JOINT UNDERTAKING

HERON
Final Dissemination Event

SESAR 3 JU Programme Manager: Oznur Uygur
CINEA Officer: Bertrand Jolas
Brussels, EUROCONTROL Headquarters, 28 November 2025

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HERON Agenda

9:30-10:00: Welcome Coffee

10:00-10:15: Keynote and Welcome Speech

- Andreas Boschen, Executive Director (SESAR Joint Undertaking)
- Benjamin Tessier, HERON Project Coordinator (Airbus)

10:15-11:00: Session 1 - Integrated 4D Trajectories and ADS-C Common Services

- ACS development and service, Peter Lubrani (ESSP), Giulio di Tillio (Airtel ATN), Jean Boucquey (EUROCONTROL)
- Arrival Flow Management and pre-sequencing supported by ADS-C, Patrick Boulet (DSNA)
- Greener descents from TOD supported by ADS-C, Patrick Boulet (DSNA)
- Opticlimb, Patrick Boulet (DSNA)

11:00-11:15: Coffee Break

11:15- 12:30: Session 2 - Green Surface Operations Management

- Optimizing Single Engine Taxiing practice at Paris Orly airport, Arthur Chevrollier (ADP)
- Optimizing Single Engine Taxiing: Advanced AMM, Giuseppe Pillirone (AFR)
- Automating aircraft parking operations at Paris Orly airport, Laura Taurand (ADP)
- AI on aircraft stand at Paris Orly airport, Laura Taurand (ADP)
- Engine-off taxiing with Taxitow at AMS, Jeroen Jaartsveld (KLM), Florian Schneider (SNBV)

12:30-13:15: Marketplace and Networking

13:15-14:00: Lunch Break

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14:00-15:15: Session 3 - Optimised Approaches

- Reduced separation based on local Runway Occupancy Time Characterisation (ROCAT) in Istanbul airport (LTFM), Andres Gortazar (IGA)
- RNP-AR in St Nazaire and Calvi, Mario Pavon (Airbus)
- Optimized flight trajectories: shorter flight planning distances for EDDB, EDDN, EDDS, EDDH, Matthias Hark and Robert Winker (DFS), Kai Binnewies (Lufthansa)
- Descent Profile Optimization (DPO), Louis Ghegebidan and Jean Nicot (Airbus)
- Increased Second Glide Slope trials at EBBR , Kseniia Kozhevnikova (skeyes)
- ORD AWALON - Optimised Runway Delivery on Final Approach for Warsaw Chopin Airport, Piotr Bratek and Andrzej Stachlewski (PANSA)

15:15-15:30: Coffee Break

15:30-15:45: Session 4 - Improved Trajectory Planning

- Dynamic RAD, Giuseppe Acampora (EUROCONTROL)
- Flight Plan Rerouting notification improvements, Giuseppe Acampora (EUROCONTROL)

15:45-16:30: Marketplace and Networking

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Keynote speech by Andreas Boschen

Executive Director, SESAR Joint Undertaking

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Welcome speech by Benjamin Tessier

HERON Project Coordinator, AIRBUS

Highly efficient green operations

HERON

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AIRBUS

HERON

A large Pan European Consortium of 24 members gathering :

- 5 airlines
- 5 Airports
- 7 ANSPs,
- And many industrials

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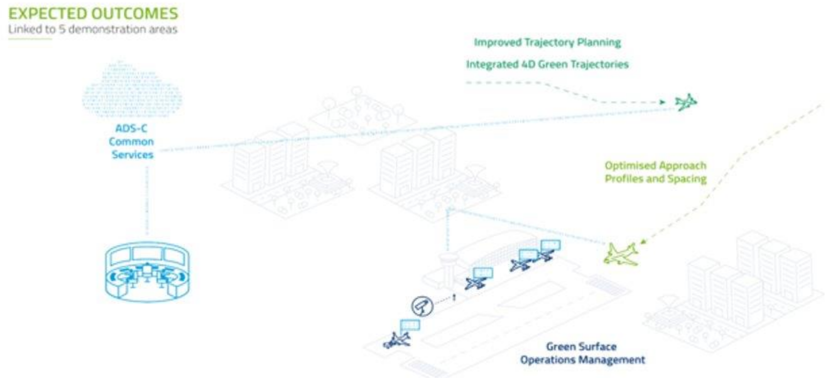
Trajectory Based Operations : Top of Descent optimisation, Continuous descent, arrival flow management optimisation

Green Surface Operations Management : Single Engine Taxiing, Taxitow, Turnaround time optimisation

Optimised Approaches : Increased glide slope, Runway Occupancy time, Optimised Runway Delivery,

ADS-C Common Services - Comm / datalink infrastructure & services

Trajectory Planning Improvement, Airspace redesign using data analytics



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SESSION 1

Integrated 4D Trajectories & ADS-C Common Services

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ACS development and service

Peter Lubrani (ESSP), Giulio Di Tillio (Airtel ATN), Jean Boucquey (EUROCONTROL)

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Agenda

- Background
- Scope & Goal
- ACS Development, deployment and Service provision
- Main Achievements
- Conclusions

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HERON Air-Ground Integration & Autonomy

ADS-C EPP

- Automatic dependent surveillance – Contract (ADS-C) enables aircraft to **automatically** transfer **accurate trajectory information** from the flight management system to the ground, known as the **extended projected profile (EPP)**.

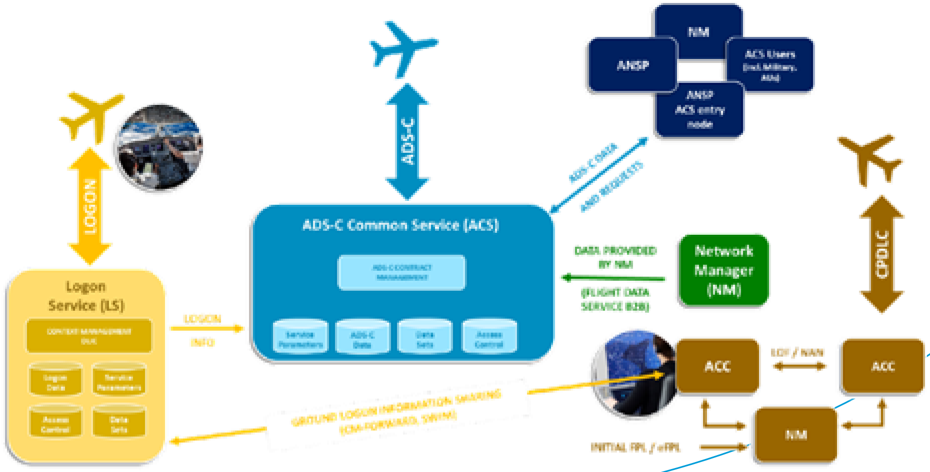
ADS-C Common Service (ACS)

- **Establishes** the contracts, **Collects** the ADS-C EPP messages from aircraft and **Redistributes** them to the users on the ground (Machine to machine interface, Direct integration of digital data, Automation);
- CP1 (IR EU No. 2021/166) mandates sharing / distribution of ADS-C data on the ground for ANSPs and NM (AF6 Family 6.3.1).

Development Projects (past-present-future)

HERON's objective: to develop further and validate the ACS.

- DIGITS, ADSCENSIO, the HERON project and ESMA



ATN DLS CONOPS Eurocontrol Spec 192

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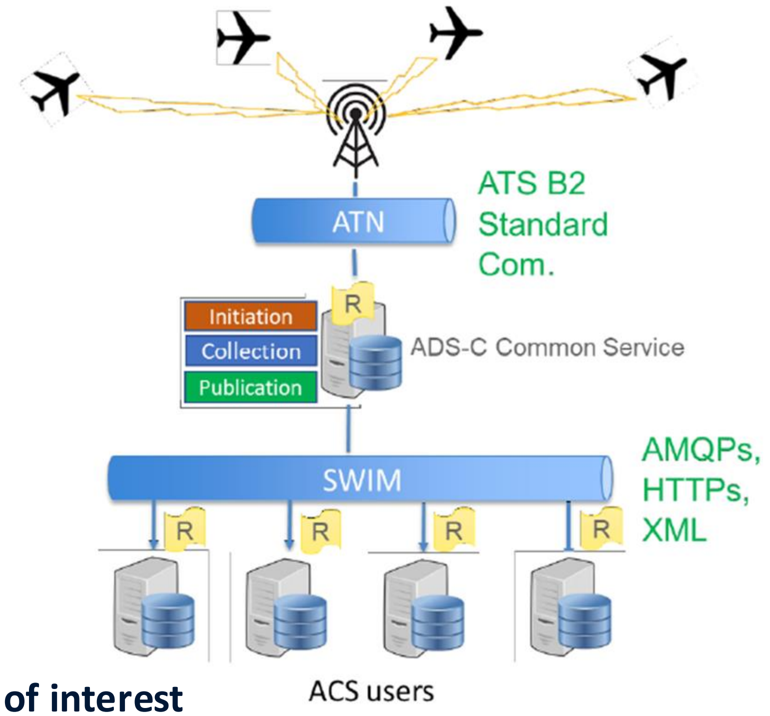
ADS-C Common Service

- ADS-C Common Service (ACS)
  - **Establishes and maintains an ADS-C connection** with aircraft as early and as long as possible
  - **Assumes responsibility for collecting** ADS-C data from airborne users
  - Allows for **one single Logon** and **Distributes** this data to entitled ground users via SWIM
  - Supports **Trajectory Based Operations (TBO)**
- Main overall goals & benefits
  - **Reduce ATN** network load (avoiding duplication on the A/G link)
  - Less complexity for clients, **lower costs**
  - **Improve ADS-C data access and faster** deployment
  - Supports **high number of clients** / ground users
- Assumptions
  - Operational need (for ANSPs and other users) **to receive ADS-C data beyond their area of interest**
  - **Multiple users** with simultaneous interest in ADS-C data for the same flight
  - **Standard ADS-C contracts** cover most user needs



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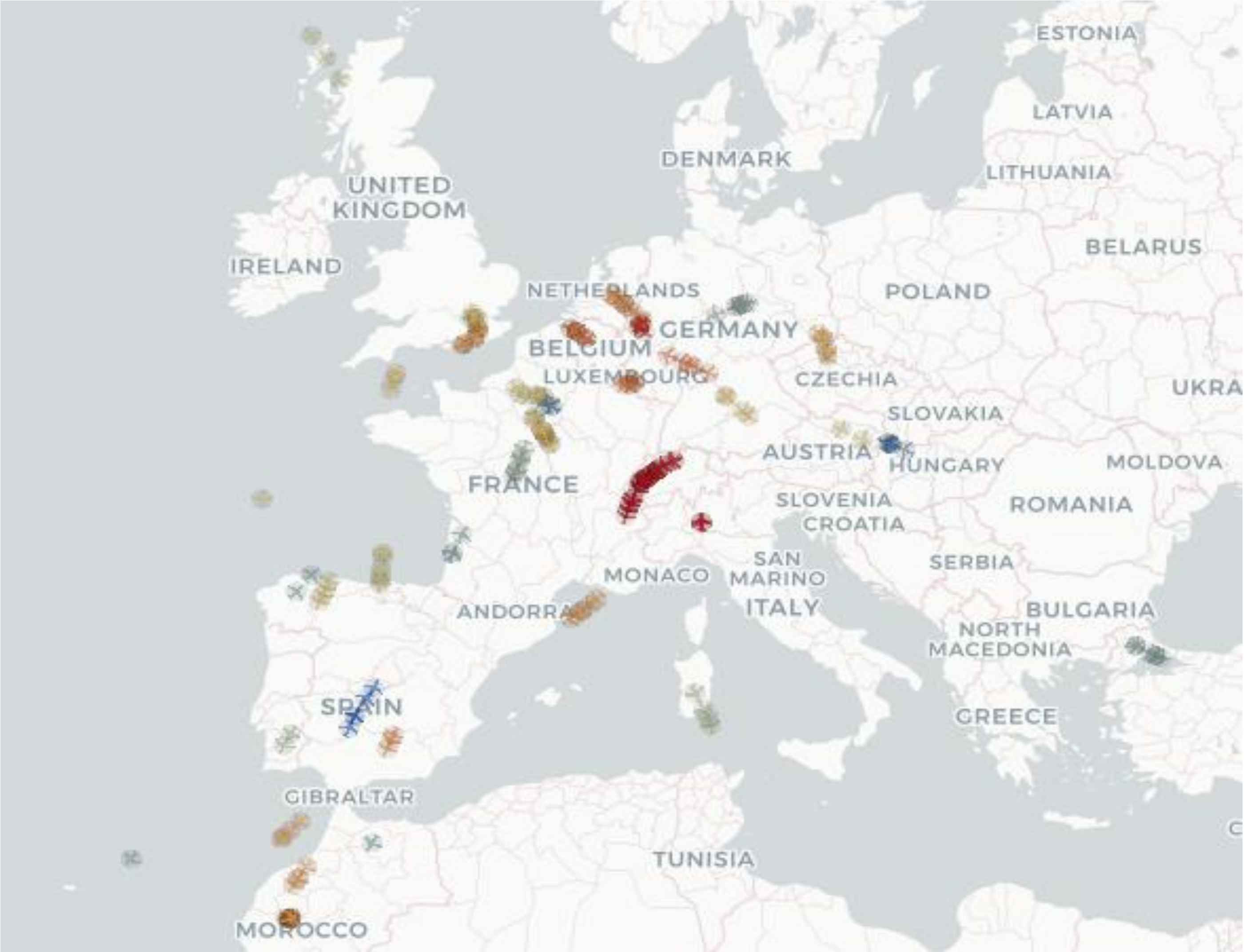
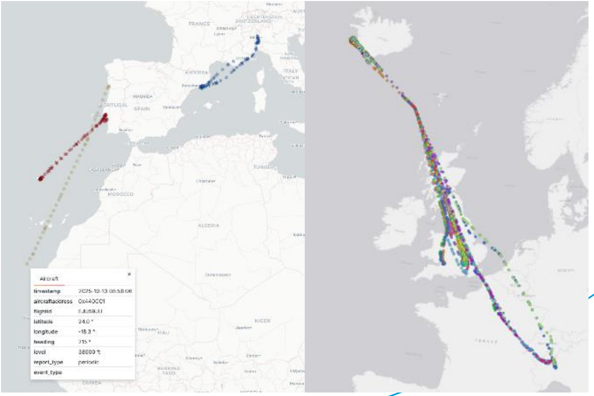
Network & Coverage



- Average flights x day (all ECAC): **150/300**
- **Average waypoints: 45**
- Maximum waypoints: 94
- Fleet: 103 a/c (flying max 87)

Around 25 flights are active right now



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HERON CM Service + ADS-C Common Service

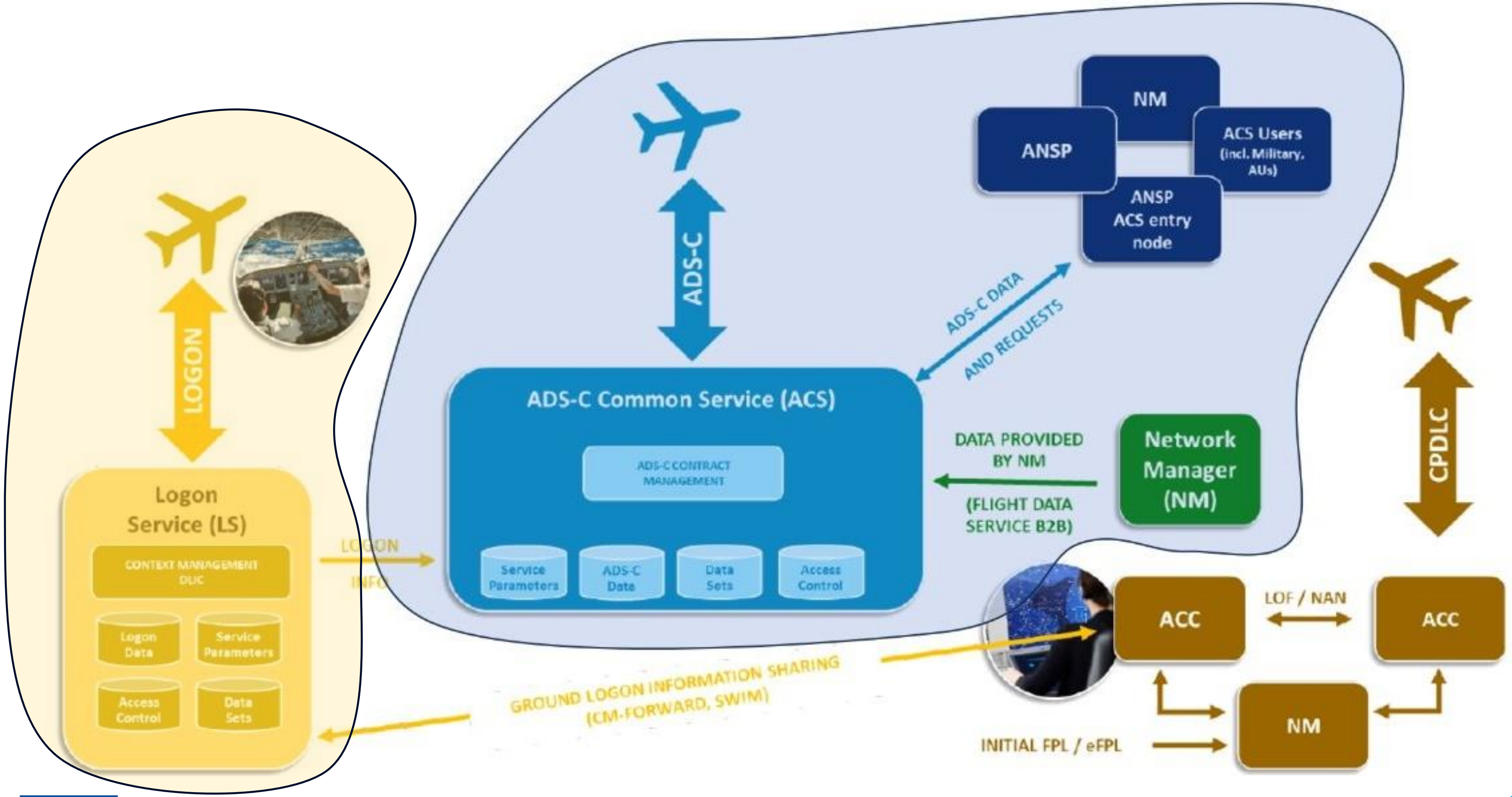
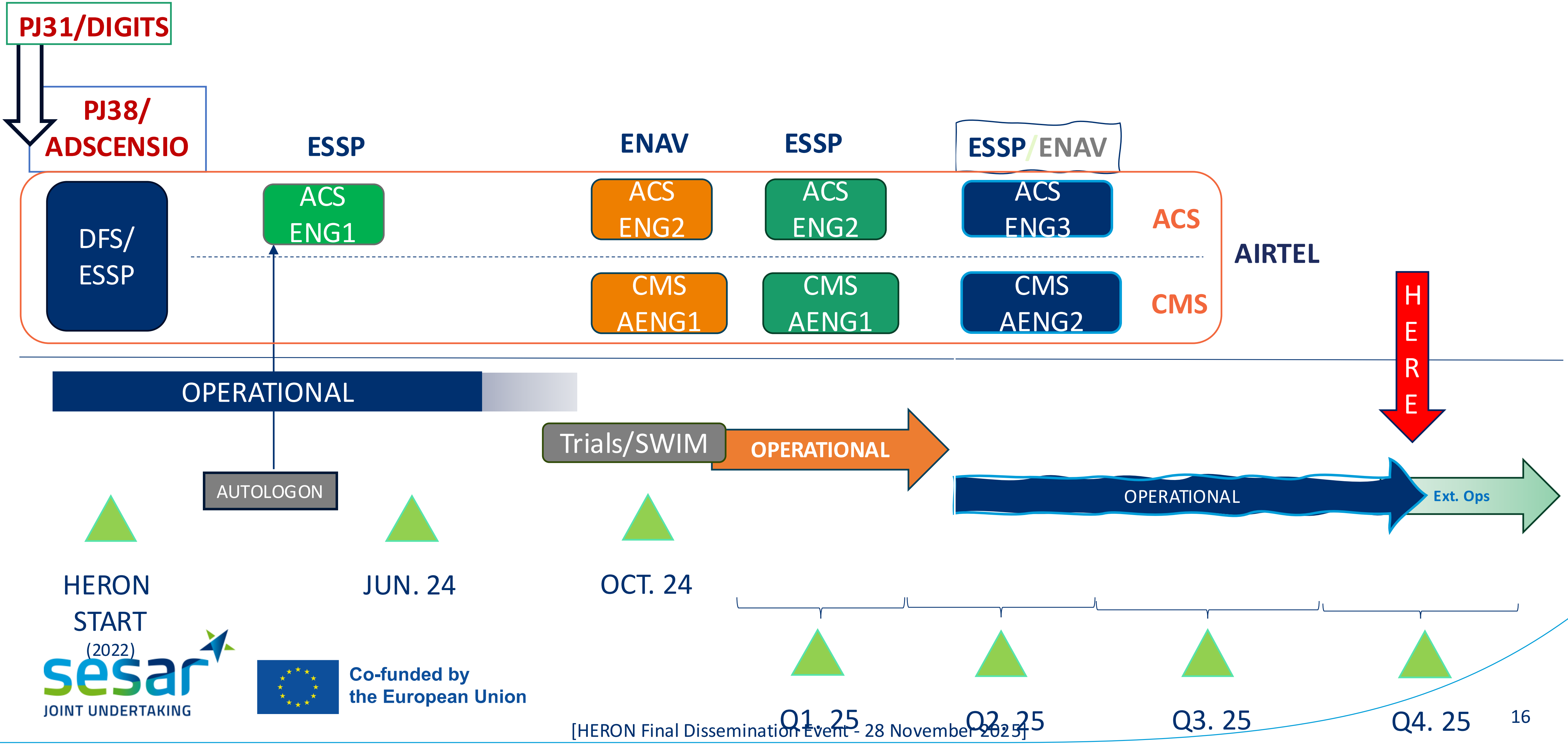


Image from EUROCONTROL Spec 192

HERON LACS Development, Deployment and Service



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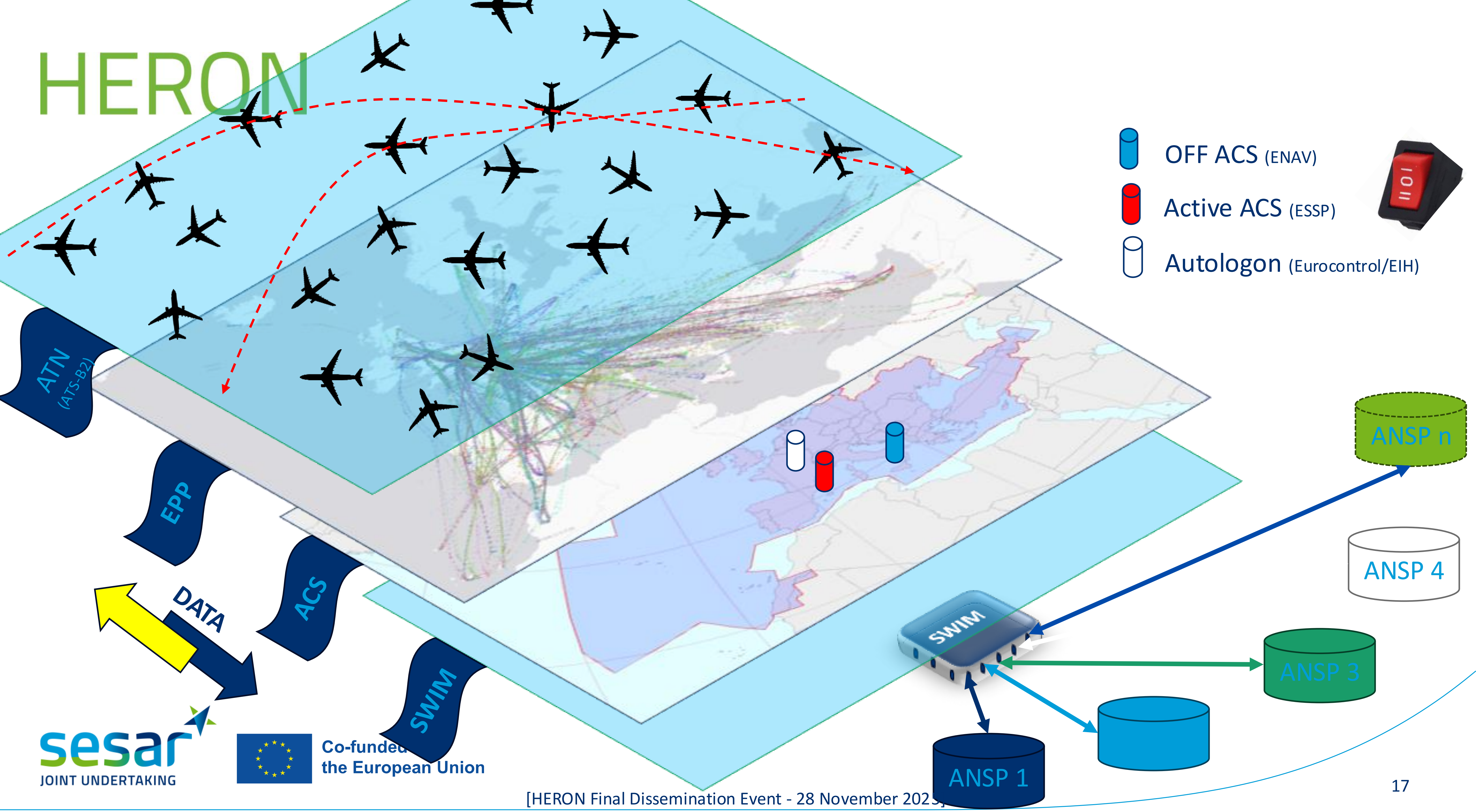


OFF ACS (ENAV)
Active ACS (ESSP)
Autologon (Eurocontrol/EIH)
ATN (ATS-B2)
EPP
ACS
SWIM
DATA
SWIM
ANSP n
ANSP 4
ANSP 3
ANSP 1

HERON CM Logons

No logon = No contract

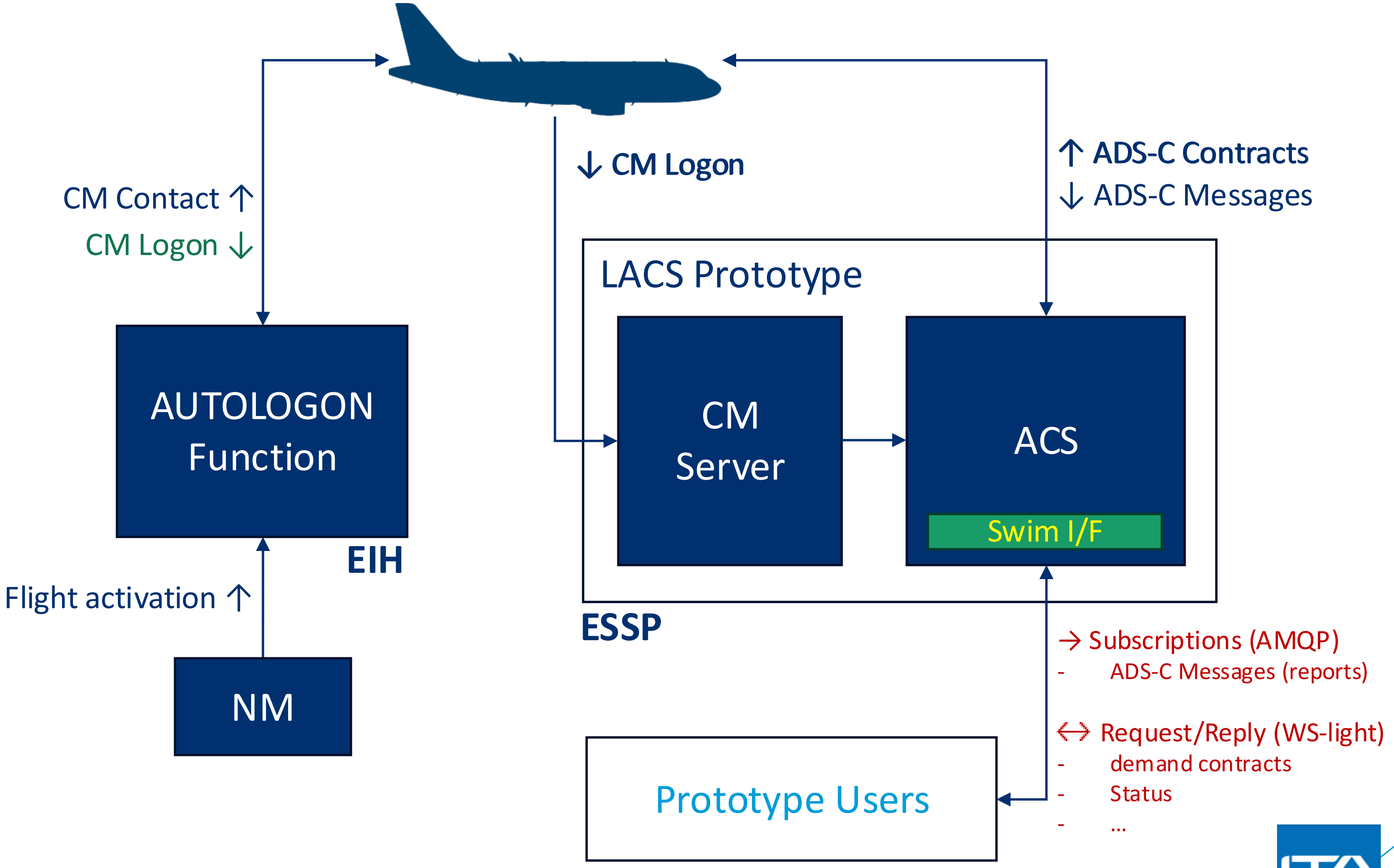
CM Logon to the ACS is required to establish ADS-C Contracts

Two CM Logons (CPDLC + ACS)
→ Crew overload

HERON (& PJ38) Solution
→ The AUTOLOGON function.

LACS Deployment
→ Central Logon Server @ European Level

Transition → See OEP 12.2 Guidance



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ACS achievements

- **Developed, tested and operated 2 CMS & 3 ACS prototypes** according to the specifications (EUROCONTORL SPEC192/193);
- During the HERON project the number of operational/connected **ACS evolved from 3 to 1** with a backup, in line with the aim to create a Common European Service.
- Demonstrated the **Logon Service (CMS) Capabilities: DLIC** (initiation, contact), **Logon Service** and **Logon Information Management** (logon-via-contact).
- Demonstrated the **ADS-C Data collection Capability: 53K flights** (approx.); **3M ADS-C reports** were collected from the start of the project to date involving **10 airlines**, **103 a/c** and an average of **180 to 350 daily flights**.
- Demonstrated the **ADS-C Data** real time **distribution via SWIM to its users (Enaire/Crida, ENAV, DSNA, DFS, NM)** and the benefit of operational exercises performed in Work Package 2.
- Provided a pre-operational service to the HERON partners.
- Demonstrated real-time monitoring of the foreseen LACS service and insights into the operation of such a service: providing a preliminary plan for service provision
- **Achieved TRL8**
- Clearly demonstrated that LACS supports the functionalities required by CP1 AF6

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HERON Conclusions and Recommendations

1. The results obtained in this demonstration exercise are considered **representative**, given its very large **scope in time and geographical extension**. Furthermore, it has been conducted with real operations.
2. The HERON project has allowed for a significant amount of data to be collected and service provision to be monitored, **underscoring the scalability of the ACS and its coverage within the ECAC region**.
3. The HERON project and the ACS service has allowed all the involved stakeholders **to get acquainted and familiarise with the concept**, the data, the procedures and the ADS-C application.
4. **The AUTOLOGON (provided by EIH): a** useful functionality allowing a transparent and automized connection between the a/c and the HERON ACS, allowing for more flights, thus data, to be captured and analysed.
5. The HERON sWP2.5 partners during the development and deployment of the prototype **proactively implemented service monitoring, stakeholder coordination and safeguards (e.g. DPMG#17 16.10.24 ITEM 6i).**
6. **R** - Acknowledging Pre-Operational Status: a **continuously running pre-OPS LACS, supports the European ANSPs in fulfilling the CP1 mandate.**
7. **R** - CM Logon sharing: ANSPs should be encouraged to share CM Logon information with the CMS (Logon Service)

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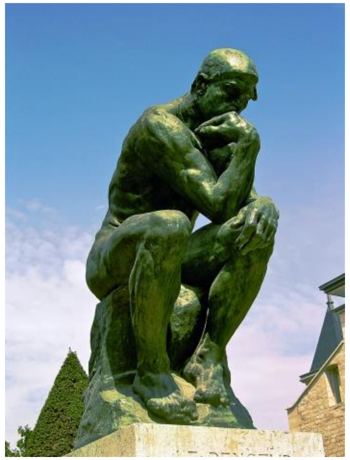

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ENAV: michele.raimondo.1@enav.it

sWP2.5 Partners: ESSP, DFS, Airtel, Eurocontrol, ENAV, Enaire/Crida, DSNA, AirFrance, NATS

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Integrated 4D for Green Trajectories

Patrick Boulet (DSNA)

EUROPEAN PARTNERSHIP

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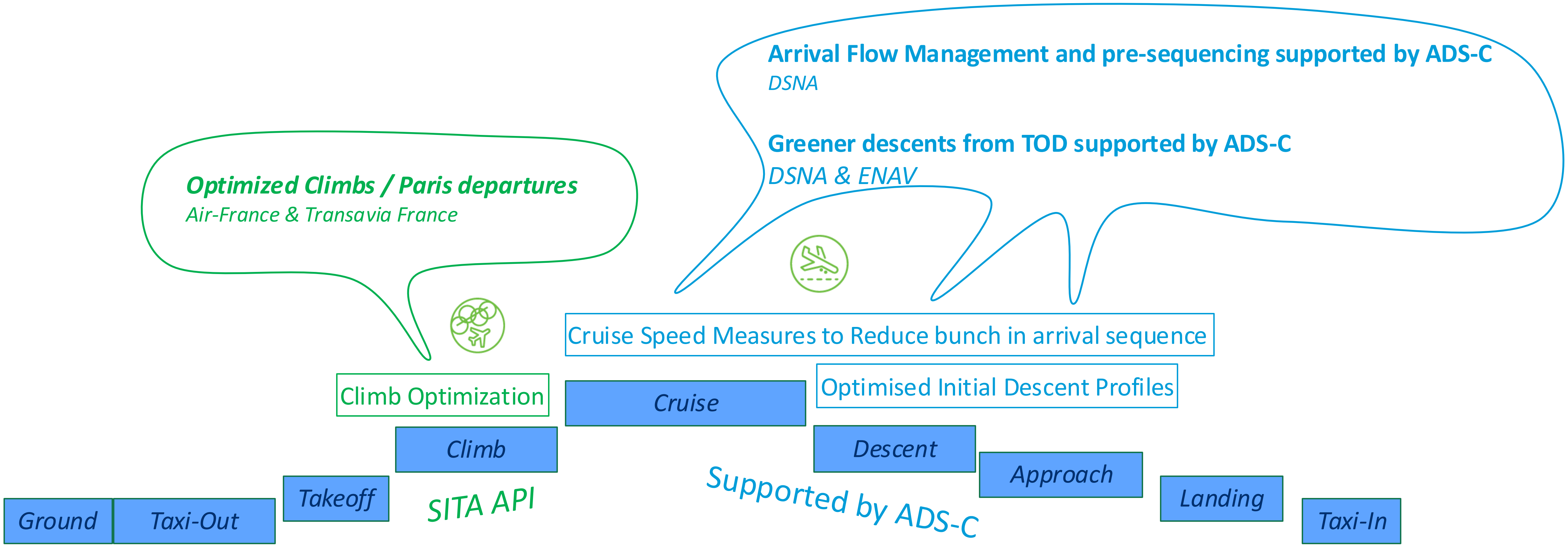
HERON Integrated 4D for Green Trajectories



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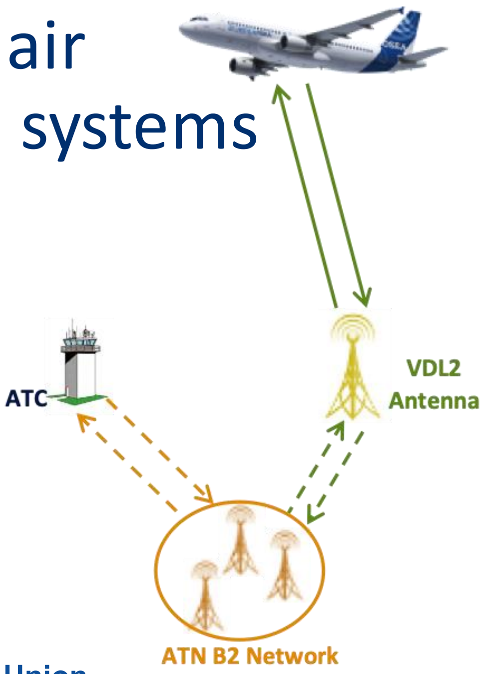
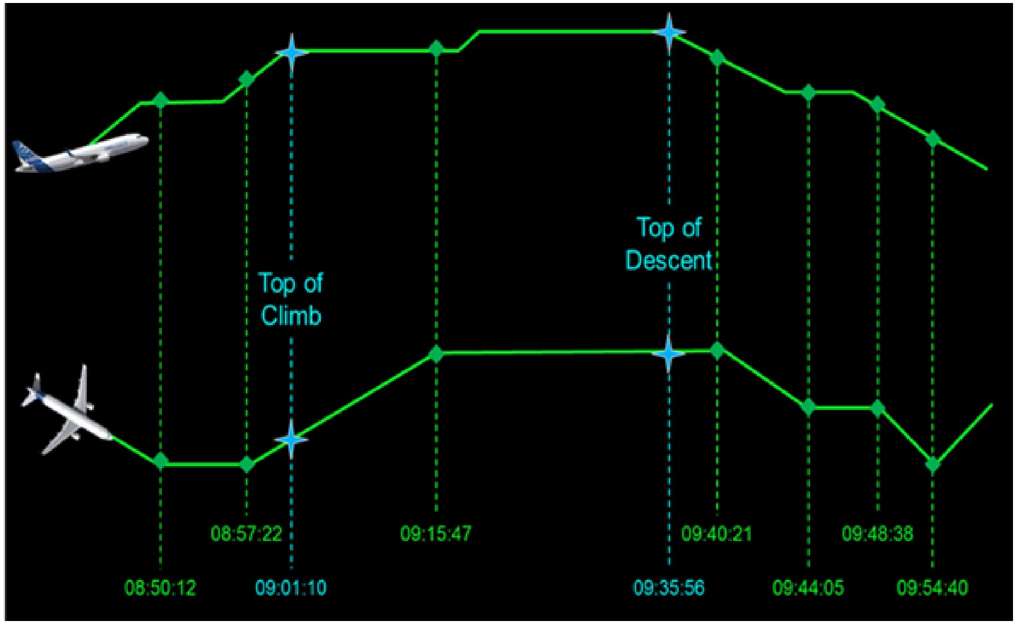
HERON What is ADS-C?

