

**Research, Engineering and Development Advisory Committee (REDAC)
Holiday Inn Rosslyn Westpark Hotel
1900 North Fort Meyer Drive, Arlington, VA
Meeting Minutes**

October 30-31, 2001

On October 30-31, 2001, the Federal Aviation Administration (FAA) Research, Engineering and Development Advisory Committee (REDAC) held a meeting at the Holiday Inn Rosslyn Westpark Hotel, in Arlington, Virginia. Attachments 1 and 2 provide the meeting agenda and attendance, respectively.

Tuesday, October 30

Welcome and Introductory Remarks

Dr. Herman Rediess, Executive Director and Designated Federal Official of the Committee, read the public meeting announcement.

Dr. Deborah Boehm-Davis, REDAC Chair welcomed members and visitors. She also welcomed a new member to the REDAC, Dr. John McCarthy. Dr. McCarthy is Manager for Scientific and Technical Program Development at the Naval Research Lab in Monterey, California. Dr. McCarthy will serve on the Air Traffic Services Subcommittee.

Meeting Objectives

Dr. Rediess provided a review of the meeting objectives. One of the primary objectives of the meeting was to develop Committee guidance on the FY 2004 budget including hearing reports from the six standing subcommittees. In addition, the Committee would hear reports from the ad hoc Small Aircraft Transportation System (SATS) Subcommittee, chaired by Mr. Ron Swanda and from Mr. John Zugschwert on the Tilt Rotor report. The Committee would also have a joint session with NASA's Aerospace Technology Advisory Committee (ATAC).

Ad Hoc Subcommittee on Security

As a result of the tragic events on September 11, 2001, Administrator Jane Garvey reconstituted the Subcommittee on Aviation Security into an Ad Hoc Security Subcommittee to evaluate security related research ideas and capabilities resulting from the thousands of solicited and unsolicited recommendations on how to mitigate attempted acts of terrorism. These recommendations to the FAA came from private enterprises, universities, other government agencies, private consultants, other governments, citizens, and elements within the FAA. The Ad Hoc Security Subcommittee is comprised of the REDAC Security Subcommittee members, the other REDAC subcommittee chairs, four Aviation Security Advisory Committee (ASAC) members, selected DOD and Boeing representatives and a representative from the Aviation Consumer Action Project. The ad hoc subcommittee was tasked to provide an independent technical review of these concepts, followed by recommendations with an initial report to the Administrator on November 26, 2001 followed by a formal report in early 2002.

Subcommittee Chairman Mr. John Klinkenberg summarized the subcommittee's activities. He commented that the subcommittee did not confine itself to finding boxcutters; rather, it had concentrated on the concept of the technologies and the mentality for mitigation needed to expand into areas of biochemical terrorism and missiles. Relative to the scope and objectives of the ad hoc group, Mr. Klinkenberg explained how this research would be broken down into six different task teams or "categories" with team leads, and further subdivided by various considerations.

Mr. Klinkenberg also stated that the FAA Administrator wants the Security Subcommittee to move as quickly as possible towards a goal of 100% screening of bags and passengers. That process would be accelerated with better technologies and the proper people.

Standing Subcommittee Reports

Each year in September/October, the Committee provides guidance on how the FAA should invest its R&D funds. This year's guidance applies to FY 2004 R&D investments. FAA uses these recommendations to prepare its investment portfolios, which are presented to the standing subcommittees in the February timeframe and the REDAC at its April meeting.

Each standing subcommittee chairman presented guidance on behalf of his subcommittee. Attachment 3 provides these reports. The presentations included the following:

Human Factors	Dr. John Hansman
Environment & Energy	Mr. Jim DeLong
Aircraft Safety	CPT Chester Eckstrand (for Dr. Lou Mancini)
Airport Technology	Mr. Richard Marchi
Air Traffic Services	Mr. Paul Drouilhet

Comments

Mr. Steve Zaidman, FAA Associate Administrator for Research and Acquisitions, spoke briefly about the challenges facing the agency. In light of the terrorist incidents, the FAA needed to understand the faltering interests and the economics of the industry and to rethink Security R&D. It may require years to get to pre-September 11 levels. The agency was continuing to push forward with Global Positioning System (GPS) equipage (although this may be delayed), Free Flight and Conflict Probe, business jets in the airspace mix, and balancing environmental issues.

Update on R&D Investments and Response to Recommendations

Dr. Rediess updated the Committee on the R&D Investments. He also provided an interim response to the Committee recommendations from the July 10 letter to Administrator Garvey.

Adjourn

Dr. Deborah Boehm-Davis adjourned the meeting at 5:00 p.m.

Wednesday, October 31

Dr. Herman Rediess read the public meeting announcement.

Status Report on the Small Aircraft Safety Transportation System (SATS) Subcommittee

At the April 12, 2000 joint REDAC/ASTAC meeting the Committee approved the terms of reference to form an ad hoc SATS Subcommittee chartered under REDAC for one year through April 2001. On April 17, 2001 the Committee voted to approve the continuation of the SATS Subcommittee under the REDAC according to the proposal presented by former Chairman, Mr. Paul Fiduccia. Mr. Ron Swanda, new Subcommittee Chairman will coordinate the charter for REDAC approval.

A recommendation was made that the FAA should undertake a study to see what it needs to do about SATS and its potential impact on the National Airspace System.

Final Report by Tiltrotor and Advanced Rotorcraft Technology in the National Airspace System (TARTNAS)

On September 12, 2000, Mr. John Zugschwert presented his draft report, Tiltrotor and Advanced Rotorcraft Technology in the National Airspace System (TARTNAS). The Committee discussed concerns regarding the report and Mr. Zugschwert continued working with the Subcommittee to address the concerns.

On September 18, 2001, Mr. Zugschwert forwarded a letter to the REDAC addressing concerns about the report and explaining his study over the past two years (Attachment 4). The REDAC agreed to forward the report to the Subcommittees for consideration since some of the research/work was already being done. The report will also be transmitted to the Administrator.

Final Committee Guidance

The REDAC agreed the following topics would be included in a letter to the FAA Administrator. Among the items discussed were: (Final letter attachment 5)

- An urging of attendance and participation at REDAC meetings by the senior leaders of the agency.
- The possible impact of the newly-formed Performance Based Organization (PBO) on the ATS Subcommittee.
- Questions concerning the viability of long-term research.
- Strengthening NASA's relationship with the FAA and vice versa.
- The impact of security issues on other research programs.
- The capacity issue still being unresolved.
- Collateral benefits of research products, especially weather products to the military.
- The restoration of wake vortex to previous funding levels.
- A systems engineering approach for the whole National Airspace System (NAS) which involves the hiring of the right people.
- A proposed noise study suggested by the Environment & Energy Subcommittee.
- A retrospective analysis of research to determine past successes and failures.
- Consideration of a military-type budget program, patterned after the DOD.

The REDAC approved the creation of a one-year ad hoc subcommittee to investigate Centers of Excellence and their relationships with universities and how the funding mechanisms work to do research and train personnel. Doctors John Hansman and David Ashley were tasked to coordinate establishment of the ad hoc subcommittee and prepare a charter.

Joint Meeting of the FAA Research, Engineering and Development Advisory Committee (REDAC) and the NASA Aerospace Technology Advisory Committee (ATAC)

On Wednesday afternoon, October 31, 2001, the Federal Aviation Administration (FAA) Research, Engineering and Development Advisory Committee (REDAC) and NASA's Aerospace Technology Advisory Committee (ATAC) held a joint meeting at the Holiday Inn Rosslyn Westpark Hotel, Arlington, Virginia.

Opening Remarks

Dr. Deborah Boehm-Davis, Chair of the FAA's REDAC, and Mr. David Swain, Chairman of NASA's ATAC, opened the meeting by welcoming members and visitors.

Terrorist Mitigation Research and Development

Dr. Herman Rediess presented a summary of the recent terrorist mitigation task, assigned by Administrator Jane Garvey. The task involves identifying and categorizing technologies and readiness levels since the September 11, 2001 attacks on aviation. Input was received at the FAA and provided from FAA, NASA, other government agencies, academia, private citizens, and industry. This information was then collected into a database for analysis.

Dr. Rediess concluded saying:

- The REDAC Security Subcommittee would be used for evaluation and recommendation of technologies. An ad hoc "security subcommittee" comprised of REDAC Security Subcommittee members, chairmen of other REDAC subcommittees, and security experts from government and industry. This subcommittee was to deliver recommendations to the FAA Administrator.
- An FY 2002 budget supplemental would address financial needs to meeting heightened aviation security concerns.
- In reference to the database, there were many good suggestions, but few practical novel concepts.
- The external suggestions reinforced the FAA's R&D efforts and plans.
- Security scenario-based operational concepts would be needed for assessing technology options.

Blueprint for Aeronautics

Mr. Sam Venneri, Associate Administrator for Aerospace Technology, reported on NASA's Blueprint for Aeronautics. This document, to be published in November, 2001, attempts to

affect national policy to articulate justification for the FY 2003 budget. Among the topics covered:

- The government's near-termination of NASA's involvement in aeronautics, specifically their air traffic management program. NASA has no plans to abrogate the air traffic management program.
- NASA is currently undergoing a strategic resource review by OMB that will look at performance, budget, and efficiencies.
- Commercial aviation is on the rise.
- A business plan with NASA programs.
- The danger of spending future dollars to place in today's programs would likely prove disastrous.
- The challenge from the Europeans.
- NASA's partnerships with the DOD.
- NASA's partnerships with universities.
- Research continues on supersonic flight, utilizing new technologies like faster engines, nanotechnology, and airframes.
- IT change states.
- Rethinking matters since September 11th.

Mr. Venneri was asked how REDAC could support NASA's R&D budget, he responded that the joint FAA/ATAC meeting is a method to move things forward.

Status of AOS – Icing Project

Mr. Chris Seher, Director, Airport and Aircraft Safety R&D Division, updated the members on the AOS-Icing Project. He stated that we have an integrated plan to coordinate research programs. Topics discussed:

- Mapping the FAA/NASA's icing plans (Document in-draft, due mid-November).
- Enhancement of icing simulation methods (working with the Air Force).
- Education and training activities (An In-flight Icing Guide for pilots, pending legal review).
- A NASA-developed icing video review.
- Pursuing more efficient and effective icing protection systems.
- Exploring efforts internationally, specifically in Russia and the Commonwealth of Independent States (CIS).

Mr. Seher mentioned the first FAA Center's of Excellence Conference would be held in Cincinnati on November 13-15, 2001.

Aviation Safety Reporting System (ASRS) Subcommittee Report

Mr. Ron Swanda (speaking for Brian Wygle) briefed the committees on the ASRS. The ASRS is a 25-year program, tracks safety-related incidents in the aviation system and coordinates them into a large database. The database has its enthusiasts, but budget cuts have hindered the program's ability to enter data and produce analysis. Dr. Rediess pointed out that the FAA was waiting for an internal NASA review.

Aviation Safety Reporting System (ASRS) NASA Review

Mr. Herb Schlickemaier, Program Operations Lead at NASA, updated the members on the extensive ASRS review conducted at NASA. After conducting an exhaustive review it was recommended that the program take on an annual review (on improving to measure progress against the actions).

Commission on the Future of the U.S. Aerospace Industry

Mr. Charlie Huettner, Office of Science and Technology Policy (OSTP) (speaking for Chairman Robert Walker), updated the members on the Commission and on the Future of the United States Aerospace Industry. Mr. Huettner reviewed the objectives and scope of the Commission. He stated the Commission intends to examine opportunities for significant advances in aerospace capabilities, identify the changes taking place globally that can potentially impact the U.S. aerospace enterprise and expand its scope to include national aeronautics R&D facilities and the air traffic management system.

Budget Synopsis: Enacted FY 2002, FY 2003 Outlook, and FY 2004 Status

Dr. Rediess presented the FAA R&D budget and noted that the FY 2002 budget had not yet been enacted. Near-term security enhancements are being considered in the Facilities & Equipment (F&E) and R&D budgets for FY 2002.

Mr. Terry Hertz presented NASA's R&D budget. He stated, among other things, that:

- NASA is re-structuring their aeronautics program.
- Information technology and communications technology would be combined and now known as Computing, Information, and Communications Technology.
- Icing was moved into the Safety Program for FY 2003.
- NASA's ATM program had picked up some space-based long-term research.
- The rotorcraft program was deleted as not far-term-looking enough.

Future Activities

Dr. Boehm-Davis and Mr. Swain agreed that the next joint meeting would be held on April 18, 2002 at the Holiday Inn Rosslyn Westpark Hotel. In addition, the respective subcommittee chairs would examine proposals for joint meeting. Discussions also concerned cooperation between the committees on matters of SATS research, aircraft safety, and technology transfer. The chairs will work together to ensure NASA's participation in the newly formed REDAC ad hoc subcommittee that will examine the effectiveness of university aviation research programs.

Adjourn

The chairs thank the members and the meeting was adjourned at 4:45 p.m.

**Research, Engineering and Development (R,E&D) Advisory Committee
Holiday Inn Rosslyn Westpark Hotel
1900 North Fort Myer Drive, Arlington, VA 22209
(703) 807-2000 Fax: (703) 522-7480**

October 30-31, 2001

Tuesday, October 30

9:00 – 10:00 a.m.	Welcome and Introductory Remarks - Welcome Dr. John McCarthy	Dr. Deborah Boehm-Davis, Chair Mr. Steve Zaidman, FAA Dr. Herman Rediess, FAA
10:00 – 10:15 a.m.	Meeting Objectives	Dr. Herman Rediess, FAA
10:15 – 10:45 a.m.	Subcommittee on Aviation Security	Dr. John Klinkenberg
10:45 – 11:00 a.m.	BREAK	
11:00 – 11:30 a.m.	Subcommittee on Human Factors	Dr. John Hansman
11:30 – 12:00 noon	Subcommittee on Environment & Energy	Mr. Jim DeLong
12:00 noon	LUNCH	
1:00 – 1:30 p.m.	Subcommittee on Aircraft Safety	Dr. Lou Mancini
1:30 – 2:00 p.m.	Subcommittee on Airport Technology	Mr. Richard Marchi
2:00 – 2:30 p.m.	Subcommittee on Air Traffic Services	Mr. Paul Drouilhet
2:30 – 2:45 p.m.	BREAK	
2:45 – 3:30 p.m.	Update on R&D Investments Response to Recommendations	Dr. Herman Rediess, FAA
3:30 – 5:00 p.m.	Committee Discussion on Guidance	Members
5:00 p.m.	Adjourn	

