Research, Engineering and Development Advisory Committee
Federal Aviation Administration
800 Independence Avenue, SW, Washington, DC

April 29, 2009

Meeting Minutes

On Wednesday, April 29, 2009, the Federal Aviation Administration (FAA), Research, Engineering and Development Advisory Committee (REDAC), held a meeting in the Round Room, at 800 Independence Avenue, SW in Washington, DC. Attachments 1 and 2 provide the meeting agenda and attendance, respectively.

Welcome and Introductory Remarks

Dr. John Hansman, REDAC Chair, welcomed everyone, reviewed the agenda and turned it over to Barry Scott.

Mr. Barry Scott, REDAC Executive Director, read the public meeting announcement and thanked everyone for attending. Mr. Scott introduced the newest member of the Committee, Dr. Christopher Wickens. Dr. Wickens will also serve as Chair of the Human Factors Subcommittee.

Mr. Scott commented on how helpful it was for him to attend all the Subcommittee meetings. It gave him an opportunity to get more information on the programs within his organization.

Updated – ABS-B – Vincent Capezzuto

Mr. Vincent Capezzuto, Director of Surveillance and Broadcast Services, FAA provided the members with an update on the Automatic Dependent Surveillance-Broadcast (ADS-B). Mr. Capezzuto briefed the Committee in April 2007. He reviewed the previous briefing and reviewed the following.

- Program Overview
- Dual Track Strategy
- Essential Services
- Critical Services
- Aviation Rulemaking Committee (ARC) Status
- Program Risks
- Summary

The members engaged in a discussion on how the program would be funded and the support within FAA. Members encouraged the Agency to make sure industry was aware of the numbers and what they represent.

Update – NextGen – Michael Romanowski

Mr. Michael Romanowski, Director, NextGen Integration and Implementation Office, provided the Committee with an update on the Next Generation Air Transportation System (NextGen). Mr. Romanowski discussed the following and showed the Gate-to-Gate Video.

- 2009 NextGen Implementation Plan (Members received a copy)
- NextGen Accomplishments
- NextGen Complexity
- Keys to NextGen
- Integration Framework – Alignment
- Infrastructure Roadmaps (12)
- NextGen Integration – Portfolio Management
- FAA Expectations for RTCA Task Force
- Research Transition Teams (Near-, Mid- & Far-Term)

The members engaged in a lengthy discussion with Mr. Romanoswki. Below are some of the topics discussed.

- Who is responsible for making it happen?
- Leads for each roadmap – collaborative with Environment.
- Who makes the gaps happen?
- FAA facilities should include airplane needs and when they need to be equipped.
- Define standards quickly – adopt system around equipage.
- REDAC can help define mid-term and longer needs by defining research. Look at what JPDO and others are doing and how do we build that bridge.

Staffing – Research Workforce/Update July Workshop – Barry Scott

Mr. Barry Scott, Director, Research and Technology Development, provided the Committee with a summary of the research workforce. He reviewed the following.

- National Academy of Public Administration Study
- Acquisition Workforce Plan
- Core Acquisition Workforce
- Workforce Plan Status (Completed – Remaining)

Mr. Scott also reviewed some of the details for the upcoming workshop on July 14.

Executive Order Advisory Committee – Karlin Toner

Dr. Karlin Toner, FAA Representative for the Senior Policy Committee, discussed the NextGen Coordination for the Secretary and Senior Policy Committee. Dr. Toner reviewed the Presidential Executive Order 13479, dated November 18, 2008 – Transformation of the National Air Transportation System. This Order does the following:

- Expresses Executive Branch support for the policy set in Vision 100.
- Enables effective participation of the Senior Policy Committee (SPC) to lead NextGen, a national effort with broad scope of policy, economic and technological complexity.
- Requires biennial reports to the President on progress made, with performance measures.

The proposed Advisory Committee will:
- Engage the private sector in public discussions.
- Focus on NextGen policy, planning and performance measures.
- Include a "broad spectrum" of aviation representatives (users, stakeholders, & transportation experts).

Presentation of Subcommittee Reports

Each year in February/March, the standing subcommittees review FAA's R&D investments in the areas of airports, aircraft safety, human factors, NAS operations, and environment and energy. After reviewing the respective portfolios proposed by the FAA, each subcommittee generates recommendations. The Subcommittee Chairs listed below presented their Subcommittee's recommendations. Attachment 3 provides the recommendations/observations presented by each Chair.

Subcommittee	**Subcommittee Chair**
Environment & Energy	Steve Alterman
Human Factors	Bill Edmunds (for Chris Wickens)
Airports	Richard Marchi (for Ed Gervais)
Aircraft Safety	John White (for Joe DelBalzo)
NAS Operations	Victor Lebacqz

The recommendations were approved and the minor edits will be made per the discussion. The final versions will be submitted to the Administrator.

ACTION: Additional discussion/research is needed regarding the MIPA rule. Nancy LoBue and Lourdes Maurice will discuss and provide comments to Sarah Dalton of the NAS Operations Subcommittee.

Committee Discussion

The members engaged in a discussion on the following.

- Core Competences Working Group – No longer needed. Could address any issues at individual subcommittee meetings.
- Suggestion was made for subcommittee chairs to meet more often.
- The questions for the subcommittees need to be reworked. Suggestion was to make questions more specific. Will work with the members to create a new set of questions.
- Look at materials presented to the members and what is missing.
- A standard format that may help with writing a recommendation will be drafted.

Below are the topics discussed by the members for recommendations to the Administrator. The letter to the Administrator is provided in Attachment 4.

- Understanding the research requirements.
- Environmental and safety approval process.
- Workforce expertise – critical software and digital systems specifically.

Dr. Hansman thanked everyone and the meeting was adjourned at 3:00 pm.

