

Adaptive systems for improving Human AI teaming



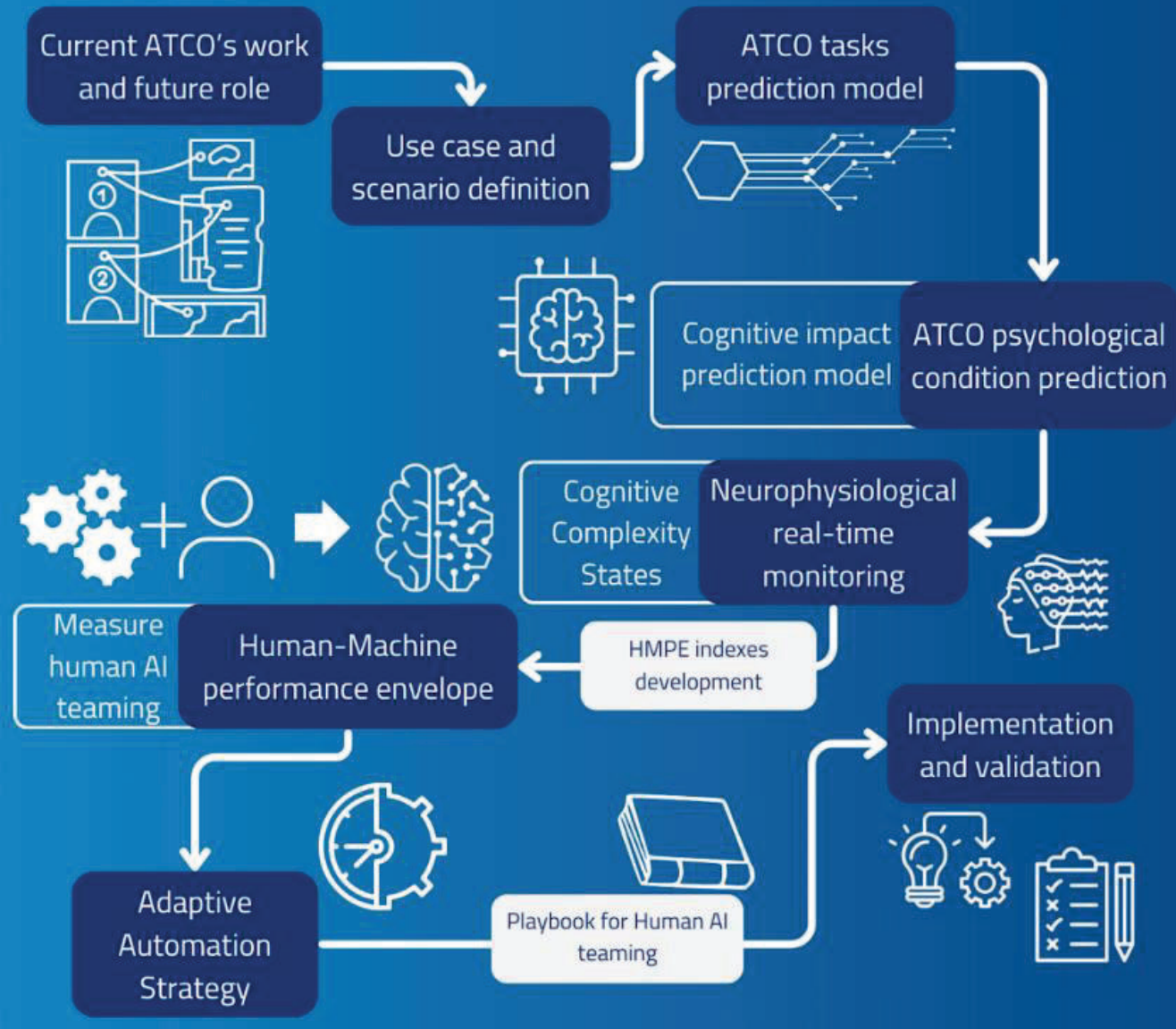
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CODA