Automatic **D**ependant **S**urveillance - **C**ontract

Real-time data exchange between aircraft and air traffic control ground systems



Flight Data (ADS-C reports) continuously recomputed and downlinked



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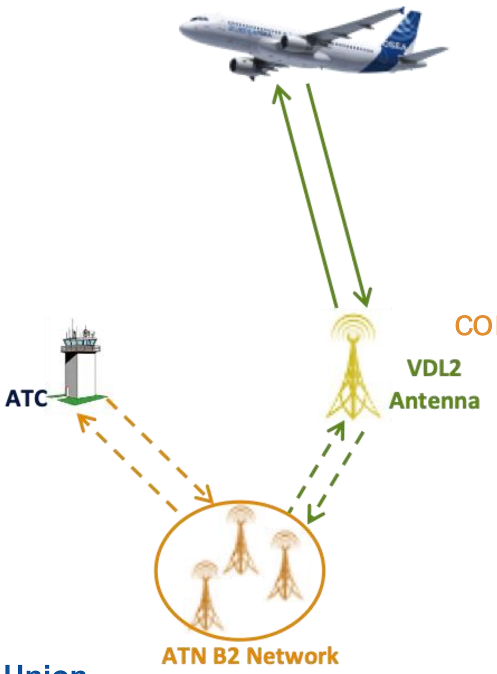
HERON ADS-C Data Description

Uplink: contract request

From an ATC Center to a connected aircraft, three different contract types

- *Periodic contract*
- *On Event contract*
- *On Demand*



Downlink: ADS-C report

Mandatory data group

- Basic Group

Optional data groups:

To be selected by ground system when establishing ADS-C contract with the aircraft

- Projected Profile
- Ground Vector
- Air Vector
- Meteorological Information
- Extended Projected Profile
- Speed Schedule
- TOA Range
- RTA status data

Data based on current aircraft status

Data based on FMS predictions

TOA: Time of Arrival

RTA: Requested Time of Arrival

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HERON ADS-C report

Basic Group
- Computation Date/Time
- Current aircraft LAT/LONG
- Current A/C altitude
- Figure of Merit

Projected Profile
- Computation Date/Time
- Data related to ACTIVE and NEXT waypoints in flight plan
  - LAT/LONG
  - *Predicted Altitude*
  - *Name*
  - *ETA*

Ground Vector
- Ground Track
- Ground Speed
- Vertical Rate

Air Vector
- Heading
- Airspeed
- Vertical Rate

Meteorological Information
- Wind Speed
- Wind Direction
- *Temperature*

Extended Projected Profile
- **Computation Date/Time**
- ***Current Gross Mass***
- ***Trajectory Intent Status***
  - ***Lateral Flight Managed***
  - ***Vertical Flight Managed***
  - ***Speed Managed***
  - ***Time Managed***
- **Data for up to 128 waypoints and pseudo-waypoint**
  - **LAT/LONG**
  - ***Predicted Altitude***
  - ***Name***
  - ***ETA***
  - ***Predicted Speed***
  - ***Vertical Type***
  - ***Lateral Type***
  - ***Altitude Constraint***
  - ***Speed Constraint***
  - ***Time Constraint***

RTA status data
- *TOA Range*
- *RTA Status*

Data based on **current aircraft status**

Data based on **FMS predictions**

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Arrival Flow Management and pre-sequencing supported by ADS-C

Patrick Boulet (DSNA)

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HERON Integrated 4D for Green Trajectories

Arrival Flow Management and pre-sequencing supported by ADS-C
DSNA

Cruise Speed Measures to Reduce bunch in arrival sequence

Ground | *Taxi-Out* | *Takeoff* | *Climb* | *Cruise* | *Descent* | *Approach* | *Landing* | *Taxi-In*

Supported by ADS-C

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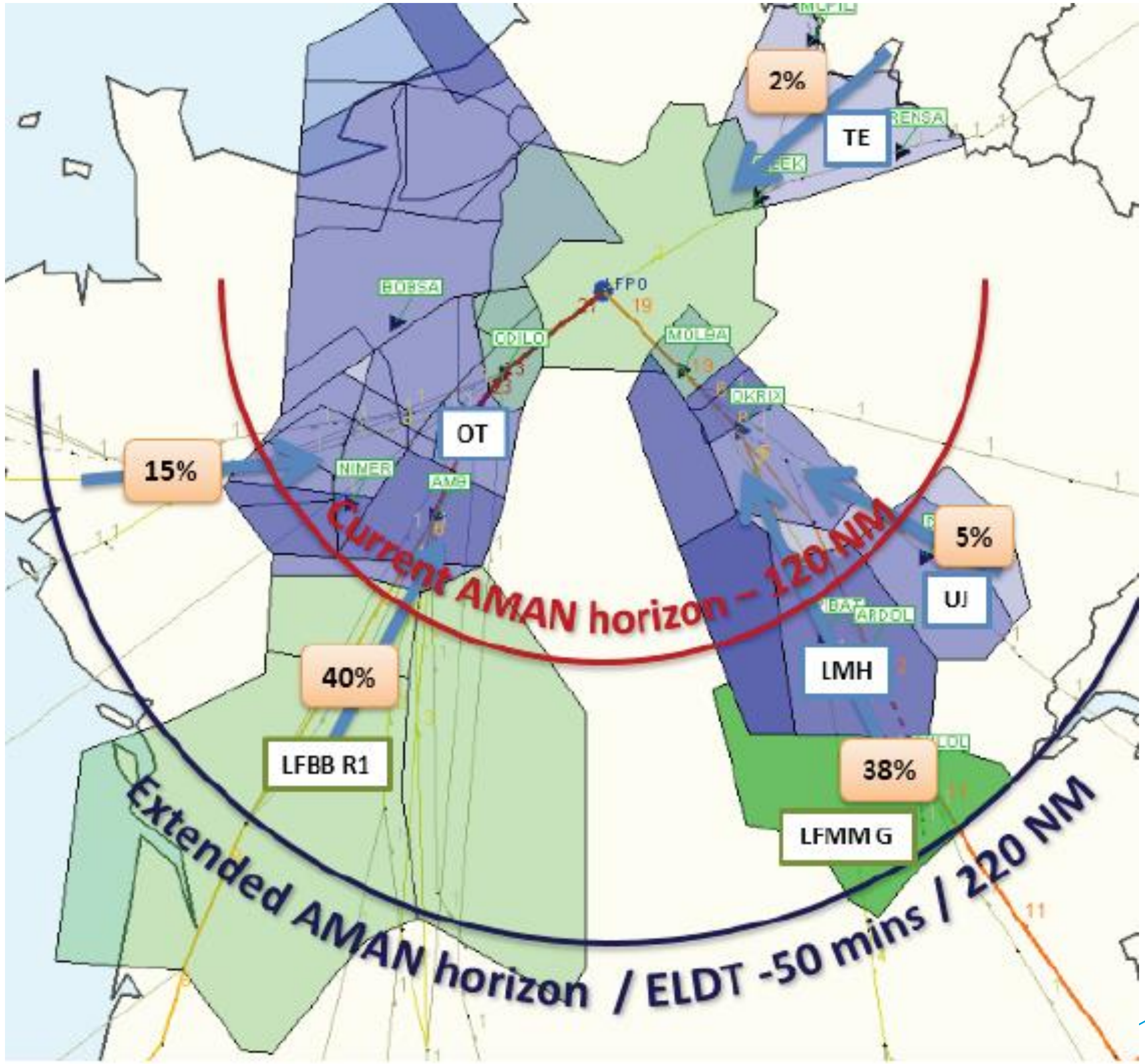
HERON Extended AMAN supported by ADS-C Scope and Goal

- Arrival Manager (AMAN) provides arrival sequence (with aircraft allocated delays) to controllers
- 2019 xStream project (“Cross border SESAR trials for enhanced arrival”) covered the Extended AMAN deployment in different locations in Europe
  - Zurich
  - Paris-Orly
  - Gatwick
- Bunches resolution by Flow Manager



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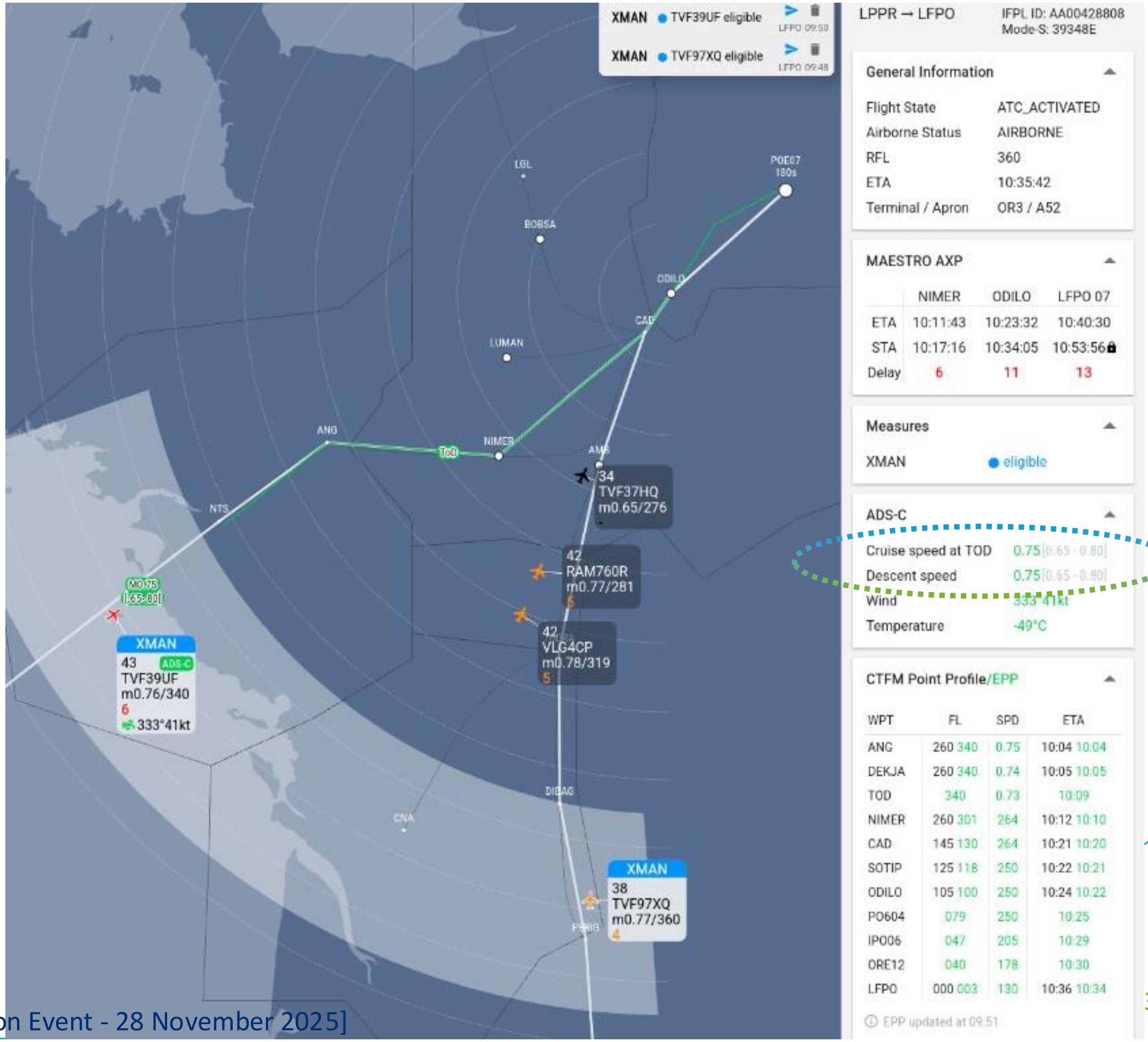
HERON Extended AMAN supported by ADS-C
Scope and Goal

xStream improvement

Paris Orly and CDG arrivals

ADS-C EPP data displayed to Flow Manager:

- **Ground** (NM) and **air** (EPP) time estimates
- **Min and Max feasible speed**
- Initial descent speed + cruise speed at TOD allow Flow Manager to assess aircraft **Cost Index**.



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Extended AMAN supported by ADS-C Conclusions and Recommendations

- The ADS-C data have a high added value for Flow Managers to set up Extended AMAN measures to arrival traffic
- Usual Extended AMAN benefits are reinforced
  - Capacity
    - By reducing complexity in Extended-TMA/TMA
  - Fuel benefits, environment
    - By reducing vectoring needs
- No quantitative measures: the impact is not yet measurable, as too few aircraft are equipped and connected to ACS.

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Greener descents from TOD supported by ADS-C

Patrick Boulet (DSNA)

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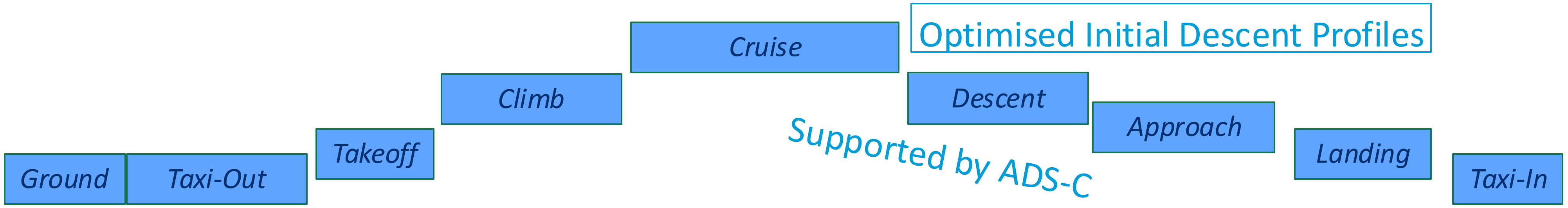
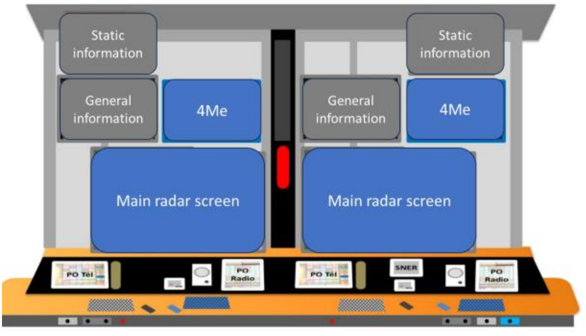
HERON Greener descents from TOD supported by ADS-C

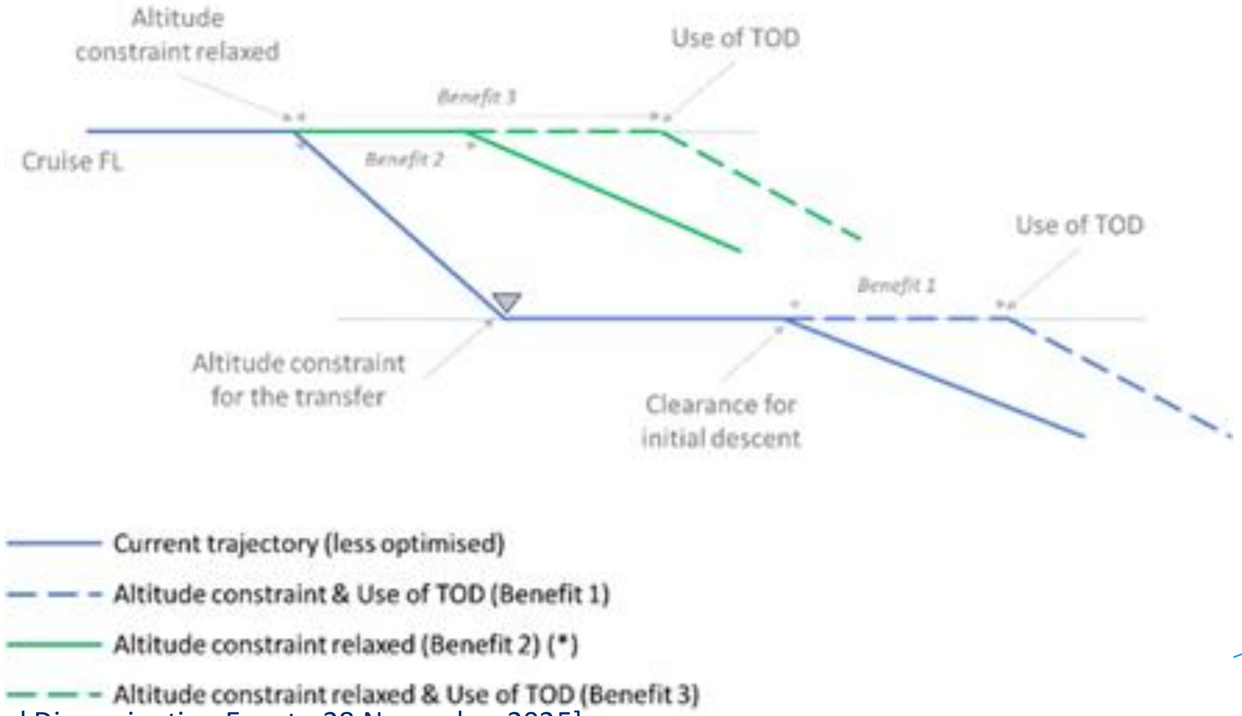
Greener descents from TOD supported by ADS-C
DSNA & ENAV



HERON Greener descents from TOD supported by ADS-C Scope and Goal

- Focus: end of cruise / beginning of descent phase
- Airspaces selection (flows, waypoints) where descent optimisation could be possible using ADS-C EPP **Top Of Descent (TOD)** information
- Paris and Marseille ACCs





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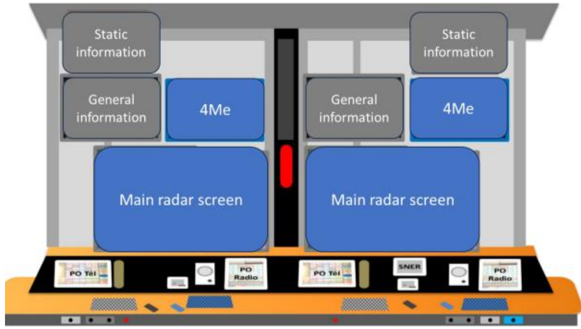
HERON Greener descents from TOD supported by ADS-C Working Method

Flight integration

Planner:
- Entrance/exit conditions check
- ADS-C TOD validity assessment: air/ground FL constraints consistency
- If optimisation situation, coordinate with next sector for a later descent

Flight management

Executive
- Remind FL constraints if air/ground non consistent
- ADS-C TOD info to impact decision about descent
  - "When ready descent"
  - Or classic descent clearance close to the TOD



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Greener descents from TOD supported by ADS-C Working Method

Flight integration

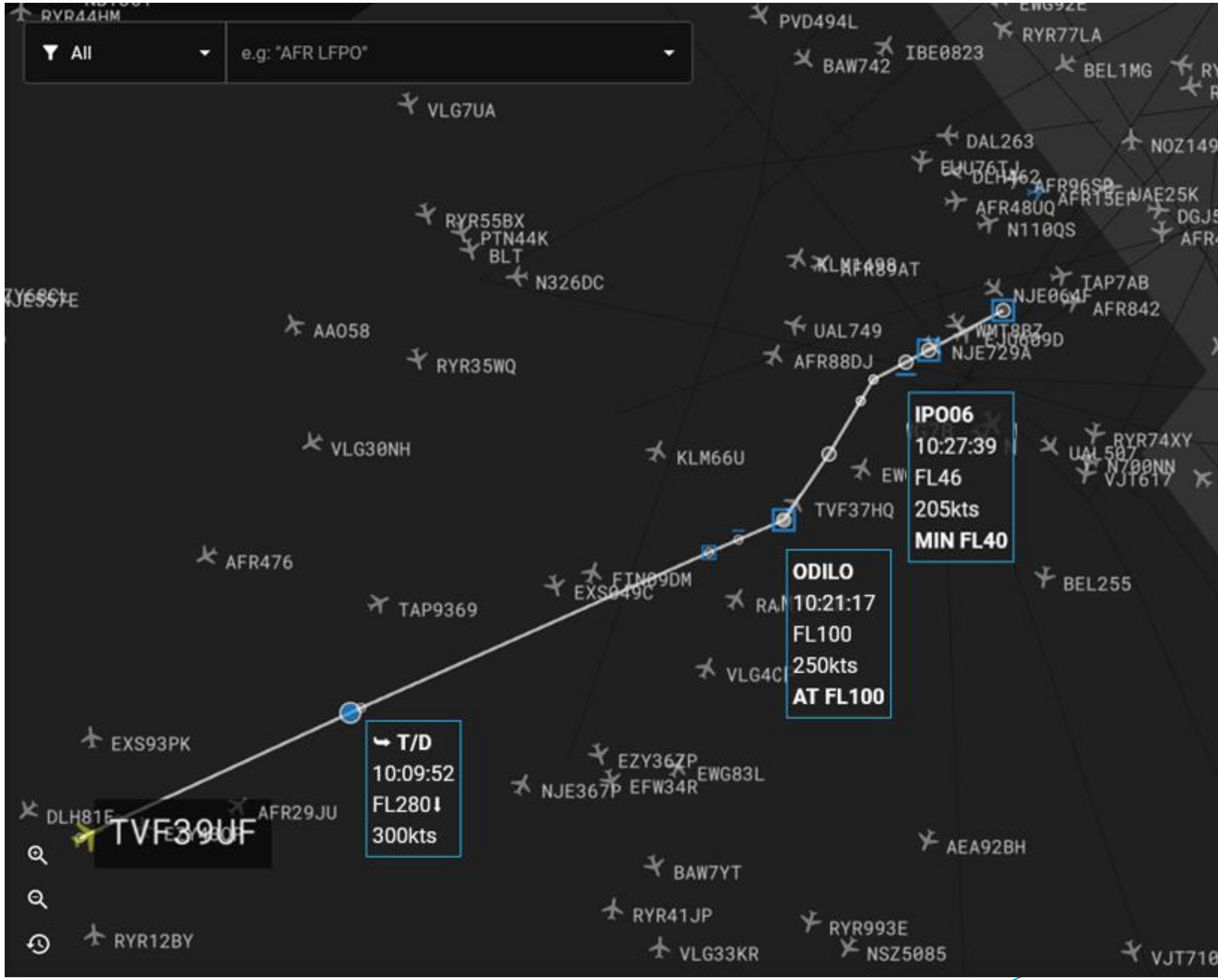
Planner

- Entrance/exit conditions check
- Air/ground FL constraints consistency (ADS-C TOD validity assessment)
- If optimisation situation, coordinate with next sector for a later descent

Flight management

Executive

- If air/ground non consistent remind FL constraints which will apply
- Once valid ADS-C TOD → descent clearance
  - "When ready descent"
  - Or classic descent clearance close to the TOD



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HERON Greener descents from TOD supported by ADS-C
What Went Well – What Went Not so Well

- Live trials in Paris-ACC (SW arrivals to Orly CDG) and in Marseille-ACC (North arrivals to Marseille) during May-June 2025
- ADS-C EPP **Top Of Descent consideration** is only efficient in **medium to low traffic level**
- Anticipated descent is often requested by pilots for Marseille arrivals
  - In good visibility situation pilots expect visual approach clearance

  →shorter trajectory than procedural approach (time and fuel savings)
- To come next: Reims ACC and Brussels Airline (Lufthansa Group) to setup new trials for Brussels arrivals during winter 2025-2026

  ADS-C TOD use during winter season (lower traffic)

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Opticlimb

Patrick Boulet (DSNA)

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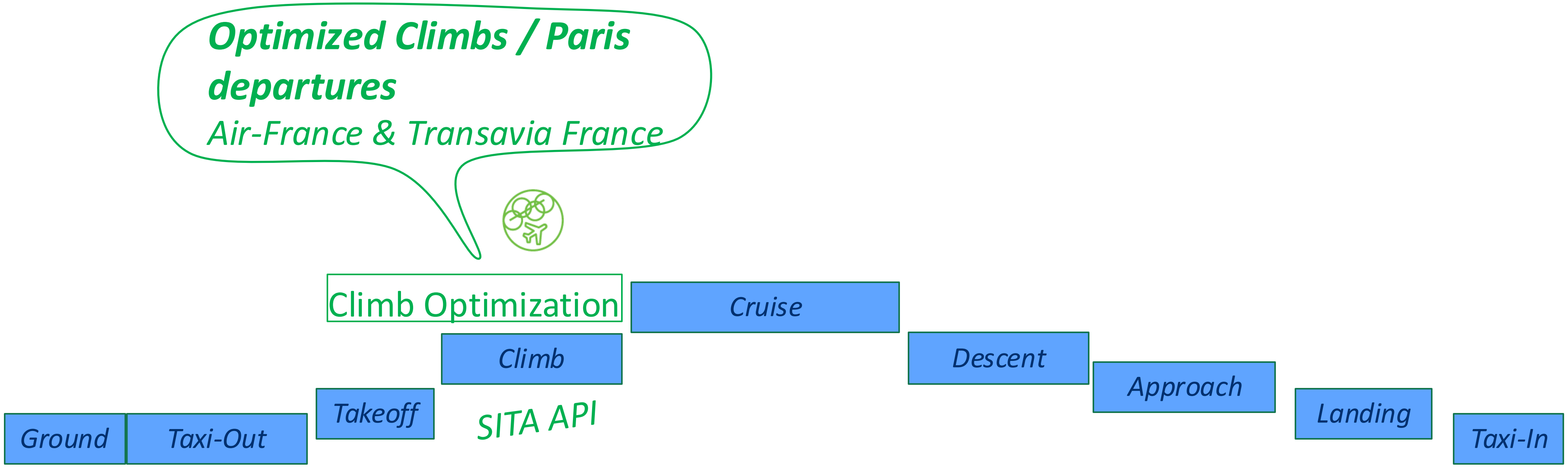
HERON Integrated 4D for Green Trajectories



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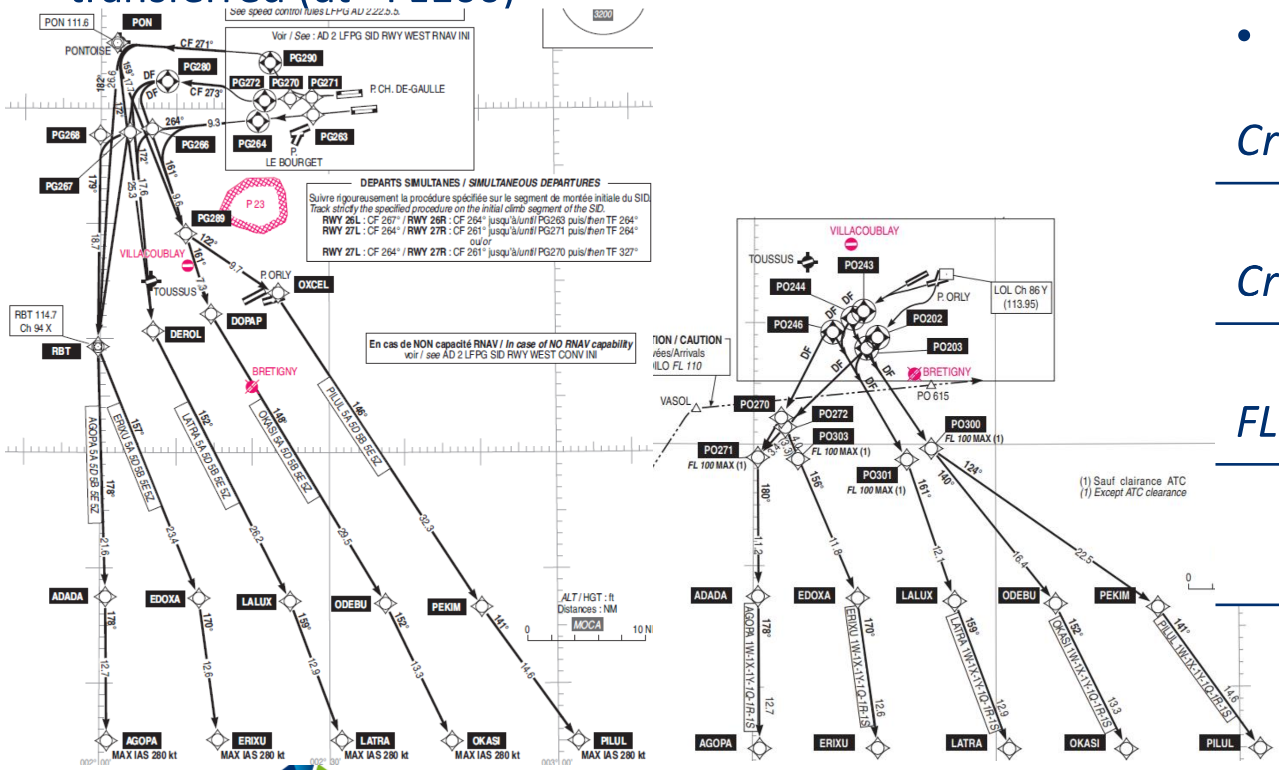
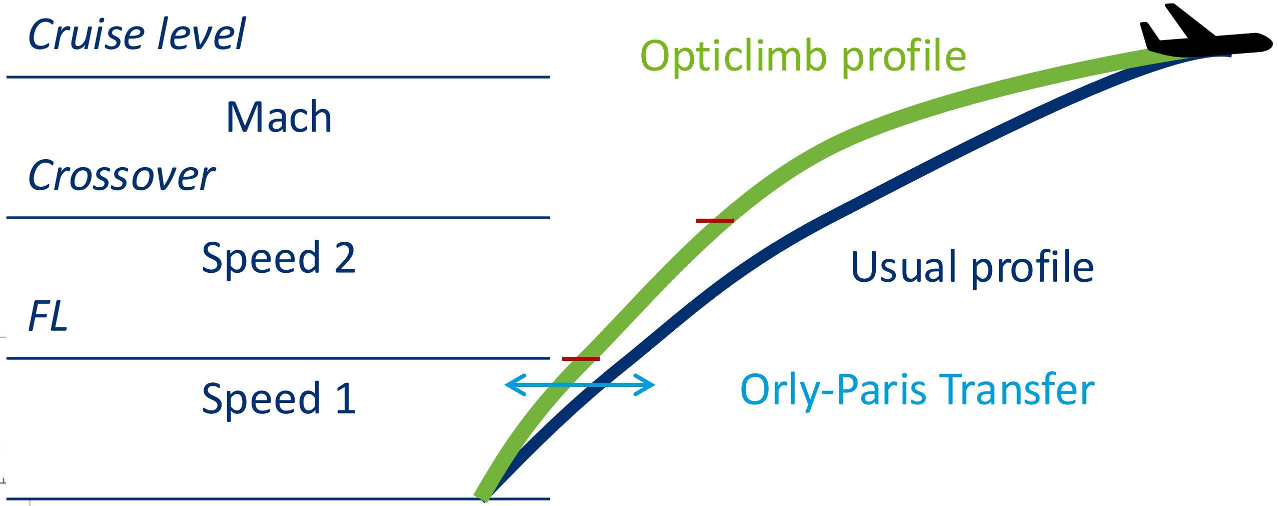
OPTICLIMB
Scope and Goal

LOA Orly APP / Paris ACC: speed 300kt when transferred (at ~FL100)



ATC issue with Orly OPTICLIMB profiles:

- Lower climb speed
- Better climb rate



- ➢ Potential catch-up issue
- ➢ Potential conflicts between Orly & CDG departing flights

