Enhanced Runway Throughput with Wind/Wake vortex sensors

Amsterdam 23/04/2015
SESAR P12.2.2 : Runway Wake Vortex Detection, Prediction and Decision Support Tools

- D4 report « Recommendations on sensor technologies » (based on XP trials at CDG)
  - Some available wind sensor technologies performances are not compliant for operational use by « wake-vortex predictor »
    - SODAR & UHF Wind Profiler: too slow update rate (10 mn), only local vertical profile
    - Lidar Wind Profiler: non operational in rainy conditions, only local vertical profile
  - New need in all weather conditions for operational 3D wind monitoring capability:
    - in rainy weather with Electronic Scanning X-band Radar
    - in clear air with 1.5 micron High-Power LIDAR

SESAR P15.4.9a : Weather sensing technologies specifications

- D1 report «Study on up-to-date technologies / recommendations »
  - Same recommendations than P12.2.2 D4 Report

WAKENET-3 Europe

  - Research Needs for E-scanning X-band Radar and High Power Lidar Sensors Technologies
UFO: Ultra Fast wind sensors for wake-vortex hazards mitigation

- Contrat: Grant Agreement 3142237 (ACP2-GA-2012-314237-UFO)
- Official EC letter signed 04/07/2012
- Customer: European Commission
- FP7 Call 5 Collaborative Project
  - Identification: FP7-AAT-2012-RTD-1
  - AREA: Area 7.1.3.3. Aircraft safety
  - Sub-topic Area: AAT-2012.3.3-2 Systems & Equipments
- Global Budget: 6276,563 k€ (EC funding: 4463,215 k€)
- Duration: 36 months

T0 = 01/11/2012
Industries

- TR6 : Thales Air Systems (FR)
- TSA : Thales Systèmes Aéroportés (FR)

SME

- LEO : Leosphere SME (FR)

Weather Meteorological Offices

- KNMI : Royal Netherlands Meteorological Institute (NL)
- DWD : Deutscher Wetterdienst Abteilung Flugmeteorologie (GE)

European Aeronautic Research Laboratories

- DLR : Deutsches Zentrum fuer Luft und Raumfahrt (GE)
- NLR : Air Transport Safety Institute (NL)
- ONERA : Office National d’Etudes et Recherches Aérospatiales (FR)

European Academic Laboratories

- TUBS : Technische Universitaet Braunschweig (GE)
- UCL : Université catholique de Louvain (B)
- TUD : Delft University of Technology (NL)
- UPMC : Université Paris 6 Pierre et Marie Curie, labo LATMOS (Institut Simon Laplace) (FR)

Associated Partner for coordination with SESAR and EUROCONTROL

- ERC : EUROCONTROL (Dennis Hart for WP11.2, Robert Graham for P6.8.1) (EU)
- FM : Munich Airport (Flughafen München) (GE)
- MF : Meteo France (FR)
- (ISL : Institut Saint-Louis (Prof. Cheinet) (FR& GE)) – Proposition to be integrated as associated partner
- (DGAC/STAC (FR)) – Proposition to be integrated as associated partner
Complementarities with SESAR P12.2.2 & P15.4.9

- Meteo Centre
- SESAR P15.4.9c
- SESAR P12.2.2
- FP7 Call 5 UFO

External Weather Observations
- Weather Hazards & Wake Vortex Decision Support System
  - Ultrafast Local Meteorological Sensors
  - Upgraded ADS-B Downlink of Wind & EDR Data
  - Upgraded Wind & EDR Weather Channel of PSR Radar
  - 3D High Power Fast Update LiDAR Scanner
  - Weather X-band Fast update E-scan Radar

- Dynamic Multifunction Sensor Resources Management
  - Wake-Vortex Radar
  - Wake-Vortex Lidar
  - Wake Vortex Sensors
  - Wake Plots Tracking

- EDR Data Fusion
- Wind Data Fusion

- Local Weather Data Cube

- Advisory System
  - Ground Weather Monitoring System
  - Wake Vortex Advisory System
  - Weather Hazards Advisory System
  - Separation Mode Planner
  - Wake Vortex Predictor
  - Wake-Vortex Monitoring & Alerting

- Wake-Vortex Monitoring & Alerting

- Aircraft Characteristics + 4D trajectory

- Thales Air Systems

UFO study
Enhanced Runway Throughput with UFO sensors

- **Wind**
  - Accurate measurement and short term forecast of the headwind is mandatory for Time Based Separation
  - Accurate measurement and short term forecast of the crosswind for Weather Dependant Separation
  - Wind shears and micro burst measurements are required for safety.

- **EDR**
  - The EDR has a strong impact on the wake vortex decay which is the key parameter to setup Time Based Separation

- **Rain rate**
  - The rain rate measurement and short term forecast will allow a better runway condition awareness for optimizing the Runway Occupancy Time

Thanks to UFO developments, improved Lidar & an X Band radar have demonstrated to reach the required performances to enhance the runway throughput
Thanks!!