CODA – Controller adaptative Digital Assistant

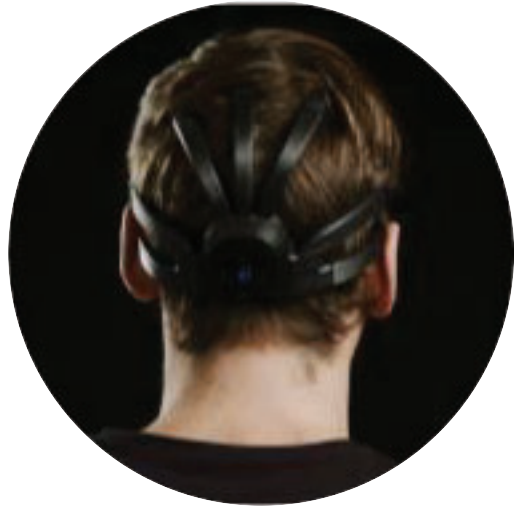
CODA's AI assistant improves integration of the new generation of automated tools, based on AI, with human operators.

Key components:

- **Predictive Models for controller's cognitive mental states and tasks.**
- **Neurophysiological Monitoring** of cognitive states, forming a **Human Machine Performance Envelope (HMPE)**.
- **Adaptive Automation** to adjust task distribution based on real-time operator status.

Goal: enhance ATC safety and efficiency through intelligent task management and automation.

