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

September 24, 2008

Meeting Minutes

On Wednesday, September 24, 2008, 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 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, Mr. Joseph Del Balzo. Mr. Del Balzo will also serve as Chair of the Aircraft Safety Subcommittee.

Workshop Summary – REDAC Activity – Barry Scott

Mr. Barry Scott presented a summary of the REDAC workshop held in July. His comments included the following.

- Planning began in April 2008
- Senior Management Approval – June 2008 (Vicki Cox)
- Bessie Coleman Room Reserved
- 32 Members Attended on July 29-31, 2008
- Survey Results Very Useful
    - Value
    - Conduct
    - Content

The survey results showed a unanimous approval to hold the workshop yearly. Below are some of things we will be working on to improve the next workshop.

- Development of process earlier (only had 3 months previously).
- Include more human factors and environment and energy.
- Standardize presentations.
- Shoot for 100% participation on briefing dry-runs.
- Provide materials earlier to members (2 weeks not enough time).
- Organize read-ahead materials on the CD in a better way.

Mr. Scott mentioned Bob Jacobsen has been attending all the subcommittee meetings. He has been able to assess the value of the workshop and briefings at the meetings. Barry is trying to attend at least one-day of each subcommittee meeting in 2009.

Mr. Scott discussed the following REDAC activities.

- Increase the REDAC Budget (increase support for Gloria)
- Refine FAA Response Process to REDAC Recommendations (expedite quicker)
- Assign Senior Person to Track Progress on Recommendations (if we say we are doing something – we need to be doing it)
- Standardize Some Material for Presentations to Subcommittees (i.e., budget briefing -the same for all subcommittees)
- Revise Terms of Reference to Include NextGen
- Review Subcommittee Memberships (expertise & balance, some cross pollination)
- Working Groups

The members and Mr. Scott engaged in a discussion on future working groups of the REDAC. He explained the process for creating a working group and discussed the following topics.

- Modeling and Simulation
- Test Beds and Demos programs
- Key priority themes across TCRG & NextGen
- Lab facility issues (how to close an old facility when not needed)
- Avionics roadmap
- Guidance on whether core programs migrate to NextGen or remain distinct

Dr. Hansman asked whether there was any impact on the observations from the workshop. Mr. Scott replied that Mike Romanowski would be commenting on this during his briefing.

Dr. Hansman suggested that the discussion on future working groups be revisited after hearing the subcommittee reports later in the day.

NextGen Update – Mike Romanowski

Mr. Mike Romanowski, Director, NextGen Integration and Implementation, FAA provided the members with an update on NextGen. Mike was filling in for Vicki Cox who was on travel.

The members engaged in a discussion as Mike discussed the following.

- Pillars of NextGen & Ops Planning
- Legacy Operations Planning Organization
- NextGen Integration & Implementation
- JPDO Responsibilities
- Relationship FAA's NextGen Implementation Plan to IWP
- NextGen I&I Hiring Status
- Integrated Approach for NextGen Aircraft Equipage
- NextGen Integration…*Portfolio Management*

- NextGen "Industry Day"
- NextGen Complexity
- Next Version of NextGen Implementation Plan – January 2009
- Recent Accomplishments
- Preliminary Assessment - Impact of FY 2009 Continuing Resolution (CR)

Members raised a question about who is responsible for operational improvements. What is the coordination, what are the incentives? Mike replied that this is still being discussed throughout the agency and that we need to define the right approach.

Ms. Sarah Dalton expressed concern about changing equipment on aircraft with a concern that equipment requirements come from different places and integration is essential. You have a technical problem of how to get all aircraft upgraded with the different technologies and avoid keeping aircraft in the hanger too long for service.

Mr. Romanowski replied that working groups are looking at what can be done to avoid some of the concerns raised by Ms. Dalton. The aircraft should go out only once for service.

Budget Update – Mike Gallivan

Mr. Mike Gallivan, ATO Finance Office provided the members with a budget update. The members engaged in a discussion as Mike reviewed the following.

- R&D Budget Overview (No change in FY 10 Amounts)
- NextGen Funding Profile - Capital & R,E&D
- R,E&D Core/Legacy (FY 2008 – 2013)
- FY 2009 Congressional Action – NextGen (House & Senate Actions)
- R&D Budget Overview – FY 09 Status (Will begin with FY 09 under a CR)
- Impact of FY 2009 Continuing Resolution (CR)
- Reauthorization Status

Below are some of the questions raised by the members.

What is a portfolio?
Response - A portfolio is all the things to implement NextGen research, to implementation, enabling activities and operational evaluation.

Is a critical path analyses being done to identify where to spend the right effort?
Response – A critical path analyses is being done. Early return from the analysis should come by December.

What are the key elements in the portfolio?

Response – The analysis is tentative in order to assure the mid-term until we can decide how far a capability needs to be developed. We are working with industry feedback on how to assess current activities including contributing to goals, identifying gaps and needs for backup strategies, as well as top-level requirements and flow-down of benefits.

Mike discussed the ATCA forum in September that talked about critical NextGen implementation issues. This forum helped us identify strengths and weaknesses from all segments of industry.

Committee Discussion

The members engaged in a brief discussion before departing for lunch. Below are areas that were discussed.

Working groups require a lot of effort and should be reserved for high impact – when senior FAA management wants it. Some of the topics could be addressed in the subcommittees and then decide if additional resources are needed and their most effective use.

ACTION: Provide more information on the workshop including a summary of key outputs from REDAC observations.

Members discussed the need for cross pollination within the Committee. It was suggested that the subcommittee chairs receive the meeting dates and agendas in advance. This would help the chairs decide whether someone from the subcommittee may wish to attend that meeting.

ACTION: Gloria to forward meeting dates and agendas to each subcommittee chair as soon as they are available.

Another comment was made that combining the workshop and subcommittee meetings would be another cross pollination option. (Possible 1 day workshop and 2 day subcommittee meeting.)