Wednesday, October 31

10:00 a.m.	Convene Meeting	Dr. Deborah Boehm-Davis, Chair Mr. Steve Zaidman, FAA Dr. Herman Rediess, FAA
10:05 – 10:30 a.m.	Status Report on SATS Subcommittee	Mr. Ron Swanda
10:30 – 10:45 a.m.	Final Report by Tiltrotor and Advanced Rotorcraft Technology in the National Airspace System (TARTNAS)	Mr. John Zugschwert
10:45 – 11:55 a.m.	Finalize Committee Guidance	Dr. Deborah Boehm-Davis, Chair
11:55 – 12:00 noon	Future Committee Activity and Adjourn REDAC Meeting	Dr. Deborah Boehm-Davis, Chair

12:00 noon LUNCH

**Joint Meeting of the
FAA Research, Engineering and Development Advisory Committee (REDAC) and the
NASA Aerospace Technology Advisory Committee (ATAC)
Holiday Inn Rosslyn Westpark Hotel
1900 North Fort Myer Drive, Arlington, VA 22209
(703) 807-2000 Fax: (703) 522-7480**

Wednesday, October 31

1:00 – 1:15 p.m.	Convene Joint Meeting of the NASA ATAC and FAA REDAC and Opening Remarks	Dr. Deborah Boehm-Davis, Chair REDAC Mr. David Swain, Chair ATAC (incoming) Mr. Jim Sinnett, Chair ATAC (outgoing) Mr. Sam Venneri, NASA Mr. Steve Zaidman, FAA
1:15 – 1:40 p.m.	Blueprint for Aeronautics	Mr. Sam Venneri, NASA
1:40 – 2:20 p.m.	Terrorist Mitigation Research and Development	Dr. Herman Rediess, FAA
2:20 – 2:30 p.m.	Status of AOS – Icing Project	Mr. Chris Seher
2:30 – 2:45 p.m.	Aviation Safety Reporting System Subcommittee Report	Mr. Ron Swanda
2:45 – 3:30 p.m.	Aviation Safety Reporting System NASA Review	Mr. Herb Schlickemaier
3:30 – 4:00 p.m.	Commission on the Future of the U.S. Aerospace Industry	The Honorable Robert Walker
4:00 – 4:45 p.m.	Budget Synopsis: Enacted FY 2002 and FY 2003 Outlook	Dr. Herman Rediess, FAA Mr. Terry Hertz, NASA
4:45 – 5:00 p.m.	Future Activities	Dr. Deborah Boehm-Davis, Chair REDAC Mr. David Swain, Chair ATAC (incoming)
5:00 p.m.	Adjourn	

**Research, Engineering and Development Advisory Committee
Oct. 30-31, 2001**

Attendance

Members

REDAC Members

Dr. Deborah Boehm-Davis, Chair
Dr. David Ashley
Dr. Mike Benzakein
Mr. Jim DeLong
Mr. Paul Drouilhet
Capt. Chet Ekstrand
Dr. John Hansman
Dr. Joseph Jackson
Mr. John Kern
Mr. John Klinkenberg
Mr. Richard Marchi
Dr. John McCarthy
Mr. Ronald Swanda
Mr. Robert Pearce
Mr. Sam Vennieri
Dr. Hans Weber
Dr. Andres Zellweger

ATAC Members

Mr. David Swain, Chair
Dr. Mark Anderson
Dr. Dev Bannerjee
Cap. Robert Buley
Dr. Ed Crow
RADM Timothy Heely
Dr. John Junkins
Dr. Norris Krone
Mr. Robert Spitzer

Audience

Edward Gervais, Boeing
Virginia Embrey-Brock, FAA
Doug Hodgkins, FAA/BAE
William Hoover, ASEB
Jim White, FAA
Frank Petroski, MITRE/CAASD
Aston McLaughlin, FAA
Raymond LaFrey, MIT/LL
Aaron Gellman, NWU
Rick Burdette, FAA
Steve Luckey, ALPA
Mike Gallivan, FAA
Ed Feddeman, Science Cmte.
Dick John, Volpe
Mari Peterson, SRI Int'l.
Martin Pozesky, FAA
Bob Mecure, NASA
Mary Ellen-McGrath, NASA
John Zugschwert, Self
Mark Anderson, Boeing
Chuck Friesenhahn, FAA
Darrel Tenney, NASA Langley
George Levin, NRC
Charlie Huettner, OSTP
Odilyn Santa Maria, NASA
David Wildes, HQDA ASA

George Greene, FAA
Sharon Darnell, FAA
Satish Agrawal, FAA
David Cross, FAA
Randy Stevens, FAA
Chris Seher, FAA
Paul Polski, FAA
Geoff Mumford, APA
Warren Fellner, FAA
Jim Jones, FAA
Vince Schultz, NASA
Joan Kansier, FAA
Gloria Kulesa, FAA
Paul Jones, FAA
Tammy Jones, FAA
Nick Stoer, Self
Chas Willits, NASA
Jennifer Jones, USRA
Ed Spitzer, Volpe
Satish Agrawal, FAA
Joan Anoz, NASA
Paul Fiduccia, SAMA
Gerald Seidel, NASA
Terence Hertz, NASA
Denise Davis, FAA
Latonia Sewell, CSSI

Susan Hallowell, FAA
Paul Dykeman, FAA
Wilson Felder, FAA
Karen Stewart, FAA
Chuck Ruehle, FAA
James Rogers, FAA
Carmine Primeggia, FAA
Wayne McKenzie, FAA
William Edmunds, ALPA
Lyle Malotky, FAA
Peter Toman, FAA
Jim Washington, FAA
Chuck Johnson, NASA
Jeff Rapol, FAA
Roy Reichenbach, NASA
Sieg Poritzky, Consultant
Robert Norwood, NASA
Steve Pansky, FAA
Jim Risser, ARREON Corp.
Robert Anoll, FAA
Benjy Newman, NASA
Dave Balderson, FAA
Ralph Beaty, NASA
H. Schlickemaier, NASA
John Junkins, Texas A&M
Tom Hetrick, BAE

Research, Engineering and Development Advisory Committee
Guidance for FY 2004

October 30, 2001

Subcommittee on Air Traffic Services
Mr. Paul Drouilhet, Chairman

IMPLEMENTATION FUNDING

Observations

There are numerous instances in which F&E funds have not been programmed to implement the results of R&D programs. This has resulted at best in a significant delay in benefiting from the results of the R&D, and at worst in losing completely the benefits, and the consequent waste of the resources put into the associated R&D.

Current examples include products of the aviation weather research program, whose implementation is held up pending the availability of F&E funds, and the RSLS (runway status light system) for which no implementation funds have been programmed.

Recommendations

The ATS Subcommittee recommends that the FAA put “wedges” into future-year F&E budgets which anticipate successful completion of R&D activities and provide for their expeditious operational implementation. The exact way in which this is done needs to be examined in light of the planned creation of the Performance-Based Organization. It is imperative that the FAA/PBO generate a goal-driven R&D process to guide the R&D programs of the various business units within the PBO.