Attachment 1

Research, Engineering and Development Advisory Committee
Federal Aviation Administration (FAA)
800 Independence Avenue, SW
Washington, DC 20591 – Round Room (10th Floor)

April 29, 2009

Agenda

9:00 am	Welcome	Barry Scott John Hansman
9:15 am	Update - ADSB	Vincent Capezzuto
9:45 am	Update - NextGen	Mike Romanowski
10:30 am	Break	
10:45 am	Staffing – Research Workforce Update – July Workshop	Barry Scott
11:15 am	Executive Order Advisory Committee	Karlin Toner
11:30 am	Committee Discussion	John Hansman
11:45 am	Lunch	

Subcommittee Reports

12:30 pm	Environment & Energy	Steve Alterman
12:45 pm	Human Factors	Bill Edmunds (For Chris Wickens)
1:00 pm	Airports	Richard Marchi (For Ed Gervais)
1:15 pm	Aircraft Safety	Joe Del Balzo
1:30 pm	NAS Operations	Victor Lebacqz
1:45 pm	Break	
2:00 pm	Committee Discussion - Recommendations - Future Committee Activity	John Hansman Barry Scott
2:30 pm	Adjourn	

Attachment 2

Attendance

Members:

John Hansman (Chair)
Steve Alterman
Sarah Dalton
Victor Lebacqz
Agam Sinha
John White (for Joe DelBalzo)
Bill Edmunds (for Chris Wickens)
Richard Marchi (for Ed Gervais)
Tom Irvine (for Jaiwon Shin)
Barry Scott, FAA/REDAC Executive Director

Audience:

Leisha Bell, AOPA
Rob Pappas, FAA
Cathy Bigelow, FAA
Chris Hillers, FAA
Keegan Hurley, AMA
Mile Gallivan, FAA
Ray Young, SENSIS
Gloria Dunderman, FAA
Edmond Boulay, US-CREST
Karlin Toner FAA/DOT
George Marania, FAA
Paul Krois, FAA
Lee Olson, FAA
Vicki Cox, FAA
Mohan Gupta, FAA
R. Scott Stevens, FAA
Lourdes Maurice, FAA
Tom McCloy, FAA
Richard Popp, FAA
Vincent Cooper, FAA
David Gannon, BAE
James White, FAA
Gary Church, AMA

Attachment 3

Subcommittee Reports – Subcommittee on Environment & Energy

FAA REDAC Subcommittee on Environment and Energy
Meeting Report and Recommendations
Spring 2009

The Environment and Energy Subcommittee of the FAA Research, Engineering and Development Advisory Committee (REDAC) met in San Francisco, California, on February 24-25, 2009. Following is the Report on the outcome of this meeting.

Introduction – Before answering the questions submitted by the full REDAC and detailing the Environment and Energy Subcommittee recommendations for Agency action, it is important to put the Subcommittee's deliberations in both financial and political context.

First, in spite of the deteriorating world economy and the concurrent reductions in airline service levels, environmental research and implementation of environmental initiatives, must remain a top FAA priority. As a practical matter, decisions made today will have long term implications for an industry that is forecast to continue its growth patterns in future years. Therefore, in assessing environmental research requirements, it is important to filter out the anomalies of a short-term economic crisis and focus on the long-term needs of the industry. Moreover, it is impossible to overlook the fact that the current political climate presents a focus that will demand that aviation play an active role in climate change mitigation. The Subcommittee would like to reiterate the fact that the environmental impact of aviation on global climate has a time scale measured in tens of years and decisions made today will have a lasting impact for decades. Faced with these facts, the Subcommittee feels strongly that expanded environmental research is absolutely necessary and that the Agency's NextGen effort must contain a significant environmental overlay.

In addition, in making recommendations for future actions, it is impossible to overlook the unsettled Congressional budget process. With the resources for Fiscal 2009 delayed well into the budget period, plans for 2010, 2011 and beyond are necessarily deferred to future years and research necessary now to address current environmental concerns is seriously jeopardized. While the Subcommittee recognizes that the Agency has little control over these budget processes, the reality of funding shortfalls must be considered in assessing the recommendations contained herein (i.e., recommendations are based on assumed funding levels that may not be available in a timely manner. Absent those funds, some of the articulated recommendations and goals will be impossible to achieve).

In an attempt to deal with these realities, this Report will be divided into two sections – the first section will answer attempt to answer the REDAC questions given to all Subcommittees and the second section will provide specific Environment and Energy Subcommittee recommendations to the Administrator.

<u>Portfolio Content</u>. Do the proposed outcomes, outputs and time frames reflected in the R&D program seem correct given the needs of the air transportation system?

The Subcommittee feels that the portfolio content of the Office and Environment and Energy is substantially correct, but recognizes that the available resources are not sufficient to accomplish stated goals in a timely manner. This fact was exacerbated by the delay in passage of a Fiscal '09 Budget and a reduction in funds from the levels originally planned for Fiscal '09 and '10.

Moreover, even if the current R&D programs were fully funded, as the "needs" of the transportation system continue to evolve (for example, an expanded concentration on Greenhouse Gas regulation), the environmental research program will necessarily have difficulty meeting such expanded goals.

What is missing? That is, what R&D initiatives are needed that are not represented by an R&D program in the portfolio?

With global climate change in the forefront of the current political debate, the regulation of Greenhouse Gases is playing an increasing role in the environmental debate. Research is needed to address the impacts of any proposed regulations and the various ways of meeting any stated goals. Research on the scientific understanding of Greenhouse Gas impacts, on more efficient aircraft technology, on modernization of inflight operations and in the development of alternative fuels is planned but not adequately funded.

In addition, system-level technology demonstrations are planned under the proposed CLEEN program but not at sufficient levels to support transition to the fleet and to reduce the risk of significant gains to be realized.

What is not needed? What R&D program or project in the portfolio should be dropped and why?

The Subcommittee finds no programs that should be eliminated.

<u>Program Funding</u>. Are the investment levels (i.e., the priorities) assigned to the R&D programs (Budget Line Items) correct?

The Subcommittee assumes that this question relates to "priorities" and not "funding levels". In terms of "priorities" (i.e., *relative* investment levels) the Subcommittee finds that the environmental R&D investments are correct, but, as noted below, the *absolute* funding levels are inadequate.

<u>Research Area Funding</u>. Are the overall investment levels (priorities) reviewed by the subcommittees correct?

The Subcommittee finds that the absolute investment levels are inadequate to achieve stated goals in a timely manner. Not only was funding reduced from that originally planned for Fiscal Year '09 and '10, but the delay in enacting a FY '09 federal budget has strained the ability to begin important new projects.

Partnerships. What specific opportunities exist to forge stronger partnerships with industry, academia and/or other government agencies in order to better leverage FAA's R&D funding?

The National Technology and Science Council (NTSC), using the National Policy and Plan for Aeronautics R&D as a guide, needs to define clear roles and responsibilities for the agencies involved in environmental projects. For example, the FAA, NASA and NOAA are all involved in climate change research without any direction on how these agencies can leverage their spending to achieve better results. Similarly, the proposed CLEEN program (and NASA's N+1 efforts) should be resourced at a national level with roles and responsibilities assigned to each agency. On a more general level, the Subcommittee feels that there needs to be more direct and timely collaboration between the FAA and NASA in the planning of environment and energy research and development. Near term efforts should be undertaken to foster cooperation with NASA with respect to the funding NASA received for system-level technology research as a result of the passage of the recent Economic Recovery and Stabilization Act.

