AVS Core Requirements

1. Emerging Flight Deck Technologies

Sponsor: Cathy Swider, AIR-600

Executive Summary: This research integrates systems, software, and human factors considerations to understand the implications of emerging technologies from a systems perspective. This research will address new display concepts and advanced control interfaces (e.g., touch, speech, gaze), and will provide data to support the certification of these technologies.

2. Advanced Vision Systems (EFVS, EVS, SVS, CVS), Head-Up Displays (HUD), and Head Mounted Displays (HMD): Operational Standards & Approval Criteria

Sponsor: Chris Hope, Group Manager, Flight Operations Group, Flight Technologies and Procedures Division, AFS-400

Executive Summary: Research is needed to characterize human factors/pilot performance considerations using Advanced Vision Systems, HUD, and HMD for new low visibility concepts of operation. This research will inform development of operational requirements, standards, conditions, limitations, mitigations, and authorizations for the use of these technologies.

3. Fatigue Mitigation in Flight Operations

Sponsor: Dale Roberts, AFS-200

Executive Summary: Continue to evaluate pilot fatigue data and the effectiveness of fatigue risk management approaches utilized by 121 and 117 certificate holders. Improve flightcrew member alertness through policy updates and educational materials associated with FRMP and FRMS. Continue analysis of the FAA FRMS database is needed to further understand pilot performance and fatigue under operational conditions associated with extended flight duty periods and flight times. Research is also needed to characterize human factors/pilot performance considerations in flight operations involving short haul multiple segment workload and cumulative sleep loss across trip pairings. Additionally, research is needed to systematically evaluate the behavioral adaptation of pilots to multiple time zone shifts associated with long-haul and ultra long-range flight operations. This research will better inform development of operational requirements, standards, conditions, limitations, mitigations, and FRMS authorizations relevant to these flight operations issues.

4. Maintenance Human Factors to Support Risk-Based Decision Making and Maintenance Safety Culture

Sponsor: Rolandos Lazaris, AFS-300

Executive Summary: Maintenance human factors issues have been prioritized by multiple NTSB recommendations and highlighted in the AVS infoshare. The importance of this project is emphasized by the Office of Secretary of Transportation/FAA/Industry meeting in July 2018 that highlights the importance of integration of human factors into required maintenance safety management systems. This research program is designed to provide AFS-300, industry, and the administrator the information needed for appropriate action.

5. Pilot Training, Qualification, Procedures and Flight Operations

Sponsor: Kathy Abbott, AVS and Robert Burke, AFS-280

Executive Summary: Pilot training and procedures are often recommended as mitigations for factors in accidents and incidents. Research is needed to provide data-driven guidance to inspectors and operators on training methodologies (especially concerning use of technologies in training, such as distance learning and virtual reality), qualification and operational procedures. Research is also needed to provide recommendations for data to support the potential emerging risks, including that of the upcoming pilot workforce, and address and mitigate those risks.

6. Human Factors Considerations and Emerging Trends Associated with Helicopter Air Ambulance Operations

Sponsor: Thomas Luipersbeck, AFS-250

Executive Summary: Research is needed to characterize and evaluate human factors and human performance considerations associated with helicopter air ambulance operations. This research will provide information that can be used to enhance the FAA's understanding of current industry risks and emerging issues and trends, and will inform policy, operational requirements, standards, procedures, limitations, mitigations, and guidance materials pertaining to helicopter air ambulance operations.

AVS NextGen Requirements

1. NextGen: Human Factors Guidelines for Advanced Instrument Procedure Design and Use

Sponsor: Kathy Abbott, AVS and Jeff Kerr, AFS-470

Executive Summary: Research is needed to anticipate, mitigate, and reduce potential pilot performance issues related to flying advanced NextGen instrument procedures, including Trajectory-based Operations. Procedures such as RNAV/RNP SIDs, RNAV/RNP STARs, and RNP (AR) approach operations are of particular interest. Pilot errors when flying these advanced procedures could result in reduced airspace capacity, loss of separation, reduction of operational effectiveness, and other safety consequences. This research will inform procedure design requirements, related ACs, training material, and associated regulations. It will help in meeting goals from the PBN NAS Strategy document such as "delivering and using resilient navigation services."

2. NextGen Procedures, Tasks, Skills and Training for NextGen Air Carrier Pilots

Sponsor: Kathy Abbott, AVS and Robert Burke, AFS-280

Executive Summary: Research is needed to evaluate procedures and training and checking requirements for pilots as their jobs change in NextGen operations, including Trajectory Based Operations. This will inform NextGen procedures and training guidance.

3. NextGen Advanced Vision Systems (EFVS, EVS, SVS, CVS), Sensor-Based Technologies, Head Mounted/Head Worn Displays (HMD), and Other Flight Deck Systems

Sponsor: Chris Hope, Flight Operations Group, AFS-410

Executive Summary: NextGen research is needed to characterize human factors/pilot performance considerations using Advanced Vision Systems, Advanced Vision System sensor technologies, and HMD/HWD for new low visibility concepts of operation. This research will inform development of operational requirements, standards, conditions, limitations, mitigations, and authorizations for the use of these technologies. This research supports NextGen operational improvements described in the NextGen Implementation Plan, Improved Approaches and Low Visibility Operations (NGIP) and the NAS Segment Implementation Plan (NSIP), Improved Approaches and Low-Visibility Operations Portfolio.

4. NextGen Human Error and Complex Systems

Sponsor: Kathy Abbott, AVS and Robert Burke, AFS-280

Executive Summary: Research is needed to evaluate and mitigate complexity and pilot errors in NextGen operations. This research will inform development of guidance for NextGen operational and equipment approvals, training programs and flightcrew procedure development for NextGen operations, such as trajectory-based operations.