NASA SBIR Select 2014 Phase I Solicitation

A20.01 Air Traffic Management Research and Development

Lead Center: ARC

Participating Center(s): LaRC

The Airspace Systems Program (ASP) seeks innovative and feasible concepts and technologies to enable significant increases in the capacity and efficiency of the Next Generation Air Transportation System (NextGen) while maintaining or improving safety and environmental acceptability. There are two projects within ASP (Concepts and Technology Development, CTD and Systems Analysis, Integration and Evaluation, SAIE). The two projects address the following Technical Challenges:Â

- Develop tactical automation technologies for complex operational choke points including surface, arrival/departure, and dense terminal operations.
- Establish the basis for air/ground functional allocation for separation assurance including safe, graceful degradation of performance in response to off-nominal conditions.
- Develop strategic automation technologies that integrate probabilistic weather information and flow management capabilities.
- Conduct seamless integration of automation applications in a resilient, end-to-end Trajectory-Based Operations system.
- For the highest levels of NextGen performance and beyond, develop concepts, technologies, and system-wide evaluation and validation approaches.

Â In support of these technical challenges, ASP seeks proposals in the following areas:Â

- Address integrated arrival, departure, and surface traffic planning for reduced fuel consumption, noise, and emissions during congested flows through:
    - Balanced runway usage and runway configuration management.
    - Precision departure release scheduling.
    - Reduced fuel/noise/emissions continuous descent arrivals with precision scheduling.
    - Maintaining safety in ground operations through the development of concepts and algorithms for both aircraft- and ground-based surface conflict detection and resolution (CD&R) and integration of the two approaches.
    - Developing pilot display requirements and technologies for 4D taxi clearance compliance, and taxi clearance conformance monitoring algorithms and procedures.
    - Dynamic aircraft spacing/separation considering wake vortices. Environmental impacts will be considered as concepts are investigated.
- Develop a tool for air traffic management cost assessment addressing:
    - Aircraft line of flight impact to the airline and the NAS.
    - Quantify user costs on equipage and training along with benefits delivered by the related new

concepts and capabilities.
    - Economic impact of policy decisions for new procedures on given concepts and technologies.
- Use of innovative data storage, data mining and big data analytics techniques to store, visualize and/or analyze large amounts of archived air traffic management data (radar data, weather data, traffic management initiatives, performance logs, etc.) for use by researchers.
- Develop Airline Operations Center simulation capability to enable conducting studies to assess integrated traffic/flow management and airline operations, collaborative decision making, and advanced automated concepts to support airline operations.
- Develop decision support capability requirements to enable Single Pilot Operations (SPO) that will substitute the crew resource management (CRM) or its parts that exists in current operations.Â
- Develop a functional description of airspace architectures and concepts that would enable all markets including but not limited to on-demand and scheduled mobility taking advantage of increased automation in the cockpit and on the ground through interconnected networks.