With respect to programs such as CLEEN and the CAAFI effort on alternative fuels, the FAA has the opportunity to interface with both industry and NASA. The ongoing PARTNER program provides continuing opportunities to work with academia and should be commended for significant progress over the past year.

Response to Committee Recommendations. The Committee and subcommittees provide comments and recommendations regarding the FAA R&D investment portfolios as guidance in the fall and as a review of the portfolio in the spring.

Has the FAA team responded effectively to the guidance?

The Subcommittee finds that the FAA is adequately following the guidance submitted in building the environmental R&D portfolio – within the constraints of funding realities.

What points were missed or not addressed adequately in the portfolio?

See answers to questions above.

Process. What should the FAA do to improve the process it is now using to engage the Committee in providing advice on the agency's R&D investment portfolio? In particular:

Is the subcommittee structure effective?

Yes. The Subcommittee feels that this structure is effective.

Is the information presented by the FAA in subcommittee and full committee meetings effective. Should more or less or different information be presented?

The information presented is effective and enables the Subcommittee to make informed decisions on the R&D portfolio. Indeed, the Subcommittee has decided that the current level of detail being presented is necessary and, due to the expanded scope of FAA environmental activity, the Subcommittee meetings need to be expanded to two full days.

Additional Guidance and Recommendations. What additional guidance and/or recommendations are offered with the objective of helping FAA to better focus its R&D investments on the needs of its customer community?

As an initial thought, the Subcommittee feels that the questions asked are too generic and need to be supplemented with the more specific recommendations. These recommendations are set forth below.

FAA REDAC Subcommittee on Environment and Energy
Supplemental Recommendations

2. The Subcommittee finds that the FAA Office of Environmental and Energy is significantly underfunded and understaffed, especially in view of the additional responsibilities (global climate change issues and a refocusing on noise research) that continue to be imposed on it. While the Subcommittee recognizes that the FAA is captive to the Congressional appropriations process, action is necessary to ensure that appropriate research activities are initiated and sustained. In particular:

    - The Agency should fully fund an additional position in the Operations and Policy Division as soon as possible.
    - The Agency should, as quickly as possible, restore the contract support that was recently removed.
    - Appropriate funding should be provided to continue the research review of aviation noise metrics and policy.
    - Support of, and leadership in, the international processes of the International Civil Aviation Organization should continue. More specifically, funds should be made available to support the activities of the ICAO GIACC that is working to establish international standards on global climate change.

7. The Subcommittee continues to be concerned that environmental issues have not been given appropriate attention in the NextGen effort. In order to ensure proper environmental consideration, it is recommended that an Environmental Management System (EMS) be established for the NextGen initiative. This EMS would be used to provide information on the environmental impacts of modernization actions and would facilitate the implementation of environmental research efforts.

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8. In order to support environmental research efforts, funding for the PARTNER program must continue.

Attachment 3 (Cont.)

Subcommittee Reports – Subcommittee on Human Factors

HF in Next Gen
Human Factors issues in NextGen are critical! The Human Factors Engineering & Research Group (AJP-61) recognizes this importance and is working to address the many issues, including human integration, that need attention.

Assurance of HF integration
Finding 1
Unable to judge the extent of HF attention across NextGen elements
Recommendation
- Key issues in a single document
- Multi-disciplinary workshop
- FAA organizations regularly report HF progress

HF Oversight in other elements
Finding 2
Many issues with HF implications fall outside purview of AJP-61
Recommendation
FAA develop a process to address critical HF within the Seven Solution Sets

Resource Limitations
Finding 3
There is an immediate need for HF positions to manage programs and let contracts
Recommendation
FAA should begin to prepare HF researchers (in and outside of FAA) for NextGen tasks
Support education of aviation HF specialists
- At universities – Contracts & grants
- FAA – HF Training for regulatory & acquisition personnel

Leadership Turnover
Finding 4
HF Office has had turnover in leadership
Recommendation
Permanent leadership needed immediately with sufficient authority to assure HF issues are effectively addressed

HF Lessons Learned in Acquisition
Finding 5
Identification of HF lessons learned in acquisition is good, as far as it goes
Finding
A process should be established to transition HF lessons learned into substantive follow-on activities to improve implementation & acquisition, standards, guidance and processes

Subcommittee Reports – Subcommittee on Airports

The Airport Subcommittee continues to support:
Close cooperation between the FAA Airport Technology Research Branch and the TRB ACRP. ACRP has reached a maturity level that is complimentary to FAA Technical Center Airport Technology Branch projects (environmental topics, airport capacity, risk assessment methodologies regarding runway safety areas and airfield separations, etc.). Each of these programs targets different issues but an ongoing awareness of each program assures no redundancies will occur.

Appreciates continued funding and recommends an increase in staffing by one person in FY 11.

Subcommittee indicates highest priorities should be (1) complete the research to identify if additional fire fighting agent is required at airports with new large aircraft (A380), and (2) wildlife research needs to be maintained at the highest levels to assure further progress in reducing wildlife hazards to aviation in the vicinity of airports.

FAA Bird Detection Technology
Comprehensive Performance Assessment
- Assessing Avian Radar Detection Systems for use at civil airports focusing on:
- Deployment Considerations (Licensing, Transmission Interference, Location, Clutter, Form 7460 approvals, Physical and Communication Infrastructure)
- Data Acquisition, Processing and Management Capabilities
- Validation of Target Detection and Tracking
- Operational Reliability (Maintenance Needs, Weather
- Integration of radar displays and airport GIS
- Outcome – Performance specification that will make bird radars eligible for FAA AIP funding as wildlife hazard mitigation tool.
- Long Term Goal: tactical use of avian radar to support real time ATC advisories (similar to LLWSAS).

The Airport Subcommittee suggests that:

- FAA should have Boeing and Airbus involved in the project for predicting fuel release during accidents.

- Research should be initiated to investigate changing red end of runway lights to amber as red lights should only mean “stop” to an air crew (and they should give consideration to daytime visibility of ground lights.

- Supports infusion of airport related considerations into the NextGen plans and programs.

FAA Pavement Software Products
Releases have been as planned and on schedule ever since 1995

FAA Training Workshops

FAA Design Software for Airport Pavement Thickness
◆The Technical Center reported that they have conducted workshops on pavement design during the past year at:
◆– Singapore (April, 2008) – Comprehensive
◆– Phoenix, AZ (April 2008) - TSW 2008 Workshop
◆– Bellevue, WA (Oct 2008 – ASCE Conference
◆- Mexico City, Mexico (Oct 2008)
◆- Richmond, VA (Feb 2009) - ACC Workshop

◆Upcoming workshops are planned for:
◆–Amsterdam, Netherlands (May 2009)
◆–Champaign, Illinois (June 2009 – BCR2A Conference)

FAA completed installation of new load modules and is performing maintenance on the pavement test vehicle in preparation for phase 5 construction (Construction Cycle "CC" 5).

