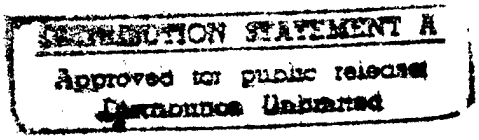
DATE: 3/20/97

CONTROLLING OFFICE FOR THIS DOCUMENT IS:
SIMULATION AND TECHNOLOGY DIVISION
DIRECTORATE FOR TECHNICAL MISSION
US ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005-5055

POC: DR. C. DAVID BROWN (DIRECTOR)

DISTRIBUTION STATEMENT A: Public release



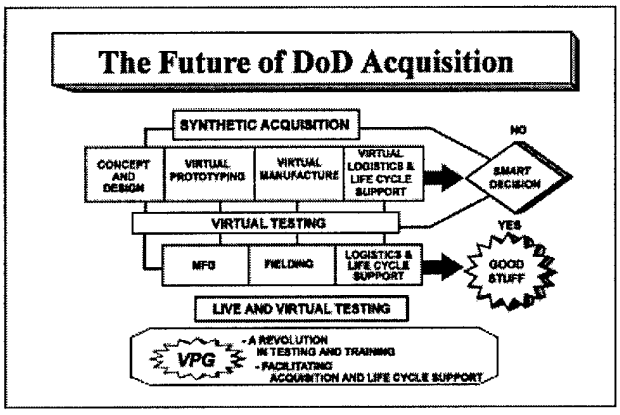
Synthetic Acquisition Cycle on the Way

by C. David Brown

Budget restrictions are leading the Army toward a synthetic acquisition cycle that will introduce and update equipment faster, allowing potential enemies no time to deny our forces current technological edge. Conducting the acquisition cycle in a synthetic environment will accelerate the introduction of new capabilities into the Army, and will help design systems for change, so subsystems and components can be upgraded during an extended lifetime.

Test and evaluations role must be rethought in subjecting systems to field conditions, learning from both successes and failures during testing, and applying test results that capture design flaws in need of redesign. The paradigm shift among the testers, users, and contractors cannot be directed from the top. Open access to the models of the system under test and the virtual test ranges during all phases is the key. To meet this need, TECOM is developing a Virtual Proving Ground which will replicate all of TECOM capabilities in a synthetic environment.

We must explore feasible alternatives before a requirement is specified. As technology reduces the time between fielding of model changes, we can explore by experimental prototype demonstrations the real operational advantages of capabilities, previously only imputed by simulation or computation. This requires an interactive, open architecture, formatted in a familiar configuration that can import, interface, and integrate a broad range of external software packages. Users must be able to transparently invoke the appropriate functions and features needed for their system applications.



New threat, fast response

The synthetic world will enable us to address new threats and determine if we should change tactics, develop new equipment, or make no response. We will be able to write the Mission Needs Statement based on wargaming different technologies. