Welcome to the EASA AI Days 2026 High-Level Conference – Day 2

9th – 10th September 2026

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Welcome to the EASA AI Days 2026 High-Level Conference – Day 2

Janet Northcote
EASA Head of Communications

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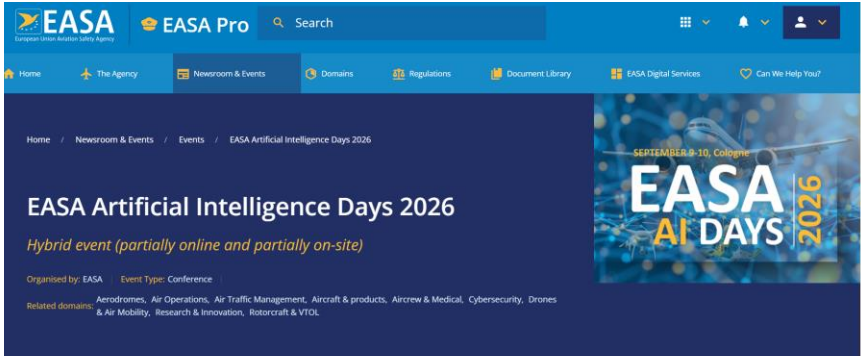
EASA AI Olympics - 2026



Other Documents

- EASA AI Olympics 2026 — Top 10cases
- Welcome to the EASA AI Olympics!
- Start your EASA AI Olympic games
- EASA Artificial Intelligence Concept Paper — Proposed Issue 3

10:30

EASA AI Olympics 2026
Voting Form
Vote for your favorite case

Welcome to the **EASA AI Olympics 2026**!

Discover the 10 AI- based systems showcased during the EASA AI Days 2026, explore their functionalities, benefits, challenges, innovation, their safety assurance approach, and the developments to the aviation sector, and vote for your favorite case (one case only).

📅 Voting closes on 10 September 2026 at 13:30/ 🔒 is anonymous and you vote only once

No.	AI Case	Organization	Vote (place an X in your favorite)
1	SenTenCe	SWIFT GmbH	
2	COAST/eORD	Eurocontrol	
3	CoAnalyst - An AI Safety Intelligence Companion for Aviation Safety Management	Comply365	
4	Xcert AI	Xcert AI	
5	PISA MaT – Real-Time Miles-to-Touchdown Prediction for Air Traffic Controllers	CRIDA A.I.E.	
6	AiMeE.invoke — Agentic Hybrid-AI decision support for MEL invocation	Air India Limited	
7	Kairos FOR DEC AI	KAIROS Aerospacial	
8	The HF-AI Auditor — a recursion-compliant human-factors assurance instrument for aviation AI	Technical University of Crete - TUC	
9	Wingman: an AI assistant for airline operations	Overwatch AI	
10	Occurrence Assistant	Austro Control GmbH	

Thank You for Voting! ✈️ 🤖 🏆

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EASA AI Days 2026 – Day 2
Opening & workshop main conclusions

Guillaume Soudain
EASA AI Programme Manager

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Discussion points

→ Ethics-based assessment

TOP 3 benefits to be reinforced	TOP 3 challenges to be further addressed
Greater trust & acceptance: supports responsible, user-centred AI deployment	**Clarification of key concepts**: e.g., fairness, dependence, manipulation
Better & more robust system design: Ethics-by-Design catches (non-)technical risks early	**Clarification of outputs**: what the assessment should produced and how are the results used
Regulatory & market value: improves readiness, compliance and competitive position (to the broader public)	**Clarification of mitigation**: practical process guidance without turning it into a fixed catalogue

Human Factors: Discussion points – Level 2b

TOP 4 benefits to be reinforced	TOP 4 challenges to be further addressed
Automation exists – this is building on Automation. We aren't starting at zero	Do we need to be Perfect. Humans aren't perfect performers, do we need to insist AI is perfect from the start
We are living with AI – Gen Alpha will not have the same concerns or issues with AI introduction	Why are we focussing on getting SA / SR into the machine when we can't define or agree what it is.
We should focus on 2A and 3 where there is clear reporting between AI and the human.	Training/Procedures are going to be radically different if we had over part or complete tasks to the AI
Voice will be only one means of communication	Isn't this fantasy AI ? Why would be do 2B when its so *involved*

SA: Situation Awareness SR: Situation Representation

AI Assurance – LKB AI frontier

TOP 3 benefits to be reinforced	TOP 3 challenges to be further addressed
ML combined with LKB (e.g. reasoning engine may be based on ML)	ML combined with LKB (e.g. reasoning engine may be based on ML)
Highly explainable (compared to other AI techniques)	Completeness (sufficient coverage of the Knowledge Base)
Big advantages compared to LLM (explainability, ODD coverage…)	Definition not clear, anything could fall under LKB (even the definition of AI in general is too broad)

LKB: Logic- and Knowledge-Based LLM: Large Language Model ML: Machine Learning ODD: Operational Design Domain

AI Assurance – LLMs (1/2)

"On-board" or safety-critical in general

TOP 3 benefits to be reinforced	TOP 4 challenges to be further addressed
Opportunities to use the LLMs (maybe in EFB format or similar, not directly in Avionics) in alerting the end-user instead of presenting too much information.	Using systems to present more and more information to end-users.
Opportunities for SPO (Single Pilot Operations) in business jets/GA.	Non-determinism is higher (e.g. Deep Learning models are giving more capabilities to provide assurance).
Easy to adapt to different usage contexts.	ODD and impact of fine-tuning on ODD.
	Learning assurance difficult to apply LLMs and they are mostly used without fine-tuning, so difficult to use them in aviation.

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LLM: Large Language Model   ODD: Operational Design Domain

AI Assurance – LLMs (2/2)

"On-ground" or operational tools

TOP 3 benefits to be reinforced	TOP 3 challenges to be further addressed
LLMS and agentic AI are already a reality: education needed.	LLMs and agentic AI are already a reality: education needed.
LLMs are more and more efficient (e.g. ontologies)	Cybersecurity (e.g. manipulation)
RAG (Retrieval-augmented generation) is a huge opportunity, but this is only one example of the needs from aviation industry	Transparency issues, commercial liability.

LLM: Large Language Model

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EASA AI Days 2026
Update on AI Rulemaking

Giovanni Cima
Project Manager 'RMT.0742'

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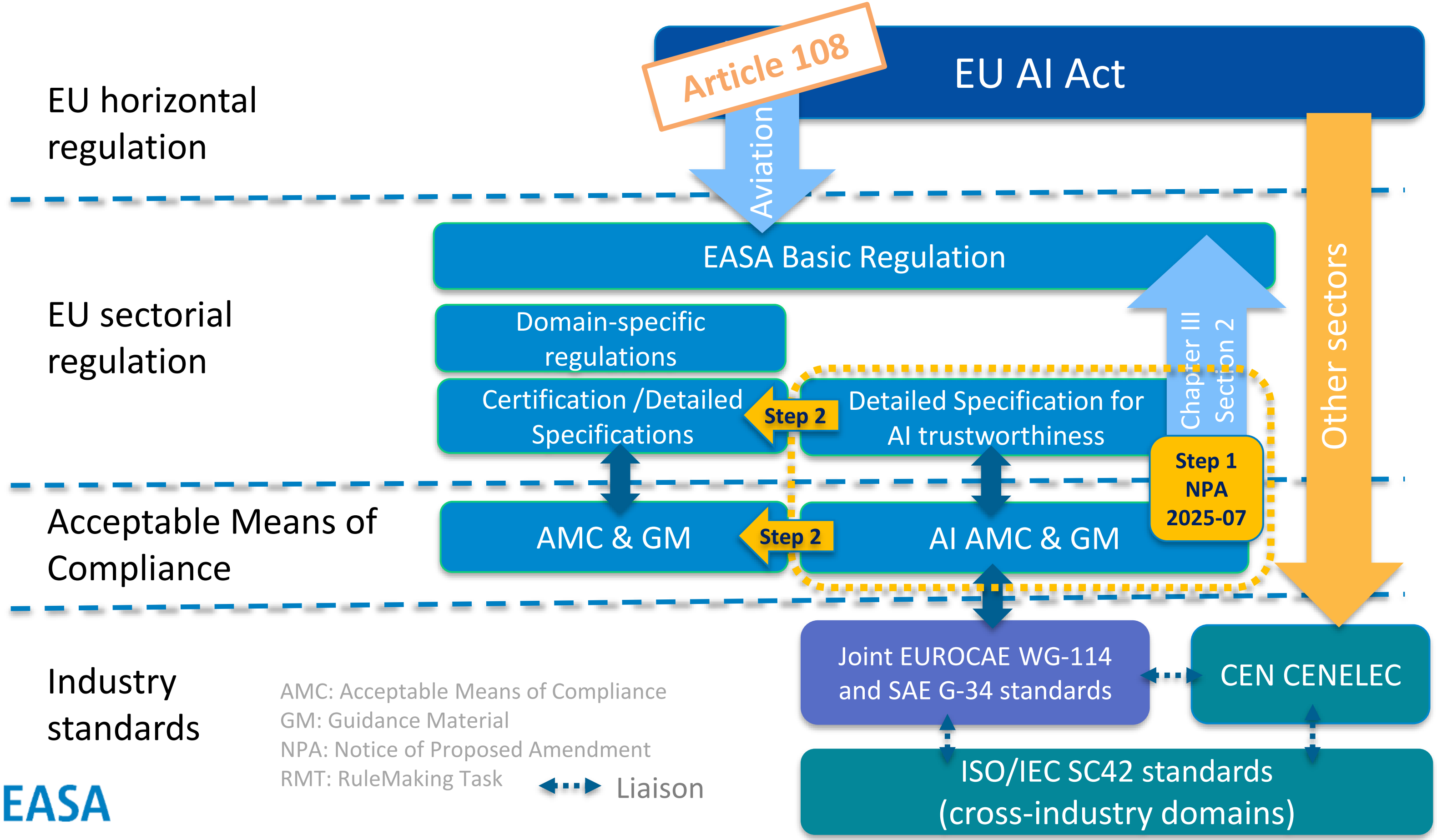
Rulemaking – AI trustworthiness (RMT.0742)



RMT.0742 - One year of work

- **20** meetings held (next meeting 11.09.2026)
- **Four sub-groups**:
  - **#1** Airworthiness (IAW focus on CSs)
  - **#2** Airworthiness (CAW + Part 21 G Production / J Design)
  - **#3** ATM/ANS
  - **#4** Drones + U-space
- **NPA 1** comments review on-going
- **NPA 2** drafting on going
- **RG composition** update launched

AMT/ANS: Air Traffic Mangement/Air Navigation Services
NPA: Notice of Proposed Amendment
CAW: Continuing Airworthiness
RG: Rulemaking Group
IAW: Initial Airworthiness

NPA2025-07 comments analysis

European Union Aviation Safety Agency

Notice of Proposed Amendment 2025-07 (A)

Issued in accordance with Article 6 of Management Board Decision 01-2022

Detailed specifications and associated acceptable means of compliance and guidance material

Artificial intelligence trustworthiness

RMT.0742 – Subtasks 1 and 2

WHAT THIS NPA IS ABOUT

This Notice of Proposed Amendment (NPA) proposes a new set of detailed specifications on artificial intelligence (AI) trustworthiness for the safe use of AI in aviation in response to Regulation (EU) 2024/1689 (the Artificial Intelligence Act) Chapter III, Section 2.

Published on 10th November 2025 for consultation (4 months)

Comments received

1,494

Total comments submitted during the consultation.

Stakeholder overview

Total: 1,494

Stakeholder	Count	Share
Manufacturer	572	38.3%
Industry association	382	25.6%
Institutional	241	16.1%
ANSP	155	10.4%
Research	73	4.9%
Consultancy	54	3.6%
Airline	46	3.1%
Tools	43	2.9%
Academia	15	1.0%

Most commented topics

Topic	Count	Share
Scope and applicability	224	15.0%
Safety assessment	222	14.9%
Human-centred design	170	11.4%
AI assurance	141	9.4%
Classification	114	7.6%
Operational Domain	110	7.4%

Top 5 anticipated changes

1. Scope and architecture of the DS, applicability and exclusions (LKB)
2. Human-centred design and AI Level 2A/2B boundaries
3. AI assurance, ODD and performance
4. Continued risk assessment
5. Measurable explainability

ANSP: Air Navigation Service Provider
NPA: Notice of Proposed Amendment
DS: Detailed Specification
ODD: Operational Design Domain
LKB: Logic- and Knowledge-Based

RMT.0742 Step 1 and Step 2

Step 1

- Implementing AI Act Ch. III Sect. 2
- Soft law : proposed DS.AI
- Link to ED-324/ARP6983 (AMC Level)
- NPA 2025-07

Step 2

- Implementing AI Act Ch. III Sect. 2
- Link to existing Aviation Regulations
- Review of comments to NPA 2025-07
- NPA 2027-xx
- Re-consultation of NPA step 1

DS: Detailed Specification NPA: Notice of Proposed Amendment

RMT.0742 Step 2 goals and methods

Goal

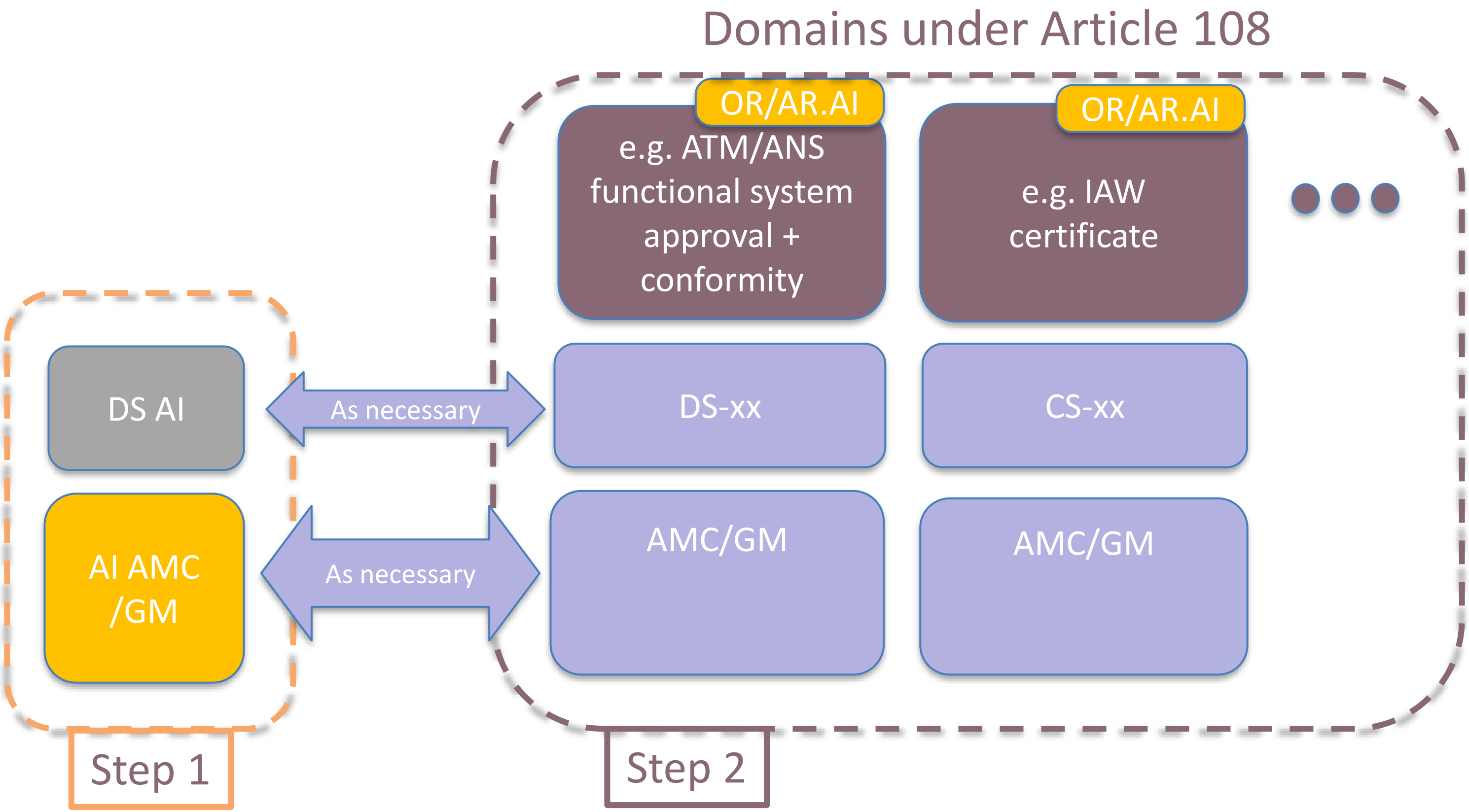
Connect the NPA Step 1 'AI trustworthiness' framework to the different domains regulations

Method

- Assess the applicable AI AMC and GM (already fully covered or not covered)
  - If fully covered not need to link
  - If not covered,
    - identify the existing regulatory paragraphs to which they should be connected
      -> draft the linking in NPA step 2
    - If none, assess the need to use the DS.AI requirement or the entire DS.AI for the domain -> draft text in NPA step 2

DS: Detailed Specification   NPA: Notice of Proposed Amendment

RMT.0742 Step 2 method (illustrated)



AMC: Accceptable Means of Compliance
IAW: Initial Airworthiness
CS/DS: Certification/Detailed Specification
NPA: Notice of Proposed Amendment
GM: Guidance Material
OR/AR: Organisations/Authorities Requirements

Rulemaking – RMT.0742 status and timeline

- Notice of Proposed Amendment NPA2025-07 proposing a **generic AI trustworthiness framework** (DS.AI) in response to EU AI Act Chapter III Section 2 published in November 2025 for 4 month consultation.

Step 1

Step 2

- Step 2 initiated early 2026, to **embed of the generic AI trustworthiness DS/AMC/GM in the existing domains Regulations** for Airworthiness, ATM/ANS and Drones.

- Step 2 NPA will be published jointly with the updated Step 1 NPA for a **full spectrum consultation in Q2/2027**.