Indexes selection



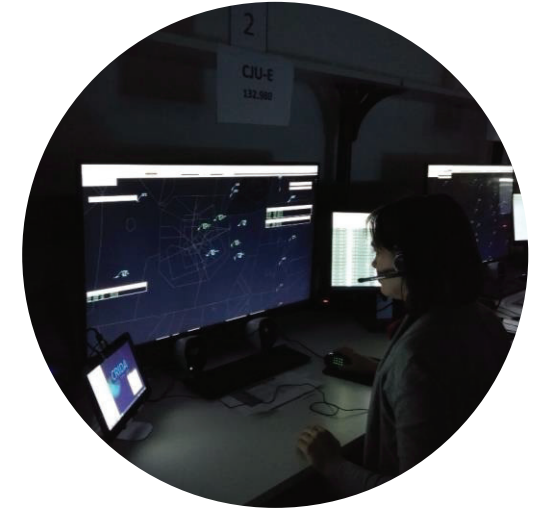
EEG sensors



EDA sensors
PPG sensors



Voice
analysis

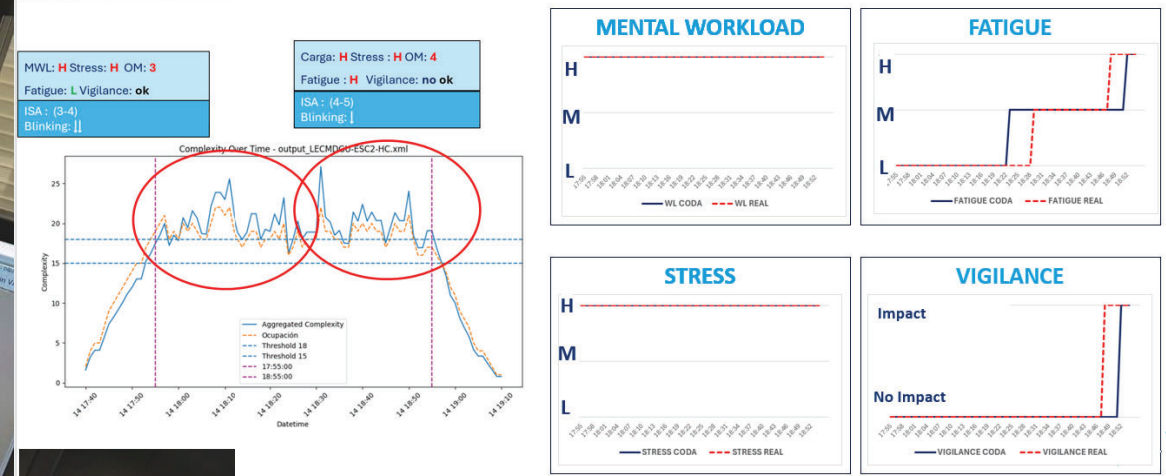
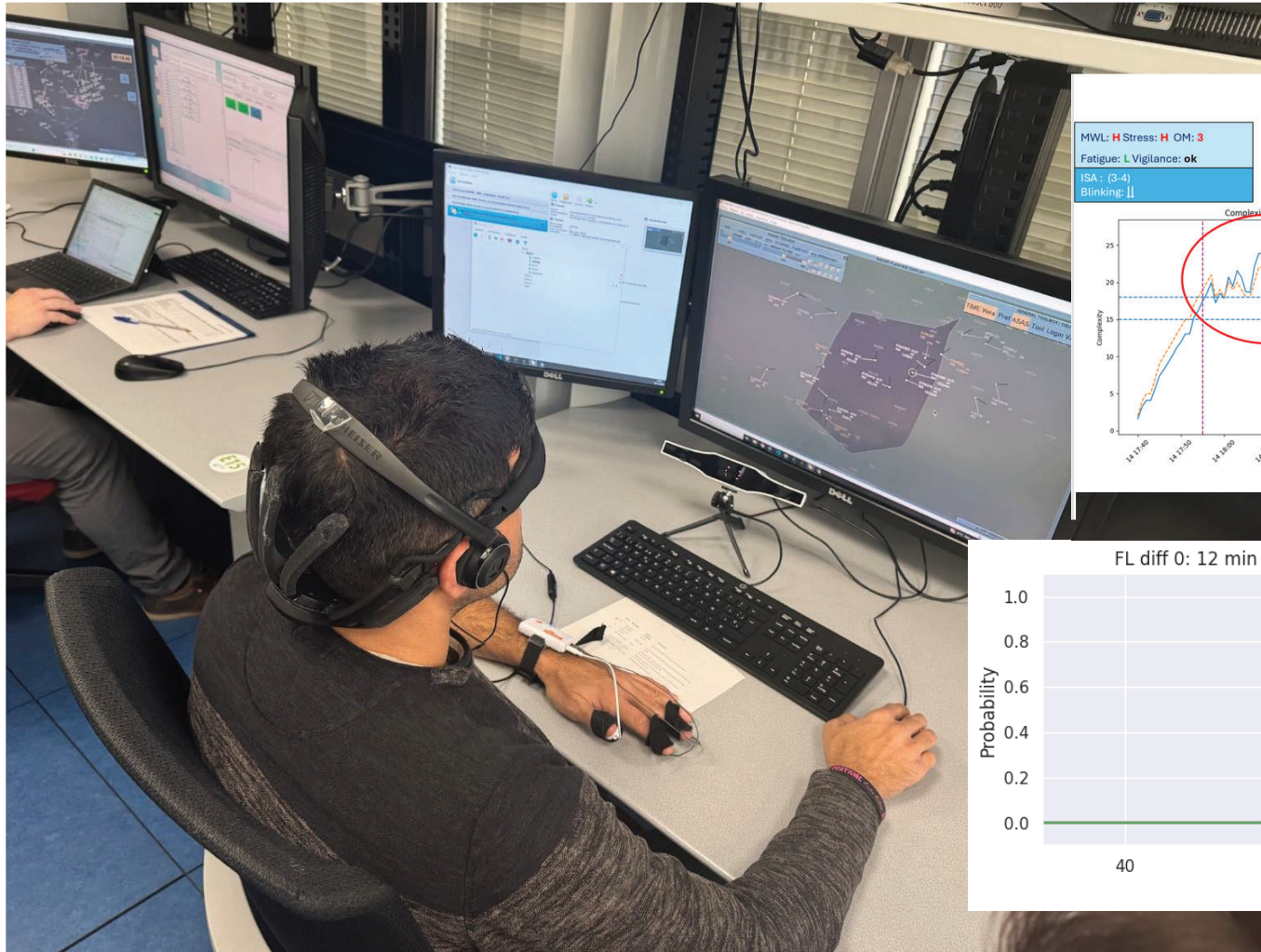


