## **Meeting Summary:**

The Subcommittee on Aircraft Safety (SAS) met on July 31 and August 1, 2018 in East Hartford, CT, at Pratt & Whitney's Customer Training Center, for its routine fall meeting. This meeting had three specific objectives on its agenda:

- 1. Review and provide comment on the FAA's ongoing safety research plan accomplishments and ongoing research.
- 2. At FAA leadership and REDAC request, review and provide comment on the FAA's recently released UAS Research Plan.
- 3. Continued review of topics of interest to the SAS including UAS, General Aviation safety and fatigue management.

To assess the 2018 research plan performance, SAS continued to utilize our new portfolio review approach. The FAA staff prepared a Research Program Area Report for the 15 major program areas summarizing the desired outcome, research outputs delivered in FY18 and the overall status. Each SAS member had the opportunity to question the researchers in each major program area. Additionally, we were provided visibility of the overall R&D Program Strategy and how the FAA is developing new "research focus areas" such as Airport Technology, Aircraft Safety Assurance, Digital Systems and Technologies, Environmental and Weather Impact Mitigation, Human Factors and Aeromedical Factors and Aviation Performance and Planning. The SAS members appreciated the approach and suggested the FAA present a first pass of the research landscape and ongoing research at our next meeting.

In advance of the meeting the FAA's recently completed UAS Integrated Research plan was distributed for committee review. The committee was presented a summary of this plan during the meeting as well as the tasking provided by the Designated Federal Officer (DFO). A focused SAS discussion on the plan then ensued. A high-level summary of committee comments and the associated Findings and Recommendations are attached to this report.

SAS continued its practice of engaging both Subcommittee members and agency expertise to inform our discussions. At this meeting presentations from MITRE and AVSI (Aerospace Vehicle Systems Institute) informed our views on the future directions of industry. Additionally, we were provided with a briefing on Commercial Space Transportation Research and the AIR Innovation Center Initiative.

The SAS will meet next on March 5 and 6, 2019. Location is TBD. We hope to use this meeting to continue to explore previously identified emerging issues and trends that are impacting needed safety research to ensure continued alignment with REDAC and AVS leadership objectives.

Respectfully Submitted, Chris Kmetz Acting Chair, REDAC Subcommittee on Aircraft Safety

## 2018 Fall Meeting Findings and Recommendations

## **Research and Development Program Strategy and Research Portfolio Assessment**

#### Finding 1:

The subcommittee notes the initiative underway to establish research focus areas to coordinate and communicate the strategic thrust of ongoing and future research. The research focus areas will include Airport Technology, Aircraft Safety Assurance, Digital Systems & Technology, Environment and Weather Impact Mitigation and Human Factors and Aeromedical Factors. A research landscape will be created for each focus area to capture all ongoing research and establish the strategic vision. The subcommittee agrees with the approach and believes this is an opportunity to assure that the strategic research needs and emerging issues that the subcommittee has defined are captured and continuously reassessed. It has been noted that the funding sources and research topics are sufficiently different between Human Factors and Aeromedical Factors that it may make sense that these not be combined into a single research area.

#### **Recommendation 1**:

The FAA should continue down the path of developing and maturing the research focus areas and landscapes and provide a draft to the subcommittee for review and feedback prior to the next subcommittee meeting in March 2019. The draft should include a compilation of the ongoing research that supports the research focus area, regardless of BLI.

#### **Recommendation 2:**

The FAA should consider not separating Human Factors and Aeromedical Factors in the new research focus areas.

## Finding 2:

The subcommittee appreciates the FAA sharing the agency's Research Landscape and Strategic Direction for R&D (Shelley Yak briefing to SAS, 31 July 2018), the draft FY21 Strategic Guidance (Mark Orr briefing to SAS, 31 July 2018, under FAA management review as of 31 July 2018), and the FY19 Aviation Safety Portfolio (document provided to SAS by Mark Orr, 1 August 2018). These materials, plus the FAA's responses to the SAS Spring 2018 Finding "Research Prioritizations", adequately addresses the SAS concern regarding the FAA's process for prioritizing research activities. Further to the subject of the FAA's research prioritization process, the SAS finds that the value of each FAA research activity will be more easily understood by identifying the hazard and/or significant safety risk being addressed by the proposed research. In accomplishing this, SAS encourages the FAA to draw on all available data as the basis for determining benefits. As one example of this, in the SAS review of the FY18 accomplishments, it was noted that reduced research budgets will delay release of an Advisory Circular. No indication was given of the linkage of this Advisory Circular release to the FAA's overall research priorities. Hence the SAS was unable to understand and provide input to the FAA on the implications of the resulting delayed Advisory Circular release.

