FAA REDAC Subcommittee on Human Factors Winter/Spring 2020 Meeting Findings and Recommendations May 20, 2020

Finding 1: Urban/Advanced Air Mobility (AAM) Research and Definition

The subcommittee was pleased to receive briefings on the HF research areas and concurs with the inclusion of AAM-related Human Factors (HF) research in the portfolio (research that will inform AAM as well as other aircraft and operations that share AAM automation and HF aspects). The FAA has taken a "watch" stance on AAM while operational concepts are being defined, letting NASA "lead" on AAM research in this rapidly evolving area. The subcommittee believes the NASA work with its industry partners may be insufficient to address all the HF issues needed to prepare the FAA for efficient AAM approval and safe operation. The subcommittee understands the FAA is becoming more involved in this area; however, the subcommittee believes the HF issues should be worked on early. For example, the FAA should be proactive in helping to define the concept of operations, standards, roles of humans, roles of automated systems, pilot/operator training and qualification requirements, and cockpit simplification acceptability. The subcommittee believes FY22 is too late for the FAA to begin the AAM research because the Original Equipment Manufacturers are targeting Entry-Into-Services (EIS) dates as early as 2023-2025.

Recommendation:

The subcommittee recognizes that AAM and related aircraft/operations is a rapidly evolving domain with a broad range of proposed vehicles and operational concepts. The subcommittee recommends that the FAA prioritize and accelerate AAM HF Research to ensure HF issues are identified and addressed during concept and use case maturation, and during design and development, rather than waiting until vehicles are entering the system. Timing is critical since FAA and NASA research objectives for AAM are currently in the process of being defined. FAA should coordinate with NASA to identify specific HF research needs and timelines to support near-term EIS targets and NAS integration. The FAA and NASA should jointly determine HF research priorities and gaps as well as define research responsibilities between the two agencies. Areas not being covered by FAA or NASA, but critical to the success of focus should include standards, roles of humans (pilots, air traffic controllers, others), roles of automated systems, pilot/operator training and qualification requirements, and cockpit simplification acceptability. The subcommittee recommends AAM HF research and definition be considered in the budgeting as a high priority emerging issue to get in front of this dynamic area.

Consequences:

Because this is a rapidly developing area and there is limited guidance from the FAA on pilot/operator training and qualifications, simplified cockpit design, and operational standards, these definitions will likely be left to the companies developing these vehicles, (such as UBER, Hyundai, etc.), many of which do not have the expertise to make these decisions, nor can provide a balanced industry-government perspective.

Finding 2: Access to FAA Research Artifacts

FAA research generates valuable outputs, i.e., research artifacts including data, reports, and findings. Presently, however, these artifacts are scattered across internal databases, research centers, and universities and are not always accessible via a centralized repository. Currently, there is no means for interested parties to access in an easy and efficient manner the research outputs created from FAA funded research. Practices enabling the sharing of research findings and artifacts with industry and research institutions are enablers to cost effective advancement of the FAA's research objectives and the overall body of aviation knowledge and expertise.

Recommendation:

The HF subcommittee recommends the FAA provide a centralized repository of research artifacts that is easy to access and search, preferably in an online format. All FAA-funded research artifacts should be made available regardless of the resource performing the research. Any research artifacts that are deemed inappropriate for public release should still be made available on-line to trusted parties, such as the REDAC, using appropriate access security measures.

Consequences:

Limiting access to FAA-funded human factors research outputs may reduce learning, create rework/duplication, and limit partners and interested parties to enhance and accelerate the advancement of FAA research objectives.

Finding 3: The proposed prioritization process

The HF subcommittee was pleased to receive a briefing on the AVS-proposed research prioritization process. It was noted the research proposed and conducted by the FAA generally considers perspectives of each Service/Office separately. The subcommittee understands the need to fund work within Budget Line Items (BLI) but is concerned that the proposed process does not require collaboration and coordination across BLIs in the agency to meet system objectives. The introduction of emerging technologies requires a more coordinated approach; for example, in approving new Electric Vertical Takeoff and Landing (eVTOL) aircraft, one must also consider the implications for pilot licensing and how the operator may interact with air traffic control. This finding and recommendation is not intended to address how projects are funded but rather how needs are identified, and how projects are proposed, prioritized, and executed by the Services/Offices requesting the work.

Recommendation:

The FAA's AVS research prioritization process should take a more strategic and coordinated approach, so the Services/Offices may collaborate on projects to achieve common goals. The subcommittee understands projects are funded and worked within BLIs but it is evident that the current process does not require effective HF research collaboration/coordination across the agency to meet system objectives. FAA needs an effective process to identify and prioritize HF research that has cross-domain impact, and not just HF issues that reside in one or a few domains or limited to only programs labeled as "human factors". The proposed prioritization process should include identifying and addressing overarching HF issues across air/ground domains throughout the NAS in order to measure and achieve

desired system performance with roles and responsibilities defined for each of the Services/Offices involved.

Consequences:

The FAA's AVS organization currently proposed research process might result in inefficient funding, duplication of effort, and potentially conflicting and/or uncoordinated activities. It will also focus on individual domains and omit HF issues that are overarching and cut across BLIs and domains.

Actions

Action 1: Process for Emerging Needs Identification and Prioritization

The subcommittee was pleased to learn the FAA will provide a BLI for emerging issues, however the process for allocating funding and for identifying appropriate issues was not communicated. The subcommittee recognizes the FAA may not have a process fully defined at this time and requests that an update on the process definition be briefed at the Summer/Fall meeting. The subcommittee recommends the process at least includes the following:

- 1. Define how the emerging issues are identified and evaluated.
- 2. Define how emerging issues are prioritized, and explicitly define the prioritization criteria.
- 3. Articulate the process for deciding which emerging issues to fund.
- 4. Describe what will happen to those emerging issues that received low priority ratings and/or are not funded in a FY.

Action 2: FAA HF Research Plan Specificity Needs Consistency

The subcommittee was pleased to receive briefings on the FY22 HF research areas and concurs with the direction the FAA is taking. Because presentations on the FY22 research were presented at a high level, it was challenging for the subcommittee to advise on the specific actions (e.g., methodologies, tools, measurements) the research would take and what specific issues would or would not be addressed. The subcommittee requests a detailed briefing on the HF research planned for FY22 at the Summer/Fall meeting that is descriptive of the research questions and plan to be executed within the identified research areas. At the next meeting the subcommittee aims to identify the right level of detail for these presentations (i.e., to create a briefing template) so that there is consistency across presentations in the future.

Observation

Observation: Human Factors Research Can Also Reside in Other (non-HF) Portfolios

The subcommittee was pleased to receive briefings on AVS Core and NextGen, and ATC Core and NextGen research requirements at the Winter/Spring meeting. However, we observed HF research is happening across the agency in programs that may not be called HF or fall under a HF budget line. It is difficult for the subcommittee to advise on research gaps and issues without visibility into all FAA HF research and how the research is prioritized and decided upon. The subcommittee would like the FAA to consider sharing the HF work being done across the agency, even if it is not listed/categorized as such, so that the HF subcommittee has the big picture view of what HF activities are being done without relying on special presentations. Better insight into the breadth of the FAA's HF work would be of

benefit to the FAA by eliminating overlapping work and by increasing coordination of work across the agency.