Behavioural
data

Human Machine Performance Envelope (HMPE)

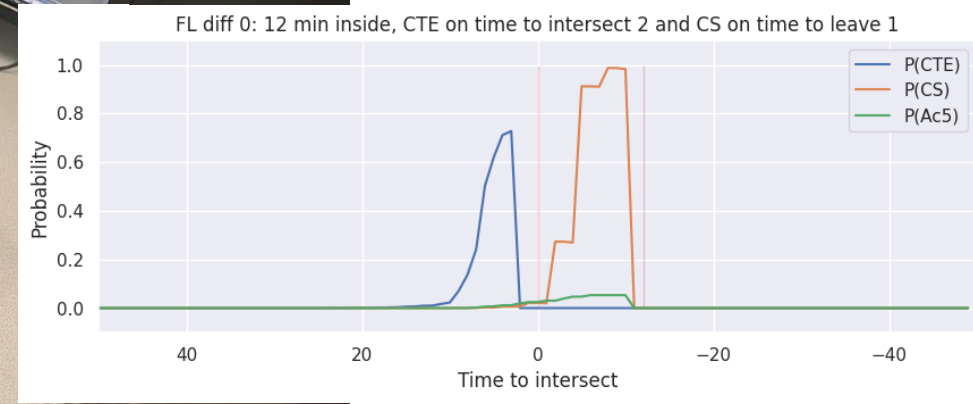
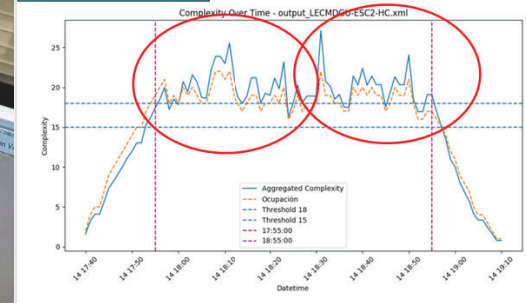
Operator mental state
Human- AI interaction
Performance of joint system

Mental prediction models



MWL: **H** Stress: **H** OM: **3**
 Fatigue: **L** Vigilance: **ok**
 ISA: (3-4)
 Blinking: **||**

Carga: **H** Stress: **H** OM: **4**
 Fatigue: **H** Vigilance: **no ok**
 ISA: (4-5)
 Blinking: **|**



