NATIONAL DEFENSE INDUSTRIAL ASSOCIATION
NET3 CONFERENCE
REMARKS BY MG (RET) WILLIE B. NANCE, JR.
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Thank you for the introduction. It is a pleasure to be here. I want to thank the National Defense Industrial Association for sponsoring this conference. I also want to thank Mr. Samuel Campagna, Mr. James O'Bryon, and Mr. David Grow for their hard work to pull the conference together and to host this very informative and timely discussion of topics that apply to every system under development today.

It is an honor to have the opportunity to visit with you and speak. I have had the opportunity to work with many of you over the last 23 years of my Army career in planning and executing testing and training of tactical and strategic missile systems. I have benefited from your support and council and I would like to thank you for that. So I recognize the great expertise that resides in this room and the great contribution that you have made to our Nation, and to our Soldiers, Sailors, Airmen, Marines and Coast Guardsmen. Without any doubt, you have helped provided these men and women the world's best systems and equipment.

Before I begin, I want to share a story. (Joke about the consultant)

Now I tell this story because I realize that you are the experts in Testing, Training and Experimentation and as I share my thoughts with you, I hope I'm not as off base as the consultant was with the shepherd. So for my comments today I will try to rely on my experiences over the last 15 years as a Product Manager, a Project Manager, a Program Director and a Program Executive Officer in the Army and the Missile Defense Agency for a good number of systems, most tactical, one strategic. Over the course of those years I've had many interesting experiences as we worked to develop, test and field missile systems.

In 1992, about three weeks after I became the Project Manager of the Brilliant Anti-tank Submunition, I was in Los Angeles for a review with the prime contractor, when one morning about 2:00 o'clock I got a phone call. It was my test director. At the time we were conducting test of a special access piece of the system at Eglin Air Force Base. The test involved suspending the special access payload from an aerostat at an elevation above 10,000 feet. The test director told me that while the test was in progress, strong winds had caused the tethers holding the aerostat in place to break. He was careful to tell me that all safety precautions had been taken. There had been a primary tether line and a backup safety tether line and a safety valve to release the gas in case it broke

free. After a pause, he went on to say the aerostat was in free flight headed toward Atlanta. Now after three weeks on the job I was faced with the possibility that the first public acknowledgement of that special assess program would be a major news story on the early morning national talk shows announcing. "Army blimp crashes into down town Atlanta".

In the mid 80's, while I was working as a Product manager in the TOW project office, the TOW missile was experiencing some flight test failures. The project office was working hard to solve the problem and was involved in an extensive failure analysis that was being made difficult by the fact that the failed missiles were destroyed on ground impact. The Project Office put out a world wide safety message stopping live firing of tactical rounds but allowing units to fire the training round. The training round had all the components and performance of the tactical round but it had a dummy warhead. One day we got a message from USAEUR about a training incident in which a crew had experienced a failure similar to the ones under investigation. It turned out that when the gunner launched the missile about 500 meters down range the flight motor shut off and the TOW plowed into the dirt. While continuing to observe the missile through his sight, the gunner noticed that the round seemed to come back to life. It began to bounce around on the ground and suddenly took flight but this time headed back

in their direction. In fact, it headed directly at them and hit the front of their vehicle. Now can you imagine the gunner trying to explain this to the crew as it was happening? These are just two experiences I encountered with testing and training. The blimp did not land in Atlanta and the TOW problem was solved.

At this conference you can see and hear about the great progress that is being made to improve the equipment, methods and technologies for testing, training, exercising, diagnosing and evaluating our weapon systems under development and in operations. This progress has been made possible by the hard work from this community to find best technologies, define best practices, and to find better and more effective ways to test, characterize and validate performance and to integrate better training and diagnosing equipment and procedures. So I applaud and thank you for that work.

Today, I want to offer a few thoughts and observations about the current acquisition environment; about developers, testers and users working together to achieve evolutionary, incremental capabilities; and about the importance of mission assurance.

First: I believe the new 5000 series is a major step in the right direction for improving our material acquisition system and processes. I believe

that it effectively characterizes today's acquisition environment and the need for an evolutionary requirements and acquisition process to deliver capability in increments. I agree with the revised policy objectives that:

- Encourage evolutionary acquisition strategies as the preferred approach to satisfying operational needs through the spiral development process.

- Encourage evolutionary acquisition as the preferred DoD strategy for rapid acquisition of mature technology for the user in capability increments.

- Encourage innovation to reduce cycle time and cost.

- Encourage collaboration and teaming between the warfighter, user, developer, tester, technologists, budgeters, and sustainers.

As the DoD and Services develop many of their new systems, the capability based, evolutionary spiral development approach will improve the acquisition and execution of these programs. And, greater teaming and collaboration among the user, developer and tester will be especially important.

