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AEON

# Advanced Engine-Off Navigation

EUROPEAN PARTNERSHIP

Co-funded by
the European Union

# AEON

**Website : https://www.aeon-project.eu/**

This project has received funding from the SESAR Joint Undertaking (JU) under grant agreement No. 892869.

# Advanced Engine Off Navigation

**ER** project funded by the SESAR JU (Nov 20 – Dec 22)

Goal: reducing the environmental impact of ground operations by supporting the use of engine off taxiing techniques

single engine taxiing

autonomous taxiing

non-autonomous taxiing

# Advanced Engine Off Navigation

- Autonomous taxi:
  - Better manoeuvrability
  - Lower dynamic performances.
  - Additional weight on board.

- Non autonomous taxi:
  - More vehicles on ground.
  - Airport based system.

- All:
  - Engine start up management.
  - Collaboration between ground operators.
  - Faster turnaround (no deconnection time)

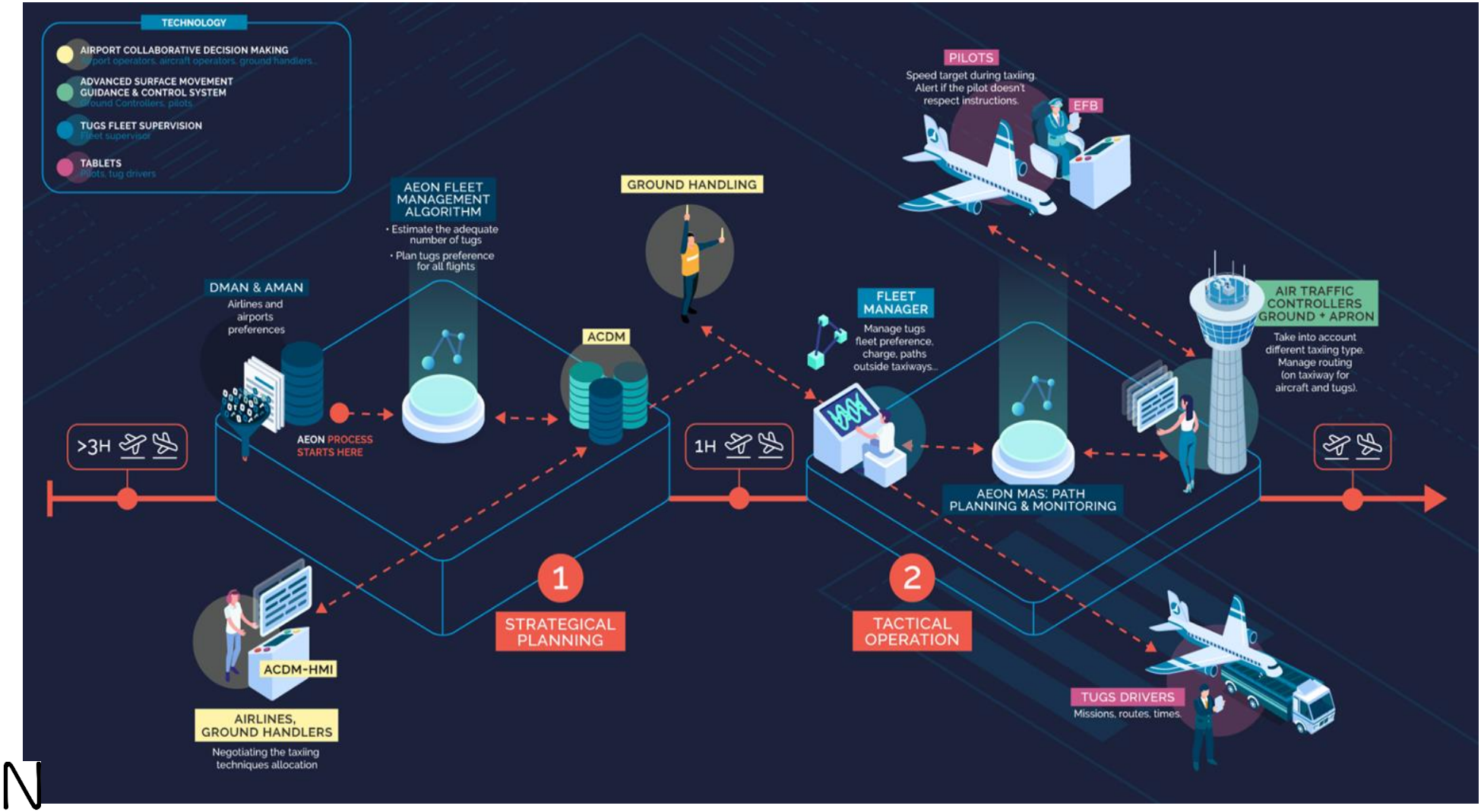
# Approach

Development of **supporting algorithms** to help operators manage the tug fleet.

Creation of **a collaborative tool** to help airline and airport implement the solution.

Introduction of **a new concept of engine-off taxiing operations** for the aviation sector.

