

ASAS Thematic
Network 2



Airborne Separation Assistance Systems



Activity Report for the ASAS-TN2

Airborne Separation Assistance System Thematic Network 2 (ASAS-TN2)

from 1st April 2005 to 31st March 2008

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Table of contents

1. Project Objectives and major achievements.....	4
1.1. Project Objectives	4
1.2. Background.....	4
2. Work Package progress.....	5
2.1. WP1- workshops and seminar	5
2.2. WP2 Web-based activity	12
2.3. WP3 – ASAS application maturity assessment	12
3. Consortium Management	12
4. Other issues	13
Annex: Plan for using and disseminating the knowledge	14

1. Project Objectives and major achievements

1.1. *Project Objectives*

The main project objective is to accelerate the application of ASAS operations in the European Airspace taking into account global applicability in order to increase airspace capacity and safety.

This high-level objective translates more specifically into the following activities:

1. Facilitate the exchange of ideas, to provide a framework for discussion and to ease the dissemination of information;
2. Provide a data base of ASAS related documents to support studies and projects;
3. Facilitate coordination of on going RTD projects related to ASAS and specifically between ground and airborne oriented projects;
4. Facilitate consensus for standardisation and certification;
5. Provide guidance and recommendations for future ASAS strategy including RTD, technical feasibility, validation and implementation; and
6. Present and to discuss information and results to stakeholders.

The project approach to meeting these objectives was to:

- Organise workshops on topics related to ASAS applications;
- Organise a seminar to present RTD results on ASAS applications open to all stakeholders;
- Maintain an ASAS repository where all the documents related to ASAS could be identified and down-loaded;
- Develop periodic reports on the status of standardisation, certification and implementation of ASAS applications.

1.2. *Background*

The ASAS-TN is a three-year project (April 2005 – March 2008) that is primarily a communication activity and that is sponsored by the European Commission (DG Research). The project 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-TN2 builds on the experience of the ASAS Thematic Network project (ASAS-TN). The ASAS-TN Library is also a key feature of the Thematic Network.

The ASAS-TN2 consortium is composed of the EUROCONTROL Experimental Centre (EEC) as the Co-ordinator of the project, six Participants (THALES Avionics, BAE Systems, ENAV SpA, LFV, NLR, and THALES ATM). The TN2 consortium also includes representatives from professional pilots and air traffic controller organisations (ECA, VC, IFALPA, IFATCA and ATCEUC). A body of members that actively participate or are key recipients of the results of the project is also identified.

The ASAS-TN2 is innovative in several areas:

- It concentrates information related to ASAS/ADS-B applications;
- It is getting air-oriented and ground-oriented people working more closely;
- It involves all key players;
- It creates forums for communication, discussion, harmonisation and dissemination on ASAS/ADS-B issues; and
- It creates a review group to develop guidance and recommendations.

The ASAS-TN2 project is divided into four Work Packages (WP):

- WP0 - ASAS-TN2 Management: WP0 is the management of the Co-ordination Action;
- WP1 - ASAS-TN2 Workshops and Seminars: WP1 will organise two-day events on ASAS topics for the RTD community but also for the ATM stakeholders;
- WP2 - ASAS-TN2 Internet and Document Repository: some 300 ASAS/ADS-B related documents are made publicly available.. In addition to its own objectives, WP2 can support other WPs through the creation of dedicated WP forums; and
- WP3 – ASAS-TN2 'Tableau de Bord' and Reports: WP3 is focussed on delivering a yearly status of the progress towards the implementation of ASAS/ADS-B applications ('Tableau de Bord') and the production of reports

2. Work Package progress

2.1. *WP1- workshops and seminar*

The objective of this WP 1 is to organise five workshops and one seminar related to ASAS.

For each workshop, the ground and the airborne side of the topic will be studied. Workshops will involve selected participants and will be organised so as to deliver products.