Presentation of Subcommittee Reports

The standing subcommittees reviewed FAA's R&D investments in the areas of airport technology, aircraft safety, human factors, NAS operations, and environment and energy. After reviewing the respective portfolios proposed by the FAA, each subcommittee generated recommendations. The subcommittee chairs listed below presented their subcommittee's recommendations. Attachment 3 provides the recommendations/observations presented by the chair.

Subcommittee	**Subcommittee Chair**
Environment & Energy	Steve Alterman (Acting Chair)
Human Factors	Bill Edmunds (for Ken Boff)
Airports	Ed Gervais
Aircraft Safety	Bill Rosenkrans
NAS Operations	Victor Lebacqz

The recommendations were discussed and approved with edits by the members. The final recommendations are reflected in the letter to the Administrator, Attachment 4.

Committee Discussion

The Chair asked members if there were any other topics that needed to be discussed or to be considered for the Administrator's letter.

A suggestion was made that a statement be included to address the environment. This would include a comment that NextGen should not just be aligned to capacity but also efficiency in terms of reducing noise and emissions.

The discussion continued relating to working groups. Tracking avionics may be something that the NAS Operations subcommittee could help with. Several other topics are still being considered for working groups. John Hansman will discuss this further with Barry Scott and Mike Romanowski.

Sarah Dalton raised a question relating to the FAA response on separation standards. The response does not address the recommendation. The Chair suggested the FAA look at the response and see if it was an oversight. (Page 10 of FAA Response letter.)

ACTION: Review the FAA response and provide additional information to the Committee.

Mr. Scott commented that he would like to help develop a style for writing the recommendations and tracking system.

Dr. Hansman thanked the members and adjourned the meeting. He announced the next meeting date is April 29, 2009.

Attachment 1

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

September 24, 2008

Agenda

9:00 am	Welcome	Barry Scott John Hansman
9:15 am	Workshop Summary Future REDAC Activity	Barry Scott
9:45 am	NextGen Update	Mike Romanowski
10:45 am	Break	
11:00 am	Budget Update	Mike Gallivan
11:15 am	Committee Discussion	John Hansman
11:30 am	Lunch	

Subcommittee Reports

12:30 pm	Environment & Energy	Steve Alterman
12:45 pm	Human Factors	Bill Edmunds (for Ken Boff)
1:00 pm	Airports	Ed Gervais
1:15 pm	Aircraft Safety	Bill Rosenkrans
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

Research, Engineering and Development Advisory Committee

September 24, 2008

Attendance

Members

Dr. John Hansman, Chair
Mr. Barry Scott, REDAC Executive Director
Mr. Steve Alterman
Mr. Bill Edmunds (for Ken Boff)
Ms. Sarah Dalton
Mr. Joseph Del Balzo
Mr. Ed Gervais
Dr. Victor Lebacqz
Mr. Tom Irvine (for Jaiwon Shin)
Mr. Agam Sinha
Mr. William Rosenkrans (Acting Aircraft Safety Chair)

Audience

Patrick Lewis, FAA
Art Shantz, OIG
Nick Stoer, Aviation Weather Associates
Jim White, BAE
John White, ALPA
Frank Mangine, FAA
Jens Henning. GAMA
Mohan Gulpta, GAA
Mike Gallivan, FAA
Charlie Leader, FAA
Bob Pearce, JPDO
Sherry Borener, FAA
Peggy Gilligan, FAA
Gloria Dunderman, FAA
Karen Braxton, FAA
Robert Jacobsen, Sierra Aviation Consulting
Kelli Willshire, FAA
Lee Olson, FAA
Robert Pappas, FAA
Mike Romanowski, FAA
Tom McCloy, FAA
Garrett Thompson, BAE
James White, FAA
Steve Serus, ALPA
Paul Krois, FAA
Nelson Miller, FAA
Ryan Schnepp, Air Products
Nick Sabatini, FAA
Nancy LoBue, FAA
Denise Davis, FAA
Monique Morris, FAA

Attachment 3

Subcommittee Presentations

Steve Alterman – Subcommittee on Environment & Energy

The Environment and Energy Sub-Committee of the FAA Research, Engineering and Development (RE&D) Advisory Committee (REDAC) held a two-day meeting on August 21-22, 2008, in Washington, DC. At that meeting, the sub-committee received status updates on various efforts and initiatives, including the Aviation environmental Portfolio Management Tool (APMT), a proposed integrated aircraft noise research plan, and efforts to integrate environmental and airspace systems models. The subcommittee members spent the majority of the meeting focusing on defining environment and energy drivers and strategic priorities.

As an introduction, the subcommittee in general believes that the programs and proposed funding levels for environmental research at the FAA and in related agencies are generally correct, with the notation that some additional investment in alternative fuels research and a renewed emphasis on noise research is necessary. At the same time, concern was expressed about the potential for funding the Agency with Continuing Resolutions for the foreseeable future. Therefore, the subcommittee requested that the FAA provide a chart detailing the impact on environmental initiatives of a failure by Congress to fund necessary programs for Fiscal 2009. The following analyses and recommendations are based on an assumption that the Agency will receive the requested FY 2009 funding, but delays in needed programs will result if this funding is not received.

The subcommittee identified the following specific issues as matters to bring to the attention of the Administrator.

Issue 1: The subcommittee re-asserted its prior recommendation that developing solutions (technology/fuels, operations) to limit or mitigate environmental impacts is critical to the future of the Next Generation Air Transportation System (NextGen). Alternative fuels will have the greatest impact on energy availability and future environmental advances and is therefore the most critical component. Research and Development to support the U.S. efforts within the International Civil Aviation Organization Committee on Aviation Environmental Protection (ICAO/CAEP), particularly the Group on International Aviation and Climate Change **(**GIACC**)** is critical to maintaining U.S. international leadership

Recommendation 1: For environmental solutions to become viable, sufficient additional resources will be required. The budget as proposed in the NARP is the minimum investment required from the agency. Work on applied solutions should be the top priority, and an increasing emphasis must be paid to the research associated with alternative fuels. Therefore, the subcommittee recommends that, beginning in 2011, budgets should list alternative fuels as a separate line item program. FAA must continue to effectively coordinate with NASA on technology (e.g., CLEEN) and on operations research. Investment to support ICAO/CAEP must continue, particularly the Aviation Portfolio environmental Management Tool (APMT), including supporting goals and metrics. Foundational research (e.g., NASA, PARTNER, etc.) should continue at the current levels and an additional noise research program is recommended, with feedback on a prioritized plan moving forward.

Issue 2: Reduction of adverse environmental impacts is a critical and urgent objective of NextGen. Environmental considerations need to be fully integrated into decision making, planning and measurement. Environmental considerations cannot be an afterthought, as implied by certain of the presentations at the recent REDAC Workshop. To accomplish this objective, Senior ATO Vice Presidents should review environmental impacts of air traffic decisions before implementation (environmental accountability needed).

Recommendation 2: FAA needs to accelerate the activity of linking the AEE and ATO analytical models, including the establishment of agreed-upon metrics. The FAA needs to understand how the results (metrics) of the environmental tools are used in the ATO decision-making process. In addition, the FAA needs to sustain "Systems Development" F&E funding to ensure that the needed transition to NextGen occurs; the agency should create an actionable schedule to implement the plan with clearly defined roles and responsibilities and present progress to the subcommittee on a yearly basis. To accomplish this, there needs to be a more formal relationship between AEE and ATO. Close coordination between AEE and ATO would be facilitated by the consolidation of Systems Operations, Technical Operations, and Service Center Support Group within ATO so AEE and others have a central point of environmental contact within ATO.

Issue 3: The NextGen Aircraft and Operator Domain is doing a good job addressing aircraft avionics. However, for environment issues to be addressed, there needs to be an additional focus on the entire aircraft

Recommendation 3: CLEEN is a good start in this effort, but strategies need to consider the entire aircraft and move beyond "avionics equipage" to "aircraft equipage". NextGen should also not exclude aircraft beyond next generation (N+1). FAA should work closely with NASA to consider elements of N+2 aircraft that may be needed to meet NextGen environmental objectives.

Issue 4: Energy is a major driver to the future of aviation. NextGen should be part of the solution to deal with high oil prices. Alternative fuels is an emerging key topic which links economics and environment (the need for both affordable fuel and low emissions).

Recommendation 4: Energy policy must be linked to NextGen. FAA should look toward accelerating implementation of energy saving initiatives. NextGen is no longer all about capacity; energy is a major constraint and the FAA must recognize this fact. The FAA needs a solid understanding of the linkage between the type of alternative fuels (biofuel vs. Fischer Tropsch , etc.) to the type of environmental benefit. The subcommittee therefore requests an overview briefing on the Commercial Alternative Aviation Fuels Initiative (CAAFI) at its next meeting in February 2009.

Issue 5: Climate Change is also a major driver for NextGen. The FAA needs to be ready to respond to upcoming local and national policies and legislation.

Recommendation 5: The FAA needs to ensure that solid science informs aviation policy. The Aviation Climate Change Research Initiative (ACCRI) should have been started yesterday – the NextGen Senior Policy Committee should bring relevant agencies together to support ACCRI.

Issue 6: Noise research is an area that should not be ignored while we pursue the issues of energy and climate. The noise research draft plan presented to the subcommittee is a good start and needs to be funded. The funding required is only a fraction of what is spent on mitigation through Airport Improvement Program. This research is critical to guide overall AIP funding on environmental mitigation.

Recommendation 6: Refine/prioritize the noise research plan presented to the subcommittee and coordinate with other stakeholders. Provide sufficient funds to carry out the plan.

Issue 7: Elements of the NextGen plan call for increased use of secondary airports and potentially, new airports. It is critical to determine the environmental impacts of these possible operational shifts. Research to determine these impacts should be part of the NextGen R&D plan.

Recommendation 7: The FAA needs to consider the environmental implications of using underutilized or new airports with the introduction of new vehicle types, particularly with regard to increased noise. There are interdependencies and tradeoffs in this issue, with the goal of relieving congestion intertwined with associated potential fuel and emissions savings. Central to these considerations is the issue of Land Use Planning.

Issue 8: The subcommittee agrees that AEE has a robust plan in place to include the latest scientific insight into its models. The APMT development effort includes careful uncertainty analyses and assessments and is subjected to frequent peer review.

Recommendation 8: The FAA should sustain funding to develop APMT. This tool should be used to inform FAA decisions.

Issue 9: Carbon neutral aviation growth is a reasonable goal that FAA should pursue, but we need to assess the feasibility and identify the relative contribution of various solutions (technology, fuels, and operations) to guide investment in each of these areas.

Recommendation 9: The subcommittee requests a briefing at the February 2009 meeting on relative contribution of various solutions toward carbon neutrality

The subcommittee agreed to hold its next meeting 24-25 February 2008, in San Francisco, California. Jacobs Consultancy will host.

(Attachment 3 Cont.)

Bill Edmunds – Subcommittee on Human Factors

Observations, Findings and Recommendations
Observations

•Applauds the close cooperation/collaboration between *ATO-P* and *AVS* human factors (HF) personnel as vital to NextGen success

•Strongly endorses the *Personnel Roadmap* as an important tool for ensuring needed consideration of HF related issues in NextGen

•Supports strategic collaboration and leverage of common resources across industry, government and academia as essential to NextGen planning and implementation

Findings and Recommendations (1)

Finding 1. Focus on Equipment at Expense of Human Issues

•*Recommendation:Edit and revise NextGen planning documents, enterprise architecture, etc. to address human systems integration issues related to NextGen implementation*

•*Recommendation: Transform "Human Factors" in FAA job titles and organizational names to "Human Systems Integration."*

Findings and Recommendations (2)

Finding 2. HF Resource Limitations. Human factors resources in ATO-P and AVS are insufficient to carry out the range of activities required to adequately support NextGen development and implementation.

