

# **ASAS Thematic Network**

## **Report of the First Workshop 28-30<sup>th</sup> April 2003, Rome**

### **ASAS Operational Improvements - Dream or Reality?**

**Version 1.0, 28<sup>th</sup> June 2003**

## 1. Introduction

The First ASAS Thematic Network (ASAS-TN) Workshop: **ASAS Operational Improvements – Dream or Reality** was held from the 28<sup>th</sup> to 30<sup>th</sup> April 2003 at the Duke Hotel, Rome (Italy).

This workshop is the first of three ASAS –TN Workshops. This workshop was focused on the user community and ASAS operational benefits, as they perceive them. The subsequent workshops will focus on ‘ASAS applications and procedures’ and the ‘Required airborne and ground functions for ASAS’.

The aim of the workshop was to identify and report upon ASAS operational benefits and implementation constraints. This was approached by presentation material and chaired discussion sessions. This event was intended to capture key issues both via the presentations and the subsequent debate sessions.

This report contains a summary of the key issues raised as a result of the presentations and the discussions.

## 2. What is the ASAS-TN?

ASAS-TN is a two-year project that is primarily a communication activity. The ASAS-TN is sponsored by the European Commission (DG Research).

ASAS-TN is a stand-alone project, arising out of the ASAS work within the programme of Co-Operative Actions of R&D In EUROCONTROL (CARE-ASAS). It is organised within the work programme for Competitive and Sustainable Growth of the European Community, Key action 4, New Perspectives in Aeronautics, Target Platform 4, “More Autonomous Aircraft in the Future Air Traffic Management System.

The ASAS-TN Objective:

**The main objective of the ASAS Thematic Network is to accelerate the implementation of ASAS applications in European Airspace taking global applicability in order to increase airspace capacity and safety.**

The work of the ASAS-TN is threefold:

- Three Workshops;
- Web-based documentation and discussion forums; and
- Development of implementation and standardisation strategy.

The ASAS strategy work identifies and produces guidelines regarding the operational and technical standards affected by ASAS applications. It produces guidelines on further activities and ASAS related projects that will be required for ASAS implementation.

The Workshops and discussion forums inform this work.

The outcome of this work, as result of the entire ASAS-TN activities, will be presented at a Seminar in October 2004.

The ASAS-TN is managed by EUROCONTROL and a partnership consisting of BAE SYSTEMS, ENAV, LFV, NLR, Thales ATM and Thales Avionics.

In addition to the above organisations, the ASAS-TN involves a very wide range of organisations (e.g. ATM stakeholders, Universities) including Pilot and Controller professional associations (ATCEUC, IFATCA, IFALPA and VC).

### 3. First ASAS-TN workshop

#### 3.1. Format of the workshop

Day 1 consisted of an introductory session describing the work of the ASAS-TN, the purpose of the Workshop and an Overview of ASAS and Package 1 activities followed by a series of keynote presentations examining the overall ASAS issues from a variety of perspectives.

Day 2 consisted of two themed parallel sessions in the morning, and two in the afternoon. In each of these 4 parallel sessions selected presentations addressed the subject area with a view to raising the key issues. In each session, the presentations were followed by a chaired discussion session of around one-hour.

A summary of the sessions was presented during the plenary session on the last day of the workshop. At the end of this additional discussion time was allowed to further explore issues.

#### 3.2. Day 1 – 28 April 2003

Topic of the day: Set up the scene - What are the expectations of the main players?

##### 3.2.1. Welcome

- **Francesco Podiani on behalf of Roberto Di Carlo**, ENAV
- **Chris North**, European Commission
- **Phil Hogge**, Event Chair

##### 3.2.2. Introduction session

Objectives: To set up the scene – What are ASAS applications? What are the associated projects?

##### **ASAS TN Overview** – Bill Booth (EEC)

- This described an overview of the Whole ASAS-TN Project
- Project composed of:
  - 3 Workshops and a final seminar
  - Web-based discussion forums and ASAS documentation
  - ASAS implementation strategy and roadmap
- The workshops and forums inform the roadmap

##### **Objectives of the workshop** – Eric Hoffman (EEC) as project leader

- Capture expectations and concerns
- The need to get the difficult issues on the table
- Define a roadmap. Where we are, where we want to go and why?
- Too many activities going on. Need to co-ordinate and avoid inefficiencies

##### **Operational applications enabled by ADS-B** – Francis Casaux (EEC)

- Package 1
  - focus on operational applications in core-area Europe
  - Operational air/ground user needs for ADS-B

- Develop operational and technical standards for early ADS-B applications
- Keep it simple, step-by-step, to implementation in 4-5years time
- No change in separation responsibilities, no change in separation standards or system performance requirements
- Beyond this first step.....
- Package 2
  - Airborne self-separation in low density airspace
- Package 3
  - Airborne self separation in high-density airspace

### 3.2.3. Plenary Session.

Objectives: What are the expectations of the main players?

See section A.

## 3.3. Day 2 – 29 April 2003

Topic of the day: The user's expectations and concerns

### 3.3.1. Session 1 (morning – room A): Benefits

Objectives: Benefits and risks (or drawbacks). What are the expectations of the airlines, aircraft operators, ATS providers, airport operators, and transport policy.

See section B.

### 3.3.2. Session 2 (morning – room B): Cost/implications

Objectives: Implications of implementing ASAS applications on ground/ airborne systems, training communication, infrastructure, etc (identify areas impacted) and the 'associated costs'. Global analysis or a set of applications (e.g. package I).

See section C.

### 3.3.3. Session 3 (afternoon – room A): Impact

Objectives: Workload issues. Responsibility issues. Human operators (pilot and controller), ATSP and Aircraft operators, Institutional issues (regulatory bodies). By application categories (difference between airborne spacing and airborne separation).

See section D.

### 3.3.4. Session 4 (afternoon – room B): Inter-operation and Safety

Objectives: How does it change the environment, delays, standards, military, ATC sectors, single sky. Transition aspects. Mix equipage environment. Time scales. Interoperability between various types of operation (e.g. military, GA, Airlines) and between ACCs (e.g. single sky).

See section E.

## 3.4. Day 3 – 30 April 2003

Topic of the day: Workshop wrap-up session

The Chairs of each session gave reports of the presentations and the subsequent discussions. These were followed by further discussions regarding the issues raised during the course of the event.

See section F.

# A. Plenary Session

## 1. Introduction

This report relates to the plenary session on Day 1 of the Workshop, which addressed the expectations of some of the key players. The purpose of this session was the presentation of several high level views of ASAS from key perspectives.

This session was chaired by **Phil Hogge** with **Bill Booth** as the secretary.

The round table experts were:

- **Chris North** (EC DGTREN)
- **Pieter van der Kraan** (EUROCONTROL)
- **Nicolas Zvegintzoff** (IATA)
- **Bo Redeborn** (LFV)

The session was organised so as to feed the discussion among the participants:

- Four briefings presented in the session (20 minutes each presentation):
  - Expectations of the European Commission by Chris North, European Commission
  - Towards Implementation of ASA/GSA Package 1 by Pieter van der Kraan, EUROCONTROL
  - Airlines' Perspective by Nicolas Zvegintzoff, IATA
  - ATS Provider's perspective on ASAS by Bo Redeborn, LFV
- Chaired Discussions
- Wrap-up by Chairman.

## 2. Review of the briefings

### 2.1. Chris North (European Commission)

#### Brief description

The presentation addressed the questions regarding the support of European Community Policies. It also asked the question "How do we speed up ATM development?".

#### Key issues in the presentation

- ⌚ There needs to be a paradigm change to support Single Sky. For us this is ADS-B/ASAS. There is a need to change responsibilities within the ATM system.
- ⌚ Must have a common European approach. There is a requirement for a common European ATM architecture, which the Commission supports
- ⌚ Co-operative ATM. We have many of the basic tools. How do we get implementation more quickly? There is the need to go to live trials.
- ⌚ In safety critical ASAS/ADS-B applications there is a need for a dual-link.
- ⌚ The current economic crisis in the industry is reducing the money for R&D. We need to speed up the change in ATM development and implementation

## 2.2. Pieter van der Kraan (EUROCONTROL)

### Brief description

The presentation outlined the ADS-B implementation programme from 2008 to 2012. Package 1 starts in 2007, with early local implementations during 2003-2007.