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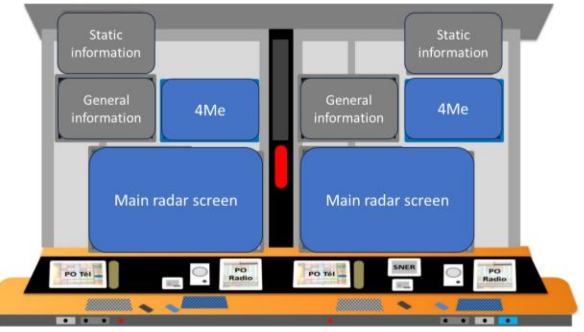
HERON OPTICLIMB Working Method

- OPTICLIMB flight announced by pilot at 1st contact
- OPTICLIMB parameters were made available for controllers

(SITA-DSNA interface)



Callsign	Init speed	Acceleration	Speed	Crossover	Mach
AFR7416 LFPG - LFBO	235 kt	FL138	268 kt	FL320	M 0.74
AFR41HM LFPG - LFML	250 kt	FL133	284 kt	FL307	M 0.76
TVF9830 LFPO - GMAD	250 kt	FL165	273 kt	FL335	M 0.78
AFR27QM LFPG - LIRQ	250 kt	FL134	268 kt	FL312	M 0.73
AFR1854 LFPG - DAAG	243 kt	FL130	274 kt	FL327	M 0.77
TVF9802 LFPO - GMMX	250 kt	FL164	273 kt	FL327	M 0.77

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OPTICLIMB
What Went … Not so Well

- Pilot is free to select the more appropriate climb parameters
  - All combinations observed
- Controllers cannot consider OPTICLIMB parameters in heavy traffic situation
- AIRBUS and BOEING FMS setup are different
  - *ADS-C EPP data would not solve the issue!*

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OPTICLIMB
What Went … Not so Well

Airbus

ON GROUND

Multi-Function Control and Display Unit (MCDU)

In the MCDU VERT REV page (on RWY WPT): Enter CLB SPD LIM IAS 1/ACC FL

IN-FLIGHT

Multi-Function Control and Display Unit (MCDU)

In the MCDU VERT REV page, at ACC FL Enter CLB SPD LIM IAS2/CROSSOVER FL

On the FCU, at CROSSOVER FL: Press SPD/MACH pushbutton and adjust to CLIMB MACH

OptiClimb schedule is partly inserted on ground (IAS1 / ACC FL) but requires an inflight entry (at ACC FL) which modifies FMS speeds

On ground:

- In the **FMS**, enter **CLB SPEED LIM** : **IAS1 / ACC FL**

Inflight:

- **At ACC FL,** in the **FMS** enter **CLB SPEED LIM: IAS2 / CROSSOVER FL**
- **At CROSSOVER FL,** select on the **FCU**: **CLIMB MACH**

Boeing

Insertion of OptiClimb schedule is fully done on ground

In the **FMC CLB/VNAV** page:

- Entrer **TGT SPD:** **IAS2 / CLIMB MACH**
- Entrer **SPD REST:** **IAS1 / ACC FL**

Notes:

- For some **Airbus** operators (AFR and TVF), the OptiClimb mach recommendation will be similar to cost index mach. No FCU selection is then required, the aircraft will fly a typical climb mach
- **A220** and **Embraer** follows a Boeing logic, all the schedule is entered on ground
- In case of **ATC speed instructions** or **SID restriction,** OptiClimb speed won't be followed

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OPTICLIMB
What Went … Not so Well

- *What next*
    - *OPTICLIMB flights distinction to improve*

HERON *Integrated 4D for Green Trajectories*

Arrival Flow Management and pre-sequencing supported by ADS-C
Greener descents from TOD supported by ADS-C
OPTICLIMB

HERON

sWP2.1 Leader: AIR-FRANCE

Giuseppe PILLIRONE gipillirone@airfrance.fr

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HERON

COFFEE BREAK
11:30-11:45

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SESSION 2

Green Surface Operations Management

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Optimizing Single Engine Taxiing practice at Paris Orly airport

Arthur Chevrollier (ADP)

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HERON Driving CO2 Reduction at Paris-Orly

Technical levers
SAF
Fleet Renewal
Future green aircraft

Regulatory levers
Taxes

Paris-Orly Objective
Net Zero CO_2 ground emissions
2030

Operational Levers
Optimization of taxi times
Taxibots or EGTS
Single Engine Taxi (SET)

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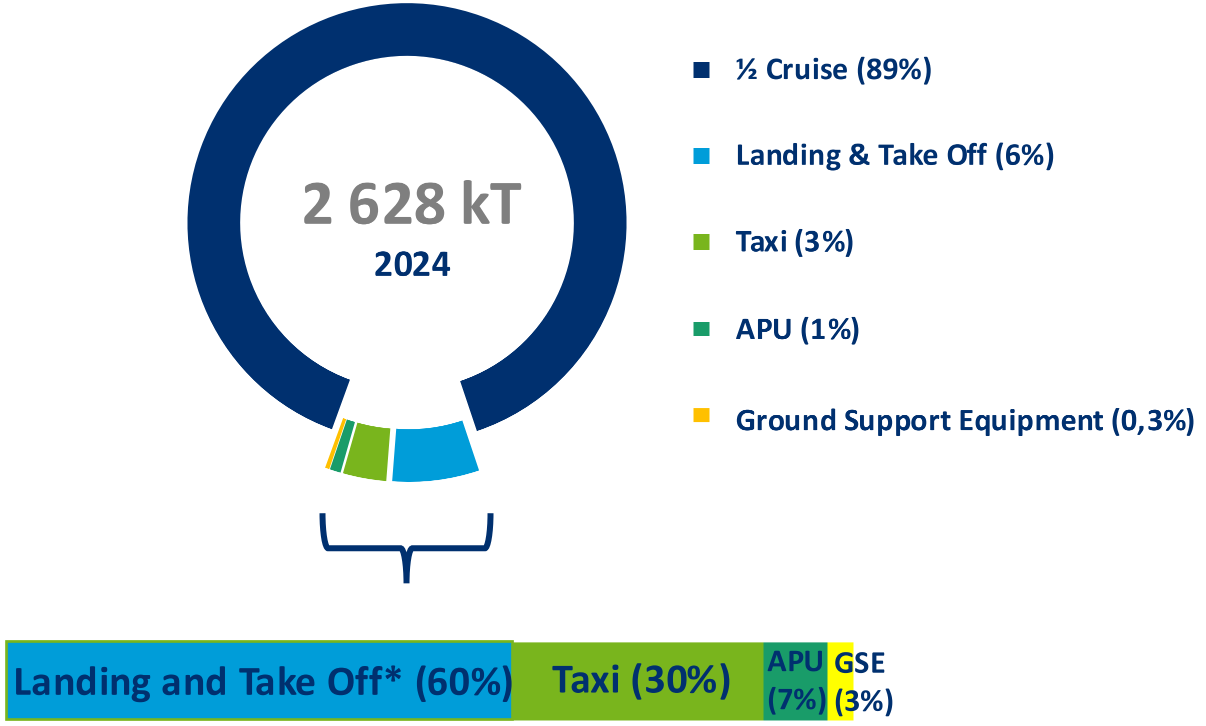
HERON Annual Emissions Breakdown



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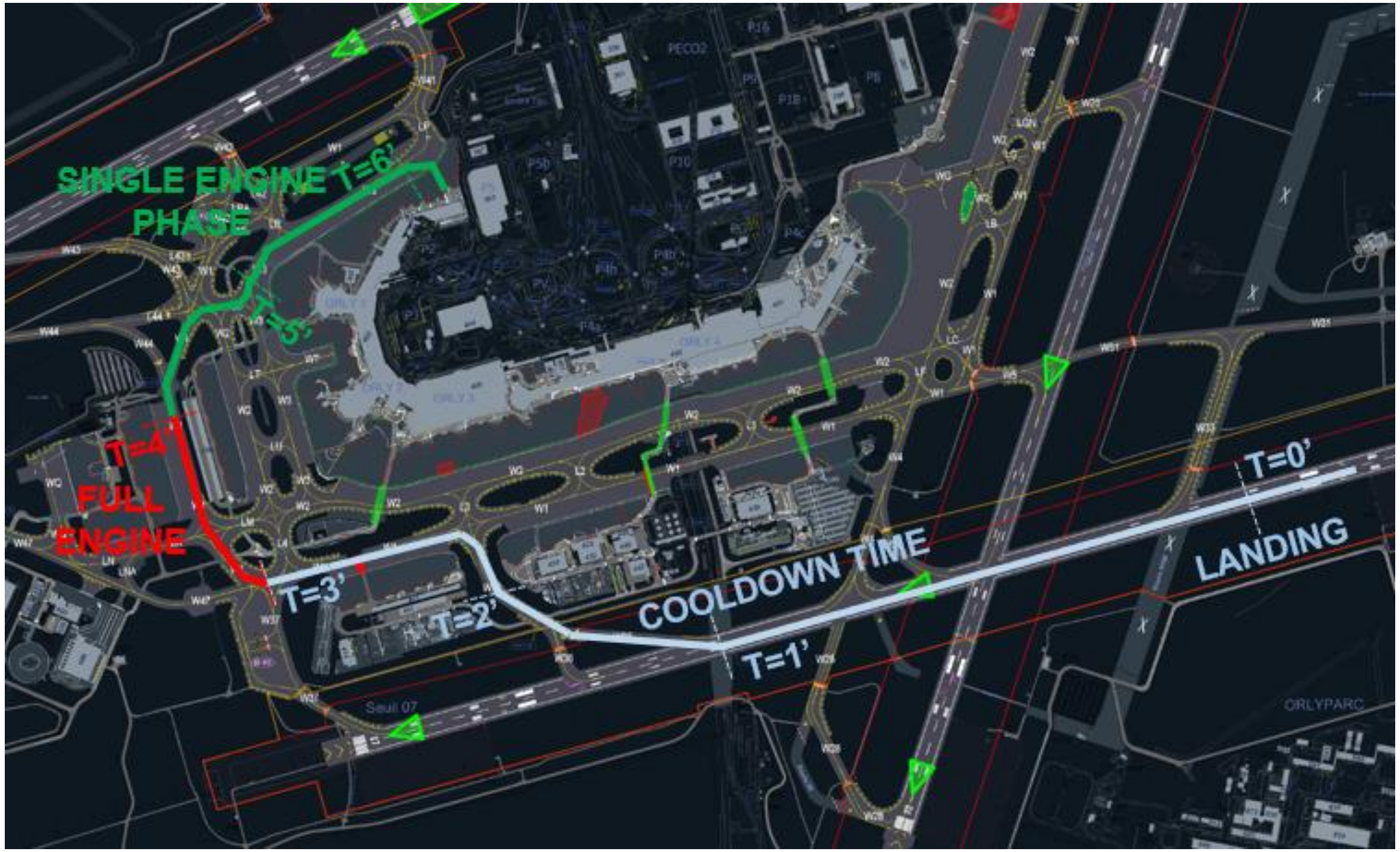
HERON Single Engine Taxi ?

HERON Single Engine Taxi in Action



HERON Baseline Performance : SET Practice in 2019

	SETI (arrival)	SETO (departure)
Year	**% of practice at PARIS-ORLY**	**% of practice at PARIS-ORLY**
2019	26.4%	2.3%
2022		
2023		
2024		
2025		

Barriers to Wider SET Practice

Operational conditions
- Airport design (sharp turns, steep slope)
- Airport congestion (stop and go)

Technical criteria
- No existing manufacturer's procedure
- Technical failure : hydraulic, APU, air conditioning

INAPLICABILITY CRITERIA

Weather Conditions
- LVP
- Contaminated RWY
- Strong wind

Human factors
- Pilots' workload

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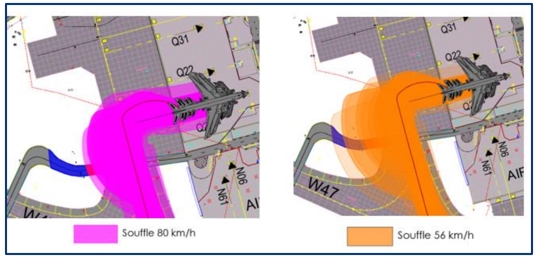
HERON Increasing SET Practice



Jet blast hazard mitigation

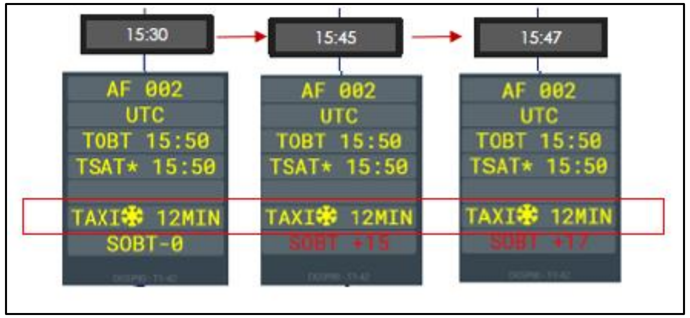
21.6 REDUCED ENGINE TAXI PROCEDURE

In order to reduce CO_2 and nanoparticle emissions from aircraft on Paris-Orly airport, pilots are invited to practice single engine taxi on arrivals and departures.

Operators are requested to assess jet blast hazards associated with this procedure before application, particularly on WT taxiway.

Recommendation in the AIP

ADP MEASURES



Estimated Taxi Time Display

GROUPE ADP

Single Engine Taxi at PARIS-ORLY Airport
HERON Project

Table of Content

Introduction - General Information about Single Engine Taxi (SET)

I- First Stage Study – Data Collection and Development of Knowledge
- Data Extraction Methods, Review of Existing Tools
- Estimation of the Potential of CO2 Emissions Saved
- Presentation of Data, Period from 2019 to 2025

II- Summary of Stakeholder Exchanges related to the Obstacles to Widespread Single Engine Taxi
- Aircraft Blast Hazard
- Cases of Inapplicability of Single Engine Taxi
- Human Factor and Flights Safety

III- Third Stage – Deployment of Solutions to Improve SET
- Blast Study and Deployment of Risk Reduction Measures & Recommendation of the SET Practice in the AIP
- Ease Taxiing on Arrival with Automated FOD Detection System
- Display on Aircraft Guidance Systems
- Guidelines to Promote the Practice among Non-practicing Airlines
- Publication of this Report

Conclusion

1

Publication of knowledge and data for airlines

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HERON The Rise of SET Practice at ORY

	SETI	SETO
Year	% of practice at PARIS-ORLY	% of practice at PARIS-ORLY
2019	26.4%	2.3%
2022	30.6%	3.3%
2023	30.3%	3.2%
2024	32.4%	3.3%
2025	34.3%	10.6%

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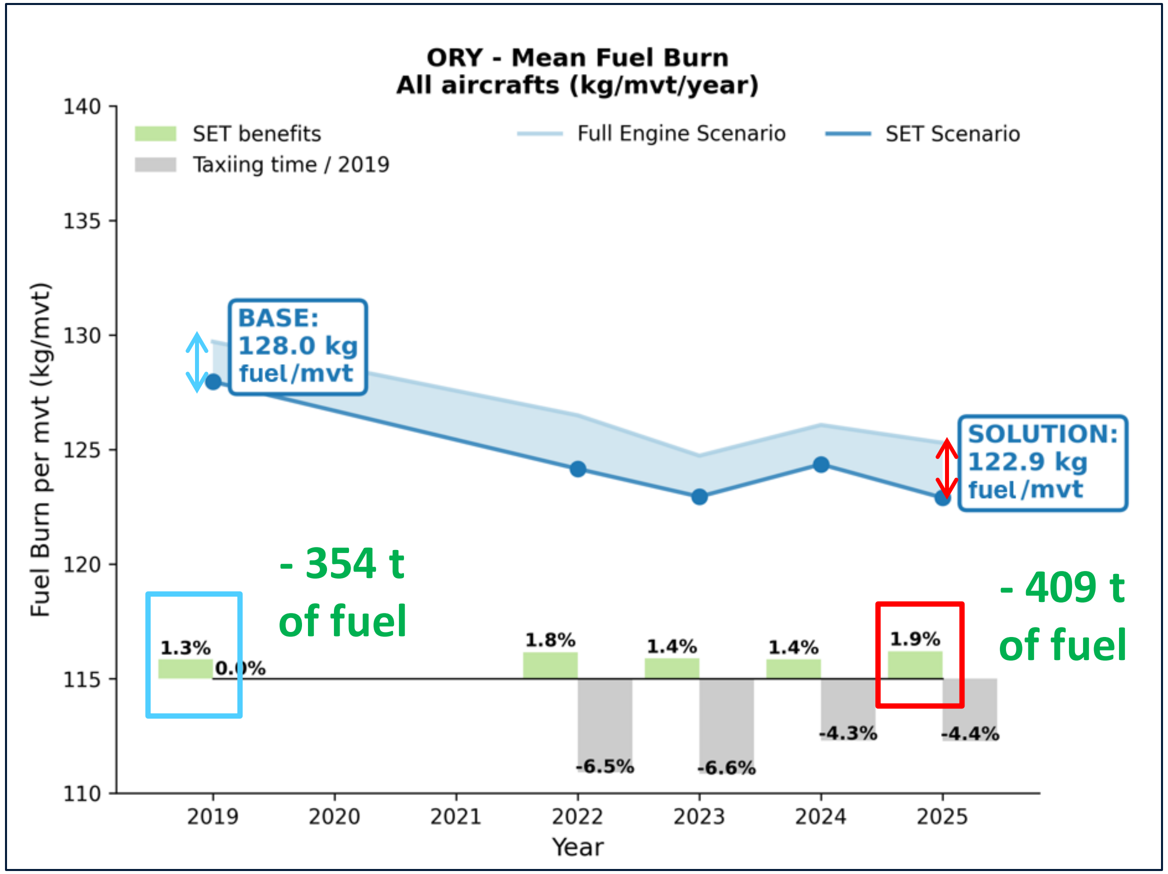
HERON Cutting CO2 on the Ground: The Impact of SET



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Optimizing Single Engine Taxiing: Advanced AMM

Giuseppe Pillirone (Air France)

EUROPEAN PARTNERSHIP

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EXE-HERON-2.4
Advanced Airport Moving Map ("AMM") for SET-Out (at departure)

- ***HERON has shown how the AMM contributes to a higher "rate of application" of SET at Departure***
  - The added situational awareness from this tool, in particular with the two advanced features described below, contributes to crews being more incline to performing SET at departure, hence a higher rate of application

"SET" = Single-Engine Taxiing

- ***Two features characterize the "Advanced" Airport Moving Map***

  1. The map is displayed In the **frontal field of vision**, as part of the main navigation displays
     - as opposed to the AMM hosted on an external device, typically the EFB
  2. The aircraft **position information** comes from the avionics
     → *higher precision than the EFB built-in GPS receiver*
     → *maintains orientation information (eg. from the compass) when the aircraft is not moving*
     - (NB : in general, externally mounted EFBs can use add-on GPS devices; This solution is not allowed at Air France)

"EFB" = Electronic Flight Bag

- This tool is even more interesting at "less familiar" airports or in "limit" conditions
  - SET application rate at AF is clearly lower in out-stations than at the home-bases
- Such an advanced Airport Moving Map has been deployed on AF's A220 fleet (optional equipage) and is also available on AF's A350 fleet
  - *This served as the source to measure the benefit for the exercise on SET at departure*

Airport Moving Map ("AMM") = Computer-generated map that shows an aircraft's position relative to the airport surface. The displayed map is dynamically moved/recentered so that the aircraft position always remains visible, or is at the center. (Very similar to automotive navigation system used when driving a car...)

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HERON Advanced Airport Moving Map – Airbus A220

1. In the frontal field of vision

compare with the positioning of the EFB, very decentralized

Airport = Paris-CDG LFPG

AMMs highlighted by the arrows.
Each of the two panels can be configured (layout, zoom level, brightness, …)

HERON Advanced Airport Moving Map – Airbus A350

The panels can be fully configured
(layout full/half, zoom level, brightness, …)

Airport = Cayenne SOCA

Alternative shots, to highlight the aircraft own position
(much more visible in reality than in these photos…)

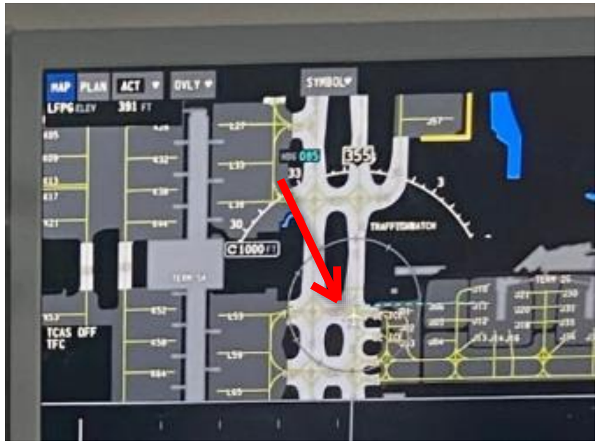
HERON Advanced Airport Moving Map

2. Aircraft position from the avionics (not only GNSS)

- → *higher positional precision than the EFB built-in receiver*
- → *maintains orientation even when a/c not moving*

Airport = Paris-CDG LFPG

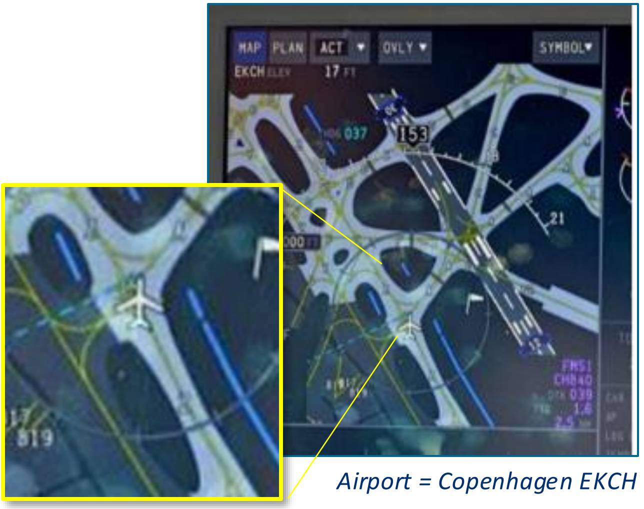
same position on the two pilots' panels (set on a different zoom level)



highlight of the a/c depiction

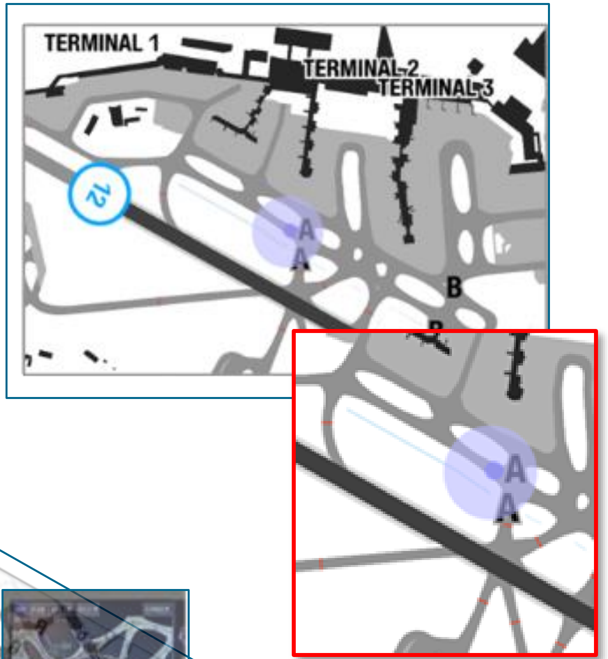
The same position is depicted here, with airrcaft at a halt (notice that when not moving there is no a/c orientation, and the EFB map turns North-up)

Aircraft AMM

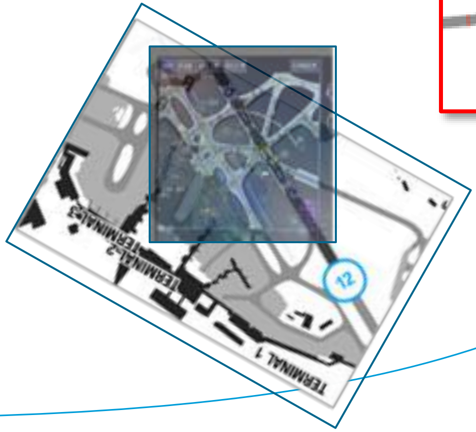


Airport = Copenhagen EKCH

EFB AMM



the two maps superposed, with the EFB map rotated "heading-up"



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HERON Demonstrated benefits

- **The demonstrated benefits are in line with the expected performance**

- **Assessment for the A220 fleet**
  - Rate of application of SET-at-departure

Airport	A220	A320
Paris-CDG	95 %	51 %
Madrid-Barajas	86 %	35 %

(Proportion of SET-O--eligible flights actually performing SET at departure.

"SET-O eligible" means "all SET operational prerequisites are satisfied")

  - *<u>Note</u>: of the measured difference, 20% is attributed to the advanced AMM*

- **CO2 benefit estimation**
  - *A +20% rate of SET-O (at departure) on AF's A320 fleet will result in <u>additional</u> **~3,2 tons of CO2** (from –1000kg of fuel) **reduction <u>every day</u>***

    (this is the extra benefit from the AMM, on top of the savings from "baseline" SET-O)
    (very conservative estimate, based on 5 minutes of one-engine-off time per departure)

Based on the following data:
- Air France flights over 9 months (1 Jan - 30 Sep 2024)
- Paris-CDG (home-base) and Madrid-Barajas (out-station)
- "Solution" sample = A220 fleet (CDG=13 000 flights / MAD=340 flights)
- "Reference" sample = A320 family fleet (CDG=23 000 : MAD=750)
- The AMM contribution has been estimated by comparing with the statistics of SET-O without Advanced AMM
  - from other A220 operators
  - from AF's A350 (AMM) vs A330 (non-AMM) statistics

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HERON

SESAR Solution #357 – Project conclusions

- Like several other activities carried out in HERON, this demonstration has shown a quick-win decarbonation solution :
- the AMM, basically a "safety" tool, has proven to be useful also in bringing environmental benefits

- Together with the initiatives by AdP, we have further advanced the deployment of Single-Engine Taxiing and the "achievements" implemented in the scope of HERON **will remain in operations**
- *all of these examples are expected to help aircraft and airport operators to reinforce SET in their internal policies*

  - Work had been started on the design and implementation of a decision-support tools, for automated evaluation of the eligibility to SET of an individual flight ("*telling the crew if it is safe to do SET on their flight*")
  - Such a tool presents important "technical", "usability" and "human factors" challenges, which lead AF to not pursue the implementation
  - However, it is clear that the Airport Moving Map will play a key role as a communication means towards the crew during taxiing, in many of the advanced taxiing assistance solution that are being studied in SESAR or elsewhere

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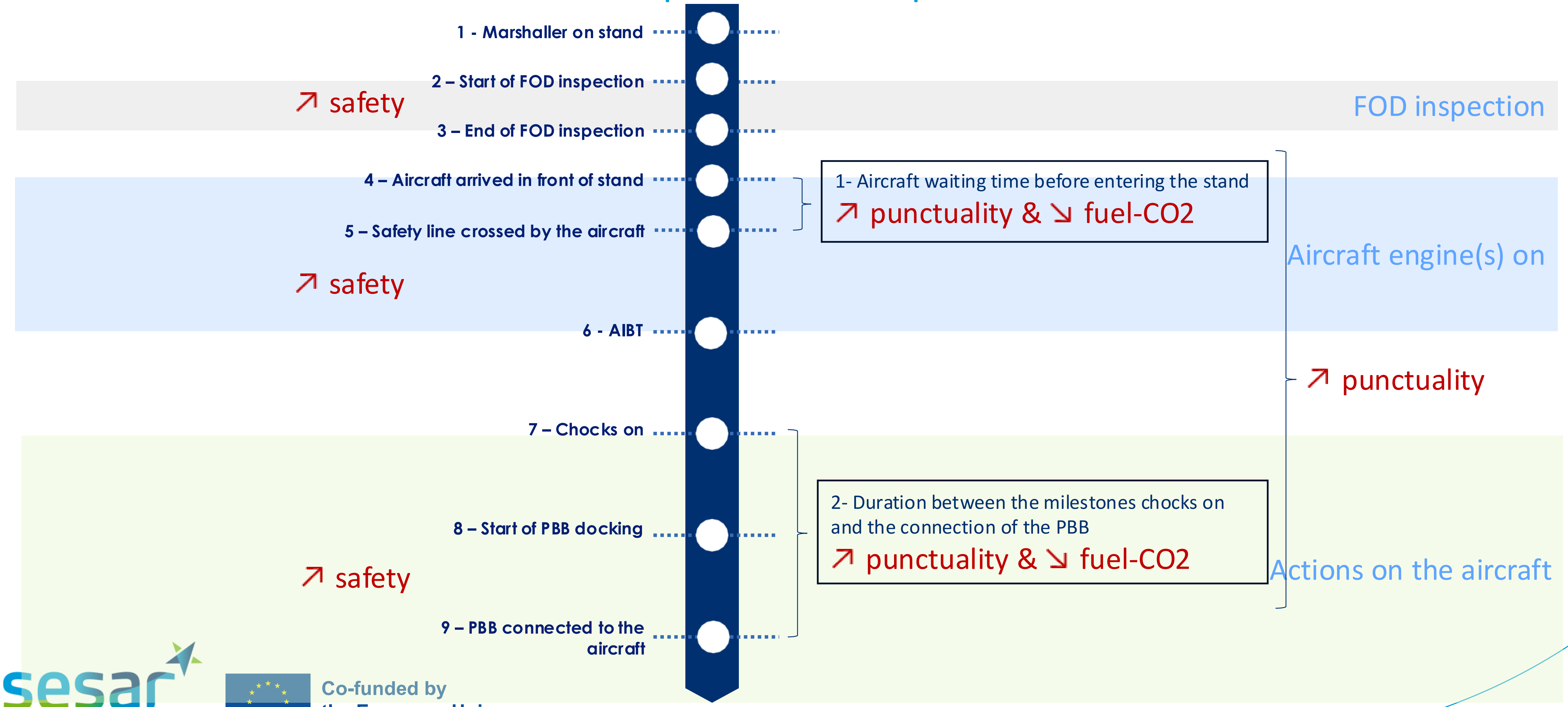
HERON

Automating aircraft parking operations at Paris Orly airport

Laura Taurand (ADP)

Co-funded by the European Union

HERON Aircraft parking Operations
Theoretical sequence of operations of **Arrival**



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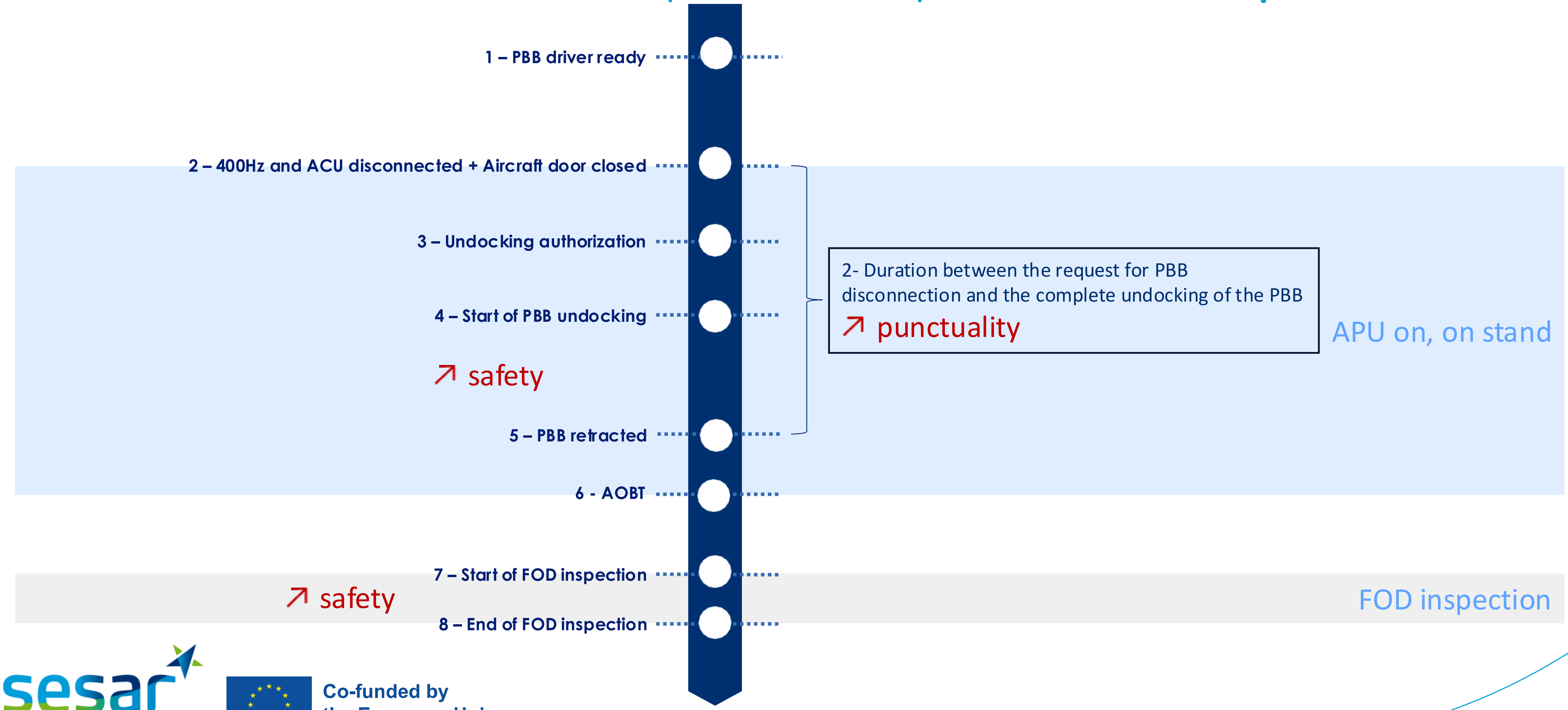
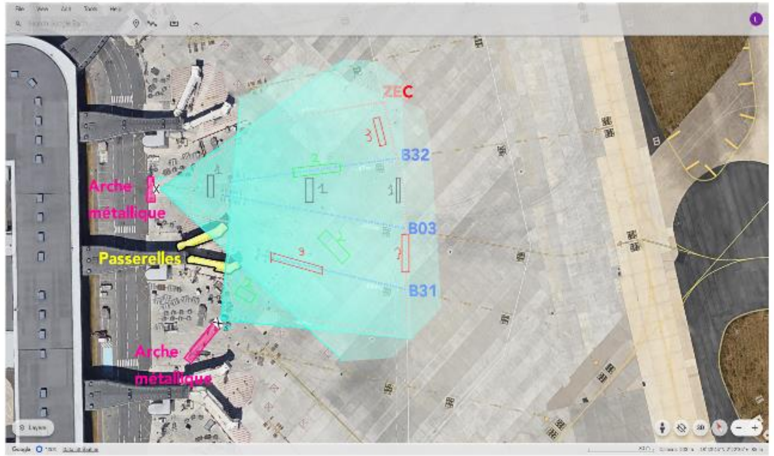
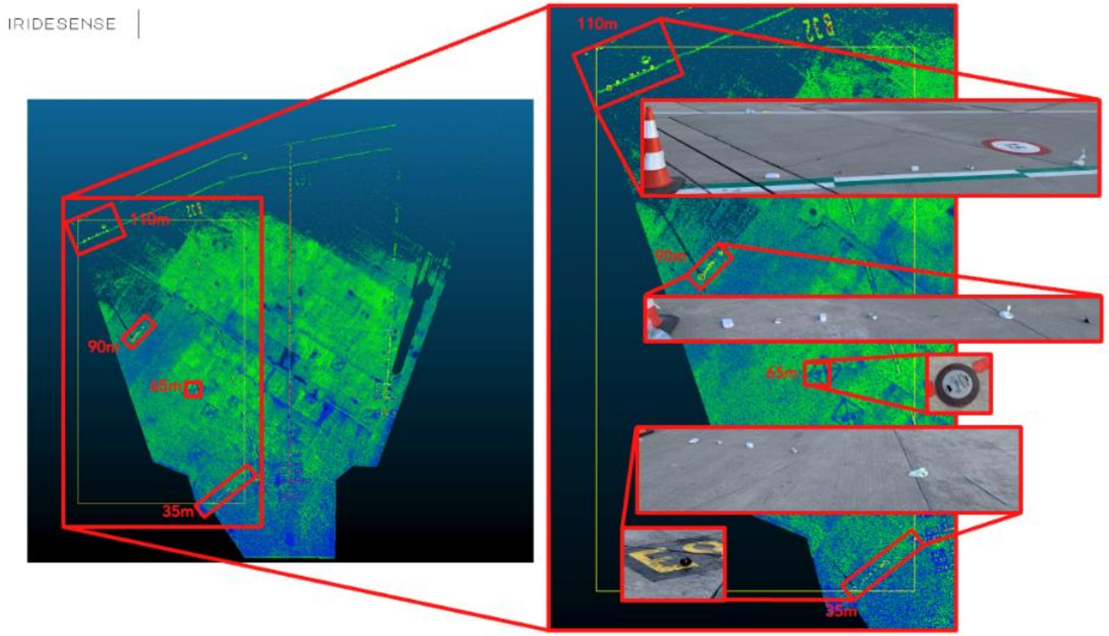
HERON Aircraft parking Operations
Theoretical sequence of operations of **Departure**



HERON Automated stand inspection

2 IRIDESENSE LiDARs installed close to two A-VDGS in Paris-Orly airport, to monitor 1 MARS stand, namely 3 aircraft stands, one wide-body (B03), two narrow-body (B31 and B32).