WAKE VORTEX R&D

Observations

The ATS Subcommittee continues to believe that wake vortices represent a substantial capacity-reducing phenomenon, and that it is important to carry out R&D activities to determine how and under what conditions wake-vortex-based arrival and departure spacings can be reduced without compromising safety. The reduction in funding from the originally-planned \$3.5M/yr to \$1M/yr will result in a sub-critical program, one which can make no real progress. The ATS Subcommittee notes that the Europeans appear to have recognized the importance of this area, and are carrying out an aggressive, well-funded effort, with about \$125M planned over the next 5 years. We also note that the U.S. industry has advocated \$5M/yr for this effort. While the U.S. can benefit from the results of the European work, we believe that it is essential that the U.S. have its own aggressive program.

Further, the ATS Subcommittee is concerned that moving the wake vortex activity under the aviation weather program will reduce management visibility of this important activity, and will cause the wake vortex program to have to compete directly for funds with other important elements of the aviation weather program.

The ATS Subcommittee is aware that CAASD and MIT Lincoln Laboratory have recently completed a joint wake vortex assessment. At the time of the Subcommittee meeting, the results of this assessment had not yet been presented to the FAA, and so could not be released to the Subcommittee.

Recommendations

The ATS Subcommittee recommends that the funding for the wake vortex program be restored to \$3.5M/yr, and that the FAA reexamine specific goals and priorities within the wake vortex program based on the results of the CAASD/Lincoln Lab assessment. The FAA should also revisit the question of how and where the program should be managed within the FAA.

NEXTOR

Observations

Several years ago the FAA established NEXTOR, a university-based center of excellence for aviation operations research. The purpose was to create a mechanism for taking advantage of the expertise of the faculty and (primarily graduate) students at the affiliated universities, and to provide a means of encouraging and supporting graduate students to pursue aviation-related studies. The initially-stated intent was to provide a core funding of \$500K/yr, to be augmented by direct funding for specific projects. However, this core funding was provided only in the first year. Since then NEXTOR has had to “live” on what could be obtained for specific projects. This has severely limited the ability of NEXTOR to meet its original goals of stimulating university-initiated R&D.

Recommendations

The ATS Subcommittee believes that the NEXTOR concept and goals are sound and worth pursuing, and recommends that the FAA budget for and provide core funding of at least \$500K/yr so that NEXTOR can undertake activities coordinated with the FAA and consistent with FAA’s long-term R&D needs, but which are not appropriate for or yet ready for specific project funding.

MANAGEMENT OF ATS R&D

Observations

The ATS Subcommittee has in the past noted the importance of closely coordinating the ATM R&D activities of the FAA, CAASD, and NASA, and has endorsed the creation of the IAIP (Interagency Integrated Product Team) as a mechanism for this coordination. However, it is concerned about the recent shift of the FAA lead on the IAIP from ARA to AOZ. While AOZ is appropriately focused on near term R&D products in support of Free Flight phases 1 & 2, it

does not appear to currently have the resources or interest to manage the coordination of the R&D directed at longer-term solutions.

Recommendations

The ATS Subcommittee recommends that the FAA designate which organization within the FAA has the responsibility for long-term ATM R&D, and make sure that that organization has the necessary expertise and resources. This organization should manage the overall ATM R&D program, especially the coordination of its in-house activities, the FAA-sponsored activities at CAASD, and the related activities at NASA. As has been noted in the past, the ATS Subcommittee believes that this activity within the FAA needs to be strengthened with additional in-house technical personnel.

GENERAL-AVIATION-RELATED R&D

Observations

NASA is vigorously pursuing an activity to demonstrate the feasibility of a small aircraft transportation system (SATS). This effort is a follow-on to the AGATE program which, among other things, supported the development of enabling technology for small, relatively inexpensive jet aircraft. SATS involves the development of technology to enable a nationwide transportation system based on such small aircraft. Key elements of SATS will be the development of technology and systems to provide enhanced, all-weather access to the many small airports in the US, and to allow large numbers of such aircraft to operate efficiently in the NAS.

If this effort is even partially successful, it will have a profound impact on the US aviation system. Already one company has placed an order for 1000 of these small jets, with the intent of creating a nationwide air taxi system. These and other SATS aircraft will result in a substantial increase in the daily operations in the NAS.

While the R&D on SATS is being led and funded by NASA (with substantial matching industry funds), it is important that the FAA be intimately involved so that SATS evolves in a way which the ATC system can accommodate, and so that the FAA is not caught off-guard by a step increase in demand.

Recommendations

The ATS Subcommittee recommends that the FAA makes available the resources to monitor and guide the NASA SATS program, and to carry out SATS-related activities as appropriate. In particular, the FAA should initiate a small R&D effort to estimate the impact of SATS on the NAS and the further R&D and F&E which would be required to accommodate it.

CLASSIFICATION/CATEGORIZATION OF ATM R&D

Observations

As in the past, the ATS Subcommittee finds the classification of programs as R&D or F&E, and their consequent assignment of budget categories, confusing and irrational.

Recommendations

The ATS Subcommittee reiterates its previous recommendation that the FAA adopt a classification and funding structure similar to that used by the DoD, with categories ranging from Basic Research (6.1) to Engineering and Manufacturing Development (6.5). This provides a useful management tool for tracking and budgeting programs throughout their life cycle, and for ensuring that funds are allocated to and protected in the early research categories (6.1, 6.2). As before, the ATS Subcommittee believes that the creation of the Performance-Based Organization provides an opportunity for creating such a budget structure for ATM R&D.

COOPERATION WITH EUROPE

Europe (specifically the EC) has established an aggressive and well-funded R&D program in CNS/ATM, with the explicitly-stated goal of gaining commercial advantage for European industries in the sale of ATC-related products and systems. The US/FAA needs to recognize this in its dealings with European agencies to ensure a two-way information flow, i.e. to preclude a one-way transfer of US technology to European industry. While cooperative activities are to be encouraged, it is important that these be structured to ensure mutual, not one-sided, benefit.

Correspondingly, the FAA and NASA should work with US industry (e.g. Boeing) to leverage their R&D resources and to enhance the US industry competitive position.

IMPACT OF SEPT 11

The events of Sept 11 have caused an immediate drop in aircraft operations, and an increased emphasis on security. The ATS Subcommittee believes that the decrease in demand is temporary, and should not be used as a rationale for decreasing the already under-funded ATM R&D activities. In particular, the ATS Subcommittee believes that the following efforts are addressing important issues, and should be fully funded:

- Aviation Weather

- Runway Incursion Prevention (especially the runway status light system)

- System-wide information management

- Wake vortex – as discussed above

- Aircraft-derived data extraction (ADDE) – This effort to improve NAS surveillance has security as well as capacity benefits

- Creation of a sound, scientific approach to the development and application of separation standards.

Subcommittee on Security
Mr. John Klinkenberg, Chairman

The tragic events of September 11 cause the subcommittee to relook at its assumptions regarding the structure and direction of civil aviation security. We had originally concluded (August 1, 2001) that FAA R&D funding for Aviation Security was the proper proportion of the FAA's R&D budget, that the allocations within security are about right, and that proper priorities are being addressed. The Sub-committee also made a number of specific recommendations that are still relevant in light of September 11.

The sub committee suggested that FAA should focus on the development and fielding of cost effective technology for automated checked baggage inspection. If progress is not made, the 2009 goal of beginning automated inspection of 100% of the checked baggage will not be achieved. The suggestion was made to examine expanding the scope of CAPPS (approaching the Israeli model) to provide 100% screening but at varying levels of intensity. For example the EDS technology can be operated at several different appropriate software settings which have varying speeds of interrogation and nuisance alarm rates. It was suggested that some high speed (with recognized shortfalls) explosive screening approach should be explored for the terminal entrances to screen all items and people for large bombs. For example people and their belongings could pass through a high volume trace portal. The Panel felt that trace explosive detection should have a greater role in the future.