### Key issues in the presentation

- Ⓔ The current CBA shows high benefits (up to 2Bn€ from SSR replacement), Enhanced Visual Approaches and Enhanced Sequencing and Merging. (CBA on package 1 ongoing).
- Ⓔ The consensus reached last year in the discussions in the ADS PSG was to use 1090 ES to start with for Package 1 with an open choice for an additional Package 1 link as soon as 1090 ES does not suffice any more.
- Ⓔ CBA plus Validation Activities = Business Case. Fully validated deliverables by 1<sup>st</sup> July 2005.

## 2.3. Nicolas Zvegintzoff (IATA)

### Brief description

The presentation gave the joint IATA/AEA position regarding ASAS Package 1 and beyond. It underlined the need for early and cost-effective implementations, and reported on the financial crisis facing the airline industry.

### Key issues in the presentation

- Ⓔ IATA/AEA joint official position communicated to European Commission and EUROCONTROL on 10/03/2003.
- Ⓔ ADS-B is recognised as a prime enabler for ATM applications. Its cost-effective early introduction is a priority for European ANSPs and airspace users. In order to achieve this Package 1 applications based on 1090 ES is considered to be the most pragmatic start. This approach guarantees interoperability with the USA.
- Ⓔ IATA and AEA will support progress at full speed to go beyond package 1.
- Ⓔ Due to effects of the Gulf war and SARS the airline industry lost US\$ 18 billion in 2001 and US\$ 13 billion in 2002. In today's environment it is vital to come up with the cheapest possible solutions.

## 2.4. Bo Redeborn (LFV)

### Brief description

The presentation gave an ATS provider's point of view of ASAS. It described the challenges and described their involvement in ASAS/ADS-B development.

### Key issues in the presentation

- Ⓔ There is an urgent need to jointly develop and validate new controller tools and new operational concepts (ASAS/ADS-B, CDM, Co-operative ATM, Free-route airspace)
- Ⓔ The pilot and Controller must be at the heart of the development to ensure acceptability
- Ⓔ SCAA supports the early introduction of ASAS applications
- Ⓔ A CNS infrastructure that is capable of supporting all anticipated new applications has a better business case.
- Ⓔ A multi-link ADS-B architecture provides an architecture with redundancy for package 1 and beyond.

### 3. Issues from chaired discussions

There was a short amount of time for discussions. In response to the presentations it was suggested that we need to:

1. Decide on the applications to take forward
2. Get full commitment
3. Implement sooner

Tony Henley said that it would be better to go down an identification/quantification of benefits route rather than the commitments one. A consensus seemed to be against mandates.

IFALPA commented that there is already equipment on aircraft that is not used.

Pieter van der Kraan and Bo Redeborn stated a need for a dual link, 1090 and VDL/4. Bo stated that a dual link would be required for Package 1.

IATA/AEA restated their position regarding a single link decision and the early implementation of selected applications. Graeme Clark fundamentally disagreed with this position, he suggested we needed a revolution rather than an evolution. This was to focus on Package 2 applications, out of which Package 1 applications would fall.

The question was raised as to whether ADS-B would have prevented the Milan accident. Bengt Moberg (SAS) stated that it would have done.

### 4. Concluding remarks

- Need to get airports and airlines more involved.
- Implementation time lines are too long. Especially as any benefits from ASAS will occur some elapsed time after implementation.
- Too many things are going on separately. We must combine the activities to move forward, rather than just discussing the same issues.
- USA/European cooperation – is the FAA/EUROCONTROL R&D committee sufficient?

## B. Session on Benefits

### 1. Introduction

This report relates to Session 1 on Day 2 of the Workshop, which addressed users' expectations and concerns. The purpose of this session was to raise key issues regarding expected operational benefits or drawbacks of ASAS from the airlines, aircraft operators, ATS providers, airport operators and transport policy. Topics of interest included the operational needs to be addressed, lessons learned and their significance in terms of operational procedures, human factors or benefits. An additional goal was to achieve a shared understanding of the expected benefits, overall maturity and potential implementation timeframe.

This session was chaired by **Giancarlo Ferrara** from ENAV SpA with **Ronald van Gent** from NLR as the secretary.

The round table experts were:

- **Juergen Lauterbach** (Lufthansa)
- **Graeme Clark** (Easyjet)
- **Pedro Rastrilla** (AENA)
- **Alain Printemps** (CENA)

The session was organised so as to feed the discussion among the participants:

- Four briefings presented in the session (20 minutes each presentation):
  - It's time for a paradigm change by Juergen Lauterbach, Lufthansa
  - What is in it for Easyjet by Graeme Clarke, Easyjet
  - ATS provider benefits by Pedro Rastilla, AENA
  - ATM service provider view by Alain Printemps, CENA
- Discussion (1 hour and 15 minutes planned for discussion), and
- Wrap-up by Chairman.

### 2. Review of the briefings

Note that issues raised in each briefing are listed in the order that they were identified. For the sake of brevity, they were not repeated if raised again in subsequent briefings.

#### 2.1. Juergen Lauterbach (Lufthansa)

##### Brief description

The briefing presented Lufthansa's view on the ASAS. Mr. Lauterbach presented the shortcomings of the present ATC system from an airline point of view and the expected benefits that would ensue from a paradigm shift of the ATC system towards ASAS.

##### Key issues in the presentation

- ⌚ A paradigm change is needed in order to be able to grow. Delays are costing the airlines too much. Key ATM problems need to be solved e.g. fragmented airspace, no co-operative system approach, no challenge for cost effectiveness through competition, no common use of data sources (except altitude). ATC is positioned as bottleneck.
- ⌚ The resulting ATCOs workload is a follow-on problem. The target is a cooperative data network. Airspace should be managed safely and efficiently from gate to gate (instead of sector to sector)
- ⌚ Key enabler is flow management based on common flight data platform (AFAS) (one common flight plan for ground and cockpit) and ADS-B (ASAS) separation in the air.

- ⌚ A co-operative ATM system with distributed intelligence and responsibilities shared according to best task accomplishment needs to be implemented.
- ⌚ By introducing ASAS many benefits can be achieved:
  - Safety , Efficiency Capacity improvements
  - ASAS benefits are: largely enhanced safety, more effectiveness and capacity, reduced controller workload, common situational awareness, data instead of voice, distributed nature of ATM system, larger sectors-strategic flow management, world wide use of common data
- ⌚ By introducing 4D Flow management the following benefits can be achieved:
- ⌚ Cooperative use of 4D trajectory, common data, reduce controller workload, data rather than voice.
- ⌚ Nothing will materialise without commitment. For ASAS is the commitment and leadership focused on implementation is required.
- ⌚ Next steps are: global standards, operational requirements, large scale trials with revenue aircraft, benefits and incentives, transition planning.
- ⌚ A users network is needed. (ANSPs and Airlines).
- ⌚ The planned EC project .C-ATM should be used as common European platform (based on IATA/AEA position) to introduce first beneficial operational ASAS applications

## 2.2. Graeme Clark (Easyjet)

### Brief description

Mr. Clark presented the view on ASAS as seen by Easyjet and stressed the importance of change in order to accommodate for growth.