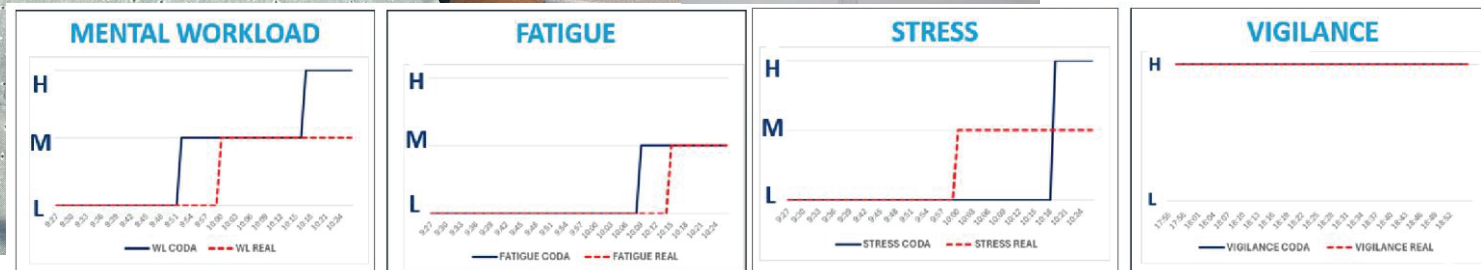
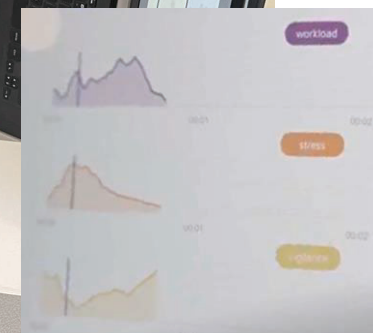
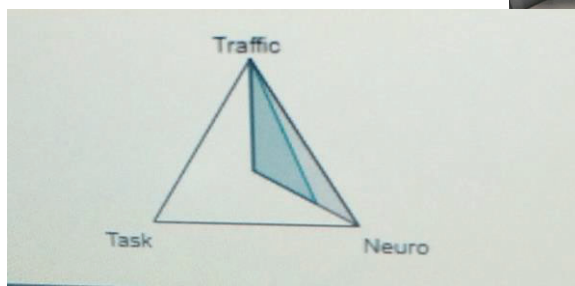
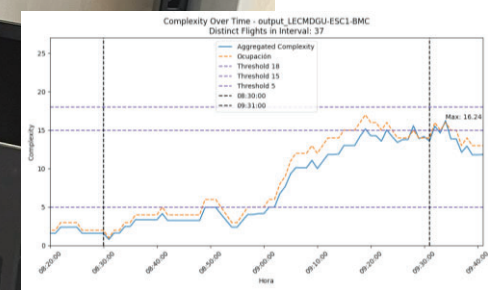
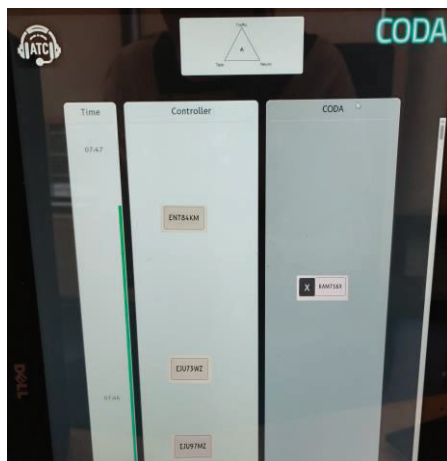
Task prediction model

