EUROCONTROL

RA Downlink Workshop Report

Summary

The RA Downlink Workshop was held at EUROCONTROL Headquarters in Brussels on 31st May 2006. The purpose of the workshop was to share with the Stakeholders results of the FARADS project and begin a consultation process on the future direction of the Study. The workshop was attended by 69 persons.

The Feasibility of ACAS RA Downlink Study (FARADS) project has been investigating technical solutions for downlinking ACAS Resolution Advisories to controller working position and whether the downlink will provide operational and safety benefit.

Following presentations and discussions it was agreed that while results showed that there is a benefit of RA downlink, there are potential problems and grey areas. Some of these problems, it was pointed out, exist in today's environment.

The attendees indicated several areas requiring further investigation. The consensus was that the work should continue and concentrate on those problematic areas. Based on these suggestions, EUROCONTROL will undertake the task to define future plans for the investigation of RA downlink through the Stakeholder consultation process.

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The workshop was opened by DAS Director Bo Redeborn. He pointed out that the workshop is an important milestone of the FARADS project, during which results will be disseminated and inputs from Stakeholders will be sought.

The workshop was chaired by Martin Griffin, ATC Domain Manager. In his opening presentation he outlined the history of the project and the goals of the workshop.

During the morning session two presentations were given to "set the scene" – showing a development of an incident from the pilot's and controller's perspective. After that, Stan Drozdowski, FARADS project manager spoke about potential benefits and disadvantages of RA downlink, today's problem with RA reporting (low reliability of pilot verbal reports), and provided a summary of other RA downlink work conducted outside EUROCONTROL.

That was followed by a technical session which consisted of two presentations. Nick McFarlane from Helios Technology presented the results of the RA Downlink Technical Study. The study concluded that RA downlink is technically feasible using mode-S, where available. Outside the mode-S coverage, the 1090 extended squitter can potentially be used. In any case, setting up a dedicated infrastructure for RA downlink is not considered feasible.

Then, Harry Hutchinson from QinetiQ presented the RA Downlink Latency Study. This modelling study determined that the RA downlink would significantly increase controller's situational awareness and should be effective in preventing controller involvement. If the mode-S technology had been used, the controller would be aware (i.e. comprehend) about 95% of RAs within 8.3 sec. Today, without RA downlink, this value is as much as 28 sec.

During the afternoon session, Dr. Bernd Lorenz presented the results of NLR/DLR evaluation of the real-time RA Downlink Simulations. RA downlink was found beneficial to improve controllers understanding of the conflict geometry if an RA was a result of controller or pilot error. The benefit of RA downlink was negligible in cases of RAs caused by High Vertical Speed. The provision of RA downlink information on the screen did neither affect the workload ratings nor global situational awareness. It tends, however, to increase the number of missed or late transfers (to adjacent sectors) in the time period immediately after the RA.

David Fisher presented the outcome of the RA Downlink Safety Case performed by HVR Consulting Ltd. The analysis indicated that RA downlink would prevent controller's intervention, increase their situational awareness, and ensure that the RA reports are structured. On the other hand, the study identified 20 safety issues of which the following 4 could not be mitigated by Safety Requirements:

- False downlinks might undermine Controllers' trust in the RA downlink system
- RAs not requiring deviation from ATC clearance might cause excess of information on the screen
- Controllers would not be able to issue clearances to aircraft, even when such clearances would not conflict with an RA
- Conflicting voice and RA Downlink reports would confuse the controller

From the evidence gathered, the Safety Study concluded, there is a net positive benefit of RA Downlink if all proposed Safety Requirements can be satisfied.

Christoph Gilgen introduced the view of IFATCA (International Federation of Air Traffic Controllers' Associations) on RA downlink. While IFATCA is in principle opposed to RA downlink, the Association welcomes the work conducted by EUROCONTROL and if RA downlink becomes mandated IFATCA would accept it if specific criteria are met. Those include resolving the controller responsibility issues, ensuring a minimum downlink delay, addressing downlink messages to the appropriate working stations, reduction of nuisance alerts and consistency with other ground based safety nets.

