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Agenda Item 5: Efficient flight paths – through trajectory-based operations
5.1: Improved operations through enhanced airspace organization and routing

SESAR DEMONSTRATION ACTIVITIES (INCLUDING AIRE) IN COOPERATION WITH THE UNITED STATES AND LINKAGE WITH ASBU IMPLEMENTATION

(Presented by the Presidency of the European Union on behalf of the European Union and its Member States[1]; by the other Member States of the European Civil Aviation Conference[2]; and by the Member States of EUROCONTROL)

SUMMARY

This paper presents past as well as further planned demonstration activities that took place in Europe, the North Atlantic and the United States.

Action: The Conference is invited to agree to the recommendation in paragraph 6.

1. INTRODUCTION – A SUCCESS STORY

1.1 The joint EU/US initiative AIRE (Atlantic Interoperability Initiative to Reduce Emissions) started in 2007 as a programme designed to reduce emissions through the implementation of joint demonstration projects and exchange of best practices. The initiative aims to improve energy efficiency, reduce noise and enhance ATM interoperability through the acceleration of the development and implementation of environmentally improved procedures covering all phases of flight and their validation with trials and demonstrations. Participants to-date already include a large number of ANSPs, airports, airlines and manufacturers from Europe, Canada, the United States, and Africa (Morocco).

1.2 The initiative accounts so far more than 10 000 flight trials that took place in real life operations with 24 projects co-financed by the SESAR Joint Undertaking (SJU). In 2009 approximately 1,150 demonstration trials for 'green' surface, terminal and oceanic procedures took place in five locations, involving 18 partners. Additionally, two full 'green' gate-to-gate flights, from Paris Charles de Gaulle (CDG) to Miami, took place in April 2010. During 2010 and 2011 the SJU co-financed a further 9416 trials in 20 more locations involving 40 consortia partners and additional 40 operators.

[1] Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. All these 27 States are also Members of ECAC.

[2] Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Iceland, Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1.3 Trials took place in a number of airports, approach and en-route centres in Europe and the United States as well as in most of the North Atlantic main FIRs (Gander Oceanic; Shanwick AOC; Santa Maria ACC; New York Oceanic; Piarco FIR, Reykjavik FIR). Results are available to the public with several brochures and media material available in a dedicated public Internet page containing also the technical reports: www.sesarju.eu/aire.

2. TECHNICAL AREAS (PAST AND CURRENT)

2.1 Specific trials have been carried for the following improvement areas/solutions as part of the AIRE initiative:

a) use of GDL/DMAN systems (pre departure sequencing system/departure manager) in Amsterdam, Paris and Zurich;

b) issue of target-off block time (TOBT), calculation of variable taxi out time and issue of target-start-up arrival time (TSAT) in Vienna;

c) continuous descent operations (CDOs or CDAs) in Amsterdam, Brussels, Cologne, Madrid, New York, Paris, Gothenburg, Prague, Pointe a Pitre, Toulouse, and Zurich;

d) use of required navigation performance authorization-required (RNP AR) techniques in Sweden;

e) calculation of estimated times of arrival (ETA) allowing time based operations in Amsterdam;

f) precision area navigation - global navigation satellite system (PRNAV GNSS) approaches in Sweden;

g) lateral and vertical flight profile changes in the NAT taking benefit of the implementation of automatic dependent surveillance-broadcast (ADS-B) surveillance in the North Atlantic; and

h) free routing in Lisbon and Casablanca.

2.2 New trials are planned in 2012-2014 and cover:

a) validation of RNP procedures to allow CDO in Riga and La Palma;

b) CDO in Budapest and Palma de Majorca airports;

c) global information sharing and exchange of actual position and updated meteorological data between the ATM system and airline AOCs for the vertical and lateral optimisation of oceanic flights using a new interface;

d) progressive step climb or continuous altitude change in the North Atlantic OTS to build into the safety case;

e) use of free routes in the EURO-SAM corridor, France and Italy;

f) a full gate to gate operation between Europe and the US with the benefit of FANS/1/A ADS-C and CPDLC capability combined with the benefits of PBN and RNP4 capabilities and User preferred routes (UPR) supported by dynamic air route planning (DARP);

g) initial 4D and controlled time of arrival (CTA), dynamic capacity balancing, enhanced ATFM measures, AOP and NOP in the FABEC airspace block;

