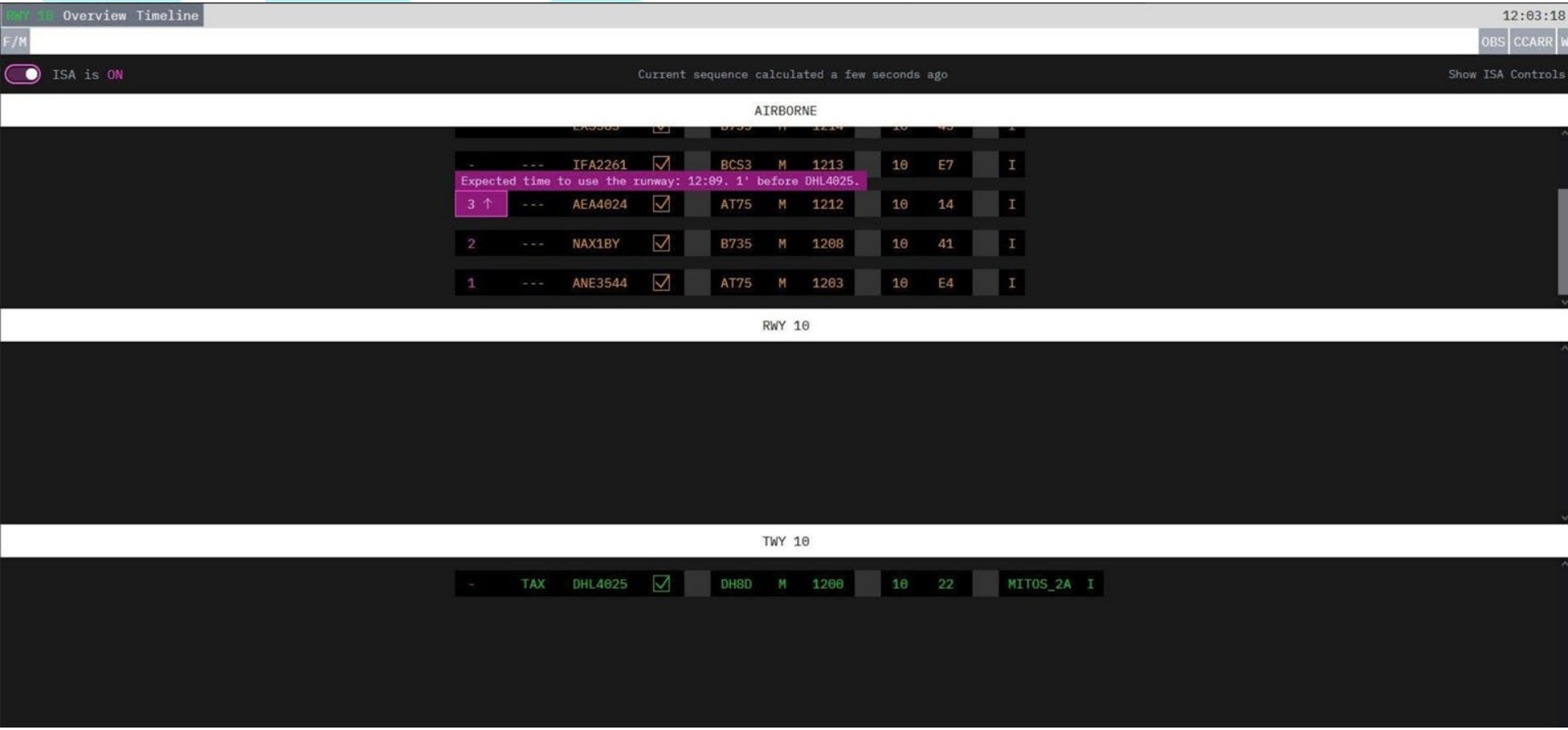

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4. Added value of AI

Current system

- The ETA Calculator Module uses **machine learning** to assess aircraft positions and speeds, trained on various simulated trajectories to improve arrival and departure processes.
- While sequencing can function without AI in stable conditions, **AI significantly enhances accuracy** and speeds up execution.
- ISA is particularly **beneficial in complex situations** with multiple tasks, adjusting to changes based on training data, which reduces the cognitive load on air traffic controllers during peak times.
- Techniques for explainability **enhance understanding** of ISA's sequencing recommendations, building trust in AI by aligning with air traffic controllers' mental frameworks.

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4. Added value of AI

Future system

- Utilising AI effectively can improve existing capabilities by:
  - **Tailoring AI models** for individual Air Traffic Controllers.
  - **Incorporating diverse data** into training sets for enhanced performance.
  - **Integrating ground movement operations** for better route guidance and conflict detection.
  - Aiding operations during **poor weather** .
  - **Establishing varied objectives** , like prioritising departures to ease airport congestion.
  - **Assisting in emergency situations** .
  - **Enhancing workforce efficiency** by automating the clearance position in towers.
  - Implementing the ISA formula for **airports with multiple runways** .

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Thank you!

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