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November 7, 2007

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 of the standing REDAC Subcommittees (Aircraft Safety, NAS Operations, Environment and Energy, Airports, and Human Factors).

The REDAC has been working with the ATO to develop a process to provide input earlier in the research requirement generation process through the Operational Evolution Partnership. We will prototype this process in the coming year and believe that it will be a mechanism for more effective advisory input.

As you know, the REDAC has also been addressing specific topics of identified importance to the agency. Recent studies include: "Weather-ATM Integration", "Separation Standards", "Financing the Next Generation Air Transportation System" and "Controller Training". We would look forward to discussing with you other topics where the REDAC could provide advice or input which would benefit the mission of the agency.

One of the congressionally mandated tasks of the REDAC is to advise on the relationship between the FAA research activities and those of other government agencies. In this regard, the REDAC has responded to several requests from the JPDO and received several briefings on JPDO and NASA research activities and plans.

With the refocusing of the NASA Aeronautics efforts to be more fundamental and thus less directly implementable, there has been a change in the relationship of FAA and NASA research efforts. This has, and will, require the FAA to adjust and expand some of its efforts. However the REDAC was pleased to observe that there does appear to be growing collaboration between the FAA and NASA in areas such as safety data analysis (ASIAS) where there is collaboration at the senior level and a clearly defined fundamental technology need which NASA can address.

In order to frame the FAA and NASA research efforts in the context of NextGen, the REDAC had requested briefings on the NextGen plan and was also asked to provide input into the NextGen R&D planning document. The REDAC was disappointed and concerned with the lack of substance in the briefings and lack of specifics in the planning documents. The JPDO has agreed to provide a more substantive briefing at a future meeting and the REDAC hopes that this will be at a level sufficient to justify the enormous trust the FAA must put in this planning process.

The challenges of implementing and receiving operational approval for the unprecedented scope of proposed changes in technology and procedures is a critical area which has emerged in the NextGen discussions. The initial NextGen implementation steps (eg ADS-B and SWIM) illustrate the challenges of transition. We must find innovative approaches to accelerate the modernization process while maintaining the safety and capability of the system. This may be a topic for a more focused REDAC study.

The REDAC and the communities which the members represent are committed to maintaining the health and viability of our air transportation system as we face the technical, operational and financial challenges ahead. We stand ready to help in this regard. I, and the other members of the REDAC, are available if you would like to discuss these, or other, issues in more detail.

Sincerely,

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

Enclosure

R&D Guidance for FY 2010

Subcommittee on Airports

With regard to specific topics the Airport Subcommittee recommends:

1. Continued close cooperation between the FAA Technical Center and the Airports Cooperative Research Program.
2. That the highest of priorities be placed on testing with the new large aircraft fire mock-up at Tyndall AFB in Panama City, FL so as to gain a clearer understanding of the quantity of fire fighting agent that will be needed to successfully deal with such events should they occur. Note should be taken that commercial operations by the Airbus A380 in the United States will commence within months.
3. Among the many projects that the Technical Center is carrying out, the Subcommittee especially supported the proposed research tasking on:
 - a) Foreign Object Damage (FOD) detection radar,
 - b) The development of light emitting diode technology for airport lighting (cooperative effort with Rensselaer Polytechnic Institute),
 - c) The study of Engineered Material Arresting System material behavior due to prolonged exposure to freeze / thaw cycles,
 - d) Continued development of the capabilities of the pavement test facility to mimic complex wheel arrangements, and
 - e) Expedited design and construction of a laboratory to support the pavement research.
4. Among the topics that the Airport Subcommittee would like to see added to the research that is already in progress are:
 - a) A consideration for the Airport Technology Branch to possibly take on the most promising of the pending projects of the Innovative Pavement Research Foundation (IPRF) and the Airfield Asphalt Pavement Technology Program (AAPT) should there be no funding approved in upcoming legislation for these programs,
 - b) The FAA should initiate a study of the affects of runway de-icing fluids on surface friction, and
 - c) The FAA should consider starting a research project on the design of the location of exit taxiways, as a possible means to reduce runway occupancy times.

Subcommittee on Environment and Energy

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

Issue 1: The subcommittee feels 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). The maturing of technologies will have the greatest impact on future environmental advances and is therefore the most critical component.

Recommendation 1: For environmental solutions to become viable, sufficient additional resources will be required. The FY09 budget as proposed in the NARP is the minimum investment required from the agency.

Issue 2: The OEP briefing was critical since it ties research to implementation. Research in a vacuum does not solve problems; therefore, tying research to operational implementation is absolutely essential.

Recommendation 2: Developing a robust R&D plan for enabling the OEP transformation is critical. It is also important that environmental concerns be identified as a major priority along with capacity, efficiency, safety, security.

Issue 3: The subcommittee felt that the Office of Environment and Energy needs to reevaluate its strategic priorities.