### Key issues in the presentation

- ⌚ Low cost airlines increase from 2% 1998 to 15% in 2007. Low cost airlines will be significantly influencing the air usage in Europe. Improvements cannot be done too late. A step change needs to be introduced. Leadership is needed, effective application of funds is needed, compelling value proposition and ensuring operational implementation.
- ⌚ Ships have shifted to VDL 4 with numbers equalling 70000 in 2.5 years. Another example of implementation is given by the Capstone trials involving General Aviation aircraft.
- ⌚ Research is done. Large-scale trials are now needed, technical standards, redefined operational procedures and progressive addition of high benefit applications.
- ⌚ USA is doing it's own thing e.g. UAT VDL 3 and delaying VDL 2, while Europe is heading towards an Air Traffic crisis. We are at the same time delaying the best technology.
- ⌚ Mode S and 1090 ES will give no significant benefits. The recommendation is to use ADS B properly. The main question is what surveillance data is needed and not how.
- ⌚ For ASAS implementation there is a clear need to take in due consideration also GA requirements since they will affect airlines operations.
- ⌚ VDL 4 can do the things you need (table was presented). Avionic racks are already full and the airlines need to keep the costs down.
- ⌚ Accelerate SEAP project trials. Take ASAS seriously.
- ⌚ Maximum European effort is needed to field ASAS by 2008!!!!
- ⌚ FOCUS on ASAS should be to provide maximum benefit.
- ⌚ ADS-B in / out and CDTI are needed!!
- ⌚ Airlines will lead when clear deriving benefits are shown.

### 2.3. Pedro Rastrilla (AENA)

#### Brief description

Mr. Rastrilla presented ASAS as seen by a mediterranean ATSP and made it clear that many issues still remained to be resolved before ASAS could be applied in an operational manner.

#### Key issues in the presentation

- ⌘ AENA is involved in a number of projects like MFF MEDUP, C-ATM and SEAP
- ⌘ ADS B is more than ASAS; a lot of changes still need to be assessed, like training for the new systems. Responsibilities need to be clearly identified.
- ⌘ ASAS Benefits:
  - Increased efficiency;
  - Increased capacity;
  - ASAS-spacing promising in TMA and oceanic airspace;
  - Airport surveillance could provide ATM with increased safety.
- ⌘ ASAS is part of Package 1 but Package 1 also includes ground surveillance applications. So, it is better to talk of ADS-B package 1 instead of ASAS package 1.
- ⌘ Similar ground and air infrastructure could allow implementation of an improved airport surface surveillance.
- ⌘ Concerns:
  - Sharing of responsibilities should be clearly defined;
  - How to deal with aircraft of different performance;
  - Sequence order in descents are to be created for each specific converging flows;
  - Where to start (too many ideas);
  - Different competing technologies;
- ⌘ Further work has to be done (e.g. requirements, procedures, safety implications).
- ⌘ ASAS will be reality and will bring important benefits.
- ⌘ Package 1 should be properly focussed – Do not make it too complex...
- ⌘ C-ATM and SEAP will allow demonstration of these applications.
- ⌘ We talked about commitment but what for?
- ⌘ Linked to benefits and airline equipage

### 2.4. Alain Printemps (ATS provider – CENA)

#### Brief description

Mr. Printemps presented the view of an ATS provider, stressing that the most realistic and acceptable approach is to aim for small benefits in small achievable steps.

#### Key issues in the presentation

- ⌘ Presentation was focused on ASAS and not ADS-B;
- ⌘ Operational benefit of:
  - ATSAW application: increased safety and capacity;
  - Spacing application: potential improvements for the arrival sector capacity.
- ⌘ Operational benefit (to be studied):
  - Arrival manager integration;

- Arrival sector->approach sector transition;
  - Demonstrate benefits for airports.
- ⌚ Transition: mandating ASAS package 1 is unlikely for the short medium term. ADS-B out with 1090 ES could be easy to use. If a significant number of aircraft ADS-out are equipped operational benefits can be achieved.
- ⌚ Transition to spacing applications: it does not require electronic stripping, spacing applications do not require MTCD/ CPDLC or other complex tools implementations, spacing applications do not require change of responsibilities and are compatible with present ATM system.
- ⌚ Transition (to be studied). Operational benefits with a limited number of aircraft equipped with package 1. Possibility to implement package 1 without complex avionics.
- ⌚ Technical ATC system upgrade. Ground ATC systems are now complex systems. Package 1 applications do not require complex system modification. Package 1 cost/benefit is good for the ground providing little benefits with little costs.
- ⌚ System implementation (to be studied). Airworthiness issue may be critical. A clear road map is needed. Airborne complexity of Package 1 integration of ACAS CDTI/ATSAW displays (need for HMI studies).
- ⌚ Controller acceptability and training: Package 1 spacing application has been well received. Training time (one week) and methodology still need to be improved.
- ⌚ Conclusion: main feasibility criteria for implementing are met for Package 1 but some work is still needed (pilot acceptance, operational benefits with limited number of aircraft, standardisation process, road map).
- ⌚ Since RVSM, Package 1 is the most promising ATM developments.

### 3. Issues from chaired discussions

Mr Richard (Thales Avionics): comments about integrating ACAS and ASAS (with reference to the presentation of A. Printemps) in the cockpit. The problem is to integrate this in details. This should be researched through SEAP and C-ATM projects.

Dr. Smoker (IFATCA): airlines state that we don't need controllers while ATSPs say we do. Mr. Rastrilla (AENA) responds that we will need them. In Package 1 responsibility remains the same. Mr. Clarke (Easyjet) answers that we need ATCo's because pilots cannot see other aircraft accurately enough. The present concept is designed around WW2 technology. We have to admit that we are not doing an optimal job. Radar has its imperfections. ATCo should become manager. ASAS Package 1 is not enough. A paradigm shift is needed! Everybody needs to see everybody. A. Printemps (CENA) reacts stating that according to the ACARE working group future aircraft may not have pilots, so why go for an airborne system? He adds that you cannot change everything in a short time, only a step by step approach is feasible. Mr Lauterbach (DLH) states that controllers will be promoted and become managers. ASAS implementation will help them to focus on the important subject of strategic flow management. Only a distributed surveillance system caters for more effectiveness and capacity. No significant benefits can be expected by sticking only to developments in the ground system

Mr. Hogge states that legally the pilots already have the responsibility for collision prevention. A paradigm shift is needed but with small steps towards it. He likes the EEC approach with steps at reasonable low expense and small benefits. Together with the SEAP track and equipping GA aircraft should be the most reasonable approach.

Mr. Kroger (IFALPA) firmly believes that present and near future ATM concepts will be ground based. Perhaps some task sharing can be achieved. Safety assessments are not done. Furthermore ATC is not the only delay factor. Runway capacity and airports in general should be taken into account.

Mr. Josefsson (LFV) is concerned about cooperation. From a service point of view he would like the connection with the aircraft for more accurate data. The scope should be increased and the question is also if you have any connection with the airport. Mr. Printemps (CENA) reacts to the questions saying that first we had PHARE project (which was all focused about connecting the

aircraft data with ATC and 4D trajectory management) after which we had Free Flight (which was about total freedom) and now Boeing is looking again for 4D again. The truth is somewhere in between. It takes time to review all the issues involved in ASAS and trajectory management. Mr. Lauterbach (DLH) sees tremendous benefits if you include ASAS at the airport operation (e.g. runway incursion, bad weather operation, ...). Mr. Rastrilla (AENA) adds that ADS-B Package 1 is a good first step and afterwards enhanced links can be added.

Mr. Moberg (SAS) states that Airbus already has the capability to fly 4D and does not see a lot of research and development needed, but we are still not using it.

Mr. Kroger (IFALPA) questions about the security of ASAS operations referring to Sept. 11. Mr. Lauterbach (DLH) adds that the expression Free Flight is often very misleading to use. For the foreseeable future there will remain the necessity for a centralised flow management from gate to gate. Nevertheless, there is an immediate need for a more efficient execution of the various operational tasks to accommodate user requirements. Among these, ASAS is one major enabler to improve tactical operational tasks.