## Recommendation 2:

In order for the SAS to provide the FAA more meaningful feedback on the proposed research portfolio, we recommend that the FAA convey, for each research activity:

- a. The alignment or linkage to the current or emerging hazards with a high likelihood or potential to result in significant safety risks as identified by the FAA's research priorities, and
- b. The benefits (e.g., safety improvement) of each research activity, drawing on all available data and reasonable hazard assessment (i.e., going beyond limited-source data such as the Commercial Aviation Safety Team (CAST), General Aviation Joint Steering Committee (GAJSC), or Helicopter Safety Team data).

## Finding 3:

In the AVS Research FY 21 Strategic Guidance, AVS has committed to applying SMS principles and is using an evidence based approach to identify hazards, risks, and safety issues to drive future research needs. These research needs are based on data gathered throughout the National Airspace System (NAS). Some of the data used to support the FY 21 Strategic Guidance is 7 years old. Much has changed in the last 7 years. Additionally, technology is rapidly evolving, which creates new challenges and a very dynamic environment for risk identification and assessment. The subcommittee agrees with and supports the data driven, evidence based approach that AVS is using. However, using old data could lead to research that isn't timely or based on assumptions that are no longer correct. It could also lead to omission of emerging issues when priorities are set. The NAS continuously generates new data. Most of this data is readily available and can be accessed in a timely manner.

## **Recommendation 3A:**

Data that is more up to date should be used when identifying hazards, risks and safety issues analyzing risk in the NAS and identifying strategic research needs

## **Recommendation 3B:**

Advances in data mining and machine learning should be applied to the large set of operational data to identify causal influences and trends in emerging risk areas

## **UAS Research Plan**

## Finding 4:

Upon review of the UAS research plan the SAS observes the continued need for of clear leadership and responsibility for UAS research. While the UAS research plan has merit at the strategic level there is a significant inconsistency between the active research and the strategic goals of the UAS research plan which indicates a lack of strategic leadership and responsibility for the UAS research agenda.

## **Recommendation 4A:**

The FAA should clearly define who has ultimate responsibility for updating the research plan and the process by which this occurs.

#### **Recommendation 4B:**

The FAA should develop a process for aligning proposed and planned work with the integration plan to assure that opportunities to adjust the plan "on the fly" to match the available funding levels are fully leveraged.

#### Finding 5:

The SAS notes that a number of funded research activities in the UAS and other areas are pending DOT approval which is making it difficult to manage and execute the research portfolio.

#### **Recommendation 5:**

The FAA and DOT should develop a process to accelerate approval of grants necessary for advancing research projects.

## Automation and Artificial Intelligence

#### Finding 6:

The committee notes the high level of industry investment and interest in higher level automation and machine learning for manned and unmanned vehicles (small and large UAV, UAM, Simplified Vehicle Operations, Automated Air Cargo, etc.). This is an emerging issue which the SAS has noted in the past but is becoming more urgent.

#### **Recommendation 6**:

FAA should develop a research plan to develop certification approaches and to support certification criteria and human factors evaluation of advanced automation systems.

#### **Runway Friction Research**

## Finding 7:

The subcommittee appreciates the briefing on runway friction research and notes that the activity is no longer airport-centric in its nature. The SAS believes that the effort would benefit from REDAC input on the next steps. There is an opportunity to take the data that is available to develop a predictive tool that can be tracked and validated via on board data.

#### Recommendation 7:

The FAA should develop a plan to explore data reduction methods and provide the REDAC with an updated research approach including the overall roadmap and strategic plan.