•*Recommendation: Increase AVS and ATO-P HF staffing and ATO-P HF research funding to support NextGen.*

Findings and Recommendations (3)

Finding 3. Lessons Learned Not Well Integrated. e.g., The Post Implementation Review (PIR) process for the Advanced Technologies and Oceanic Procedures program resulted in a number of significant human factors findings, but there is not a clear process to ensure these findings are fed forward to benefit other NextGen programs

•*Recommendation: Develop a process to formalize a human factors component to Post Implementation Reviews and establish processes to ensure lessons learned are available to other NextGen programs.*

Findings and Recommendations (4)

Finding 4. Crosscutting NextGen HF Issues Are Not Adequately Addressed

•*Recommendation: Develop a management structure to address cross cutting human systems integration issues. Consider sharing REDAC subcommittee members or joint REDAC subcommittee meetings*

(Attachment 3 Cont.)

Ed Gervais – Subcommittee on Airports

The Airport Subcommittee Recommends:

Continued 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 target different types of issues but only an ongoing awareness of each program about the other's activities will assure that each program take advantage of the good work of the other. Appreciates continued funding and recommends an increase in staffing by two persons in FY 11. Strongly supports testing with the new large aircraft fire fighting mock-up at Tyndall AFB, FL, as well as continued research on:

- A full-scale visual guidance test bed
- Engineered Material Arresting Systems
- Warm-mix asphalt behavior for airfield applications
- Construction of a materials laboratory at the Tech Cente**r**

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SLIDES CONTAINING PICTURES NOT INCLUDED

<u>REDAC Questions – from the NextGen Workshop</u>

1. Do the Airport related R&D tasks, timing and outcomes meet the air transport system needs?

The Airport Technology research program has been developed and refined over the years with the close contact and cooperation of the Airport Subcommittee. Specific focus tasking is created, removed, increased or decreased as a result of the input of the Subcommittee. The Subcommittee is supportive of the research and is confident that the right research is underway.

2. Are the investment levels and priorities in the Airports area assigned correctly?

Each project within the airport research portfolio is funded relative to its scope and assigned priority. Whenever new or unanticipated tasking is identified, the Subcommittee recommends appropriate actions either directly to the researchers, or back to the full Committee as required.

3. Are the overall investments assigned to target areas correctly?

The Airport Subcommittee believes that the overall investment levels are correct.

4. Do we see specific opportunities for partnering with industry, academia or other government agencies in our area of Research?

On an as-needed basis the Airport Technology Branch has entered into partnerships with industry and academia to resolve specific tasks. We have not found obvious synergies with other Government agencies, however the work with the ACRP stands as an effective example of opportunities that have been realized through oversight on each project provided by FAA staff.

5. Does the FAA Airport Technology team respond effectively to the guidance that the Subcommittee provides?

The Airports Subcommittee is highly pleased with the performance of the Airport Technology Branch. They are responsive to the requests made by the Subcommittee and they act quickly, efficiently and professionally to the needs identified by the Subcommittee.

6. What should FAA do to improve the process of engaging the Committees to provide portfolio advice (?) is the subcommittee structure effective (?) and is the information provided to Subcommittee appropriate (and adequately presented)?

In the airports area, the current structure of the Subcommittee is excellent in that it provides a good cross section from across the airports industry and hence, well rounded feedback is assured. The Airport Subcommittee has in the past asked for more (or less) in terms of detailed presentations of the research tasks that are covered at the Subcommittee meetings, and the FAA Airport Technology Branch has been directly responsive to the wishes of the Subcommittee in this regard. The only un-tapped area for possible expansion would be for more opportunities for Airport Subcommittee members to attend sessions of other subcommittees (and vice versa) but no efforts have been made to enable this possibility.

7. Does the Airport Subcommittee have any added suggestions to help FAA better focus its R&D investments?

The Airport Subcommittee sees an overarching need for the NextGen program to more thoroughly consider airports in its plans. A well-articulated vision of future airport requirements would be extremely helpful for the Airport Technology Branch to scope it's projects to better "fit" the NextGen goals.

Research Project	**FY 2010**	**FY 2011**	**Increase**
Advanced Airport Pavement Design	$ 450	**$ 468**	$ 18
Pavement Design & Evaluation Methodology	$ 900	**$ 936**	$ 36
National Airport Pavement Test Facility	$ 2,500	**$ 2,500**	$ -
Field Instrumentation & Testing	$ 540	**$ 750**	$ 210
Improved Paving Materials	$ 1,100	**$ 1,350**	$ 250
Non-Destructive Pavement Testing	$ 980	**$ 1,100**	$ 120
Pavement Roughness	$ 420	**$ 437**	$ 17
Material Testing Laboratory	$ 300	**$ 200**	**$ (100)**
CEAT-University of Illinois	$ 300	**$ 312**	$ 12
Airport Planning	$ 350	**$ 364**	$ 14
Airport Design	$ 700	**$ 728**	$ 28
Operation of NLA	$ 800	**$ 800**	$ -
Composite Materials Firefighting	$ 616	**$ 453**	$ (163)
Airport Wildlife Hazards Abatement	$ 2,500	**$ 2,500**	$ -
Airport Visual Guidance / Incursion Reductions	$ 1,825	**$ 3,200**	$ 1,375
Soft Ground Systems Follow on	$ 300	**$ 312**	$ 12
Surface Technology	$ 1,000	**$ 1,000**	$ -
Rescue and Fire Fighting	$ 420	**$ 624**	$ 204
Subtotal--Contracts	$ 16,001	**$ 18,034**	$ 2,033
In-House (FTEs)	**$ 3,347**	**$ 3,481**	$ 134
Airport Cooperative Research	**$ -**	**$ -**	
Total	**$ 19,348**	**$ 21,515**	**$ 2,167**

Summary of Recent Events

The Airport Subcommittee continues to enjoy good industry participation.

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

Internationally – FAA opinions regarding airfield pavements have been adopted by the International Civil Aviation Organization. Many foreign governments are seeking Cooperative Research agreements with the Airport Technology Branch to pursue both pavement and safety related research. France, China, Brazil and India all currently have CRDA's w/FAA (some are still getting formal approvals).