FAA has completed the rewrite of AC 150/5320-6D (FAA software referred to as "FAARFIELD 1.3" which is replacing the design nomographs for standard thickness design).

High pressure tire testing is planned to in the near future to determine the rutting potential of 240 psi tires (as compared to 217 psi which is the current international standard for routine usage of airfield pavements). Asphalt temperature needs to be controlled for the results to be meaningful.

The Technical Center discussed need for a Heavy Vehicle Simulator (HVS) to develop specifications for gyratory compaction of asphalt pavement. R&D in this area has relied on laboratory testing, but full-scale tests are needed to validate the predictive models. An HVS cost is $2.4 million to acquire, but long term costs are less than the alternative of heating the test pavement.

Summary of Recent Events
The Airport Subcommittee continues to enjoy a high level of industry participation.

The National Pavement Test Facility is continuing to perform full scale pavement testing; currently evaluating concrete overlay performance under four wheel and six-wheel loading.

Internationally – The FAA findings from the initial (1998-2002) test results, as related to ACN / PCN have been adopted as an international standard by the International Civil Aviation Organization (ICAO).

FY-09-10-11 FUNDING	FY 2009	FY 2010	FY 2011
AIRPORT TECHNOLOGY R&D	Enacted	Request	Target
Contracts $$	x1000	x1000	x1000
Advanced Airport Pavement Design	$450	$468	$450
Pavement Design & Evaluation Methodology	$900	$936	$1,000
National Airport Pavement Test Facility	$2,500	$2,850	$2,850
Heavy Vehicle Simulator	$0	$0	$2,400
Field Instrumentation & Testing	$540	$750	$750
Improved Paving Materials	$1,100	$1,350	$1,300
Non-Destructive Pavement Testing	$980	$1,100	$1,100
Pavement Roughness	$420	$437	$450
Material Testing Laboratory	$300	$200	$250
CEAT-University of Illinois	$300	$312	$350
Airport Planning	$350	$364	$380
Airport Design	$700	$728	$700
Operation of NLA	$800	$800	$800
Composite Materials Firefighting	$616	$453	$500
Airport Wildlife Hazards Abatement	$2,500	$2,500	$2,500
Airport Visual Guidance/Incursions Reduc.	$1,825	$1,200	$2,125
Visual Guidance Test Bed	$0	$2,000	$2,300
Soft Ground Systems Follow on	$300	$312	$300
Surface Technology	$1,000	$1,607	$1,000
Rescue and Fire Fighting	$420	$624	$650
Subtotal--Contracts	$16,001	$18,991	$22,155
In-House PCB&T	$3,347	$3,481	$3,620
TOTAL	$19,348	$22,472	$25,775

Conclusions of the Subcommittee

The Airport Technology Subcommittee supports and recommends approval of the budget plan that has been submitted for 2011, which includes:

- Completion of research to identify if additional fire fighting agent is required at airports with new large aircraft
- Continued focus on wildlife research, which needs to be maintained at the highest levels to assure further progress in reducing wildlife hazards to aviation in the vicinity of airports.
- One additional engineer for Tech Center
- $2,300,000 for phase II of the visual aid test bed
- $2,400,000 for the high tire pressure testing initiative

Subcommittee Reports – Subcommittee on Aircraft Safety

General Observations

- Presentations given by FAA managers and researchers were of uniformly high quality.
- Method of summarization and content presentation greatly improved and readily comprehensible at a management level.
- The plans were presented very clearly & in a consistent & well constructed format that allowed rapid understanding by the SAS.
- The FAA R,E&D prioritization process reviewed and streamlining of process noted.
- Streamlined prioritization process is improvement for identifying and focusing most relevant projects.
- Recommendation tracking & closure process continues to be effective means to assure the FAA research management team addresses each recommendation made by SAS.
- FAA research personnel who provided the tours & presentations impress the SAS with their deep technical knowledge & personal commitment. Enthusiasm, expertise and interest-in-the-work of the presenters were clearly evident.
- *The SAS commends them for their visible enthusiasm and thanks them for sharing their work with us.*
- The SAS recognizes that there are in reality three levels/kinds of valid and realistic research and development. Clear identification would be valuable to management.
- Lines-of-Business specific program areas – R&D to provide support data for executive decisions (separation reductions **or new technology introduction)**

Recommendations

- National and Global Issues – R&D which stakeholders, industry, or Congress consider important, but may not be crucial to FAA's immediate mission
- Agency-wide initiatives – Research to provide basic information to FAA and stakeholders on capabilities of new technologies, procedures and processes

Laboratories And Facilities

- The Subcommittee recommends that, even in difficult budget periods, the work and funding of these laboratories be addressed from not only a program perspective, but from an Agency and national perspective as well. The full motion flight simulators at CAMI supporting research in Terminal Area Safety is a case in point.

Support of NextGen

- As stated in the last several SAS meeting reports, the Subcommittee recommends that this must be accelerated to assure research is done in a manner consistent with Next Gen deployment timing. In the interim the FAA research sponsors must use their best judgment to anticipate the Next Gen research needs until such requirements become better defined.
- In addition as requirements evolve, the sponsors must be aware of research that has already been done. For example, much work has been done to evaluate closely spaced parallel runway limitations for today's infrastructure. Much of this work may be

applicable to support Next Gen objectives for assessing self-separation capabilities on closely spaced parallel runways.

Plans - Milestones - Deliverables

- The Subcommittee recommends that the FY11 plans be defined, be clear & explicit to the point of being trackable on a monthly basis – not just the budget expenditure but the actual results vs. the plan. This timely understanding of execution issues enables midcourse corrections to be considered & implemented early for maximum benefit.
- Additional focus on execution excellence will yield more & better research per dollar spent. Earned Value Measurement techniques are available to help here and can be very simple to implement in their most basic form.

Project Level Agreements

- The Subcommittee recommends that the Project Level Agreement mechanism be used actively to document the core research efforts and to capture industry and stakeholder input.

Apparent Funding Disparity

- In light of the growing and crucial importance of software/digital systems, the Subcommittee recommends that this work be given additional emphasis and funding, as well as renewed efforts to hire software and digital systems experts.

Unmanned Air Systems - UAS Research Requirements

- The Subcommittee recommends that significant system level thinking be applied to the development of the optimal operational construct & to the definition of the research (if any) needed to permit guidance material & regulations to be developed. The Subcommittee recommends that a Program Plan be developed with milestones, metrics and funding requirements.

