Subcommittee on Aircraft Safety 2016 Spring Meeting Summary

FAA Research, Engineering & Development Advisory Committee May 26, 2016

Spring 2016 SAS Meeting Objectives

- Provide meaningful input to FAA Safety leadership considering:
 - UAS Research Priorities
 - Review of FY18 Safety Research Portfolio
 - Further evolution of Emerging and Future Issues
 - Input on FY19 Research Guidance Document

SAS Approach

- Desire to 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
- 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)

Agenda Development Guide

- Meeting's agenda built with a strong connection to previously identified Emerging and Future, and high level REDAC, issues
- Mixed UAS and Manned Aircraft Operations (Full REDAC)
 - UAS Discussion
- Effects of breakthrough medical technologies on FAA medical certification standards (Emerging Issue)
 - Aviation Safety Medical Issues
- Dependability of Increasingly Complex Systems (Emerging Issue)
 - Aircraft Software Security
 - Autonomy and Automation
 - PARC CAST Discussion
- Icing (Significant \$ and safety impact)
 - Higher Level Aircraft Icing Research Perspective

For Consideration During the Meeting

- Are SAS Emerging and Future issues still the right ones?
 - Should they be changed or adjusted?
- What else do we need to evaluate/deep dive into to better inform us?
 - Short term?
 - Long term?

• UAS

• Findings

- Industry needs high level strategy and single, overarching, plan with clear objectives and milestones (roadmap)
- Integration and connection between various elements of UAS activity is not clear
- UAS CONOPS lacks broad stakeholder input and is likely incomplete
- Lack of coherent, current, UAS safety data is a shortcoming and could inform future data needs
- Pathfinder scope is limited when considered against the scope of expected operational demands
- COE connection to the overall strategy and research priorities is unclear

- Finalize and distribute a coherent strategy for safe and efficient UAS integration.
- Implement a cohesive organizational structure and place overall responsibility in one person or organization
- Update and vet CONOPS, concept maturity plan and prioritized research requirements with all stakeholders
- Begin comprehensive effort to collect UAS operational and safety data
- Initiate research effort to understand what long term UAS safety data is required
- A11H.SSM.11 (Safety Oversight Management System) research be expanded to include UAS
- Accelerate Pathfinder program to include more complex types of operations with accelerated schedules
- Future ASSURE projects should be consistent with FAA research needs and priorities based on strategic plan
- Develop a process to ensure capable institutions not currently affiliated with ASSURE can be engaged

- UAS Funding Impact on Other Safety Research Portfolio Items
- Findings
 - Contract funding for UAS has been significantly expanded, by congressional re-allocation, over the requested amounts, each of the past two years
 - 2015- \$7210k to \$13210k
 - 2016 \$8150k to \$16022k
 - This has come at the expense of other necessary safety research. For example:
 - Human Factors reduced \$5100k in 2016
 - Aeromedical reduced \$1500 in 2016
 - Weather reduced \$1600 in 2016
- Recommendations
 - FAA conduct review to assess the collateral impact of these congressionally mandated re-allocations on existing safety efforts
 - FAA re-review BLI's or RE&D tasks that are provided funding in one year but then halted in interim year(s) with consideration of balancing funds to minimize impact
 - FAA consider developing alternate approach to incrementally fund UAS that does not result in reductions to existing prioritized research

- Immediate needs for Additive Manufacturing Certification Support (Repeat Item)
- Findings
 - Near term strategy is required to help the certification directorates assess type designs or type design changes which incorporate parts produced utilizing additive / advanced manufacturing methods
 - Industry continuing to accelerate efforts to incorporate additive manufacturing technologies as fullscale production processes
 - Continued slow progress accelerating the development of a FAA Additive Manufacturing Roadmap and identification of focused research. Current focus on:
 - Certification Policy Memos
 - Tactical Project Plans

- Expedite guidelines describing the considerations which should be assessed relative to the incorporation of parts produced by Additive Manufacturing
- FAA assess the need for additional research to supplement the initial guidelines for the potential longer-term codification of Additive Manufacturing guidance

Advanced Materials Research

• Findings

- Fall 2014 SAS identified Emerging Issue of Certification of Advanced Materials and Structural Technologies
- As new aircraft and engine designs drive towards advanced performance, new material systems and structural concepts will continue to be introduced that are significantly different.
- FAA needs to stay abreast of industry changes to build its knowledge to make certification decisions and support regulations, standards, guidance materials and training
- Four specific areas of concern include:
 - Hot corrosion on engine rotor life and incorporation of work into DARWIN
 - Advanced Non Destructive Evaluation (NDE) of critical components
 - Cold dwell fatigue modelling in Titanium
 - Computational Material Science research to understand microstructural changes in critical materials

- FAA continue to prioritize funds for further development and validation of hot corrosion into DARWIN code
- Continue the study of innovative NDE techniques and assist in the transition of the most promising methods to manufacturers and overhaul facilities
- Work collaboratively with industry and AFRL to fully understand texturing in Titanium to prevent cold dwell fatigue
- Continue to work collaboratively with industry and USAF to develop computational methods into DARWIN code to enhance life prediction

- Ice Crystal Icing (ICI) Engine Test and Analysis Capabilities
- Findings
 - SAS presented a comprehensive review of icing related safety research
 - Both the Engine Harmonization Working Groups (EHWG) and Technical Community Representative Groups (TCRG) identified need for additional ICI engine testing
 - Research in avoidance of ICI is ongoing although it is not practical to expect complete environmental condition avoidance

- Means must be designed, analyzed, and lab tested, to predict and reduce ice crystal icing susceptibility for engines
- RE&D funding for A11.D (Research on Ice Crystal and SLD Icing Conditions) be prioritized at a higher level in FY18 and beyond to support engine testing

Appendix

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