Bill Rosenkrans – Subcommittee on Aircraft Safety

Subcommittee Membership

- Active participants
  - Mike Bragg (Univ Illinois)
  - Bill Rosenkrans (Pratt & Whitney)
  - John White (ALPA, former NASA member)
  - *Doug Rohn (NASA)*
  - *Nasser Vaziri (Boeing)*

- Additional <u>active</u> members needed to provide guidance & review in the following areas:
  - Software Digital Systems
  - GA aircraft
  - Rotorcraft
  - Safety Management Systems
  - Human Factors
  - Weather User (Airline dispatcher)
  - Aerospace Medicine

Subcommittee Focus & Priorities for FAA Safety R&D
Research to address:

- Next Generation Air Transportation System (NextGen)
- Identified, data-based safety issues
  - Particular concern: research needs identified by:
    - Commercial Aviation Safety Team (CAST)
    - General Aviation Joint Safety Committee (JSC)
    - International Helicopter Safety Team (IHST)
- Improved identification and assessment of current and emerging safety issues
- Enabling insertion of new technologies into certified civil aviation products and their operations

Observations/Recommendations

- SAS reiterates it's recommendation that R,E&D requirements definition for NextGen must be expedited
  - Lack of research requirements on the time bounded NextGen implementation plan means alternative (less capable) solutions will be likely due to lack of readiness & maturity of new systems
- Only 10% of <u>current</u> R,E&D efforts are aligned with NextGen Solution Sets & Domains based on Roadmap alignment assessment
  - While waiting for top down requirements, SAS recommends AVS R,E&D management extend the approach, on a proactive basis, to uncover potential research requirements by reviewing Roadmaps, Integrated Work Plans & Operational Improvements and whatever lower level plans are available & discuss resulting findings with Solution Set coordinators for validation

- Solid progress being made in key areas
  - Weather – Recommend FAA engage the user community for both safety & capacity improvements validation
  - ASIAS – Concern for new start funding this key effort with the expected FY09 CR. Recommend mitigation plan be developed to continue this work. Automation desperately needed
  - Engine Icing – SAS commends the continued NASA/FAA work to gather flight data on the phenomena and recommends finding a way to enable the Weather program to provide pop-up support of the upcoming flight test effort to maximize efficiency of testing
  - UAS – Recommend a proactive education approach aimed at the "newcomers" to this rapidly expanding aviation sector as well as accelerating rulemaking supporting research

- Concern Areas
  - FAA leadership must assure the new Self Separation & Air – Ground Integration work is properly co-funded by ATO & AVS. SAS is very encouraged by the cross-FAA organization approach and the leadership displayed by the TCRG lead
  - A System Safety Model to permit quantitative assessment of proposed NextGen solution elements should be pursued vigorously to enable proper trades & capabilities to be defined
  - NASA/FAA Technical Center work on Aircraft Icing by SLD has progressed on it's roadmap however continued effort is needed to provide predictive capability for all relevant conditions
  - Subcommittee membership is below critical mass to provide proper expert review & guidance to the very broad R,E&D community. Recommend expanding SAS membership

Victor Lebacqz – NAS Operations Subcommittee

NASOPS: Portfolio Content

- Finding: Neither the July workshop nor the September briefings presented adequate information to determine if, or how, critically important (if very difficult) R&D with system-wide NextGen design implications is being conducted. Specific areas of concern are an apparent lack of R&D devoted to (1) separation responsibility--including the air-ground split, the human-automation split, and the impact of failures or aircraft nonconformance; (2) the impact of new classes of vehicles (UAS, VLJ, CESTOL, etc) on the NextGen design and operation; (3) the development of risk assessment methods and safety analyses for the NextGen ConOps; and (4) the design of NextGen and operations in it to optimally minimize adverse environmental effects.

- FY11 Recommendation 1: Use a taxonomy based upon research devoted to these areas to assess the FY 09 and FY10 R&D projects to ascertain whether a re-binning and an increase in funding for FY11 for R&D in these difficult areas is required. If so (and NASOPS believes it is so), consider re-allocating additional resources from other target areas to NASOP

- Finding: Although there was mention that a plan to establish an avionics roadmap has been drafted. the FAA appears to have no avionics roadmap yet for aircraft equipage, nor incentive to the industry to equip in an integrated fashion. Briefings on the airborne requirements for ATM are not linked to specific performance requirements. Since equipage is a major cost and complexity driver for airlines, this lack needs to be remediated immediately.

- FY11 Recommendation 2: NASOPS subcommittee offers to work with the Aircraft Working Group of the JPDO to establish an airborne avionics road-map and FY11 funding requirements for airborne ATM R&D and lead-in re-prioritization of FY10 funding.

NASOPS: Partnerships

- Finding: The NextGen design appears to be based on intuition and consensus, rather than modeling, analysis, simulation, and demonstration or testing. The implication from the July workshop is that the FAA intends to start a whole new activity in modeling and simulation, heavily infrastructure based, which was not ready to be briefed to NASOPS in September. This is not the correct approach. Additionally, the demonstration activities (e.g. Florida) need to be explicitly a part of the analysis, simulation, and learning process, and there is no evidence that they are.

- FY11 Recommendation 6: Leverage the work of NASA and other government partners, and particularly the considerable investment of the JPDO and its industry partners in the work accomplished by its System Modeling and Design Division, to form the basis from which to start this activity. Re-examine funding plans to develop entirely new simulation capabilities.

- FY11 Recommendation 7: Establish criteria for demonstration projects that link them to specific research questions and on-going analysis and simulation to provide validated answers. Provide exit criteria for, and lessons-learned from, each demonstration project. Establish clear funding stream for proof-of-concept tests or demonstrations.

Attachment 4

T. WILSON PROFESSOR OF
AERONAUTICS AND ASTRONAUTICS
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October 17, 2008

The Honorable Robert Sturgell
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Administrator Sturgell:

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 to integrate near term and longer term (NextGen) objectives as well as the beginning of a research requirements flow down process driven by NextGen. The REDAC is concerned, however, that the multiple shared objectives of NextGen (e.g. Capacity, Efficiency, Emissions, Noise, Safety, Security) are somewhat piecemeal and need to be more fully integrated in both near term and long term plans. It is also important that the NextGen planning processes remain dynamic and able to adapt to emergent factors such as fuel, emissions and financial concerns which may shift the relative importance of competing NextGen objectives.