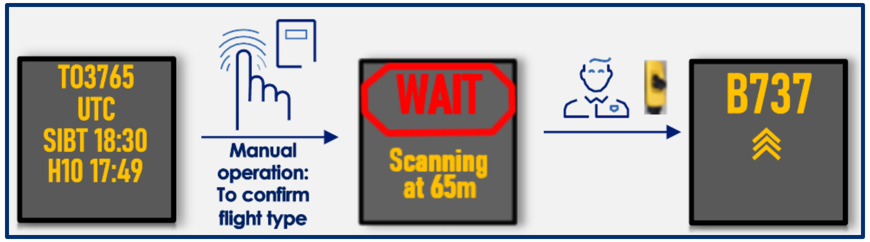
93% of all FODs are detected (true positive),
with a minimal size for FOD of 5 cm

0.6 false positive are created per inspection

HERON Automated launch of Visual Docking Guidance System

Before / Out of HERON

Semi-automatic mode



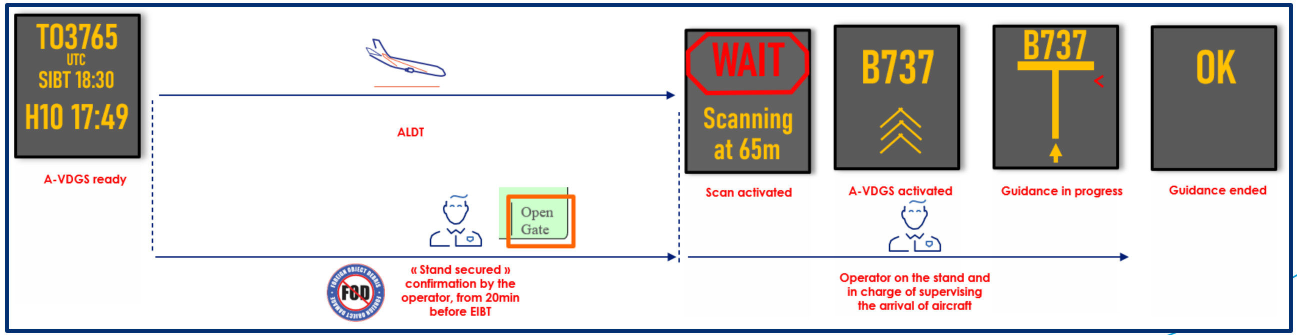
Actions implemented

Continuation of A-VDGS Scenario 0:

- The guidance launched automatically when the aircraft lands
- The entrance of the aircraft is possible only when the marshaller is present and makes a specific sign to the pilot.
- Then, the marshaller supervised the guidance, holding the emergency button with him.

Demonstration of A-VDGS Scenario 1 on one stand at ORY with Transavia from the 26/09/2025

- The entrance of the aircraft is possible only if the marshaller has validated on the A-VDGS panel that the stand is safe (namely, he assumes responsibility for having carried-out a FOD inspection)
- The marshaller makes a specific sign to the pilot.
- Then, the marshaller supervised the guidance, holding the emergency button with him.



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Automated Passenger Boarding Bridge docking / undocking

Functionalities

Automatic driving function

- Trajectory calculation based on aircraft position (AODB, VDGS)
- Door recognition : camera (01)

Operational functions

- On ground supervision (02)
- Door opening authorized: LED strip (03)
- Door closed detection (04)
- Docking status display (05)

Safety functions

- Human PBB entrance detection (06-09) + No entrance display (10)
- Objects on external head detection (11)
- Aircraft anti-collision: radar (12)
- Objects on ground detection: sonar (13)
- Stairs anti-collision (14)
- Emergency button (15)

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Automated Passenger Boarding Bridge docking / undocking

- 3 Tests of the automated PBB on an empty aircraft
- 202 Tests of the automated PBB on a mock-up

HERON Aircraft parking Operations
Theoretical sequence of operations of **Arrival**

- FOD until 5 cm detected
- + 24% FOD detection
- + 18% obstacle detection

FOD inspection

1 - Marshaller on stand
2 – Start of FOD inspection
3 – End of FOD inspection
4 – Aircraft arrived in front of stand
5 – Safety line crossed by the aircraft
6 - AIBT
7 – Chocks on
8 – Start of PBB docking
9 – PBB connected to the aircraft

1- Aircraft waiting time before entering the stand
10% of the flights: -1 min and 26 s.
(49 kg of CO_2)

Aircraft engine(s) on

Less marshallers on service roads

2- Duration between the milestones chocks on and the connection of the PBB
1st results to be improved with trajectories optimization:
+ 3 s. (on mock-up)
+ 28 s. (on aircraft)

Actions on the aircraft

22 incidents in 1 year related to PBB manoeuvre avoided

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HERON Aircraft parking Operations
Theoretical sequence of operations of **Departure**

1 – PBB driver ready

2 – 400Hz and ACU disconnected + Aircraft door closed

3 – Undocking authorization

4 – Start of PBB undocking

5 – PBB retracted

6 - AOBT

7 – Start of FOD inspection

8 – End of FOD inspection

2- Duration between the request for PBB disconnection and the complete undocking of the PBB

- 1 min 5 s. (on mock-up)
- 45 s. (on aircraft)

APU on, on stand

100 % FOD detection

FOD inspection

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HERON

AI on aircraft stand at Paris Orly airport

Laura Taurand (ADP)

EUROPEAN PARTNERSHIP

Co-funded by the European Union

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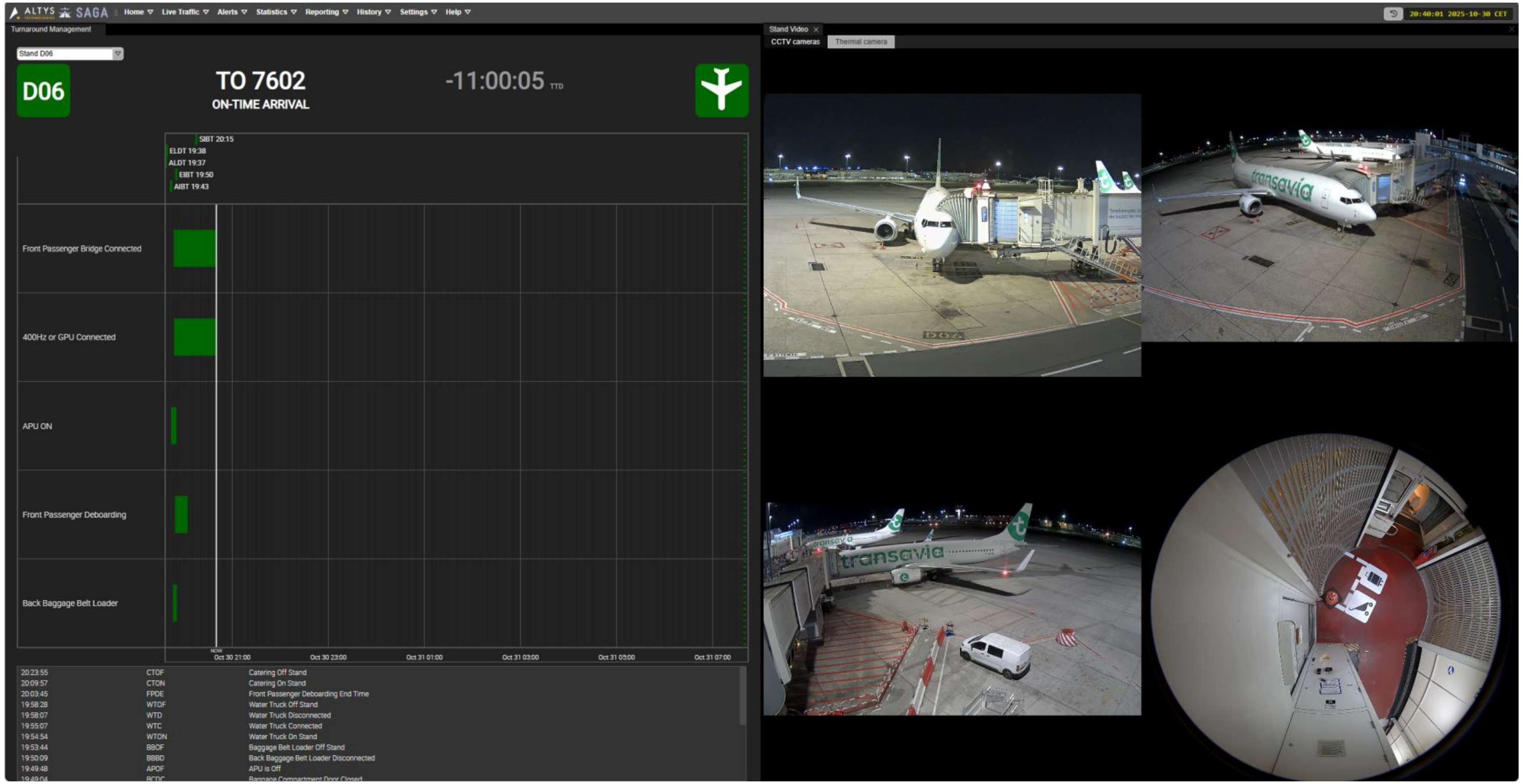
AI on aircraft stand

- Monitoring **aircraft turnarounds**
- 3 aircraft stands: R01, D06 and B05
- Using **Artificial Intelligence** applied to data obtained from sensors such as **CCTV cameras** and **thermal cameras**
- **Object detection** applied to detect key elements (the aircraft, the chocks, the workers, the pushback, and many more)
- **Detect automatically all the turnaround milestones and the APU usage.**



HERON

AI on aircraft stand

- Detection integrated in an **interface sending alerts** in case of:
    - **delays**
    - **non-compliant APU usage**.
- Provide a clearer view of the situations on the ground, on **live** and for **post-operational analysis** to
    - the **airport**,
    - the **airlines,**
    - the **ground handlers**.

Objectives reached for now:

- Reduce the average departure delay per flight thanks to the **reduction of the turnaround duration** → EZY: 1.6 % (48 s. in average by turnaround) & Transavia France: 0.5 % (20 s. in average by turnaround)
- Reduce CO_2 thanks to the reduction of the **APU and taxi durations** (through reduction of aircraft waiting time)
- **Improve TOBT values** → 7 % turnarounds with more precise TOBT

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Engine-off taxiing with Taxitow at AMS

Jeroen Jaartsveld (KLM), Florian Schneider (SNBV)

EUROPEAN PARTNERSHIP

Co-funded by the European Union

HERON: Taxitow Demonstration @AMS

Engines-off taxiing

Jeroen Jaartsveld (KLM) & Florian Schneider (SNBV)

AMS Schiphol

HERON

HERON: WP 2.2 Green Surface Operations & Taxitow

HERON

Why Taxitow?

Why Taxitow aircraft at Amsterdam Airport Schiphol?

Workers on the apron are exposed to emissions from Diesel engines and Aircraft engines, including exhaust gasses and Ultra Fine Particles (UFP).

The VDME Program

- Aims to drastically reduce emissions from diesel and aircraft engines.
- Reduces exposure of workers to the emissions from diesel and aircraft engines

How?

- Start engines further from the parking positions, at the end of bays
- Use seamles inbound flow to reduce inbound emissions (in addition to SET)
- Provide PPE to workers on the apron
- Taxitow to the runways to remove emissions from the bay and reduce congestion

AMS Schiphol

Traditional taxi operations vs. Taxitow

HERON

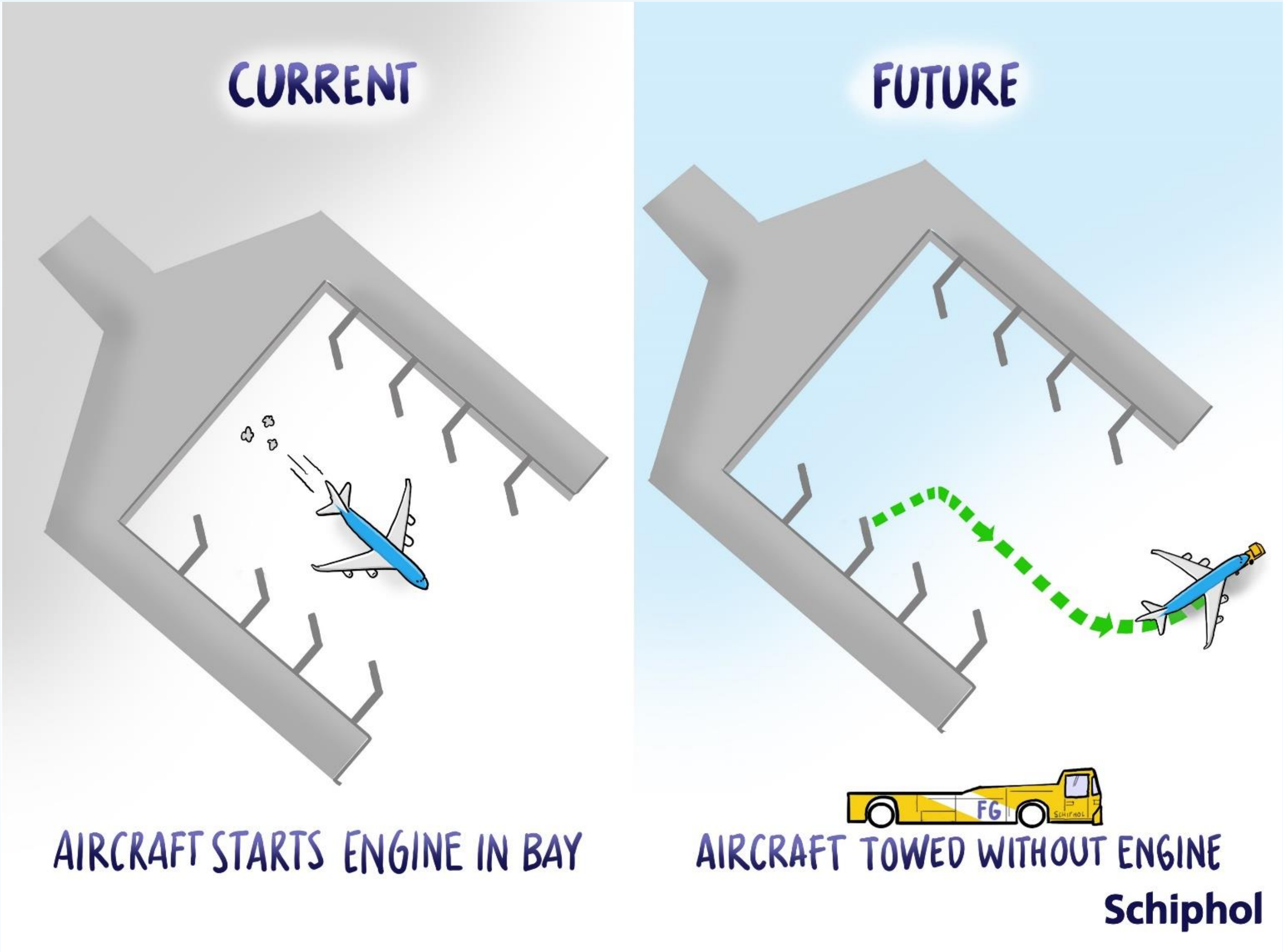
Taxitow operations

Goal @ Amsterdam Airport Schiphol
Engines-off taxiing for all departing narrowbody aircraft of home-based carriers by means of Taxitow vehicles.

Status
- 88 live missions completed (25/11/25)
- Purchase of 4 new, fully electric Taxibot vehicles by AMS.
- The first fully electric Taxibot was delivered 4 September 2025.

Preview
- Investigate feasibility of scaling and embedding in daily operations.
- Preparing for further scaling (de-coupling locations, charging, maintenance etc.)

Challenges
- Ambitious plan with infrastructure challenges
- Careful coordination within the sector and with stakeholders



AMS Schiphol

Mission overview

AMS Schiphol

Missions to the Polderbaan Runway 36L

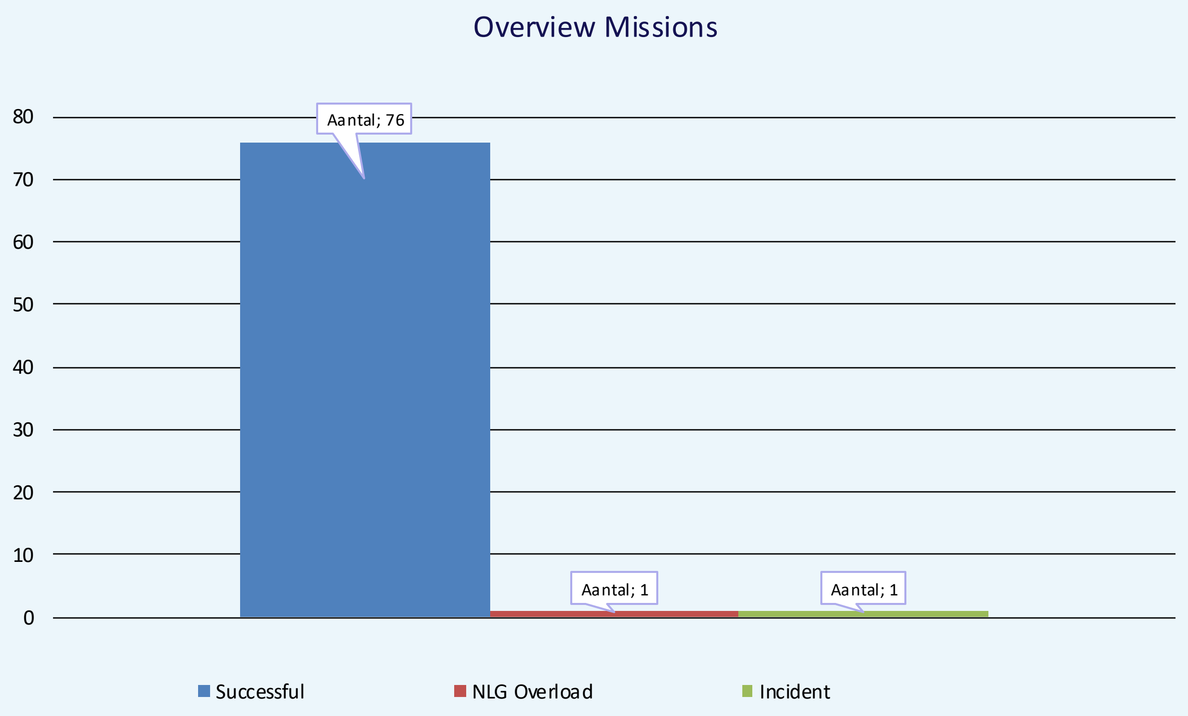
HERON

Demonstration Results

HERON

Executed missions since 10-12-2024

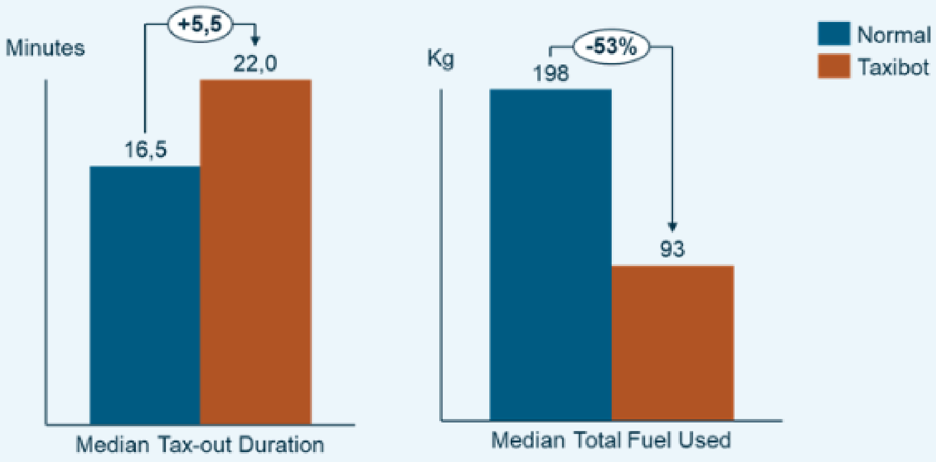
- 78 in total
    - 76 successful
    - 1 NLG Overload
    - 1 Fuel Incident
- Average mission burn incl. APU: 66,52 KG
- Average Saving vs. N-1: 144,57 KG
- Average Savings vs. N: 218,74 KG

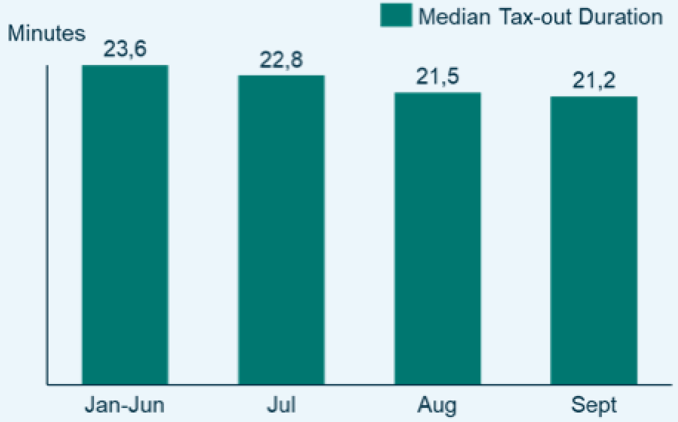


Demonstration Results

HERON

Route A21→W5:





Significant fuel savings

- Fuel savings > 50% for taxi duration
- Reduced emissions from fuel burn
- Reduced UFP on the ramp

Expected further improvements on taxi times:

- Improved acceleration after breaking
- Faster speed in corners
- Combined clearance for pushback & taxi
- Engine startup during taxi

First fully electric TaxiBot arrived!

HERON

What next?

AMS Schiphol

HERON

Together we move forward with ambition

This roadmap focuses on modifying arrival and departure procedures to minimize employee exposure to UFP. The new concept consists of three main components:

- **Seamless inbound flow (SIF)**
- **Tug release points (TRP) in the bay**
- **Taxitow**

The years mentioned are indicative and subject to the outcome of trials, the decisions that still need to be made and their feasibility.

The roadmap is a living document in which the design ambition is outlined over a period of time. There are numerous uncertainties in the roadmap, with elements in the early years being more severe than those in later years.

2025

SIF
- Docking performance dashboard
- Deployment new VDGS

TRP
- Trials in D-tuning fork en FG-bay

Taxitow
- Trials and training
- Available: E4, D-buffer and Y-platform
- Decoupling platform P6/P7 in operation
- 2x taxitow vehicles available

2026

SIF
- Update forecast model docking performance dashboard
- Clean stand policy
- Deployment VDGS complete

TRP
- Pavement of FG-bay
- Trials in EF-bay
- Research TRP's in DE-bay

Taxitow
- Purchase 4x taxitow vehicles, 6 available in total

2027

SIF
- Complete seamless docking

TRP
- Pavement of bays EF + AB
- Trials in AB, GH and lane A2

Taxitow
- 6x taxitow vehicles

2028

SIF
- Seamless docking available
- Stand readiness indicator

TRP
- Pavement of CD-bay
- Trials in CD + BC

Taxitow
- Extra available: D pier
- Purchase 10x taxitow vehicles, 16 available in total
- Initial charging facilities

2029

SIF
- Seamless docking available

TRP
- Pavement of bays: BC + GH

Taxitow

Southern runway use
- Decoupling platform 18L
- Purchase 10x taxitow vehicles, 26 available in total
- Scale-up of charging infra

2030

SIF
- Seamless docking available

TRP
- Pavement of bays: D-stemvork
- CD operational

Taxitow

Northern runway use
- Decoupling platform 36C
- Widening of service road (all VOP's reachable)
- Purchase 10x taxitow vehicles, 36 available in total
- Scale-up of charging infra

2031+

SIF
- Fully autonomous
- FOD detection
- GSE check and removal

TRP
- All TRP's implemented

Taxitow

Scale-up operation southern runway use
- Decoupling platform 24
- Purchase 10x taxitow vehicles, 46 available in total

Interim decision-making based on outcomes trials

Measure to be further investigated for manufacturability and feasibility

Version 18-12-2024

Questions?

Come meet us in the atrium.

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MARKETPLACE

IN THE FOYER

12:30-13:15

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LUNCH BREAK

13:15-14:00

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HERON Final Video

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SESSION 3
Optimised Approaches

SESAR JOINT UNDERTAKING

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ROCAT – Runway capacity increase through ROT Characterization – Istanbul Airport Case

Andrés Medina Gortázar (iGA Istanbul Airport)

EUROPEAN PARTNERSHIP

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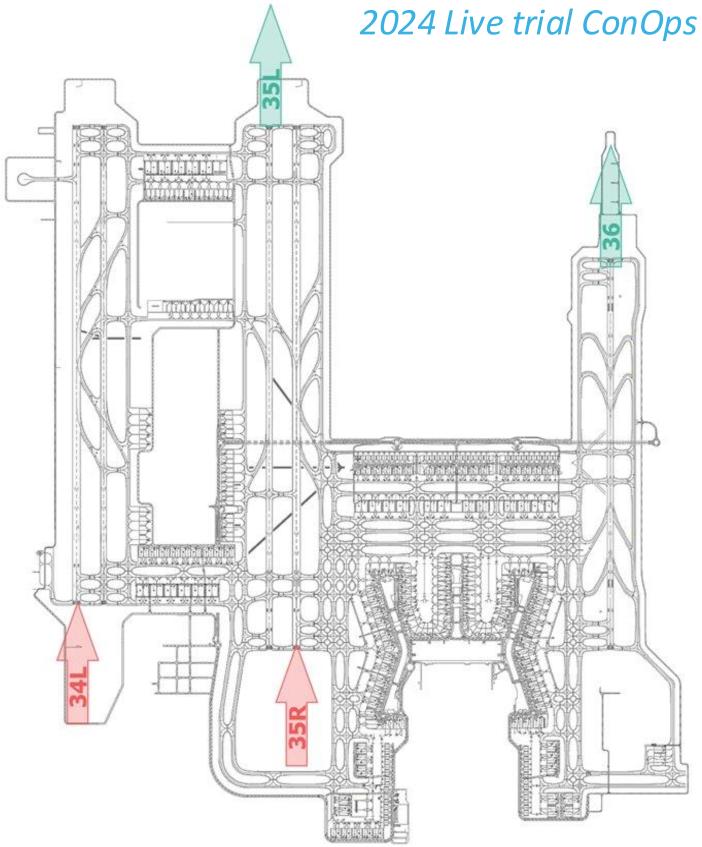
HERON ROCAT – Reduced Separation based on Runway Occupancy Time CATegorization – IST Case

2024 Live trial ConOps



List of solution partners:
iGA Istanbul Airport, DHMİ, Turkish Airlines, EUROCONTROL

TRL1 | TRL2 | TRL4 | TRL6 | TRL8

2024 2025

ROCAT aims to increase runway throughput based on the characterisation of local ROT and determination of the ROT spacing categories applied between consecutive arrivals.

This procedural application of ROCAT is based on the ROCAT solution developed in SESAR PJ02.08.03. ROCAT Solution had achieved TRL6 by 2024. This project is the procedural application of that solution in a real-life environment to achieve TRL8.

For the procedural application, the optimized separations calculated through ROCAT were applied to consecutive arrivals at Istanbul Airport (LTFM) during a live operational trial period that lasted from ***September 2024 to December 2024.***

Considering the ConOps of Istanbul Airport in 2024, the values of consecutive arrivals of RWY 35R were analyzed. The data sets and their sources are:

- ***Runway Throughput****: Provided by A-SMGCS systems at Istanbul Airport (iGA Istanbul Airport)*
- ***Performance Metrics on Arriving Aircraft****: Provided by on-board systems (Turkish Airlines)*
- ***Safety KPIs****: Provided by Istanbul TWR and HP workshops on pilots (DHMI & Turkish Airlines)*

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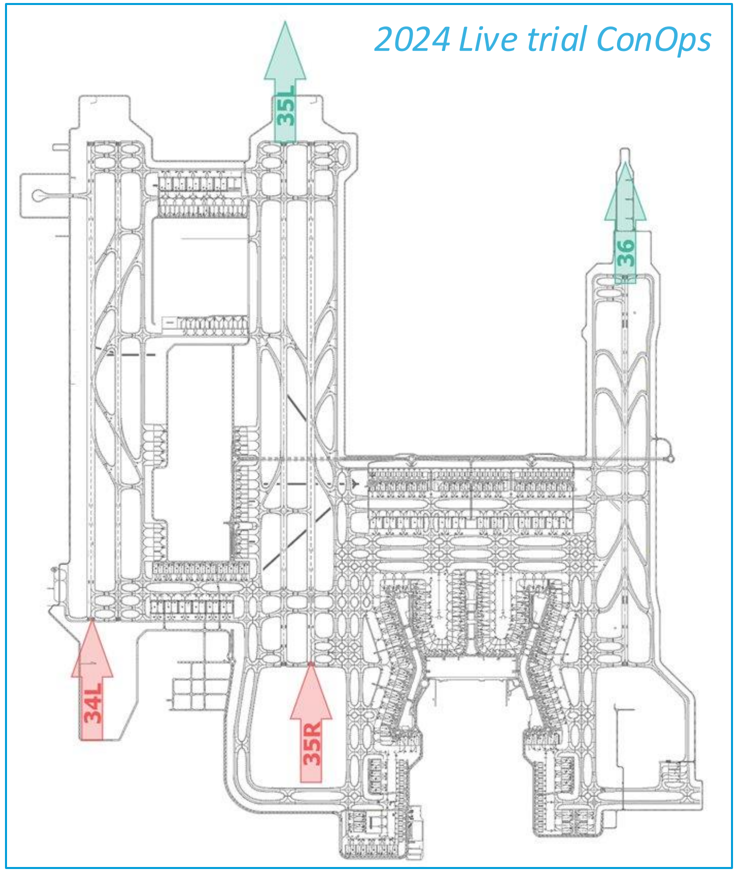
HERON ROCAT – Reduced Separation based on Runway Occupancy Time CATegorization – IST Case



List of solution partners:
iGA Istanbul Airport, DHMİ, Turkish Airlines, EUROCONTROL

TRL1	TRL2	TRL4	TRL6	TRL8

2024 2025

RESULTS:

- ***Main Objective – Runway Capacity Increase***:
  - ✓ *Runway throughput increased by* ***2 landings per hour (7,41%)***
- ***Complementary Objective – Efficiency on Performance Metrics***:
  - ✓ *Flight Time: Reduced by 2 minutes 42 second (9%)*
  - ✓ *Distance Flown: Reduced by 8.88NM (9%)*
  - ✓ *Fuel Burnt: Reduced by 133.99kg (7%)*
- ***Safety – Ensuring that the objectives were achieved with a maintained level of Safety:***
  - ✓ *In abnormal conditions making ROCAT impossible, separations will go back to normal, ensuring safety at all operative scenarios*
  - ✓ *During live trials, the number of go-arounds related to a loss of separations did not increase*
  - ✓ *During the HP Workshop, both ATCos and pilots expressed no safety concerns with ROCAT*

ROCAT was so successful at Istanbul Airport that airport authorities adopted the new reduced separations to their operativity, and the airport is currently operating with reduced separations

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RNP-AR in St Nazaire and Calvi

Mario Pavon (Airbus)

EUROPEAN PARTNERSHIP

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RNP AR deployment in Europe

Since 2009: RNP AR nav spec in the ICAO PBN Manual, ICAO RNP AR design criteria, EASA AMC 20-26

ANSPs/Airports:

- RE (EU) 2018/1048-*PBN IR* requires to study RNP AR where no other RNP approach is feasible.
- Low percentage of fleet is RNP AR capable:
  - Development cost not supported by extensive use of the procedures.
  - Traffic mix (RNP AR / non-RNP AR) can be difficult to manage for ATC.

Airlines:

- Significant costs to start operating RNP AR:
  - RNP AR Aircraft mod
  - Operational approval
  - Flight-crew training
  - Flight dispatch
- Procedures only available for a reduced number of airports

RNP AR benefits beyond the accesibility to difficult terrains, still to be exploited: safety, fuel/CO2 efficiency, noise reduction, capacity.