Mr. Van Gool (Eurocontrol) states that the PHARE program started with the superposition that the aircraft has better info and that the ground would be allowed a link to these systems. Controllers during the trials had a lot of problems working with these systems. To get a system like that working you need different kind of controllers. Mr. Smoker (IFATCA) answers that controllers will take along a lot of baggage in the form of previous experience. Controllers want to know what is going on. There is reason for optimism for the future but not as quick as the airlines want. Phil Hogge adds that sometimes the psychological barriers are larger than the technical. Small steps with small advantages can be eye-opening. Experience with the new paradigm must be introduced gently. Mr. Clarke (Easyjet) answers that ASAS tests have been done but there are simply not enough aircraft sending data. SEAP is all about getting a substantial amount of aircraft with ADS-B to produce enough flight trial to gain experience. VDL 4 is 7 years old, but we are still reluctant to implement it. Airlines will go broke in the mean time. Mr. Lauterbach (DLH) agrees with most of what Mr. Clarke said, but a step by step approach seems more likely. However, if Package 1 is only a playing field then no airlines will buy it. If there is no business case there is no point for the airlines. When he speaks about commitments he is talking about the commitment from ATSP to allow using it.

Mr. Josefsson (LFV) supports comments from the airlines and adds that they have been working on it for years in Sweden.

Mr. Ferrara (ENAV) asks the airlines position on the possibility of implementing ASAS in low-density areas. Mr. Lauterbach (DLH) answers that airlines need benefits. A business case should always be the basis for the implementation.

Mr. Robinson (IAOPA) asks why you need ADS-B in low-density airspace. Mr. Ferrara (ENAV) answers that it depends on the requirements that you have. It can increase capacity in special cases. Mr. Kroger (IFALPA) adds that any smoothness of operation added will benefit everybody. The business case is also to be found in search and rescue and surveillance in less dense areas especially for GA (ADS-B is relatively low cost). Mr. Clarke (Easyjet) asks how many GA aircraft fly in Europe. Mr. Robinson (IAOPA) answers 47000 versus 4000 civil (airline) aircraft. Easyjet's point of view is that they have committed themselves with 120 new aircraft, but there is a lack of political commitment. They are very interested to commit to projects such as SEAP.

Mr. Watson (NATS) asks why airlines cannot decide to equip by themselves. Mr. Clarke (Easyjet) answers that equipping aircraft only makes sense if all airlines do the same. Easyjet cannot commit alone. Mr. Lauterbach (DLH) adds that there is nothing to buy, because there is no commitment that a product to be built upon. Mr. Watson (NATS) asks if 2007 (Package 1 implementation) will happen, but Mr. Lauterbach (DLH) stresses that this will only happen if decisions are made soon. Mr. Printemps (CENA) adds: to get commitment you must start with Package 1. The priority is to demonstrate that there are real benefits.

Mr. Hoffman (Eurocontrol) talks about 100 UPS aircraft being equipped in Louisville. FAA has approved it for use. From the ground perspective we want to do small steps. We need a full Cost Benefit Analysis (CBA) to go faster, but you cannot get the full CBA without collecting data. Yet, how come UPS can equip their aircraft. Mr. Clarke answers that UPS has a strong but unique business case (e.g. they swap aircraft in the air). Mr. Hoffman (Eurocontrol) adds that they want to do successive visual approaches, which could be done also in Frankfurt.

Mr. Clarke (Easyjet) adds that soon we will be able to implement ASAS based on a safety case instead of a business case. He believes that a catastrophic event will again take place soon if we continue as we do now. Another issue is that we do not need system integration, because the pilot can perfectly be the integrator.

Mr. Rastrilla (AENA) states that we are talking about commitments but that is not possible because we still do not know the procedures and the concept. We should use the projects that are running and build this commitment step by step and convince the controllers. The other point is that a business case for one airline is different from another.

Mr. Booth (Eurocontrol) states that we should not wait for political commitment but we should inform the politicians about the possibilities of ASAS.

Mr. Robinson (IAOPA) adds that we should not forget the GA.

Mr. Clarke (Easyjet) ASAS is a strategic business enabler. Even if it is expensive it can be very cost effective.

## 4. Concluding remarks

- Encouraging interest and promising benefits were displayed in all presentations.
- The big issue is the stakeholders' commitment and focus on implementation. A large number of issues were identified, like the need for global standards, new operational procedures, large-scale trials and an effective transition planning.
- From airlines point of view (see IATA/AEA official position) Mode S and 1090-ES should be used for the implementation of ASAS Package 1 applications. There is a clear need to use ADS-B properly and effectively.
- Some Airlines also stated that maximum European effort is needed to implement ASAS by 2008 maximising the benefits through Package 2 and 3 implementation. A serious added value could be provided only with ADS-B in & out and CDTI implementation.
- Airlines will lead the change when a clear Business Plan will be shown.
- A large number of potential benefits and concerns were identified and discussed:
  - Increased efficiency/capacity and safety;
  - ASAS Spacing seems to be the most promising application for the short term;
  - ASAS Spacing should improve arrival sectors capacity;
  - Airport enhanced surveillance could improve the safety and efficiency of related operations.
- At the same time a number of concerns were highlighted during the discussion:
  - Sharing of responsibilities needs to be clearly defined;
  - How to deal with aircraft with different performance and equipment?
  - There is a need to clearly define reference operational concepts and procedures (too many ideas driving to different operational procedures);
  - Different enabling technologies (1090 vs. VDL Mode 4) competing to support ASAS Applications;
  - Technology fight in Europe is counter productive to the implementation of ASAS and also hindering the required progress towards implementation;
  - Safety Case has to be consolidated;
  - Evaluation of the ATC/avionics system upgrade complexity;
  - Controller acceptability.
- ATSPs highlighted that Package 1 represent a small (realistic) step giving back small benefits while airlines are looking for an early implementation of Package 2 and 3 applications that will deliver clear benefits for aircraft operations. ATSPs believe that this is not feasible and prefer a stepwise approach starting with Package 1.

- ATSPs clearly defined their interest to have the connection with the aircraft for more accurate data. It was also stated that airspace capacity is not the only limiting factor (e.g. RWY capacity).
- IFALPA stated that present and near future ATC will be ground based however, some task sharing applications could be achieved in the medium term. On the other side, airlines believe that ASAS could be implemented based on clear safety requirements.

In summary the stakeholders noted that, for ASAS, the commitment is possible only with clear procedures and concepts available while for the airlines the ASAS is a strategic business enabler but a Business Case is paramount for success. Finally was noted that the Business Case for an airline could be different from the Business Case for another.

In conclusion, there was a general agreement inside the group that much work is being addressed in many different ASAS research areas and there is a need for a clear commitment speeding up the implementation process.

## C. Session on Costs/Implications

### 1. Introduction

This report relates to Day 2 of the Workshop, which addressed users' expectations and concerns. The objective of the session was to identify implications of implementing ASAS applications on ground/ airborne systems, training communication, infrastructure, etc (identify areas impacted) and the 'associated costs'.

This session was chaired by **Tony Henley** from BAESYSTEMS and **Giorgio Matrella** from ENAV S.p.A.

The round table experts were:

- **Pieter van der Kraan** - ADS-B Architecture and CBA (EUROCONTROL)
- **Peter Howlett** (THALES ATM)
- **Thomas Fixy** (Airbus)
- **Francis Casaux replacing Patrick Souchu** (DGAC)

The session was organised so as to feed the discussion among the participants:

- Four briefings presented in the session (20 minutes each presentation):
  - ADS-B Architecture and Cost Benefit Analysis by Pieter van der Kraan, EUROCONTROL
  - ASAS Impact on Ground Architecture by Peter Howlett, THALES ATM
  - ASAS Dream or Reality – Airbus view by Tomas Fixy, Airbus
  - Ground System implication for ASAS implementation by Francis Casaux on behalf of Patrick Souchu, DGAC
- Discussion (1 hour and 15 minutes planned for discussion), and
- Wrap-up by Chairman.

### 2. Review of the briefings

#### 2.1. Pieter van der Kraan (EUROCONTROL)

##### Brief description

The presentation gave an overview of the Package 1 Architecture activities. This included both the ground and airborne aspects.

The package 1 CBA analysis shows a potential positive results up to 2 BN€ benefits from enhanced sequencing and merging application, airborne separation (in the GRE area) and airborne self-separation (in low density airspace). Focus has been made on different equips scenario with creative positives benefits.

