Business Aviation
The ATM Challenges in Europe

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SESAR, Lessons Learnt

- **POSITIVE ASPECTS**
  - A real opportunity for all stakeholders to work together
  - Development of a common "Concept of Operations" for the future ATM
  - Decisions conditioned by the "Cost Benefit Assessment"

- **REMAINING CONCERNS**
  - Part of the ConOps relative to GA, HA & BusAv is limited (due to lack of time)
    - There is a need to cover "operations in TMAs of local airports and GA operation safety
  - SESAR technology recommendations are not covering all GA & HA needs
    - There is a need for "low cost, low power, integrated CNS solutions"
  - Deployment cost of the future ATM remains a concern
    - There is a need for public funding, "ATC charges" will not cover all deployment costs
    - This funding must cover in priority the needs of the users which have no revenues (GA)

The CNS Developments

- **NAVIGATION**
  - Satellite Based Augmentation System (EGNOS in Europe, WAAS in USA)
    - Pseudo ILS (LOC+GS) approaches on any runway (DH/DA down to 200ft)
    - In the US, 30 000 GA aircraft equipped and more than 1000 approaches published
  - GNSS Developments
    - Galileo and GPS III (2012/2015) Better availability, accuracy, integrity and continuity of service
    - GPS + Galileo might be recognized as sole means of navigation" for light aviation
    - A Back up system will probably be required for Business Aviation and Air Transport
      - Potential candidates have to be evaluated (eLoran, DME…), selection must be coordinated with users.
  - A clear "Decommissioning plan" of obsolete Navigation systems has to be established

- **SURVEILLANCE**
  - There is a need for a new Concept of Safety
    - Safety no longer only based on "see & avoid" but on technology
    - Each flying object must report its position and has access to position of other aircraft
  - ADS-B
    - There is a need for a solution adapted to local airport TMA and GA/BusAv use
    - UAT which provides ADS-B in & out, FIS & TIS seems the solution (Recommended by the FAA)

The Technologies

- **COMMUNICATION**
  - Extension of VHF 8,33 kHz in the lower airspace
    - Remains an open question. No real Cost Benefit Assessment for GA.
  - Data-Link
    - VDL2 considered for large aircraft, however it might not be the most efficient means for all GA aircraft
    - For GA UAT has to be considered (more cost effective), VDL4 is also a possibility
  - WIFI and WIMAX
    - Access means to SWIM

- **TECHNOLOGY SELECTION & DEPLOIEMENT**
  - Based on a plan accepted by all stakeholders
  - Cross needs, CNS integration & safety issues have to be considered
    - If UAT provides DL, no need of VDL2 on light aircraft
    - "Separation" and "collision avoidance" means selection depend of the safety objective requirements
      - Common points : Baro-altitude and communication means (1090ES & TCAS)

Benefits for Business Aviation

- **IN TERM OF SAFETY**
  - Minimization of collision risk in local airport TMAs
    - Management of airspace : Virtual tower, Dynamic management of approach & T.O paths airspace
    - ASAS : To allow pilot to maintain separation and avoid collision (ADS-B, TIS-B, TCAS)
  - In low aircraft density airspace (above FL410, Desert areas, Africa)
    - Development of "cooperative self separation" ASAS mode (Separation delegated by ATC to pilot)
  - Elimination of all non NPA (Non Precision Approaches)

- **IN TERM OF ECOLOGY**
  - Climbing cruise operations & real CDA (in SBAS mode) to eliminate all level offs
  - Development of SBAS Steep & Curved app. to minimize noise nuisance to airport residents

- **IN TERM OF OPERATIONS**
  - Optimization of the complete flight from take off to landing (Business Trajectory)
  - Possibility to operate on free routes in "climbing cruise" in a unique sector all over Europe
  - Possibility to perform "3D pseudo ILS" approaches down to 200 ft on any runway (SBAS)
    - Possibility to operate in CAT2/3 conditions down to 100/50 ft for HUD/EVS aircraft equipped

Falcon "EASy" Cockpit


Falcon 7X “EASy”

Benefits for Light Aviation

- **IN TERM OF SAFETY**
  - Separation based on technology (ADS-B) and no longer on "see & avoid"
    - Will request "ADS-B in & out" in one link as UAT (or VDL4)
  - Access to information in real time as "weather graphic maps" or information on airspace
    - Will request FIS-B (FIS-B will be provided in the US on UAT and only on UAT)
- **IN TERM OF OPERATIONS**
  - Possibility to perform precision approaches on any runway (SBAS LPV)
  - Perfect knowledge of the situation (traffic, weather, aeronautical information, ATC)
- **IN TERM OF COST SAVING**
  - GNSS as sole means of Navigation
  - UAT as surveillance means (ADS-B in & out) and communication means (DL)

Cessna Skyhawk Cockpit “Garmin 1000”

Helicopter Robinson R44 Cockpit

The Future ATM

- **SESAR-JU**

  SESAR definition phase is finished, the ATM Master Plan has been published

  Now SESAR-JU with a budget of ~2,1 B€ will put in place the R&D programs

- **SESAR-JU CONCERNS**

  SESAR was "User Driven" , it will no longer be the case for the SESAR-JU

  How to be sure that needs & requirements of GA / BusAv will be considered ?

  GA / BusAv need the help and support of Eurocontrol

- **ATM DEPLOYMENT**

  To minimize costs, common solution on both sides of the Atlantic is a must

  ATM deployment will request public funding to support the :
  - specific ground infrastructure
  - aircraft avionics