Next consultation (Q2/2027)

DS: Detailed Specification NPA: Notice of Proposed Amendment RMT: RuleMaking Task

Anticipated evolution for RMT.0742

2018/1139 Articles	Aviation domain	AI hook source
17, 19	Airworthiness	AI Act Art. 108
27	Aircrew	2026/1744
31, 32	Air operations	2026/1744
36, 39	Aerodromes	2026/1744
43, 47	ATM/ANS	AI Act Art. 108
50, 53	ATCO licensing & training	2026/1744
57, 58	UAS / drones	AI Act Art. 108

Deployment timeline

AI Act Art. 108

Original bridge to aviation rules for Arts 17, 19, 43, 47, 57 and 58

24 Jul 2026

Regulation (EU) 2026/1744 published

★ **2026/1744 adds**

Arts 27, 31, 32, 36, 39, 50 and 53

27 Jul 2026

Entry into force; AI Act Arts 102–110, including Art. 108, apply

2 Aug 2028

Main Chapter III high-risk requirements for Annex I / Art. 6(1) systems apply

→ The new domains will be added to the Subtask#4 scope

→ This gives sufficient time to complete subtask #3 for Article 108 domains

→ RMT.0742 subtask#4 will be replanned for the other domains

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EASA AI Days 2026
Impact of AI in Aviation Organisations

Maxime Albertini
Rulemaking Officer ‘RMT.0742’

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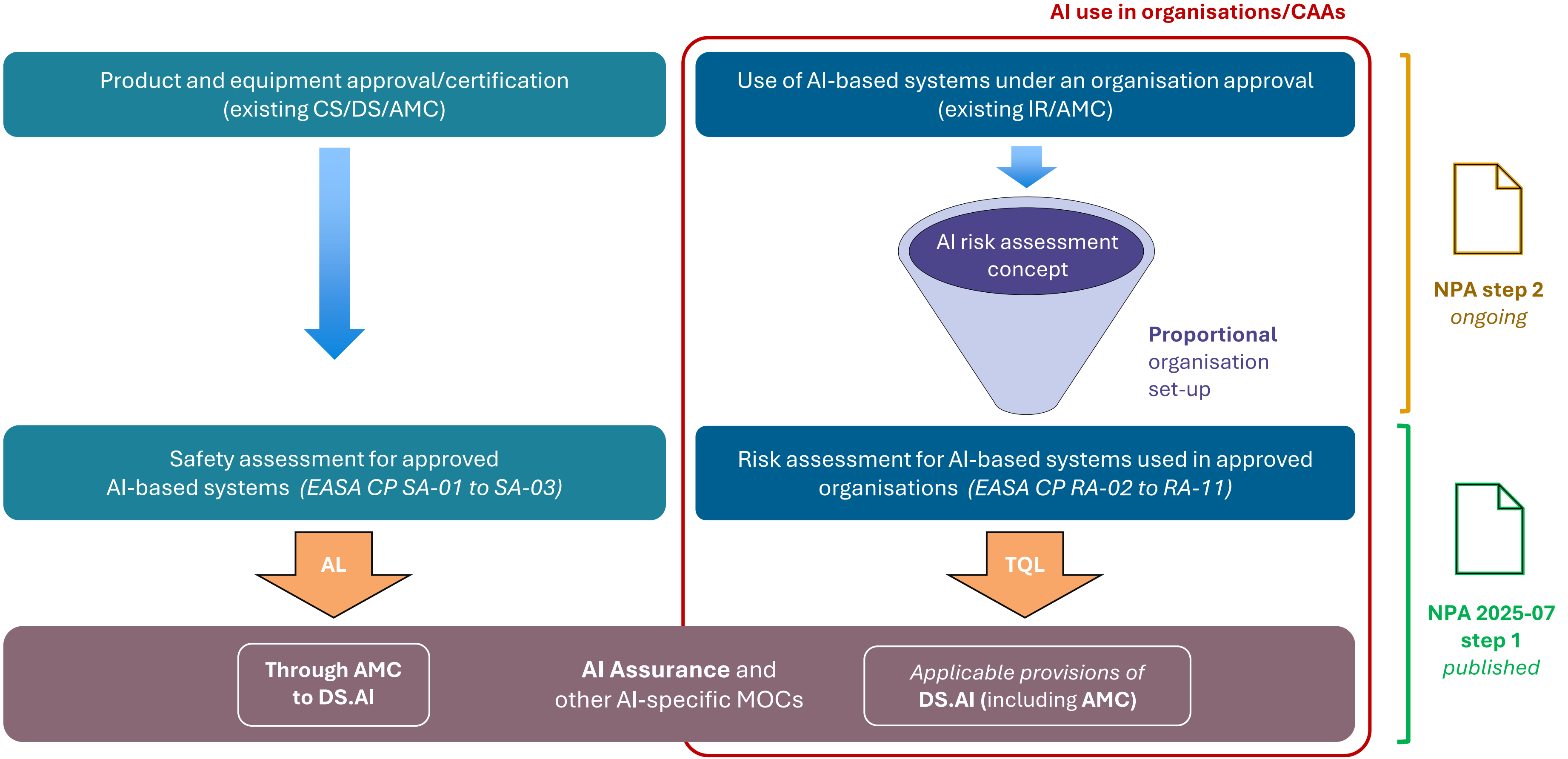
Scope of AI rulemaking (RMT.0742)



AMC: Accceptable Means of Compliance
GM: Guidance Material
CS/DS: Certification/Detailed Specification
IR: Implementing Rule
CP: Concept Paper
NPA: Notice of Proposed Amendment

Scope of AI rulemaking for approved organisations

EU civil aviation **Basic Regulation**
(Regulation (EU) 2018/1139)

EU AI Act *(Regulation (EU) 2024/1689)* - **Article 108**
+ *Regulation (EU) 2026/1744* - **Article 2**

Chapter III Section 2 *(high-risk AI systems)* to be taken into account when adopting acts

- **ATCO**
- **Air operations**
- **Aircrew**
- **Aerodromes**
- ATM/ANS equipment
- UAS
- Airworthiness

Product certification

Organisations (+ competent authorities)

Initial Airworthiness *(Reg. (EU) No 748/2012)*
- **Part 21G** (production)
- **Part 21J** (design)

Continuing Airworthiness *(Reg. (EU) No 1321/2014)*
- **Part-145/CAO** (maintenance)
- **Part-CAMO/CAO** (continuing airworthiness management)
- **Part-147** (maintenance certifying staff training)

→ Airworthiness organisations were the starting point for NPA step 2

→ Generic provisions designed for application across all domains

ATCO: Air Traffic Controller NPA: Notice of Proposed Amendment UAS: Unmanned Aircraft System

Objectives for approved organisations

Main objectives

Enable the use of AI in approved organisations while keeping controls safety-focused and proportionate

Risk focus	Proportionality	Common framework
Controls where AI-based systems contribute to activities presenting risks to safety, training effectiveness or oversight performance	Depth of assessment and mitigation depends on the intended use, level of automation, and user interaction.	A common framework across domains, adapted where necessary to each organisation and operational context.

Use of a benchmark

Maintenance organisations (Part-145) have been the starting point for drafting, before extension to other approvals.

- Maintenance data processing
- Planning resources
- Maintenance release verification
- Records management
- MOE & procedures

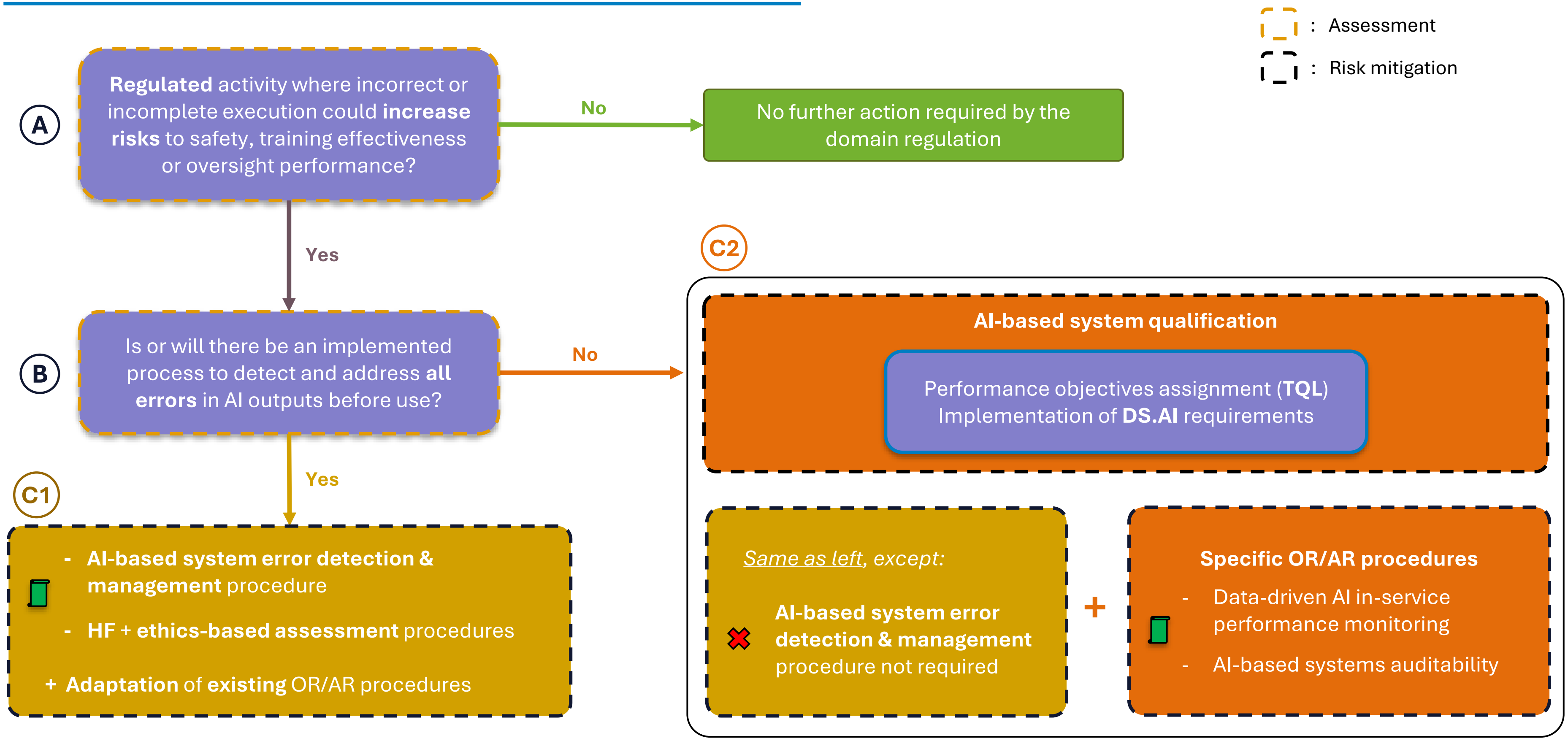
AI-based tools/equipment

To perform maintenance tasks, AI may support personnel, be supervised by personnel, or benefit from increased automation.

Various industry applications

AI-based systems risk assessment concept

Actions performed by the organisation



CS/DS: Certification/Detailed Specification OR/AR: Organisations/Authorities Requirements
TQL: Tool Qualification Level

Step A: Risk determination

Assessment prior to risk mitigation measures

The organisation has to determine if AI-based systems are used for activities which present certain risks

Review of AI uses

Inventory of AI-based systems used within the organisation's scope of approval

Link to activities

AI considered used for an activity if it performs it or its outputs affect the result.

AI Level 1A and above

Assess activity risk

Determine whether the activity presents a relevant risk (when not properly carried out)

- For **approvals with an SMS** (e.g. Part-145) → consider aviation safety hazards and risks identified through the organisation's SMS.
- For CAAs, consider risks to approval and oversight performance identified with the management system.
- Exploring clarifications to the assessment objectives & process, as relevant.

Continuous review

When new AI-based systems are introduced, or when intended use of outputs change the initial determination.

NOT a failure-probability exercise but a simple decision on whether risk mitigation is needed.

AI-based systems **inventory** + **AI-risk determination procedure** *(expected CAA approval)* + assessment **records**

CAA: Civil Aviation Authorities SMS: Safety Management System

Step B: Risk mitigation path

AI-based system used for activities presenting a risk

Step C1

Output verification & error handling

Ensure **verification** of **all AI-based system outputs** before use either through:

– Systematic **checks by** involved **personnel**

– **Automated checks** by non-AI software

Key elements

- Output acceptance **criteria**
- **Actions** and **Reporting** arrangements in case of errors
- **Appropriate HMI** for personnel

Output verification procedure *(expected CAA approval)* + implementation **records**

Step C2

System qualification

CAA: Civil Aviation Authorities HMI: Human-Machine Interface

Step C1: Organisational adaptations

Purpose

Preparing involved personnel to appropriately use AI-based systems and manage potential errors

Existing

Changes to organisation manual & procedures

- Assignment of **responsibilities**
- **Training** and **competence** of involved **personnel**
  - characteristics, limitations & expected interactions
  - error detection & handling
- **Reporting** and **investigation** of AI-related events
- **Exchange of information** with suppliers & developers

+

New

Human factors assessment process

- **Assessment of HF aspects posing risks**, including:
  - impairment of judgement, decision-making, situational awareness, and oversight
  - **overreliance**, influence on behaviour & workload
  - personnel **deskilling** & competence erosion
- Implement **mitigation measures** (e.g. verifications, training, limitations, instructions, etc.)

Ethics-based assessment process

Updated OR + HF & ET assessment procedures
(expected CAA approval) + implementation **records**

CAA: Civil Aviation Authorities ET: Ethics-based assessment HF: Human Factors OR: Organisations Requirements

Step C2: AI-based system qualification + OR adaptations

Purpose

Qualification ensures that the system **performs** within **specified boundaries** for the **intended use** and **operating conditions**

AI-based system specifications

\+

Same OR. adaptations as *previous slide*

Produce evidence

Obtain & assess evidence

Acceptable means of compliance

e.g.
DS.AI
NPA 2025-07

In-service performance monitoring

As necessary

Corrective actions

1. **Self-developed** systems or **procured** from an external source
2. Establish **operational performance boundaries**

1. Monitor **operational data** and **events**
2. Define **assessment methods** & **frequency**

Introduction of **limitations**, **suspension**, **requalification**, **changes**, or **retraining**.

Qualification & monitoring procedures *(expected CAA approval)* + implementation **records**

Key areas under development

Ongoing activities

Building and refining remaining blocks to complete the framework for AI in organisations

Scope of ethics

Further work is needed on how ethical aspects (defined in the EU AI Act) should be addressed in domain regulations.

DS.AI risk assessment (DS.AI.130)

Develop risk assessment provisions usable by organisations to define the TQL, a pre-requisite to system qualification.

Proportionality by approval

Adapt expected TQL and evidence depth to the risk level, considering the intended use and the type of organisation.

SMS suitability

Review how SMS-based risk assessment applies & explore whether further guidance is needed.

Methodology

Those topics will be addressed as NPA Step 2 is being drafted and **tested against sample cases**.

TQL: Tools Qualification Level

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EASA AI Days 2026
Rulemaking – Q&A

www.sli.do
#aidays2026
Passcode: nyg15q

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AI Olympics!

You have a slot

in the

EASA AI Days

CONGRATS!

You are on the TOP 10 !!!

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EASA AI Days 2026

Coffee break – 09:30 to 10:30

Please visit the AI olympics!

www.sli.do

#aidays2026

Passcode: nyg15q

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EASA AI Days 2026
Industry Research Projects : SESAR JU & JARVIS

Moderator: Andrew Kilner
EASA

Riccardo Massacci
SESAR JU AI Coordinator

Dmitrii Kirov
JARVIS / Collins

Elisa Spiller
JARVIS / Collins

EASA AI Days 2026

Riccardo MASSACCI – SJU Programme Manager

AI in SESAR: Towards Human–AI Teaming and Higher Automation

10 September 2026 - Cologne

ATM Challenges and Solutions

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ATM CHALLENGES

Air Traffic Management operates in one of the most complex, tightly constrained and dynamic environments

TRAFFIC GROWTH
More traffic, more pressure

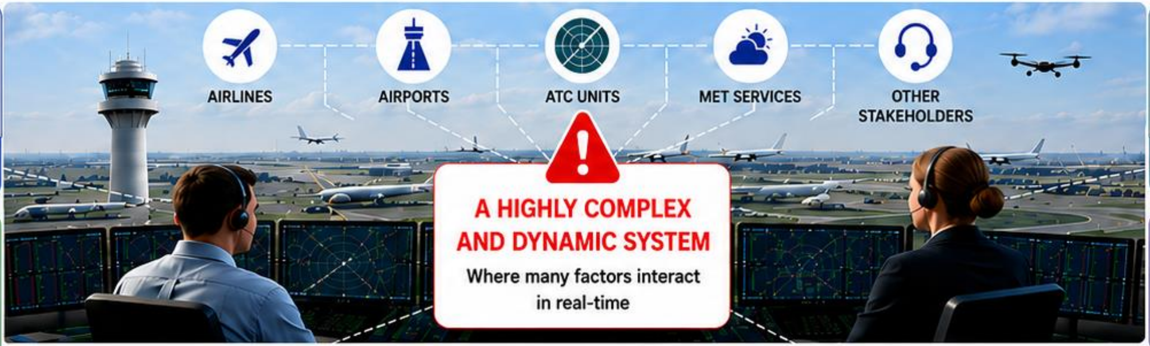
PUNCTUALITY PRESSURE
Every minute matters

CONTROLLER WORKLOAD
People at the limit

INFORMATION FRAGMENTATION
The right info, at the right time

CAPACITY CONSTRAINTS
Limited capacity, infinite demand

WEATHER AND UNCERTAINTY
Unpredictable by nature



CYBERSECURITY THREATS
Security is mission critical

SAFETY AND RISK MANAGEMENT
Safety, always

DYNAMIC AND UNPREDICTABLE SYSTEM
Change is constant

STAKEHOLDER COORDINATION
Working together, every day

INTEGRATION OF DRONES
New users, new challenges

MILITARY–CIVIL COORDINATION AND COOPERATION
One sky, one team

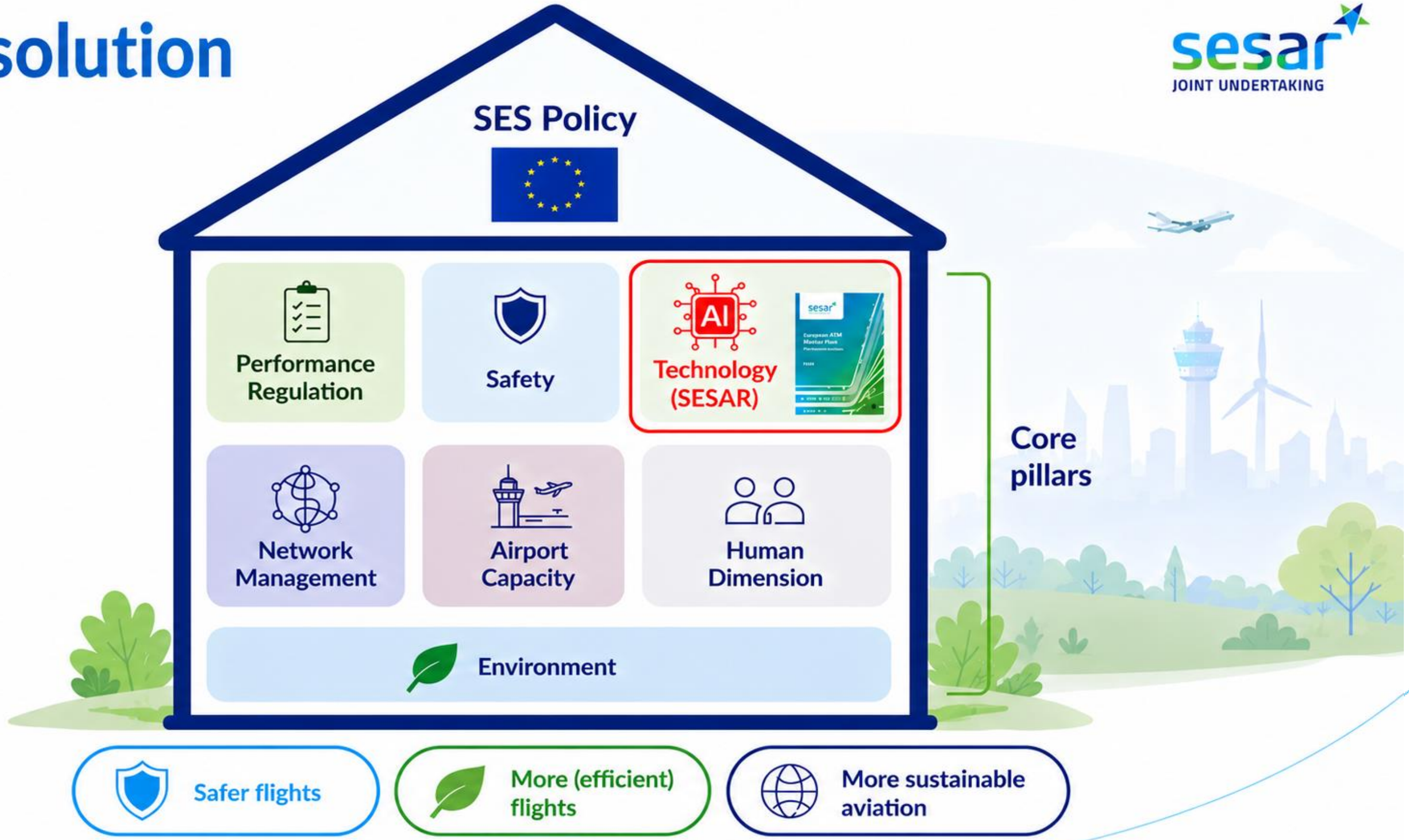
DELIVERING REAL BENEFITS for Europe's ATM

- **SAFETY** Enhanced safety for all
- **CAPACITY** More capacity, less delay
- **EFFICIENCY** Lower costs, better performance
- **SUSTAINABILITY** Lower emissions, smarter use of resources
- **HUMAN PERFORMANCE** Better decisions, lower workload

MEETING THESE CHALLENGES REQUIRES INNOVATION, COLLABORATION AND NEW TOOLS

Smarter decisions | Stronger partnerships | Safer, more efficient and sustainable operations

The solution



AI Techniques applied in DES

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SESAR AI TECHNIQUES TAXONOMY

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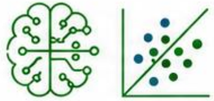
JOINT UNDERTAKING

THE 6 HIGH-LEVEL AI CATEGORIES

1 MACHINE LEARNING



Algorithms that learn patterns from data to make predictions or decisions without being explicitly programmed.

Includes:
- Supervised Learning
- Unsupervised Learning (e.g., clustering)
- Transfer Learning
- Multimodal Machine Learning
- Deep Learning (e.g., CNN, RNN, LSTM, ANN)
- Pattern Discovery (e.g., clustering, anomaly detection)

TYPICAL USE CASES IN ATM
- Traffic flow prediction
- Demand forecasting
- Delay prediction
- Anomaly detection
- Aircraft trajectory prediction
- Capacity estimation

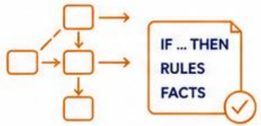
2 REINFORCEMENT LEARNING

AI that learns by interacting with an environment and receiving rewards or penalties to maximise cumulative outcomes.