##### Key issues in the presentation

- £ Establish a common view of ADS-B and TIS-B functions
- £ Support the Validation activities
- £ Airborne costs for ADS-B 1537 M€
- £ Ground costs for ADS-B 237 M€
- £ Package 1 total benefit (100% equipage) 3721 M€
- £ Total benefits (ECAC wide) 4683 M€

## 2.2. Peter Howlett (Thales ATM)

### Brief description

An analysis of the ground architectures and technical specification may vary depending the different applications. Some system capabilities may not be required for certain applications. Architectures may differ depending on the environment and existing surveillance data processing systems. Controller working position needs to support appropriate tools for ASA applications. (Safety, co-ordinations and transfer, merging operation and so on).

### Key issues in the presentation

- ⌚ Requirements on specific ASAS applications may vary depending on TN application.
- ⌚ One of the challenges will be to define a consistent set of requirements for this components covering all Packages 1 applications.
- ⌚ Some CTA tools are likely to be application-specific.
- ⌚ A common infrastructure is hopefully required.

## 2.3. Thomas Fixy (Airbus)

### Brief description

ASAS should be integrated in a global concept of operations, like the Single European Sky, that will maximize its benefit. The best approach to start will be with simple applications both on the ground and airborne sides with minimum system impact, otherwise the paradigm could change depending on the operational use (procedures, ATC/pilot task repartition, etc).

### Key issues in the presentation

- ⌚ Operational deployment of ASAS is a dream due to financial situation, maturation time, deployment (retrofit), standardisation, certification etc. So we can define 3 possible time frames:
  - Operational Concept Validation: 5-7 years
  - Industrialisation: 5-7 years
  - Deployment: 3-5 yearsbut it should be noted that timing could change with priorities.
- ⌚ Human factors and training aspects must be addressed if we hope to transfer tasks/responsibilities from the controller to the pilot.
- ⌚ Pilot's need for better awareness of traffic situation is legitimised and especially so if traffic increases. The benefit of ATSAW would be safety, crew education and voice com reduction.

## 2.4. Francis Casaux (on behalf of DGAC)

### Brief description

A brief analysis of national ATM systems shows a peculiar difference among them, the needs to implement ASAS Application and the relative upgrades may vary for the different location. Normally ATCOs are concerned with Aircraft capability to perform specific ASAS Application not knowing specific on-board technology. Appropriate HMI tools are required to support for example transfer of Aircraft chain between sectors. ASAS Spacing and above all ASAS separation will have a great impact on ATCOs and Pilots tasks and a clear responsibility and roles of both should be defined.

### Key issues in the presentation

- ⌚ ATCO only concern with Aircraft capability - not specific on board technology
- ⌚ Tools are required to support new situation like transfer of "aircraft chain" between sectors
- ⌚ Need to recognise diversity of national ATM systems - Different upgrades will be required in each location

- ⌚ Spacing is supposed not to change task responsibility and separation minima. Once we move from ASAS spacing to ASAS separation, there shall be impact on both controller tasks and pilots. Both of which have to be clearly defined.

### 3. Issues from chaired discussions

A common agreed issue at early stage of the discussion was that 1090ES is not the solution but it might be the first right enabler to start with ASAS Application. Further investigations are needed for the up-link standards, and the solution may be the use of 1030.

At this point a criticism has been made by LFV regarding the fact that no validation exercise has been made on the use of 1090ES while former validation studies have been made over other technologies (VDL4).

A further study has to be made over the CBA that show only provisional figures.

We have to keep in mind that ATSAW + Spacing have different cost in terms of equipments, personnel training, than ATSAW + Automated Spacing updated to Separation. Package 1 is the required first step for a proposal implementation.

In current situation Package 1 should be mandatory in order to reduce the timescale, Package 2 should be coming afterwards. No one would invest for something that shows to be rentable in 2015.

If we see at the Navigation Strategies we can find a clearer picture than in the ATM Strategies where there is no hardly commitment and mandate.

A soft approach could be to begin with some subset of Package 1 Application, in order to start in a short period.

Other important issue is the impact in terms of cost for military and general aircraft and a clear CBA has not yet been done.

### 4. Concluding remarks

- Early implementation is essential
- Further work is needed for Standards and CBA
- We should mandate Package 1 and focus on subset Application to reduce timetable
- 1090ES is not the answer but is going to happen, a study for the up-link is needed

## D. Session on Impact

### 1. Introduction

This report relates to Day 2 of the Workshop. The topic for the day was the users' expectations and concerns. The purpose of this session was to raise the key issues with regards to the expected impact of ASAS on workload, safety, and responsibility. A particular emphasis was put on the expectations and concerns of the human operators of ASAS applications, i.e. pilots and controllers and the related perspective of ATSP and Aircraft operators. The specific impact of application categories (difference between airborne spacing and airborne separation or Package 1 and Package 2 & 3) was to be discussed if relevant.

This session was chaired by **Billy Josefsson** from LFV and **Eric Hoffman** from EEC.

The round table experts were:

- **Uwe Kroger** (IFALPA and VC)
- **Anthony Smoker** (IFATCA)
- **Bengt Moberg** (SAS)
- **Roberto Barchitta** (Alitalia)

The session was organised so as to feed the discussion among the participants:

- Four briefings presented in the session (20 minutes each presentation):
  - IFALPA and VC by Uwe Kroger
  - IFATCA and ATCEUC by Anthony Smoker
  - SAS and CNS Systems by Bengt Moberg
  - Alitalia by Roberto Barchitta et al.
- Discussion (1 hour and 15 minutes planned for discussion), and
- Wrap-up by Chairman.

### 2. Review of the briefings

#### 2.1. Introduction

The purpose of this session was to raise the key issues with regards to the expected impact of ASAS on workload, safety, and responsibility.

The discussion was deliberately postponed after the four presentations were given. Therefore the comments and issues raised reflect the content of the overall discussion rather than specifics linked to a particular presentation.

#### 2.2. Uwe Kroger (IFALPA and VC)

##### Brief description

Capt. Kroger gave a general introduction to IFALPA and provided an overview of its mission, which can be summarised as the "Global voice of Airline pilots". This was followed by a few words on the purpose of the European Cockpit Association (ECA) whose is mainly aimed at interacting with the Brussels institutions to represent the pilot interests.

IFALAPA has a draft policy concerning ASAS. It calls for a ground-based controller centred ATC system. Separation based on the use of a CDTI is considered to be potentially unsafe. The transfer of separation responsibility can only be envisaged in very prescribed situations.

There are still many issues to be addressed concerning ASAS applications, e.g. certification on a local or global basis, equipment and the level of redundancy as well as fallback required,

procedures in particular in terms of separation minima or area of applicability, training to cover initial, recurrent and checking...

A need for more education on ASAS towards the global pilot community was acknowledged.

As concluding remarks, Capt. Kroger stressed that safety is paramount to flight crews, with a need to better use existing safety measures. However, we should not request perfection, as otherwise nothing will ever happen. Finally, he concluded that the pilots' organisations he represented were willing to be convinced of the potential of ASAS application.

#### Key issues in the presentation

- Ⓔ Safety is paramount from the pilot organisations' perspective. ADS-B/ASAS safety needs to be demonstrated.
- Ⓔ At this point, pilot organisations' only have limited information on ADS-B/ASAS.
- Ⓔ Pilots involvement in ASAS development need to be ensured

### **2.3. Anthony Smoker (IFATCA and ATCEUC)**

#### Brief description

Dr Smoker started his presentation by indicating to the audience that, in general terms, controllers are fearful of ASAS as it could potentially become a bad dream to them if not properly handled. He provided some historical background to this attitude. There is a general distrust of large technical systems in ATC as their track record of implementation is abysmal. The needs of the controllers are often not understood. Procedures and work-arounds are set-up to make the system work with the human being used as a fall back to cover technical shortcomings... It should also be recognised that ASAS applications will be the source of new errors and the design of the applications should take resilience to errors and failures into account.