Members view NextGen efforts as equal in importance, if not more so, than efforts focused on the International Civil Aviation Organization Committee on Aviation Environmental Protection (ICAO/CAEP). While members felt that both activities important and must be supported, emphasis should be driven by the change in importance of NextGen.

Recommendation: The subcommittee recommends that the Office of Environment and Energy consider the following priorities in its future efforts:

- **#1 Applied Solutions** such as technology development, alternative fuels, operational improvements and maturation of the CLEEN program should be the top priority.
- **#2 Modeling** should focus on NextGen as the #1 priority, although continued work on CAEP remains critical.
- **#3 Research on understanding** the various elements of aviation environmental challenges (climate, local air quality, noise and water quality) continues to be critical, with climate and water quality identified as the areas that need to be accelerated.
- **#4 Research to support regulatory work** must continue, but the subcommittee felt that the other priorities listed above are more important.

Continuing to mature Centers of Excellence (COEs) and the CLEEN consortium are business priorities, not program priorities, but clearly need to continue.

Issue 4: The National Airspace System (NAS) enabled by NextGen will have a number of new aircraft and systems. It is critical to determine the environmental impacts of these new aircraft and systems. Research to determine these impacts should be part of the NextGen R&D plan.

Recommendation: Ensure that determining the environmental impacts of new aircraft and systems (including developing appropriate analytical tools) is considered in building the FY10 FAA R&D budget.

Issue 5: The scope of the environment and energy program has grown to meet needs. Budget requests should include resources for additional personnel to address developing issues (while keeping to the principle of maintaining a lean organization).

Recommendation: Ensure that resources for additional personnel are part of future budget requests. FAA also needs a robust recruiting strategy to attract qualified personnel to execute the NextGen R&D efforts.

Issue 6: The committee was supportive of the CLEEN implementation briefing.

Recommendation: FAA and NASA should start working the details of CLEEN, even if establishing the program is reauthorization/appropriations dependent. The subcommittee should be briefed on progress/status at Feb 2008 meeting.

NAS Operations Subcommittee

Findings:

NASA's foundational research in ATM automation technologies is addressing long-term issues in automation, but it is not clear that the FAA is tracking it or assessing its connection to their needs. NASA's human factors work should be addressing foundational issues in human-automation interaction or air-ground roles and responsibilities in the context of FAA NextGen design, and that connection was not clear from the briefings.

The final version of the JPDO R&D Plan needs to identify priorities in research, responsible parties for conducting the research, and estimated resources and timeframes (the committee saw only working drafts of the document which were lacking these important details).

Review of FAA's ATM and Next-Gen related research by the NASOPS subcommittee has continued to be confusing by virtue of incomplete or obscure financial and research information, and providing recommendations based on the level of detail that has been presented is difficult.

Recommendations:

The FAA and NASA signed a new MOU (Feb 2006) that stipulated the formation of an Executive Research Steering Committee to coordinate research and development activities between the two agencies, but this has not been implemented. It is recommended that the FAA and NASA do so.

The FAA and NASA, through their roles in JPDO, should assure that the JPDO R&D plan, as coordinated through the OMB, will serve as an actionable de-facto guide to their respective research initiatives for NextGen. If the FAA wishes REDAC to weigh in on the JPDO research requirements, a formal means of review with adequate time for review and JPDO feedback should be instantiated.

FAA should continue to find ways to report on research related to NextGen in ways that are consistent with understanding both the research and the budget associated with it. Recent efforts to relate the work to the OEP solution sets appears to be step in the right direction. Adopting a common format for reporting on research projects (similar to what had been used by the REDAC in previous years) would aid in project evaluation.

Subcommittee on Human Factors

Summary Organizational Issues:

The FAA has undergone significant organizational change in ATO-P supportive of JPDO and its research requirements.

Finding 1: The committee finds that Human Factors research and human-system integration is well aligned into the ATO-P processes and supportive of the JPDO research program, as well as the Operational Evolution Partnership

Recommendation: The subcommittee urges that the Human Factors Research and Engineering Group maintains its centrality in human-system integration research and attend to cross-cutting research issues in the ATO-P organization. Overall, the organizational structure, along with

current and anticipated budgetary increases, bodes well for the appropriate level of concern for human-system integration.

Finding 2: The subcommittee feels that cross cutting areas of applied Human Factors research (specifically, in the areas of safety, human error and modeling) provide an opportunity for assuring that “human factors” concerns become an integral system engineering element in both the ATO and AVS research and development processes.

Summary Budget Issues:

A significant increase in funding for fiscal year 2008 and a further increase in 2009-2010 are anticipated. The subcommittee concludes that the combination of significant increase in budget and major organizational changes offer significant opportunity for development and integration of human factors research in support of: decision-making in procurement issues, development of near and midterm flight deck and ATC workstations, development and convergence of ATC procedures and training, and support of flight deck and ATC JPDO research requirements.

The subcommittee finds that the Human Factors office is responding to these and other specific areas of research development integration.