The presentations will be structured in such a way (e.g. by themes, applying templates) that quick comparisons and easy discussions on results of the projects will be eased, enabling efficient production of recommendations about research, development and implementation strategies.

ASAS-TN2 First Workshop – Malmö (WP1)

The first ASAS-TN2 workshop was held in Malmö, Sweden, in September 2005, 90 people from 13 different countries participated.

The title of the workshop was “Implementing ASAS”. The event was co-hosted with the NUP2 project.

The workshop was organised in several focussed sessions with presentations to stimulate debate. The workshop report contains a summary of the presentations, transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

1. **ASAS in the global ATM environment**
2. **Progress in ASAS applications**
3. **NUPII**
4. **Implementation, planning and future packages**

The following recommendations were distilled from the proceedings:

- Validation programs should be tightly linked to the RFG with the goal of validating the RFG outputs.
- The RFG process should be used for Package 2 & 3 when appropriate.
- Links with ICAO need to be strengthened. National representatives to ICAO should be encouraged to take note of RFG outputs.
- Existing R&D programmes should highlight the significance of their particular work to RFG activity.
- All future ATM projects, including SESAME, should use RFG outputs where appropriate
- Packages 2 & 3 require a coordinated research programme now in order to define the road map for development
- There needs to be an activity to identify and eradicate differences in terminology and definitions.
- The current ADS-B/ASAS path to implementation should be taken as an opportunity to scrutinize current "legacy" practices, such as airspace or procedures, and identify areas where significant changes are required

ASAS-TN2 Second Workshop – (WP1)

The second ASAS-TN2 workshop was held in **Roma (3rd – 5th April 2006)**. Italy, in April 2006, 120 people from 17 different countries participated.

The title of the workshop was “ASAS as an integral part of future ATM”. The event was co-hosted with the ASSTAR project (Advanced Safe Separation Technologies and Algorithms).

The workshop was organised in several focussed sessions with presentations to stimulate debate. The workshop report contains a summary of the presentations, transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

1. **Progress, plans and challenges**

2. **ASSTAR User Forum 1: Progress in ASAS Application Development and Validation (Session 2A: Radar Crossing and Passing Applications & Session 2B: Oceanic Applications)**
3. **ASAS/ADS-B: The MFF experience and the way forward (Session 3A. ASAS implementation: The MFF Experience & Session 3B: ASAS/ADS-B in the Mediterranean Area)**

The following recommendations were distilled from the proceedings:

- RFG work should be continued and strengthened.
- Particular emphasis now needs to be given to developing robust procedures to support the new ASAS applications.
- ASAS needs to be formally addressed by the relevant ICAO operational panels in addition to the technical ones.
- The ADS-B 1090ES standards need to be addressed to ensure consistent aircraft equipage and interoperability.
- SESAR needs proactively to be made aware of the concepts and benefits of ASAS applications.
- There is the need for structure and formalise the definition of advanced ATM/ASAS concepts including Package 2 and Package 3 applications.

ASAS-TN2 Third Workshop – (WP1)

The third workshop entitled “ASAS: Civil and Uncivil Practices” was held in Glasgow, Scotland, in October 2006, 134 people from 18 different countries participated.

The workshop was organised in several focussed sessions with presentations to stimulate debate. The workshop report contains a summary of the presentations, transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

1. **Progress and status of implementation and standardisation.**
2. **UAV, military and business aircraft operations: ASAS implications.**
3. **Human performance, Human factors and a Cognitive systems approach to ASAS operations**
4. **Towards ASAS Package 2**

The following recommendations were distilled from the proceedings:

- Engage more with SESAR
- Write to SESAR Executive Committee
- Produce a summary matrix of ASAS key issues.

ASAS-TN2 Fourth Workshop – (WP1)

The fourth ASAS-TN2 workshop was held in **Amsterdam (23rd – 25th April 2007)**. The title of the workshop was "ASAS: a reality check".

