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)
• 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?
Findings and Recommendations

• 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

• Recommendations
  • 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
Findings and Recommendations

• **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
Findings and Recommendations

• 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 full-scale 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

• Recommendations
  – 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
Findings and Recommendations

- **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
- **Recommendations**
  - 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
Findings and Recommendations

• **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

• **Recommendations**
  • 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
• 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
• 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