MEMORANDUM OF AGREEMENT

SUBJECT: Using Design of Experiments for Operational Test and Evaluation

Regarding the subject, we endorse the enclosed findings of the Operational Test Agency Technical Directors and the Science Advisor for Operational Test and Evaluation.

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Commander, AFOTEC

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Enclosure: Design of Experiments (DOE) in Test and Evaluation

Design of Experiments (DOE) in Test and Evaluation

At the request of the Service Operational Test Agency (OTA) Commanders, DOT&E hosted a meeting of OTA technical and executive agents on February 20, 2009 to consider a common approach to utilizing DOE in operational test and evaluation endeavors. Representatives from ATEC, OPTEVFOR, AFOTEC, JTIC, DOT&E and two experts in DOE from the National Institute of Standards and Technology (NIST) met to discuss the applicability of DOE principles to support test and evaluation efforts.

This group endorses the use of DOE as a discipline to improve the planning, execution, analysis, and reporting of integrated testing. DOE offers a systematic, rigorous, data-based approach to test and evaluation. DOE is appropriate for serious consideration in every case when applied in a testing program. A program applying DOE involves:

- Starting early in the acquisition process with a team of subject matter experts who can identify operational conditions (what they consider the driving factors in the successful performance of the system and the levels of each factor that should be considered)
- Forming a team that must include representation for all testing (Contractor Testing, Government Developmental Testing, Operational Testing), an expert in test design, including DOE, and approval authorities such as DOT&E
- Developing the master plan for the complete test program, the resources needed, and the plan for early tests (even component tests) and use the results of early tests to plan further testing
- Focusing the testing strategy to assure each stage of testing addresses all important parameters, to preclude compartmentalization of specific parameters into separate tests.
- Iterating planning and testing correctly to produce an understanding of the driving factors of system performance and the levels that need to be tested to have an adequate IOT&E that confirms performance.
- Accumulating evidence that the system performs across its operational envelope before and during IOT&E
- Applying DOE as a key ingredient in the formulation of meaningful integrated testing.

Experimental design further provides a valuable tool to identify and mitigate risk in all test activities. It offers a framework from which test agencies may make well-informed decisions on resource allocation and scope of testing required for an adequate test. A DOE-based test approach will not necessarily reduce the scope of resources for adequate testing.

Successful use of DOE will require a cadre of personnel within each OTA organization with the professional knowledge and expertise in applying these methodologies to military test activities. Utilizing the discipline of DOE in all phases of program testing from initial developmental efforts through initial and follow-on operational test endeavors affords the opportunity for rigorous systematic improvement in test processes.