The final presentation by Stan Drozdowski briefly discussed proposed future steps. Those steps would include RA downlink monitoring to determine the number of RAs, operational circumstances and any frequent transponder problems (e.g. contributing to false downlink). Also, ICAO regulations and interactions with STCA need to be addressed.

He pointed that an RA downlink capable ATC system is already commercially available and in the implementation phase. Therefore, there is an urgent need to establish whether and how RA downlink should be operationally used.

The last workshop session was dedicated to discussing the future of RA downlink. Several participants expressed their views. While some of them were sceptical whether RA downlink will deliver the perceived benefit, or were concerned that RA downlink would bring new problems, the consensus was rather clear – more research and consultation with Stakeholder are required.

Questionnaires were distributed to the attendees to collect their views about the RA downlink concept, future steps and the workshop. The summary of the questionnaires results can be found in the appendix.

In his closing remarks, Martin Griffin stated that EUROCONTROL will undertake the task to define future plans for the investigation of RA downlink and present that plan to Stakeholder for their endorsement through working groups and individual consultation process. He also reminded that several problem areas mentioned in the discussion are not inherent to RA downlink – these issues are today's reality and the objective should be to alleviate these problems.

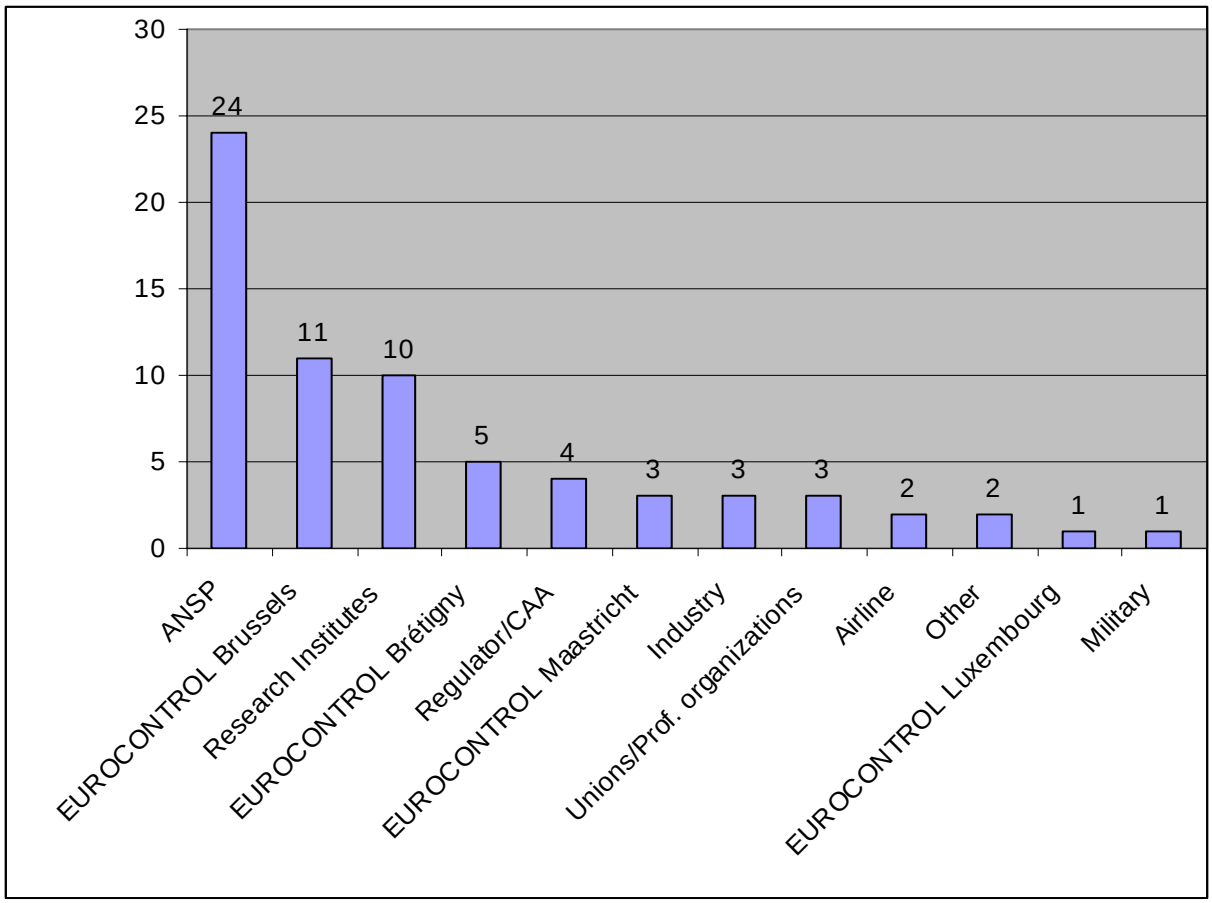
For further information regarding the workshop (presentations, questionnaire results, agenda, information about the participants and speakers) please visit:
www.eurocontrol.int/ra-downlink

