

## NAS Operations Subcommittee – August 2013

### NextGen Wake Turbulence and Re-Categorization

**Findings:** The subcommittee found that NextGen Wake Turbulence and Re-Categorization programs have made excellent progress in delivering quantitative operational benefits to the user community. It was gratifying to the subcommittee to see these operational benefits realized after the considerable investment by both FAA and NASA in the understanding of the impact of wake turbulence on NAS operations.

In its discussions with the FAA, the subcommittee found that there may be a gap in the ability for aircraft designers and manufacturers to accurately predict, at design, the operational impact of an aircraft's wake. The specific example cited was the experience with the A380 where the flight tests revealed that substantial additional wake turbulence separation was required over that initially anticipated.

**Recommendation:** The FAA should ask the participants in its user group (Wake Net USA) if they are confident in their ability to predict, at design, the operational impact of an aircraft's wake. If the current set of analytical and numerical modeling tools are not sufficient for a high-confidence prediction, then the FAA should consult with the manufacturers and NASA on the need for more advanced research in this area.

### Research Requirements for Aviation Weather Research Program (AWRP) and Weather Technology in the Cockpit (WTIC)

**Background:** The NASOPs Subcommittee has previously recommended that the FAA present a clear justification for both the AWRP and WTIC programs. Specifically, the committee recommended that the FAA provide quantitative estimates for the NextGen safety and operational benefits achievable with the research results when applied to operations. The committee further recommended that if those requirements have not been defined and quantified, the FAA should orient this research portfolio to define the requirements. The FAA responded that its Weather Division has contracted with MITRE to develop the Operational Weather Requirements Analysis Methodology (OWRAM) to establish a repeatable process for deriving operational weather requirements as they relate to the NextGen Segment Implementation Plan (NSIP). The FAA further responded that both the AWRP and WTIC programs would undertake a more rigorous analysis of General Aviation (GA) weather-related accidents to define the weather research requirements related to quantitative safety improvements and agreed to present these requirements in 2014. During its summer 2013 meeting, the subcommittee received a briefing from MITRE on OWRAM and a briefing from FAA on WTIC.

**Findings:** The subcommittee is pleased that the FAA is committed to developing weather research requirements that are firmly based in quantitative operational improvements. The subcommittee found that the MITRE OWRAM approach presented was reasonable and will be useful in assessing whether or not there are research elements missing in the AWRP. This work also has the potential to do trade studies to look at the cost and potential operational impact of different elements of the AWRP portfolio. The work is still in its early stages and is projected to produce an initial set of weather research requirements in the early spring of 2014.

The Subcommittee found that the FAA has made no significant progress in its justification of the WTIC program, based on GA safety benefits or Part 121 operational benefits, despite repeated requests by the subcommittee. The WTIC program has defined a relatively modest effort to define GA safety benefits that would yield a research product in 2017. The committee found this inconsistent with the FAA commitment to provide an analysis in 2014. The WTIC program referred to pilot simulation studies that they have previously conducted that show that pilot decision making is different with different weather presentations, but there was no demonstration of a safety impact of this difference. The Subcommittee noted that only a fraction of the WTIC program resources are now focused on GA and most of the program is focused on Part 121 operations. However, the subcommittee found that there was no communication or coordination between the WTIC program and the MITRE OWRAM work. In its deliberations, the Subcommittee discussed the potential that some WTIC applications could provide near term benefit (e.g., uplink of cloud top information in oceanic airspace and the uplink of accurate wind information for use in descent spacing), but found that the FAA cannot prioritize this work with other AWRP programs unless there is effective coordination of the benefits assessment.

### **Recommendations:**

1. The FAA should expedite its work with MITRE to develop its initial set of weather research requirements early in CY2014. The subcommittee looks forward to reviewing them during their March 2014 meeting. The OWRAM presentation should include an assessment of the level of effort required to use this methodology for cost/benefit trades for the entire AWRP. The Subcommittee also recommends that the OWRAM effort also assess any potential utility of WTIC research products for use in the NextGen NSIP Alpha and Bravo.
2. The FAA should immediately take steps to justify its continued investment in the WTIC program. The subcommittee cannot recommend continuation of this program as it is now constituted. As a near-term action, the FAA should rapidly identify those portions of the WTIC program that can provide quantitative NextGen benefits and focus its efforts exclusively on those. If the FAA believes that WTIC can provide a significant, quantitative safety benefit to GA, then it should present this case to the subcommittee at its March 2014 meeting. If not, then it should discontinue this portion of the WTIC program.

