RTCA

Research, Engineering and Development Advisory Committee

Subcommittee Report – Aircraft Safety (SAS)

Terry McVenes, SAS Chair

October 4, 2023

SAS Meeting August 8-9, 2023 Agenda

Day 1

- Hybrid – In-Person/Virtual at WJHTC, ACY
- FAA Budget Update – Tom Kelly
- Review FAA Responses to Previous F&Rs
- Fatigue Working Group Briefing – Hannah Baumgartner
- RTCA SC-242 Spectrum Briefing – Ed Hahn
  - Impact of Spectrum on avionics systems
  - Opportunities for new research?
- Strategic Research Planning Approach – Bruce DeCleene

SAS Meeting August 8-9, 2023 Agenda

Day 1

- Requested 30-minute Briefings
  - Existing & Advanced Inspection or Monitoring Technologies – Danielle Stephens
  - Large Electric Energy Storage Systems – Tom Maloney
  - Complex Digital Systems – George Romanski
  - Urban Air Mobility (UAM) Icing – Chris Dumont
  - Improved Integration of HF into Aviation Safety Regulatory Policy and Processes for Aircraft Certification and Flight Standards – Kathy Abbott
  - Validation of Visual Operation Standards for sUAS – Phil Maloney

SAS Meeting August 8-9, 2023 Agenda

Day 2

- AI/ML Roadmap – Dr. Trung Pham
- Review of Planned FY24 Research – Mike Paglione/Mark Orr
- Wearable Sensors and Aircraft Automation Technology – Dr. John Crowley/Captain Jim Mangie
- FY25 Research Portfolio (Next Level NAS Oversight) – Bruce DeCleene – Strategic Thrusts
- Lab Tours

SAS General Observations, Findings & Recommendations

- Three (3) General Observations
  - Strategic Research Planning
  - AI/ML
  - Wearable Sensors and Aircraft Automation Technology

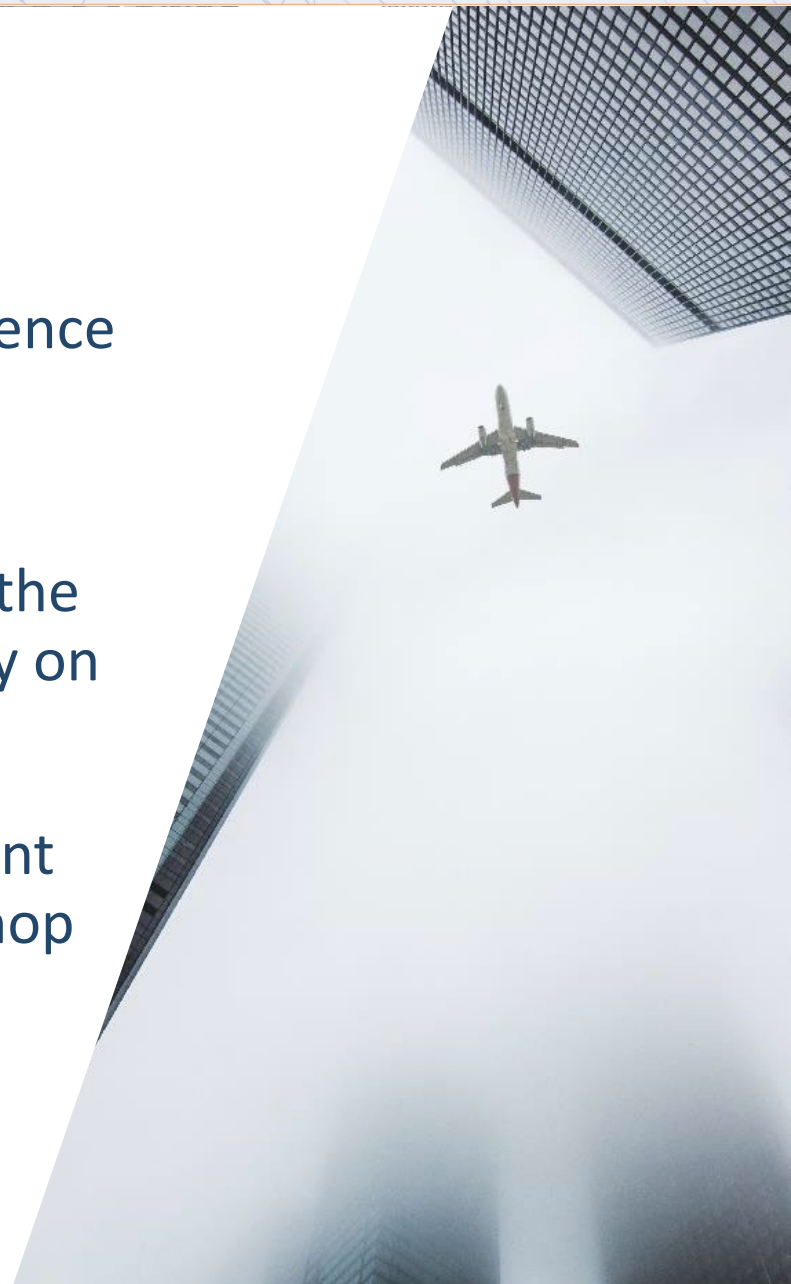
- Three (3) Findings and Recommendations
  - Cyber Resiliency for Digital Safety Systems
  - Reduced Crew Operation
  - Detection of Bleed Air Contaminants

