sesar
JOINT UNDERTAKING

# CREATE

## CREATE - INNOVATIVE OPERATIONS AND CLIMATE AND WEATHER MODELS TO IMPROVE ATM RESILIENCE AND REDUCE IMPACT


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- Project Manager


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EUROPEAN PARTNERSHIP

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# Partnership

1. UNIPARTH, Università degli Studi Napoli «Parthenope»
2. ARIANET srl
3. CIRA - Italian Aerospace Research Center
4. FMI - Finnish Meteorological Institute
5. ISSNOVA, Institute for Sustainable Society and Innovation
6. NLR - Netherlands Aerospace Center
7. UPC - Universitat Politecnica de Catalunya

# WHAT

CREATE is a project aligned with the research topic “Environment & Meteorology for ATM”, which is part of the research area “ATM Excellent Science & Outreach” of the SESAR 2020 Exploratory Research programme (call H2020-SESAR-2019-2).

**Integrate new meteorological and air quality products into ATM**

- CREATE explores the capabilities of high-resolution CTMs (Chemical-Transport Models) for air quality assessment studies to test the advantages in terms of environmental impact in TMAs (Terminal Manoeuvring Areas), and on the regional and global scales to study the impact of aviation emissions onto the global chemistry.
- CREATE explores the capabilities of CTMs for air quality assessment studies.
- CREATE explores the capabilities of short-range, high-resolution weather prediction models

# WHAT

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**Investigate operational changes to ATM aiming at reducing the environmental impact from aviation**

- CREATE proposes new ATM concepts, taking advantage of curved approach/depart RNP procedures and advanced 4D trajectory optimisation and replanning algorithms
- The 4D trajectory optimisation and replanning concept proposed in CREATE is designed as a 4D multi-aircraft optimisation framework

The environmental impact of flight operations is studied for both en-route and TMA phases

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**Enhance ATM efficiency**

- CREATE analyses ATM vulnerabilities with respect to weather, by considering both en-route and TMA phases and the different meteorological phenomenon (heavy winds, thunderstorms, rain, low visibility conditions) and severity levels
- CREATE integrates meteorological information for the improvement of the resilience of the ATM system to local weather and global and/or long-term phenomena