Finding 3: There is a convergence of conditions that the subcommittee feels provides the Human Factors Research and Engineering Group with an opportunity to redefine itself at a national level within the Human Factors research community. The new organizational structures in ATO, the significant proposed increase in budget and the likely increase in the breadth of demand for applied human factors research, given changes in NASA’s roles and responsibilities in applied Human Factors research, remind the subcommittee of the opportunities and motivation provided for the National Plan for Aviation Human Factors.

Recommendation: The subcommittee recommends revisiting and updating a national Human Factors research plan, with the FAA taking the lead in applied aeronautical Human Factors research to address and define current gaps in support of JPDO research requirements.

Summary Integration of Research with NASA

It was a goal of this subcommittee meeting to have the Human Factors Subcommittee advise the FAA of the adequacy of its research portfolio given changes in NASA Aeronautical Human Factors research. It was, however, difficult to make an assessment of the NASA Human Factors research portfolio with respect to the FAA HF program. The subcommittee was provided presentation of specific research projects but did not receive information about the breadth or extent of NASA’s investment in aeronautical Human Factors.

Finding 4: The committee did not feel it was in a position to make a comparison, or gap analysis, between NASA’s response to JPDO Next Generation research requirements in Human Factors and that work being performed by the FAA.

Recommendation: The subcommittee recommends that an interagency programmatic exchange be undertaken with respect to applied aeronautical Human Factors and that the Human Factors Research and Engineering Group take the lead in this effort.

Subcommittee on Aircraft Safety

The Safety Subcommittee recommends that the FAA take the necessary actions to ensure its safety R&D portfolio, including the FY 2008 and FY 2009 program elements, are fully aligned to the following priorities:

- Research linked to the development and implementation of the Next Generation Air Transportation System (NextGen).
- Research addressing currently identified safety issues that are substantiated by data characterizing the level of risk associated with the particular issue. The subcommittee is especially concerned with those research needs identified by the Commercial Aviation Safety Team (CAST), General Aviation Joint Safety Committee (JSC), and the International Helicopter Safety Team (IHST).
- Research aimed at improving the identification and assessment of emerging safety issues.
- Research aimed at enabling the insertion of new technologies into certified civil aviation products and their operations.

The Safety Subcommittee has provided AVS management with detailed observations and recommendations related to each of its specific program elements.

- The Safety Subcommittee recommends that the FAA ensure that the OEP R&D planning timelines and the AVS R&D planning timelines are consistent.
- The Safety Subcommittee recommends that the FAA modify its safety R&D portfolio development process to clearly identify the linkage between NextGen/OEP planning activities, planning documents and any identified R&D needs, and their incorporation into the detailed AVS planning activities and the resulting R&D portfolio. The roles and engagement of AVS focal points supporting NextGen/OEP planning should be clearly articulated.
- The Safety Subcommittee recommends that the FAA begin to realign the thrust of its activities in critical research areas that will be necessary for NextGen/OEP implementation and certification of advanced technologies as soon as practicable, including FY 2008 and FY2009 activities. In advance of detailed NextGen/OEP R&D requirements, preparatory research should be conducted as expeditiously as possible in areas such as advanced software digital systems, complex systems integration, human factors/automation, enabling enhanced crew situational awareness and assessing potential air crew or air traffic controller responsibility changes, etc.
- The Safety Subcommittee recommends that the FAA make every effort to assure that F&E funding is available to sustain critical R&D capabilities, that the R&D community knows how to access F&E funding, and that needed equipment upgrades are obtained in a timely manner.
- The Safety Subcommittee recommends that the FAA ensure that critical R&D facilities, such as its fire test facilities, are identified as national assets and that they are included in the National Aeronautics R&D facilities plan to protect their long-term vitality.
- The Safety Subcommittee recommends that the FAA develop clear program linkage between its environmental alternative fuels initiative and its safety-related fuels program to ensure any potential safety-related implications are identified and addressed.

- The Safety Subcommittee notes the positive impact of close FAA –NASA collaboration on ASIAs, where a joint FAA-NASA roadmap was developed and implemented for research development and transition from NASA to FAA and then the private sector. The subcommittee believes other program areas will benefit from the development of similar FAA-NASA collaborative roadmaps. Therefore, the subcommittee recommends that, at a minimum, the FAA and NASA pursue joint roadmaps related to weather in the cockpit and icing R&D.

Observation on the ASIAs Program

The Safety Subcommittee believes significant progress has been made over the past year in defining the Aviation Safety Information Analysis and Sharing Initiative (ASIAs) program and its execution. The subcommittee especially notes and credits the personal leadership of Nick Sabatini and Jay Pardee of the FAA and Lisa Porter of NASA for driving a well integrated plan that will form the basis for proactive risk identification and assessment in the future. The subcommittee supports ASIAs and believes ASIAs will be an important link in the overall industry safety system. It provides perhaps the most potential for safety improvements, if pursued correctly and vigorously, with active support from all stakeholders.