



OPERATIONAL TEST  
AND EVALUATION

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MEMORANDUM FOR COMMANDER, ARMY OPERATIONAL TEST AND  
EVALUATION COMMAND  
COMMANDER, OPERATIONAL TEST AND EVALUATION FORCE  
DIRECTOR, MARINE CORPS OPERATIONAL TEST AND  
EVALUATION ACTIVITY  
COMMANDER, AIR FORCE OPERATIONAL TEST AND  
EVALUATION COMMAND

SUBJECT: Modeling and Simulation (M&S)

You expressed concern to me in writing, and in person, that “pressures to reduce acquisition time through the use of M&S—especially constructive models—could lead to expectations that model results can substitute for test results.” I share your concern and agree with you that we must continue to focus on, “. . . the real system, in the real environment, with the real operator . . .”

Our responsibility is to provide independent and objective performance evaluations to decision makers. I believe these evaluations should draw upon principles founded in the scientific method and design of experiments. Items such as prediction (hypothesis), planning (test design), data collection (test event), analysis (data verification), and reporting (conclusion) should all contribute to providing the most credible, insightful, and valuable evaluation possible. Of these core processes, the test is simply an environment created during which data are collected. In this context, I believe the notion of replacing testing with M&S simulation is inappropriate.

It is, however, appropriate to use models or simulations to support the core processes mentioned above. I offer the following as examples. Models should help us predict (quantify) performance throughout the mission space. Models should help us design tests to maximize our learning and optimally apply our resources. Models (stimulators) should help us replicate the environment during test to realistically stress the system under test. Models should add to our insight and understanding in interpreting collected data. Lastly, models using the data and information gleaned from testing should be used to demonstrate the significance of conclusions reached.

I endorse the well thought-out use of models as tools to support all of our core processes. However, just as we should train as we fight, I believe we should test as we fight. To that end, we must create a realistic environment in which real operators use real systems to accomplish real tasks, operations, and missions. Models can play a value-added role in achieving and understanding that realistic environment. The principal strength of using models to support



operational evaluations lies in the ability to aid in pre-test and post test analysis, not as a source of the data collected.

It has been my observation that program managers who make an early commitment (i.e., goals, strategy, development, resources, etc.) to integrate the use of models as tools to support learning and to gain insight and understanding throughout the life cycle of a program are *crittinely better positioned to be successful than those who try to use models late in the life of a program as a means to respond to resource or schedule constraints.*

Using models appropriately in applying the fundamental principles of the scientific method, design of experiments, and sound engineering judgment in support of our *core processes* can help us produce the most credible, insightful, and valuable evaluations possible. All of us should be striving to do this all the time.

Though not in direct response to your memo, I also believe test data and information should be compared to input data and assumptions of decision-aid models used by operational and force planners. We have to do a better job of getting our operational evaluations to warfighters for operational planning and our actual system performance data to users of high-level models to refine their input data and assumptions.

  
Thomas P. Christie  
Director