We hope that these observations are useful to you and the agency. 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)
Guidance on FY 2011 R&D Portfolio

Subcommittee on Environment and Energy

1. The Agency must continue to focus its environmental research on both activities to support NextGen and the traditional research necessary to ensure that United States leadership in the international process (ICAO) remains constant. It is therefore recommended that additional resources be made available, at least at the levels envisioned by the NARP.

2. With respect to NextGen, it is recommended that:

    a. Concentration on applied solutions should continue, especially with respect to the ongoing research on potential alternative fuels. Indeed, to highlight the importance of alternative fuels, the Subcommittee recommends that funding for Alternative Fuels research be broken out as a separate line item in future FAA budgets.
    b. Airspace redesigns have generated an entirely new class of aircraft noise complaints, with citizens miles from airports now voicing concerns. It is recommended that sufficient funds be made available for a thorough reassessment of the noise issue to ensure that the goals of NextGen are not derailed by environmental concerns based on noise.
    c. Similarly, with NextGen considering a shift to underutilized or new airports to relieve future congestion, the environmental challenges inherent in such a paradigm shift, both in terms of noise and emissions, must be considered. Sufficient funding to conduct such research should be provided.
    d. In order to foster continued communication and cooperation between the Office of Environment and Energy and the Air Traffic Organization (ATO), the subcommittee recommends that ATO establish one point of contact for work with the environmental community. Such communication is necessary to ensure that environmental metrics are included in the ATO NextGen decision-making process so that the environmental impacts on air traffic decisions are adequately considered.
    e. With respect to longer term considerations, the subcommittee recommends that FAA environmental research also concentrate on the environmental benefits of new aircraft development and specifically that work in conjunction with NASA on such issues continue.
    f. Finally, with global climate change an increasing environmental concern, the subcommittee recommends that the FAA work to bring together all relevant agencies to support the Aviation Climate Change Research Initiative (ACCRI).

3. With respect to the ICAO standard setting process:

    a. The development of tools and metrics to support international standard setting should continue. In order to support these objectives, funding for the PARTNER program and the tool to assess the costs and benefits of various environmental initiatives (APMT) must continue.
    b. With ICAO having established a new process to assess the issue of global climate change (GIACC), the subcommittee recommends that sufficient funding and personnel resources be made available to support this activity.

Subcommittee on Airports

The Airport Subcommittee submits the following recommendations:

1. The Subcommittee is pleased with the Airport Technology Research budget allocation for FY 10 / FY 11, and with the task statements and recommends a personnel increase of two persons that the budget supports.

2. The Subcommittee recommends closer coordination between the Airport Cooperative Research Program (ACRP) and the FAA's own Airport Technical Research Program based at the FAA Technical Center. This is especially important given the maturation of the ACRP after a several year start-up period. These two research programs should be, and largely are, complimentary and are both vital to supporting the airport progress needed in the years ahead. While they target different types of airport issues, only a continuous awareness by each program of the other's activities can assure that the goal of complimentary programs will be achieved.

3. There has been talk of moving the Airport Technology Research Branch (AJP) from ATO to AAS, which is the primary sponsor for the Airport Technology research. The subcommittee supports this realignment.

4. The subcommittee recognizes the good work that has come out of the large aircraft fire mock-up at Tyndall AFB in Panama City, FL and recommends the transition of this work to a draft training document as soon as possible to support fire crews across the nation at airports wherever the A380 might operate. An emphasis on composite fire fighting is also strongly supported.

5. The subcommittee supports the pavement area research and the construction of a laboratory to support this research area. There is one topic that the Airport Subcommittee recommends adding to the pavement area research and that would be an effort to investigate the use of warm-mix asphalt for air carrier airport pavements, which reportedly deliver environmental benefits to paving operations.

6. The subcommittee recommends an increase for FY 2011 of $1,375,000 for visual aids, which increases this item to a total of $3,200,000. The increase is required to start work on the development of a visual aids test For visual guidance FAA will start a multiyear initiative to develop a state-of-the-art visual guidance technology test bed that will enable visual guidance engineers an opportunity to design, install, test, monitor, and report on what it will take to create a visual guidance infrastructure that will take full advantage of state of the art technologies in

Signs, Lighting and Markings to provide a more efficient infrastructure and the best visual cues to the airport user. Major advances in visual guidance technology have brought forth new, brighter, more efficient and more conspicuous lighting devices, enhanced paint material that lasts longer than traditional paint, and airport signage that is easier to read from greater distances. This new technology, when compared with the current state of visual guidance systems, warrants that the FAA undertake a major research effort to enhance these essential systems, making improvements that will best serve the future of our nations aviation system. The FAA's conceptual "NextGen" Program talks about levels of air traffic increasing to three times what it is today, bringing thousands and thousands of aircraft to smaller airports that have historically seen very little traffic. The demand for the visual guidance infrastructure at these airports will increase significantly, bringing with it higher levels of usage, higher performance requirements, and higher costs to maintain. Energy use and energy costs are becoming an important consideration for all airports in their efforts to become more sustainable and "green". Today's General Aviation community is already indicating that there is a need to enhance their visual aids, citing examples of aging power cables, antiquated fixtures, and high energy costs as major problems that they are experiencing now.

7. The Subcommittee recommends that at some point in the future to carry out a study that would validate (or refute) the findings on taxiway deviation at JFK, now that NLA operations nave begun. While not necessarily the only study that could be considered for validation, it would be timely to do this, once the numbers of daily operations increase to a suitable level.

8. The Airport Subcommittee sees an overarching need for the NextGen program to more thoroughly consider airport issues in its plans. The NextGen Program should decide what a future airport might posses in order to make it fully NextGen ready, and then articulate the attributes that airports will need to build to, in order to achieve consistency with that vision.

Subcommittee on Human Factors

Observations

1. The committee noted the strong cooperation/collaboration between ATO-P and AVS human factors (HF) personnel. The committee believes that a continued level of close cooperation will be critical to achieving success in development and fielding of NextGen concepts.