SAS General Observations

- Strategic Research Planning
  - Briefing from Mr. Bruce DeCleene on the FAA's Strategic Research Planning
  - Top-down approach the FAA is taking to ensure FAA R&D is establishing research goals that provide a stronger role for strategic priorities to drive research
  - Well received and supported by the SAS members
  - SAS further supports the development of research strategic thrusts across the domains that addresses the significant role that FAA plays in aviation safety research.

SAS General Observations

- Artificial Intelligence/Machine Learning
  - Appreciate follow-up action FAA took on our previous F&R
  - FAA first industry draft of the Roadmap for Artificial Intelligence Safety Assurance - industry workshop to introduce the roadmap to industry and collect feedback
  - SAS views these as positive developments and encourages the FAA to continue with the same quality and sense of urgency on this topic that has been demonstrated in the past year
  - SAS appreciates the opportunity for the industry to comment on the roadmap in an upcoming technical exchange workshop



SAS General Observations

- Wearable Sensors and Aircraft Automation Technology
  - SAS believes that new developments in artificial intelligence and machine learning, coupled with new wearable sensors and aircraft automation technology, have a potential role in improving aviation safety, while creating possibilities to alleviate current and projected pilot shortages
  - The FAA should actively monitor industry activity in pilot physiological state monitoring
  - When specific and viable applications are proposed to the FAA, it should leverage industry partners and academia to assess what research (if any) is needed to enable the FAA to write policy, guidance, and grant approval for specific use of the application

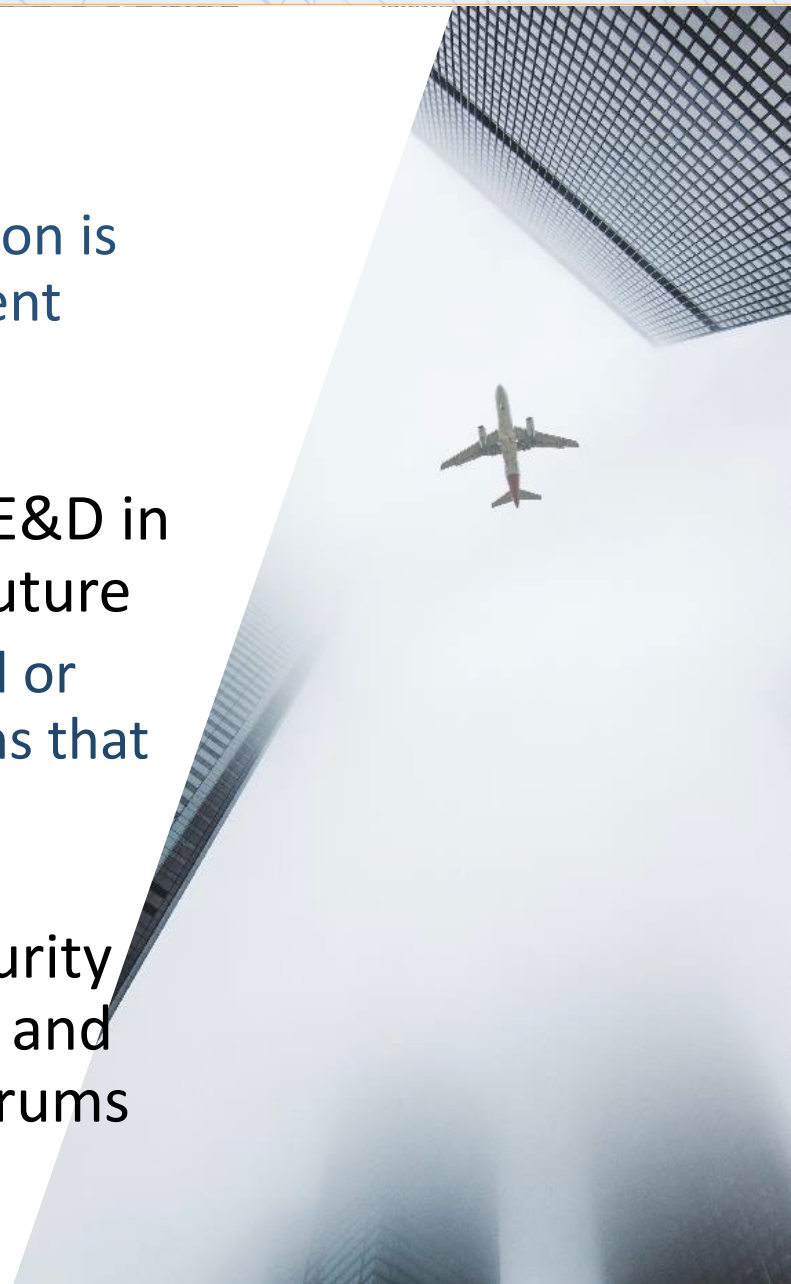
Finding #1 - Cyber Resiliency for Digital Safety Systems

- FAA Response to Previous F&R

"No RE&D funded research is required since the SAS recommendation is already being or will be addressed by the FAA's Program Management Office (PMO)…"

- SAS needs better understanding on the full context of FAA RE&D in this area so to provide improved inputs on this topic in the future
  - A briefing by the PMO on what development activities funded or planned that may address the various subcommittee questions that were listed in our original submitted F&R

- SAS is aware of the context and details of the FAA Cyber Security Data Science program through its engagement with industry and active industry research collaboration with other industry forums



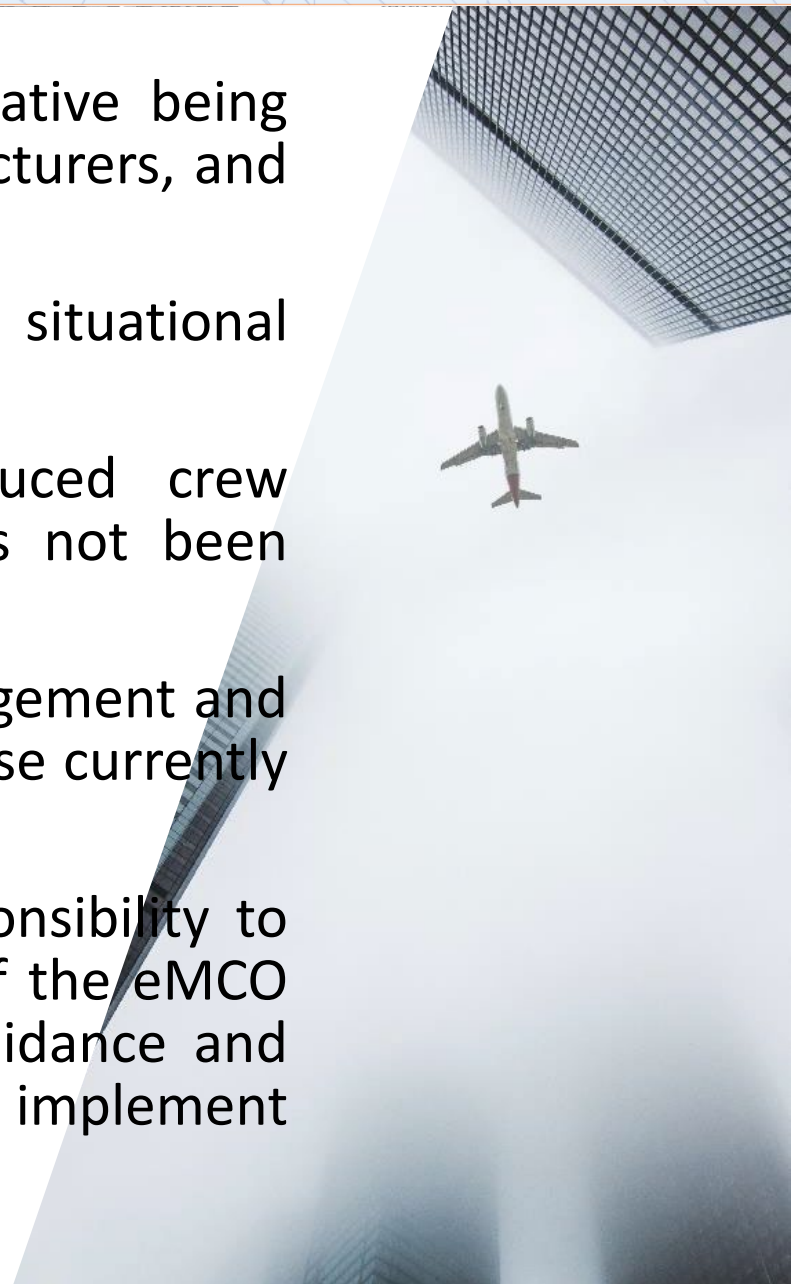
Recommendation #1

- SAS requests a briefing by the PMO on the status on what development activities funded or planned that may address the various Subcommittee questions listed in our original F&R

- Will provide members of the SAS to develop more informed input to support to the FAA at the Spring 2024 REDAC SAS meetings

Finding #2 – Reduced Crew Operations

- Extended Minimum Crew Operations (eMCO) is a recent initiative being aggressively explored by aircraft manufactures, avionics manufacturers, and airlines
- Systems that allow greater autonomy can also degrade pilot situational awareness by masking changes in aircraft system health
- Current or proposed monitoring technology using a reduced crew complement is backed by limited scientific research and has not been validated in real world operations
- Significant gaps in current knowledge dealing with fatigue management and flight time limitations with crew complements different than those currently in use in airline operations
- The SAS agrees with the FAA that it is not the agency's responsibility to develop or mature the science and technology to enable use of the eMCO concept, but the FAA needs to be ready to apply rigorous guidance and oversight once they are approached by a stakeholder looking to implement eMCO in commercial operations



Recommendation #2

- The Committee recommends that the FAA assess the potential applications of eMCO to aviation operations and safety

- Develop a research plan/roadmap that includes a multidisciplinary team and leverages work in other government agencies, academia, and industry to provide both certification standards and internal implementation guidance for eMCO

- SAS recommends the FAA develop requirements for means of compliance against the established rules, regulations, and procedures to assist industry in introducing additional automation and increasing autonomy for enhanced safety

Finding #3 – Detection of Bleed Air Contaminants

- SAS recognizes current research being undertaken as directed by the FAA Reauthorization Act of 2018, specifically, A11J FCMS.2, “Detection of bleed air contaminants in the cabin”

- Solid understanding of the chemical constituents in cabin air is essential. When completed, it is anticipated the work will be reflective of a similar undertaking by SAE, published in 2020 as Aerospace Information Report AIR1539C, “Environmental Control System Contamination”