Aging General Aviation Fleet

- The Subcommittee recommends that FAA develop a broad mandatory reporting system for the general aviation fleet as a means of gathering factual data on the aging GA fleet to proactively prevent in-flight catastrophic structural failures by enabling timely, appropriately focused, data based, high priority GA R&D activities leading to improved structural assessment guidance material and potentially Airworthiness Directives.
- This is directly aligned with the FAA mandate to assure Continued Operational Safety as well as complimentary to the ongoing Small Airplane Directorate Part 23 Certification Process Study.

Volcanic Ash Risk Assessment Paper

- The Subcommittee recommends that the research be limited to the development of procedures for getting tactical information to flight crews so they can effectively avoid the hazardous areas.
- Finally the Subcommittee believes that even this limited scope for research is relatively low in the broad research portfolio.

Attachment 3 (Cont.)

Subcommittee Reports – NAS Operations Subcommittee

Portfolio Content

- *Finding*
  - As presented, research is heavily focused on mid-term (2018) capability, not on the longer term transformation. While important to provide near-term benefits, this near-term emphasis may not provide transformational benefits.
- *Recommendations*
  - FAA should conduct on assessment of the extent to which the planned "mid-term" imporovemetns to the NAS for 2018 are consistent with the requirements for the transformed long-term NAS. Research conducted for the 2018 goal should be scable to the transformations most needed for the long-term vision
  - If 2018 research does not scale to long-term vision, FAA should identify additional resources required and how they will be obtained
- *Finding*
  - Avionics roadmap is a good start to understanding air-side contribution to NextGen, but performance metrics and system requirements must be defined, particularly for the 2018 capability.

- *Recommendation*
  - The FAA should accelerate developing airborne avionics and ground-based automation requirements for 2018 so that users will know what they need to do, including consideration of reliability requirements for airborne contribution. Roadmaps should include necessary stakeholder decision, actions, and implied costs.
- *Finding*
  - NASOPS has mixed opinions of the Human Factors works as presented. ConOps and technical issues such as human-automation or air-ground roles have not been determined, so plus-ups seem premature. However, controller roles will clearly change, and it should be possible to hypothesize skill sets and training requirements for that.

- *Recommendation*
  - FAA should task REDAC to form joint NASOPS-HF Working Group to assess the best way to accelerate appropriate HF research to support 2018 capability, especially with new controller selection and training criteria.

Program Funding

- *Finding*
  - In presentations of NASOPS research, lack of connection to desired increments in capability, lack of clarity in magnitude of problem being addressed, lack of technical detail of approach, lack of metrics to assess benefits and progress, and lack of priority among elements make it difficult to place research in context and ascertain in value.

- *Recommendation*
  - FAA should conduct or complete gap analysis to identify projected benefits in quantitative terms of proposed implementations in the solution sets, the priorities among them, and the research required to provide them, putting this information into research portfolios with clear milestones, exit criteria, funding lines, and lines of authority.

Research Area Funding

- *Finding*
  - Material to assess relative funding among the Subcommittee research areas was not presented.

Partnerships

- *Finding*
  - Public-private partnerships hold substantial potential for many of the NextGen activities, and dramatically increase the potential for innovation. They are most effective when emphasizing pre-competitive, industry-wide design guidelines, standards for systems and architectures, and means of compliance for certification.

- *Recommendation*
  - FAA should consider developing a public-private partnership to execute NextGen, using past models for lessons learned, built around pre-competitive focus, shared governance, cost sharing, and appropriate IP protection.

Response to Committee Recommendations

- *Finding*
  - FAA responses to NASOPS recommendations are reported to Congress through a NARP appendix, and, in the case of NASOPS, have been occasionally unclear or misleading

- *Recommendation*
  - FAA should consider putting REDAC recommendations, broken out by subcommittee, in the main parts of the NARP that describe the work being accomplished and discussed

Process

- *Findings*
  - Limiting NASOPS review purview to RED funded items limits the ability to assess pre-implementation activities in the solution sets and progress toward NextGen.
  - Working Groups have provided concrete technical and programmatic suggestions to FAA
- *Recommendations*

- NASOPS suggests presenting the research by Solution Sets, and setting up Working Groups aimed at doing in-depth review of all the work in each Set.
- NASOPS will provide specific suggestions for organizing the material to be presented at future meetings.

Additional Guidance

- *Finding*
  - The described FAA approach to assessing the environmental impacts of operational changes focuses on deleterious effects but does not allow credit for offsetting reductions in environmental impact. This imbalance was particularly evident in a discussion of RNP approaches that remove noise impacts over much of a possible approach or departure area by concentrating all flight tracks in narrow corridors.

- *Recommendation*
  - FAA should task REDAC to develop a NASOPS/E&E Working Group to propose new assessment approaches for environmental impact.

Attachment 4

R. John Hansman
T. Wilson Professor of Aeronautics and Astronautics
Director, International Center of Air Transportation

Massachusetts Institute of Technology
77 Massachusetts Avenue, Building 33-303
Cambridge, Massachusetts 02139-4307

Aeronautics and Astronautics
Engineering Systems Division

Phone 617-253-2271
Fax 617-253-4196
Email rjhans@mit.edu

May 18, 2009

The Honorable Lynne Osmus
Acting Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Administrator Osmus:

On behalf of the Research, Engineering and Development Advisory Committee (REDAC), I am enclosing the summary observations and recommendations from the fall meetings of the standing REDAC Subcommittees (Aircraft Safety, NAS Operations, Environment and Energy, Airports, and Human Factors).

As a general observation, the REDAC has been encouraged by the efforts to develop a structured approach for NextGen implementation. The REDAC does have concerns that the NextGen scope is so broad it is difficult to identify the most critical research requirements and determine if the appropriate research is in place to support NextGen. The 2018 focus of current implementation efforts seems appropriate for initial FAA implementation but it will be important to retain a longer national focus for the full NextGen effort.

The REDAC also notes that the existing environmental and safety approval processes are not well structured to deal with the magnitude of system changes expected from NextGen. The challenges of the New York airspace redesign illustrate the difficulty of making even modest changes which clearly improve the environmental performance of the system. Innovative technical and policy approaches to these processes will be necessary for successful modernization.

Finally, the REDAC has a continuing concern regarding the FAAs technical workforce in several emerging technology areas. In particular, the REDAC has repeatedly identified critical software and digital systems as an area where the agency has unique responsibility and exposure to technical risk in both air traffic and flight safety. The progress has been disappointing and will require a significant effort in the hiring and training of core technical staff as well as a research investment to stimulate national competency in these areas.

We hope that these observations are useful to you and the agency. As always, the REDAC stands ready to assist if there is any way we can help in our common objectives of improving the safety, efficiency and capability of the air transportation system.