All final reports will also be available on our website once the review process is complete.

Appendixes

1. Workshop attendees by organization type
2. Meeting notes
3. Questionnaire results
4. Comments and opinions from the questionnaire regarding future steps

Appendix 1 – Workshop attendees by organization type



Appendix 2 – Meeting Notes – Key Points Made by Attendees

This is a summary of the questions and discussions sessions in sequential order.

Session 1, following the Pilot's View, Controller's View and the FARADS Background & Objectives presentations:

- Skyguide (Switzerland) considers that estimates about current situation (number of RAs, …) are not sufficient for a full safety case.
- European Commission points out that the focus is only on real-time use; RA Downlink can also contribute to general safety improvements.
- European Commission points out that economic aspects need to be considered.
- MUAC (EUROCONTROL Maastricht) reminds of training/knowledge problems for ATCO and pilot; RA Downlink could contribute to improving awareness.
- MUAC insists that the main issue is that responsibilities must be clarified.
- DSNA (France) points out the importance of training (re. RITA); replay of events to controllers is important.
- DSNA stresses the need for a good (procedural) solution for the current problems (can't wait for technical improvements) and fears that FARADS could delay this.
- Alex Vink (EUROCONTROL retired) requests clarification of term "defining moment" (this comes back later in the context of latency: confusing).

Session 2, following the Other RA Downlink Work, Technical & Latency presentations:

- European Commission seeks clarification regarding the assumptions and conclusions of the Helios study (re. dedicated ground network); further states that an economic case is needed taking into account the existing infrastructure; the mode S programmes in ECAC area, the needed software changes in the systems, etc.
- European Commission states that there is a need for clarification of "false alarms" (not being just a cockpit issue).
- European Commission pointes out that responsibility issues could be resolved through European Measures.
- DSNA expresses the opinion that responsibilities are clearly defined (bottom line: the sooner ATC is advised, the better).
- European Cockpit Association supports the DSNA opinion.
- European Cockpit Association requests a clarification regarding the QinetiQ presentation of the Latency Study ("Are you advocating ATC intervention?").
- European Cockpit Association reminds that RA downlink was covered in SARPs from the beginning and is surprised that the available information is not used in the ground system.
- Skyguide points out that there is a gap between ceasing to be responsible and becoming aware.

- Skyguide asks several detailed questions about the QinetiQ presentation (realism of expecting ATC intervention; difference between operational and safety scenario; assumptions on tracking).
- MUAC requests clarification regarding the Helios presentation (downlink in case of RA changes).
- IANS (EUROCONTROL Luxembourg) questioned the usefulness of RA downlink in respect of avoiding conflicting instructions (if conflicting instruction is issued before the downlink information is displayed).
- DSNA supports the claim that RA downlink significantly increases situational awareness. It does not support other usage (involvement/intervention), what we are discussing in this workshop.
- European Cockpit Association considered latency to be key: RA downlink can't cover all cases but contributes to reducing the "grey zone" (considering the dynamics of the situation, reducing the "grey zone" is better for all parties).