RNP AR operation to be extended to departures and parallel runways (EoR)

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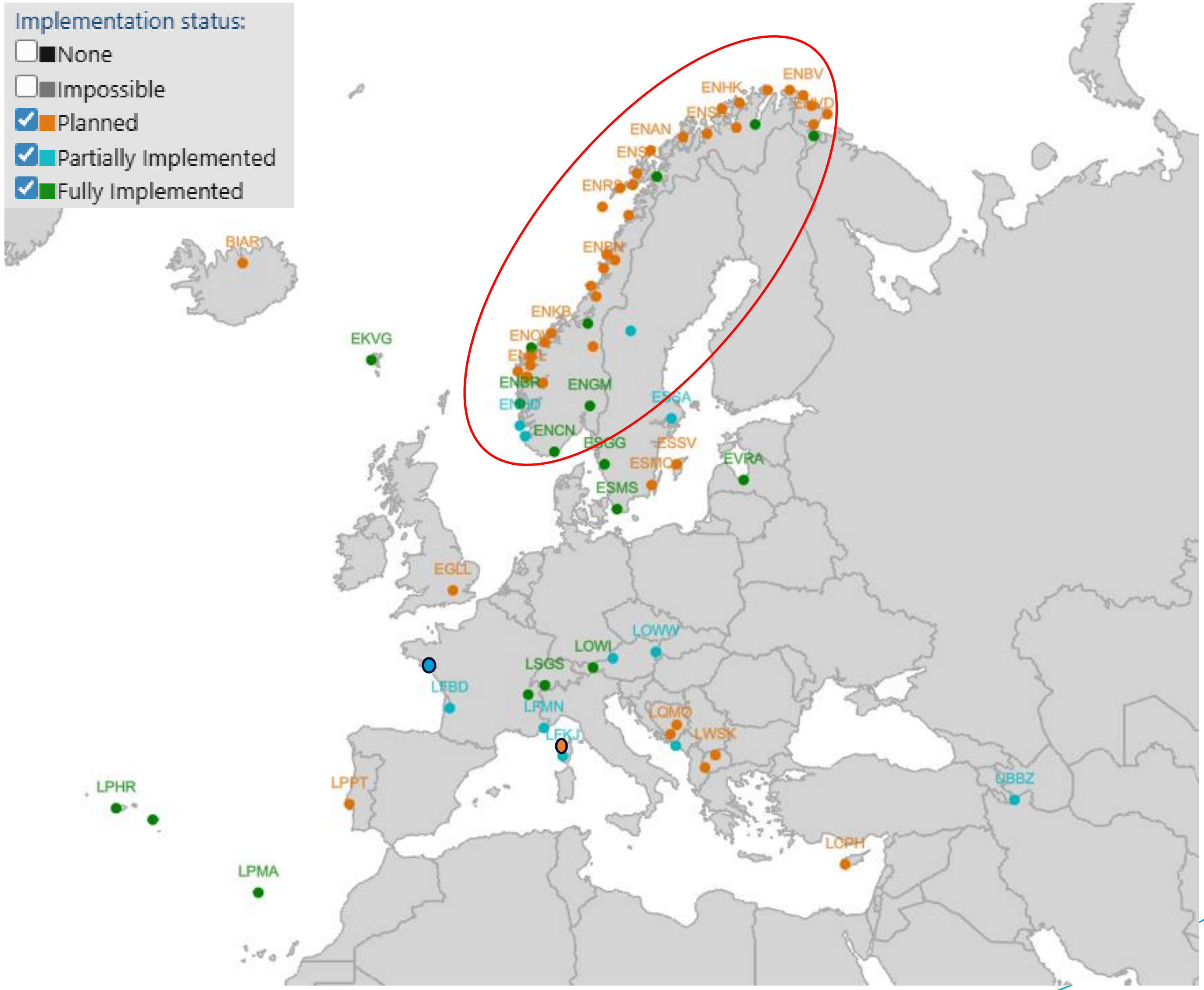
RNP AR deployment in Europe

- AVINOR "RNP AR everywhere" example:
  - Improved safety and efficiency
  - Promotion of RNP AR capability within the fleet
  - Authority familiar with RNP AR approval



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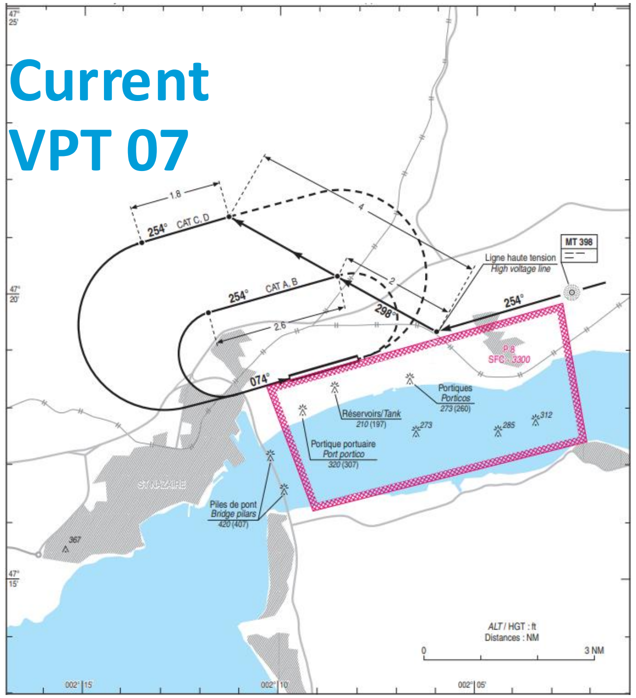
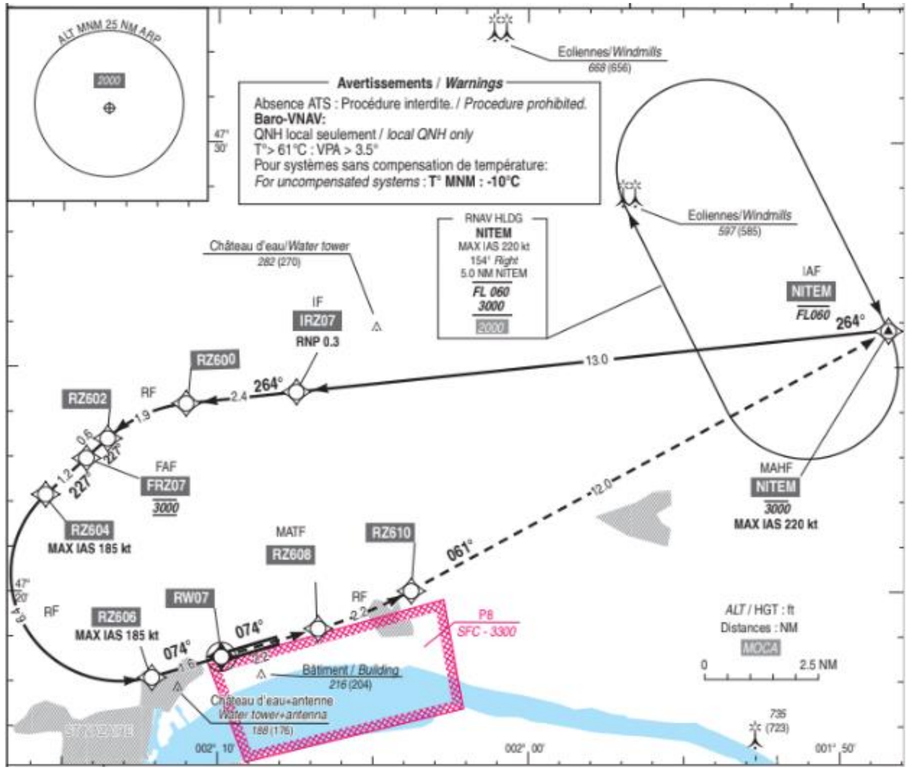
Current VPT 07



New RNP AR 07



- Visual prescribed track approach: No instrument lateral or vertical guidance:
  - Lateral dispersion
  - Inefficient profile: level-off at 500 ft AGL
- Flown manually with regard to external visual references
- Decision height 850 ft
- Overflying populated areas at the north of the airport

- Fully guided (lateral/vertical guidance)
- Fully managed (FMS/AP)
- Aircraft configuration can be optimized for the descent
- Decision height 350 ft
- Avoiding populated areas as far as possible

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‘RNP AR Saint Nazaire’ Noise study

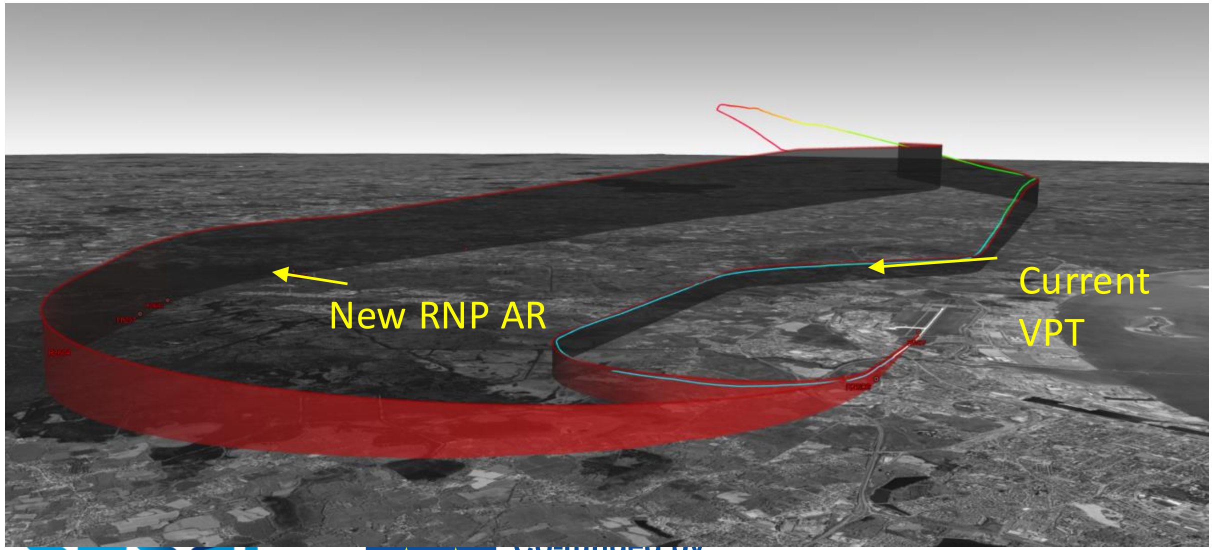
- Two model-based noise studies conducted, comparing current real trajectories with the new RNP AR:
  - DSNA: In the frame of the approach approval dossier. French official methodology
  - Airbus: Using Airbus official performance software PEP.

Results:

- Up to 15 dB reduction at equivalent distance from the runway
- **-60% surface affected**
- **-50% population affected.**

'RNP AR Saint Nazaire' Fuel study

- Model-based assessment using Airbus official performance software PEP
- Acceptable comparison between current real trajectories and new RNP AR. Results should not be taken literally
- Frozen environmental conditions:
  - Aircraft weight 156T
  - ISA conditions, no wind



Results:

- The distance flown by the RNP AR is longer by 4 NM for flights from Hamburg, and 9 NM for flights from Toulouse.
- RNP AR allows for better energy management: generally the trajectory is higher, and as the approach is fully guided, the crew can focus on optimizing configuration.
- Considering a decelerated approach (late landing config):
  - **Average 50kg fuel saving from Toulouse**
  - **Average 150kg fuel saving from Hamburg**
- Early stabilized approaches eliminate fuel savings. No need in LFRZ as the a/c will be fully configured at VAPP when aligned with the runway.
- Recommendations communicated to ATI, to be applied wherever possible, not limited to LFRZ.

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'RNP AR Saint Nazaire' Elements required for the entry into service

RNP AR Approach procedure

- Design ✓
- Validation ✓
- Dossier ✓
- **Approval (DSAC)** ✓
- **Publication in AIP** ✓

RNP AR Aircraft (Beluga XL)

- RNP AR MOD ✓
- SIM/Flight tests ✓
- Airworthiness Documentation ✓
- FCOM/FCTM - Flight Crew Operating Manual and Training Manual ✓
- **RNP AR Certificate (EASA)** ✓

NOT IN HERON SCOPE

Airline (ATI) Ops. approval

- Approval dossier ✓ (in progress)
- Training ✓ (in progress)
- Generic Flight Operations safety assessment (FOSA) ✓ (in progress)
- **ATI Operational approval (DSAC)**

✓ = Completed

✓ = In progress

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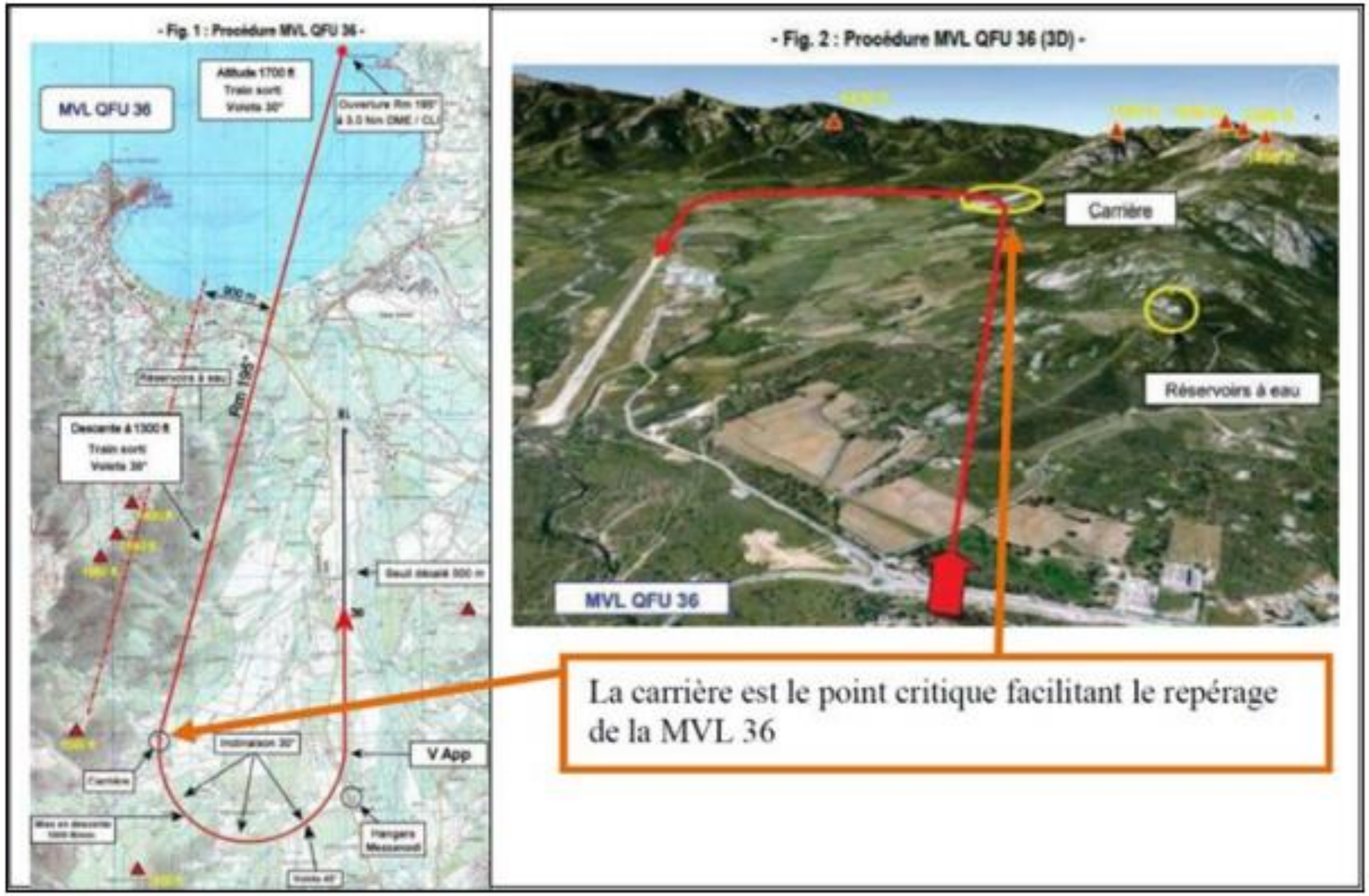
'RNP AR Calvi' : Current visual approach Rwy 36

- Visual approach: No instrument lateral or vertical guidance
- Flown manually with regard to external visual references
- VMC required, **no night operations**
- Flight close to high relief
- Frequent turbulences
- Steep descent > 1500 ft/m



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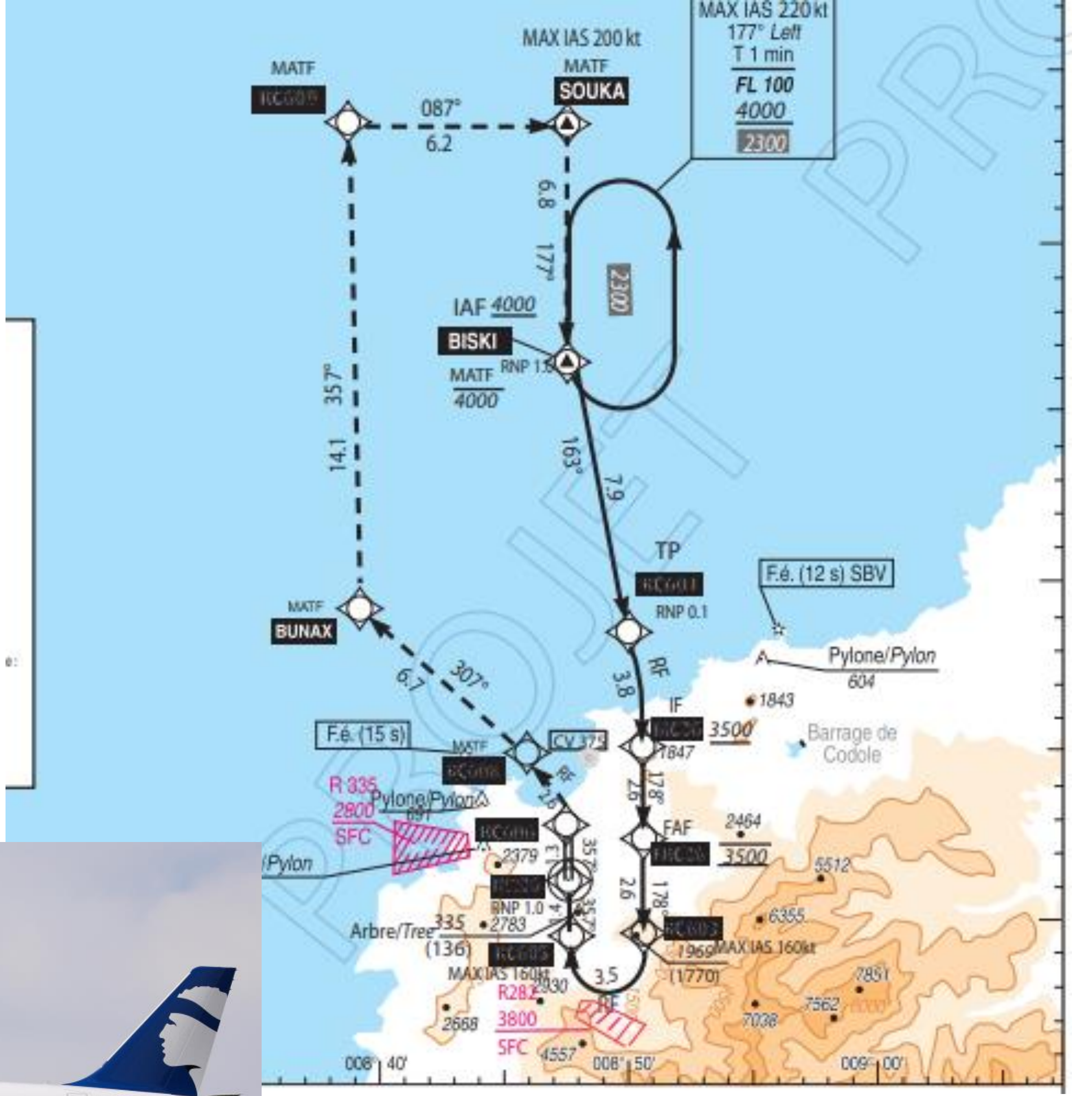
‘RNP AR Calvi’ : New RNP AR 36

- **RNP AR Rwy36**
  - **RNP 0.1**
  - Steep approach: 4.1°
  - Start of operations: Cloud free and 1500M VIS

- Fully guided (lateral/vertical guidance)
- Fully managed (FMS/AP)
- Flight crew can focus on the aircraft configuration and monitoring of the approach
- Optimized vertical profile



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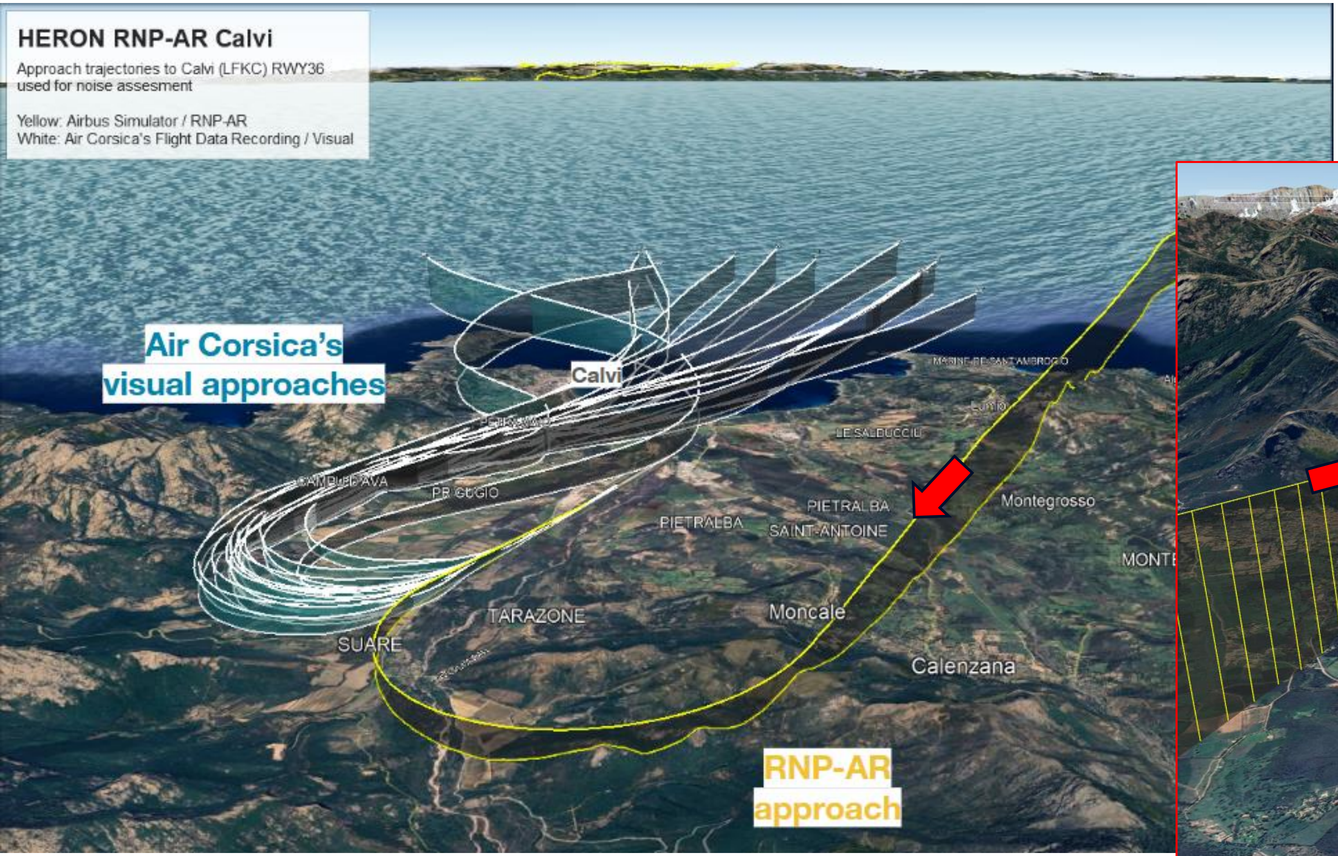
'RNP AR Calvi' : New RNP AR 36



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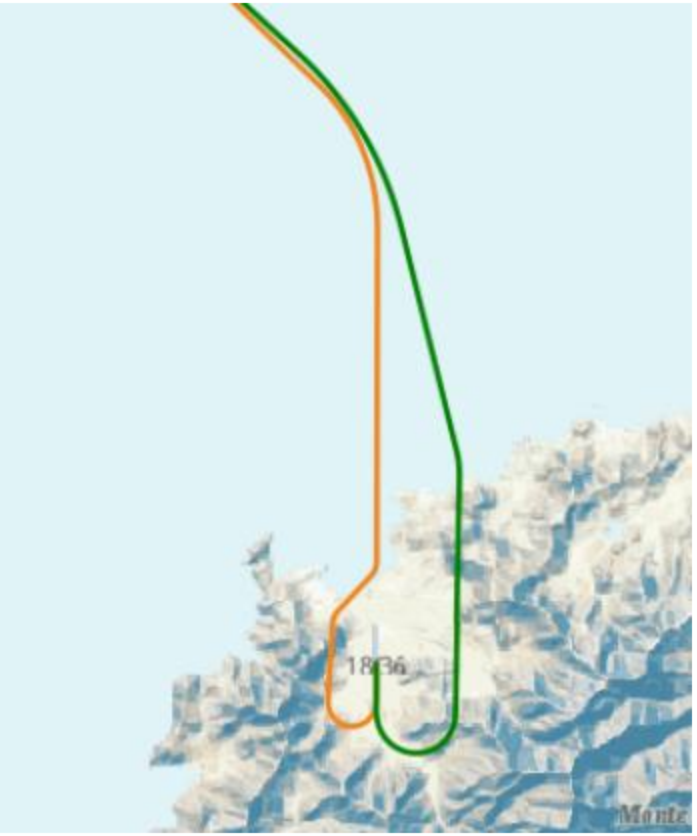
'RNP AR Calvi' : Fuel Study



- 77kg fuel saving per approach

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‘RNP AR Calvi’ Approval and publication of the approach

RNP AR Approach procedure

- Design ✓
- Validation ✓
- Documentation ✓
- **Approval (DSAC)**
- **Approach publication**

Several trajectories designed for validation, with slight changes in descent angle and final turn. Purpose to avoid TAWS. ✓

Satisfactory simulator validation ✓

Dossier submitted in April, including:
- Technical design report ✓
- Safety assessment ✓
- Environmental study ✓
- Validation report ✓
- Consultation ✓

NOT APPROVED, due to a particular AIR OPS interpretation of the French Authority

+ Noise study ✓
+ Fuel study ✓

DEMOR

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Optimized flight trajectories: shorter flight planning distances for EDDB, EDDN, EDDS, EDDH

Robert Winker (DFS)

HERON

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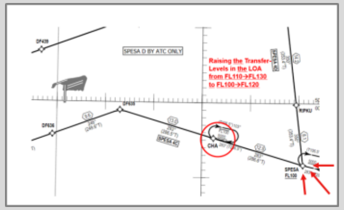
HERON Optimisation of flight trajectories using data analytics in 4 clusters (exe 3.7)

Optimize descend profiles based on navigational procedures utilizing altitude windows: **Extending a STAR to EDDF into Upper airspace MUAC**

- Cluster 1 -

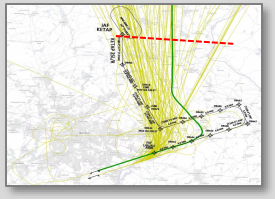


Adjust operational concepts or working procedures to improve vertical and lateral flight efficiency: **Raising Transfer Level in TMA EDDF**

- Cluster 2 -

Analysis of sector geometries and adoption: **Shifting Traffic Flows for better Profile to EDDL**

- Cluster 3 -



Optimize flight planning distances for airports with a high traffic volume: **90 Percentile for Fuel Planning**

- Cluster 4 -

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HERON Flight Planning Distances: The Observation

Observation

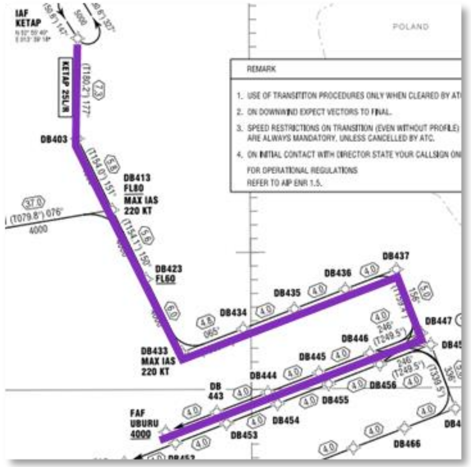
- PBN standard arrival routes are often **designed with a long downwind leg** for safe and fluent traffic flow in delay situations
- In daily operation, however, incoming flights are rerouted via considerably **shorter tracks**

Idea

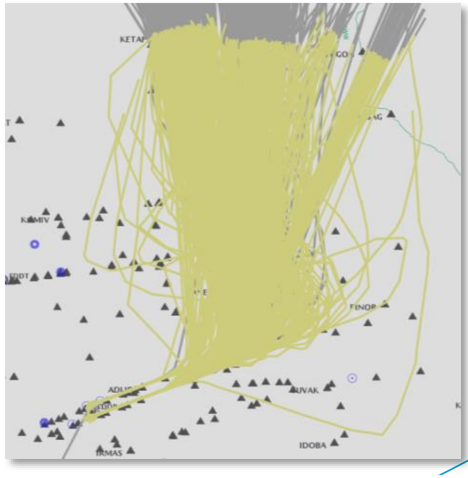
- Publish a shorter and **more realistic distance** in the AIP which can be used in flight planning.
- Once published in the **AIP**, the reduced planning distances can be used by all airspace users

Realization

- **Close Collaboration** of DLH and DFS
- **First steps** at EDDF, EDDM and EDDL in 2020
- Further steps within the **Digital Sky Demonstrator project HERON** for EDDB, EDDN, EDDH and EDDS (Nov. 2022 – Oct 2025)



Example: KETAP STAR EDDB in AIP GERMANY



Example: Actual flown KETAP STAR EDDB in 2023

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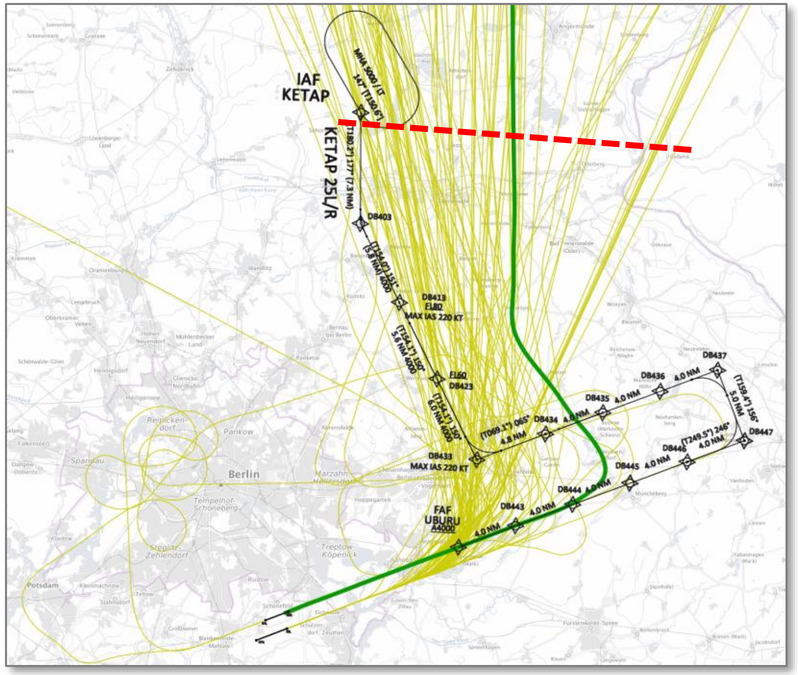
HERON The Solution: Use the 90 Percentile

Methodology

- **Collect** the distribution of actual flown arrival distances of respective airport (**Yellow**)
- **Define** a line as the balance boundary that cuts off as many flight tracks as possible in a meaningful way, in accordance with the STAR (**Red**)
- **Measure** the ground distance from this line to landing
- **Select** the 90 percentile of the distance for safety reasons (**Green**)
- **Compare** this distance to the nominal transitions published in the AIP (**Black**)
- **Publish** this distance as an expected flight distance with an amendment to AIP
- **Monitor** actual arrival distances once to twice a year after the implementation/publication
- **Update** the amendment of AIP for any deviations > 5 NM from distance published before



Yellow: Radar tracks for KETAP Arrivals EDDB RWY 24 L/R

Black: KETAP STAR in accordance with AIP Germany

Red: STAR entry line

Green: 90 percentile of KETAB arrivals

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HERON Potential Benefits: STARs to EDDB in 2023

Distance Saved x Fuel Flow x Cost of Weight = Potential Fuel Saving per flight

EDDB	Nominal	AIP (new)	Diff [NM]	Flights SR (2023)	Flights LR (2023)	Saving SR	Saving LR	Total Savings [kg Fuel]
ATGUP_07	88,9	60	28,9	3950	3	5,8	151,7	23.286
ATGUP_25	87,6	52	35,6	7151	13	7,1	186,9	53.345
KETAP_07	111,8	69	42,8	1926	11	8,6	224,7	18.958
KETAP_25	79,6	49	30,6	3782	17	6,1	160,7	25.877
KLF_07	76,3	37	39,3	4150	3	7,9	206,3	33.238
KLF_25	85,1	53	32,1	8850	19	6,4	168,5	60.019
NUKRO_07	106	71	35	5304	445	7,0	183,8	118.897
NUKRO_25	92,5	54	38,5	11062	1015	7,7	202,1	290.334
OGBER_07	73,1	40	33,1	5292	226	6,6	173,8	74.306
OGBER_25	103,4	67	36,4	9849	393	7,3	191,1	146.803
			Sum of flights:	61316	2145			845.063

Total Fuel Savings EDDB = 845.063 kg Fuel ≈ 2.662 tCO_2 p.a.

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HERON Dissemination and Implementation

Preparation of values

- the 90 percentile values are transferred in a tabular description for the AIM department of ANSP

Notification of publication

- AIM department is informed on an update or new data set for respective aerodrome in chapter EDXX AD 2.22 of AD 2 section. Publication with next AIRAC.

Dissemination

- Information Campaign for Airlines
- Flight planning departments need to use the information:
- Either manually coding as “modified” STAR length for fuel calculation
- Or via NM B2B services (ENV coordinator will provide NM with the update procedure length for coding in CACD)

Monitoring

- All flights of selected airports must be analyzed again once or twice a year. STAR distances with changes >5 NM have to be updated in the AIP

STAR Bezeichnung/ STAR ID	Betriebspiste/ RWY in use	Durchschnittliche Flugentfernung/ Average flight distance (NM)
ATGUP 06L/R	06	60
ATGUP 24L/R	24	52
KETAP 06L/R	06	69
KETAP 24L/R	24	49
KLF 06L/R	06	37
KLF 24L/R	24	53
NUKRO 06L/R	06	71
NUKRO 24L/R	24	54
OGBER 06L/R	06	40
OGBER 24L/R	24	67

Flugplanung

Im Gegensatz zum Flugplan können nachfolgende Entfernungen vom Anfangspunkt der STAR bis zur Landung als zu erwartende Flugentfernung für die Flug- und Treibstoffplanung angenommen werden. Abweichungen davon können als Verzögerung betrachtet werden.

Flight planning

In contrast to the flight plan, the following distances from the starting point of the STAR to the landing may be regarded as the expected flight distance for flight and fuel planning purposes. Any deviations from this may be regarded as a delay situation.

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Way Forward: Harmonized publication in Europe

Prerequisites

- **Standardized evaluation** method - same distances at every airport
- **Data source** for full amount of flight tracks
- **Automated** data evaluation and results
- Assessment of **applicability** – regional show stopper, exit criteria

Open Items:

- Responsibility for **analysis** of distances and **monitoring** – we propose NM, all data available there!
- Consultation of **ANSPs** - what is required to publish?
- Consultation of **flight planning providers** – what is required to use it?
- Consultation of **airlines** – what is required to use it?