2. The Personnel Roadmap is an extremely valuable tool to ensure recognition and visibility for human-related issues in NextGen. The committee strongly supports this effort and feels it will be a valuable component of the NextGen development process.

3. It is important that NextGen planning and implementation continue to leverage common resources across industry, government and academia.

Findings and Recommendations

Finding 1 - Focus on Equipment at Expense of Human Issues. Current FAA NextGen planning in the solution set framework focuses primarily on equipment acquisition and insufficiently addresses human-related issues and needs. Greater emphasis on human systems integration in NextGen is required.

Recommendation 1a: Edit and revise NextGen planning documents, enterprise architecture, etc. to address human systems integration issues related to NextGen implementation. Continued development and integration of the Personnel Roadmap should facilitate this process.

Recommendation 1b: Change term "Human Factors" in FAA job titles and organizational names to "Human Systems Integration." This may facilitate a broader role and understanding of the human component in the systems engineering approach.

Finding 2 - Human Factors Resource Limitations. Human factors resources in ATO-P and AVS are insufficient to carry out the range of activities required to adequately support NextGen development and implementation.

Recommendation 2: Increase AVS and ATO-P HF staffing and ATO-P HF research funding to support NextGen. In case of an extended Continuing Resolution for FY09 that will maintain Human Factors funding at the FY08 level, the FAA should augment human factors research funding so that critical NextGen human factors activities can be initiated. The human factors subcommittee notes that for FY08 the NextGen human factors budget line items were among the few that did not receive funding to perform substantive work. An additional delay in funding will jeopardize human system integration for NextGen.

Finding 3 - Lessons Learned Not Well Integrated. The Post Implementation Review (PIR) process for the Advanced Technologies and Oceanic Procedures program resulted in a number of significant human factors findings, but there is not a clear process to ensure these findings are fed forward to benefit other NextGen programs.

Recommendation 3: Develop a process to formalize a human factors component to Post Implementation Reviews and establish processes to ensure lessons learned are available to other NextGen programs.

Finding 4 - Crosscutting NextGen HF Issues Are Not Adequately Addressed. Due to the management structure of NextGen (individual program managers, solution set managers, etc.), it is not clear how crosscutting human factors issues will be recognized and addressed.

Recommendation 4: Develop management structure to address cross cutting human systems integration issues. Consider sharing REDAC subcommittee members or joint REDAC subcommittee meetings.

Subcommittee on Aircraft Safety

Key program observations and recommendations are listed below:

Observation 1: The Subcommittee on Aircraft Safety is encouraged by the FY2011 AVS Strategic Guidance provided by the Associate Administrator to the research planning community. The guidance created two new TCRGs, one focused on Weather in the Cockpit and the other on Self Separation & Air-Ground Integration. Additionally, emphasis was placed on the importance of program metrics, milestones & project phases in planning research projects. All positive additions intended to guide the right project management planning & execution.

Recommendation: Item tracking database put in place. Assures subcommittee input is addressed.

Observation 2: The Subcommittee on Aircraft Safety reiterates it's past recommendation that R, E & D requirements definition for NextGen must be expedited. Failure to define the research needs supportive of the envisioned cutting edge technologies that NextGen is counting on will result in less capable, in hand, solutions having to be implemented with NextGen performance suffering as a result. Given that the NextGen mid-term implementation target dates are 2012-2018 or just 3 to 9 years from now, R&D should already be well underway on any new capabilities envisioned for these time frames. Without roadmaps in place, some capabilities currently being envisioned for NextGen may already be overtaken by time.

Currently only about 10% of the R,E&D efforts are aligned explicitly with NextGen needs based on a SAS requested Solution Set, Domain & Roadmap alignment assessment. While waiting for top down requirements;

Recommendation: The Subcommittee recommends AVS R,E&D management extend the assessment approach, on a proactive basis, to uncover potential research requirements by reviewing Roadmaps, Integrated Work Plans, ConOps and Operational Improvements (as well as any other lower level plans that might exist) and discuss the findings with the Solution Set coordinators for validation.

Observation 3: As was discussed at the July 2008 REDAC workshop on NextGen, there is currently no overarching System Safety Analysis model for NextGen. This model could be used

to assess the impact of the large number of proposed NextGen system & subsystem elements and enable proper trades & capability requirements to be defined.

Recommendation: The Subcommittee recommends a System Safety Model be developed to permit an integrated, quantitative assessment of NextGen.

Observation 4: Aviation Weather research is a very complex topic with the dual goals of improving both safety and capacity. The Subcommittee appreciated the review provided by Ken Leonard and the team. A strategic plan is needed to show how the products developed under the research program will be transitioned to meet the needs of the flying community.

Recommendation: Recommend the FAA engage the user community for both safety and capacity improvements validation.

Observation 5: ASIAS has indeed come a long way. However, there is still much work to do in R,E&D to accomplish ASIAS objectives as envisioned. Tools are still needed to effectively process, integrate, and mind the large amounts of disparate data that will be entered into ASIAS as more data sources come on line. Thus need to have clear roadmaps with roles and responsibilities of what new capabilities are needed and how they will be inserted into ASIAS. Also, it was noted that a Continuing Resolution (CR) in FY09 will impact new starts planned for ASIAS. SAS did not hear a mitigation strategy if CR should go past March, which is indeed possible in an election year.

Recommendation: Subcommittee strongly recommends FAA create mitigation plans, in the event the CR goes for an extended period. (note: this concern is not unique to ASIAS)

Observation 6: FAA should continue to contribute to instrumentation development for the NASA High Ice Water Content Atmospheric Characterization effort. There is a need for fundamental physics research on accretion of ice crystals inside an engine – partial funding of this work is being contemplated by the FAA. This basic research is needed for future engine development and certification as well as resolving in-service issues of engine power loss. This research has applications beyond the engine, to any inlet with a heated surface, as well as probes which can be corrupted by ice crystals.

Recommendation: Subcommittee recommends finding a way to enable the Weather program to provide “pop-up” support of the upcoming flight test effort to maximize the efficiency of the test program.