# Overall Concept



# Advanced Engine Off Navigation

- A-CDM taxiing technique definition
- A-SMGCS increased situational awareness
- ATM Solution: Management of non-autonomous engine-off taxiing operations by Tug Fleet Manager:
  - ✓ Prepare ATCO work
  - ✓ Communicate with tug drivers / airline operations
- Technological Solution: Ecological routing with speed profiles
  - ✓ ATC side computation
  - ✓ Conflict free routing

# Advanced Engine Off Navigation

Airport simulation:

- Roissy CDG & Amsterdam Schiphol
- Taxiways maps and procedures
- Traffic generation or replay

Working positions:

- Ground ATCO
- Pseudo pilots
- Pseudo tug drivers

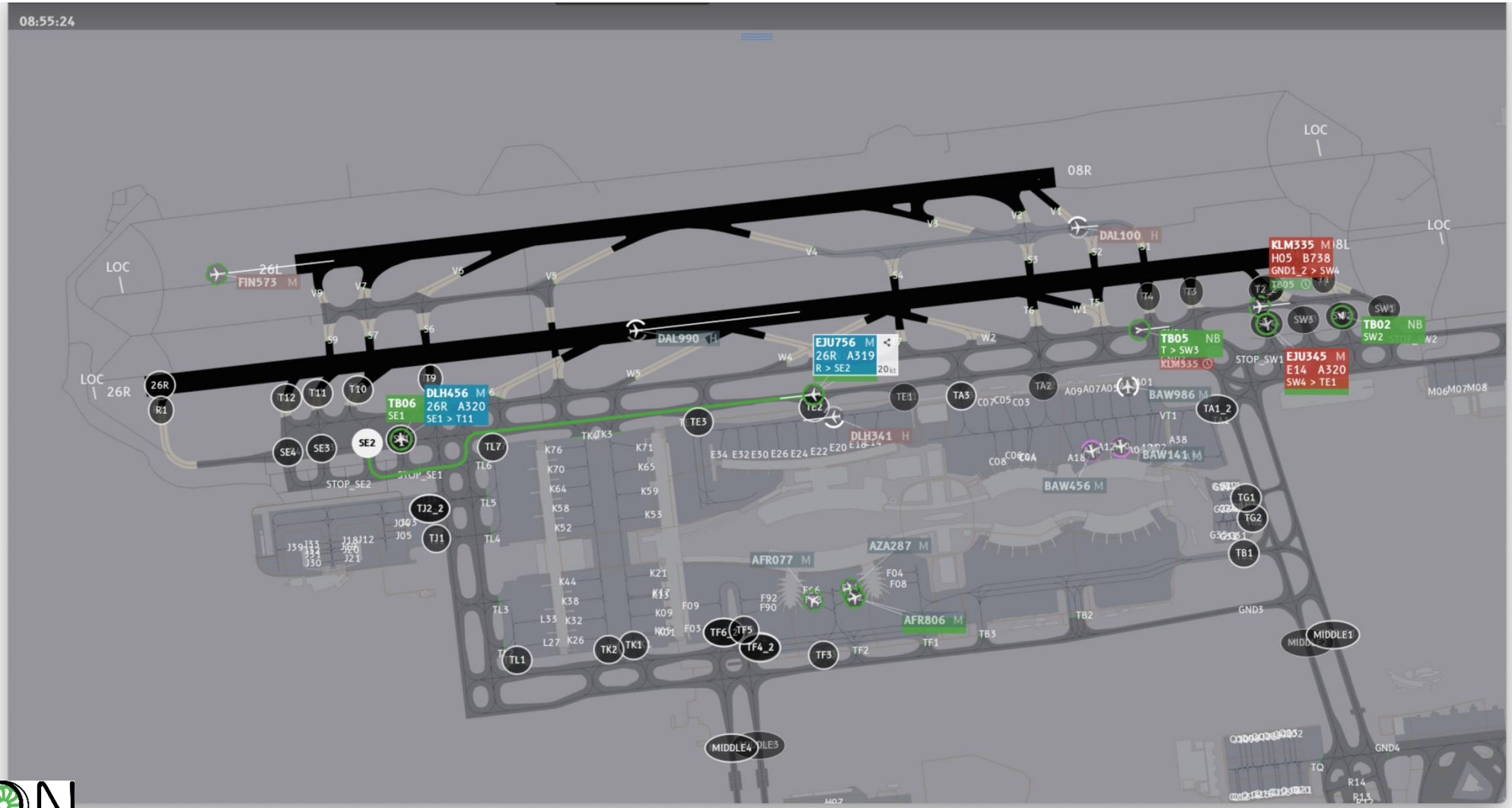
Algorithm modules:

- Tugs allocation to aircraft
- Multi Agent System for routing and speed profiles

# Validation Sessions

- 1 week beginning of July
- 3 pairs of ATCO played alternatively Ground Control and Fleet Manager roles
- 1h representative of average traffic at Roissy CDG
- Each pair played the scenario twice

# A-SMGCS : situationnal awareness



# Fleet Manager Working Position

# Airport Map Generation

- Use of open source data from community
- Internal algorithm to refine the data to feed routing algorithm
- Taxiway slopes computation
- Identification of holding points, runway thresholds…

# A-SMGCS : Traffic rules editor

# Project's results

- Human Performance report
- Safety report
- Cost Benefits Analysis
- Concept of Operations

**https://www.aeon-project.eu/**

# AEON : impacts on A-SMGCS

- Surveillance Service
  - Additional tugs to be equipped with transponders
  - Tugs and Towed aircraft to be displayed on radar image
  - Additional tugs on radio frequency
  - Additional ‘flight plan’ data with the taxiing technique
  - A-SMGCS data may be used for external services such as Tug Fleet Manager working position
  - New statistics on ecological taxiing indicator

# AEON : impacts on A-SMGCS

- Airport Safety Support Service
  - Tugs on taxiway are more maneuvrable, impact on the conflicts detection system
  - Differences in aircraft dynamics may impact CMAC alerting system

# AEON : impacts on A-SMGCS

- Routing Service

  - Routing dependent on taxi technique
  - New speed profiles computation
  - Taxi time computation dependent on taxi technique

# AEON : impacts on A-SMGCS

- Guidance Service

  - Additional vehicles to guide
  - Additional data to transfer to vehicles (speed profiles)
  - Extended use of datalink for non critical clearances (frequency transfer…)

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# THANK YOU FOR YOUR ATTENTION!

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