- 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

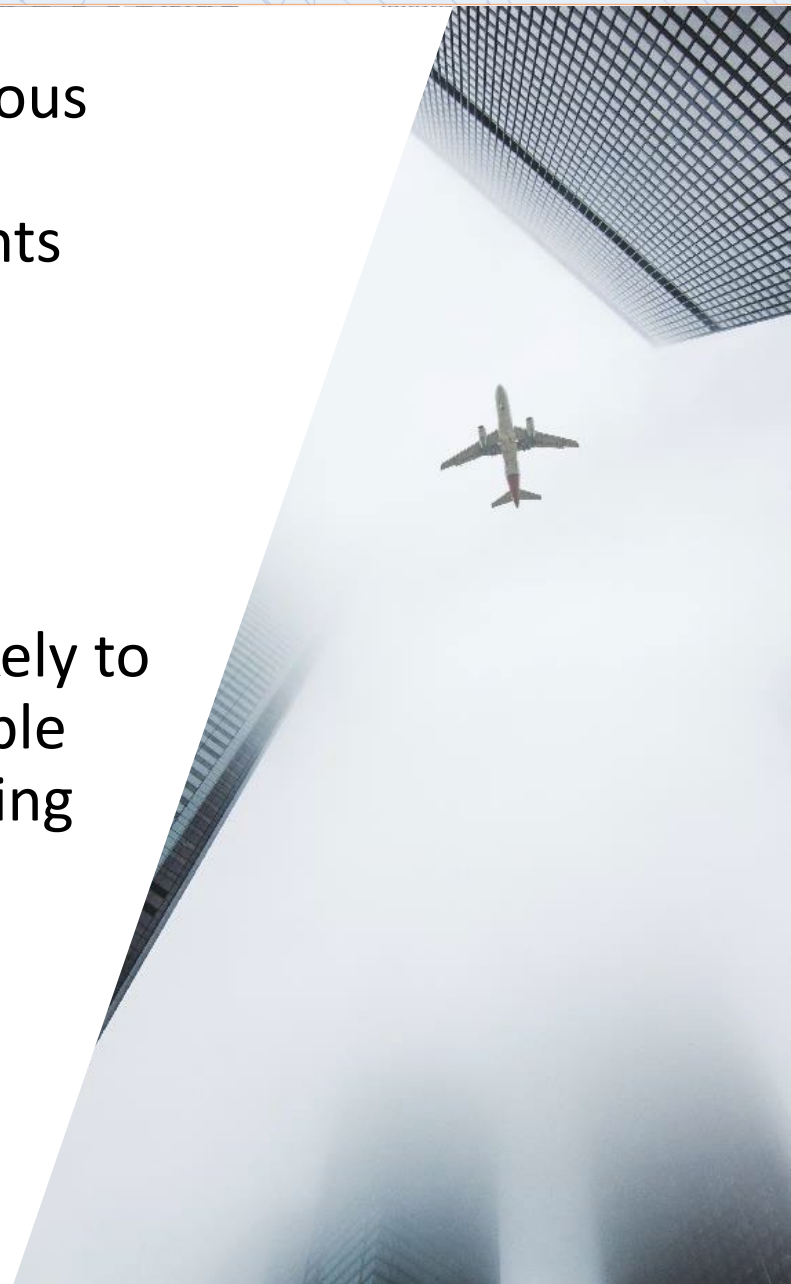
- Scientific study is needed to establish which substances are both hazardous and present in concentrations of concern

- The research should support development of standards to inform measurement techniques that could identify required maintenance as well as safe environments

Recommendation #3

- The Committee recommends research that builds on previous work that identified chemical compounds and substances present in engine bleed air to include additional constituents typical in
  - normal operations
  - smoke/odor/fire events
  - as a result of maintenance issues

- For those substances that impact human health and are likely to be significantly present, research should establish acceptable concentrations and durations of human exposure, supporting standards development



Next SAS Meeting Date

- March 12-13, 2024
  - Metro DC Area

- Questions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