Observation 7: The influx of new Unmanned Aircraft Systems (UAS) requirements from the user community is not waiting for or being driven by NextGen. The FAA needs to address current requirements that are ready for operational implementation, and also have a strategic plan to ensure NextGen can accommodate emerging and future UAS requirements.

Recommendation: Subcommittee recommends the FAA take a proactive education approach aimed at the “newcomers” to this rapidly expanding aviation sector as well as accelerating rulemaking supporting research.

Observation 8: Research is planned to: “Develop minimum standards for augmented manual control Fly By Wire (FBW) designs”. The Subcommittee is surprised that the current

certification approach apparently relies heavily on program specific Special Conditions instead of up to date, comprehensive regulations. The Subcommittee is equally surprised the current regulations apparently do not adequately cover the >15 year old Fly by Wire technology.

Recommendation: The Subcommittee recommends the FAA closely examine all areas of aircraft & engine certification for repeated use of Special Conditions as an indicator of areas where the regulations have not actually kept pace with the "advancing" technology.

Observation 8: Airframe Icing - NASA and the FAA Technical Center have been involved with other organizations in a multi-year SLD technology roadmap to define the SLD environment and to develop engineering tools (codes, icing tunnels) with which airplane manufacturers can predict SLD ice shapes. This capability is critical to the airplane design, flight test, and certification processes. The FAA advisory group is currently conducting a status review of the available SLD engineering tools prior to the rulemaking proposal being issued for public comment. Although there is an "interim" capability for developing SLD ice shapes for freezing drizzle conditions the available tools are inadequate for freezing rain conditions. It is essential that FAA & NASA provide adequate priority and funding to enable completion of the key remaining SLD technology roadmap tasks prior to the regulation being implemented.

Observation 9: Halon Replacement - Industry is still committed to working with the FAA to define an acceptable Halon-1301 replacement for engine/APU applications. This requires continued work with the nacelle fire simulator located at the William J. Hughes Technical Center. In addition to further testing using the FAA/industry-reviewed protocol Minimum Performance Standard - Engines (MPSe) Rev03, it will be necessary to define Rev04 of the MPSe to account for next generation fire extinguishing agents (e.g., higher boiling points, non-gaseous). Lack of support for these initiatives will make it difficult or even impossible to eliminate Halon-1301 from the propulsion fire extinguishing system on future airplanes.

NAS Operations Subcommittee

Briefings were given on the FY10 budget, the R&D prioritization process, the NAS OPS PPT activities (including ConOps development, Human Factors, and Wake), the Weather Office research, an update on demonstration plans, and the Enterprise Architecture.

Portfolio Content

Finding: Neither the July workshop nor the September briefings presented adequate information to determine if, or how, critically important (if very difficult) R&D with system-wide NextGen design implications is being conducted. Specific areas of concern are an apparent lack of R&D devoted to (1) separation responsibility--including the air-ground split, the human-automation split, and the impact of failures or aircraft nonconformance; (2) the impact of new classes of vehicles (UAS, VLJ, CESTOL, etc) on the NextGen design and operation; (3) the development of risk assessment methods and safety analyses for the NextGen ConOps; and (4) the design of NextGen and operations in it to optimally minimize adverse environmental effects.

FY11 Recommendation 1: Use a taxonomy based upon research devoted to these areas to assess the FY 09 and FY10 R&D projects to ascertain whether a re-binning and an increase in funding for FY11 for R&D in these difficult areas is required. If so (and NASOPS believes it is so), consider re-allocating additional resources from other target areas to NASOPS.

Finding: Although there was mention that a plan to establish an avionics roadmap has been drafted. the FAA appears to have no avionics roadmap yet for aircraft equipage, nor incentive to the industry to equip in an integrated fashion. Briefings on the airborne requirements for ATM are not linked to specific performance requirements. Since equipage is a major cost and complexity driver for airlines, this lack needs to be remediated immediately.

FY11 Recommendation 2: NASOPS subcommittee offers to work with the Aircraft Working Group of the JPDO to establish an airborne avionics road-map and FY11 funding requirements for airborne ATM R&D and lead-in re-prioritization of FY10 funding.

Program Funding

Finding: NASOPS is pleased to see the development of an Enterprise Architecture. The EA should enable a portfolio management process that provides some increasing linkage of the R&D that is being performed to some type of requirement, be it an OI or an RPD. Currently, the linkage of the R&D to requirements, and the criteria to select what R&D should be done, still are imperfect. Specifically, the criteria used by the Next Gen review board, as briefed, are too near-term and are risk averse, so important work (such as 2025 ConOps development) fails to be funded. Additionally, it is not clear that any work is actually dropped as a result of the current intuition- and consensus-based approach.

FY 11 Recommendation 3: Continue to fund the EA at an appropriate level, but ensure that it develops into a straightforward tool to map and assess requirements and R&D.

FY11 Recommendation 4: Re-establish funding at $15M/year for 2025 ConOps development, and develop a less risk averse NextGen Board ranking criterion.

FY11 Recommendation 5: Re-examine lower priority work currently funded with the goal of ending it. A specific recommendation is to stop Common Data and Structure Data (CSSD) work. Another is to re-examine the funding requirement for Common Automation Platform.

Partnerships

Finding: The NextGen design appears to be based on intuition and consensus, rather than modeling, analysis, simulation, and demonstration or testing. The implication from the July workshop is that the FAA intends to start a whole new activity in modeling and simulation, heavily infrastructure based, which was not ready to be briefed to NASOPS in September. This is not the correct approach. Additionally, the demonstration activities (e.g. Florida) need to be explicitly a part of the analysis, simulation, and learning process, and there is no evidence that they are.

FY11 Recommendation 6: Leverage the work of NASA and other government partners, and particularly the considerable investment of the JPDO and its industry partners in the work accomplished by its System Modeling and Design Division, to form the basis from which to start this activity. Re-examine funding plans to develop entirely new simulation capabilities.

FY11 Recommendation 7: Establish criteria for demonstration projects that link them to specific research questions and on-going analysis and simulation to provide validated answers. Provide exit criteria for, and lessons-learned from, each demonstration project. Establish clear funding stream for proof-of-concept tests or demonstrations.