The workshop was organised in several focussed sessions with presentations to stimulate debate. The workshop report contains a summary of the presentations,

transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

5. **Progress and status of implementation and standardisation**
6. **ASAS in future European and US ATM concepts**
7. **ASSTAR User Forum**
8. **Beyond the clean lab environments**

The following recommendations were distilled from the proceedings:

§ Good progress has been made since the first ASAS TN1 workshop in Rome in April 2003. There has been a wide range of successful R&D programmes and, recently two important milestones have been achieved:- (1) the second Maturity Assessment of ASAS Applications which shows significant advances, and (2) the publication by EUROCAE and RTCA of the ADS-B-NRA standards in ED-126 and DO-303.

§ ASAS applications are now included in the SESAR draft Concept of Operations. The Glasgow workshop had been concerned that these were not being taken sufficiently seriously by the SESAR working groups. There was now a unique opportunity to integrate ASAS into the new ATM system, but the ASAS community needed to work hard to prove that ASAS could achieve what is promised.

§ It is most important to maintain continuity of a number of activities:- (1) the RFG standardisation work; (2) pre-operational trials; (3) working with partners in the US, Australia and Asia to ensure global applicability; (4) defining benefits and translating these into financial terms; (5) interacting with the appropriate SESAR working groups.

§ In many areas good work is in progress. In particular:- (1) the further refinement of sequencing and merging showing that benefits could be derived in complex TMAs, with mixed equipage and in non-nominal situations; (2) new work on Package 2 applications; and (3) simulations of self-separation.

§ Amongst other considerations:- (1) it was inappropriate to continue to refer to Free Flight, it would be better to refer to Autonomous Flight Management; (2) approval for airborne separation standards would be needed in each continent; and (3) there were concerns over 1090MHz saturation in the 2015- 2020 timeframe.

§ Regarding the political capacity goal that has been set for SESAR, it should be noted that the FAA has concluded that, if only 2% of passengers switched to VLJs, the result would be a tripling of the number of movements.

§ The SESAR Concept of Operations includes military requirements and a more flexible use of airspace. In addition, ATM security will need to be addressed within an open information architecture.

§ This was the first ASAS workshop at which there have been presentations from EASA and EUROCAE. The process from R&D, to RFG preparation, to EUROCAE standards, and then to EASA certification is clear, but no-one should underestimate the length of time it will take and the difficulty of certifying some of the more complex applications.

ASAS-TN2 Fifth Workshop – (WP1)

The Joint Fifth ASAS-TN2 Workshop and Second FLYSAFE Forum was held in **Toulouse (17th- 19th September 2007)**. The title of the workshop “Equipping for ASAS: Ground and Airborne Industries”

The workshop was organised in several focussed sessions with presentations to stimulate debate. The workshop report contains a summary of the presentations,

transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

- 5. Progress and status of worldwide ADS-B/ASAS implementation and evolving airborne separation standards.**
- 6. ASAS in future European and US ATM concepts**
- 7. Flysafe**
- 8. Ground and Airborne industry progress**

The following recommendations were distilled from the proceedings:

Short-Term implementation

- The ASAS-TN2 team recommends that the short-term development of appropriate ASAS applications receives the necessary funding.
- The ASAS-TN2 team recommends that the short-term ASAS applications (ATSA-SURF, ASPA-S&M, ATSA-ITP) should be included in SESAR D4 IP1.
- Ways should be found to enable pioneer airlines to implement S&M and ATSA-SURF. A project similar to the CASCADE/CRISTAL projects is needed to enable pioneer airlines to use these applications in specific locations in Europe.
- The ASAS-TN2 team recommends that for ATSA-SURF the different levels of capability are defined, together with the associated operational and safety benefits.

Medium / Long-Term implementation

- The ASAS-TN2 team recommends that the definition of the requirements for the high capability level ASAS applications (separation and self-separation) starts now in order to ensure that the appropriate technology will be available on time.