Updated Regulation required?

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HERON Proof of concept for automized application

Concept:

– Centralized and automized data analysis to provide planning distances for all European airports

Data Basis:

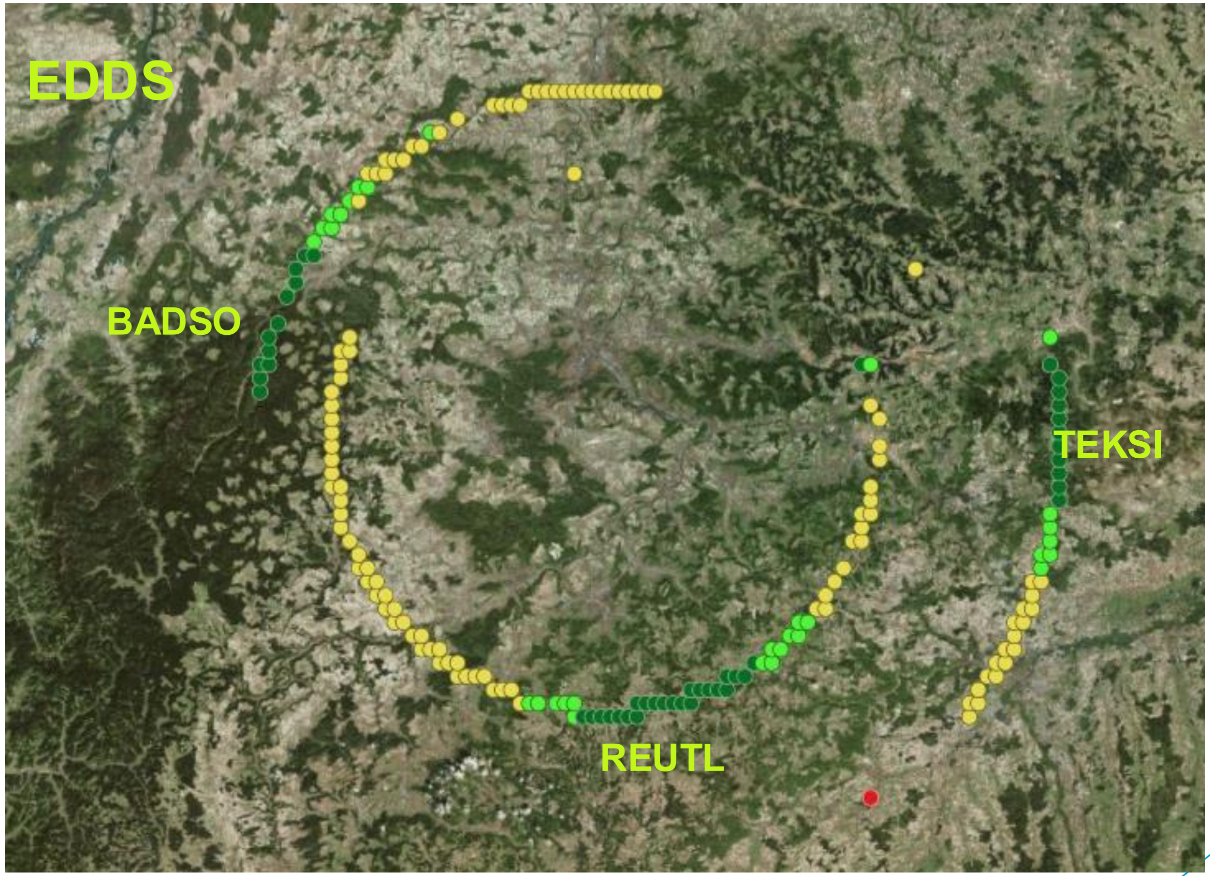
– 2 weeks, all flights: CW52/2024 (low traffic) and CW24/2025 (high traffic), data provided by Eurocontrol

Approach:

- Distance from STAR entry point to touchdown
- Evaluate 90th percentile for each STAR-runway-combination

Result:

- Automized evaluation of 90th percentile is possible (RNDSG activities)
- Cross check of generated distances with published AIP entries successful
- More steps required after definition of further KPIs and implementation of more data



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Optimisation of flight trajectories using data analytics (exe 3.7)

HERON

Exe 3.7 Leader: matthias.hark@dfs.de / joachim.scheiderer@dlh.de
Cluster 4 Manager: robert.winker@dfs.de / kai.binnewies@dlh.de

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Descent Profile Optimization (DPO)

Louis Ghegebidan and Jean Nicot (Airbus)

EUROPEAN PARTNERSHIP

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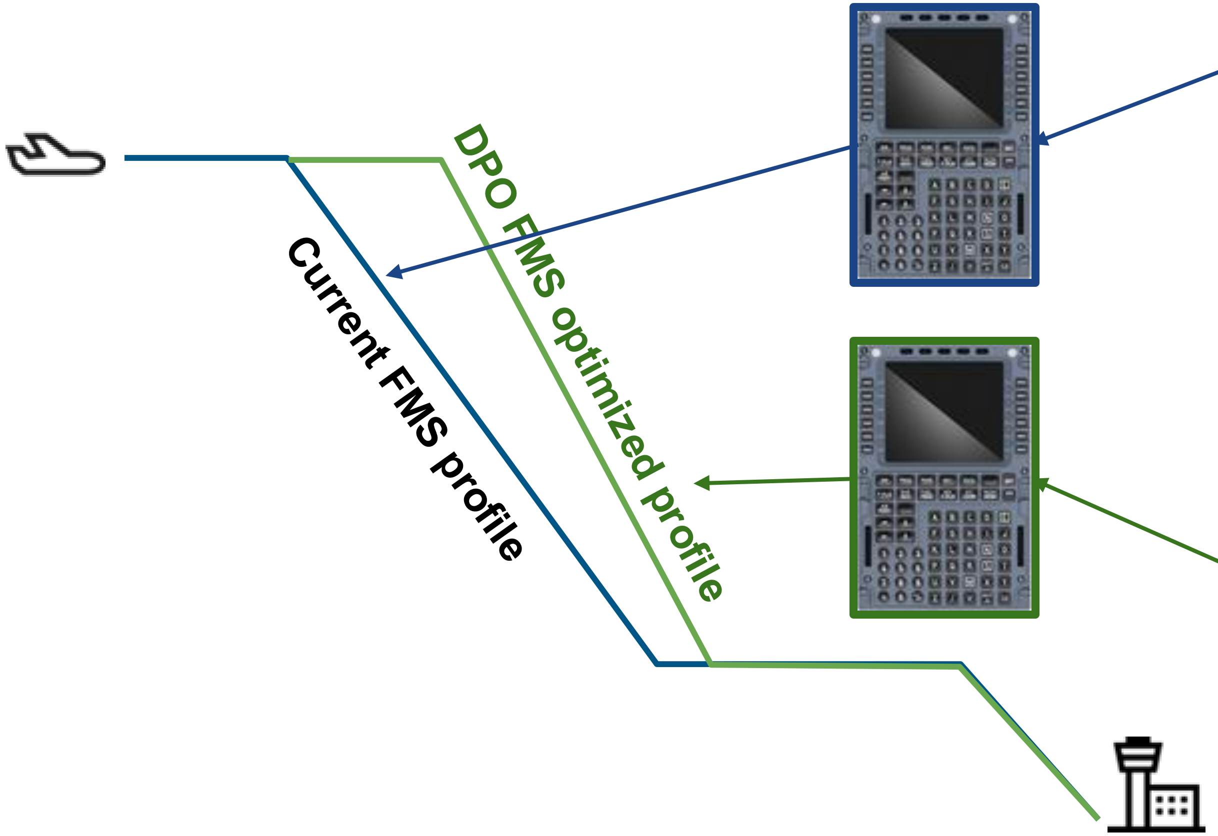
EXE 3.6: DPO (Descent Profile Optimisation)

easyJet
AIRBUS

DPO principle



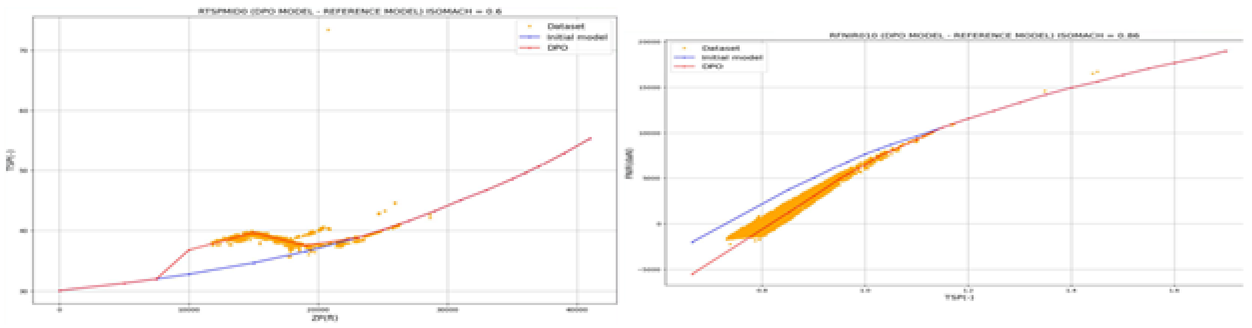
Current FMS model

Descent performance identification on current FMS models was not performed

Idle margins were needed to ensure good guidance in descent

Descent performance identification on flight tests tuning:
Flight-Idle control parameter (N1)
Thrust force

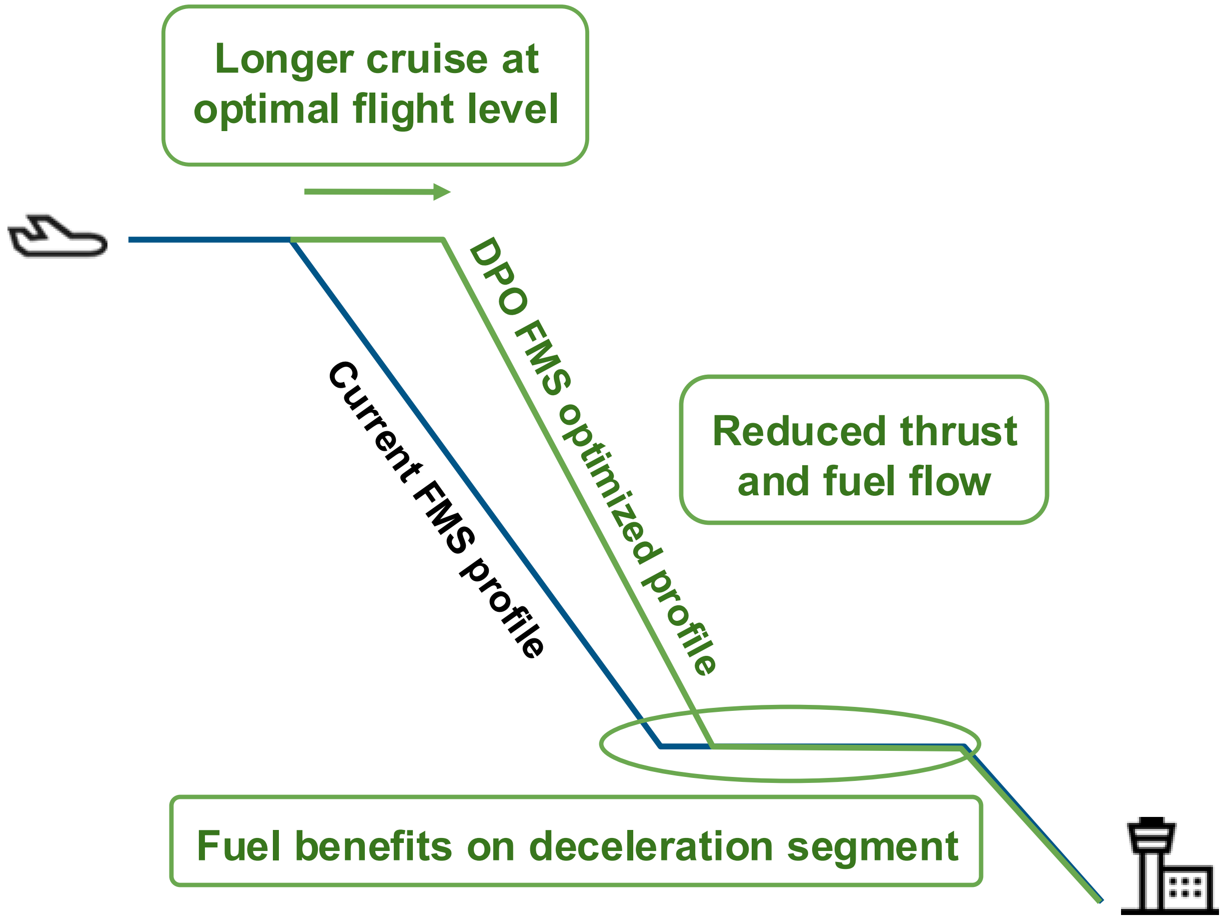
Relaxation of the idle margins leading to a descent profile closer to **idle performance**



DPO FMS model

EXE 3.6: DPO (Descent Profile Optimisation)

DPO expected benefits



Δ10 NM on T/D for Single Aisle

Single Aisle: **-70 kg/flight**
Long Range: **-140 kg/flight**

Expected **CO2 savings per aircraft per year**:
400 tons Single Aisle
270 tons Long Range

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EXE 3.6: DPO (Descent Profile Optimisation)

Project timeline

December 2023	December 2024	December 2025
200 aircrafts equipped with the DPO function	**Benefit evaluation**	**Assessment and demo report**
Flights prior to this date are used as reference flights. Those flights will be compared to 2024 flights equipped with DPO	Definition of the method and computation of the fuel benefits based on WP3	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor.

EXE 3.6: DPO (Descent Profile Optimisation)

easyJet
AIRBUS

Data collection

Reference flights

Non **DPO** IF = 0	Non **DPO** IF = -3.5
3k flights	423k flights
standard reference scenario	easyJet reference scenario

Optimized flights

DPO IF = 0
352k flights
easyJet optimized scenario

EXE 3.6: DPO (Descent Profile Optimisation)

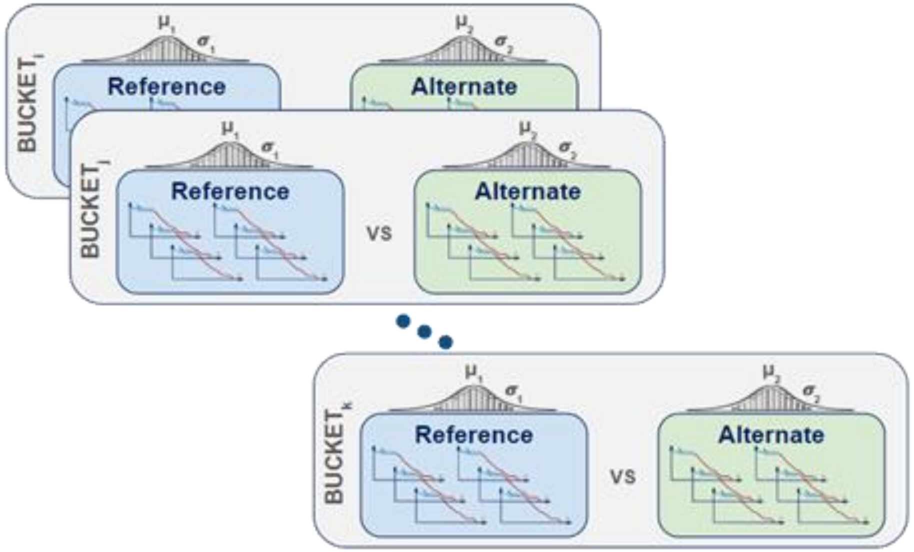
easyJet AIRBUS

Methodology

Reference
No-DPO/IF=-3.5

vs

Alternate
DPO



Filter out movements not suitable for fuel burn assessment

(top of desc not in 180Nm before touchdown, top of climb in 180Nm before touchdown, go-around, ...)

For each movement, compute:

- Fuel burn over 180Nm before touch-down
- For each movement, compute characteristic data (vpath mode %, mach cruise, zp cruise, Weight...)

Sort out movements in comparable buckets according to:

- **Fuel Flow$_{avg}$ cruise**
- **Mach$_{avg}$ cruise**
- **ESAD$_{cruise}$**

} cruise

- **ZP$_{ToD}$- ZP$_{ldg}$**
- **FPA$_{ground}$ / FPA$_{air}$ (ToD →Touchdown)**
- **CAS$_{avg}$ (ToD →FL100)**
- **Level off ESAD**

} descent

Compute statistics on each bucket to compare DPO vs no DPO:

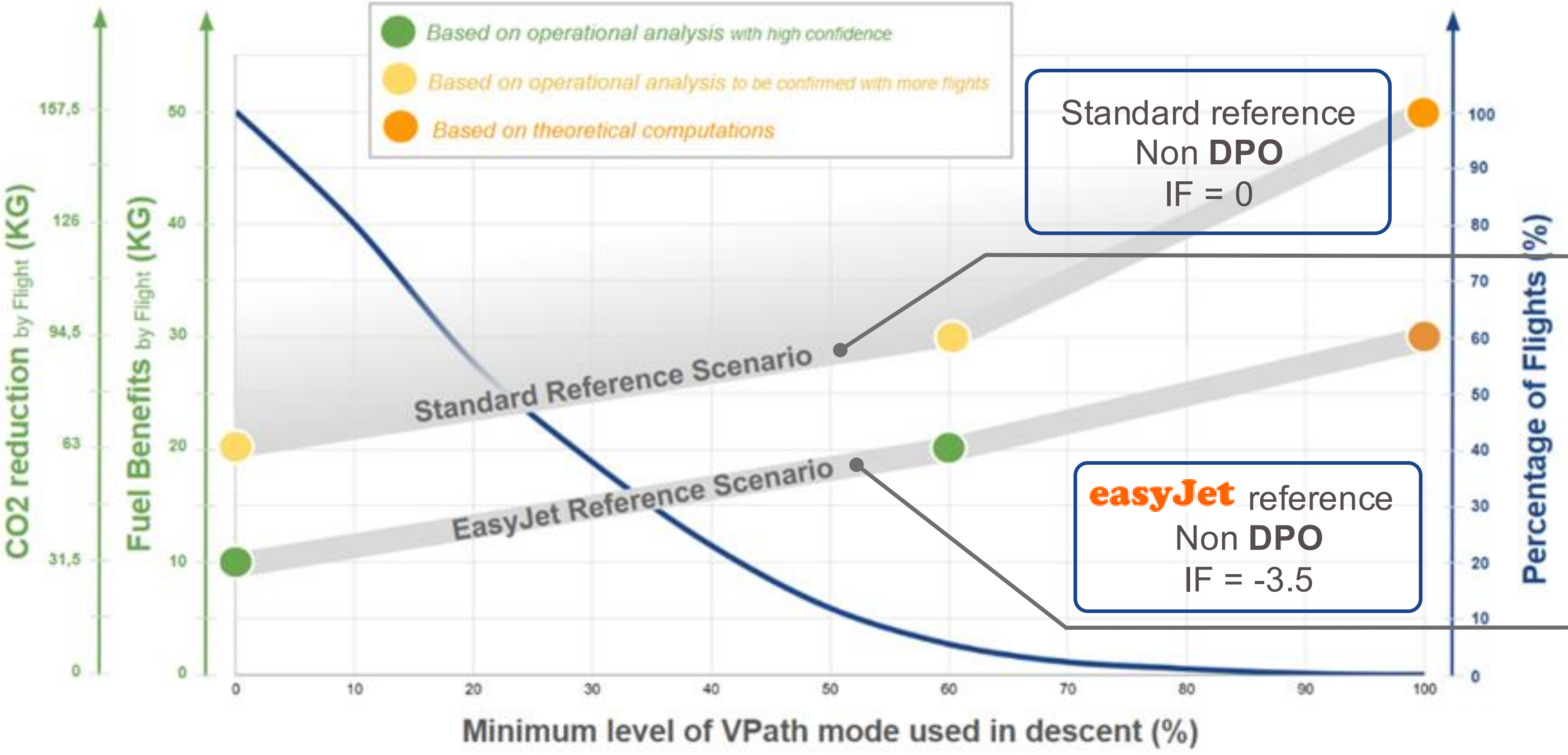
- Fuel burn average and standard deviation
- T-test on fuel burn mean difference

EXE 3.6: DPO (Descent Profile Optimisation)

easyJet
AIRBUS

Benefit evaluation

Fuel / CO2 = f(VPath mode use)



Fuel → [20 ; 30] kg/flight
CO2 → [60 ; 95] kg/flight

To be confirmed with more flights for the reference to be confirmed with **T-test**

Potential is at 50kg /flight in fuel & 160kg / flight in CO2

Fuel → [10 ; 20] kg/flight
CO2 → [30 ; 60] kg/flight

Confirmed with **T-test** & confidence interval

Potential is at 30kg/flight in fuel & 160kg / flight in CO2

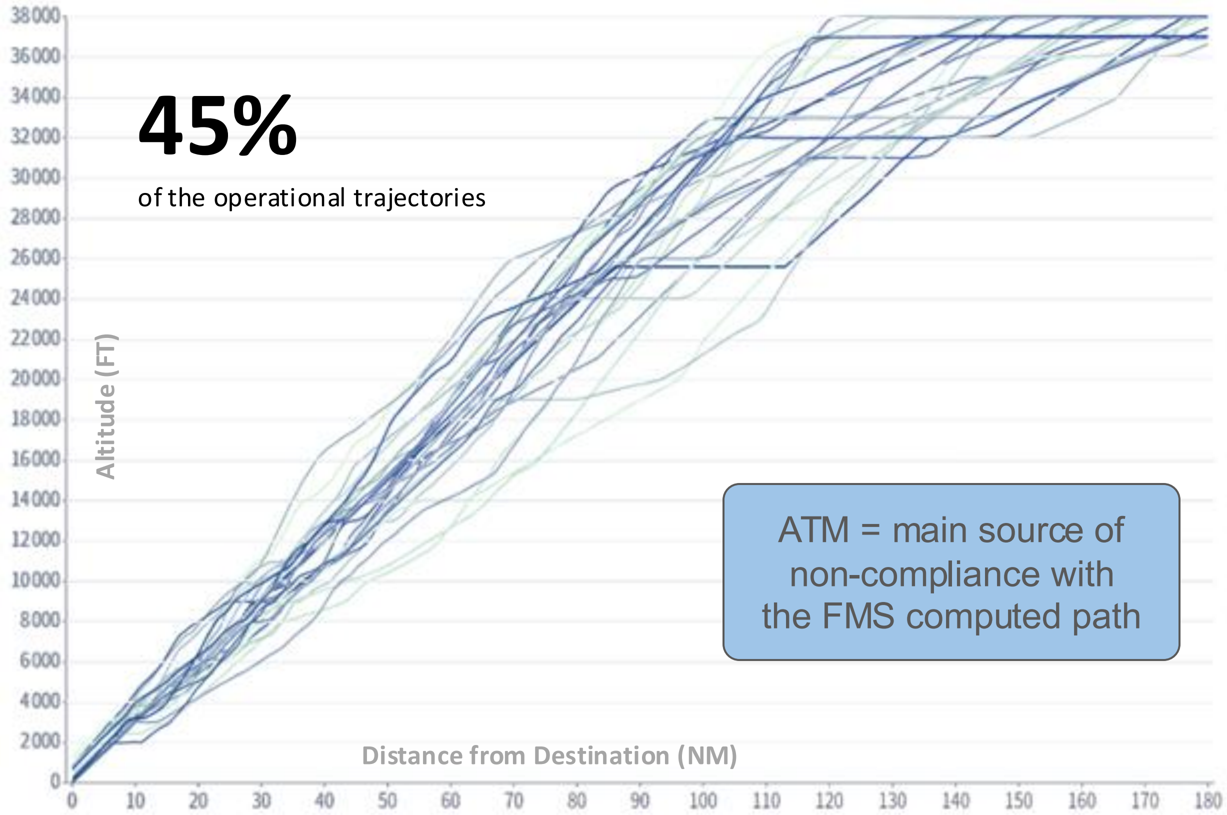
VPath = Aircraft is on FMS computed descent path in managed mode

EXE 3.6: DPO (Descent Profile Optimisation)

Details on Ops trajectories

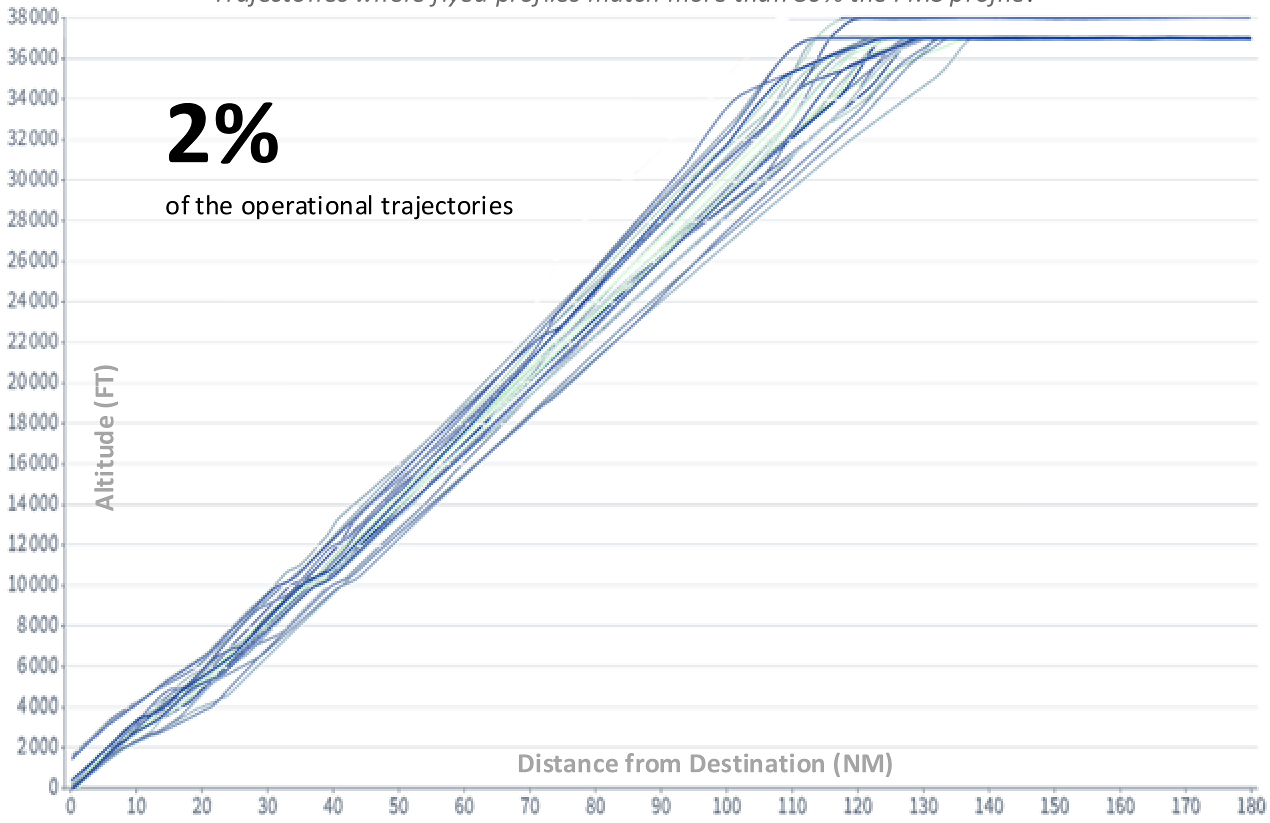
Extract of trajectories with VPath mode < 20%

Trajectories where flyed profiles match less than 20% the FMS profile.

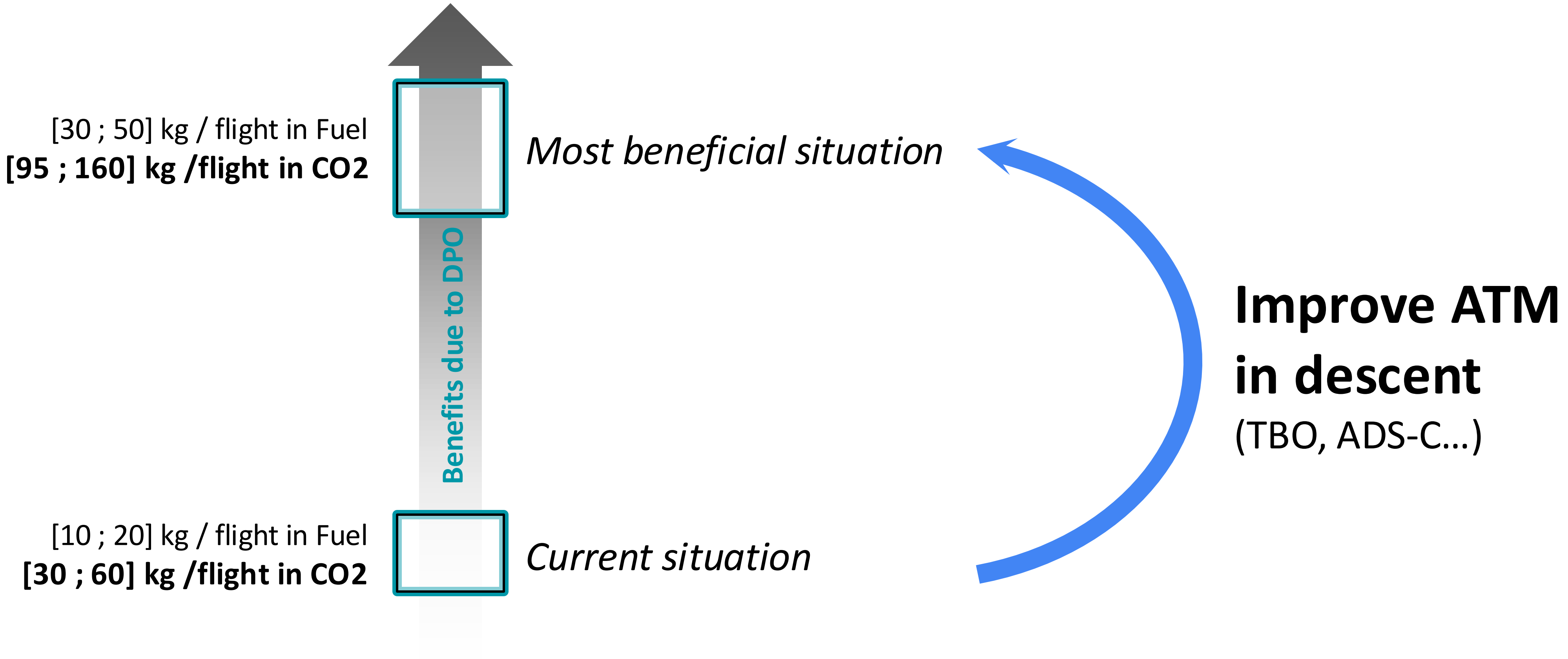


Extract of trajectories with VPath mode > 80%

Trajectories where flyed profiles match more than 80% the FMS profile.



Synthesis on Fuel / CO2 Benefits



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EXE 3.6: DPO (Descent Profile Optimisation)

easyJet

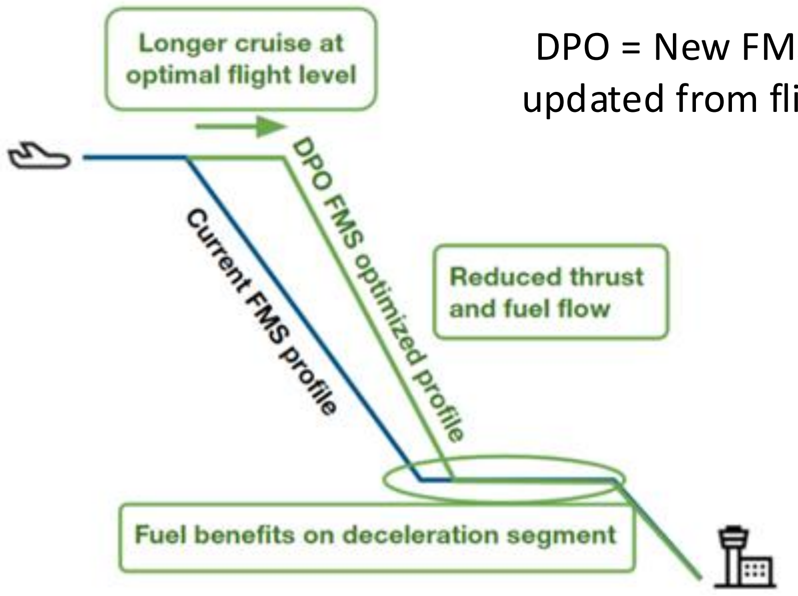
AIRBUS

Overview of the exercise

Reminder on the function

Optimizing descent with DPO

This function permits the real time computation of the most optimum descent, which consists of defining the optimal descent profile including the correct top of descent position.



DPO = New FMS model updated from flight tests

Benefit study

- Deployment
  → ***228 Aircraft equipped*** with DPO
- CO2 emission reduction
  → ***in CO2 [30 to 95] kg/flights***
- Potential for higher benefits
  → ***Improved ATM in descent (TBO, ADS-C…)***

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Increased Second Glide Slope trials at EBBR

Kseniia Kozhevnikova (skeyes)

EUROPEAN PARTNERSHIP

Co-funded by the European Union

HERON Background

- Increased Second Glide Slope (ISGS) trials at Brussels Airport (EBBR)

- **Key trial objectives**
  - **Demonstrate:**
    - **noise reduction** of ISGS operations
    - **safety and workload levels** remain acceptable
    - **changes to working methods** are feasible, do not negatively impact safety and HP

  - **Assess impact** of ISGS operations on:
    - **noise**
    - **flight and fuel efficiency**
    - **airport capacity**
    - **HP**

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HERON What?

Publication of 3 new RNP approaches

- **RNP only** (no ILS)
  - LNAV/VNAV is based on BARO → Temperature-dependent
  - LPV → no impact of temperature. Only 10% of the EBBR fleet
    - LPV via SBAS (CAT I) or GBAS (CAT II or CAT III) -> GBAS not applicable for EBBR
- **RWYs**
  - RWY 25R -> 1 ISGS: **3.2 degree** (no additional PAPI needed)
  - RWY 25L -> 2 ISGS: **3.2 degree** (no add. PAPI) **and 3.5 degree** (add. PAPI).
    *Two different ISGS **not** to be used in the same assessment period, on the same RWY.*
  - Maintain RNP glide interception altitude at 2000 ft -> assess impact increased slope + limit impact traffic flows

Calm periods – night (23h-6h LT) only

Participating airlines: BEL/JAF/DHL/VLG


RWY 25R
RWY 25L
PAPI

HERON When?