From a policy perspective, IFATCA deems arguable that ASAS concepts have a potential. However, the "jury is still out". Considerable more work and data will be required before a definitive position can be found. As a note, IFATCA supports the change of "assurance" to "assistance" in the ASAS acronym.

Dr. Smoker then went on to discuss a long list of points that will require proper handling before ASAS applications become a reality. Among these points were the ICAO rules requiring modification, the impact on airspace organisation, aircraft identification in ASSAP, intent information required, resilience on the ground, system failure, guidance on applicability, interaction with other airspace users like the military, transfer between sectors, ACC, FIR....

He went one to stress the fact that separation provision is only one of the tasks of controllers among others. In that light, it is essential that ASAS be placed as part of a holistic concept. It could be seen as one tool among others in the controller toolbox.

Finally, Dr Smoker concluded on the importance of not including the controller as a system user. He pleaded for a significant increase in controller involvement while reinforcing that ASAS still has a long way to go.

#### Key issues in the presentation

- Ⓔ Controllers are fearful of ASAS, as it could potentially become a bad dream to them if not properly handled.
- Ⓔ Controllers should be considered as system users rather than service providers.
- Ⓔ Controllers' involvement in ASAS development needs to be reinforced.

## 2.4. Bengt Moberg (SAS and CNS Systems)

### Brief description

Mr. Moberg started his presentation by reminding the audience that the ultimate responsibility for collision avoidance is currently with the pilot in command and that it should be taken into account when discussing separation responsibility and in particular transfer of it from the ATC to the flight deck.

Current day cockpits can be seen as a history lesson on technology evolution. Many boxes have been added over time, with in particular in terms of nav aids quite a few now very seldom used. This has implications in terms of weight, training and costs. Creative ways to remove equipment in cockpits – before putting new one – should be found.

While global solutions are in general favoured by airlines and industry, Mr. Moberg advocated for a European solution initiative that could incorporate local or regional implementations for ADS-B/ASAS as the “global” pace was too slow and leading to dead end solutions.

Mr. Moberg noted that for an airline, even when a decision is made, it is very difficult to get what it wanted from aircraft or avionics manufacturers due to their lack of flexibility and long lead times. He provided the specific example of the integrated stand by instruments on the SAS Airbus fleet.

Even if comparatively there are more pilots involved than controllers (in particular at this workshop), the level of operational involvement is far too low. ASAS procedures will have to fit in current pilot tasks as for example documented in the numerous pilot checklists.

Mr. Moberg reviewed successively all phases of flight and showed how ADS-B and ASAS could be beneficial in each of them. He also stressed that ADS-B / ASAS was step towards closing the loop between air ground and moving away from short term tactical instructions (e.g. a speed instruction) towards more goal oriented tasks (be x minutes behind, be at location at given time).

### Key issues in the presentation

- ⌚ Operational involvement in ASAS development is too low.
- ⌚ Aircraft/avionics industry has very long lead times.

## 2.5. Roberto Barchitta and Armando Bonazzi (Alitalia)

### Brief description

The presentation started with a reminder of the conclusions of the High Level Group Workshop in 2000. From an operator point of view is stressed the need for the creation of single European sky, with a single organisation to manage it, a differentiation between regulatory and service provision functions. The ultimate goal to be kept in mind is the benefits to all users. However, since in particular in the frame of ADS-B/ASAS, the airlines are the party going to perform the largest investments they should be given priority in terms of benefits.

In order to allow an airline to take a decision and make a commitment, it is of utmost importance that the problem to be addressed by properly framed strategy in particular in terms of a single technical choice, a clear time frame and agreed upon benefits.

All development needs to be strongly operationally focussed to ensure proper handling of crew's workload and the consideration of relevant operational scenario. This can only happen through strong airline, pilots and pilots' associations' involvement.

The conclusion was that there is strong need of tailoring the services to the need of airlines and route charges mechanisms should be reviewed to provide incentives.

### Key issues in the presentation

- ⌚ Route charges/incentives mechanisms must be considered.

### 3. Issues from chaired discussion session

⌚ The level of controllers and pilots awareness and involvement in ASAS should be increased:

It was unanimously recognised that there is a need to involve more controllers and pilots in ASAS development. In particular, there is a need to educate them on how and for what purposes ASAS applications are being developed.

Along the same thread, it was noted that all stakeholders, but in particular pilots and controllers should take ownership of the ASAS concepts (as an element of the future ATM) for its implementation to be possible.

It appears that there is often a controller morale issue. While significant efforts are being made very successfully by them to improved the ATM system at the global level (i.e. total system delay) individual users recriminations (and hence lack of recognition of achievements) tend to affect negatively the controllers willingness to be involved in new concepts like ASAS.

⌚ “Trust” is one ASAS key issue:

A key issue with respect to ASAS is controller trust. Controller trust is related first to technology: what it can deliver (and when), how reliable it is, will controllers have to compensate for bad design, short comings etc... Secondly it is related to the evolution of their role in ATM – is it just a new tool or does it endanger their job in the long term.

The trust issue with respect specifically to ASAS developments is compounded by the fact that as “management” seems to be unable to handle properly the current ATM situation – with the ATCO shortage in a large number of centres as a case in point. Any projection of solutions is the future by the same “management” appears then questionable.

⌚ ASAS must be positioned in the more global context of ATM evolution:

In the same thread, it was noted that IFATCA preferred not to expressed any long-term vision of the future of ATC, but rather focus on short to medium term aspects. It was further reinforced by IFATCA support for a step by step approach.

The question was raised on possible alternatives to ASAS in particular in terms of safety (with some implicit statement that on the safety aspects, there may be none) and hence on the importance to place ASAS within a more general ATM concept to understand all the implications.

⌚ Everybody claims to believe in ASAS, but nobody wants to be first:

There is a “Wait & See” attitude concerning ASAS: there is a general belief that ASAS could potentially bring benefits but nobody wants to be first to try and prove it, as in particular in such cases, generally, the first to try get the costs and the second one gets the benefits!

⌚ A transition path towards ASAS needs to be charted:

ASAS applications were referred a number of times as a tool among others, but this was also opposed to the notion of paradigm change carried by ASAS. Compared to the tool approach, the paradigm change brings about key issues related to transfer of separation responsibility and also to distributed decision making (which both make the matter much more complex).

Evolutionary approach appears feasible from controller and pilots perspectives.

A need for a transition before full integration was expressed. It was reported that “bolt on” solutions like the one tested in NUP at SAS appeared acceptable from a pilot perspective and still “function”, provide the expected ATM benefits.

The ultimate end users of the ATM systems and hence of the ASAS applications are passengers and cargo forwarders. This should be kept in mind when making decisions having impact on costs and benefits.

⌚ Generic CBAs have little value:

There is a key issue on how to convince people of the benefits of ASAS and on how to collect evidence on these.

It appeared that there is very little value to produce generic overall CBAs. All Stakeholders have potentially different costs structure. Typically, what it is true for one airline may not be true for

another one even if similar aircraft types are operated. The CBA results are highly dependent on the detailed business model of individual stakeholders. The focus should be rather to produce; gather solid, indisputable “raw” that individual organisations can use to feed their own CBAs.

Concerning the data collected, while the value of simulations was recognised – they should be pursued –, the need to start going quickly into real world with shadow mode experiments or local trials was emphasised to gather the required information.

The current endeavour to improve the ATM system is European scale problem: therefore funding at European level is required to boot strap system wide solution and there is no hope that local solution has any chance to succeed.

With current working arrangements, much of the pilot and controller involvement through IFALPA and IFATCA is performed on the basis of individuals’ best effort and spare time. This significantly impacts the available level of effort by them to review, contribute, etc. with direct consequences in terms of overall operational community awareness, trust and concept ownership.

⌚ Contradictory proposals for the way forward:

The wishes of the session participants appeared in a number of cases contradictory, with the contradictions being not only between participants.

(1) A full top down approach needs to be followed to allow proper identification of the applications with benefits and how to get them in full.

or:-

A bottom up approach is required to get a feel of how it will work. This calls for trials or shadow mode experiments as soon as practical with bolt on equipment if required.