Includes:
- Reinforcement Learning
- Deep Reinforcement Learning
- Multi-Agent Reinforcement Learning

TYPICAL USE CASES IN ATM
- Dynamic sectorisation
- Tactical conflict resolution
- Adaptive flow management
- Runway assignment optimisation
- Adaptive scheduling
- Multi-agent coordination

3 LOGIC- AND KNOWLEDGE-BASED AI

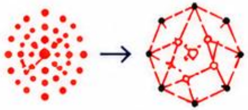


AI based on explicit knowledge, rules and logic to represent, reason and derive conclusions.

Includes:
- Knowledge Graphs
- Rule-Based Reasoning
- Expert Systems
- Logical Reasoning & Inference
- Compliance Logic Trees

TYPICAL USE CASES IN ATM
- Regulatory compliance checking
- Airspace classification
- NOTAM interpretation
- Policy consistency checking
- Decision support systems
- Procedural compliance monitoring

4 GENERATIVE AI



AI that creates new content, data or solutions based on learned patterns.

Includes:
- Synthetic Data Generation
- Generative Models (e.g., GANs, VAEs, Diffusion Models)
- Large Language Models (LLMs)

TYPICAL USE CASES IN ATM
- Scenario generation
- Synthetic training data creation
- What-if analysis & simulation
- Natural language report generation
- Automated briefing generation
- Concept & solution ideation

5 COMPUTER VISION

AI that interprets and understands visual information from images or video.

Includes:
- Image Recognition
- Object Detection
- Visual Feature Extraction
- Image Segmentation

TYPICAL USE CASES IN ATM
- Aircraft and vehicle detection on apron/runway
- Taxiway/runway incursion detection
- Surveillance data interpretation
- Damage detection (runway, infrastructure)
- Weather phenomenon detection from imagery

6 SPEECH & LANGUAGE AI

AI that understands, interprets and generates human language and speech.

Includes:
- Speech Recognition
- Natural Language Processing (NLP)
- Natural Language Understanding (NLU)
- Speech Transcription
- Machine Translation

TYPICAL USE CASES IN ATM
- Voice-based ATC assistance
- Automatic speech transcription
- Information extraction from text
- Multilingual communication
- Conversational interfaces
- Semantic search over documents

SESAR AI TECHNIQUES – PROJECTS BREAKDOWN

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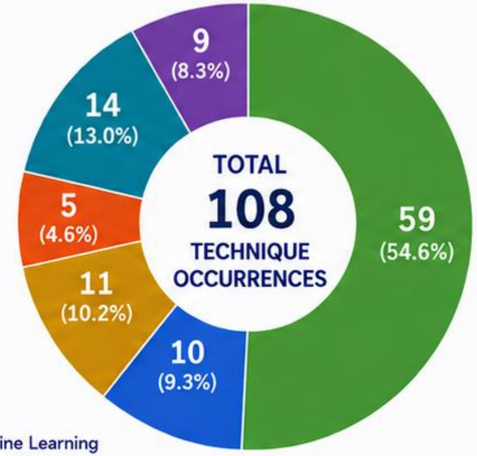
Distribution of AI techniques used across SESAR ER & IR projects

ALL PROJECTS (ER + IR COMBINED)

Across 62 Projects



1 Machine Learning
2 Reinforcement Learning
3 Logic- and Knowledge-Base AI
4 Generative AI
5 Computer Vision
6 Speech & Language AI

AI TECHNIQUE	OCCURRENCES (ACROSS PROJECTS)	% OF TOTAL OCCURRENCES
1 Machine Learning	59	54.6%
2 Reinforcement Learning	10	9.3%
3 Logic-and Knowledge-Base AI	11	10.2%
4 Generative AI	5	4.6%
5 Computer Vision	14	13.0%
6 Speech & Language AI	9	8.3%
TOTAL	108	100%

JARVIS PROJECT – TECHNIQUES USED

	Machine Learning	Reinforcement Learning	Logic-and Knowledge-Base AI	Generative AI	Computer Vision	Speech & Language AI
JARVIS	✓	✓	✓	–	✓	✓

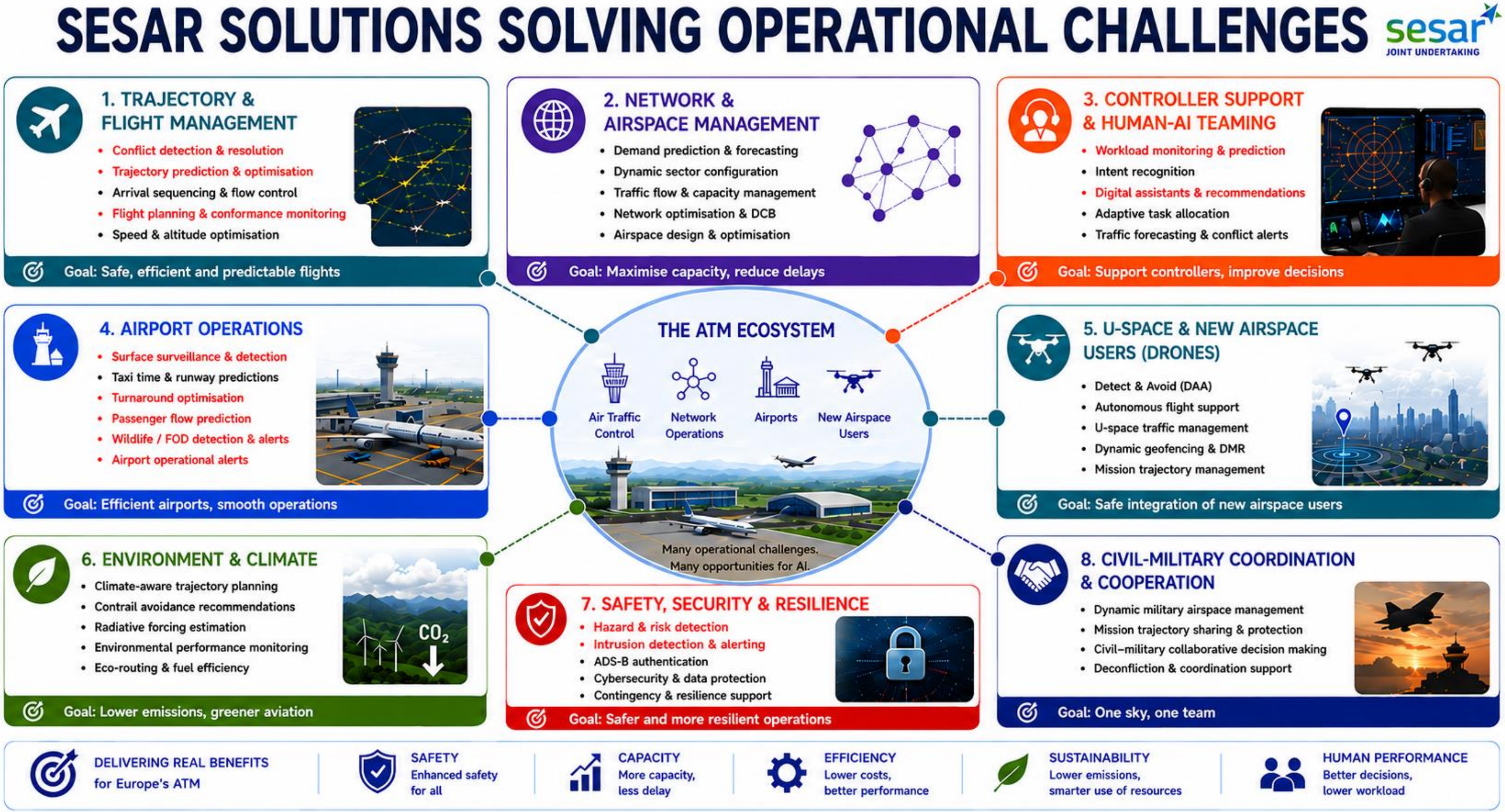
Note: Projects can use multiple AI techniques. Therefore, the total count represents occurrences of techniques across projects, not mutually exclusive projects.

OVERALL SUMMARY

62 TOTAL PROJECTS (ER + IR)

108 TOTAL AI TECHNIQUE OCCURRENCES

MULTIPLE TECHNIQUES CAN BE USED BY A SINGLE PROJECT



Use cases in red are addressed by JARVIS

AI in Support of Automation

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JOINT UNDERTAKING

EASA AI AUTOMATION LEVELS FOR AVIATION APPLICATIONS (LEVELS 1A–3B)

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European Union Aviation Safety Agency

Based on EASA Concept Paper – Proposed Issue 03 (June 2026)

AI LEVEL	EASA LABEL	WHAT THE AI SYSTEM DOES	HUMAN ROLE & AUTHORITY
3B	Non-supervised advanced automation	AI makes decisions and takes actions without human supervision.	No operational end user involved.
3A	Safeguarded advanced automation	AI makes decisions and takes actions in most situations within a high AI authority.	Limited human authority, mainly upon alerting or when safety requires intervention. MASTER PLAN LEVEL 4 AUTOMATION
2B	Human–AI collaboration	AI makes some decisions and actions. Human supervises and can intervene.	Partial human authority. Human supervises and can intervene.
2A	Human–AI cooperation	AI automatically proposes a decision or action. Human cross-checks before approval.	Full human authority. Human cross-checks every decision and takes final action.
1B	Human assistance	Provides recommendations or alternatives and supports the human in deciding.	Full human authority. Human decides with AI support.
1A	Human augmentation	Provides information, data and assessments to increase human understanding.	Full human authority. Human decides.

KEY BOUNDARIES

1A → 1B: information support → decision support

1B → 2A: decision support → automatic decision/action

2A → 2B: every decision cross-checked → some decisions without prior cross-check

2B → 3A: some decisions under supervision → high level of AI authority

3A → 3B.: supervised → non-supervised operations

AI AUTOMATION LEVELS ACROSS THE SESAR RESEARCH PIPELINE

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Based on EASA Concept Paper – Proposed Issue 03 (June 2026)

EASA European Union Aviation Safety Agency

EASA AI AUTOMATION LEVELS

INCREASING AI AUTHORITY

3A — **Safeguarded advanced automation**
AI makes decisions and takes actions in most situations within a high AI authority.

2B — **Human–AI collaboration**
AI makes some decisions and actions. Human supervises and can intervene.

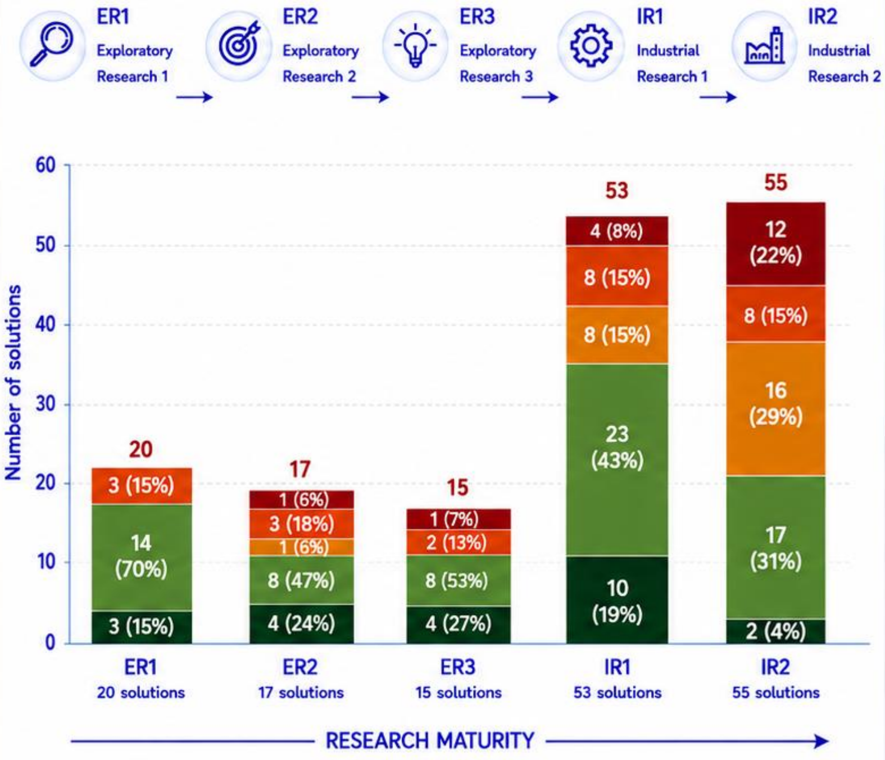
2A — **Human–AI cooperation**
AI proposes decisions or actions. Human cross-checks every decision.

1B — **Human assistance**
AI supports the human with recommendations or alternatives.

1A — **Human augmentation**
AI provides information and insights to increase human understanding.

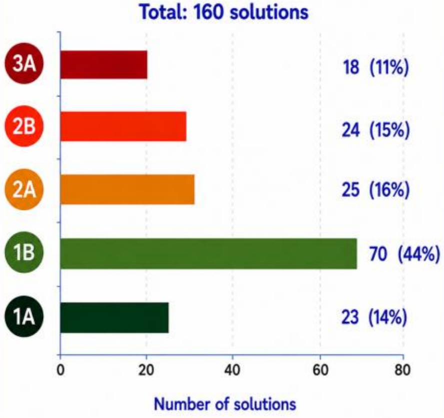
DISTRIBUTION OF AI SOLUTIONS BY RESEARCH PHASE

(Number of solutions)



OVERALL PORTFOLIO SNAPSHOT

(All research phases combined)



KEY HIGHLIGHTS

- 44% of solutions are at Human Assistance (1B), the most prevalent automation level.
- IR2 (Industrial Research 2) shows the highest investment in advanced automation: 37% of solutions are at levels 2B–3A.
- ER phases are primarily focused on lower automation levels (1A–1B).
- Several ER projects not captured in this database are frameworks and enablers underpinning higher automation levels.

ER = Exploratory Research | IR = Industrial Research

** Based on current mapping (August 2026) – 160 solutions*

Challenges in Deployment

DEPLOYMENT OF SOLUTIONS

Is not only a technology challenge, but more than that.

TECHNOLOGIES ENABLED BY AI

Developed and validated by SESAR R&I

→

DEPLOYMENT REQUIRES MORE THAN TECHNOLOGY

→

OPERATIONAL IMPACT

Real benefits for European aviation

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AI CHALLENGES IN AIR TRAFFIC MANAGEMENT

1 DATA GOVERNANCE

Limited availability of high-quality, shareable data, plus issues around ownership, access, and standardization.

- Data silos
- Access restrictions
- Ownership issues
- Lack of standardization

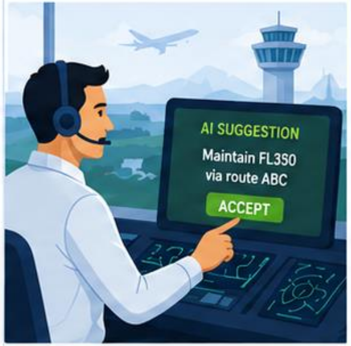
2 TRUST AND EXPLAINABILITY

AI systems must be transparent and explainable so that controllers and regulators can understand and trust their outputs.

- Transparency
- Explainable outputs
- Understandable logic
- Build trust

3 HUMAN ACCEPTANCE

Successful deployment depends on user trust, training, and effective human–AI interaction.



- User trust
- Training & knowledge
- Human–AI interaction
- Change management

4 REGULATION (ROLES & ACCOUNTABILITY)

Clear frameworks are needed to define accountability between humans and AI systems in operational decision-making.

- Defined roles
- Accountability
- Oversight & audit
- Governance framework

5 CERTIFICATION

Ensuring AI systems meet strict aviation safety standards.

- Safety assessment
- Verification & validation
- Compliance with standards
- Continuous monitoring

ADDRESSING THESE CHALLENGES IS ESSENTIAL TO DEPLOY SAFE, RELIABLE AND TRUSTED AI SOLUTIONS THAT SUPPORT CONTROLLERS AND ENHANCE OPERATIONAL PERFORMANCE.

Conclusions

KEY TAKEAWAYS

FROM AI RESEARCH TO OPERATIONAL IMPACT

1 — AI is a key enabler of the Digital European Sky
Improving safety, capacity, efficiency, sustainability and human performance.

2 — SESAR is building a broad and diversified AI portfolio
Multiple AI techniques addressing operational challenges across the entire ATM ecosystem.

3 — Deployment requires more than technological maturity
Data quality and sharing, trust, explainability, human acceptance, assurance and regulation are critical to move to operations.

4 — Exploratory research is today still predominantly human-centric
Most solutions are at EASA Levels 1A–1B.
At the same time, several projects are already focused on enabling higher automation levels.

5 — IR2 will push the automation frontier
IR2 shows the highest investment in advanced automation: 37% of solutions are at levels 2B–3A.

Level 2B → Level 3A

ADVANCING AI AUTHORITY WHERE IT CREATES VALUE
while keeping safety, trust and the human role at the centre.

SAFETY | CAPACITY | EFFICIENCY | SUSTAINABILITY | HUMAN PERFORMANCE

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THANK YOU FOR YOUR ATTENTION!

ANY QUESTIONS?

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EASA AI Days 2026

Industry Research Projects : SESAR JU & JARVIS

Moderator: Andrew Kilner
EASA

Riccardo Massacci
SESAR JU AI Coordinator

Dmitrii Kirov
JARVIS / Collins

Elisa Spiller
JARVIS / Collins

JARVIS

Insights from LKB* Reasoning Assurance and Ethics Assessment

* LKB: Logic and Knowledge Based

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Co-funded by the European Union

Dmitrii Kirov (Collins Aerospace)
Elisa Spiller (Deep Blue)

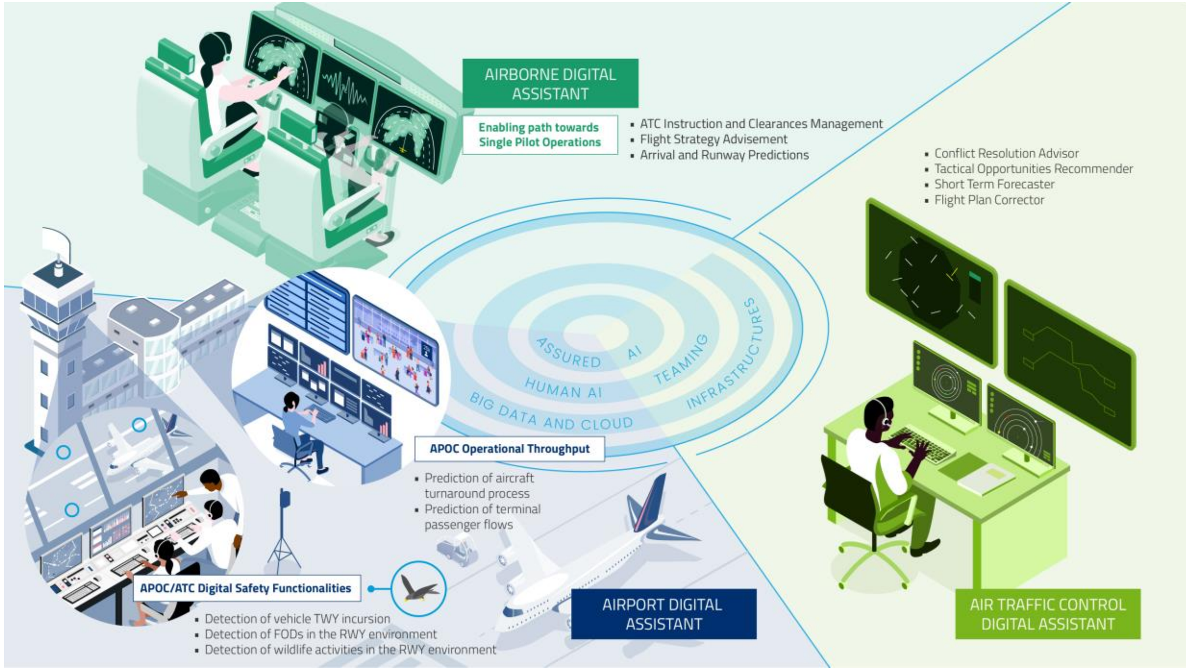
EASA AI Days| 10 September 2026

JARVIS

Outline

- Introduction: JARVIS
- Use case: Airborne Digital Assistant
- Logic & Knowledge Based AI – assurance considerations
- AI Ethics Assessment
- Preview: JARVIS-CONNECT

JARVIS: Just a Rather Very Intelligent System



- SESAR IR (Industrial Research) project, 3 years, **ended in May 2026**
- JARVIS developed and validated **AI-based digital assistants** that would enhance existing ATM operations and enable new ones
- **Key target** – increase human performance: acceptability, situational awareness, workload
- First steps towards **SRIA Automation Level 4**, Enhanced Ground Ops and Reduced Crew Ops

