Given the increased mobility demand of goods and people, air transportation has become a major tool for economic and social development. Due to this context, travellers are placing greater emphasis on airfare, on respect for the environment and more direct point-to-point connections.

Future aircraft programs require the development of new aeronautical technologies and solutions for helicopters and tiltrotors in order to reduce the environmental impact, in terms of noise footprint, gaseous emissions and fuel consumption. In particular, the use of tiltrotors in the context of civil aviation is considered as a major change in the current air traffic operational environment.

The partly EU-funded OPTIMAL project was aimed at developing some innovative procedures for aircraft/rotorcraft approach and landing phases.

More recently, the NICETRIP project has allowed a first assessment of the impact of the introduction of the civil tilt rotor ERICA into the existing Air Traffic Management environment. Approach procedures were defined for the tiltrotors in terms of Point-in-Space (PinS approach) or the Final Approach and Take off area (FATO approach), as well as departures. The procedures were developed using advanced Navigation systems such as GBAS and SBAS, which were designed with proper Required Navigational Performance.

The main goal of the TRAVEL project is to define novel low noise tilt rotor procedures for the approach/landing and take off and assess the impact of tilt rotor on ATC operations.

The target time frame for the operational implementation of TRAVEL proposed procedures is 2020 and beyond, consequently it is expected that TRAVEL will pave the way in conjunction with SESAR programme, towards a significant evolution of the environment friendly operational procedures.

The work is break down into 5 Work Packages:
- Definition of the operational environment and the concept of operations for the use of a tiltrotor in an integrated ATC/tiltrotor environment.
- On the basis of the simulation requirements, the validation plan will be developed and the technical requirements of the integrated ATC/TR platform will be defined
- Specific tiltrotor procedures will be developed on the basis of the identified scenarios and concept of operation.
- Preparation of the distributed platform (ATC, Tiltrotor and connections) from both the operational and technical perspective.
- Execution of the validation exercises and the analysis of the results.

Two target scenarios in which the tilt-rotor will be mixed with fixed-wing aircraft traffic in a controlled airspace are considered:
- the first one will consider a major European airport (e.g. Milan Malpensa Approach Tower);
- the second one will consider an elevated Helipad (e.g. private helipad) with the tiltrotor that will enter in a controlled airspace.

These various scenarios will be validated through real time simulations using full scale simulation platform composed of tiltrotor (provided by the manufacturer) and ATC simulator remotely connected through an internet connection.

The following picture provides an overview of the validation platform.

This platform will be used in the context of SESAR validation activities to assess new concepts in pre-operational conditions (V2 and V3 according to the E-OCVM validation methodology).
Tiltrotor Flight Procedures will be designed, within WP3, with the support of FPDAM (Flight Procedure Design and Airspace Management) tool. FPDAM tool is fully compliant with ICAO design specifications. Specifically, such a compliancy is assured for each phase of the procedure design, including all relevant aspects (e.g. protection areas, obstacles separation).

The FPDAM tool automates aeronautical functions and supports the user in graphic development of Instrument Flight Procedures with visualization of 2-D and 3-D protection areas superimposed onto the aeronautical charts.

The design of this innovative flight procedure will be mainly based on ICAO PANS-OPS existing criteria for GNSS approach. However, subject to local constraints and taking into account navigation performance capability and needs of tilt rotor, additional design ad-hoc criteria will be applied during design activities. Moreover, the new procedures should comply with the SESAR scenario and with current and future navigational requirements operating for example with a GNSS augmented with SBAS.

**Expected results**

*a) Timeline & main milestones*

MS1: Month 1, TRAVEL KoM

MS2: Month 3, ATC/TR scenario simulation requirements

MS3: Month 12, Hardware, software and communication requirements

MS4: Month 15, Low noise tiltrotor specific IFR procedures

MS5: Month 21, ATC/TR simulation: first experiment and shakedown

MS6: Month 27, ATC/TR simulation: conventional vs low noise procedures

MS7: Month 33, ATC/TR simulation: nacelle tilt

MS8: Month 39, Final report

**b) Environmental benefits**

TRAVEL contributes to the objective to define and validate, using an integrated TiltRotor-ATM simulation platform, new ATC procedures reducing environmental impact in terms of noise and gas emissions.

**c) Maturity of works performed**

Cleansky-Green Rotor Craft sub-project 5 is aimed at developing and testing new flight procedures for both helicopters and tiltrotors, aiming at significantly reduce noise and gas emissions. This proposal contributes to the validation of technologies best fitting the pollution and noise reduction goals set for the tiltrotor that will enter the market in the 2020s.
### Project Summary

**Acronym:** TRAVEL  
**Name of proposal:** Tilt Rotor ATM integrated Validation of Environmental Low noise procedures  
**Technical domain:** Rotorcraft Flight Path - Air Traffic Management  
**Involved ITD** Green Rotorcraft  
**Grant Agreement:** 296648  
**Instrument:** Clean Sky  
**Total Cost:** 796 400€  
**Clean Sky contribution:** 573 640€  
**Call:** SP1-JTI-CS-2011-01  
**Starting date:** February 2012  
**Ending date:** May 2015  
**Duration:** 39 months  
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