Industry

- Develop a plan for a minimum number of avionics upgrades to support the progressive introduction of ASAS applications.
- The SESAR JU should ensure that sufficient funding is made available to develop high capability level ASAS applications.

ASAS TN2 Final Seminar (WP1)

The final ASAS TN2 seminar entitled "ASAS now!" was held in Paris (14th – 15th April 2008).

The seminar was organised in several focussed sessions with presentations to stimulate debate. The seminar report contains a summary of the presentations, transcripts of the debates and conclusions and recommendations distilled from the event.

The event sessions were:

- 1. Progress and status of implementation and standardisation**
- 2. ASAS in European and US ATM plans**
- 3. ASAS where it is needed**

The following recommendations were distilled from the proceedings:

1. The ASAS Thematic Network is fulfilling its objective to accelerate the introduction of ASAS/ADS-B operations and has already seen many of its previous recommendations successfully achieved. For example:
 - The extensive sharing of information between delegates and organisations is stimulating the development of ASAS applications, is furthering understanding, is helping to find opportunities for implementation, and is aiding global harmonisation.
 - This global activity has significantly advanced the maturity of the ASAS applications.
 - Both the SESAR and NextGen Master Plans include the development and implementation of ASAS.
 - There are four ADS-B/ASAS applications in operational use :-
 - ADS-B NRA in Australia
 - M&S, CAVS and ATSA-SURF in the USA
 The first European applications are expected soon
 - Both Airbus and Boeing now explicitly include ASAS functionality in their plans.

2. However progress towards implementing ADS-B and initial ASAS applications is more advanced in the USA than in Europe. For example:-
 - There are currently only a very small number of ASAS projects in Europe compared with the USA.
 - European outcomes such as the ASPA-M&S algorithms have been implemented in the USA but not in Europe.
 - European ADS-B implementation plans are more fragmented than those in the USA, Canada and Australia.

3. Outside Europe important developments are taking place to advance the implementation and understanding of ADS-B and ASAS. Within Europe action needs to be strengthened to ensure that future developments and implementations advance in step. It is therefore recommended that:-
 - both EUROCONTROL and the FAA actively build on the commonalities in the SESAR and NextGen roadmaps. Therefore the EUROCONTROL/FAA R&D Action Plan 23 (Future Uses of ADS-B and ASAS) should be strongly supported.
 - noting that considerable development work is required to enable future ASAS applications, and that this work needs to be defined in consultation with the ASAS community, the SESAR JU work programme must give appropriate emphasis to ASAS research in delivering the SESAR Target Concept.
 - the fragmentation of the European ADS-B implementation plans be addressed at Single Sky Committee level.

4. Given that the SESAR and NextGen plans include ASAS, the members of the ASAS Thematic Network are concerned that ICAO is not working with sufficient urgency on the procedures and standards for the use of ASAS. It is therefore recommended:-
 - That the SESAR JU and NextGen agree an early joint approach to ICAO on the use of ASAS in order that ICAO gives ASAS the necessary emphasis.
 - That there is a pressing need for ICAO to start work on identifying appropriate international standards, for example:-
 - PANS-OPS
 - PANS-ATM
 - High level standards for ADS-B

- The work deriving requirements in support of early ADS-B and ASAS applications, done by the RFG, a Joint Sub-Group of RTCA SC-186 and EUROCAE Working Group 51 (ADS-B), should be considered by ICAO at the earliest opportunity.
5. Strong near-term business drivers for ASAS include:-
- ITP applications in Oceanic areas which have the potential to increase payload, to reduce fuel burn, and to reduce environmental emissions.
 - ATSA-SURF application, on the airport surface, can increase safety by reducing the risk of runway incursions and can increase the efficiency of airport operations.
 - ASPA-M&S application in the TMA (particularly when enabling CDAs) has been shown to reduce fuel burn, to reduce noise and environmental emissions, and increase airport throughput.
6. Given the fact that there are some strong potential business drivers, but that it is difficult to find ways of starting suitable widespread implementations, there is a need to encourage both airlines and ANSPs to start trials and to coordinate local deployments which will lead to a harmonised system. It is therefore recommended that:-
- CASCADE Programme and its CRISTAL activities, which are already having a positive impact on early deployment, should be continued, but strengthened through a cohesive European implementation plan.
 - Incentives be identified to encourage pioneer stakeholders.
 - EUROCONTROL should continue ASAS-TN type work and link it with the planned FAA ASAS communication activity.