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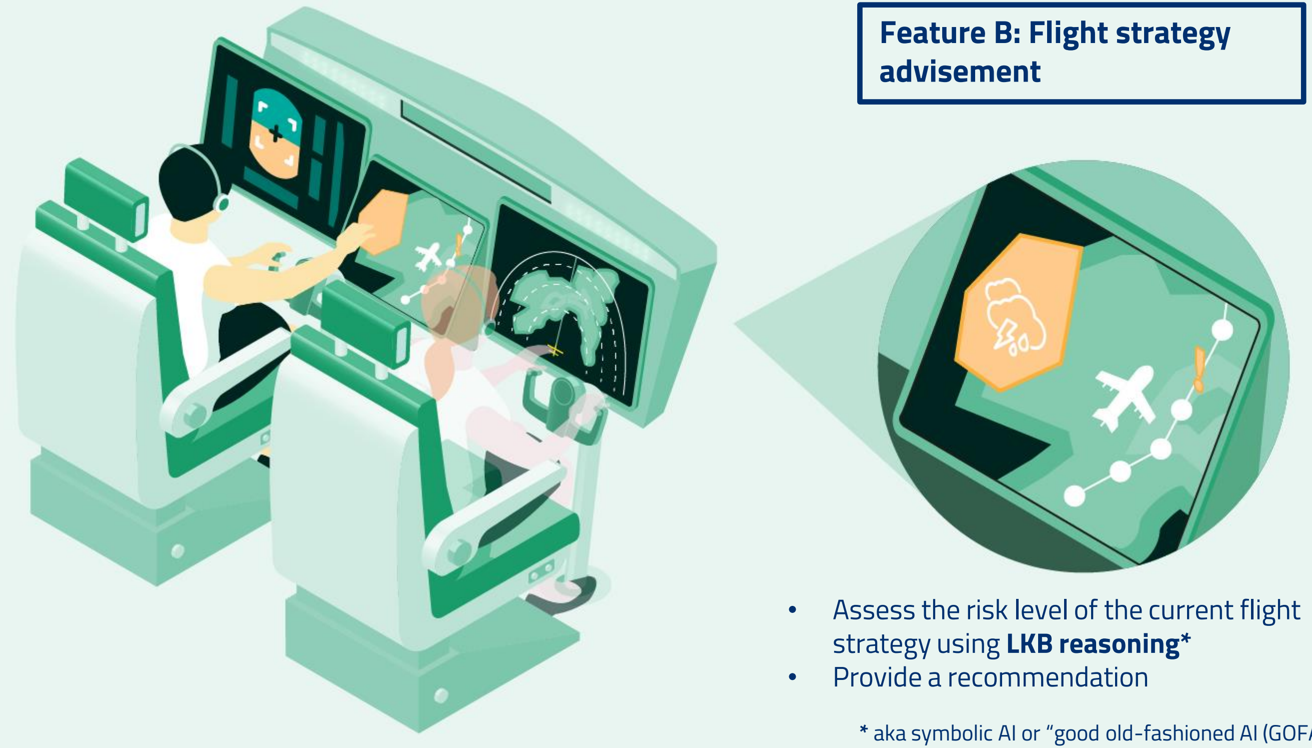


Feature B: Flight strategy advisement

- Assess the risk level of the current flight strategy using **LKB reasoning***
- Provide a recommendation

* aka symbolic AI or "good old-fashioned AI (GOFAI)"

Benefits

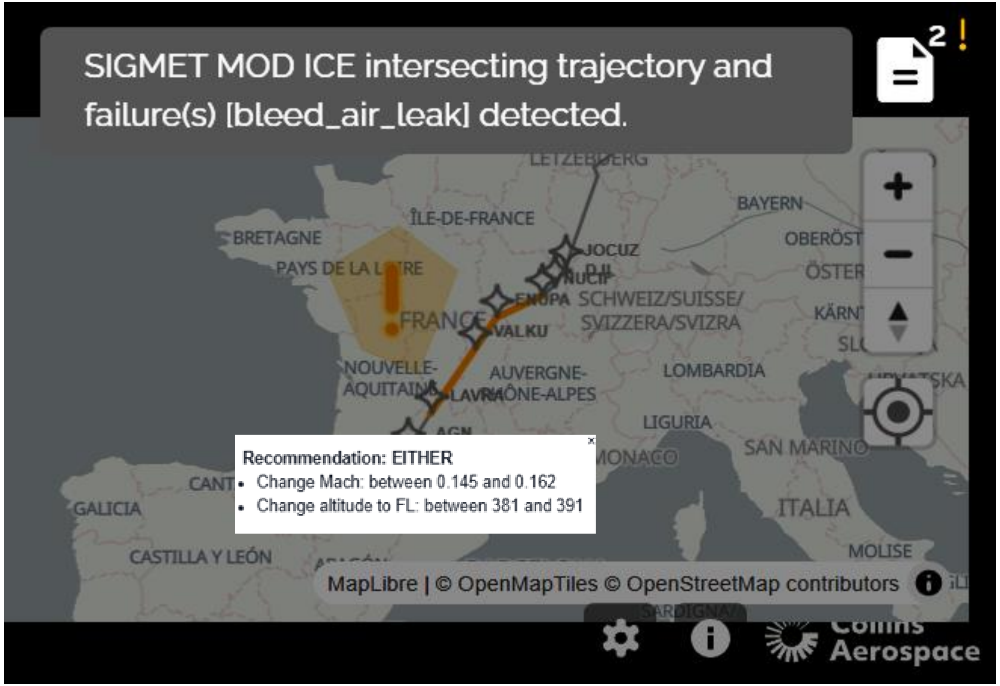
DECREASED WORKLOAD

IMPROVED FLIGHT EFFICIENCY

SITUATION AWARENESS

Feature B Example: Risky Trajectory

The interface switches to a map-based view when a risky avoidance region event is detected.



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Feature B Example: Risky Trajectory

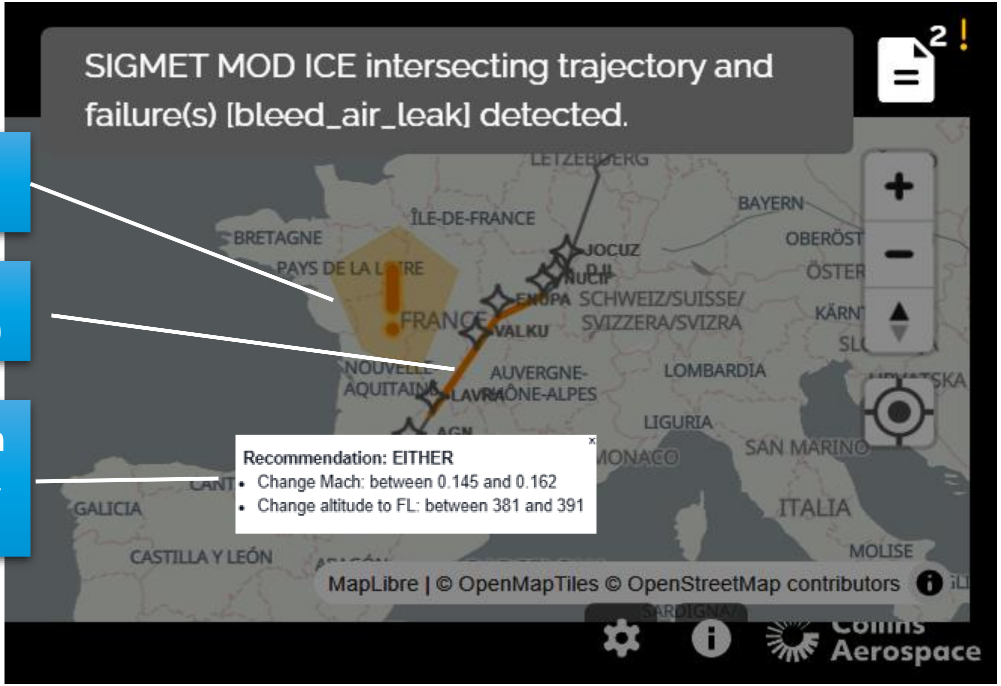
JARVIS

The interface switches to a map-based view when a risky avoidance region event is detected.

Meteo event

Risky trajectory segment (orange)

Recommendation (speed change or FL change)



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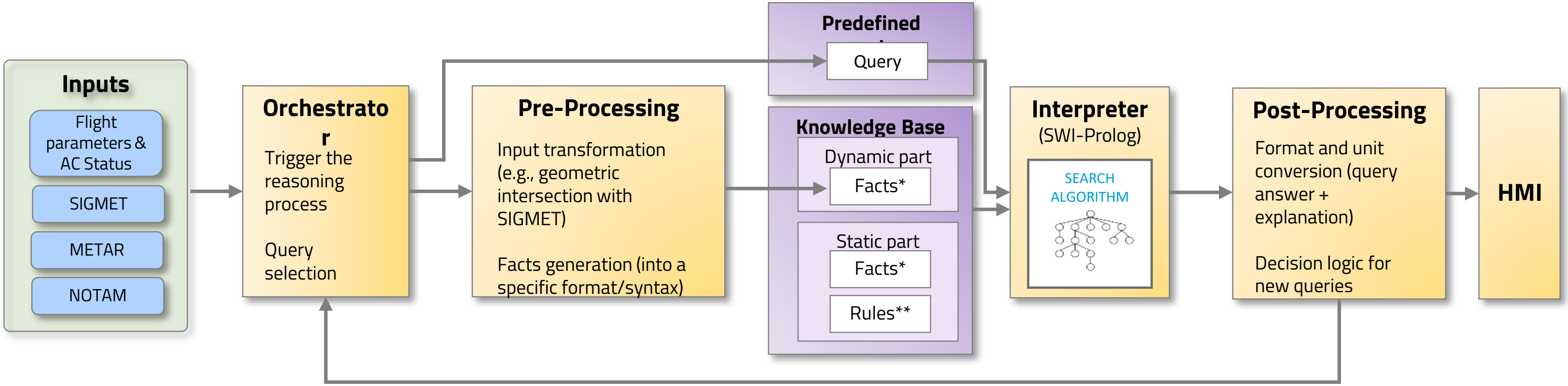
Logic and Knowledge Based AI

Assurance considerations

JARVIS AI/LKB System Description



Imperative program
Declarative program

* Facts are both **static** and **dynamic**, they represent the current flight context. Static facts include AC characteristics and FMS database.
** Rules are **static**, they are extracted from SME (pilots,…), ICAO docs, AC flight and op manuals

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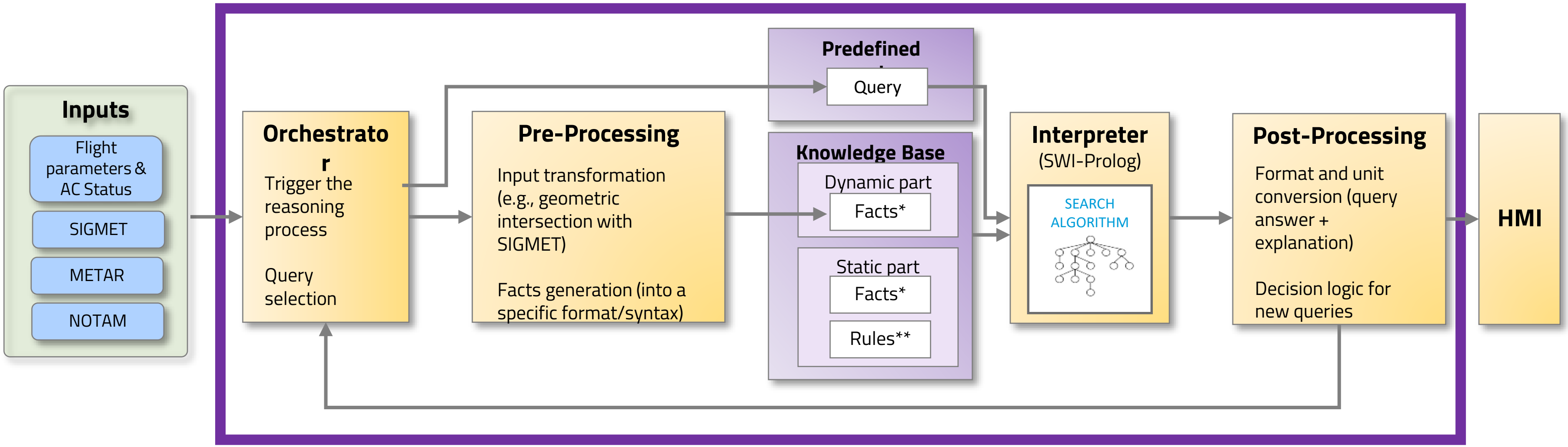
JARVIS AI/LKB Constituent

AI/LKB Constituent (as per EASA AI Concept Paper Issue 03)



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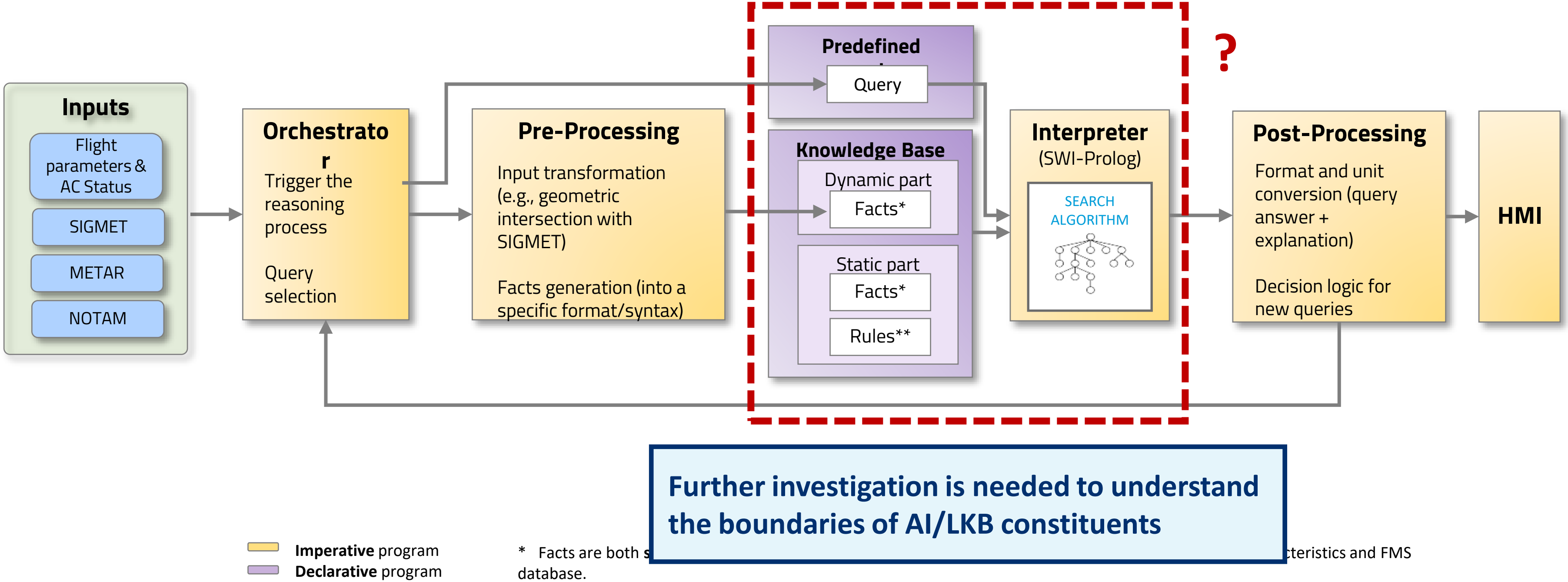

Further investigation is needed to understand the boundaries of AI/LKB constituents

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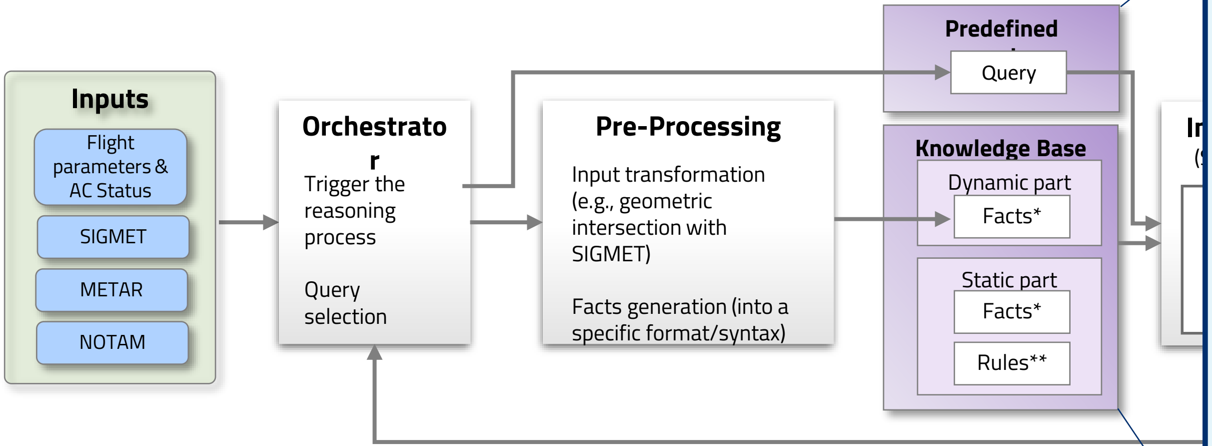
JARVIS LKB Definition (K-LKB-01)



- LKB language: Prolog
- Rules and Facts are Prolog predicates
- Knowledge base is created using flight manuals and domain knowledge – no reuse of any existing KB

Rule **Facts**

```
actual_landing_distance_multiplier(X) :-
    (
        (ac_type('turbojet') -> X=1.67) ;
        (ac_type('turboprop') -> X=1.7)
    ).
```

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Declarative program

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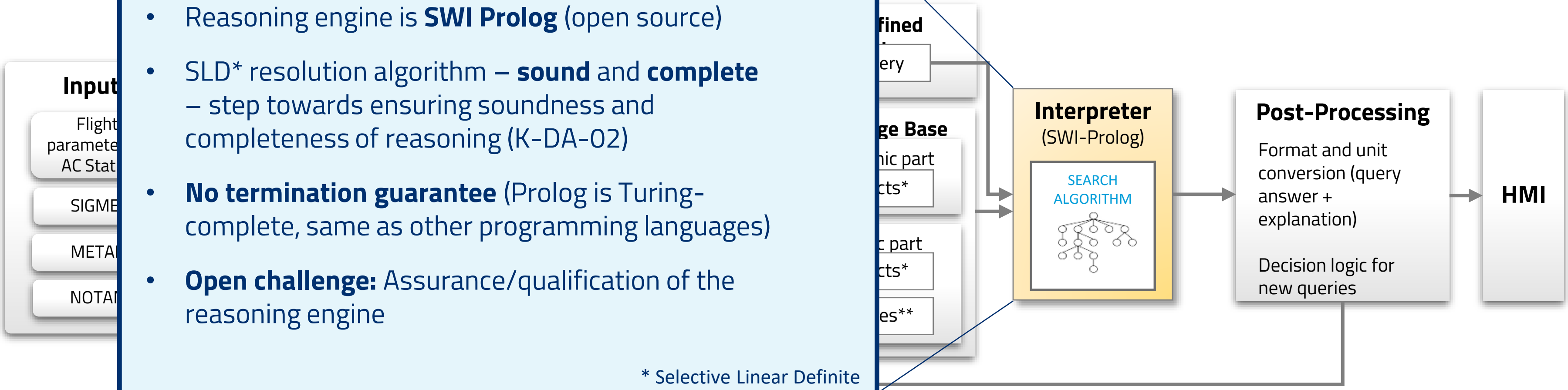
JARVIS Reasoning Engine Definition (K-LKB-02)

- Reasoning engine is **SWI Prolog** (open source)
- SLD* resolution algorithm – **sound** and **complete** – step towards ensuring soundness and completeness of reasoning (K-DA-02)
- **No termination guarantee** (Prolog is Turing-complete, same as other programming languages)
- **Open challenge:** Assurance/qualification of the reasoning engine

* Selective Linear Definite



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JARVIS

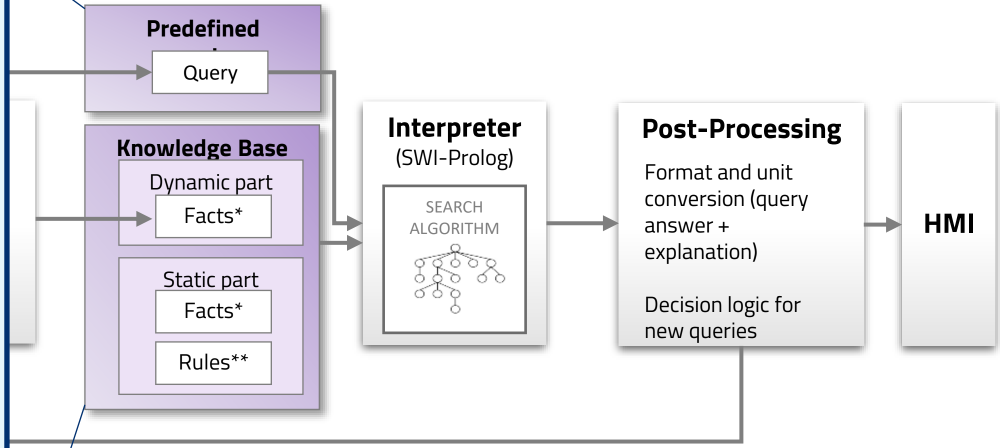
LKB Verification (K-LKB-03)

- **Bottom-up way**: see what can be verified for the KB
- Approach: Property verification with **formal methods**[1]
- Structured methodology to provide formal guarantees for reasoning systems

Property verification
Type checking: ensure compatibility
Determinacy: how many answers to the query?
Tool: CiaoPP[2]

Reachability analysis
Detect logically unreachable code
Detect dead code
Tool: CiaoPP

Termination analysis
Prove mode-dependent termination
Hard problem with recursive logic rules!
Tools: cTI [3]and AProVE[4]



[1] A. Claviere, R. De Masellis, D. Kirov, S. Minopoli, and S. F. Rollini. *Assurance Considerations for AI-Based Reasoning Systems in Avionics*. In Proc. of Digital Avionics Systems Conference (DASC), Sept. 2026.