A better management of consequential delays is expected

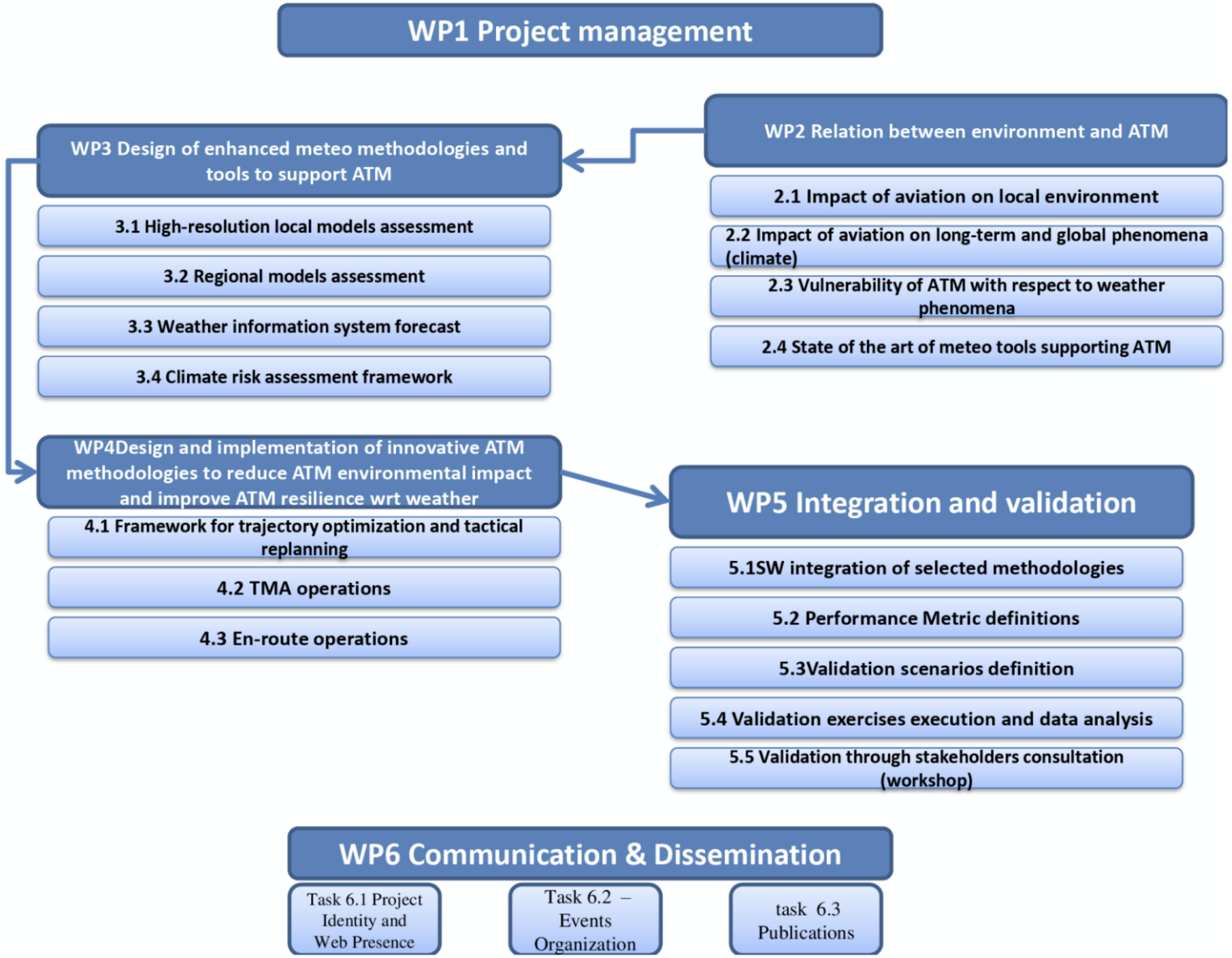
# CREATE proposes three solutions

- CREATE-SOL-1: Multi-scale multi-pollutant air quality system (WAQS)
  - This solution enables the evaluation of the impact that the air traffic regulation policy options can have on the environment and climate, estimating the extent of the environmental impacts that current and future air traffic movements might have
- CREATE-SOL-2: Multi-aircraft environmentally-scored weather-resilient optimized 4D-trajectories
  - This solution aims to support the update and revision process of the reference business trajectory (RBT) in highly disrupted scenarios due to weather hazards or climate-sensitive zones, tackling (near) real-time aspects and the network and safety constraints arising in a multi-aircraft environment
- CREATE-SOL-3: $CO_2$ and non-$CO_2$ balanced Environmental Scores Module
  - The solution points to the “greenness” of aircraft trajectories related to flight and ATC sector environmental performance. Candidate trajectories are evaluated with respect to $CO_2$, $NO_x$ and contrail probability formation

# Workpackages

| Id | Title | WPL's Institution |
|---|---|---|
| WP1 | Project Management | UNIPARTH |
| WP2 | Relation between environment and ATM | CIRA |
| WP3 | Design of enhanced meteo methodologies and tools to support ATM | UNIPARTH |
| WP4 | Design and implementation of innovative ATM methodologies to reduce ATM environmental impact and improve ATM resilience wrt weather | UPC |
| WP5 | Integration and Validation | UNIPARTH |
| WP6 | Communication and Dissemination | UNIPARTH |

# WBS


WP1 Project management
WP2 Relation between environment and ATM
2.1 Impact of aviation on local environment
2.2 Impact of aviation on long-term and global phenomena (climate)
2.3 Vulnerability of ATM with respect to weather phenomena
2.4 State of the art of meteo tools supporting ATM
WP3 Design of enhanced meteo methodologies and tools to support ATM
3.1 High-resolution local models assessment
3.2 Regional models assessment
3.3 Weather information system forecast
3.4 Climate risk assessment framework
WP4Design and implementation of innovative ATM methodologies to reduce ATM environmental impact and improve ATM resilience wrt weather
4.1 Framework for trajectory optimization and tactical replanning
4.2 TMA operations
4.3 En-route operations
WP5 Integration and validation
5.1SW integration of selected methodologies
5.2 Performance Metric definitions
5.3Validation scenarios definition
5.4 Validation exercises execution and data analysis
5.5 Validation through stakeholders consultation (workshop)
WP6 Communication & Dissemination
Task 6.1 Project Identity and Web Presence
Task 6.2 – Events Organization
task 6.3 Publications

# Technical deliverables

| WP | Deliverables | Lead Beneficiary | Date of first submission/ final acceptance |
|---|---|---|---|
| WP2 | D2.1 Aviation impact on local environment term and global phenomena | ARIANET | April 9, 2021/ July 14, 2021 |
| | D2.2 Analysis of vulnerability of ATM to weather phenomena | CIRA | May 15, 2021/ July 26, 2021 |
| WP3 | D3.1 Local and regional models integrated with weather and climate information | UNIPARTH | July 9, 2021/ October 25, 2021 |

# Technical deliverables

| WP | Deliverables | Lead Beneficiary | Date of first submission/ final acceptance |
|---|---|---|---|
| WP4 | D4.1 Integrated methodology for ATM procedure design reducing TMA and en-route operations impacts | UPC | September 27, 2021/ October 28, 2021 |
| | | | |
| WP5 | D5.1 Software design for validation scenarios execution | UNIPARTH | April 21, 2022/ May 20, 2022 |
| | D5.2 Procedures validation identifying potential benefits and risks and stakeholder's implementation suggestions | UNIPARTH | August 5, 2022/ ---- |
| | D5.3 Final Project Results | UNIPARTH | September 5, 2021/ ---- |

# Milestones

| # | Title | Date of achievement |
|---|---|---|
| MS1 | Kick-off meeting | July 1, 2020 |
| MS2 | Methodologies supporting ATM ready for design | July 26, 2021 |
| MS3 | CREATE ATM procedure ready for implementation | October 9, 2021 |
| MS4 | Intermediate CREATE results | October 9, 2021 |
| MS5 | AB recommendations | March 7, 2022 |
| MS6 | Stakeholders workshop | July 19, 2022 |
| MS7 | CREATE final project results | September 3, 2022 |