

1. **Research Title:** Product Line Engineering Research for Low Cost 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:** Traditional acquisition processes for military air platforms have evolved toward very long development, test, production and operational use periods for aircraft. These protracted acquisition cycles have exponentially driven up overall acquisition and sustainment costs. Product line engineering principles are successfully applied in other industrial settings, such as the consumer information technology, communications, entertainment and automotive industries; all of these industries operate on the assumption their consumers will dispose of older systems and acquire new as these systems become outdated and newer, better technologies emerge. The challenge of applying these principles to military systems, particularly limited life, low cost air vehicles, will be an acquisition revolution requiring differentiation between consumer product principles that can be applied in the military air vehicle setting and those that cannot. This topic seeks to leverage or modify product line engineering approaches that reduce the life cycle cost of an air vehicle by periodic technology refresh of designs, reestablishing production, and disposing outdated aircraft as opposed to expensive modifications and upgrades to higher end air vehicles with decades-long service lives.
5. **Description:** This research seeks to develop new methods for systems analysis, operations research, cost estimating and program planning to predict the overall system effectiveness and cost, schedule and risks associated with the incremental development and fielding (to include operations and sustainment and disposal) of a product line of air vehicles and the ground control segments that support them.

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 incrementally developed and upgraded systems are expected to interact with more complex and expensive exquisite systems. Research into approaches to rapidly and efficiently develop and analyze system of systems models is desired.

A clean sheet, bottoms-up cost, schedule, performance and risk estimating approach is expected to be required for and incrementally developed product line of air vehicles. Research into approaches to rapidly and efficiently develop bottoms-up systems models, and leverage existing models for product areas that use product line engineering approaches 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:** All DAGSI Universities.

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