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RESEARCH, ENGINEERING AND DEVELOPMENT ADVISORY COMMITTEE

SUBCOMMITTEE REPORT – AIRCRAFT SAFETY (SAS)

APRIL 16, 2024
CHRIS DYER, SAS CHAIR

SAS MEETING MARCH 12-13, 2024 AGENDA

DAY 1

Overview of August 2023 F&Rs	Atwood/DeCleene
AVS Cyber Security Strategy	DeCleene
Update on Aviation Safety R&D strategy	DeCleene
FAA Budget Update	Blackwell/Kelly
Introduction to Research Portfolio	Orr/Atwood
Domain: Aircraft Safety Assurance	FAA/SAS
Domain: Digital Systems and Technologies	FAA/SAS
Domain: Environment and Weather Impact Mitigation	FAA/SAS

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DAY 2

Domain: Human and Aeromedical Factors	FAA/SAS
Domain: Aviation Performance and Planning	FAA/SAS
SAS Industry Briefing on MBSE & Digital Twins	P&W/NGC/Boeing
Overview of Aviation Safety CoE Programs	Procurement Services & Grants Management Division (ANG-A1)
PEGASAS CoE for General Aviation	Crossley/PEGASAS SDs
Capabilities and Previous Projects	
Future Opportunities and Open Discussions with SAS	

SAS GENERAL OBSERVATIONS, FINDINGS & RECOMMENDATIONS

Three (3) General Observations

1. Strategic Research Planning
2. Overview of Aviation Safety Center of Excellence Programs
3. Model Based Systems Engineering and Digital Twin Usage in Aircraft Safety

Three (4) Findings and Recommendations

1. Addition of Cybersecurity to Future Thrusts
2. Detection of Bleed Air Contaminants

3 & 4. Leveraging Centers of Excellence

SAS GENERAL OBSERVATIONS

Strategic Research Planning

- The Subcommittee supports transitioning to a tops-down project-based research approach for Aviation Safety R&D, allowing for agility in addressing evolving concerns.
- We believe there is value in informed investment in lab facilities, workforce development and research priorities with more flexibility, speed, and alignment within government agencies and industry.

Overview of Aviation Safety Center of Excellence Programs

- The Subcommittee acknowledges the insights gained from the Grant Office's briefing on Aviation Safety Center of Excellence Programs, highlighting opportunities for robust Aircraft Safety Research and professional development.

Model Based Systems Engineering and Digital Twin Usage in Aircraft Safety

- The Subcommittee appreciates the opportunity to present and recognizes the potential of Model Based Systems roadmaps and digital-twin activities in the industry to enhance safety and certification processes in current and future products.

FINDING #1 – ADDING CYBERSECURITY TO FUTURE THRUSTS

- The REDAC SAS appreciates FAA's efforts to organize research around critical Thrusts, supporting the discussion on creating a new Thrust for Aviation Cybersecurity.
- With aviation connectivity growing rapidly, cybersecurity faces evolving challenges, including advanced AI threats and emerging entrants lacking traditional safety culture.
- Cybersecurity attacks can target individual systems or multiple systems simultaneously, unlike physical attacks
- It's recommended that FAA adds a Cybersecurity Research Thrust addressing both IT and networking cybersecurity and aviation Integrated Control Systems challenges.
- The SAS supports existing Cybersecurity programs like GPS/PNT and CSDS, which align with industry needs and require continued coordination.

RECOMMENDATION #1 - ADDING CYBERSECURITY TO FUTURE THRUSTS

- The Subcommittee recommends that the FAA create a roadmap that incorporates the FAA cybersecurity integration efforts with the “cybersecurity, cyber-safety and cyber-resilience” efforts of ICAO, including for example the Trust Framework Panel (TFP) and Cybersecurity Panel (CySecP), and efforts like IPS cybersecurity, etc.
- The Cybersecurity thrust should explicitly include all forms of aircraft Communications, Navigation, and Surveillance (CNS) capabilities in addition to PNT/GPS and should include jamming and spoofing of Radio Frequency signals in addition to “network-like” attacks on aircraft systems.
- The Cyber security thrust should include the detection and assessment, and mitigations against varying scales of cybersecurity threats from attacks.
  - Including individual NAS systems, airport systems, and aircraft, up to simultaneous, systemic cybersecurity attacks against multiple NAS systems, airport systems, and fleets of aircraft.