Adaptative automation

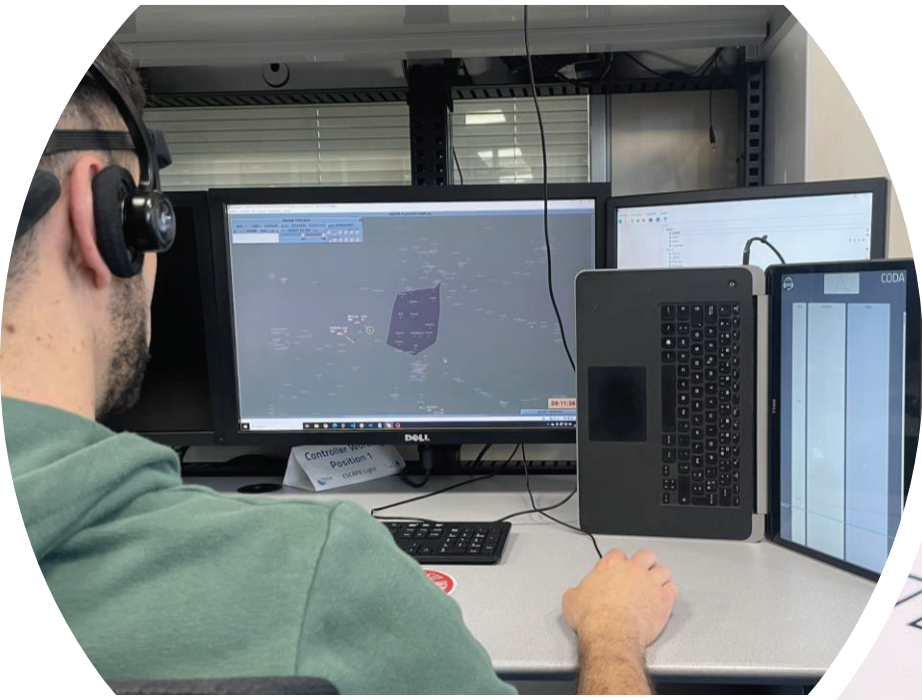
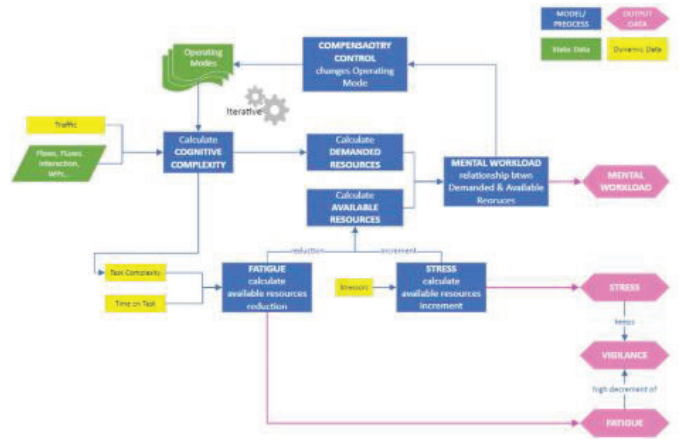
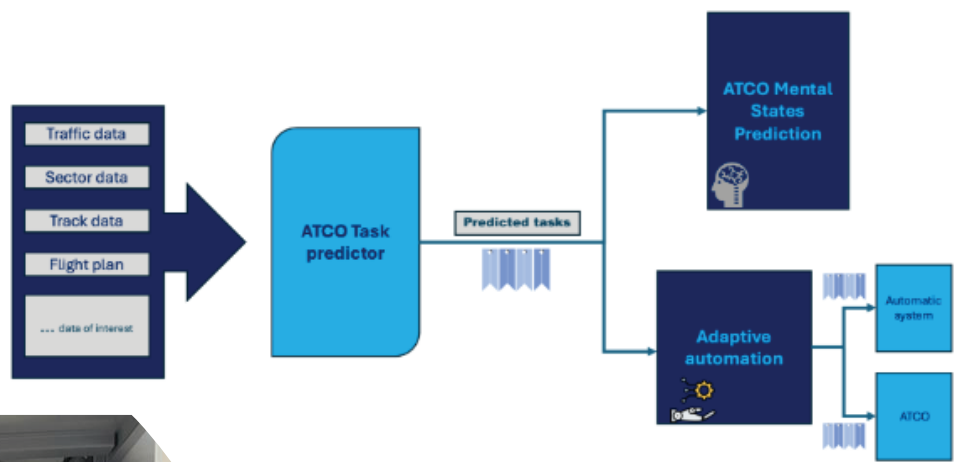
The interface displays a timeline on the left from 08:49 to 08:58. The main area is divided into three columns: Unassigned, ATCO, and CODA. The Unassigned column contains flight tasks from 08:48 to 08:54. The ATCO column contains tasks for 08:57 and 08:58. The CODA column contains tasks for 08:55 and 08:56. A top bar includes a timer at 14:02:14 and an Explanations button. A 3D diagram on the right shows a pyramid with vertices labeled Traffic, Task, and Neuro, with a blue shaded section. Below it, a text box states: "[low to low], task load [low to low], and cognitive workload [low to low] remain stable within operational thresholds, CODA will maintain its current automation level to ensure consistency and avoid unnecessary".

Time	Unassigned	ATCO	CODA
08:58		FLIGHT1 - Ac13 -08 : 58	
08:57		FLIGHT3 - H1 -08 : 57	
08:56			FLIGHT2 - R1 -08 : 56
08:55			FLIGHT5 - A4 -08 : 55
08:54	FLIGHT4 - CTE32 -08 : 54		
08:53	FLIGHT3 - Ac12 -08 : 53		
08:52	FLIGHT2 - Ac5 -08 : 52		
08:51	FLIGHT5 - A4 -08 : 51		
08:50	FLIGHT3 - A1 -08 : 50		
08:49	FLIGHT2 - Ac13 -08 : 49		
08:48	FLIGHT1 - CTE31 -08 : 48		

CODA experiment



CODA



Preliminary outcomes



THANK YOU FOR YOUR ATTENTION



CODA
Website



CODA
Linkedin



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Acknowledgement

This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon Europe research and innovation program under grant agreement No 101114765



Co-funded by
the European Union