[2] https://ciao-lang.org/ciao/build/doc/ciaopp.html/
[3] https://www.cs.unipr.it/cTI/
[4] https://aprove.informatik.rwth-aachen.de/

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JARVIS

ODD Definition

Inputs

Flight parameters & AC Status

SIGMET

METAR

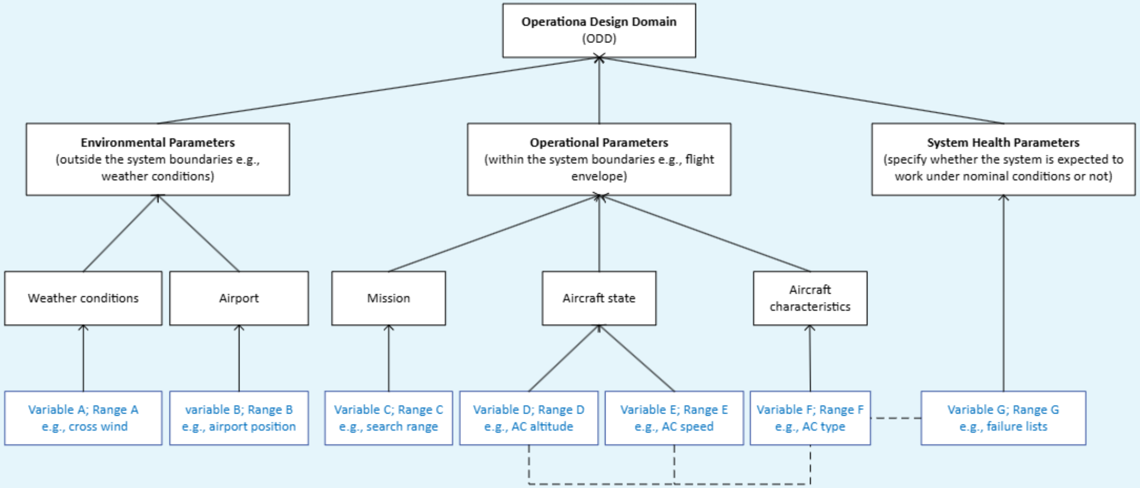
NOTAM

Orchestrat r

Trigger the reasoning process

Query selection

HMI



Snippet of the Feature B ODD for the “suitable runway” scenario (19 variables, 10^{60}+ possible value combinations)

- ODD is a key artifact for verifying the completeness of the Knowledge Base
- **Challenge:** Capturing variable dependencies

Imperative

Declarative

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Takeaways (LKB Assurance)

- JARVIS developed an AI/LKB system for helping pilots with flight strategy assessment using Prolog
- Identified Prolog-specific and general LKB assurance considerations (e.g., massive space of possible queries, reachability, termination)
- Formal methods provide promising means for LKB verification – yet further work is required to define LKB consistency and completeness assurance cases
- Collaboration between JARVIS and EASA helped to guide the exploration of the assurance approach and informed the recent EASA AI Concept Paper Issue 03

AI Ethics Assessment

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If **JARVIS (Feat.B)** is technologically feasible…

…how can we make it also

Ethically Sound

→ **Systemic Ecosystem View**
Evaluating AI not as isolated code, but through its impact on pilots, operations, and procedures

→ **Medium-to-Long-Term Horizon**
Looking beyond immediate flight tests to career-span skills, authority, and trust

→ **Proactive Governance, Step by Step**
Eliciting operational friction points early to govern the AI transition during concept design

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How we explored this perspective

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Feat.AI

By DeepBlue

A structure, iterative, multidisciplinary, and participatory approach to AI ethics, grounded in Human-Centred Design (HCD).

How we explored this perspective

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Could AI be fostering automation bias?

Less active pilot engagement?
Progressive deskilling over time?

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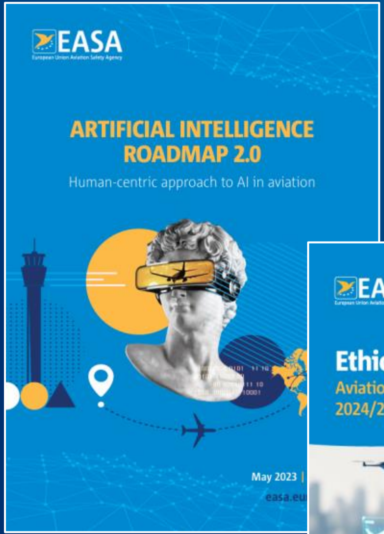

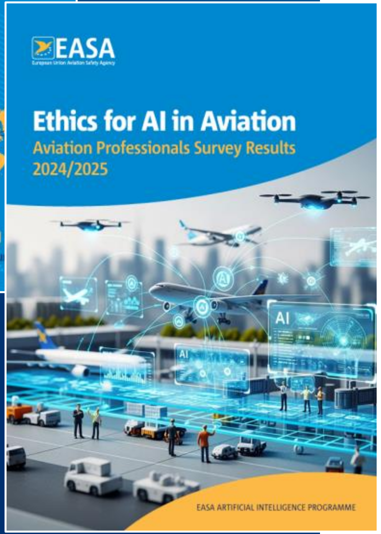

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Acting on opaque AI recommendations?
Bearing full legal responsibility?

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Could AI implementation undermine Just Culture?

Will system logging turn safety auditing into crew surveillance?
Could perceived data misuse compromise non-punitive reporting?

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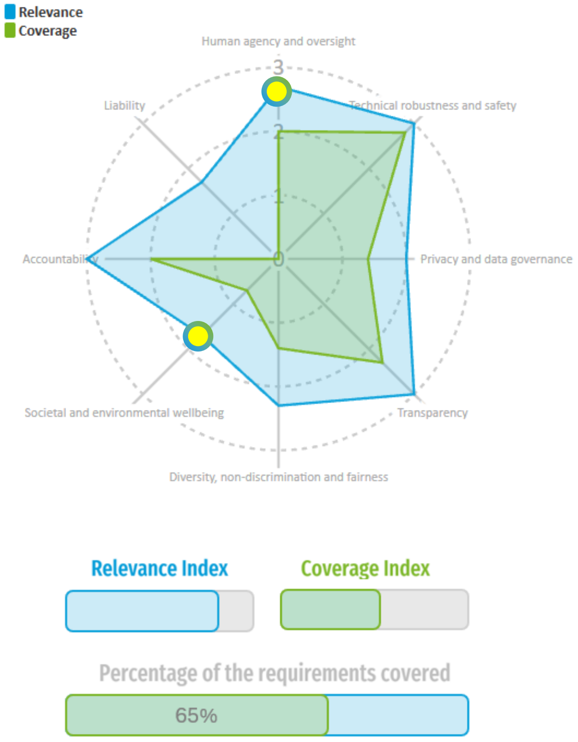
What
Findings



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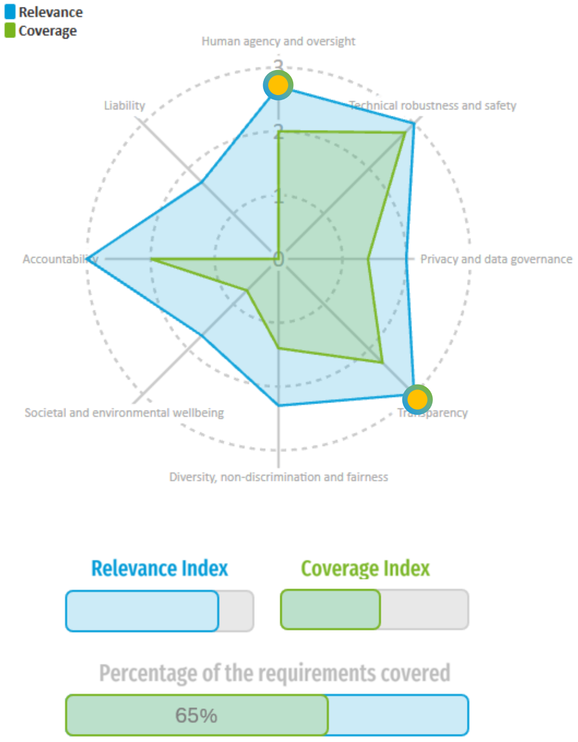
01. Human Oversight & Societal Wellbeing

What in Feature B: Deskilling & Automation Bias

Prolonged reliance risks reducing PIC decision-making capabilities and long-term airmanship.

What Findings



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02. Transparency & Human Oversight

What in Feature B: Limited Contextual Awareness

Missing timestamps in AI recommendations complicate real-time and retrospective oversight.

What

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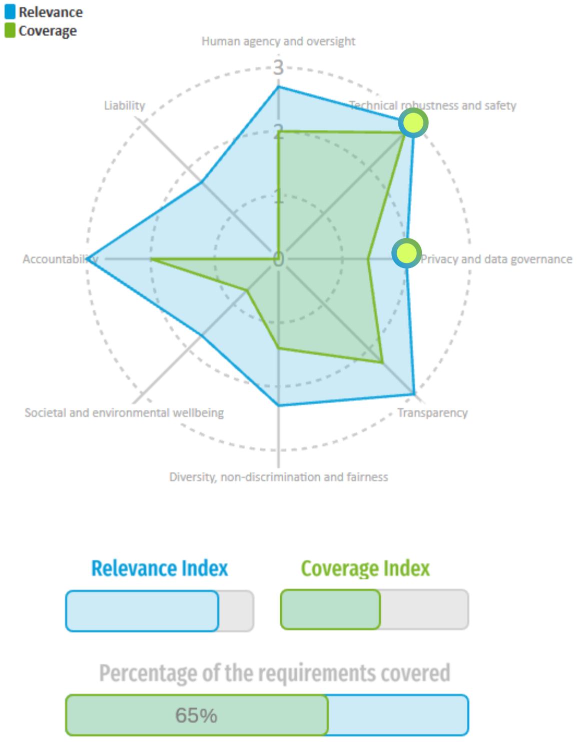

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Risk of unfeasible recommendations and data/model pollution from operational inputs.

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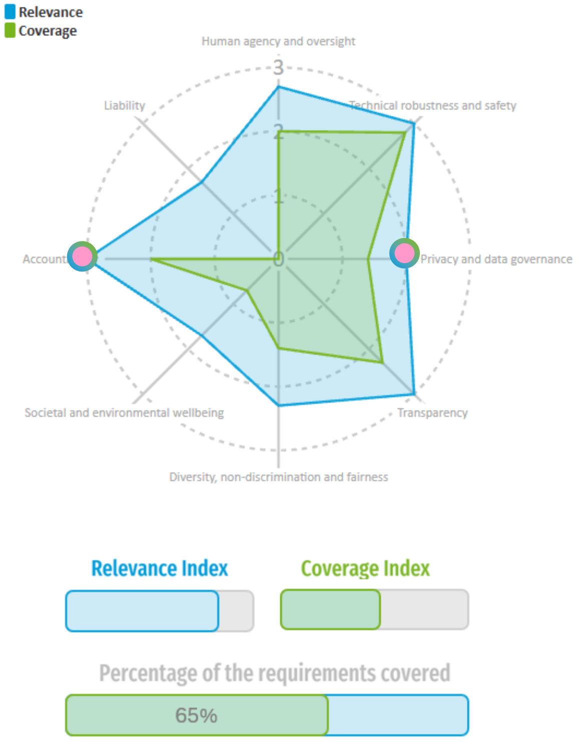

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04. Privacy & Accountability Tension

What in Feature B: Privacy, Data Governance & Just Culture

Interaction logs risk exposing pilot performance, creating tension with Just Culture.

What

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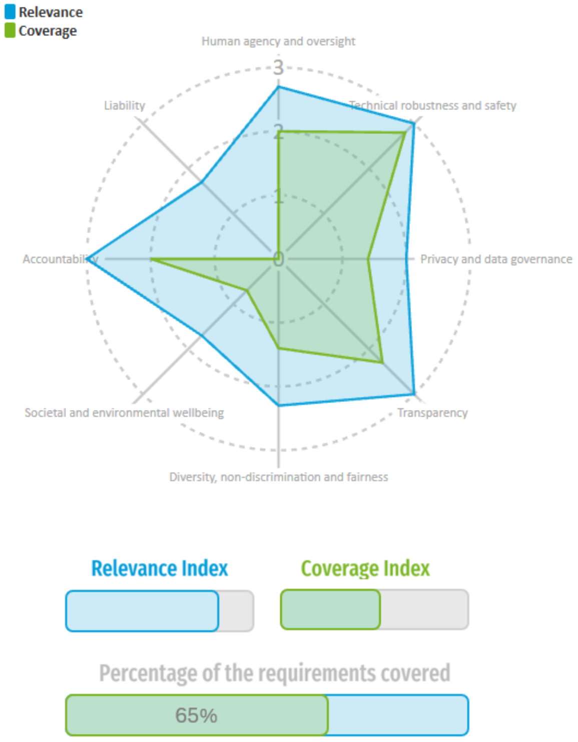

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AI Ethics ... made Applicable

Prompts for System Multidisciplinary Co-design

Human Factors (Strategic Airmanship)

How can we design active-engagement UI triggers (e.g., confidence thresholds) to protect long-term airmanship from cognitive passivity?

To Safety & Operations (Fair Oversight)

What real-time explainability (e.g., timestamped rationale) is required to set fair liability boundaries for the PIC?

To AI Engineering (Just Culture)

How do we structure machine-centric audit logs to track software defects without creating crew surveillance concerns?

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▶ Low-Overhead Process

Embedded co-design that enriches system validation without creating R&D bottlenecks.

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▶ Low-Overhead Process

Embedded co-design that enriches system validation without creating R&D bottlenecks.

▼ Proactive Risk Elicitation

Captures systemic friction points early, well before flight testing and software freezing.

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JARVIS & AI Ethics

In a nutshell

Candidate Baseline (JARVIS | TRL4)

- **Compliance Support:** Feat.AI as a structured framework to meet EASA ET-01 & NPA 2025/07 objectives.
- **Early Diagnostic:** Uncovering systemic trust, airmanship, and liability gaps before software freezing.

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Multi-Agent Scaling (JARVIS-CONNECT | TRL6)

- **Ecosystem Expansion:** Scaling the methodology to multi-agent, Trajectory-Based Operations (TBO).
- **Shared Oversight:** Resolving human-machine teaming and AI-to-AI accountability gaps.

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EASA Certification Readiness (2028)

- **Regulatory Alignment:** Direct preparation for EU AI Act / AI Omnibus and EASA AI Roadmap 2.0 enforcement.
- **Zero Rework:** Full Compliance-by-Design, eliminating costly late-stage software patches.

JARVIS & AI Ethics

In a nutshell

Candidate Baseline (JARVIS | TRL4)

- **Compliance Support:** Feat.AI as a structured framework to meet EASA ET-01 & NPA 2025/07 objectives.
- **Early Diagnostic:** Uncovering systemic trust, airmanship, and liability gaps before software freezing.

Multi-Agent Scaling (JARVIS-CONNECT | TRL6)

- **Ecosystem Expansion:** Scaling the methodology to multi-agent, Trajectory-Based Operations (TBO).
- **Shared Oversight:** Resolving human-machine teaming and AI-to-AI accountability gaps.

EASA Certification Readiness (2028)

- **Regulatory Alignment:** Direct preparation for EU AI Act / AI Omnibus and EASA AI Roadmap 2.0 enforcement.
- **Zero Rework:** Full Compliance-by-Design, eliminating costly late-stage software patches.

Ethics for Societal Readiness

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JARVIS & AI Ethics

In a nutshell

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Ethics for Societal Readiness

JARVIS CONNECT

- New SESAR IR project (June 2026 – May 2029)
- Connected digital assistants implementing a TRL6 TBO* solution
- LKB reasoning assurance and AI Ethics analysis will be further matured

* TBO = Trajectory Based Operations

Thank you

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Co-funded by the European Union

Deliverables: https://cordis.europa.eu/project/id/101114692/results

https://research.dblue.it/jarvis/
https://www.linkedin.com/company/jarvisproject
https://twitter.com/JARVIS_sju

JARVIS

EASA
European Union Aviation Safety Agency

SESAR
JOINT UNDERTAKING

EASA AI Days 2026
Industry Research Projects : SESAR JU & JARVIS

Moderator: Andrew Kilner
EASA

Riccardo Massacci
SESAR JU AI Coordinator

Dmitrii Kirov
JARVIS / Collins

Elisa Spiller
JARVIS / Collins

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EASA AI Days 2026
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Sameer Alam
ATMRI Singapore

Romaric Redon
ANITI / DEEL

Carmen Bruder
DLR

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NANYANG
TECHNOLOGICAL
UNIVERSITY
SINGAPORE

Digital ATCo Assistant

Dr. Sameer Alam
Director,
Air Traffic Management Research Institute,
Nanyang Technological University,
Singapore

EASA AI Days 2026
September 9-10, 2026, Cologne

Introduction

Growing Challenge

- Asia-Pacific air traffic is projected to **double by 2040.**
- **Operational complexity** and **capacity pressure** on ATM continue to increase.

Strategic Response

- A shift toward **digital, data-driven** and **sustainable** air traffic operations.
- The challenge is **not a lack of data or automation**, but helping ATCOs rapidly extract, integrate and interpret relevant information across systems, time horizons and operational contexts while maintaining safety and decision quality.

Opportunity Ahead

- Move from static information to **intelligent, adaptive assistance**.
- Develop **context-aware, responsive systems** that:
  - Understand **operational context**
  - Adapt to **user needs in real time**
  - Support **proactive, data-driven decision-making**

THE CHALLENGE

Current Bottlenecks in ATC Decision Support

Information is available, but not in the right form, at the right time, for the right controller.

ATCOs operate in a complex, time-critical and information-rich environment.

Today's tools provide data, but limited context, integration and personalization.

1 Generic tools, not personalized

Current ATC tools are generic and not customized to user preferences, while the cognitive process of each ATCO is differrent.

2 Fragmented information

Critical operational information is fragmented across multiple systems and formats (surveillance, weather, procedures, coordination).

3 Heavy manual workload

ATC operations remain heavily manual, especially in surveillance monitoring and readback verification.

4 Coordination is effort-intensive

Coordination and task-intensive activities (e.g. handovers, inter-sector coordination, monitoring aircraft labels/detecting late plan changes) become increasingly error-prone and effort-intensive.

5 Limited foresight

Limited support for near-term foresight or early identification of emerging complexity drivers.

The result: higher cognitive load, increased risk of situational awareness loss, and limits to capacity.

Digital ATCO Assistant

Aim

To design and develop an intelligent, personalized and trustworthy AI assistant for ATCOs that enables them to handle increasing air traffic.

Objectives

Develop the core technologies that will support the development of the AI assistant

1 Enhance communication and coordination awareness

Support ATCO communication and coordination awareness across tactical and planning functions.

2 Reduce cognitive effort

Reduce cognitive effort associated with information retrieval, integration and task tracking.

3 Extend the planning horizon

Extend the effective planning horizon through context-aware foresight and early cues.

4 Enable adaptive personalization with trust

Develop adaptive personalization methods that incorporate trustworthiness and safety assurance for ATCO decision support.

A human-centric, non-intrusive assistant — augmenting ATCO expertise, not replacing it.

SAFER SKIES | MORE EFFICIENT ATM | A MORE CONNECTED WORLD

Digital ATCO Assistant: Phases

- R&D of a **Digital ATCO Assistant**, capable of delivering on-demand, context-aware, and user-tailored advisory support during air traffic control operations.
- Two progressive phases:

1 Phase 1
Situational awareness and Integrated Information support

- On-demand information and knowledge retrieval
- Context-aware communication and task assurance support
- Multi-source traffic summarization & forecasting
- Recommendations and partial task automation
- Quick access to sector-specific insights without navigating multiple systems
- Persistent record of communications and task progression

Including 'what-if' visualisation, efficiency advisories, draft hand-off and coordination messages, and near-term forecasts (up to 30 min).