### **Trade Space Analysis of Mixed Equipage and Benefit Scenarios**

**Background:** Many of the benefits of NextGen depend on a “critical mass” of equipage by flight operators before a procedure is operationally feasible. When distinct benefits are not immediately available for flight operators who equip, a situation can occur where flight operators are perversely incentivized to be the last to equip to improve their individual business case. In August 2012, the REDAC recommended to FAA that research activities for concepts that leverage new aircraft equipage include trade space analyses to address mixed equipage environments. That research should include work to understand questions such as critical mass thresholds, automation mitigations for mixed equipage, performance tradeoffs, etc. An update from the FAA on this recommendation was shared with the NAS Operations subcommittee in August 2013.

**Finding:** The subcommittee is encouraged with the FAA’s response, indicating the intent to establish a research plan that addresses these needs. The FAA’s plans for operations concept

validation (F&E 1A08H) as presented, however, did not list any activities related to mitigation of mixed equipage challenges to achieving NextGen benefits.

**Recommendation:** FAA should ensure that mixed equipage challenges and trade space analyses are explicitly addressed in research plans associated with NextGen concepts. Because this work may be funded outside of the RE&D funding category, the FAA should identify, within the research plan, other work that may be addressing mixed equipage performance and business case questions for specific concepts, such as trajectory-based operations, and other NextGen concepts that require aircraft equipage to achieve operational benefits.

## **JPDO**

**Finding:** There is a productive tension between the technology readiness and implementation readiness for NextGen. NASA has the charter for the farther term R&D defining the art of the possible (and advancing the farther-term technology readiness), the FAA for nearer-term R&D leading to NextGen implementation. These distinct charters create a useful tension between the farther- and nearer-terms, the higher- and lower-risks, and the shorter- and longer-timelines. However, for the nation to benefit we need proactive management of this creative tension. The JPDO is the logical organization, with the Congressional charter, to perform this vital role. The JPDO budget requests for 2014 and beyond appear minimally adequate to fulfill their role.

**Recommendation:** Given current budget limitations, the FAA should strengthen its bilateral agreements across participating agencies to supplement the NextGen coordination performed by JPDO

## **NextGen Implications for Commercial Space Transportation**

**Findings:** Little focused investment exists in either the FAA or NASA in this arena. The FAA's presentation to the subcommittee on its New Air Traffic Management Requirements and Operational Concept Validation included a Space Vehicle Operations Concept Development task deliverable in October 2014. While the Commercial Space Transportation Advisory Committee (COMSTAC) is currently advising the Administrator on matters related to commercial space flight, the REDAC NAS Operations Subcommittee has no insight as to whether NextGen topics such as TBO, DataComm, SWIM, and others are being addressed by the COMSTAC.

**Recommendation:** The FAA should ensure that NextGen capabilities are specifically addressed in its development of the Space Vehicle Operations Concept Development. The FAA should ensure that both COMSTAC and REDAC are made aware of any NextGen implications for commercial space flight operations in the NAS.

## **Prioritization of Research across FAA portfolios and lines of business**

**Background:** The NASOPs Subcommittee has previously recommended that the FAA undertake a broader management framework for its research and development in order to enable the FAA to manage its research portfolio across funding lines to focus on achieving specific operational benefits to the National Airspace System (NAS). The full REDAC made a similar recommendation in its May 14, 2013 letter to the FAA Administrator. The FAA responded that Mr. Dennis Filler, the new Director of the William J. Hughes Technical Center, who is also head

of the of FAA R&D will work to develop a more strategic, forward looking process to achieve an integrated agency-wide view of R&D. During its summer 2013 meeting, the Subcommittee received a briefing on this topic from Mr. Filler as well as a briefing on the 2013 National Aviation Research Plan (NARP) from Dr. Cathy Bigelow, the Manager of the FAA's Research and Development Management Division.

**Findings:** The Subcommittee is pleased that the FAA is committed to developing a more holistic view of its research program. It was clear from the briefing by Mr. Filler that he is committed to this goal, but the subcommittee finds that the work is still in its conceptual stages.

The Subcommittee is pleased with the FAA's commitment to strengthen the high level goals of the NARP to align more closely with the National Aeronautics Research Plan and NextGen. The subcommittee finds the three R&D principles (Improve Aviation Safety, Improve Efficiency, and Reduce Environmental Impacts) to be reasonable. However, the subcommittee noted that the resulting R&D goals covered a very broad area of research topics and that the FAA has simply mapped all the existing RE&D Budget Line Items (BLI) onto the new goals without any indication of prioritization or changes to the research portfolio. Furthermore, there was almost no quantitative aspect to the research goals – many of them contained phrases such as “improved understanding”, and “improved knowledge”, which provide no reasonable means to track progress toward the goals.

**Recommendations:**

1. The FAA should vigorously pursue its stated commitment: “to develop a more strategic, forward looking process, so that there will be an integrated agency-wide view of R&D”. The FAA should present its progress toward its stated goal at the next subcommittee meeting in the spring of 2014.
2. As the FAA formulates its research goals, they should contain quantitative goals and metrics by which the progress of its R&D can be measured. If quantitative research goals have not been established, then the FAA should reorient its research program to establish these goals.