(2) The overall process should be boot strapped by mandate for ADS-B out. This would allow a large number of aircraft of be equipped soon.

or:-

Localised (full) implementations should be tried out so as to provide (full) benefits to first equipped.

(3) We should go directly to a fully integrated solution, in particular on the cockpit side.

or:-

A bolt on solution is the way to go, even for advanced Packages

## 4. Concluding remarks

- In general there is a lack of knowledge concerning what ASAS are and the potential impact of ASAS implementation. This was clearly expressed by both IFALPA, IFATCA and ATCEU.
- IFALPA, IFATCA and ATCEU all expressed the willingness to be involved as contributors in the ASAS development process. However this might set demands for additional working arrangements in order to secure the continuity and appropriate commitment.
- Trust of both technical issues and managerial issues was highlighted as crucial for the ASAS process to note progress.
- Concerns were expressed by some that Package 1 may not be ambitious enough in terms of benefits and therefore that we should move directly to Package 2 & 3.
- Along the same lines, it was a concern to some (and a reassurance to others) that Package 1 may not be a strong enough step towards a paradigm shift.
- It was suggested to learn from experience in “parallel worlds” and use the safety case to leap frog the way forward. Considering that there are 46000 General Aviation aircraft in Europe, what would be the cost, taking into account the savings of mass production, of equipping them with ADS-B (and CDTI) so as to get immediate safety benefits and start the process for Package 1 and beyond?

## E. Session on Inter-operation and Safety

### 1. Introduction

The purpose of this session was to raise the key inter-operation and safety issues with regards to ASAS applications. How does it change the environment, delays, standards, military, ATC sectors, single sky. Transition aspects. Mix equipage environment. Time scales. Interoperability between various types of operation (e.g. military, GA, Airlines) and between ACCs (e.g. single sky).

This session was chaired by **Jean-Claude Richard** from Thales Avionics and **Francis Casaux** from EEC.

The round table experts were:

- **Alberto Pasquini** (Deep Blue – Safety methodologies)
- **Jose Roca** (EUROCONTROL)
- **Ronald van Gent** (NLR) – Onesky project
- **Martin Robinson-** (IAOPA) – GA/AW viewpoint

The session was organised so as to feed the discussion among the participants:

- Four briefings presented in the session (20 minutes each presentation):
  - MFF Safety Work by Alberto Pasquini (Deep Blue)
  - Inter-operation by Jose Roca (EUROCONTROL)
  - The ONESKY Project by Ronald van Gent (NLR)
  - General Aviation viewpoint by Martin Robinson (IAOPA)
- Discussion (1 hour and 15 minutes planned for discussion), and
- Wrap-up by Chairman.

### 2. Review of the briefings

#### 2.1. Alberto Pasquini (Deep Blue)

##### Brief description

Preliminary experience and initial results from the MFF (Mediterranean Free Flight) project were reported. MFF is focused on the validation of procedures for ASAS applications in the Mediterranean area. Safety assessment is performed in steps following the EUROCAE ED78A methodology (i.e. OSED/OHA/ASOR). Currently, the identification of the potential hazards is on going and the allocation of the safety requirements is to be completed.

Real Time Simulations (RTS) were used to study hazard situations for an airborne spacing application (ASPA-S&M). As an example, the aircraft performing the spacing task selected the wrong target aircraft. Data was collected during the RTS but also through questionnaires, brainstorming and debriefing sessions.

There are known limitations to this work: RTS cannot bring statistical evidence; the RTS platform was not 100% effective; Controllers were not familiar enough with these new procedures and new aircraft capabilities; Safety perception differs from one country to another (i.e. multi-national controller team).

##### Key issues in the presentation

- ⌘ One main result is that the degree of controller's confidence varies with the spacing instructions: more flexibility for the aircraft results in less confidence.
- ⌘ It seems also that effective monitoring tools may be required to help the controller to detect errors or malfunctions.

## 2.2. Jose Roca (EUROCONTROL)

### Brief description

It took 500 years for Leonardo de Vinci to get his parachute design working. Let's try to go faster for ASAS applications. Nevertheless at this stage, it seems that users have different expectations:

- From a temporal perspective: Short/medium term (e.g. Package 1) versus medium/long term (e.g. future packages). These expectations are completely different.
- From an environmental perspective: Oceanic airspace versus continental airspace (e.g. TMA, ETMA, en-route). It is necessary to qualify.
- The four ASAS application categories are presenting different challenges.

Inter-operation with system elements is key. This includes ACAS, data-link technologies, ATC tools (e.g. AMAN, MTCD), airspace structure, airports and AOCs.

Transition issues include transition between airspace with different rules, transition to full equipage, operation of various levels of capabilities and performances.

Environment (e.g. noise and pollution) and security (e.g. to built a less vulnerable system) have to be considered.

### Key issues in the presentation

- ⌚ Do ASAS applications fit in the future ATM concept? Flexibility provided by ASAS versus predictability through 4D trajectory control.

## 2.3. Ronald van Gent (NLR)

### Brief description

The main objective of the ONESKY project was to develop a new European airspace structure to best support the management of flows of traffics and military operations regardless of State boundaries. This was done using Fast Time Simulation (FTS) facilities providing ATC controller workload measures. First, local optimisation of sectors was studied and second, an overall redesign of the European airspace was performed.

The findings of the study show that local optimisation of sectors could bring capacity. The redesign of the overall European airspace could further increase capacity up to 35% of the current level but there is still a limit that is the individual ATC controller workload.

To overcome the foreseen gridlock a change of paradigm looks required. Indeed, controller workload is affected in an exponential way by the number of conflicts while the flight crew workload will be affected on a linear way. Studies are showing that flight crew workload to self-separate from other traffics seem acceptable.

### Key issues in the presentation

- ⌚ The bottom line is the controller workload and the optimum size of the airspace sectors.
- ⌚ Real benefits will come through the implementation of airborne self-separation applications. Core area of Europe is too complex to start with but implementation in other less dense area should start as soon as possible.

## 2.4. Martin Robinson (IAOPA)

### Brief description

General Aviation (GA) already enjoys free flight, single-pilot operations and visual approaches as a mode of transport. There are 46.000 GA aircraft in Europe not including gliders and ultra-lights. 'GA must be taken seriously'.

US and European approaches appear to be different. In the US, the technology comes first for airborne uses. In Europe, operational requirements for ground uses are the priority.

Any solution should be kept cheap, light and simple. Mode S 1090 Extended Squitter is not a solution for GA because of room and power requirements. UAT is more a solution for the US. VDL Mode 4 is the preferred solution of GA in Europe.

#### Key issues in the presentation

- ⌚ The preferred incentive for GA is access to the airspace.

### **3. Issues from chaired discussion session**

#### **3.1. General**

- ⌚ Enhancing coordination of ASAS activities to be continued in Europe:
  - The need to disseminate the information outside the ASAS community was reiterated.
  - People should use the same terminology (e.g. current confusion round the words 'sharing', 'transfer' of delegation')
  - Coordination is still lacking between European project for example in terms of exchange of validation results
- ⌚ There is still a need to avoid the capacity gridlock:
  - The current downturn in aviation is delaying the planned growth by 4/5 years.
  - If Europe and North America are severely impacted, traffic is still increasing in the Asia region (but the SARS impact still need to be assessed).

#### **3.2. Maturity?**

- ⌚ Package 1 still require validation:
  - A validation plan is currently being drafted by the ADS Programme
  - Validation activities are taking place in several projects (e.g. NUP II, MFF, MA-AFAS).
  - Not all stakeholders are up to speed and part of the validation exercise (e.g. ANSPs)
  - There is a need for European operational trials. They are expected to take place in projects like SEAP and C-ATM.
- ⌚ ASAS applications need to be integrated with existing systems:
  - The ASAS community seems to be working in isolation.
  - Boeing and Airbus position is that developing ASAS solutions with the current market outlook would be a very expensive option.
  - On the ground: Legacy systems, new tools (e.g. AMAN/DMAN, MTCD, multi-sector planning).
  - On the air: ACAS, HMI, warning systems.
  - This integration may require a few more years.