2 Phase 2:
AI personalization and advisory alignment

Personalization

Learn from ATCO behaviour, decision-making patterns and preferences.

Advisory Alignment

Match advisories with ATCOs' mental models and reasoning styles.

Task Prioritization

Personalized prioritization within a sector.

Powered by continuous learning and feedback

to improve relevance, trust and operational effectiveness.

PROJECT SCOPE – PHASE 1

Situational Awareness and Integrated Information Support

Focus:
Non-safety-critical functions with high operational value

On-demand Information and Knowledge Retrieval

Quick access to sector-specific insights without navigating multiple systems.

Show latest NOTAMs for sector A

- NOTAMs
- Weather
- Procedures
- Sector information

Context-aware Communication and Task Assurance Support

Providing a persistent record of operational communications and task progression.

Handoff message to next sector

Draft handoff message: "BAW123, FL350, estimating sector B at 10:15, no known constraints..."

- Readback verification
- Task tracking
- Coordination support

Multi-source Traffic Summarization & Forecasting

Integrating surveillance, flight plan, weather, and coordination data to produce sector-level overviews. Near-term forecasts up to 30 minutes.

Next 30 minutes

- Traffic forecast
- Weather impact
- Potential conflicts
- Sector load

Recommendations and Partial Task Automation

Including 'what-if' visualisation of potential actions, efficiency-focused advisories, and draft generation of routine hand-off and coordination messages.

What-if analysis

Suggested actions

- Route option
- Coordination draft
- Efficiency gain
- Impact assessment

PROJECT SCOPE – PHASE 2

AI Personalization and Advisory Alignment

Tailoring AI support to each ATCO's context, preferences and decision-making style.

Focus:
Human-aligned, personalized and trustworthy AI support

1 Learn from ATCO behaviour and operational preferences

Personalization of AI advisories through systematic learning from ATCO behaviour, decision-making patterns and operational preferences.

- Workload patterns
- Decision style
- Operational preferences

2 Align advisories with ATCO mental models

Focus on alignment of advisories with ATCOs' mental models and reasoning styles i.e. Advisory Conformance with the ATCOs.

- Match reasoning style
- Context-aware explanations
- Adapt to user feedback

3 Personalized task prioritization within a sector

Provide adaptive, context-aware advisories that surface the most relevant information and tasks, at the right time, for the right controller.

Prioritized for you

1	Coordinate handover to Sector B	High
2	Review climbing traffic (FL350+)	Medium
3	Check revised route (WX impact)	Medium
4	Monitor inbound flow	Low

- Adaptive prioritization
- Right information, right time
- Personalized to the controller

USE CASES

Use Cases Overview

From information to intelligent, context-aware advisory support.

8 High-Value Use Cases
Covering key ATCO needs across information, operations, memory and advisory support.

INFORMATION
Access the right information depth, when needed.

- 01 Procedure retrieval
- 02 Readback detection

OPERATIONS
Support real-time operational tasks.

- 03 Prioritized monitoring
- 04 Boundary coordination

MEMORY
Maintain and reconstruct operational context.

- 05 Shift handover
- 06 Event reconstruction

ADVISORY
Provide intelligent, context-aware recommendations.

- 07 Request feasibility
- 08 Weather routing

Progressive Capabilities

- **P0** Establishes trusted retrieval, speech understanding and monitoring
- **P1** Turns the shared event stream into coordination and memory
- **P2** Adds multi-constraint recommendations

METHODOLOGY

Large Language Models: From Language Interface to Operational Reasoning Layer

Integrating multi-source operational data with LLM reasoning to deliver trusted, context-aware ATCO support.

Operational Data & Knowledge

Heterogeneous, time-sensitive and operationally contextual sources

- AIP / procedures
- NOTAMs & aeronautical information
- Weather & constraints
- Voice / communication logs
- Flight plans & trajectories
- Surveillance / sector context

LLM

What the model contributes

- Understands user intent and language
- Retrieves and synthesises information across sources
- Maintains context across tasks and time horizons
- Produces concise, human-readable outputs
- Supports explanation, summarisation and query answering

In practice: language interface + reasoning over grounded tools and data

ATCO Support Outputs

Actionable, context-aware and trustworthy assistance

- Query answering
- Operational summaries
- Task / coordination awareness
- Near-term foresight cues
- Advisory explanation
- What-if support

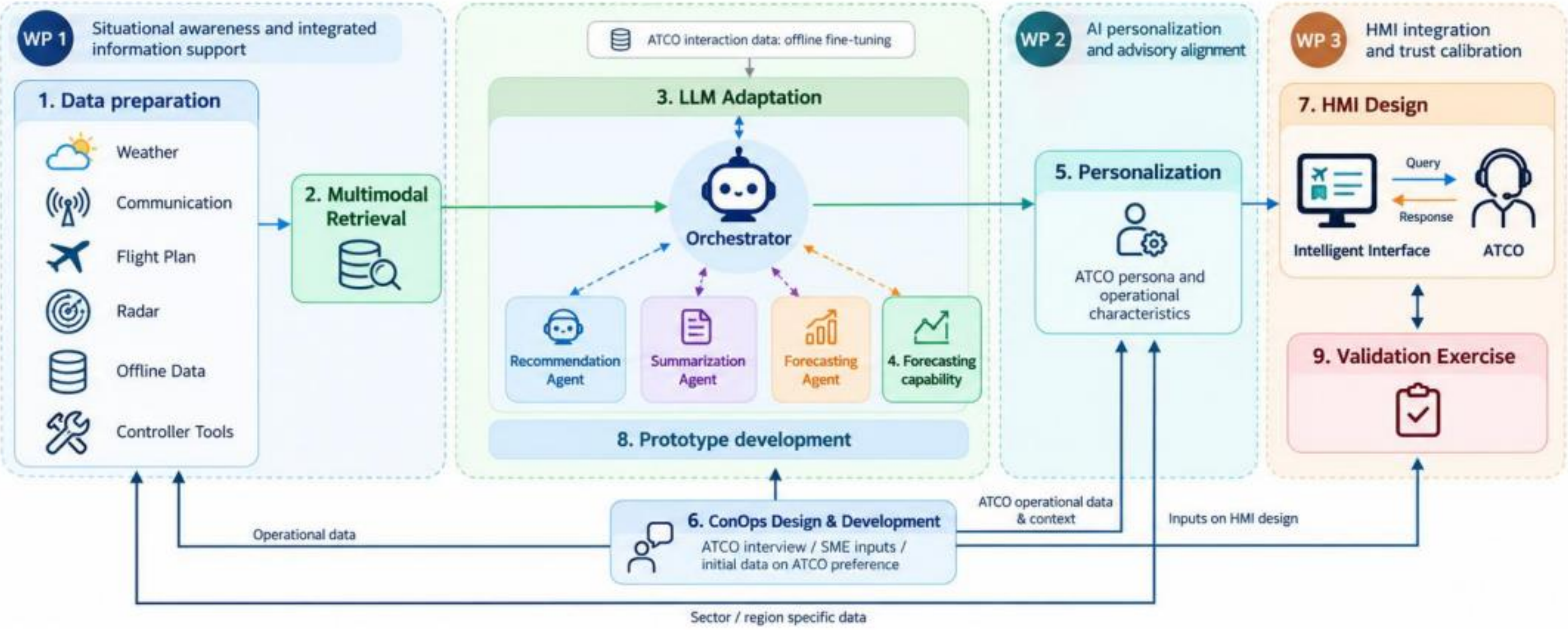
Outputs remain advisory and are presented through the ATCO-facing interface

Boundary Condition for Aviation Use

The LLM operates within validated data, connected to domain tools, constrained by procedures, traceable in its outputs, and kept within human authority.

Methodology

Agentic AI framework to integrate operational data and task-specific tools into a Personalized Digital Assistant for air traffic control.



NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Air Traffic Management Research Institute

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Mohsan Jameel
DLR

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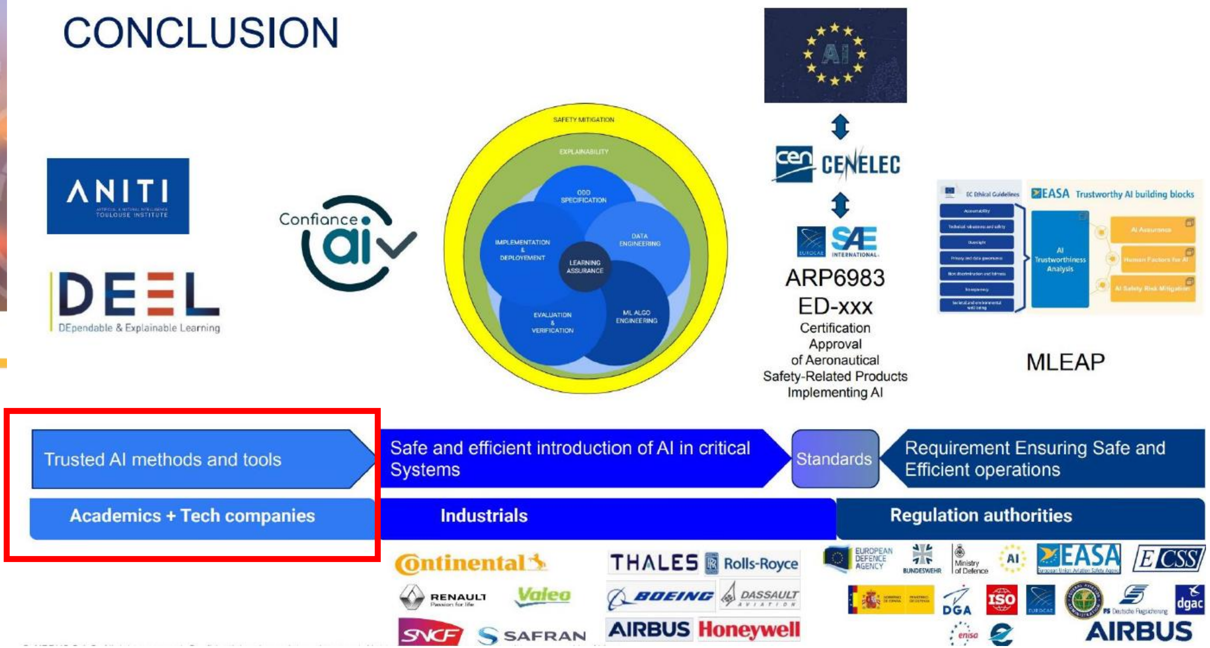
AI Trustworthiness contributions – EASA AI Days 2026

Romaric Redon ANITI Operational Director

Some years ago….

BACK



AI Trustworthiness for aviation @ANITI

DEEL
Dependable, Explainable & Embeddable Learning
IRT SAINT EXUPÉRY

Tuples
TRUSTWORTHY AI
horizon europe

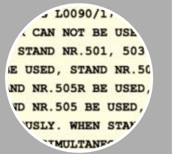
AIRBUS ONERA THE FRENCH AEROSPACE LAB

LARD V2

Image Object Detection

OSS Dataset **LARD V2**

THALES

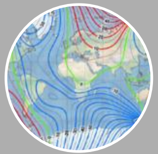


NOTAM

Text (NLP) Classification Knowledge Extraction

OSS Dataset **NOTAM**

THALES



IGRF

Regression Surrogate model

AIRBUS

ACT-STT

Audio Readback verification

OSS Dataset **STEAK**

AIRBUS

BELUGA

Tasks Planning & scheduling

Shared Data Set **BELUGA**

AI Trustworthiness ?

EASA Concept paper

DS.AI Detailed Specifications for AI Trustworthiness

ED324/ARP 6983 Certification Approval of Aeronautical Products Implementing AI

Trustworthy AI Open source libraries

DEEL INFLUENCIAE
DEEL XPLIQUE Explainability Toolbox for Neural Networks
Interpreto
DEEL DEELLIP
DEEL PUNCC A Conformal Prediction Library
DEEL OODEEL
Decomon A verification tool for NN
Discrete Optimization

AI research

ERTS 2026
NeurIPS CVPR ICLR icaps

ANITI

LARD V2

Image

Object Detection

ANITI

LARD V2: Enhanced Dataset

V1

- **17 000 images** (2048x2448)
  From ~ **200+** different runways

- Videos of **real landing footage**
  1800 frames from **200** videos manually annotated

- **A scenario generator** for trajectories in *Google Earth* with **Automatic labeling** of images

V2 NEW

➔ **110 K images** (1024x1024)
- 30 images per runways
- ~980 runways

➔ **Multi-source**

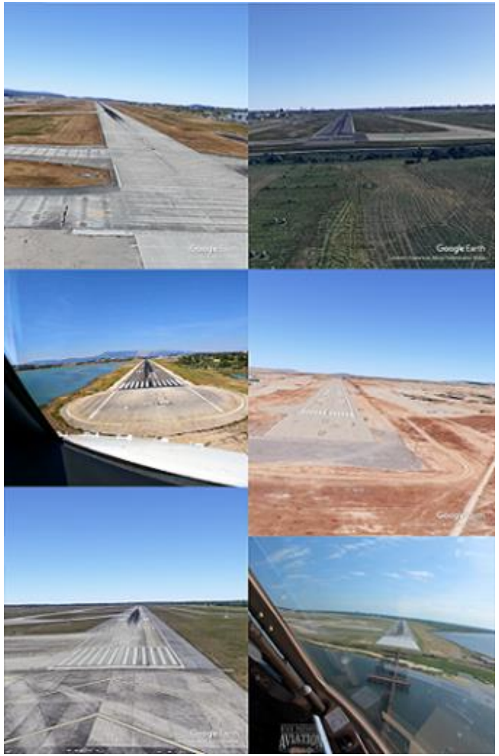
+ Xplane / Flight Simulator

+ Bing Maps / ArcGIS via **Cesium**

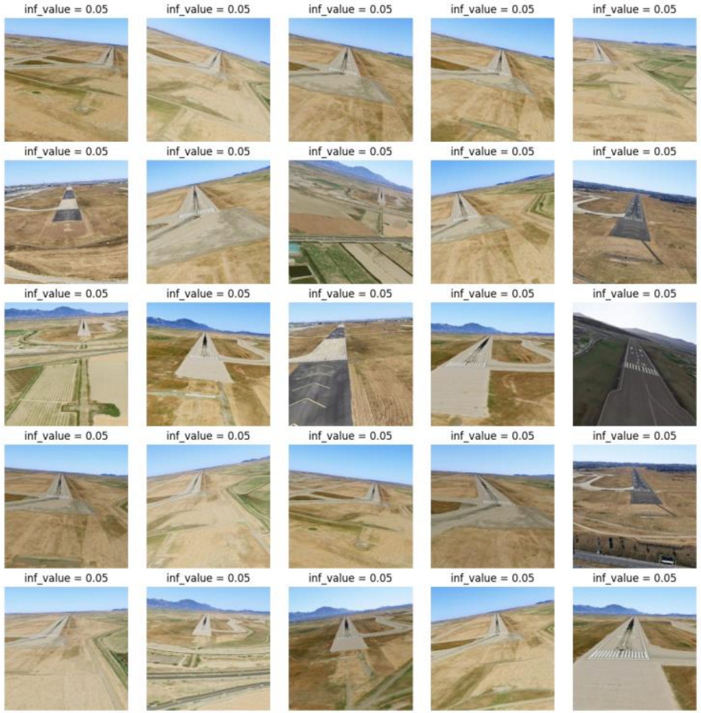
➔ **Multi-runway**

➔ **Possible variability:**

+ Weather / Seasonal / Night



Searching for Biaises



Influenciae

A Tensorflow Toolbox for Influence Functions

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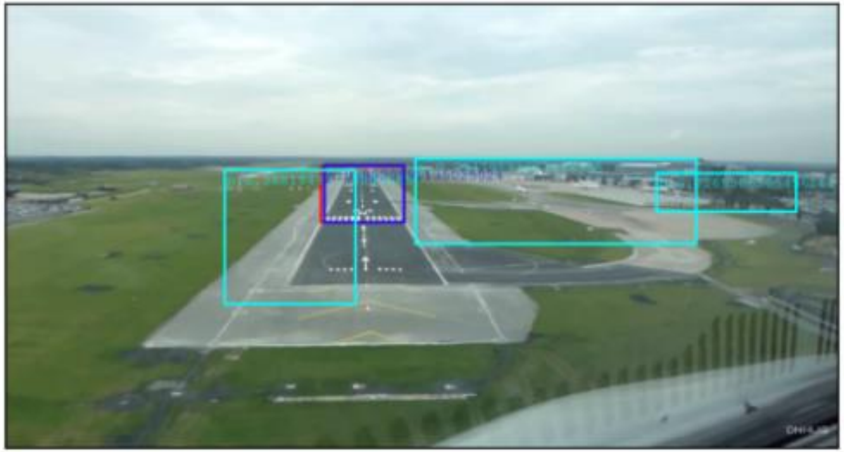
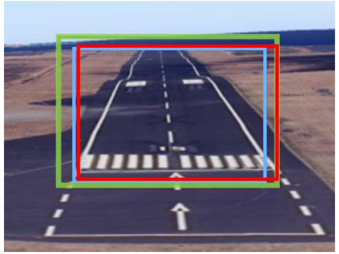
OOD in object detection: OOD bbox filtering



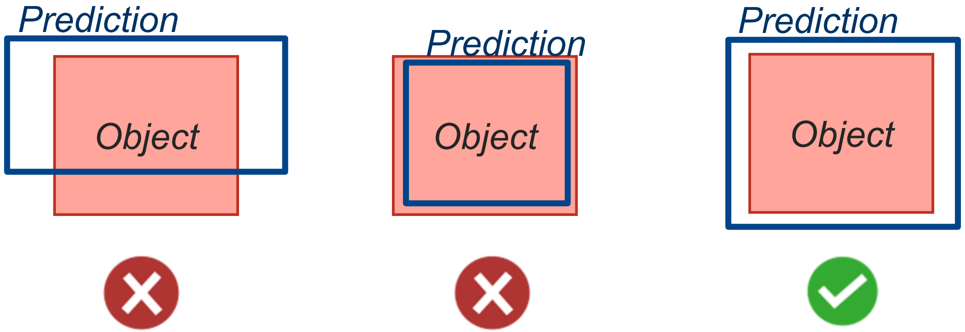
OODEEL

A post-hoc deep OOD detection toolbox

Conformal prediction

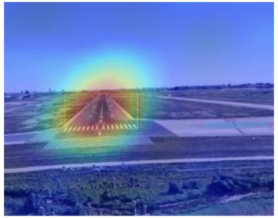


- Objective { Provide a probabilistic guarantee that the **ground truth is fully enclosed** in the detection box

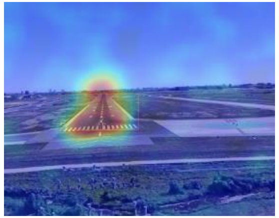


Explicability

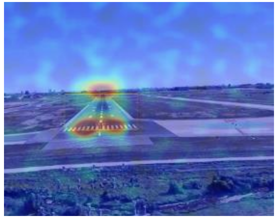
Attribution methods on FCOS



Rise : grid size 7 – 1K samples



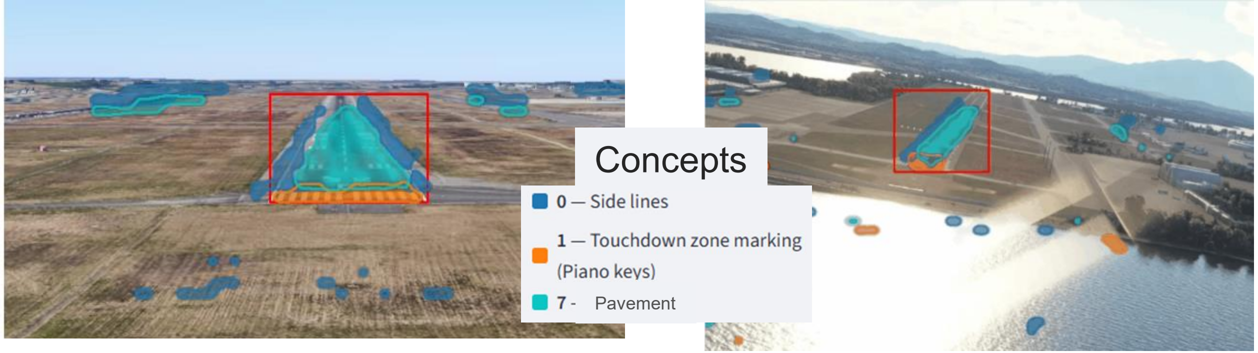
Rise : grid size 13 – 2K samples



Rise : grid size 23 – 5K samples

XPLIQUE
Explainability Toolbox for Neural Networks

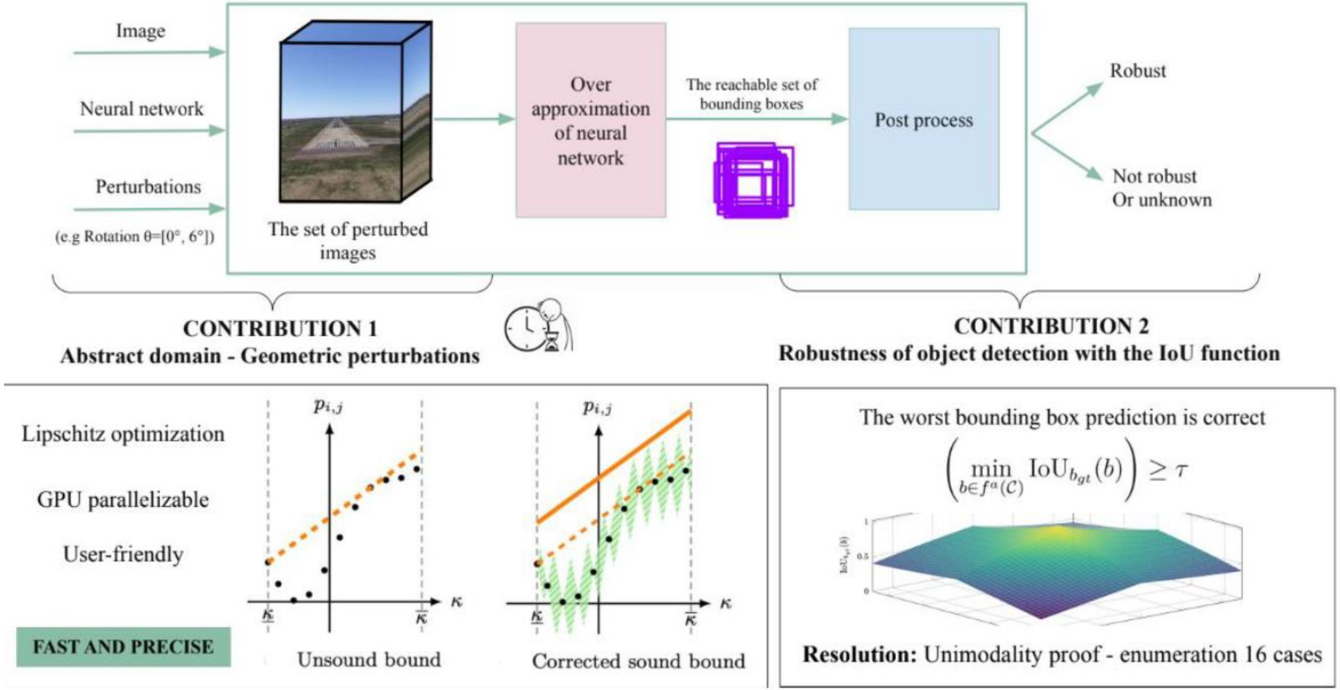
Concept based methods

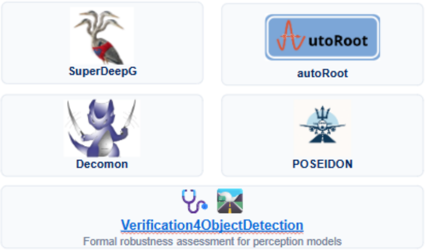


AI trustworthiness ?