Session 3, following the presentations of simulations results, Safety Case and IFATCA (International Federation of Air Traffic Controllers' Associations) view:

- Discussion arises regarding responsibility in case if the pilot does not follow an RA. DSNA considers that the responsibility is clearly in the cockpit; IFATCA referred to Doc 4444 to point out ATCO responsibilities.
- European Cockpit Association (invited by chair) briefed the workshop on its written policy (existing since 2004; coordinated with but different from IFATCA policy): conform existing Annex 10 (at least 15 years) there are provisions for RA downlink which must be used to improve situational awareness (HF considerations to be taken into account).
- Skyguide questions: a) what happens when a controller sees an RA on the screen and does not react and an accident happens? b) if there should be a requirement for legal recording.
- IANS pointes at inconsistencies in ICAO documents.
- Some debate/clarification about the differences between the IFATCA "5 seconds" requirements and the outcome of the latency study.
- MUAC requested clarification about the typical time between RA occurrence and start of manoeuvre. Later, Thierry Arino (Sofreavia) talks about pilot responses based on their recent ASARP study (ACAS Safety Analysis Post-RVSM Project) using a slide from 30 May set.
- European Cockpit Association pointes out that safety studies should also address the existing situation (underlying issues must be solved first and there is not yet a broad consensus how to solve them; then, the technical solution should mirror the operational consensus).
- HVR states that, under current regulations, the moment when responsibility of separation shifts from ATC to pilot is unclear.
- European Cockpit Association objects to the notion of shift of responsibility (pilot is never responsible for "separation", and warned against mixing operational and legal aspects (for example, in Class E airspace there are no specific rules but the pilot is still responsible although this is not always realistic).

- IFATCA pointed out that ICAO is working to remove existing problems and fears that RA downlink would bring unknown new problems.
- Skyguide stated that the fact that different interpretations exist doesn't imply that a procedure is wrong and warned against using existing problems as show-stoppers (Skyguide considered that there are certain benefits for RA downlink and pointed out that that no clear show-stoppers were identified).
- MUAC reminded of the Delta case in the Netherlands and Linate (local legislation takes precedence over ICAO regulations; bottom line is "duty of care" which is complicated by RA downlink).
- John Law (EUROCONTROL Mode-S & ACAS Programme Manager) clarified the PANS ATM and PANS OPS alignment process (State Letter expected by end 2006).
- European Commission clarified that ICAO regulations are not binding and therefore offer no legal protection; SES regulations would be different.
- FACT (Flick Aviation Consultancy and Training) reminded of the many existing misconceptions and hence the need for training (engine failure experienced less frequently but trained far more); action should focus on preventing RAs (e.g. by auto-reducing vertical rate during last 1000 feet).
- DSNA reminded that prevention was discussed at many occasions; ATC is well placed to achieve reductions (e.g. 2000 feet minimum to solve hot spots close to Orly), but prevention by Pilot of Aircraft is much more difficult.
- European Cockpit Association supports all initiatives to prevent RAs but reminds that RA frequency can be a sign of implicit safety problems.
- European Cockpit Association stressed the importance of the verbal report (if the obligation for verbal reports would be removed, European Cockpit Association would not support RA downlink).

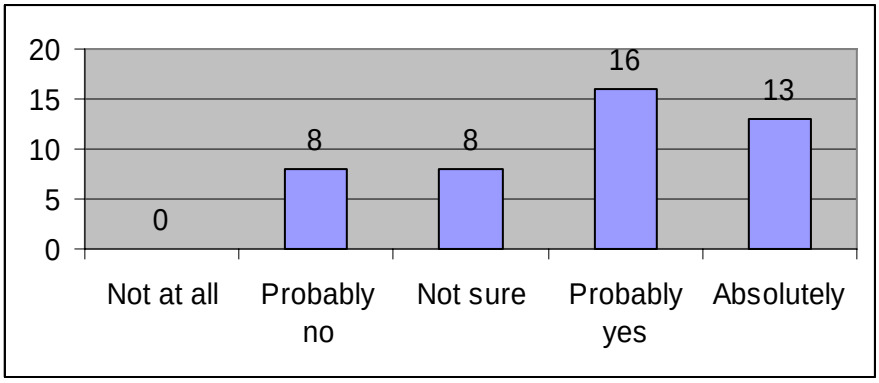
Session 4, following the future steps:

- European Cockpit Association stressed the importance of addressing the issue not only in Europe but also World-wide; ICAO involvement needed.
- Skyguide suggested to involve bodies like SPIN (we do not need only operational procedures but also specifications) and APDSG, and to take sufficient time.