#### **3.3. Mixed-equipage?**

- ⌚ Different impact on the four ASAS application categories:
  - In general airborne traffic situational awareness applications require 100% equipage because the overall traffic picture is necessary. This is not always true (e.g. enhanced successive visual approaches). Aircraft can also operate in an already segregated airspace (e.g. Upper oceanic airspace) or because TIS-B is implemented.
  - Airborne spacing and airborne separation applications only require the aircraft involved in the instruction or the clearance to be equipped.
  - For airborne self-separation applications, a segregated airspace looks to be the solution.

- ⌚ Need to study the impact of the equipage rate on the associated benefits:
  - For each application and if a 100% equipage is not required, it is necessary to study the relationship between the equipage rate and the associated benefit.
  - Another important aspect is the acceptability from a controller and pilot perspectives. Indeed, it is more difficult to manage a heterogeneous fleet of aircraft.
- ⌚ Transition phase needs to be defined:
  - A local implementation can be a starting point.
  - The new instructions and clearances can be introduced progressively or with some restrictions.
- ⌚ Non-participating aircraft will need to be considered:
  - Military aircraft will not be equipped with ADS-B. Some military aircraft may be equipped with data-link technology to downlink information to the ground system. No solution is envisaged for air-to-air surveillance.
  - Non ADS-B aircraft may be GA aircraft which do not need ADS-B for their operations.

### 3.4. Mandate?

- ⌚ Safety benefits are difficult to demonstrate and to quantify:
  - It is recognised that some ASAS applications (e.g. ATSA-SURF) can provide essential safety benefits.
  - Current methodologies (e.g. EUROCAE ED78A) are not designed to assess the safety benefits provided by an operational application. On the contrary, this methodology is only looking for hazards that are detrimental to safety.
  - A political decision is often required to implement operational applications enhancing safety because the associated costs are not compensated by new income.
- ⌚ An mandate presents some advantages:
  - It allows the industry to anticipate.
  - It obliges the regulatory authorities to freeze the standards.
  - It requires an implementation plan with a precise road map agreed and co-ordinated with the stakeholders.
  - It should come with exemptions for the users who do not need to have access to the airspace or who are not involved in the application.
- ⌚ An mandate in Europe is difficult to achieve:
  - ANSPs have different interests and views.
  - Aircraft operators have also different interests.
  - All those interests are not necessary compatible.
- ⌚ The Mode S elementary surveillance mandate is a major opportunity to introduce ADS-B in Europe:
  - Aircraft operators should be encouraged (at least) to provide ADS-B OUT capabilities on their Mode S transponders. The additional costs seem bearable.
  - This will allow the initial implementation of ground surveillance applications.
  - This will facilitate the validation of airborne surveillance applications through live trials.
- ⌚ Incentive for the users:
  - For GA, access to the airspace is the main incentive. A low cost equipment for GA is around 1.000 Euros.

- An incentive mechanism needs to be found for the pioneer users which are going to invest for the benefit of the non-equipped users.
- A mandate is an incentive for the aircraft and avionics industry.
- ↳ Clear environment and clear roadmap is a requirement:
  - Before any incentive mechanism a clear roadmap has to be established.
  - EUROCONTROL and the industry need this roadmap now and before the Single Sky initiative is implemented.

## 4. Concluding remarks

Following the session 4 discussions, it seems that:

- The Stakeholders (ANSPs and Users) are still having different expectations that are not compatible. This was already recognised at ADS-B seminar in Rome in March 2002 and this led to the development of 'Package 1' and the following packages. The consensus, which has been established around 'Package 1', is still fragile and questioned by some parties. Or it is perceived as not ambitious enough in terms of content (e.g. too little benefits) and time scale (e.g. too long) or it is perceived as unrealistic because there are too many operational and technical issues to be addressed. The answer is certainly in between the two extremes.
- From an operational perspective, it is clear that ASAS applications included in 'Package 1' still require intensive validation through fast-time and real-time simulations. They need to be integrated in ground and airborne systems. Large-scale flight trials need to be considered only when a good level of maturity is achieved.
- The ADS-B technology choice (1090ES versus VDL4) is again complicating the debate. Some stakeholders have strong positions based on their own agenda. Some rationale is lacking in this area.
- The mandate for Mode S elementary surveillance is perceived as an opportunity to introduce ADS-B in Europe. Member airlines from IATA and AEA have the possibility to demonstrate a clear commitment based on their own ADS-B policy. This can be coordinated with major aircraft manufacturers like Airbus and Boeing.
- ASAS applications should have a well-defined role in the future ATM concept. 4D trajectory planning can increase predictability of the ATM system. ASAS applications can provide flexibility to manage flows of traffics and to resolve tactically conflicts. The future ATM concept should allow the progressive introduction of the paradigm shift.
- Users are asking for a clear and stable ATM roadmap. Stakeholder commitment looks essential but each party is looking at the other to commit first. The aircraft and avionic industry are looking for the aircraft operators to place orders. Aircraft operators are asking for benefits. ANSPs are not convinced about these potential benefits provided by ASAS applications, which furthermore could impact their business. EUROCONTROL is managing several programmes, which are competing for resources. The European Commission is investing money in the 6th Framework programme with very ambitious objectives.

## F. Workshop conclusions

### 1. Introduction

The Chairs of each session gave reports of the presentations and the subsequent discussions. These were followed by further discussions regarding the issues raised during the course of the event.

### 2. Summary of the workshop conclusions

The following conclusions were selected by the ASAS-TN consortium as the key common issues. These are to inform the ASAS-TN implementation strategy work .

#### ⌚ **Need for agreement and commitment from the various stakeholders:**

- Airlines and ATS providers have different approaches and views relative to ASAS applications
- Airlines have different visions because of the respective business (i.e. Low cost operators versus more traditional operators)
- ATS providers also have different visions because of different needs (i.e. Core are of Europe versus other areas)
- GA perspectives / Military perspectives
- We are missing a lot of main stakeholder specifically airports
- Few airlines and ATS providers are currently involved and participating.
- EC policy pushing for a change of paradigm. There is a disconnect with the Industry and ATS providers which are focused in short/medium term.

#### ⌚ **Package 1 definition:**

- Consensus still fragile
- The step approach is recognised.
- But the size of step 1 is still questioned:
  - Or the step is not enough ambitious
  - Or a subset of package I application should be aimed at.

#### ⌚ **Need for pilot and controller acceptability:**

- Pilot and Controllers Organisation more involved in the operational definition

#### ⌚ **Need for agreed standards for interoperability including:**

- EUROPE/US should work together
- Operational definitions
- Pilot/controllers roles
- Business Case
- Safety Case
- The ADS-B technology choice is making the issue more complex

#### ⌚ **Need for a clear implementation plan:**

- A roadmap
- CBA is needed
- Mandate or not mandate?

- Incentive policy ?

£ **Need for improved exchange of information**

### **3. Role of ASAS-TN**

The ASAS-TN cannot itself resolve all the above issues but its objectives are still to:

- Disseminate the available information on ASAS applications;
- Foster the exchange of information among the various players and to enlarge the ASAS community; and
- Develop guidelines to help the European Commission and EUROCONTROL to accelerate the implementation of ASAS application in Europe (as part of WP3).

### **4. Dissemination**

All the presentations made during this workshop are available through the CARE website at the following address:

[http://www.eurocontrol.int/care/asas/tn-workshop1/asas\\_tn\\_workshop1.htm](http://www.eurocontrol.int/care/asas/tn-workshop1/asas_tn_workshop1.htm)

They will be also accessible through the ASAS-TN CIRCA Internet facility.

The key messages and conclusions of the workshop will be:

- (1) Delivered to the European Commission;
- (2) Given wider dissemination via the activities of the ASAS-TN; and
- (3) Provide an input to the ASAS-TN Work Package 3 to develop an ASAS implementation strategy.

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