Runway detected
AND
CONCEPTS
PIANO + Side Lines +
Pavement are identified
and used

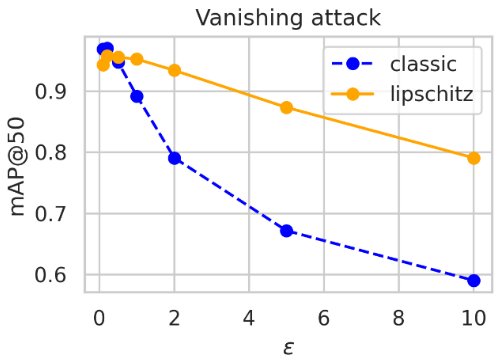
Robustness Formal methods



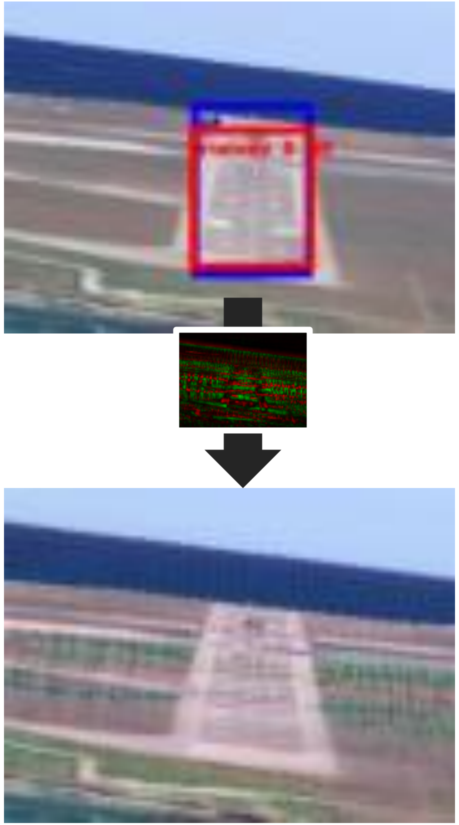


Robustness to adversarial attacks

- **Objective:** Find minimal perturbation (of L2 norm ϵ) to trick the model into detecting no more targets.



Robustness of lipschitz vs classic equivalent models wrt L2 norm of *vanishing adversarial attacks*, evaluated using ***mAP@50** metric* (the higher the better).



DEEL DEEL-LIP LIPSCHITZ KERAS LAYERS

NOTAM

Text (NLP)

Classification

Knowledge Extraction

ANITI

The NOTAM Dataset

Pros:

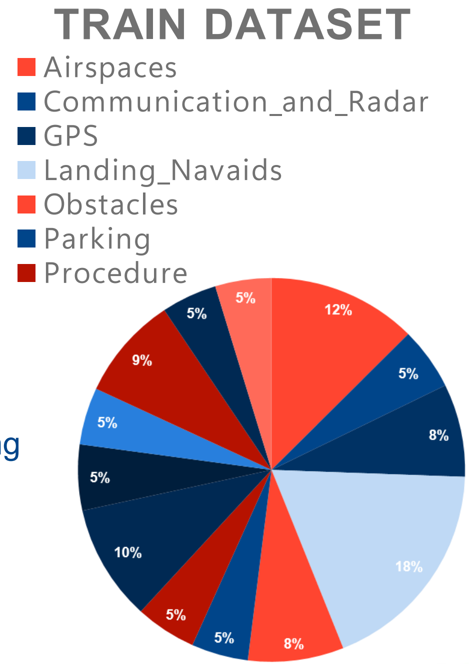
- **Open source** dataset for research
- **8000+** NOTAMs:
    - Splits: 4000+ train / 4000+ test
- Toy case with **industrial data**
- Can be extended at will…

    \+ Over 2 millions new data available each year

    \- Requires manual / semi-automated labeling

Cons:

- Task is intrinsically multi-label:
    - 1 NOTAM can contain **several pieces of information** referring to several classes
    - Some classes have **semantic overlaps**
- Is this distribution realistic ?



Explainability for NOTAM classification attributions methods

DEEL
Dependable, Explainable & Embeddable Learning

Classification task : Predict Notam class → Parking
Highlighted in red : words contributing to the choice of Parking Class
Highlighted in Blue : words contributing to the choice of another Class

Inputs restrictions for acft with wingspan greater than 36m : - at arrival , to join northern industrial area after rwy 05 / 23 vacation , compulsory stop on twy u for towing towards parking area . - departing from northern industrial area , compulsory towing from parking area and compulsory stop on twy u . acft stand nr - 12 commercial aviation apron clsd

Class Parking

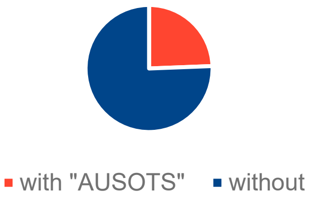
Interpreto
Interpretability Toolbox for LLMs
DEEL FOR ANITI

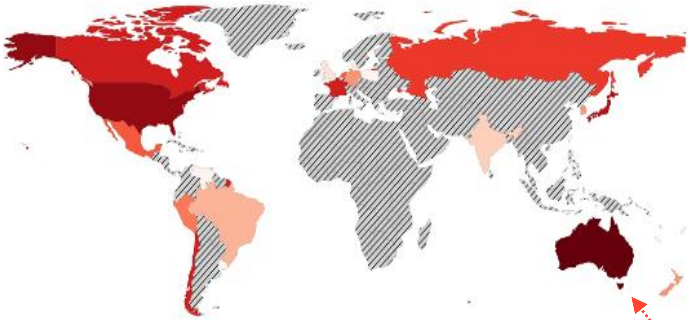
ANITI

Explainability for Notam Classification
Highlighting biases in the Data set

- **Airspaces:**
  - Unexpected top word: “**AUSOTS**” – the Australian Organised Track Structure
  - Among 529 NOTAMs truly labelled as Airspaces, **129** contain the word “AUSOTS”.
  - Strong **geographical bias** in the data collection.
  - Could be discovered by a simple statistical analysis, so XAI can be seen as a safety net.

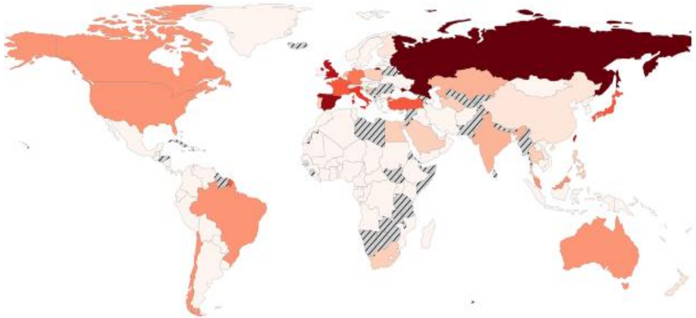
AIRSPACES





Origin of ‘Airspace’ NOTAMs in the **Dataset**

Over-representation



Origin of ‘Airspace’ NOTAMs in the **Scraped data** (~real world)

BELUGA

Tasks

Planning & scheduling

ANITI

Tuples TRUSTWORTHY AI

Explainability for Planning

In general, "**Why X?**" (with X a solution or UNSAT)

To be defined... 3 patterns:

- Causal explanation:
  - *How was X derived?, Why infeasible ?*
- Contrastive explanation:
  - *Why X and not Z?*
- Conversational explanation:
  - *Iteratively refine explanation & model*

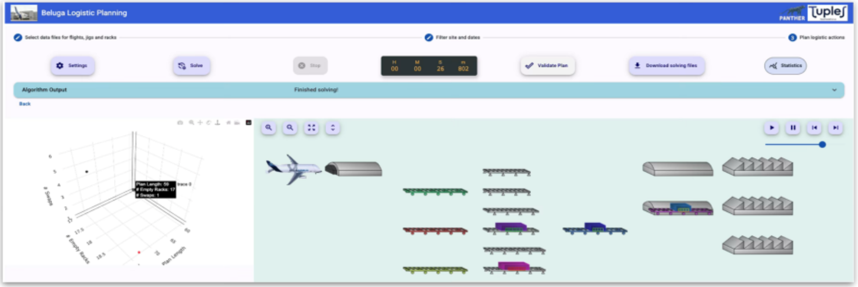
OSS libraries

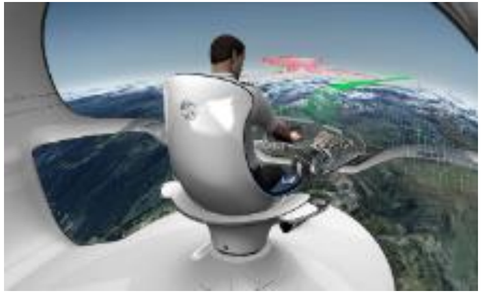
XCP –explain

KU LEUVEN

Discrete-optimization

AIRBUS





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Stay tuned ! more is coming

ACT-STT

Audio Readback verification

FAME: Scaling Formal Explainability

Exploring an enabling technology to bridge the gap between formal guarantees and complex architectures for safety-critical AI.

The Certification Challenge

- **The Formality Gap** Heuristic XAI (e.g., heatmaps) is useful for debugging but lacks the strict mathematical guarantees required for high-stakes certification.
- **The Scalability Wall** Formal XAI provides deterministic proofs (AXp) but traditionally faces combinatorial explosion, making it intractable for complex models.

How FAME Shifts the Paradigm

- **GPU Pre-Conditioning** FAME acts as a massive filter, safely pruning the search space via abstract interpretation to bypass sequential solver bottlenecks.
- **Making the Intractable Computable** By reducing problem size before exact refinement, it achieves up to 10x speedups, scaling to deep architectures like ResNet.

Why it Matters for EASA

- **Towards Mathematical Certainty** Demonstrates that securing deterministic evidence of *why* a model made a decision is no longer limited to simplified, toy datasets.
- **An Enabling Technology** Positioned as a foundational step to make formal XAI a viable, pragmatic methodology for future AI certification processes.

ACCEPTED AT ICLR ICLR 2026

ANITI

Take aways

Portfolio of Trustworthy AI methods developed by ANITI eco-system can support EASA Learning assurance process

You wish to

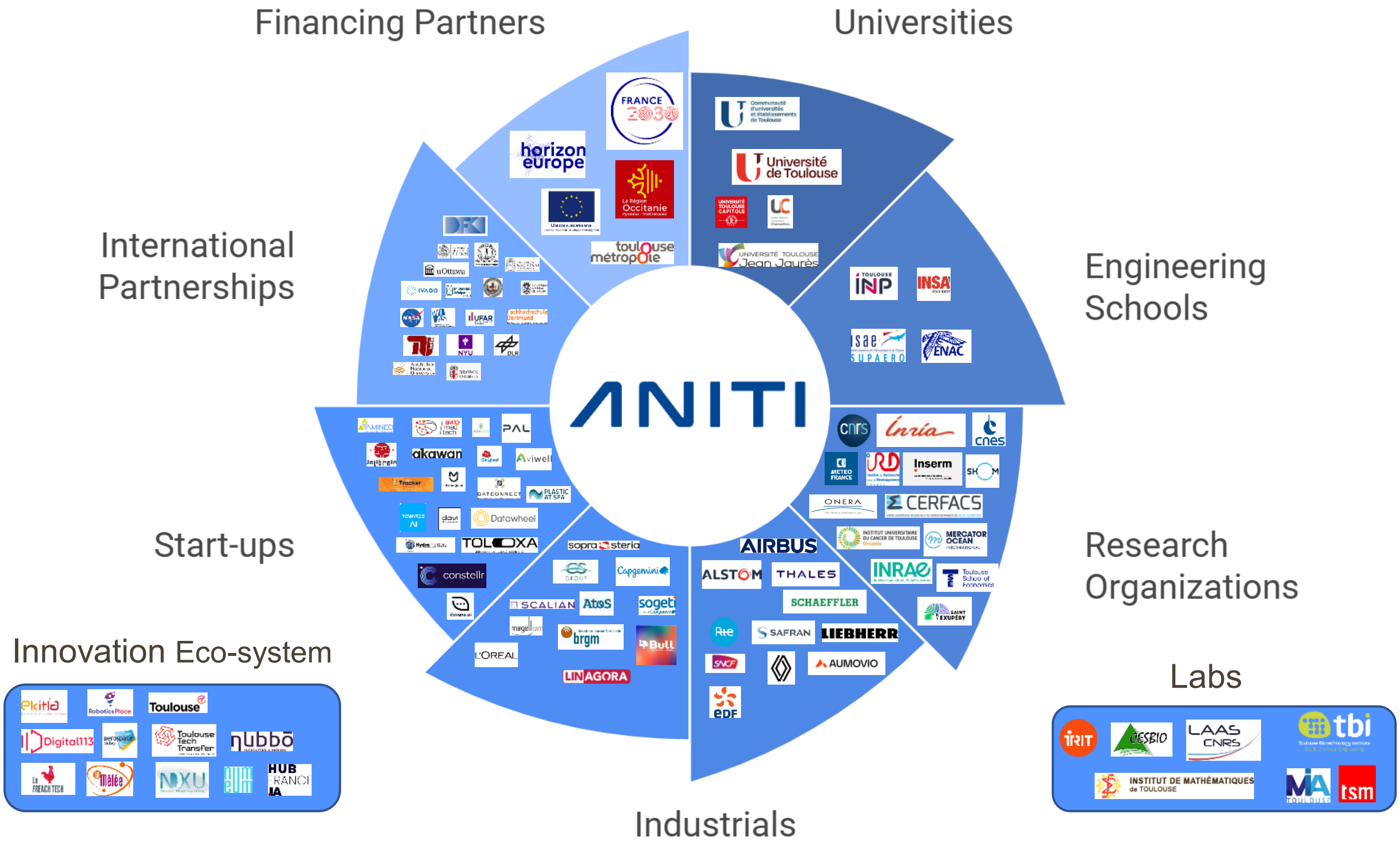
Assess AI trusworthiness on your uses cases

become proficient with our Trustworthy AI libraries

Contribute to Trustworthy AI Research

→ Contact us ☺

ANITI


Financing Partners
Universities
International Partnerships
Engineering Schools
ANITI
Start-ups
Research Organizations
Innovation Eco-system
Labs
Industrials

EASA
European Union Aviation Safety Agency

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“The future is not a place we are going to — it is one we are creating.” [Herbert Marshall McLuhan]

DLR LOKI

Researching and Designing Human-AI collaboration in aviation

Carmen Bruder & Mohsan Jameel

Agenda

- Introduction to the DLR project LOKI
- Designing Human-AI collaboration in ATC
- Validating Human-AI collaboration
- Lessons learned and outlook

DLR Project LOKI (2022-2026)

DLR

In the DLR project LOKI we developed

- guidelines, prototypes and findings for
- collaboration of human operators and AI systems
- together with users and
- for future developments of
- trustworthy AI systems
- at DLR and for the aviation industry.