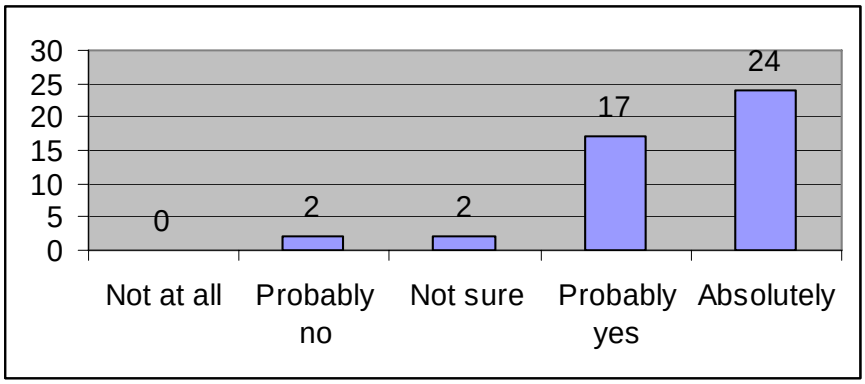
Appendix 3 – Questionnaire Results

45 questionnaires were returned.

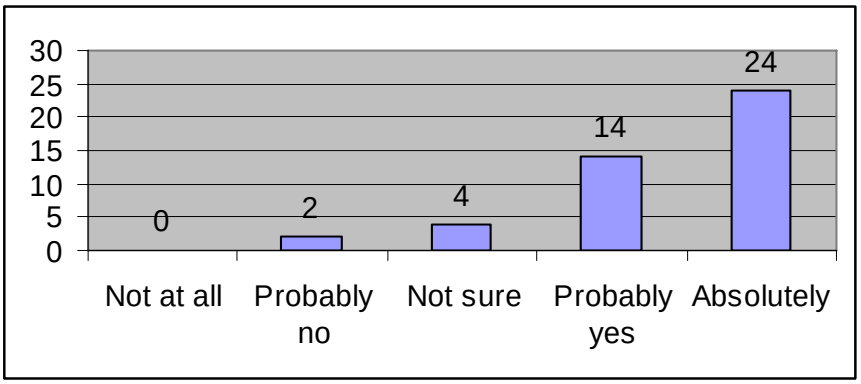
Q1. After the workshop, do you believe that there are operational and/or safety benefits of displaying RA downlink information to the controller?



Q2. Do you see a need for more research on RA downlink?

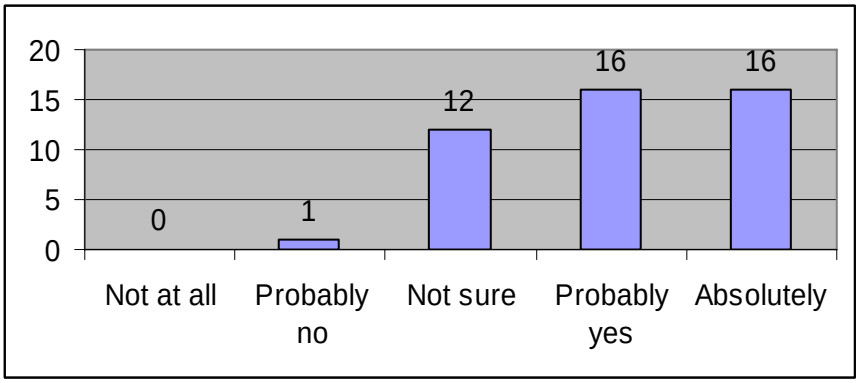


Q4. Is there a need for future consultations with Stakeholders before the decision to implement RA downlink or not is made?