Multiple assessments periods:

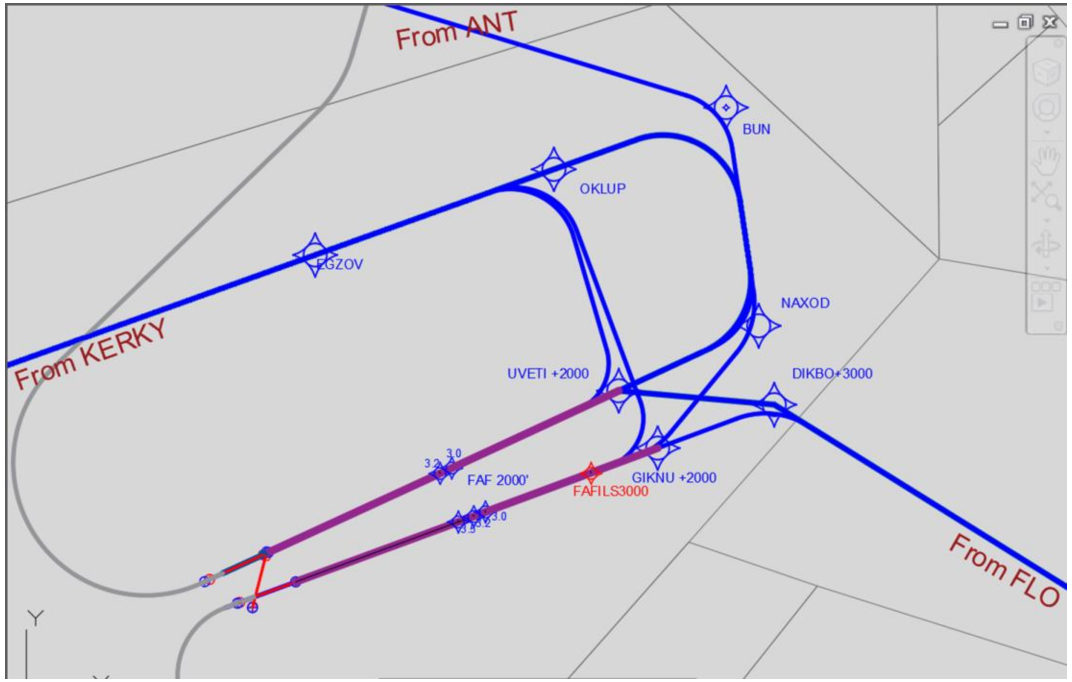
Period 1 – 1 OCT 2024 – 1 JAN 2025

Extension of Period 1 - 15 JAN 2025 – 13 FEB 2025

- **Focus: ISGS (3.2 degree)**
- Procedures
  - 25R: 3.2 degree (ISGS)
  - 25L: 3.2 degree (ISGS)
- No additional PAPI

Period 2 – 3 MAR 2025 – 1 JUN 2025

- **Focus: ISGS (3.5 degree)**
  - Procedures
    - 25R: 3.2 degree (ISGS)
    - 25L: 3.5 degree (ISGS) -> **additional PAPI**



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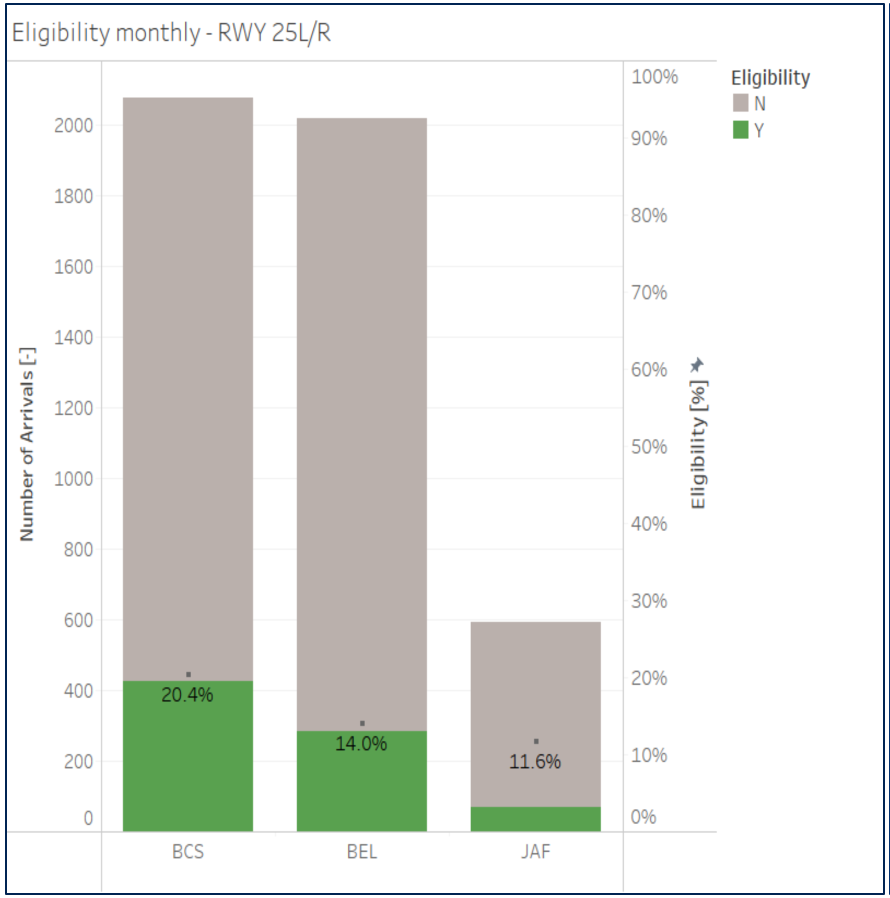
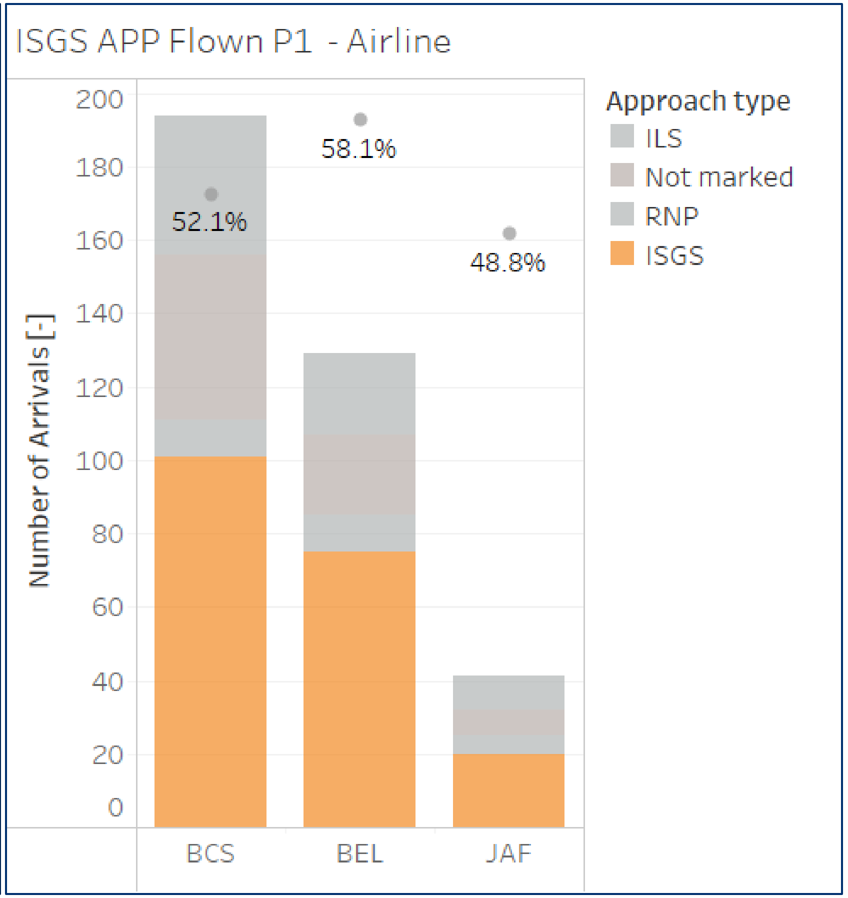
Eligibility & acceptance





How many could have flown ISGS?

- 17% of all relevant (BEL, JAF, BCS) arrivals is ISGS eligible, i.e. 23% of all 25L/R arrivals.

ISGS eligibility -> ATIS states:
"INCREASED GLIDE SLOPE TRIALS IN PROGRESS FOR PARTICIPATING AIRLINES".

How many flew ISGS?

- When proposed 54% of arrivals accepted ISGS.

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HERON What was achieved?

Noise reduction:

- Measured benefits:
  - Up to – 2 dBA for 3.5° glide slope approaches.
  - Up to – 1 dB for 3.2° glide slope approaches.

- **Noise contour simulations** confirmed consistent noise reduction trends around the airport.
- **Statistical under track noise analyses** confirmed consistent noise reduction Greater benefits expected with higher ISGS adoption rates.

Actual Average Fuel Burn:

- **Medium aircraft:** 10 kg **reduction** in fuel burned
- **Heavy aircraft:** 22 kg **increase** in fuel burned

Note: The differences expressed are calculated between the ISGS and ILS approaches.

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ATC/Flight crew feedback

Mostly, feedback from operational stakeholders (ATC and flight crews) was positive; still, various improvement points were identified.

Pilots

- **Radar vectoring:** Limited predictability and when combined with low interception altitudes, vectoring introduces uncertainty, prompting pilots to adopt conservative descent strategies and results in long lvl-offs.

ATC

- ISGS procedures were considered operational feasible only in light traffic conditions Controllers also pointed out that airport capacity is reduced due to the larger separations required.

- No new automation support tool was used during the trials to assist the controllers in monitoring separation during ISGS operations. Although not pointed out by the ATCOs, such support tool could have be useful to reduce their workload and increase their situational awareness.

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PANSA

ORD AWALON - Optimised Runway Delivery on Final Approach for Warsaw Chopin Airport.

Speakers: Piotr Bratek / Andrzej Stachlewski.

EUROPEAN PARTNERSHIP

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HERON Optimised Runway Delivery on Final Approach

The ORD is **a support tool** designed to **assist EPWA APP controllers** in **managing the effect of compression** that occurs on short final from the lead aircraft crossing the deceleration fix. The ORD tool consists of an **indicator on the final approach that displays to the ATCOs the spacing needs to be achieved between each aircraft pair prior to the Deceleration Fix (DF)** to achieve the required separation / spacing at the separation delivery point (runway threshold).

The **ORD tool helps to ensure the consistent and efficient management of the spacing compression** that occurs from the lead aircraft crossing the deceleration fix. This in turn helps to ensure **consistent and efficient separation delivery at the separation delivery point**.

Solution based on SESAR PJ.02-01-01
Maturity Level: **TRL7 ORD / TRL8 Wind Module**

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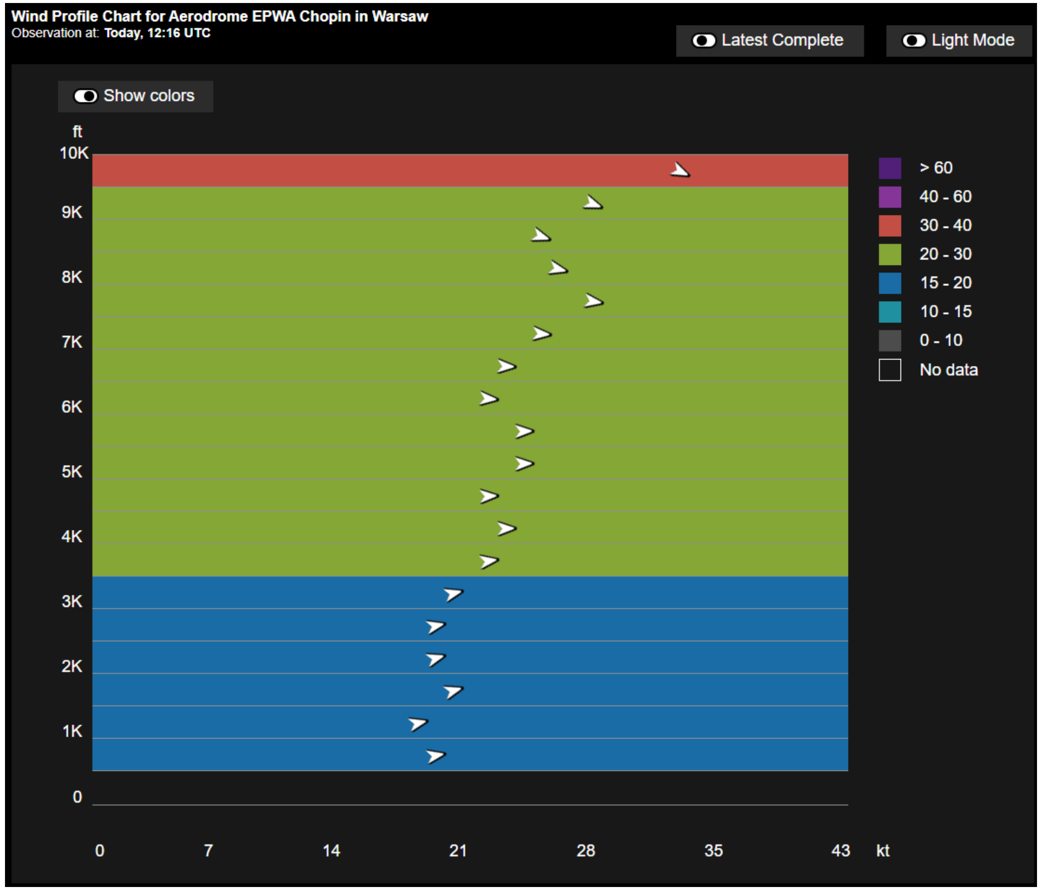
HERON Wind module for PANDORA informative system



Vertical Wind profile for Warsaw Chopin Airport based on downlinked Mode-S data - Warsaw Approach and Tower environment.

Operational implementation December 2024

Show only current

Altitude ↓	Avg Dir	Avg Spd	Status	Samples	Min Angle	Max Angle	Min Spd	Max Spd
10K	293°	32 kt	Current data	17	281°	301°	26 kt	36 kt
9.5K	290°	28 kt	Current data	15	283°	301°	25 kt	32 kt
9K	285°	26 kt	Current data	14	274°	294°	23 kt	29 kt
8.5K	286°	27 kt	Current data	13	280°	291°	20 kt	30 kt
8K	283°	29 kt	Current data	7	280°	291°	27 kt	32 kt
7.5K	276°	26 kt	Current data	8	270°	281°	21 kt	29 kt
7K	272°	24 kt	Current data	10	268°	278°	22 kt	26 kt
6.5K	275°	25 kt	Current data	10	257°	282°	19 kt	30 kt
6K	269°	24 kt	Current data	14	262°	279°	19 kt	26 kt
5.5K	273°	25 kt	Current data	16	266°	280°	18 kt	28 kt
5K	271°	25 kt	Current data	8	265°	279°	22 kt	28 kt
4.5K	271°	24 kt	Current data	22	264°	277°	15 kt	26 kt
4K	264°	22 kt	Current data	27	256°	272°	15 kt	26 kt

HERON Optimised Runway Delivery on Final Approach

- The Demonstration consisted of two activities:

- **Preliminary RTS hosted by EUROCONTROL** at the Innovation Hub using the ESCAPE platform – with Leading Optimised Runway Delivery (LORD) demonstrator.
- Ran between the 18th and 22nd of November 2024.

- **Three-day shadow-mode demonstration using the PEGASUS_21** Testbench at PANSA premises in Warsaw, supported by a locally developed version of the ORD tool.
- Ran between the 4th and 6th of June 2025.

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HERON ORD Markers and Scenarios

Shapes and colours of the indicators used

Initial Target Distance (ITD) indicators: separation/spacing AND compression:

→ WT / MRS separation constraint

→ ROT spacing constraint

→ Gap spacing constraint e.g. for inserting departures

Final Target Distance (FTD) indicator: Separation / spacing to be achieved at runway threshold

→ WT / MRS separation constraint

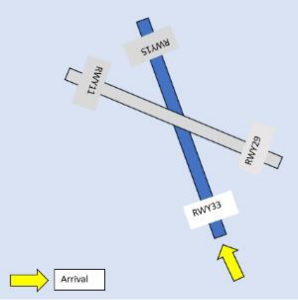
→ ROT spacing constraint

→ Gap spacing constraint e.g. for inserting departures

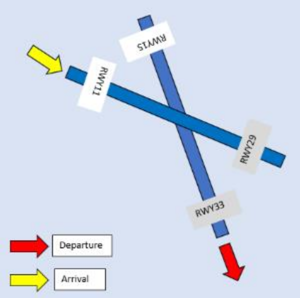
(Note the FTD is also slightly bigger is size than the ITD)

Operational scenarios

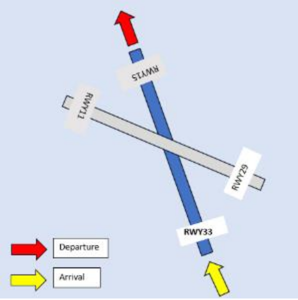
Arrivals RWY 33



Arrivals RWY 11
departures RWY 15



Arrivals and departures
RWY 33,
mixed mode /
operations on one runway



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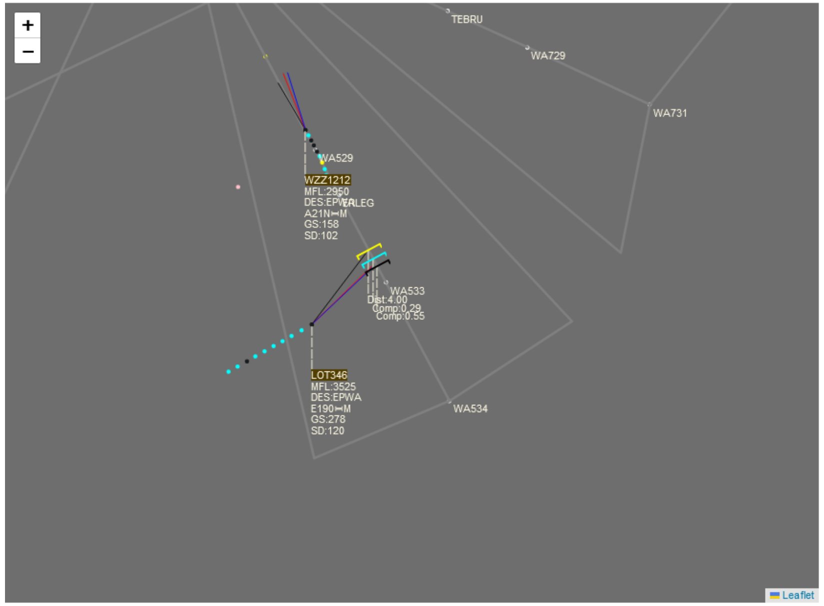
HERON Optimised Runway Delivery on Final Approach

PANSA developed prototype – an important step towards the implementation into PEGASUS_21 (main ATM system)

Streaming: LIVE



LORD | Statistics | Settings | Definitions | Departures | Wind | Logs

Active | Parked (0)

#	Callsign	Dist	DistSep	SepType	W/R/G	Alt	T/W/R	ELDT
1	WZZ1212	7.48				2950	A21N/M/D	1211
2	LOT346	12.91	0.29	GAP	3 / 3.1 / 4	3525	E190/M/?	1213
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

AWALON

LORD
Departures
Definitions
Settings

Active | Parked(0)

Document width: 1920px

NR	CALLSIGN	TYPE	SEP TYPE	COMP	DISTANCE	W/R	W/R/G	PARK	GAP
8	LOT4KK	B738				M/D	-/-/-	P	-
7	LOT2MV	E195				M/?	-/-/-	P	-
6	LOT2EF	E190	GAP	0.69		M/?	3/2.9/4	P	4
5	LOT9004	E170	GAP	0.42		M/?	3/2.8/4	P	4
4	LOT6LJ	E195	GAP	0.24		M/?	3/3/4	P	4
3	LOT6350	B38M	GAP	0.51		M/D	3/3.1/4	P	4
2	DLH5NL	A320	GAP	0.50		M/D	3/3.1/4	P	4
1	LOT5PR	A320			7.98	M/D	-/-/-	P	-

Logged as:
Admin User

Logout

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HERON Optimised Runway Delivery on Final Approach

Benefits:

- **Capacity – Increased Runway Throughput**:
- The main benefits of applying TBS and indicator support at Warsaw Chopin Airport have been shown to be the **increased throughput capacity and reduced spacing of aircraft** when using the LORD tool and time-based minima.
- The tool **allows controllers to handle more traffic**. Additionally, **under high traffic conditions**, the reduced variance in spacing indicates more consistent controller performance.
- Efficiencies would lead to **reduced holding delays, helping to reduce overall flight times**.
- Safety - **safe standard controller working practices** were observed with the ORD tool in both the mixed and segregated mode.

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HERON Optimised Runway Delivery on Final Approach

Project conclusions:

- The demonstration was **successfully run over three-day shadow-mode using the PEGASUS_21** Testbench at PANSA premises in Warsaw, supported by a locally developed version of the ORD tool
- **Results showed promising indications relating to the AWALON tool.** The demonstration was able to provide further **evidence to the human performance benefits, particularly supporting the tool's positive impact on task performance, workload, situational awareness and usability**.
- The demonstration **enabled the verification of the operation of the tool in real traffic conditions**. This provided the opportunity to draw insights from ATCOs to drive future recommendations from the system.
- **HERON project results will support the operational implementation of the tool for EPWA in 2026.**
- **ORD AWALON introduction as first step towards TBS at EPWA Chopin Airport**

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☕ COFFEE BREAK

15:15-15:30

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SESSION 4

Improved Trajectory Planning

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WP 2.4 - Objective

- To improve the management of trajectory through the implementation of solutions at EUROCONTROL/NM (available or new) and local levels allowing AUs to file more efficient trajectories according to the available ATM improvements.

- Opportunities to stakeholders aiming to improve their local systems interoperable with NM via B2B services.

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HERON Heron Demo Plan – WP 2.4 exercises

- **Demo Plan EXE-HERON-4.1 "Dynamic RAD“**
- **Demo Plan EXE-HERON-4.2 "Automated Flight plan Rerouting – algorithm and notification improvement “**
- Demo Plan EXE-HERON-4.3 "ASM Scenarios“
- Demo Plan EXE-HERON-4.4 "FF-ICE/R1 NM Services"

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Dynamic RAD

Giuseppe Acampora, EUROCONTROL

EUROPEAN PARTNERSHIP

Co-funded by the European Union

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Dynamic RAD – Concept Introduction 2020

Purpose

- **Introduce more flexibility in the management of RAD restrictions**
- **Promote flight efficiency, avoiding unnecessary traffic constrains in case of sustainable demand**

Scope

- **Feasible for existing RAD measure**
- **Complementary to RAD consolidation efforts**
- **Suitable solution for everyone**

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4.1.9 RAD

The current RAD process should be reviewed such that restrictions are implemented permanently active only for specific reasons (e.g., because of military areas or to comply with cross-border Letter of Agreement), leaving the rest of the RAD restrictions disabledbut in stand-by status.
Disabled RAD restrictions would remain in a non-active status, until they are activated following the pre-tactical/tactical Demand and Capacity Balancing (DCB) process, supported by the Network impact assessment of relevant ATFCM measures.

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Dynamic RAD – Concept Validation

Live Trials

SESAR VLD

Concept Validated

SOL 362

TRL 6

NM Release 27.0

SESAR DSD

TRL 8

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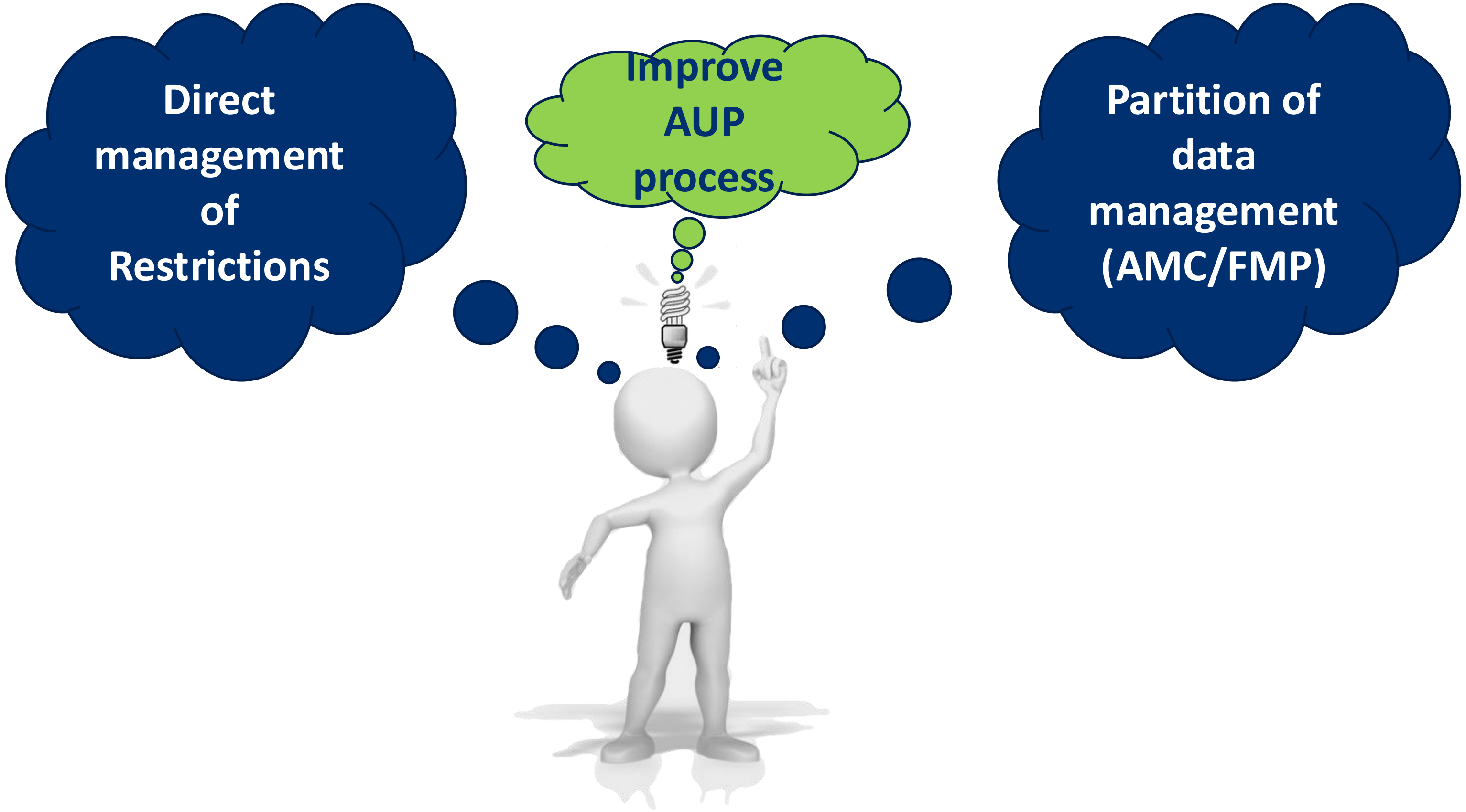
HERON Technical improvements implemented with NM release 27.0 (2023)



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DynamicRAD - PANSA

The project involved changes to technical systems

Common Airspace Tool CAT - The local ASM system used by AMC Poland required an update to enable dynamic RAD changes to be received and sent to NM.

CAT supports the following functions:

- Receive messages for any DynamicRADs activation request sent by the FMP actor.
- Include them in the AUP/UUP and send B2B to the NM via the CAT.
- NM systems were updated to make dynamic management a native characteristic of RAD rules. The updates enabled NM systems to receive the AUP/UUP updates with the included DynamicRADs, along with updating related information in the NOP.
- DynamicRAD has reached TRL8 and has been implemented in operations the 20.02.2025

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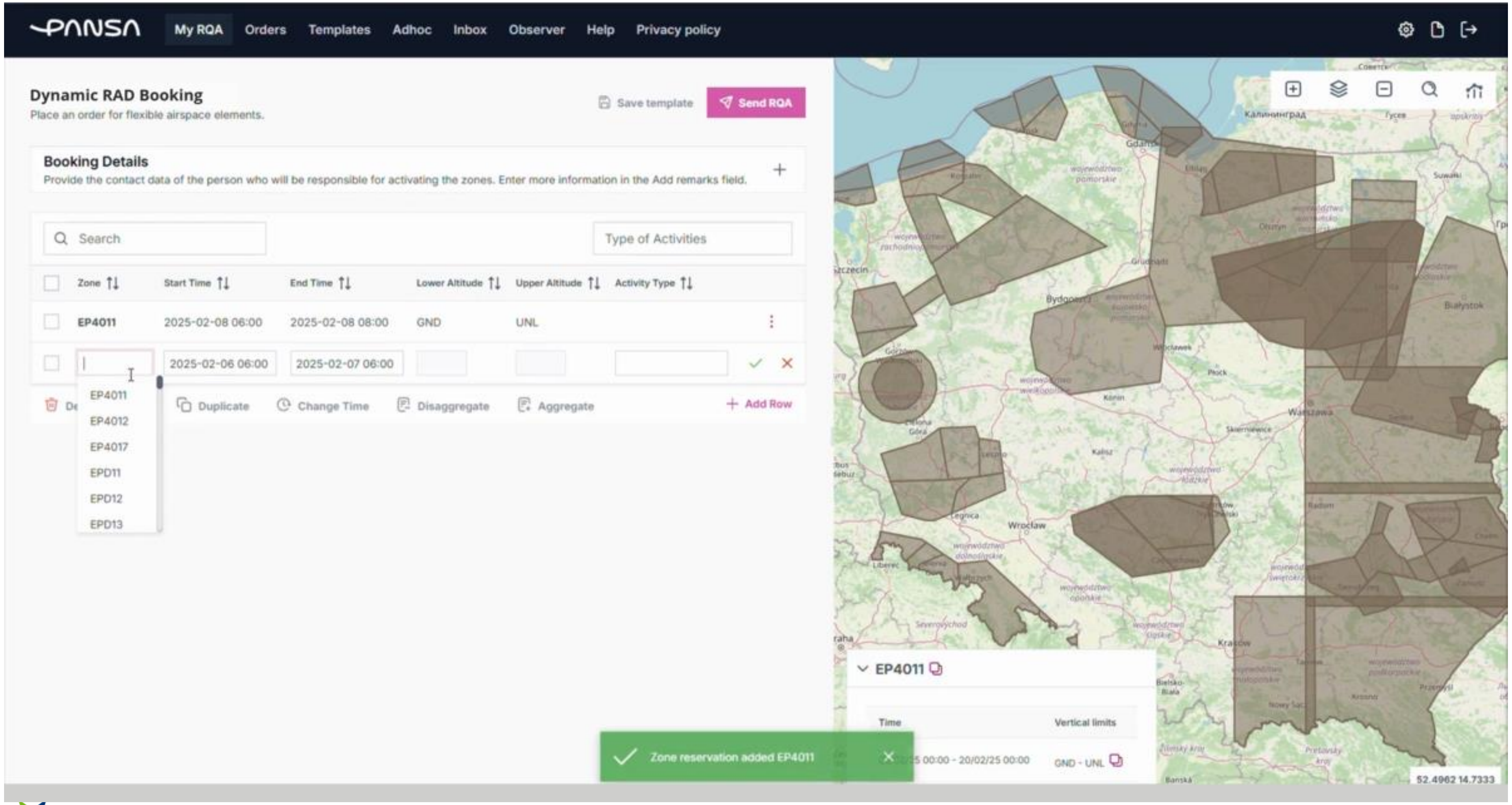
HERON DynamicRAD – CAT system



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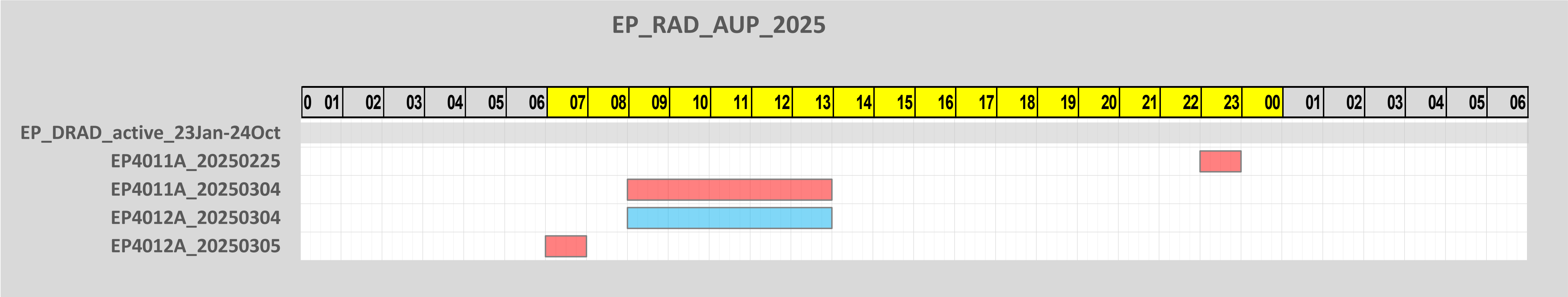
Dates and time of publication for the active restrictions

HERON

AUP on NOP was checked from 23 January until 24 October 2025

Three days were found when the EP restrictions were active:

- 02 Feb 2025 — EF4011A active from 22:00 to 23:00
- 04 March 2025 — EF4011A active from 08:00 to 13:00
  EF4012A active from 08:00 to 13:00
- 05 March 2025 — EF4011A active from 06:00 to 07:00



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Traffic (EP4011 capture) on 29 July 2025

Call Sign	Origin	Destination	EOBT	Date	ETOT	Arrival Time	RFL	Airline	Aircraft Type	WVC	Route Length (NM)	FL_opt for route length
AUA600	EPKK	LOWW	04:45	29-07-2025	04:55	05:47	**170**	AUA	AT76	M	196.45	**220**
AMQ11L	EPCD	LKMT	14:20	29-07-2025	14:25	15:15	**400**	AMQ	PC24	M	239.33	**430**
LOT225	EPWA	LOWW	15:20	29-07-2025	15:35	16:30	**340**	LOT	E75S	M	318.17	**370**
BCS5917	EPKT	EDDP	19:50	29-07-2025	20:00	21:10	**360**	BCS	B738	M	385.41	**400**
LOT389	EPWA	EDDB	15:00	29-07-2025	15:15	16:04	**360**	LOT	E190	M	285.6	**370**
LOT2MB	EPWA	LOWW	05:10	29-07-2025	05:25	06:19	**340**	LOT	E75S	M	318.17	**370**
BCS94Q	EPGD	EDDP	19:40	29-07-2025	19:50	20:57	**340**	BCS	B752	M	399.67	**410**
FPO6DN	EPGD	EDDB	18:30	29-07-2025	18:40	19:22	**340**	FPO	B738	M	234.93	**320**
LOT5EV	EPWA	LKMT	11:20	29-07-2025	11:35	12:14	**280**	LOT	E75S	M	215.1	**300**
AUA632	EPWA	LOWW	17:40	29-07-2025	17:55	18:50	**340**	AUA	E195	M	313.42	**370**
LOT7AE	EPWA	EDDB	07:35	29-07-2025	07:50	08:41	**340**	LOT	E75S	M	285.6	**370**
AUA626	EPWA	LOWW	06:25	29-07-2025	06:36	07:29	**340**	AUA	E195	M	313.42	**370**
RYR4077	EPKK	LKPR	11:15	29-07-2025	11:25	12:09	**280**	RYR	B38M	M	247.04	**300**
LOT7AN	EPWA	EDDB	18:30	29-07-2025	18:45	19:34	**360**	LOT	E190	M	285.6	**370**
LOT521	EPWA	LKPR	14:05	29-07-2025	14:20	15:16	**320**	LOT	E170	M	325.47	**390**
LOT2MD	EPWA	LKPR	15:45	29-07-2025	16:00	16:55	**360**	LOT	E170	M	325.47	**390**
AUA624	EPWA	LOWW	13:00	29-07-2025	13:11	14:05	**340**	AUA	E195	M	313.42	**370**
BCS5919	EPKT	EDDP	00:45	29-07-2025	00:55	01:59	**340**	BCS	B738	M	357.51	**400**
ETH731	EPWA	LOWW	17:35	29-07-2025	17:50	18:42	**340**	ETH	B789	H	326.83	**330**
AUA68P	EPWA	LOWW	04:50	29-07-2025	05:01	05:54	**340**	AUA	E195	M	313.42	**370**
AUA598	EPKK	LOWW	12:40	29-07-2025	12:55	13:48	**200**	AUA	AT76	M	196.45	**220**
BCS5547	EPWA	EDDP	19:50	29-07-2025	20:05	21:14	**300**	BCS	A306	H	405.19	**390**
LOT52P	EPWA	LKPR	06:00	29-07-2025	06:15	07:10	**360**	LOT	E170	M	325.47	**390**
ECC601	EPRZ	LKMT	21:00	29-07-2025	21:05	21:39	**240**	ECC	CL60	M	172.43	**290**
ADB729F	EPLB	EDDP	20:00	29-07-2025	20:05	21:35	**320**	ADB	A124	H	534.92	**370**
QAV25B	EPGD	LKMT	14:25	29-07-2025	14:35	15:32	**380**	QAV	C25B	L	313.99	**450**
LOT3FG	EPWA	LKPR	09:05	29-07-2025	09:20	10:19	**320**	LOT	E75S	M	325.47	**370**
LOT529	EPWA	LKPR	18:25	29-07-2025	18:40	19:39	**320**	LOT	E75S	M	325.47	**370**
QAV25B	EPGD	LKMT	15:15	29-07-2025	15:25	[illegible]	**380**	QAV	C25B	[illegible]	313.99	**450**

