REDAC NAS Operations Subcommittee

Jim Kuchar Fall 2020

NAS Ops Subcommittee – Fall 2020 Meeting

- September 1 2, virtual meeting using WebEx
- Agenda
 - Update on research drivers and landscape
 - o Budget overview
 - New Air Traffic Management Requirements; Enterprise Concept Development
 - Runway Incursion Reduction
 - Enterprise Human Factors; ATC / Technical Operations Human Factors
 - **o** Weather Program; Weather Technology in the Cockpit
 - Operation Concept Validation and Infrastructure
 - Wake Turbulence
 - Flight Deck Data Exchange Requirements
 - \circ Deep dives
 - Weather Research Program requirements process
 - FAA NAS 2035 Vision
 - NASA 2045 Vision
 - Cyber R&D
 - International Aviation Trust Framework
 - Aircraft Systems Information Security / Protection (ASISP)

NAS Ops Subcommittee – Fall 2020 Finding and Recommendation Summary

- 1. Enhance and highlight connectivity between FAA Research Landscape and subsequent R&D planning processes
- 2. Ensure NAS 2035 vision and related R&D address strategies for off-nominal event management, recovery, and graceful system degradation
- 3. Enhance coordination across cyber R&D efforts

Finding 1

- The subcommittee received a briefing describing the FAA's progress in developing and exploiting its Research Landscape for the National Airspace System. The subcommittee appreciates the utility of defining research Drivers and mapping them to the various RE&D activities within the FAA.
- The organization of the Landscape into four major Driver categories (Advances in New Vehicles / New Missions; Advances in Technology and Materials; Advances in Data and Processing Power; System Wide Advancements / Improvements) is helpful toward understanding how the broad range of RE&D programs span the space of work required to progress beyond NextGen.
- Some challenges in the roll-out of this process were identified, including the need to better socialize the various Drivers so that program managers understood where their programs would fit within the Landscape, and some practical matters such as requiring the ability to allow program managers to map their work to more than one Driver. We anticipate that those challenges will be easily addressed in the near future.
- At this time, however, the connection between the Research Landscape and the FAA's research planning process has not been clearly articulated. The subcommittee identified an opportunity to more explicitly connect the Research Landscape to the FAA's RE&D planning and prioritization efforts.

- The NAS Operations subcommittee recommends that the FAA more clearly define how the results of the Landscape effort will inform RE&D prioritization, and subsequently report out periodically to the REDAC subcommittees on the prioritization process.
- By making a connection between Drivers and priorities, we anticipate there will be more utility extracted from the Landscape process beyond its current value in communicating Driver-to-Research mappings. Ideally, the subcommittees would be provided with regular updates on the connections between Drivers, RE&D programs, and their priorities, to build a more holistic understanding of the FAA's research portfolio.

- The FAA 2035 Vision and NASA 2045 Vision invoke a significantly higher degree of autonomy than today's NAS, with machine learning (ML) and artificial intelligence (AI) supporting a dense operations environment comprised of diverse vehicles and operating entities. These visions allude to the need for operations-recovery constructs and infrastructure resiliency when off-nominal conditions occur.
- The subcommittee notes, however, that responding to novel, or previously unobserved situations (and recognizing precursors to these) is particularly challenging for ML/AI technology.

- Development of strategies for effectively responding-to and recovering-from significant, off-nominal scenarios should be a priority in these future NAS visions. The off-nominal scenarios encompass both unplanned operational events as well as system failures. In system failures, the likelihood that significantly-moreintense operational responsibilities will need to shift back temporarily to the human work force in a graceful manner (airline, air-traffic control and flowmanagement) during off-nominal situations should be considered.
- In addition, historical data on these autonomous systems performance and behavior does not exist, and thus a prognostic analytical approach is needed to determine the system health as well as assist in standards development and certification processes. Furthermore, the autonomous systems will need to coexist and be integrated into the traditional human centric systems.
- The subcommittee recommends that future versions of these FAA and NASA visions, and their related RE&D efforts, explicitly address strategies for off-nominal event management, recovery, and graceful system degradation, and that these be briefed to the subcommittee when appropriate.

Finding 3

- A11.r Flight Deck Data Exchange Requirements and Aircraft Systems Information Security Protection (ASISP) research are targeted at identifying and mitigating potential cyber vulnerabilities in aircraft systems. An important part of the cyber analysis process is developing a methodology that is both effective and vetted across multiple stakeholders including the FAA and other government agencies, and industry spanning airframe manufacturers, avionics, ground systems, and data communications systems.
- The ASISP program has built a strong cyber Safety Risk Assessment (SRA) methodology that has been closely coordinated with industry and government stakeholders including the Cyber Safety Commercial Aviation Team (CS CAT) and broader constituencies such as the tri-agency Aviation Cyber Initiative (ACI) and the international Aviation Information Sharing and Analysis Center (A-ISAC).
- ASISP has successfully conducted several cyber system analyses on critical components such as the Flight Management System. In contrast, the cyber analysis process currently being used in A11.r was not explained directly, and it was apparent that this effort is not closely coordinated with or leveraging the methodologies and accomplishments of the ASISP program. Some efforts, such as analysis of Aircraft Information Displays and Flight Management Systems, appear to be duplicative or overlapping with ASISP.

- The FAA should ensure that the A11.r Flight Deck Data Exchange Requirements research effort is making full use of and closely coordinating with the ASISP program.
- Findings and methods used in ASISP should be informing the methods used in A11.r, and likewise results from A11.r should be coordinated with ASISP and the broader ACI and A-ISAC communities.

Next NAS Ops Meeting: 16-17 March 2021

- Requested documents prior to next meeting
 - FAA 2035 Vision briefing with Key Activity dashboard (ANG-3)
 - Technical Description of iTBO Gate-to-Gate operations (AJV-S)
 - Future of the Oceans 2035 Vision report (AJV-S)
- Requested Deep Dive topics for Spring 2021 meeting:
 - iTBO and Future Flow Management accomplishments from FY20 ATDP
 - Commercial Space R&D update with focus on NAS operations impacts
 - UAS / UTM roadmap update
 - NASA ATM-X R&D update
 - Simplified Vehicle Operations (SVO)