The ASAS TN2 Committee organised a workshop for the airlines 8th October 2007 at the NLR in Amsterdam. The purpose of this event was to explain in high level terms what ASAS is, how it could be used in the SESAR 4D trajectory environment, probable timescales for implementation, and to concentrate on potential benefits.

A report has been produced, http://www.asas-tn.org/workshops/ASAS_Airline_event

Communication & networking:

The growing number of participants to the workshops (90 participants in the 1st Workshop in Malmö, 120 participants in the 2nd workshop in Rome, 134 in the 3rd workshop in Glasgow, 119 participants in the 4th workshop in Amsterdam, 128 in the 5th workshop in Toulouse, 147 in the final Seminar) is one measure of their success. However, a more detailed analysis of the participants' affiliations shows that while the ATM community is relatively well covered, industry and specifically airlines participation is still very limited.

There have been good levels of support from the pilot and controller professional organisations (IFALPA/ECA/VC and IFATCA/ATCEUC). It should be noted that although they are funded for travel, they support the project activities in their own time, despite continuing operational responsibilities.

One concern is also that findings of the workshop may not be fed with sufficient emphasis towards SESAR. A number of actions have been put in place so as to mitigate these points:

- Distribution list are being reviewed and expanded. (now 3600 names)
- More effort is spent on communication. (EEC newsletter)

- A collaborative action with the past Workshops Chairman Phil Hogge so as to draft introductory material on ASAS more easily accessible and understandable to airlines. An airline day was organised in Amsterdam (8th October 2007).

2.2. WP2 Web-based activity

ASAS-TN2 project website (WP2)

All public domain project deliverables are available on the ASAS-TN website www.asas-tn.org

A library of some 400 ASAS-related documents are available on the ASAS-TN area in the OneSky teams space on the EUROCONTROL extranet.

The objective of WP2 is to organise ASAS/ADS-B documentation and to make it available.

The project URL (www.asas-tn.org) contains the main project descriptions and public deliverables, in addition to those of the predecessor project ASAS-TN.

2.3. WP3 – ASAS application maturity assessment

The original title of this work package has been updated to “ASAS application maturity assessment”.

The objectives of WP3 are three-fold:

- a. To develop a yearly ‘Tableau de Bord’ related to ASAS/ADS-B applications. This ‘Tableau de Bord’ will review the progress of research and development, operational standards (e.g. ICAO SARPs), technical standards (e.g. MASPS and MOPS from RTCA/EUROCAE) and implementation. When appropriate, guidelines and recommendations will be provided to accelerate the path towards implementation.
- b. To develop the ASAS-TN2 yearly and final reports.
- c. To perform the co-ordination between the work packages and with the EC.

The proposed approach to this work was presented at the first workshop in Malmo in September. The first version of the report was available in March 2006 and was sent to a selected group of international experts who were chosen to be representative of the wider ASAS stakeholders. These individuals were also chosen on the basis that they were known to be very active in the ASAS domain.

Following review comments, and positive statements about the usefulness of the WP3 report, from the peer review group, a new version of the document was produced. This was presented to the workshop in Rome in April.

The WP3 document has been distributed to the ASAS-TN2 mailing lists.

3. Consortium Management

The project consortium worked together for three years. Two of these were for the predecessor project ASAS-TN. The consortium continued to work cohesively, despite a few personnel changes.