The concept of Free Flow and systems integration were supported, but FAA was challenged to 'think out of the box', alternatives such as off airport check in and screening will reduce the congestion at the airport. The FAA should explore using a think tank to define the requirements for free flow to move away from the set solutions. The panel encourages a closer collaboration between the policy developers and researchers. AAR needs to proceed in the development of a 5-year R&D strategy. FAA needs to focus the R&D on the where it can realize the greatest impact this can be identified by the careful use of the Total Architecture.

It was suggested that passenger identification was an area FAA could control and investigate. In the Aircraft hardening program work needs to continue to look at additional standoff threats and what can be done to address security issues with developing new airframes. The Human Factors program has advanced tremendously over where it was 3 years ago. The scientists understand and are working on the right problems. The Panel supports the aviation security R&D efforts and affirms the progress made. The Total Architecture coupled with a fleshed out free flow program should help to lead to an integrated program that addresses the greatest threats with high efficiency solutions.

Aviation Security Technology Assessment Effort

FAA Administrator Garvey requested the Aviation Security R&D Advisory sub committee hold a special meeting October 25. At this meeting, working with the chairs of the other RE&D Advisory sub committees, they were to examine and prioritize the many R&D and technology suggestions from the American public and industry in addition to the ongoing FAA and relevant Federal Government research. The group is to assess various technologies and provide short, mid and long term recommendations to achieve the Administrator's goal of preventing harm to aircraft, passengers, and crew as well as support national security and counter-terrorism policy.

Dr. Rediess presented an overview of the total compilation of suggestions that AAR had catalogued to date from a variety of sources. These sources have included government research and ideas, corporate research and current commercial products. Mr. Seher discussed research on improving the performance of aircraft safety, air traffic control, and human factors, which would contribute to improving aviation security. Mr. Polski provided an overview of the current Aviation Security research program. Dr. Rediess provided a compilation of the suggestions from the public and industry sent in to "Tell FAA".

The Assessment team was organized by Chairman Klinkenberg into six task teams chaired by Aviation Security R&D Subcommittee members that were to focus on the breadth of the program effort:

Airport Screening Checkpoints	Nick Cartwright/Colin Drury
Aircraft Hold Areas and Cabin Supplies	John Pennella
Aircraft Security/Hardening & ATC	Capt. Luckey
Data and Identification Systems	John Klinkenberg
Airport Security	Hans Weber
Forward Looking Issues	Len Wolfson

The remainder of the participants present organized themselves into the above teams that were charged with examining, integrating and prioritizing the ideas and products submitted as well as any others contributed by the participants. It was suggested that because of the heavy workloads of all participants and tight schedule that the smaller teams could hold virtual meetings via either teleconference or e-mail. To that end a list of all participants was provided. It was proposed that the security technology assessment team meet as the whole on November 16 and that the subgroups present their recommendations for discussion and concurrence at that date. This would allow a DRAFT report to be forwarded to the FAA administrator by November 21.

Subcommittee on Airport Technology
Mr. Richard Marchi, Chairman

The subcommittee met in Atlantic City on August 28 and 29, 2001 to review the proposed program and budget for the airport technology research program. Presentations by FAA staff on the Research Project Definitions (RPDs) and the accompanying budget requests stimulated a discussion of priorities among subcommittee members.

As has been the case for some years, the largest component of the airport technology research program continues to be in the pavement research area. Given the large historic and continuing investment in airfield pavements by the FAA Office of Airports, the subcommittee confirmed its prior agreement that this emphasis is appropriate. However, schedule and budget adjustments were suggested to permit resources to be devoted to other, also pressing, areas. These suggestions were largely incorporated in the final budget submission (attached).

The first round of pavement testing using the National Pavement Test Facility indicates that, as hypothesized, some of the current FAA design guidance for certain flexible pavements may be overly conservative. It also appears that for certain other types of pavements the testing results confirm the current FAA design methodology. Analysis of the data is ongoing and will lead, eventually, to modification of the pavement design advisory circular to reflect the knowledge gained through this program. The Center of Excellence participants (University of Illinois at Urbana and Northwestern University) are actively contributing to this research.

Runway safety and visual guidance research projects are currently underway in support of FAA's Runway Safety Program. Items ranging from automated taxiway guidance systems to increased conspicuity of airfield vehicles are being evaluated and will be subject of in-service demonstrations under the program.

Wildlife hazard abatement efforts are continuing in cooperation with USDA. Active projects to evaluate the benefits of relocating wildlife, dispersing threats with radar or laser, modifying habitat and predicting population densities in near real-time are all underway.

Airport terminal planning guidance contained in FAA advisory circulars is badly out of date. An effort originally intended to develop new space planning criteria for airport terminals has been re-directed to review the outdated guidance available from IATA and ICAO, and to modify that guidance in light of the research conducted in this program.

Further development of runway safety area improvements is underway. The already successful Engineered Materials Arresting System developed under a CRDA in the airport technology program, is being refined with the development of blast-resistant coatings that will allow these devices to be installed very close to the runway threshold. This will provide additional protection against overruns at airports like LaGuardia, where space is critically limited.

Winter runway friction research is continuing in a joint effort involving NASA, Transport Canada and, recently, the Frankfurt airport. Continental Airlines has adopted research on infrared deicing of aircraft previously developed under CRDA in the airport technology program at their Newark airport facilities.

Work continues to acquire data on the distribution of deviations from taxiway centerline experienced by large aircraft in service. This is critically needed to allow for reconsideration of taxiway clearances in light of the planned introduction of the Airbus A-380 aircraft to U.S. airports, commencing in 2005/6. Ultimately, this work is expected to support development of a risk-based methodology for determining wingtip clearances on taxiways and aprons.

Finally, work is underway in the Airport Rescue and Fire Fighting area to address several pressing issues. As ARFF vehicles have become heavier and faster, the industry has been experiencing an increase in rollover accidents. Research is underway with vehicle manufacturers on suspension system modifications to resolve this problem. The problem of accessing and evacuating large numbers of passengers from a second level deck has been made more acute by the introduction of the Airbus A-380 and research in this area is underway. A recent action by EPA has led the manufacturers of the most commonly used fire-fighting foam to discontinue production. Pressing research is underway jointly with the DoD to quickly identify and test a replacement foam fire-fighting agent.

Subcommittee on Aircraft Safety
Capt. Chet Ekstrand, Chairman (for Dr. Louis Mancini)

- Subcommittee met Oct. 3, 2001
- Objective:
 - Review FY03 portfolio and FY01 accomplishments
 - Provide recommendations where Aircraft Safety R&D could address events of 9/11

FY 01 MAJOR ACCOMPLISHMENTS

- Report on Intrusive Inspection of Aging Wiring submitted to Rulemaking Advisory Committee.
- Developed arc fault circuit breaker and completed ground and flight testing.
- Designed and fabricated an airborne hollow fiber membrane (HFM) ground based inerting (GBI) system for center fuel tank protection ground tests in B747 airplane.
- Delivered set of deicing fluid holdover time (HOT) guidelines to FAA Flight Standards Service.