h) A-CDM and DMAN at CDG;

i) integrated FMP/AMAN-DMAN and extended FMP/AMAN horizon, time-based separation, initial 4D and CTA, free routing, system interoperability with air and ground data sharing, airspace management and advanced FUA in Scandinavia and the Baltics;

j) free route over Germany, Belgium, Luxembourg, Netherlands;

k) advanced MET solutions in Belgium;

l) I4D+CTA, communication with CPDLC only, time-based sequencing, SWIM in Italy and the United Kingdom;

m) efficient required navigation performance (RNP) procedures in high density traffic situations, integrated AMAN – DMAN and extended AMAN horizon, I4D+CTA, free routing, system interoperability with air and ground data sharing, surface planning and routing, airspace management and advanced FUA, CDA and CCDs;

n) system interoperability with air and ground data sharing, CDM trajectory negotiation between airspace user (AU) and controller, use of Pan-European network service (PENS) as communication backbone, optimized oceanic trajectories in Santa Maria & New York Oceanic, Portugal, Spain and London FIR; and

o) approach procedures with vertical guidance, optimised RNP aviation including rotorcraft, enhanced situational awareness advanced flexible use of airspace for general and business in Switzerland, Spain, Poland, Slovakia, Bulgaria, Turkey, Morocco.

3. LINKAGE WITH ASBU MODULES

3.1 The activities carried out in the demonstration activities to-date in the specific context of AIRE address mainly Block 0 and 1 related to several modules for KPAs Greener Airports and flight efficiency most of them already completed on the global readiness checklist as for example: B0-05 Efficient flight path improved flexibility and efficiency in descent profiles (CDOs); B0-10 Optimum capacity and flexible flights improved Operations through Enhanced En-Route Trajectories; B0-15 Greener Airports Improved Runway Traffic Flow through sequencing (AMAN/DMAN); B1-105 Optimum capacity and flexible flights better operational Decisions through integrated weather information (planning and near-term service).

3.2 An ICAO initiative and advocacy for demonstrations such as these for the evolution of the ASBU´s and modules would constitute good guidance and model tool for supporting implementation and monitoring the ICAO developments of agreed, timely and efficient ICAO provisions and standards.

4. REGULATORY ASPECTS

4.1 In some states the performing of live trials and demonstrations is legally quite complex and dependent on several local, national, regional and sometimes international (e.g. for international waters) safety

and environmental regulations. This, sometimes insurmountable, bureaucracy results from outdated regulations based on obsolete technologies, adding to the regulator's lack of awareness as the trials are dealt within the same framework as standard procedures. All this can result in delaying, and sometimes the blocking of real life demonstrations and trials from happening.

4.2 Safety is a paramount and should never be compromised. It is known that there is a delay between the availability of state-of-the art technology and the development of regulations, sometimes resulting in an over conservative approach to the deployment of new capabilities. There also exist significant State differences on this matter meaning different abilities to pursue new ideas in different regions. ICAO's technical groups should consider the development of a simpler and lighter process that, manifestly without compromising safety, facilitate the performance of these types of demonstrations.

5. CONCLUSION

5.1 Demonstration projects have proven to be facilitating the achievement of significant safety, environmental, cost-effectiveness and capacity benefits and could serve as best practices and examples for ASBU modules implementation and to feed related technical discussions. ICAO is invited to build and capitalise on the results of these demonstration activities which have been executed and are planned in the context of SESAR in collaboration with NextGen and other regions of the world.

6. RECOMMENDATIONS

6.1 The Conference is invited to:

a) note the collaborative demonstrations provided in this paper and their efficiency in preparing the path towards implementation as well as fostering a common understanding of immediate benefits and costs. The fact that they link directly into the Block 0 modules deployment and the development of ICAO provisions for Block 1 modules gives substantial evidence that these types of demonstrations will complement and facilitate the efforts needed for implementation support as well as for the development of new or adapted ICAO provisions;

b) request that ICAO urgently builds and capitalises on the results of these demonstration activities which have been executed and are planned in the context SESAR in collaboration with NextGen for demonstrating the evolution of the ASBU modules; and

c) recommend that ICAO, as a matter of urgency, develops an adapted regulatory and standardisation framework to facilitate the performance of such live trial demonstrations and validations in consultation with national and regional regulators. Such a framework should take into considerations the use of guidelines for how safety analysis work shall be used in this context.

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