Sincerely,

R. John Hansman
Chair, FAA Research, Engineering and Development Advisory Committee

Enclosure

Research, Engineering and Development Advisory Committee (REDAC)
Recommendations on the FY 2011 R&D Budget

Subcommittee on Airports

Recommendation: The Subcommittee recommends the FAA expedite completion of the research to identify if more firefighting agent is required at airports. This research is for the new large aircraft (group 6 aircraft) such as the A-380. These aircraft carry much more fuel than the group 5 aircraft such as the B-747.

Recommendation: The Subcommittee recommends the FAA continue to focus on wildlife research. This should be maintained at the highest levels to assure further progress in reducing wildlife hazards to aviation around airports.

Recommendation: The Subcommittee recommends that staffing be increased by one engineer within the Airport R&D Branch at the William J. Hughes Technical Center. The position will support the increased funding and research projects underway.

Recommendation: The Subcommittee recommends the FAA include $2,300,000 for Phase II of the visual aid test bed, and $2,400,000 for the high tire pressure testing initiative in the FY 2011 program request.

Subcommittee on Environment and Energy

Recommendation: The Subcommittee finds that the FAA Office of Environmental and Energy is significantly underfunded and understaffed, especially in view of the additional responsibilities (global climate change issues and a refocusing on noise research) that continue to be imposed on it. While the Subcommittee recognizes that the FAA is captive to the Congressional appropriations process, action is necessary to ensure that appropriate research activities are initiated and sustained. In particular:

a. The Subcommittee recommends that the Agency fully fund an additional position in the Operations and Policy Division as soon as possible.

b. The Subcommittee recommends the Agency should, as quickly as possible, restore the contract support that was recently removed.

c. The Subcommittee recommends that appropriate funding should be provided to continue the research review of aviation noise metrics and policy.

d. The Subcommittee recommends that support of, and leadership in, the international processes of the International Civil Aviation Organization (ICAO) be continue. Specifically, funds should be available to support the activities of ICAO's Group on International Aviation and Climate Change (GIACC). GIACC is working to establish international standards on global climate change.

Recommendation: The Subcommittee continues to be concerned that environmental issues have not been given appropriate attention in the NextGen effort. In order to ensure proper environmental consideration, it is recommended that an Environmental Management System (EMS) be established for the NextGen initiative. This EMS would be used to provide information on the environmental impacts of modernization actions and would facilitate the implementation of environmental research efforts.

Recommendation: In order to support environmental research efforts, the Subcommittee recommends funding for the Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program is continue.

Subcommittee on Human Factors

Finding 1: As a whole, the NextGen research work plans proposed by both Air Traffic Control/Technical Operations (NextGen Controller Efficiency) and Flight Deck (NextGen Self Separation and NextGen Air Ground Integration) domains were well crafted and reflect a good allocation of budget. The Subcommittee was pleased to see the efforts within NextGen Self Separation and NextGen Air Ground Integration focused on flight deck automation and human-automation function allocation. However, after reviewing the material provided (NARP, NextGen Implementation Plan), we were unable to judge the extent to which human factors was adequately addressed beyond the efforts of The FAA Human Factors Office (AJP-61) across NextGen elements. Numerous reviews by GAO, National Research Council and so forth have highlighted the lack of a NextGen strategy for ensuring that concerns with human performance, human-system integration and effective use of automation are being systematically and thoroughly addressed at all stages of design and implementation.

Recommendation: The FAA, perhaps through the NextGen Integration and Implementation Office, should ensure that all organizations responsible for design and implementation of NextGen contribute to and act upon the following:

(a): A thorough review should be made and reported in a single document (e.g., "*Human Factors Requirements of NextGen*") of the key issues with human performance, human-systems integration and effective use of automation inherent to NextGen Operational Improvements (OIs) and enablers. Particular attention should be devoted to highlighting potential solutions and mitigations to likely issues.

(b): This document should be finalized in a multi-disciplinary workshop. The workshop organized outside of AJP-61 should include key decision makers in NextGen design and implementation. It should include the Chief Scientist for Architecture, the NextGen Development and the Director of the NextGen Integration and Implementation Office. This workshop should also address a strategy for pervasively, comprehensively, and systematically accounting for issues with human performance, human-systems integration, and effective use of automation, and building in solutions and mitigations to identified concerns early in design. The document should have concurrence with the Chief Scientist for Architecture and NextGen

Development and by the Director of the NextGen Integration and Implementation Office at the conclusion of the workshop and made available for public dissemination.

(c): The Subcommittee recommends that the agency should require all organizations in the FAA to periodically report how they are addressing the human factors requirements as documented in the areas of NextGen design and implementation for which they are responsible.

Finding 2: Many programs within and outside NextGen call out issues that have direct human factors implications but may not fall within the purview of AJP-61. Examples are weather products, safety, System-Wide Information Management (SWIM), and the repeated articulation of "supporting situational awareness" across many NextGen elements. We are concerned that critical human factors issues within these elements may not be addressed.

Recommendation: The Subcommittee recommends that the FAA develop a consistent process that addresses critical human factors issues within the seven NextGen Solution Sets. One approach would be to hire a human factors professional within the solution sets comprising the developmental areas of NextGen. AJP-61 could help coordinate and facilitate these developmental human factors activities.

Finding 3: The Subcommittee views the new NextGen positions allotted to AJP-61 and one more position as important steps to addressing the resource shortfall. However, filling the remaining positions is an immediate need for managing programs and contracts. Challenges external to the FAA include a shortage of both qualified applied researchers who understand the flight-deck, ATO domains, human factors engineering, and qualified human-in-the-loop simulation facilities. Compounding this problem is the lack of rapid and effective mechanisms for letting contracts to bring external researchers into the program.

Recommendation: The Subcommittee recommends that the FAA begin now to prepare human factors researchers for the NextGen tasks. This should include bringing in top talent in human factors and providing rapid but comprehensive exposure to the flight-deck and ATO domains. The FAA should explore ways to engage researchers in countries with similar ATO traditions (e.g., Canada, Europe, and Australia). Qualifying simulation facilities needs to be explored and the specialized programming skills required for this work obtained. The NextGen program is of long enough duration that a concerted effort to train the necessary researchers is still feasible, if it starts immediately. Other funding mechanisms need to be explored to allow qualified researchers to participate effectively, e.g., contracts, inter-agency agreements, broad agreements with umbrella groups (e.g., National Institute of Aerospace) and temporary assignments of researchers to FAA for specific time periods.

We also recommend that efforts be made to increase the pool of qualified applicants for future positions. This may be addressed by supporting the education of aviation human factors specialists at universities through contracts and grants. Within the FAA, short courses may be offered in aviation human factors for acquisition and regulatory personnel.