SAS Comments

- Subcommittee agrees with direction of planned R&D portfolio and distribution of effort between research thrusts.
- Encouraged continued partnerships and leveraging with NASA, DoD, and international organizations.
- Recognized close linkage between regulatory requirements and research outputs.
- Provided 17 (unprioritized) recommendations and comments on addressing aviation terrorism that were forwarded to the Security Subcommittee.

Subcommittee on Human Factors
Dr. John Hansman, Chairman

Committee Activities

October Meeting

- “Brainstorming” Session
 - *Security Issues (to support AAR “quick look”)*
 - *Emerging Needs*
- Included
 - REDAC Subcommittee Members
 - FAA HF Subject Matter Experts
 - NASA HF Representatives
- Tour of PAX River Naval Air Station HF Laboratory

Questions for Oct. REDAC Meeting

In what areas should FAA invest its R,E&D resources?

- In what areas is FAA not investing that it should be?
- In what areas is FAA investing that it should not be?

What should be the priorities among the areas where FAA should be investing?

In what areas should FAA invest its R,E&D resources?

Subcommittee continues to support prior recommendations

- *Within areas they are investing, focus seems appropriate overall*
- *Need to anticipate and invest in emerging needs*
- *Motivation for emerging needs “brainstorming” meeting*

HF Portfolio Content

Flight Deck/Aircraft Maintenance

Air Traffic and Airway Facilities

Aeromedical

Security (not normally reviewed by HF Subcommittee)

Requirements Database

Requirements database appears to be a good tool in prioritizing and aligning current and emerging needs.

- *Recommend continuing development and utilization of the tool by sponsoring orgs.*
- *NASA is cooperating in the development and use of database.*

Need to continue building the relationships between operating orgs and research orgs. –

- Support effective reqs process
- Part of the reqs process
- Network
- How to operating orgs to participate

What should be the priorities among the areas where FAA should be investing? Post Sept. 11

Pre Sept 11 Issues Remain

- May be modified by a changed operating environment

Capacity and efficiency issues will re-emerge

- Opportunity to “do it correctly”
- Apollo 1 example

Need to examine new security initiatives for unintended Human consequences, e.g.:

- Access to emergency medical kits in cockpits
- Crew Incapacitation requiring intervention in cockpit
1 per 2 months in US

What should be the priorities among the areas where FAA should be investing? Post Sept. 11

Recognize that security human factors underfunded compared to current and expected demands - don't have info. Shouldn't come out of non-security Human Factors.

- \$5.2 M Security HF
- \$22 M for HF across all other lines

Recognize that the operational environment has changed.

- Need to re-examine the programs to see how they will fit in the system
- Should be done comprehensively (i.e. researchers as well as management and REDAC)
- Have not had time to fully review.

Open Issues

Human Factors, Security, Safety, ATC Interaction

- HF Committee role across lines (advice, review)

Issues with flagship initiatives

- *Do not seem to be working.*
- *No flagships have been funded.*

REDAC “Brainstorming” Emerging Needs

1. Changes in the operating environment (post Sept. 11) may cause unexpected disturbances, what will the new constraints be?
 - a. How will capacity be affected by distributing a/c to other airfields?
 - b. What will be the procedures for non-airline operations?
2. What is the FAA's response to new CNS/ATM (e.g., Boeing) plan?
 - a. If Boeing proceeds, then there will be a need to respond. There will be HF issues that need to be addressed. AAR-100 proposed a flagship initiative that will support Boeing or any other agency to address ATC issues.
 - b. The Boeing plan may lead to an emerging need, what will be the HF issues? Is there data to support Boeing's effort? What is FAA's responsibility to support Boeing's effort?
3. What are the security issues with new NAS plans.
4. Is the flagship initiative a good strategy vehicle?

5. Improved Avionics for GA.
 - a. Technology is more complex, starts at the low end then migrates to heavy A/C. Need RDTE for GA low-end avionics.
 - b. Biggest change in technology is at the low-end avionics where market forces and lack of standards allow less restricted growth, issues of how to relate low-end systems and experience to high-end systems.
 - c. Don't have the data to support whether certain GA avionics features should be rejected.
 - d. Training and re-currency requirements for new avionic technologies.
6. Training and selection for new ATC technologies. Need – how to implement training procedures in the near term. Are these training and selection procedures anticipating the shift in work force population?
 - a. Future ATC will be decision aid display intensive. Current training has not adapted to this.
 - b. Training is not uniform across facilities, e.g., URET has different training curricula across facilities.
7. When do you use data link for tactical, en-route, TRACON ops? 20 year research background, but the implementation of CPDLC has many new research issues that must be addressed.
 - a. What is the failure-mode operations, backups, mixed modes, mixed equipage, and procedures.
 - b. What is the transition plan across TRACON to en-route?
 - c. Short-term projects, tactical questions.
 - d. What is the effect of graphical data link?
8. ATC decision aid integration issues?
9. Cockpit decision aid integration issues?
10. How to evaluate new systems? New NAS models are being proposed (NASA, Boeing, etc), how do you evaluate HF in emerging concepts?
 - a. What is the metric to evaluate new concepts?
 - b. What is the infrastructure to evaluate a concept?
11. Improving inter- and intra-facility coordination.
12. Flight data recorders provide a wealth of information, how will HF use this information?
 - a. A source of nominal data, provide bench marks, be able to track behavior, characterize norms,
13. What kind of information does a mechanic need to turn around an a/c in short period of time?
 - a. How to display information? How to train people?
 - b. Computerization of inventory, training,
 - c. Lots of software being sold to AvMaint facilities, need to evaluate the HF issues related to this software.
14. Electronic signoff for AvMaint mechanics.
 - a. Long paper trail to account for fix. What is the technical, legal, HF issues for an electronic sign off?
15. Provide a master minimum equipment list on each a/c. Currently, the process is paper but can this change to digital.
16. Condition based maintenance
17. Database development and integration. FAA doesn't have databases that are integrated nor developed to track aeromedical issues for safety reasons.

18. Modeling – cabin egress, bio-dynamics, accident investigation, cabin air flow of infectious/chem./bio agents.
 - a. Cabin egress studies are very expensive, injuries, time consuming. By developing a model of cabin egress, this may minimum cost and resources. Furthermore, a model may provide better understanding of the type of injuries that occur in the cabin.
19. Molecular and biochemical tests.
 - a. Improved reliability and validity of mishap remains.
 - b. Improved measurements of drugs.
 - c. Apply life science research findings to aerospace medical applications.