LOKI video @ DLR youtube channel

LOKI – bringing perspectives together (2022-2026)

Pooling competencies@DLR

- Aviation & Space Psychology
- Flight Guidance
- AI-Safety
- Software Systems
- Data Science
- Air Transport Economy

Cooperation with partners:

- DFS Research & Invention
- Austro Control GmbH
- EASA AI Group
- BDL
- IFATCA AI Group
- University of Lübeck

Designing Human-AI collaboration in LOKI

Psychological requirements & training needs

Regulatory perspective right from the start

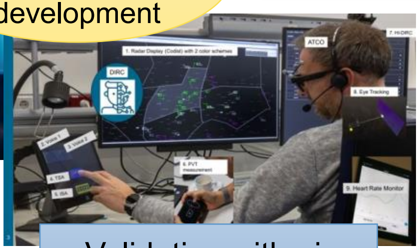
Interface Design
Explainability
Communication
AI Agency & Ethics

user-centered design

Work as air traffic controller

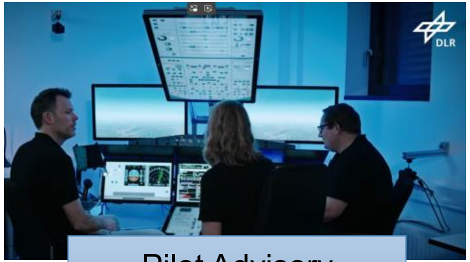
Collaboration with AI-based partner

Investigation of safe AI development



Validation with air traffic controller

Work as pilot



Pilot Advisory System

LOKI user-centered development (ISO 9241-210)

DLR

Plan the human-centered process for AI-based system in air traffic control (ATC)

Specify context of use in HF-expert workshop 2022 and online ATCO survey 2023

Specify requirements of air traffic controllers (ATCOs) in 1st LOKI workshop 2022

Design solutions for digital interactive reliable controller (DIRC)

Evaluate DIRC against requirements in 2nd workshop (2023) 3rd workshop (2024)

iterative if necessary

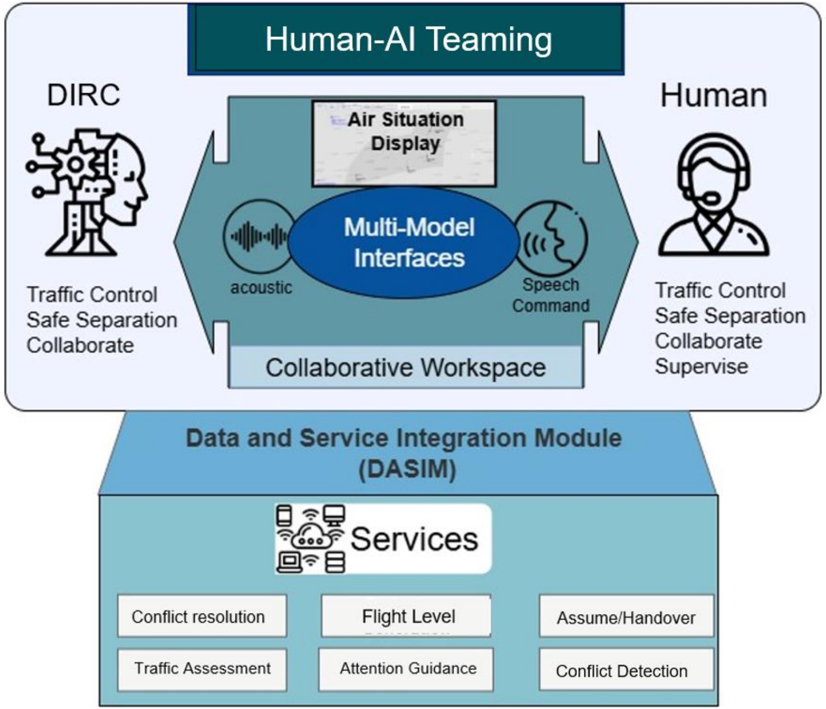
Evaluate DIRC in human-in-the-loop validation (2025)

Final exchange with ATCOs & EASA: 4th Workshop (2026)

LOKI

Human AI Teaming Architecture (Collaborative Workspace)

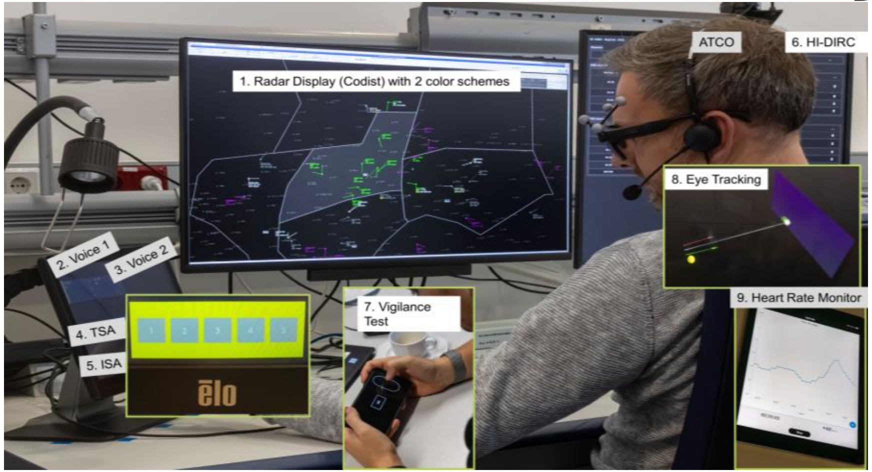
- **Human ATCO** – in-charge, perform all controlling tasks, and supervise digital partner
- **Digital Interactive Reliable Controller (DIRC)** – performs conflict detection and resolution, level clearance, assume and handover automatically without human prompting.
- **Delegation of Control** – enables transfer of control between human and DIRC.
- **Multi-modal Human-DIRC Interface –** implemented bi-directional communication channel, facilities interaction between team partners.
  - Enhanced Radar Display
  - Attention Guidance
  - Speech Input
  - Secondary Screen Interface (a.k.a HI-DIRC)



DIRC is a collaborative AI Agent

Validation: High-Fidelity human-in-the-loop Simulation

- **Simulation Environment:**
  - DLR's Air-Traffic-Management & Operatio n Simulator (ATMOS) – a high-fidelity, real-time ATC test-bed.
  - service-oriented architecture, including sim-pilot workstations
- **Study Design:**
  - 10 experienced ATCOs from 3 ANSPs (Germany, Austria and France)
  - Counter-balanced within-subjects design
- **Evaluation Metrics**
  - Safety, Workload, Situation Awareness, Trust, Usability

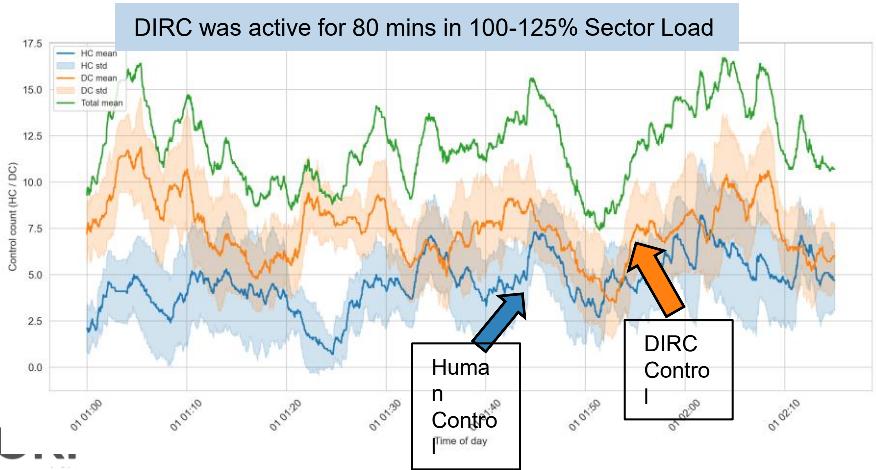


	Baseline	Solution
Nominal 50 min 80% traffic	1 ATCO 2 Roles without Support	1 ATCO SCO + DIRC
Overload 80 min 125% traffic		

SCO: Single Controller

Demonstrated Feasibility at 125% Declared Sector Capacity

- **Performance:** DIRC issued 167 level-change commands, successfully completing 156 of them (93%)
- **Capacity:** ATCOs reported average effort during overload scenarios matching their real-world peak
- **Workload:** Comparable NASA-TLX ratings across baseline and HAT—no increase in mental load despite higher traffic

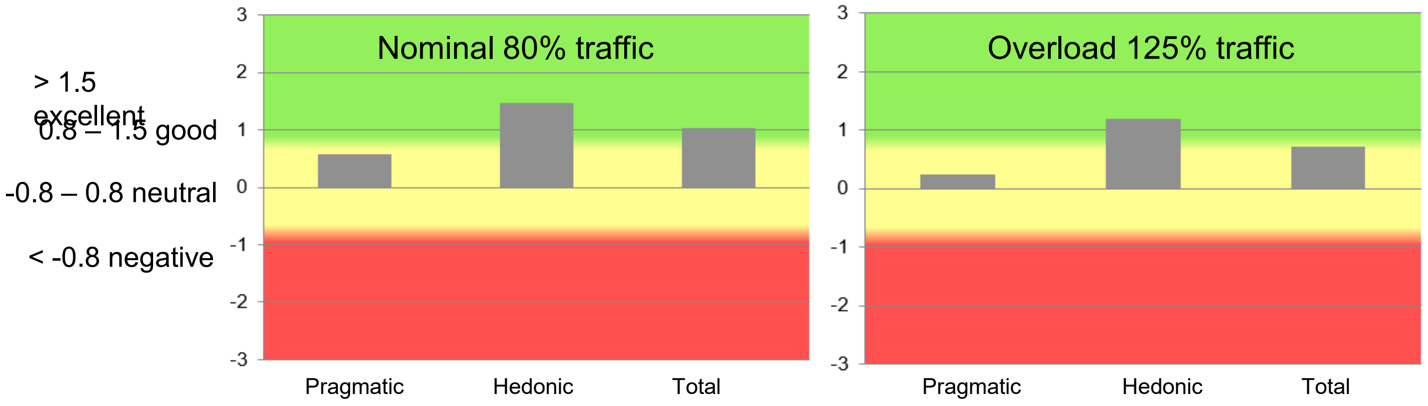


Scenario	Baseline Nominal	Solution Nominal	Baseline Overload	Solution Overload
Workload (0-100) mean	48.7	48.6	66.4	63.0
Flight deletions	n/a	n/a	10	3

Positive User Experience with the Digital Controller

- ATCOs rated the concept of a digital controller as Good
- The demonstrator is evaluated as Neutral (requires further improvements)

User Experience Questionnaire – Short (UEQ-s)			
Quality	**Score**	**Meaning**	**Relevance**
Pragmatic	Neutral (0.5 and 0.25)	How it works (usable)	TRL 5 and above
Hedonic	Good (1.45 and 1.2)	How it feels (desirable)	TRL 1 to 4

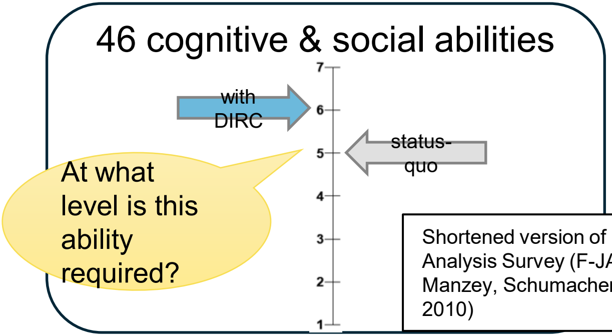


Summative Evaluation of DIRC in LOKI

Follow-up survey of the LOKI validation study

- psychological requirements for ATCOs
- training needs for collaboration with DIRC
- user feedback on ethical aspects

- online by a semi-standardized interview (1h)
- 7 ATCOs, 1-14 days after validation
- 22-69 years (with 0-26 years as ATCO)

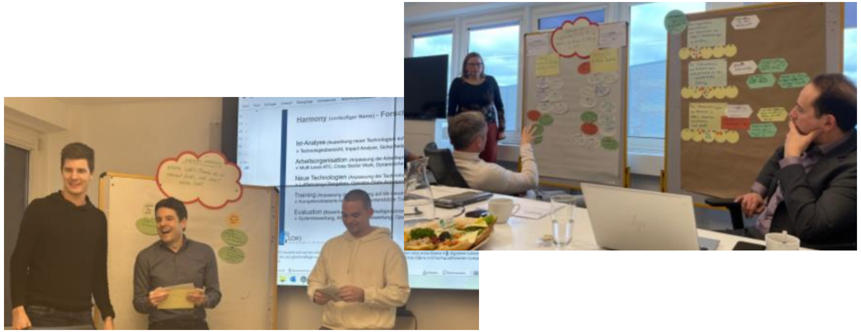


Shortened version of Fleishman Job Analysis Survey (F-JAS; Kleinmann, Manzey, Schumacher & Fleishman, 2010)

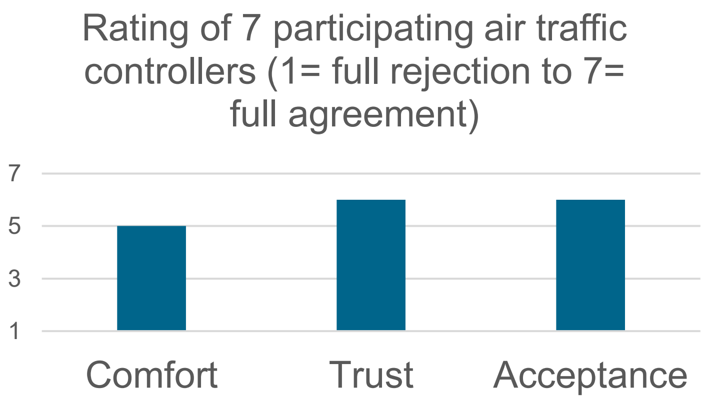
Final LOKI workshop with ATCOs

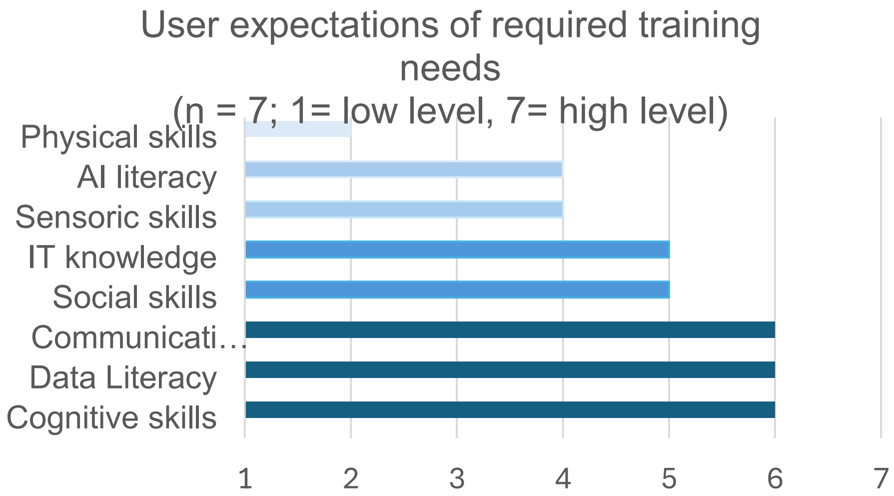
- user feedback on final design of DIRC
- core issues of Human-AI teaming in ATC
- future research needs

- Two-days in Hamburg
- With 7 ATCOs (DFS & Austro control)
- Second day: EASA took part



Key findings: Psychological requirements & training needs





For changes in psychological requirements:

- re-learning as a major challenge (learning speed & openness to new ideas expected to increase)
- demands on personal competences expected to increase (emotional competency & behavioral flexibility)
- need for social competencies expected to decrease (sociability & social sensitivity)

Key insight: hints for ethical assessment by users

ELSA questions designed to:

- assess perspective of ATCOs
- on whether DIRC meets the EU AI Act
- to understand requirements in real operational contexts

Insights about DIRC

- promising for routine ATC tasks
- step-by-step integration preferred
- trust hinges a bit on edge cases
- biggest gap is informed oversight

Limitations:

- small N / short duration → not generalized proof but strong indicative insights
- user perception signals, not compliance proof

ELSA @ DLR assessment of AI applications

Questions

AI Act requirement	Brief requirement description	Relevant questions	Indicative findings this could lead to	Response options
Art. 9 – Risk Management System	The system must manage risks across different contexts and avoid creating new risks	Did DIRC/DICO ever suggest an action that you felt could increase risk? Did you feel DIRC/ DICO adapted safely to changes in context? (e.g., traffic, fatigue levels, etc.)	Identifies if ATCOs perceive hidden risks, unsafe recommendations/ actions or poor adaptability. May also reveal gaps in acceptance if perceived unsafe.	Yes | No | Not sure + brief explanation
Art. 10 – Data & Data Governance (user-facing: perceived fairness & consistency)	Data must be relevant, representative, accurate and non-discriminatory. Users won't see the datasets but might experience issues linked to them	Did you notice any biased, strange, or systematically wrong suggestions in specific conditions?	Highlights potential perception of bias, inconsistency, or unfairness. Many "Not sure" responses may show that data-related requirements are hard for operators to observe directly.	Yes | No | Not sure + brief explanation
Art. 11 – Technical Documentation (user-facing: explainability)	Users should be provided with adequate information on the system's logic and limits	Did DIRC/DICO provide you with enough information to understand why it made a recommendation/ action? Did you feel that you could trust the explanations provided?	Indicates if explanations support trust/acceptance. If users cannot understand outputs, transparency gaps may appear.	Yes | No | Not sure + brief explanation
Art. 12 – Record-keeping / Logging	The system must log events in order to support traceability	Were you aware that DIRC/DICO was logging or recording interactions? Would being able to review a history of DIRC/DICO's actions help you in your work?	Shows whether logging is visible/ useful to users. "Not sure" means low awareness; acceptance improves if users value traceability.	Yes | No | Not sure + brief explanation
Art. 13 – Transparency & Information	Users must be informed about the system's capabilities, limitations and overall role	Was it always clear that the recommendations/ actions came from AI (DIRC/DICO) and not a human? Did you understand the role and limitations of the assistant during the test?	Showcases user clarity on the AI's role and limits. Uncertainty reduces trust → hinders acceptance.	Yes | No | Not sure + brief explanation
Art. 14 – Human Oversight	The system must allow human control	Did you feel you were always in control of the system?	Shows if oversight mechanisms are actually meaningful	Yes | No | Not sure + brief explanation

2

AI Act requirement	Brief requirement description	Relevant questions	Indicative findings this could lead to	Response options
	and override (when needed)	Were you confident you could override or ignore the system if needed? Did the system's design (alerts/ interface) help	in practice. Acceptance depends a lot on feeling in control.	
			Identifies trust in accuracy and resilience. Negative findings reduce acceptance. Unpredictability undermines safety.	Yes | No | Not sure + brief explanation
			Reveals whether users feel informed and confident. Uncertainties/ negative responses indicate literacy/training needs (which will strongly affect acceptance).	Yes | No | Not sure + brief explanation
			Gives insight into acceptance levels (based on EASA). Strong link between legal compliance and real-world usability (even if something is 100% compliant might still not be used/accepted).	Yes | No | Not sure + brief explanation

3

Lessons learned: challenges & guidance for further research
(7 ATCOs from DFS & Austro Control GmbH, all from WS1-3)

- **Observation 1**: ATCOs struggle to maintain a mental picture when the AI automatically assume control.
  - Recommendation: Design an attention mechanism that clearly highlights which tasks the AI has newly assumed control of.

- **Observation 2**: The role concept shifts from a fixed “radar and planner” to a flexibly allocated set of tasks.
  - Recommendation: Create a framework for step by step adaption of roles and operator task requests.

- **Observation 3**: AI explanations are adequate but not appropriate for time critical decisions.
  - Recommendation: Train ATCOs to quickly interpret AI explanations and build calibrated trust.

- **Observation 4**: AI optimizes globally; humans are responsible locally.
  - Recommendation: Align local actions with global goals using shared performance indictors and feedback.

HARMONY

Human-**AI** **R**ole **M**anagement for **O**peration in the **N**ext-Generation Air Traffic **Sy**stem

(Jan 2027- Dec 2029)

Streamline Human-AI teaming with **dynamic task sharing** framework

Align **work organisation** and **procedures** across operational contexts

AI generated – ChatGPT (OpenAI), 20026

Facilitate **training approaches** and **technology solutions** implementation

Ensure **ethical**, **legal**, and **social** readiness compliance

HARMONY Team

DLR

Cooperation with partners

- DFS Deutsche Flugsicherung GmbH, DE
- Austro Control GmbH, AU
- LFV – Luftfartsverket, SE
- ECTRL Maastricht Upper Area Control, NL
- Frequentis AG, AU/DE
- EASA – AI Group, EU
- Deutsche Bundesverband Luftverkehrswirtschaf BDL, DE
- IFATCA, Int
- HS Osnabrück, DE
- TU Delft, NL

Pooling competencies@DLR

- Flight Guidance
- Aviation & Space Psychology
- AI-Safety
- Software Systems
- Data Science
- Air Transport Economy

Selected LOKI publications & contact

Hunger, R., Jameel, M., Bruder, C., Friedrich, M., Materne, L., & Mühlhausen, T. (2026). Validating Human-Autonomy Teaming in Air Traffic Control: The Role of the Digital Controller-in-the-Loop. In Proceedings of HCII 2026, 26 - 31 July 2026, Montreal Canada.

Bruder, C., Jameel, M., Kyrampalidou, S., & Berlenga, I. (submitted). Operational, psychological and ethical requirements for human oversight of AI in aviation - Insights from the user perspective. Aviation Psychology and Applied Human Factors - EAAP 2026 Proceedings Paper.

Gerdes, I., Jameel, M., Materne, L. J., & Bruder, C. (2025). Synergies in the Skies: Situation Awareness and Shared Mental Model in Digital-Human Air Traffic Control Teams. Aerospace, 12(6), 472. https://doi.org/10.3390/aerospace12060472

Stefani, T., Jameel, M., Gerdes, I., Hunger, R., Bruder, C., Hoemann, E., Christensen, J., Girija, A., Köster, F., Krüger, T., & Hallerbach, S. (2024). Towards an operational design domain for safe human-AI teaming in the field of AI-based air traffic controller operations. In *2024 AIAA DATC/IEEE 43rd Digital Avionics Systems Conference (DASC)* (pp. 1–10). IEEE. https://doi.org/10.1109/DASC62030.2024.10749684

Tyburzy, L., Renkhoff, J., Jameel, M., & Bruder, C. (2025, 22. - 27. Juni). User Centered Interface Design for Human Autonomy Teaming in Air Traffic Control: A Case Study [Proceedings]. 27th HCI International Conference, HCII 2025, Goetheburg, Schweden. https://doi.org/10.1145/3729176.3729185

Schon, J., Bruder, C., Liebherr, M., & Theis, S. (2025, 23. - 25. Juni). Cleared for Takeoff - Artificial Intelligence Acceptance in Air Traffic Control [Konferenzbeitrag]. CHIWORK '25: Proceedings of the 4th Annual Symposium on Human Computer Interaction for Work, Amsterdam. https://doi.org/10.1145/3729176.3729185

Hunger, R., Böhm, J., Materne, L. J., Christoffels, L., Tyburzy, L., Mühlhausen, T., Kleinert, M., & Pick, A. (2025). Increased safety goes hand in hand with higher cost efficiency: Single-controller operation showcasing its advantages. *Aerospace, 12*(4), 321. https://doi.org/10.3390/aerospace12040321

Jameel, M., Tyburzy, L., Gerdes, I., Pick, A., Hunger, R., & Christoffels, L. (2023). Enabling digital air traffic controller assistant through human-autonomy teaming design. *2023 IEEE/AIAA 42nd Digital Avionics Systems Conference (DASC)*, 1–9. https://doi.org/10.1109/DASC58513.2023.10311220

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