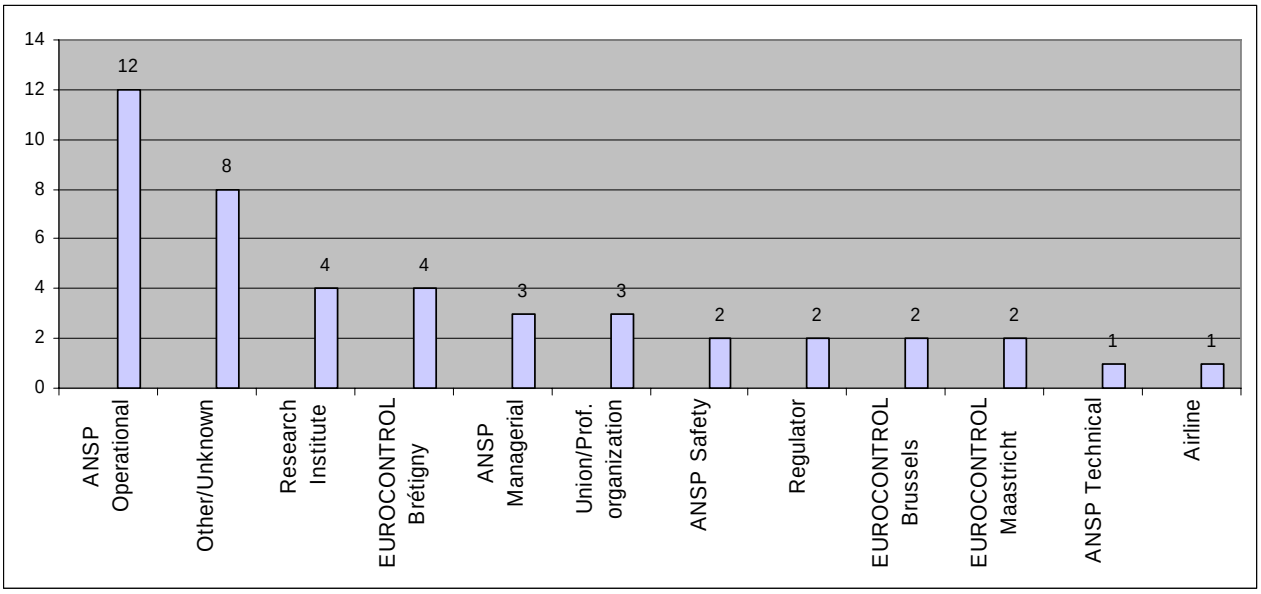


Note: one missing answer.

Q6. The objective of the workshop was to present the results of the Feasibility of ACAS RA downlink. Did the workshop meet its objective?



Questionnaire responses by organization type:



Appendix 4 – Comments and Opinions from the Questionnaire Regarding Future Steps

From the comments and opinions submitted in the questionnaires, the following clusters of possible future activities were derived;

Operational & Technical Monitoring
More live data from ECAC in needed for evaluation (number of RAs, distribution, etc.)
Establish the quality of downlinks (number of false and nuisance downlinks).
Identify transponder problems.
Analyse RAs in the context of traffic situations.
Analyse quality of pilot reports and responses.

Legal issues
Work on clarification of legal responsibilities.
Ensure clarity TCAS procedures.
Consider ICAO PAN-OPS clarifications.

Technical issues
Find the optimum technical solution (coverage, availability, cost, latency).

Operational issues
Define procedures for controller when RA is displayed.
Work on HMI issues (filtering of RAs, details of RA, show direction or not, termination of RA, reversals).
How RA downlink would interact with STCA?

Human Factors
Determine if too much information on the screen is a big problem.
How to avoid information overload?

Safety Case
Review based on monitoring results.
Build contingency tree.

Business Case
Determine the cost of implementation.

Other
Investigate what happens today after an RA.
Determine impact of downlink in the high density areas.
Quantify benefits.
Evaluate impact of partial implementation (some areas have it, some don't).
Study the reasons of current incompliance.
Analyse the impact of TCAS on current and future pilot/ATCO cooperation.