REDAC “Brainstorming” Security

Vectors:

CK Checkpoint
 B Check Baggage
 M Cargo mail
 AC Aircraft
 AP Airport
 ATC ATC, NAS

Crosscutting

IVT Intelligence, vulnerabilities, Threat Assessment
 HF Human Factors
 SI Systems Integration

REDAC “Brainstorming” Security

1. F&E changes to the infrastructure of the FAA regarding C³I. Need HF acquisition support. (ATC, SI)
2. Support inclusion of HF in systems engineering of C³I (command, control, communication, and integration). (ATC, SI, IVT)
3. Shared situational awareness regarding threats. Problems of shared databases across agencies/groups/etc (integration of information). (IVT, SI)
4. Information requirements and flow to support tactical decisions. (all vectors) (IVT, SI)
5. Process models of information flow, decision-making for Action. (all vectors) (IVT, SI)
6. ATC recognizing these kinds of Situations (recognizing deviations from flight path). (ATC, AC, AP, SI)
7. Recognition of deviation from conformance (individuals, luggage, flight path, etc.) – criteria for intervention. (all vectors) (IVT)
8. Integration of prior cost/Benefit studies sponsored By FAA/NASA and their Application to security, e.g., certification versus time to delivery or technology for joint capacity and safety enhancement. (SI)
9. HF of technological systems and procedures to support new roles. (all vectors)
10. What are the effects of this on other transportation systems? (SI)
11. ASRS, FOQA and mechanisms to report anomalies for security. (all vectors) (IVT)
12. How to keep the vigilance high. Now it’s punitive – can it be non-punitive like in a gaming Situation? (B, CK, others ?)
13. How do we develop working environments to support vigilance, e.g., shift rotation? (CK, B, AC)
14. How do we find mechanisms for establishing and Applying guidelines that are scientifically Based? (all vectors) (SI)

15. Physiological/Behavioral measures of vigilance. (CK, B)
16. Formal methods for analyzing system vulnerabilities and their propagation. (SI, IVT)
17. Public risk perception. What are the Actions that will have the most affect on public risk perception? (all vectors) (IVT)
18. Authority and function allocation between human and machine. (all vectors) (SI)
19. Enhanced GPWS – expanded envelope protection (can't fly into a Building). (AC, ATC)
20. In any of these schemes, where human authority might Be taken away, what are the criteria to transition? Includes ATM issues. (AC, ATC, CK)
21. Pattern recognition/decision support systems for screening people, luggage, carry-ons, etc. (CK, B)
22. Insider threat mitigation. (all vectors) (IVT)
23. Identify unique capabilities of human to integrate and validate data. (all vectors) (IVT)
24. What are the cabin crew and flight crew going to do in the new environment? (AC)
25. New training for cabin and flight crew – strategies and policies. (AC)
26. What will the interface be between the cockpit and cabin crews? (AC)
27. Systems Operating characteristics/Receiver Operating characteristics - Human reliability screening/observation. (CK, B, AC, ATC) (SI, IVT)
28. Bio-identification/automatic finger print recognizer (maintenance, food handlers, pilot). (AP, AC, CK)
29. How do you develop/maintain a safety/security culture so that people in the system will observe and report. (all vectors) (IVT)
30. Alerting system research. (all vectors) (SI)
31. How do issues relate to GA? (AC, AP, ATC) (IVT, SI)
32. Analyze data (radar and other data sources) to see deviations in regular patterns of use of GA equipment/commercial equipment (e.g., terrorists scooping out a target). (IVT)
33. How will travel patterns shift – e.g., more GA travel. (ATC, AP, SI)
34. Functional role of ATC changing to include a monitoring task to protect the general public. (ATC, SI)
35. Respiratory/eye protective equipment for pilots. (AC, SI)
36. Means for detecting low levels of Biohazards. (all vectors) (IVT)
37. Given the increase in the number of air marshals – will require that we have a database to track the success of the selection criteria. (AC)
38. Team training to address facility/ATM outages, including radar and communication. (ATC)
39. Airport perimeter surveillance (AP)
40. Enhance profiling system. (CK, m, B, IVT)
41. Evaluate existing emergency response procedures, tools, techniques, and decision making. Lessons learned. (AP, ATC, other)
42. Electronic verifiable databases for pilots (i.e., verify that the person is really a pilot). (CK, AP)
43. Verifiable database for any crewmember for restricted parts of the airport. (AP)
44. Issues regarding cargo and cargo mail. (m, B, AC)
45. Real time statistical analysis data of passenger data to detect suspect passengers. (CK, AP, AC, IVT)
46. Emergency medical care in NAS – e.g., medical devices through screening points, medical kit location, medical kit contents, and pilot incapacitation which requires people to enter the cockpit. (AC, ATC, AP, CK)
47. Airport responsibilities in terms of medical care and Biohazards, e.g. EMS response, isolation. (AP)

48. FAA to integrate with other organizations in this response to terrorist threat – FAA makes sure it is Appropriately represented. (all vectors) (IVT, SI)
49. Bio-defense and evolving genetically engineered threats related to aviation as mechanisms for propagation/dissemination. (AP, AC, ATC, IVT)
50. Use of FOQA to define norms. (AC, ATC, IVT)
51. How the change in the operating environment will affect other RED requirements. (all vectors) (SI)

Subcommittee on Environment and Energy
Mr. Jim DeLong, Chairman

Issue

National crisis of flight delays is directly attributable to lack of runways; this lack is the direct result of community opposition to noise.

- While each agency is working diligently, no one agency assumes overall responsibility for orchestration of noise reduction measures.

- Many agencies - FAA, NASA, engine & aircraft manufacturers, academia - are working on the problem, but difficult to measure success. •Funding for programs within NASA at historic lows

- While industry spending almost one billion annually on noise mitigation at airports, FAA budget hovers in the vicinity of \$4 million annually for R&D. **What is Needed?**

An analysis, costing \$950,000, to determine:

1. What are the stated NSTC, FAA & NASA goals for noise reduction? Are they still relevant goals & is the timetable realistic?
2. Who is doing what to achieve these goals?
3. Is the effort underway sufficient to accomplish stated goals in the time frame allotted?
4. If not:

What agency should be designated lead agency?

How much additional investment will be necessary?

Where will funding come from?

What additional work needs to be done and by whom? **Conclusion**

1. Airport delays directly correlated to noise issues
2. Many working on issue, little focus
3. Short, mid & long term solutions possible
4. Study will examine each and provide road to Congress and the Administration for implementation

September 18, 2001

Professor Deborah Boehm-Davis
Chairperson
Federal Aviation Administration
Research, Engineering and Development Advisory Committee
700 Independence Ave, S.W.
Washington, DC 20003

Dear Professor Boehm-Davis,

I am very pleased to forward the attached study, "Tiltrotor and Advanced Rotorcraft Technology in the National Airspace System (TARTNAS)" conducted over the past two years under the auspices of your committee.

It is most impressive to note that the study has found that the major investments in research and development of vertical flight aircraft over the past thirty years by the Department of Defense, the National Aeronautics and Space Administration, academia and industry has provided vertical flight aircraft that can provide air commerce from and to any place on the earths surface with high dispatch reliability and with a high degree of safety in most all weather conditions while avoiding the "choke points" posed by airports.

This is a major finding and one that can contribute significantly to solving the current crisis of congestion in world wide aviation commerce.

It is interesting to note that a full 30 of the 50 reference documents are United States Government projects that have supported the findings that vertical flight aircraft, not only represented by tilt rotor technology, that can fly at fixed wing altitudes, speeds and ranges while not requiring runway space or "slots", are prepared to meet aviation commerce congestion challenges at this time.

What remains to be done?

Most of the research and development for the basic aircraft has already been accomplished as pointed out by the references. Research, engineering/ development/testing remain to be accomplished to integrate these new aircraft technologies into the national airspace system.

The four chapters in this report, addressing the Aircraft, Operational Considerations, Air Traffic Control/Air Traffic Management and Public Acceptance/Perceptions, each provide specific recommendations for these research, engineering and development efforts to make this new capability function in the air commerce system of today and tomorrow.

A list of the most significant Research, Engineering, Development and Testing tasks remaining to integrate advanced vertical flight aircraft into the National Airspace Systems is as follows:

Research:

- Noise reduction – Perceived and actual:

This effort must not only address reduction in actual noise emitted by the aircraft (acceptable now but needs improvement) but airspace management procedures to be followed to reduce operational noise, i.e. high speed, high rate of decent "blade slapping"

etc., increased approach glideslope angles to reduce noise “footprint” on the ground and the reduced perception of helicopter noise, internal and external.