Finding 4: The Human Factors office (AJP-61) has had rapid turnover in leadership with a series of temporary appointments. This may provide human factors with less influence on NextGen policies and decisions than would be the case if there was long-term continuity in the office.

Recommendation: The Subcommittee recommends that permanent leadership be appointed as rapidly as possible. This person should have sufficient authority to ensure effective, coordinated human factors activities across the organizational lines spanned by human factors.

Finding 5: The Subcommittee is encouraged by the identification of human factors lessons learned in acquisition such as those expressed in the AJA Report *Cross Post-Implementation Review Analysis Lessons Learned,* dated December 30, 2008. However, in order for the FAA to take full advantage of the opportunities identified, a follow-on activity is needed to address each of these lessons as an appropriate change to acquisition policy, standards, guidance, or processes.

Recommendation: The Subcommittee recommends a process be developed that establishes how to transition human factors lessons learned into substantive follow-on activities. This will improve both system implementation and acquisition policy, standards, guidance, and processes.

NAS Operations Subcommittee

Finding 1: The majority of the research presented was oriented at developing a "mid-term" capability in 2018 for the NAS or by implementing incremental changes to the existing system to increase controller productivity. The general construct for the research is therefore one of evolution from the current system, rather than a transformation of the system. The Subcommittee understands that it is important for the FAA to provide as many benefits to the NAS users in the near term as possible; the evolutionary focus is consistent with that requirement. However, the Subcommittee is very concerned that this emphasis will not provide the technologies, policies, and procedures required for the transformation to the long-term vision of the NAS, because it is a push from current operations rather than a pull from the future. To have research oriented to both 2018 and the long term may require more resources than those needed for either vision alone.

Recommendation (a): The Subcommittee recommends that the FAA conduct an assessment of the extent to which the planned "mid-term" improvements to the NAS for 2018 are consistent with the requirements for the transformed long term NAS. Research conducted for the 2018 goal should be scalable to the transformations most needed for the long-term vision.

Recommendation (b): If the research supporting the 2018 capability does not scale to the longer-term vision, the FAA should undertake to identify additional research resources that may be required for the longer-term vision and clarify the approach for obtaining them.

Finding 2: The Subcommittee heard a briefing on the Avionics roadmap, which provides a good start to providing an understanding of the requirements for the air-side contribution to the NextGen infrastructure, but much work remains to be done. Performance metrics must be established and systems requirements must be defined. This is particularly true for the aircraft contribution to the 2018 architecture, because no research was described which addresses what the airspace users have to do to enable NextGen. Additionally, none of the research we have seen has addressed the aircraft avionics reliability impact on the 2018 or the long-term ConOps.

Recommendation: The Subcommittee recommends that the FAA accelerate developing airborne avionics and ground-based automation requirements that permit achievement of the stated 2018 goals so that users will know what they need to do. Consideration of reliability requirements should be part of this development. The roadmaps should include necessary stakeholder decisions, actions, and implied costs.

Finding 3: The Subcommittee was given a briefing of the "Air Traffic Control/Technical Operations Core" and the "NextGen Controller Efficiency" human factors research programs. The Subcommittee has mixed opinions concerning this work and the level of funding it is receiving. On the one hand, these two programs each are requesting "plus-ups" near $6M for FY11, which are substantial increases when overall ConOps, and technical issues such as human-automation or air-ground roles-responsibilities, have not yet been determined. On the other hand, it is clear that controller roles will in some sense be switching from tactical control to "management" of traffic, even for the mid-term implementation, and it should be relatively straightforward to develop hypotheses regarding the change in required skill sets and start developing selection and training programs for new hires.

Recommendation: The Subcommittee recommends that the FAA task REDAC to put together a joint NASOPS-Human Factors Working Group to provide an external assessment of the best way to accelerate appropriate ATM human factors research in support of the 2018 mid-term capability. A key aspect should be the definition of accelerated activities required to develop new controller selection and training criteria.

Finding 4: In the presentations given to the Subcommittee, there is frequently a lack of connection of the research to desired increments in NextGen capability, a lack of any sense of the magnitude of the problem being addressed, a lack of any real technical detail of the work being performed, a lack of any measure of the extent to which performing the research and implementing the results will provide an efficiency or capacity increase for NextGen, and a lack of an overall sense of relative priority among research elements. The resulting lack of clarity makes the research (1) very difficult to place in context, and (2) very difficult to ascertain in value.

Recommendation: The Subcommittee recommends that the FAA should conduct (or complete, if it is underway) a gap analysis which clearly identifies projected benefits, in quantitative terms, to capacity, efficiency, and/or safety of proposed implementations in the solution sets, the priorities among them, and the research required to provide them, and develop research portfolios which have clear milestone completion requirements, exit criteria, defined funding lines, and clear lines of authority.

Finding 5: Public-private partnerships hold substantial, and largely untapped, potential for many of the activities underway for engaging the private and state sectors in NextGen technology maturation and the related required innovations. Such partnerships are particularly effective when they emphasize pre-competitive, industry-wide design guidelines, industry standards for systems and architectures, and means of compliance for certification of new technologies. Additionally, industry methods for managing R&D may provide various accelerations to the FAA approach. Even with the slowly rebuilding NASA/FAA partnership, current FAA NextGen implementation strategies make scarce, insufficient use of partnerships.

Recommendation: The Subcommittee recommends that the FAA should consider developing a public-private partnership for the execution of NextGen. The FAA should use past models for lessons learned, and build the partnership around pre-competitive focus, shared governance, cost sharing, and appropriate IP protections. An approach would be to engage the National Council for Public Private Partnerships (NCPPP) as a forum to facilitate the design exercise, and engage the roles of small and large businesses (OEMs and suppliers), the states and municipalities, the operators, academia, and the Federal sector.

Finding 6: The described FAA approach to assessing the environmental impacts of operational changes focuses on deleterious effects but does not allow credit for offsetting reductions in environmental impact. This imbalance was particularly evident in the discussion of the Required Navigation Performance (RNP) approaches that remove noise impacts over much of a possible approach or departure area by concentrating all flight tracks in narrow corridors.

Recommendation: The Subcommittee recommends that the FAA should task REDAC to develop a NAS Operation/Environment & Energy Working Group to propose new assessment approaches for environmental impact.

Subcommittee on Aircraft Safety

Finding 1: The Subcommittee has considered the roles played by several activities and laboratories – especially the Tech Center Fire laboratory, the Fuels laboratory and, importantly, CAMI. FAA has made major contributions to knowledge in these areas. The laboratories and their work are world renowned and add important luster to FAA. There is a need to document the various capabilities and the justification for the care and feeding of these facilities, so as to permit an FAA-wide examination of the need for, modernization of, and the funding of existing facilities. This examination should ensure that adequate ATC/Cockpit/pilot/controller simulation and modeling capabilities are available to support studies related to NextGen, self-separation, human factors, reduction of spacing between parallel runways, RNP, etc.