FINDING #2 - DETECTION OF BLEED AIR CONTAMINANTS

- In a previous finding the committee stated that follow-on research is required to determine if there is a direct correlation between exposure to cabin air, beyond engine bleed air, and reported illnesses in well maintained passenger aircraft.
- Specifically, scientific study is needed to establish which substances are both hazardous and present in concentrations of concern. The research should support development of standards and measurement techniques that could identify required maintenance.
- The FAA stated in their response they did not agree with the recommendation as it is too broadly scoped (‘any possible exposure’) to be actionable or affordable and is not guided by any risk-prioritization that indicates a health hazard in existing operations.
- The committee agrees that the recommendation is too broadly scoped and is submitting a more narrowly focused recommendation.

RECOMMENDATION #2 - DETECTION OF BLEED AIR CONTAMINANTS

- SAS recommends that the FAA perform research to determine if there is a direct correlation between exposure to cabin air, beyond engine bleed air, and reported illnesses in well maintained passenger aircraft.
- Specifically, conduct scientific study to establish if a direct correlation exists between illness complaints and nano-particulates of engine oil, de-icing fluid, hydraulic fluid or jet fuel chemical components that could be both hazardous and present for durations, and in concentrations of concern, other than incidentally during events that require maintenance.
- And Establish if such chemical presences originate from aircraft systems or are drawn in from outside (i.e., ramp or taxiing).

FINDING #3 – LEVERAGING FAA CENTERS OF EXCELLENCE

- The subcommittee appreciated grant office briefing on the FAA authority to make research & development grants to institutions of higher education.
  - Currently, there are five active Centers of Excellence (COE) in the following areas: jet fuel and environment, advanced materials, unmanned aviation systems, general aviation, and technical training & human performance.
- The SAS noted this process and the COEs have significant potential to access subject matter expertise, facilities and resources from academia, state governments, industry, and non-profits. The SAS also noted the potential for COEs to multiply the research power of the FAA by leveraging the requirement for a minimum 50% match from non-FAA funds.
- It was unclear how to identify current portfolio R&D projects utilizing COE and whether each R&D BLI considered using COEs.
- PEGASUS briefed their specific projects and process for consideration of new/future R&D project activities.
  - The process for the COE, along with its strong partner coalition of academia and industry, to put forward proposals for new R&D projects that could be considered by FAA and its advisory committees was unclear to the SAS.
- During the FAA budget update briefing, the subcommittee noted an increase from $10 to $20M for the budget line item "Aviation grant management & Section 625 workforce development." This provides opportunity to further leverage COEs and support workforce development objectives as each COE includes responsibility for conducting research and to supply trained air transportation personnel.

RECOMMENDATION #3 & 4 - LEVERAGING FAA CENTERS OF EXCELLENCE

- SAS recommend that the FAA increase the visibility and use of Centers of Excellence (COEs) to utilize the opportunity to access subject matter expertise, facilities and resources from academia and industry while also leveraging FAA's R&D funding and expertise.
- FAA Aviation Safety R&D Portfolio summary documents should identify COE projects and funding levels within each domain/BLI and the total project funding including the COE contribution.
- The portfolio of proposed projects should include whether they can be supported or accomplished in whole or in part through a COE providing an opportunity for input and recommendations from FAA and Advisory committee participants.
- SAS recommends that the FAA provide a transparent, streamlined process for COEs to propose R&D projects for consideration by FAA and advisory committees including the opportunity to take advantage of industry resources and matching funds.
  – This has the potential of multiplying the research power of the FAA to the benefit of safety and the taxpayer.

NEXT SAS MEETING DATE

13-14 August 2024

FAA William J. Hughes Technical Center

Considering joint session with Human Factors Subcommittee

Questions