- Operations in icing conditions:

Approached from increased capability of the aircraft to operate in icing conditions when encountered, as well as a reduction in overly restrictive procedures not allowing vertical flight operations in “possible forecast” conditions, i.e. use actual vs. possible.

- Public “perception” of helicopter noise and safety:

As pointed out in the references, helicopters actual safety records compare favorably to fixed wing aircraft and its noise impact on the environment can be controlled to be less than airplanes, yet public perception must be changed to accept these facts – a real challenge.

Engineering, Development and Testing:

- Establishment of the operational procedures for simultaneous non-interfering operations by vertical flight aircraft in the enroute and terminal structure. (near term and already demonstrated).
- Establishment of appropriate weather minimums and accurate weather information availability to allow vertical flight aircraft operations over shorter distances. (already available through commercial sources.)
- Establish positive communications and surveillance to the surface (satellite capability) to all points where vertical flight aircraft may be required to operate under all weather conditions. (demonstrated).
- Develop operational criteria for vertical flight aircraft from points other than airports that are safe, exploit these aircraft operational capabilities and be user/neighbor friendly. (demonstrated at numerous hospital heliports).

General:

Helicopters operate under Instrument Flight Rules (IFR) today, but only to and from airports because that is the only place where approach/departure procedures exist. To exploit the great capabilities of these advanced vertical flight aircraft being capable of doing all things current airplanes do except very high speed and very long range, approach and departure procedures from “my back yard” must be made possible and are possible with the highly accurate Global Positioning System capabilities today – of just a few meters in lateral and vertical location.

The advent of highly capable vertical flight aircraft and GPS are the greatest advancements in aviation since the jet engine and radar fifty years ago. Those capabilities demanded major changes to the then existing “system”. Vertical flight and GPS will demand acceptance of just as significant changes today, a challenge that can be met and is possible.

I feel sure that our Government in the Administration and the Congress will be supportive of this answer contributing to solving their constituents major concerns relating to air commerce congestion and delays costing millions of dollars each and every day.

My study team and I stand prepared to address any additional questions or concerns your committee may have.

We hope you will find this report acceptable to forward to the Federal Aviation Administration in an expedited manner with your strong committee endorsement.

Sincerely,

John F. Zugschwert
Study Coordinator



Dr. Deborah A. Boehm-Davis
Chair, Research, Engineering and Development Advisory Committee
Professor of Psychology, George Mason University, 4400 University Drive, ARCH Lab
MSN 3F5, Fairfax, Virginia 22030-4444

February 4, 2002

The Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Ms. Garvey:

I am sorry that you were unable to join us at our Federal Aviation Administration (FAA) Research, Engineering and Development (REDAC) Advisory Committee meeting. The Committee members look forward to discussions with you and they hope that you will be able to join us for our next meeting, scheduled for April 23 and 24.

On the basis of our meeting, we recommend the following.

- That Associate Administrators meet with the REDAC Committee to describe how they see the research and development process fitting into their operations and to outline their strategic plan for incorporating R&D into their programs. Specifically, the Committee would like the administrators to articulate their research needs and describe how they prioritize work and manage their programs.
- Developing a fully competent and expertly staffed FAA organization to absorb and use the results of NASA's R&D.
- Strengthening FAA participation in international bodies such as ICAO and recognizing that participation as essential to FAA's mission and continued leadership in the world aviation arena.
- That the FAA administrator recognize and champion NASA's research directed towards achieving major capacity and safety gains through an advanced ATM system.
- A study to evaluate the effectiveness of current research in aircraft noise and emissions reduction technologies.
- Continued support for the wake vortex program without a loss of funding for the weather research program.

Several of these recommendations are presented in greater detail in the attachment.

With the establishment of the Performance-Based Organization and the hiring of its Chief Operating Officer drawing closer, the Committee would like to emphasize again the opportunity that this change in structure poses for:

- providing leadership and focus for research, particularly in the ATM area;
- elevating the visibility of high level system engineering within the agency;
- more tightly integrating NASA research program planning with FAA planning, both in support of the Operational Evolution Plan and for longer term research initiatives; and,
- improving the process for transferring technology from research to operation.

Finally, the Committee cannot ignore the events of September 11 and the impact of those events on research, engineering, and development. The Committee recognizes the need to invest more heavily in security research, engineering, and development, but is concerned that this funding may come at the expense of other areas. Funding for research has been relatively flat for the past several years, and the FAA cannot afford to divert funds away from core areas to cover additional investments in security work.

I am interested in discussing these proposals with you at your earliest convenience. The Committee continues to be dedicated to providing you with advice and recommendations on any R&D issue that you may need us to review. We stand ready to serve you. Please contact me at (703) 993-8735 or at dbdavis@gmu.edu if you have any questions or would like to meet.

Sincerely,

Deborah Boehm-Davis, Ph.D.

Chair

FAA Research, Engineering and Development Advisory Committee

Attachment

Recognition of NASA Research

We believe the FAA administrator should recognize and champion NASA's research directed towards achieving major capacity and safety gains through a more fully automated ATM system. We believe this work should be encouraged by the FAA through a substantial and continuing involvement by a wide variety of FAA operational and technical personnel to ensure that it proceeds expeditiously in a way suitable for introduction into the NAS. Publicizing this kind of activity could serve as a sign of FAA's ability to think far ahead.

Developing FAA Expertise to Facilitate Technology Transfer

The Committee continues to be concerned that FAA itself appears to be less and less involved in the essential research and development for the future. NASA is doing very good research, but there must be a fully competent and expertly staffed FAA organization to absorb and utilize the results of this R&D if it is to transition successfully into the NAS. The Free Flight Project Office and the newly-formed Terminal Business Unit are positive steps. However, both are primarily implementation organizations, with major near-term challenges. Neither appears to have the resources to take on the tasks of monitoring and assisting in guiding the NASA research activities, and transitioning the results of the NASA research to NAS implementation when appropriate. We are concerned that the FAA is not adequately equipped, with experts and organization, to absorb and apply the research results to the NAS. This work cannot be done by contractors alone, no matter how capable, but must be understood, managed, and directed by FAA's own people. Without such a capability much of the future NASA R&D may be wasted. Thus, we urge the rapid build-up of FAA's technical capabilities and the organization needed across FAA to implement and fully exploit the coming capabilities. This means hiring new people with demonstrated technical (and technical management) expertise in each of the technology areas that are crucial to FAA success.

International Visibility of the FAA

It is critical that the FAA play a role internationally to help improve the world's aviation systems, and to ensure that the technical eminence the United States has long enjoyed in the world is maintained and enhanced. Several European countries are working hard to become leaders in developing future ATM systems, are applying substantial R&D resources, and are making implementation decisions independent of the USA. Our leadership can no longer be taken for granted. There are disturbing signs that we are not aggressively working with our people and our resources to maintain that eminence. FAA needs to work on concepts for the future, and to assure that the world is aware of our work. Our participation in international bodies such as ICAO needs to be strengthened now, and recognized as essential to FAA's mission and continued leadership. In each area of ATM modernization, the FAA should compare its efforts and accomplishments with those of Europe and other areas of the world when planning its R&D agenda.