H24 FPL captured by RAD restriction definition: 29 flights

Lost opportunities:
FPL with FL optimal for route length greater than restriction level capping (FL365): 7 flights

Benefits:
FPL with filed RFL above restriction level capping (FL365): 3 flights

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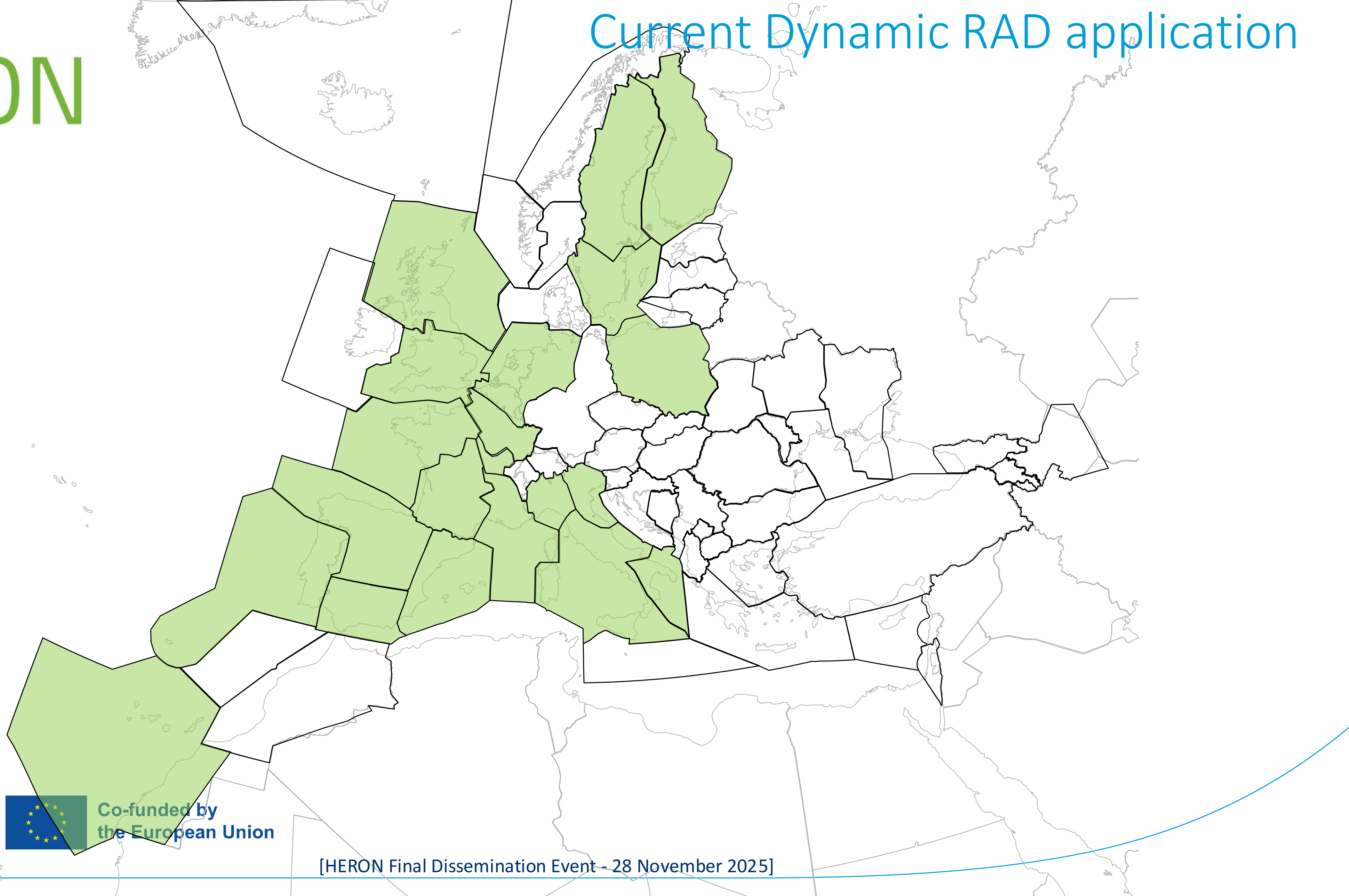
Current Dynamic RAD application

HERON



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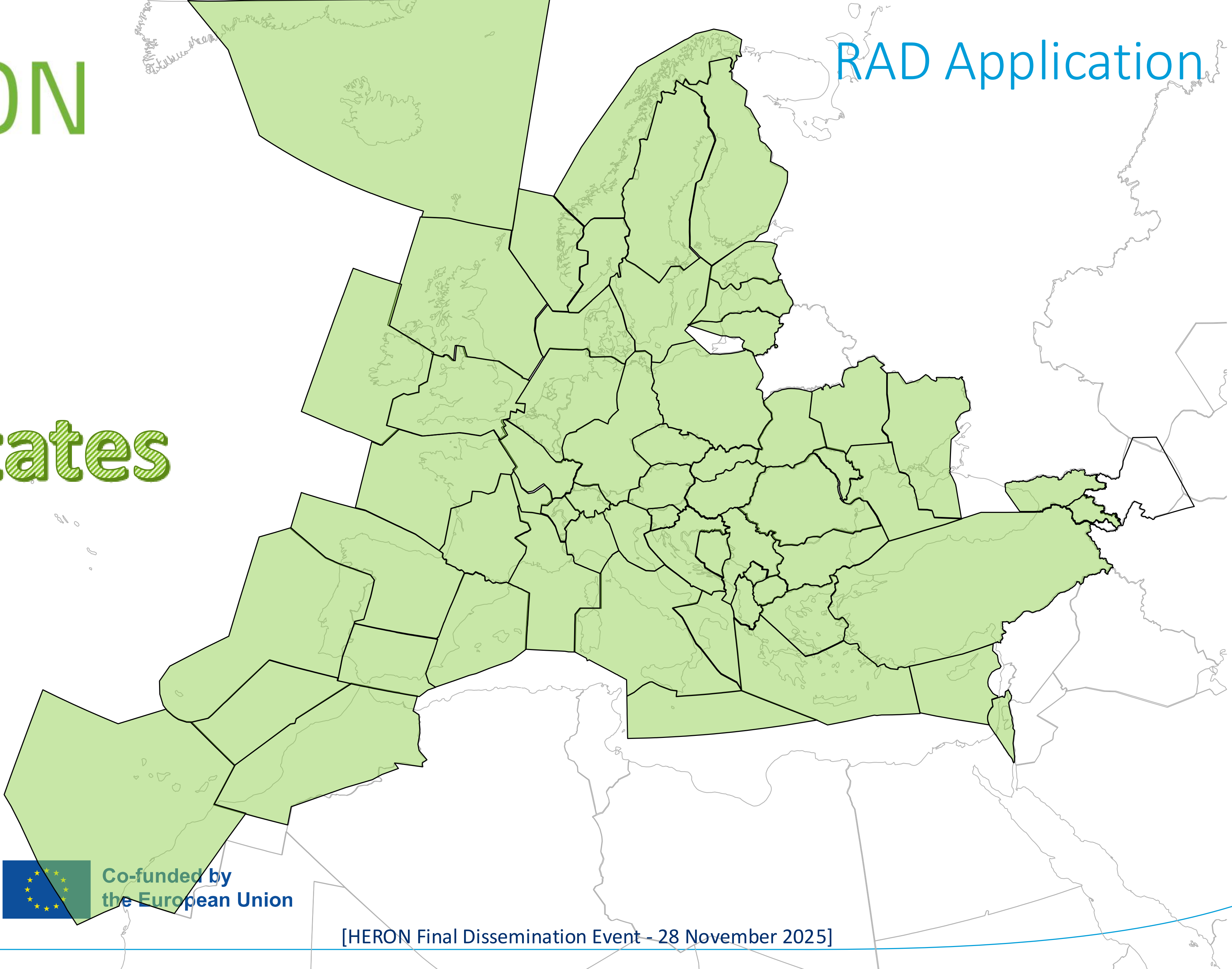
RAD Application



44 States

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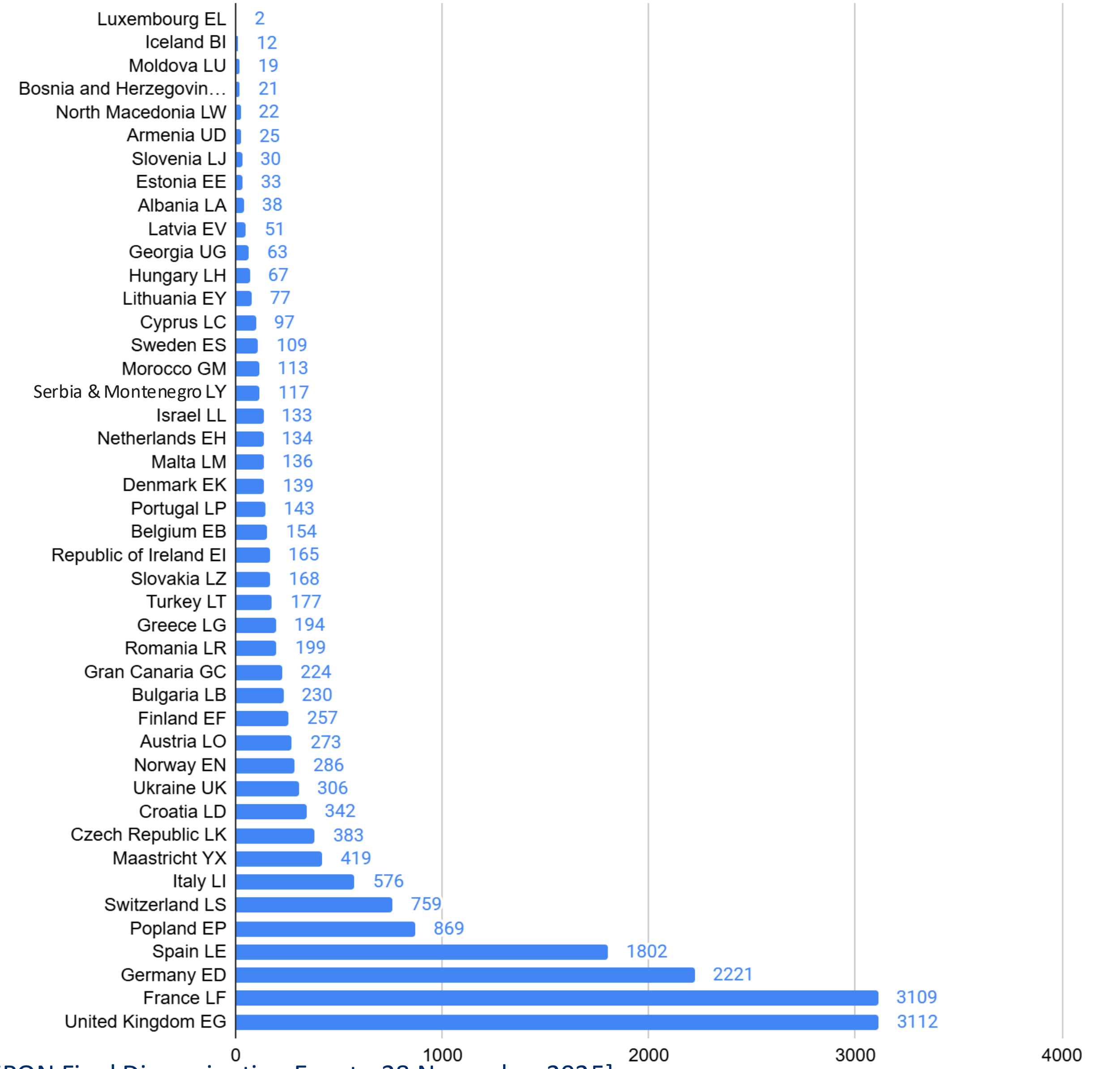
RAD Application

HERON

17.806 (October 2025)



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Flight Plan Rerouting Notification Improvements

Giuseppe Acampora, EUROCONTROL

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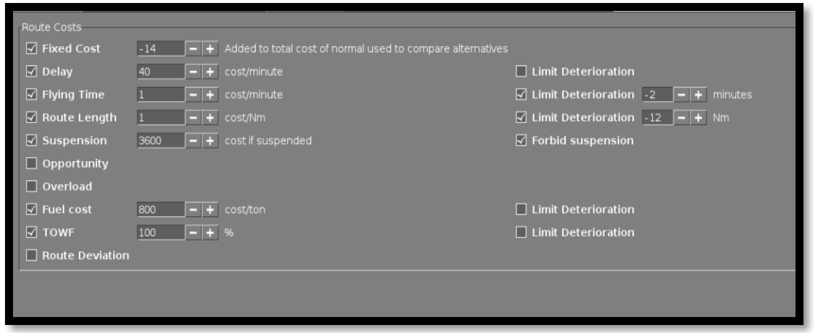
HERON NM Automated rerouting tool (GRRT - Opportunity tool)

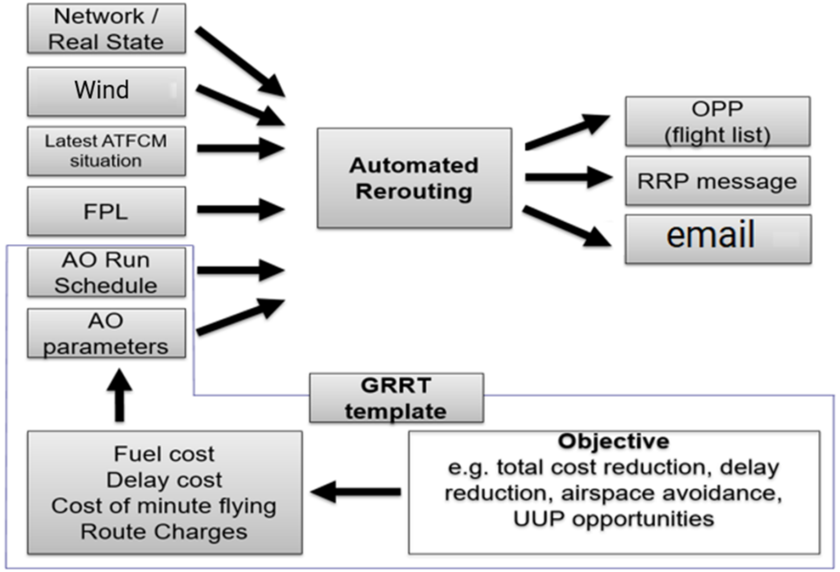
- NM system automated tool is used to enhance the visibility on possible routing options offered by network and is available to all AOs.

- Automatically calculates rerouting options based on **AO's preferred parameters**, latest real state of network (route availability, ASM and ATFM component) and weather.
  - Proposals are displayed back on the FPL originator

- Last choice of using it remains to the FPL originator.



More than 70 customised GRRT templates



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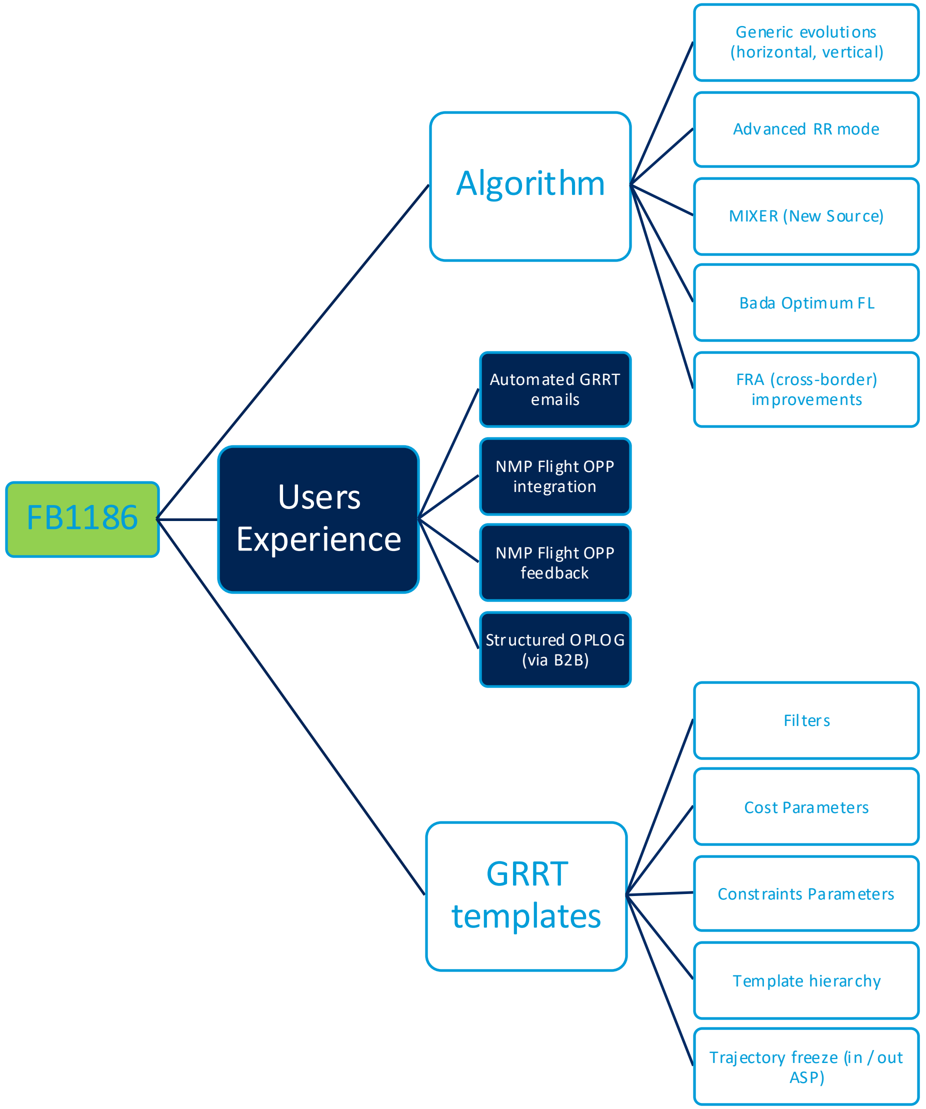
HERON Rerouting Tools improvements

Objective:

- To improve the NM rerouting tools algorithm, to provide additional information to users to better assess available routes and allow the distribution of enhanced information about the opportunities for AOs after each run of the group rerouting tool (GRRT) by the NM system.

- An additional objective: enhance NM B2B access to NM rerouting tools results.



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Flight Efficiency use case: 27.0 vs 26.0

- Use case: GRRT try to improve by at least 10 NM the 29778 flights of 9 August 2022
  - +mix : activates the mixer source
  - +exp : activates the expensive CPG path generator search and the expensive mixer (more time and CPU)

	26.0	27.0	27.0+exp	27.0+mix	27.0+mix+exp
Interesting	2276	2607	2831	3235	3522
Diff Mileage	-75243	-83295	-92909	-106003	-116713
		15%	24%	42%	55%
vs NM 26 Baseline					

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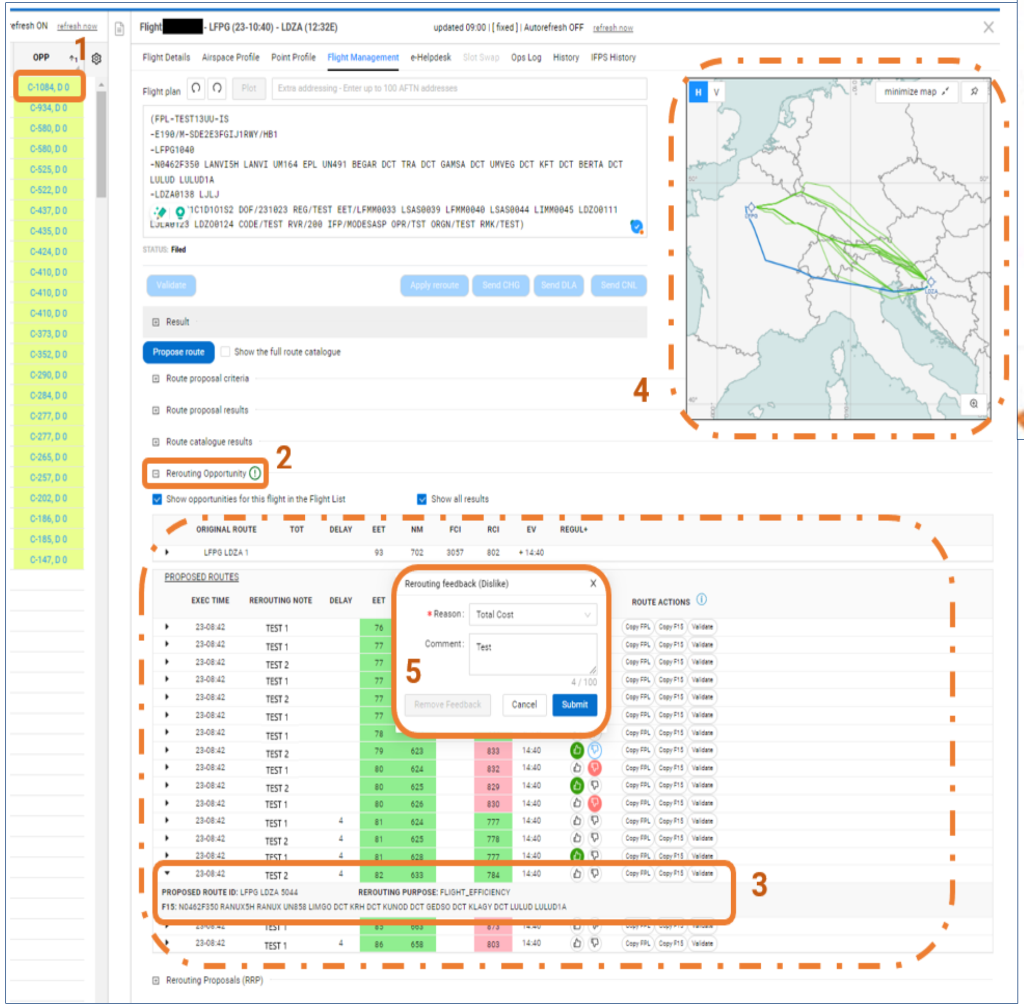
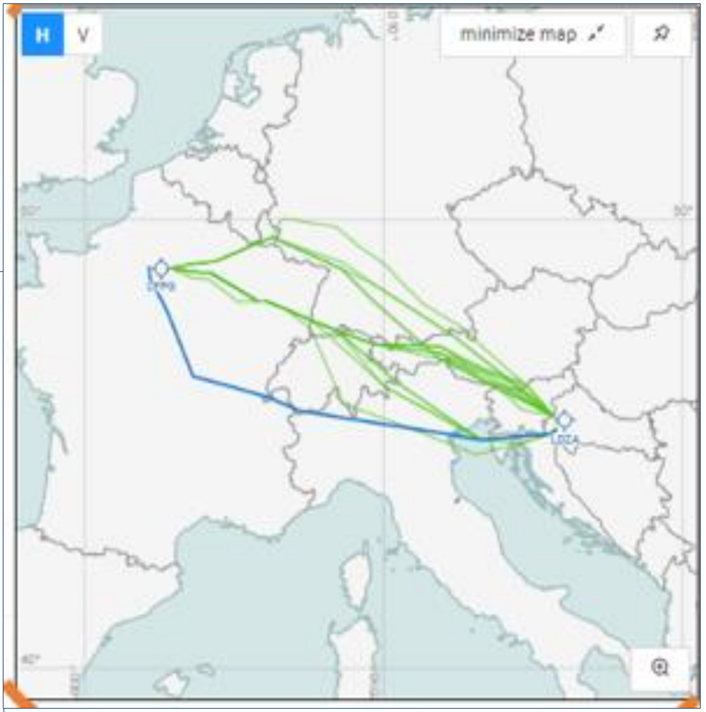
HERON NMP Flight - Opportunities

- 1-2. Identify opportunity
- 3-4. Evaluate
- 5. Provide feedback

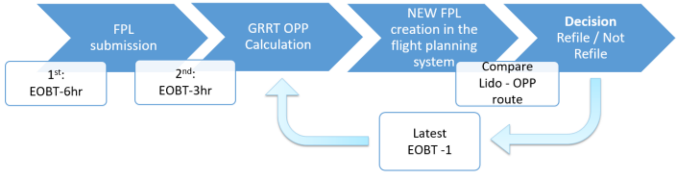




- Blue - filed flight plan
- *Green - rerouting opportunities*

It is the Airspace Users responsibility to determine the operational acceptability of the routes before use.

- **Direct effect** - same alternative will not be proposed again for the same flight



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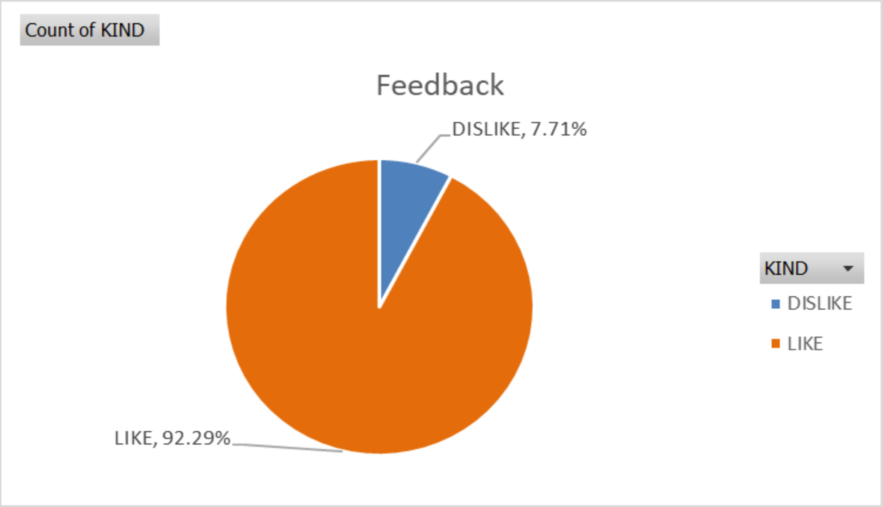
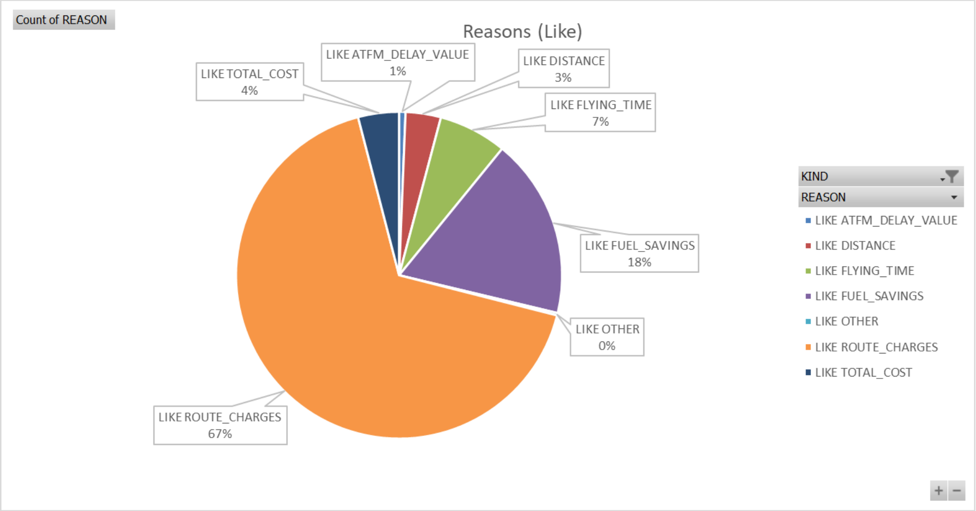
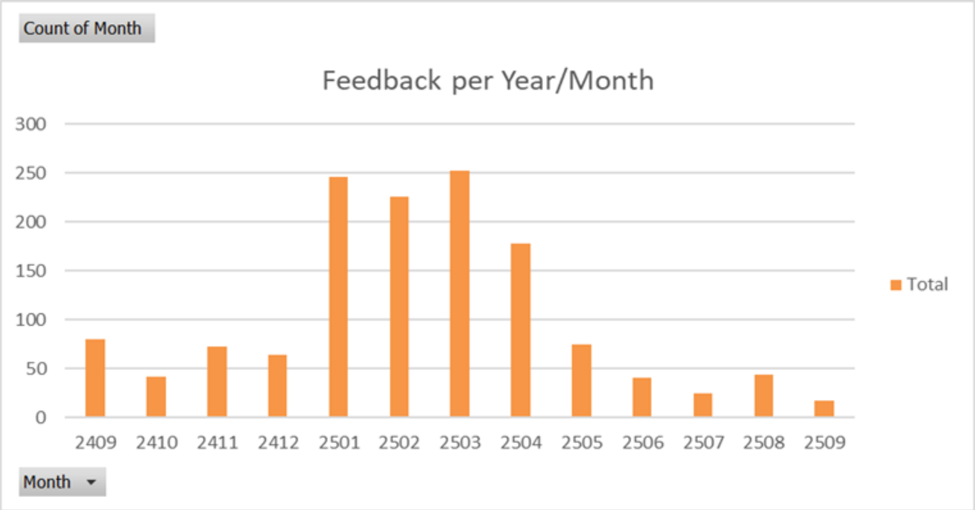
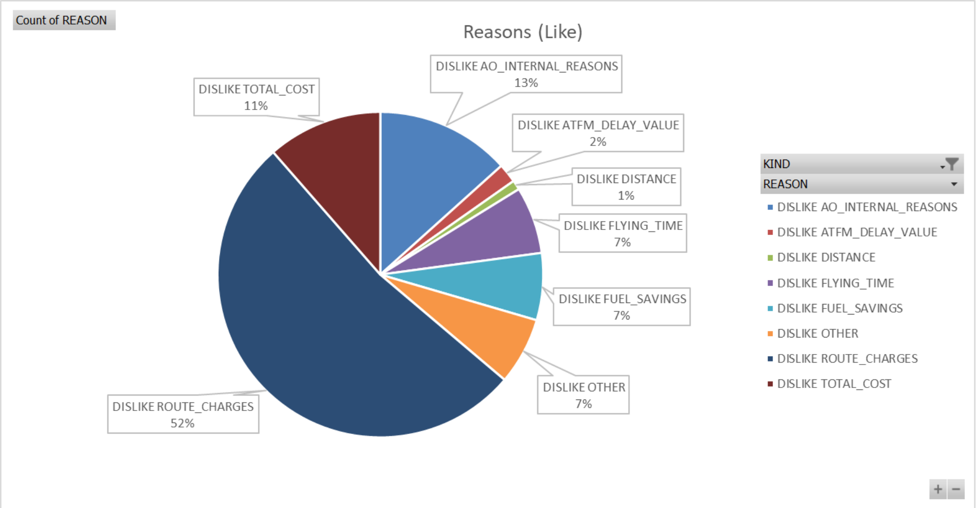
GRRT Feedback EZY / EJU / EZS (SEP 2024-OCT 2025)





4 Feedbacks / day
8 Feedbacks / day - peak (Jan - APR 2025)





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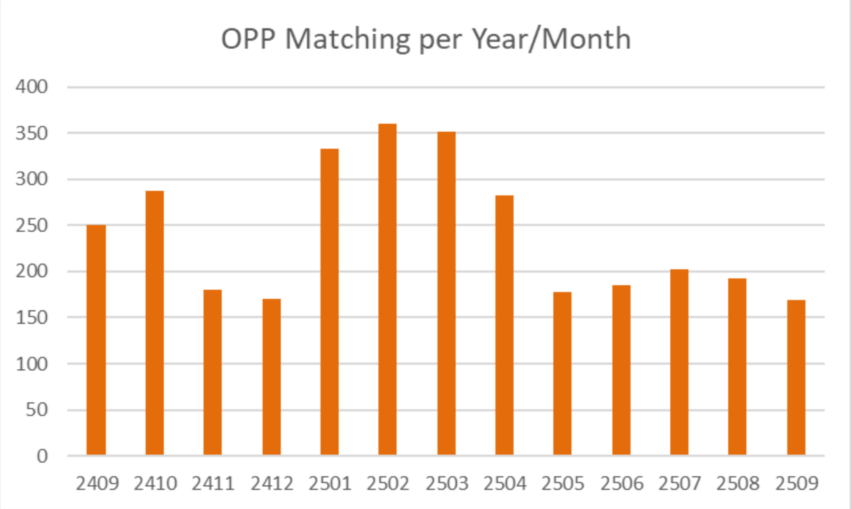
GRRT OPP Matching EZY / EJU / EZS (SEP 2024-OCT 2025)



Emission type	Factor (kg/kg fuel)	Total (kg)	Total (tonnes)
CO_2	3.15	**2,875,316.85**	2,875.32
H_2O	1.237	**1,129,132.36**	1,129.13
SOx (440 ppm)	0.00084	**766.75**	0.77
SOx (600 ppm)	0.000114	**104.06**	0.10
NOx	0.0148	**13,509.43**	13.51
HC	0.00032	**292.10**	0.29
CO	0.00325	**2,966.60**	2.97
PM volatile	0.000092	**84.98**	0.085

8 Matching / day
11 Matching / day - peak (Jan - APR 2025)

**Automated estimates of matching by NM system, conservative values*

Average of fuel saving (kg)	-297
Average of RTE Charges savings (eur)	-82
Average of Distance savings (NM)	-57

Total of fuel saving (kg)	-912799
Total of RTE Charges savings (eur)	-250879
Total of Distance savings (NM)	-176430

2900 tonnes CO_2 saved

*EUROCONTROL Standard Inputs for Economic Analysis (Edition 10 - Chapter 7)

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THANK YOU FOR YOUR ATTENTION

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HERON Project

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