RQ 17-35

System of Systems Operations Research for Revolutionary Air Vehicle Concepts

1. **Research Title:** System of Systems Operations Research for Revolutionary Air Vehicle Concepts

2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Aerospace, Mechanical or Systems Engineering or Operations Research / Systems Engineering and Operations Research (BA/BS, MS or Ph.D. level)

4. **Objectives:** The maturation and transition of revolutionary air vehicle concepts face a number of challenges due to their revolutionary nature. This topic seeks innovative approaches to address two of these challenges. One challenge arises because revolutionary systems are likely to be used differently than current systems. This feature complicates the process of determining the full value of the revolutionary system and the communicating that value to stakeholders and decision makers. The second difficulty is associated with predicting the development costs, schedules, performance and risks of revolutionary systems. This process is complicated due the inability to use analogous systems to make the predictions.

5. **Description:** This research seeks to develop new methods for systems analysis, operations research, cost estimating and program planning to improve the quality and reduce the planning costs associated with predicting the overall system effectiveness and cost, schedule & risks associated with the development of revolutionary air vehicle concepts.
   The determination of overall system effectiveness is expected to require a robust M&S approach that includes analysis of the system under study in a system of systems model. System of systems considerations are required because a revolutionary new system is expected to interact with the other systems in ways different from the interactions with existing systems. Research into approaches to rapidly and efficiently develop and analyze system of systems models is desired.
   A bottoms-up cost, schedule, performance and risk estimating approach is expected to be required for revolutionary air vehicle concepts. In addition to the low likelihood of having similar systems available to serve as a basis for comparison, early in the concept maturation process many enabling technologies are expected to be at low readiness levels. Research into approaches to rapidly and efficiently develop bottoms-up systems models is desired.

6. **Research Classification/Restrictions:** US Persons Only. Access to ITAR / Export Controlled information is required. SECRET COLLATERAL clearance is preferred.

7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided.
   [✖] **DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati).