

# **SUBCOMMITTEE ON AIRCRAFT SAFETY (SAS)**

## **2018 FALL MEETING SUMMARY**

FAA Research, Engineering & Development Advisory  
Committee

November 14, 2018

# SAS APPROACH

---

Continue to build upon work of prior SAS meetings

Keep previously identified Emerging and Future concerns in the forefront to assist in identifying research gaps

Meet the advisory needs of the AVS Management Team

Incorporate CSTA and outside industry / FAA expert participation whenever possible

Deep Dives into significant items – as defined by:

- Significant research dollars committed

- REDAC priority items

- Committee concern items (Emerging issues)

Continuous improvement of the research review process

# AGENDA DEVELOPMENT GUIDE

---

- Deep dive into UAS Integrated Research Plan status (REDAC request)
- Update on research portfolio and prioritization (SAS and REDAC request)
- Commercial space R&D (Emerging Issue and SAS request)
- General Aviation Safety (Emerging Issue and REDAC request)
  - Alternate fuels
- Aeromedical Research (Emerging Issue and SAS request)
- Support AVS requirements (SAS and AVS Request)
  - AIR Innovation Center Initiative
- Continued education on industry observations / directional checks
  - Industry technology briefings
    - Artificial intelligence and machine learning
    - Aerospace Vehicle Systems Institute

# FALL 2018 SAS MEETING OBJECTIVES

Input on guidance to the research portfolio

Discuss FAA R&D program strategy

Review and provide comment on the FAA's recently released UAS Research Plan

Continue to explore previously identified emerging issues and trends impacting needed safety research

Commercial Space Transportation Research, Runway Friction Research, and the AIR Innovation Center Initiative

Learning from Industry: MITRE, AVSI (Aerospace Vehicle Systems Institute), PWA / UTC (Additive Manufacturing)

Deep dive into Aeromedical topics including the Protection and Survival Branch and Bio-aeronautical Sciences

# GENERAL COMMENTS

---

## **R&D Program Strategy**

SAS was provided with a preview of the new “research focus areas” which are intended to focus the R&D landscape and guide planning, execution and output

SAS response was favorable and encourages the FAA to provide a first pass at the current state of the ecosystem at our next meeting

## **Funding situation**

FY18 Omnibus was at \$189M – well above the \$150M request. This is seen as a positive development

Out year planning remains at a \$74M level based on targets from OMB.

Unclear that there is a good process in place to assure that the right research gets funded when FY budgets are released at >2X target

SAS feeling is that the FAA, who is best equipped to make recommendations on required research, is somewhat voiceless in setting the research priorities

# GENERAL COMMENTS

---

## **Technology status briefings**

Common themes continue to be identified in industry presentations

Will continue to use these industry briefings to ensure our emerging and future issues are still relevant

## **Emerging and future issues**

Emerging issues from Fall 2014 are included in back-up

SAS agrees that it would be worthwhile to dedicate time during a 2019 meeting to re-assessing the emerging issues to determine if there are any new items which should be included

# FINDINGS AND RECOMMENDATIONS

---

## Research focus areas

### Findings

Subcommittee notes the initiative underway to establish research focus areas to coordinate and communicate the strategic thrust of ongoing and future research

General agreement 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

### Recommendations

Develop and mature the research focus areas and landscapes and provide a draft to the subcommittee for review and feedback prior to the next subcommittee meeting

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

# FINDINGS AND RECOMMENDATIONS

---

## Annual Planning and Research Prioritization

### Findings

FAA provided good visibility and follow-up into the research planning process

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.

### Recommendations

The FAA should convey, for each research activity:

- 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

- The benefits (e.g., safety improvement) of each research activity, drawing on all available data and reasonable hazard assessment

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

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



# FINDINGS AND RECOMMENDATIONS

---

## UAS Research Plan

### Findings

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

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

### Recommendations

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

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.

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

# FINDINGS AND RECOMMENDATIONS

---

## Automation and Artificial Intelligence

### Findings

Subcommittee 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.

### Recommendations

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

# FINDINGS AND RECOMMENDATIONS

---

## Runway Friction Research

### Findings

Subcommittee notes that the research activity is no longer airport-centric in its nature.

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.

### Recommendations

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

# AVSI UPDATE

---

## Summary

AVSI (Aerospace Vehicle Systems Institute) addresses issues that impact the aerospace community through international cooperative research and industry, government and academic collaboration

FAA a liaison member – participated in ~15 projects to date mostly in software / digital domains

Strong industry representation noted with strong IP protections

3 major themes to the research

- Support of Standards

- Reliability

- Certification

Providing a unified aerospace industry voice for common technology issues

# PROTECTION AND SURVIVAL BRANCH

---

## Summary

Briefed on the functions of the branch

- Primary - Aerospace accident and incident prevention

- Secondary - Mitigating hazards in aerospace accidents and incidents

Discussed research around survival factors

- Human performance / crew performance

- Occupant protection initiatives

Work continues around the development of standards, cabin safety, speed of egress and physiology

Specific questions related to the research were provided to the presenters during the briefing

Upcoming research appears relevant and appropriately targeted toward emerging issues

# BIOAERONAUTICAL SCIENCES

---

## Summary

Briefed on the functions of the branch

Forensic Sciences focuses on Forensic Toxicology and Biochemistry

- Extensive research and publication ongoing relative to top toxicology findings from 297 cases in 2017 (aviation, rail, highway, marine)

- Forensic lab contains critical skills and capabilities within the FAA that are not duplicated elsewhere (Spring 2018 SAS Finding)

Biomedical Sciences focuses on Functional Genomics, Autopsy and Knowledge Management

- Leading edge research is ongoing relative to RNA and gene expression bio markers (“Molecular Flight Recorder”). This research should continue

Specific questions related to the research were provided to the presenters during the briefing

# AIR INNOVATION CENTER INITIATIVE

---

## Summary

SAS provided with the opportunity for discussion of the Aircraft  
Certifications Innovation Center

Realignment is ongoing with the directorates changed to be functionally  
aligned

All certification offices are now under one executive leader (Lance Gant)

Policy and innovation division consolidates all policy and standards under  
one leader (Mike Romanowski)

Intent is to align with trends in the industry and to eliminate functional silos  
driven by different product types

Specific questions related to the center were provided to the presenters  
during the briefing

# FALL 2018 SAS MEETING OBJECTIVES

---

2019 meetings: March 5-6, 2019 and August 19-21

- ✓ Input on guidance to the research portfolio
- ✓ Discuss FAA R&D program strategy
- ✓ Review and provide comment on the FAA's recently released UAS Research Plan
- ✓ Continue to explore previously identified emerging issues and trends impacting needed safety research
  - ✓ Commercial Space Transportation Research, Runway Friction Research, and the AIR Innovation Center Initiative
  - ✓ Learning from Industry: MITRE, AVSI (Aerospace Vehicle Systems Institute), PWA / UTC (Additive Manufacturing)
- ✓ Deep dive into Aeromedical topics including the Protection and Survival Branch and Bio-aeronautical Sciences



# **SUPPLEMENTAL DATA**

---

# FALL 2014 - SAS EMERGING ISSUES

---

## Reminder

Real time system-wide safety assurance

Dependability of increasingly complex systems

Certification of advanced materials and structural technologies

High density energy storage, management, and use

# FALL 2014 - SAS FUTURE OPPORTUNITIES

## Reminder

Commercial space integration with the National space system

General aviation's role in safety systems development

Effects of breakthrough medical technologies on FAA medical certification standards

Identification and funding of strategic research and development