Each of the partner organisations has experience of leading the organisation and management of the workshops with support from the other partners. This has worked well.

There have been some difficulties with co-hosting partner projects in conjunction with ASAS-TN2 events. It has had to be made clear that the ASAS-TN2 is the lead in the Workshop, with all decisions, co-ordination and invitation being co-ordinated with the ASAS-TN2 management team. Problems appeared when one of the hosted projects worked in a stand alone manner, but this was quickly discovered and dealt with.

The decision to use an experienced chairman for the workshop events, who is well known to the ATM community and represents all organisations has proved to be valuable.

There have been good levels of support from the pilot and controller professional organisations (IFALPA/ECA/VC and IFATCA/ATCEUC). It should be noted that although they are funded for travel, they support the project activities in their own time, despite continuing operational responsibilities.

4. Other issues

ASAS-TN2 provides reports on relevant projects (e.g. NUP and ASSTAR) and programmes (CASCADE and TMA 2010) as part of its work. In this context it interacts with many SME (Small and Medium-sized Enterprises) and RTD (Research and Technology Development) performers. The project interaction with end-users occurs via the professional organisations as outlined above.

Annex: Plan for using and disseminating the knowledge

Section 1 Exploitable knowledge and its use.

Dissemination of the prospects and results of the project is critical to its success in providing a major step forward in European ATM operation.

Technology transfer is vital in systems, equipment and processes associated with air transportation. For any technology to be successfully applied, it must be disclosed and recognized in terms of its operational aspects, utility, function and performance, etc. to all parties involved, for reasons of interoperability and international certification.

The most important bodies in place for that are:

- Airline user forums (AEA, IATA) (user operational, procedural and business aspects);
- Air traffic service provider forums (via EUROCONTROL, system definitions, standardisation, operational/procedural application and implementation);
- ICAO (international civil aviation operational and function/performance standardisation);
- EUROCAE (systems and equipment minimum operational performance standards);
- RTCA (systems and equipment minimum operational performance standards); and
- ARINC/AEEC (equipment interchange-ability standards).

The ASAS Thematic Network 2 consortium partners have well established access to, and reputation at, any and all of these forums and will integrate their findings from the Thematic Network 2 into their individual corporate RTD plans as appropriate, for dissemination into these forums.

Given the safety and efficiency enhancement usage of the airspace that the operational use of ASAS applications may produce, there will be a market incentive at each of these organisations to accelerate as much as possible the introduction of ASAS into the market. The EC projects that are led by the core partners will provide good opportunities to further enhance and accelerate introduction of key technologies and developments into the market.

Section 2 Dissemination of knowledge

Planned/ actual dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible/involved
All project duration (April 2005-March 2008)	Project web site: - archives - workshops presentations & reports - list of partners	Research/ Industry		5000	EUROCONTROL EEC
3 times a year	EEC newsletter	Research/ Industry	70	8000	EEC
Conferences:					
26-28/09/05	1 st workshop, Malmö, Sweden	Research/ Industry	13	90	LFV
03-05/04/06	2 nd workshop, Rome, Italy	Research/ Industry	17	120	ENAV/(BAE Systems)
11-13/09/06	3 rd workshop, Glasgow	Research/ Industry			BAE Systems
23-25/04/07	4 th workshop, Amsterdam	Research/ Industry			NLR
17-19/09/07	5 th workshop, Toulouse	Research/ Industry			Thales Avionics
14-15/04/08	Final seminar, Paris	Research/ Industry			Thales ATM
E mailing:					
	- Workshops announcements - reports dissemination	Research/ Industry	50	1800	EEC
Publications: Workshops reports					
May 05	1 st workshop report	Research/ Industry	50	1800	EEC
June 06	2 nd workshop report	Research/ Industry	50	1800	EEC
November 06	3 rd workshop report				EEC
May 07	4 th workshop report				EEC
November 07	5 th workshop report				EEC
April 08	Seminar report				EEC