Many of the new programs involve complex development efforts to integrate Battle Management Systems, Command and Control Systems, Communications Systems, Sensor Systems, Weapons Systems, Embedded Training, Testing and Diagnostic Systems, and other critical components that must all work together as prescribed to achieve the system's capability objectives. In these cases, the systems engineering, integration, design and development will involve some degree of discover to determine real capability versus expected and specified capability. Some components will work better than expected and some may not work as well as expected thus requiring trades and reallocation of performance across system and component specifications. In these developments the teaming and collaboration between the user, developer and tester will be vitally important.

- For the assessment of actual performance and capability,

- To provide information for performance trades and specification reallocations,

- To determine the suitability and effectiveness of incremental capabilities,

- To allow the decisions on a increment's military utility, and

- To identify changes that must be made to the next spiral to achieve objective capability.

Testing, in these cases, should be to measure and validate performance, to assess suitability and effectiveness of incremental capabilities and to determine adjustments required for subsequent spirals of capability.

Second: I believe test, training and mission failures must be minimized by placing greater emphasis on mission assurance in the design, development, test, production and fielding processes of weapon systems. To me, Mission Assurance means knowing that systems will work exactly as predicted and required every time they are tested or used. I believe some of the key ingredients to making mission assurance successful include:

- Starting the mission assurance focus in the system's design to reduce risk and to eliminate defects and faults,

- Ensuring that ground testing is conducted to cover the full range of system's required operating environments (nominal and

extreme),

- Conducting stress tests of the system, subsystems and components to greater margins than the specification requirements.

- Conducting integrated ground testing and integrated system simulations to assure we know and can predict with certainty exactly how the system will perform.

- Not being hardware poor; buying enough hardware to assure rigorous and early component and system tests.

- Demanding quality, validating processes and procedures, and paying attention to detail in each workmanship function,

- Not accepting unverified failures, the one in a million probability of failure. These are real failures waiting to happen in a critical test or when the system is need in combat operations.

Third: I do not believe that operational tests should be the first time a system is tested to its boundary operational conditions. The extreme and off nominal performance conditions must be tested during the developmental testing.

- Initial tests should be in defined conditions that offer high confidence for success and to allow maximum learning.

- Subsequent tests should increasingly stress the system to grow confidence and understanding of performance capabilities and determine boundaries of operational capability.

- With this approach, development testing can truly explore a system's performance limits and improve its probability for successful operational tests.

Fourth: Today's systems must have embedded test, training, exercise, diagnostic assessment, and mission assessment instrumentation capabilities. The technology is available and the benefits to the development, test, training and deployment of systems demand this capability. I applaud this community for the great work you have done to progress the technologies and the methods of embedding and using this capability. While I was the National Missile Defense Program Director, the user and operator commands demanded that we develop and embed test, training and exercise capability (TTEC). The initial

reactions were that doing so would be too hard and too expensive and embedding these functions into the operational system could create risks to the systems fail safe requirement. The initial cost estimates were three quarters of a billion dollars making TTEC's implementation a major system cost driver. To address the issue, we established a team comprised of the Program Office, the User, the Operator, the Tester, the Prime Contractor and STRICOM. The result was a better requirement and an approach for reusing the operational software and embedding the functions within the operational system. The benefits of embedded capabilities are significant.

- Costs are reduced. The amount of software and external equipment needed to perform these functions are reduced along with their associated development.

- Embedded capabilities allow operators to train, exercise, diagnose and maintain using their operational equipment. This will increase confidence in and proficiency of the system.

Last, I recommend that every chance possible, the developer, tester, and contractor test organizations should be collocated and integrated into a collaborative and combined test team. I believe this type of test

approach offers powerful benefits. I have come to believe that the tester should be involved in nearly every activity in the development process from concept through fielding. With such an approach:

- The tester is actively involved with the formulation of system concepts, the development of program strategies and acquisition plans, participates in system design, performance trade and specification allocations, and helps get test requirements properly identified in program budgets

- Participates in the defining and designing performance verification plans, models and simulations, hardware in the loops, ground tests, acceptance test equipment and other critical activities.

I believe, the collocation and collaboration of the developer, tester and contractor test organizations can help the acquisition process reduce acquisition cycle time and deliver a more suitable and effective capability.

Again, I want to thank you for allowing me to participate and speak today and for your great contributions to the Soldiers, Sailors, Airmen, Marines and Coast Guardsmen serving our Nation. You can be justifiably proud of the great job you are doing. Continue your

insistence on excellence and demand that only the best will be placed in the hands of the men and women who depend on you to give them the best. Thank you and God bless you.