Recommendation: The Subcommittee recommends that, even in difficult budget periods, the work and funding of these laboratories be addressed from not only a program perspective, but from an Agency and national perspective as well. The full motion flight simulators at CAMI supporting research in Terminal Area Safety is a case in point.

Finding 2: Several research topics presented plans that were stated to be in support of the Next Gen initiative. Detailed NextGen research needs appear to be elusive and still need to be clearly defined in most areas. It was mentioned that the I&I office is working diligently on this requirements definition process.

Recommendation: As stated in the last several Subcommittee meeting reports, the Subcommittee recommends that this must be accelerated to assure research is done in a manner consistent with NextGen deployment timing. In the interim the FAA research sponsors must use their best judgment to anticipate the NextGen research needs until such requirements become better defined. In addition as requirements evolve, the sponsors must be aware of research that has already been done. For example, much work has been done to evaluate closely spaced parallel runway limitations for today's infrastructure. Much of this work may be applicable to support Next Gen objectives for assessing self-separation capabilities on closely spaced parallel runways.

Finding 3: Consistent with the Strategic Guidance provided, the Subcommittee expects to see detailed plans with measurable milestones & deliverables for the FY11 research activity. It is noted that excellent results need several key ingredients – complete planning, diligent execution & skilled people.

Recommendation: The Subcommittee recommends that the FY11 plans be defined, be clear & explicit to the point of being trackable on a monthly basis – not just the budget expenditure but the actual results vs. the plan. This timely understanding of execution issues enables midcourse corrections to be considered & implemented early for maximum benefit. Additional focus on execution excellence will yield more & better research per dollar spent. Earned Value Measurement techniques are available to help here and can be very simple to implement in their most basic form.

Finding 4: The Subcommittee understands that FAA now uses Project Level Agreements as a management tool to make judgments about appropriate NextGen research levels – as opposed to the former use of Program Plans. Program Plans have been valuable as a mechanism to gather user and stakeholder support and input. Weather Plan and Human Factor Plan are good examples. (The Weather research program, for example. continues to deliver high quality capability improvements. This consistent delivery may be due, in part to a consistently high level of research funding for which multi-year detailed plans are created & executed). This approach could be duplicated for strategically critical programs in other areas. These efforts have helped FAA to achieve support, consistency, and effective monitoring on the research initiatives.

Recommendation: The Subcommittee recommends that the Project Level Agreement mechanism be used actively to document the core research efforts and to capture industry and stakeholder input.

Finding 5: The Subcommittee also recognizes that Weather requirements cut across both safety and capacity mission objectives of the FAA. Consequently there are inherent institutional complexities for managing and sponsoring the Weather research.

Recommendation: The Subcommittee recommends that FAA ensure it has enough qualified people to manage the broad and complex Weather related programs that support multiple mission needs.

Finding 6: There is more funding proposed for Unmanned Air System (UAS) activities than for software /digital systems work. We have been informed that all the internal requests for research have been fully funded, but this situation may be evidence of the previously identified difficulty of FAA acquiring talented software/digital system experts. Next Gen based research requirements for Software Digital Systems are largely missing & must be defined. The continued lack of requirements is actually quite surprising since all of Next Gen is dependent on advanced avionics.

Recommendation: In light of the growing and crucial importance of software/digital systems, the Subcommittee recommends that this work be given additional emphasis and funding, as well as renewed efforts to hire software and digital systems experts.

Finding 7: Unmanned Air System (UAS) research requirements are fuzzy at best and lack a coherent plan that provides a clear path to certification & operation of UAS in the NAS. It appears the possible solution set is overly constrained by multiple conflicting operational requirements to the point where it may well be a null set making research either irrelevant or misdirected.

Recommendation: The Subcommittee recommends that significant system level thinking be applied to the development of the optimal operational construct and to the definition of the research (if any) needed to permit guidance material & regulations to be developed. The Subcommittee recommends that a Program Plan be developed with milestones, metrics and funding requirements.

Finding 8: The Subcommittee notes that based on what was presented, the FAA planned activities for icing research are relevant, appear to be on track, and are well integrated with other organizations doing icing research such as NASA.

Finding 9: The Small Airplane Directorate has a very tough task ahead to assure Continued Operational Safety (COS) for the >150,000 general aviation aircraft in the US. The issue of aging aircraft (one that has been worked tirelessly for many years on large commercial aircraft with great success) has barely had an impact in the General Aviation (GA) fleet. There remains significant work to do here. The approach proposed to develop guidance material for GA airplane structural fatigue assessment is good but insufficient. The efforts of the Directorate to educate pilots, mechanics & owners are commendable & are very slowly increasing awareness of the issue, but this too is insufficient. There needs to be a large scale, mandatory reporting system implemented to permit the FAA to gather the aging aircraft structural cracking data it needs to support an adequate, data based, reliable approach to COS for this fleet. This is unpopular & difficult. Absent a program such as this, the GA fleet will expose the structural fatigue issues, event by event, death by death. It will happen, what will be the human cost before the FAA is called to react to the systemic issue of aging GA aircraft?

Recommendation: The Subcommittee recommends that FAA develop a more efficient and timely reporting system for the general aviation fleet as a means of gathering factual data on the aging GA fleet to proactively prevent in-flight catastrophic structural failures by enabling timely, appropriately focused, data based, high priority GA R&D activities leading to improved structural assessment guidance material and potentially Airworthiness Directives. This is directly aligned with the FAA mandate to assure Continued Operational Safety as well as complimentary to the ongoing Small Airplane Directorate Part 23 Certification Process Study.

Finding 10: The Subcommittee was asked to review a Volcanic Ash Risk Assessment paper that was provided at the meeting. Although the risk assessment was very limited and there have been no accidents to date due to Volcanic Ash encounters, the Subcommittee recognizes there is legitimate concern within the transport pilot community about the potential hazards of volcanic ash. The subcommittee concludes that these concerns probably warrant further research.

Recommendation: The Subcommittee recommends that research be limited to a very focused approach on how to detect and avoid a volcanic ash encounter. The Subcommittee does not believe the research related to the development of onboard technologies to detect or harden an aircraft against volcanic ash is warranted. The Subcommittee recommends that the research be limited to the development of procedures for getting tactical information to flight crews so they can effectively avoid the hazardous areas. Finally the Subcommittee believes that even this limited scope for research is relatively low in the broad research portfolio.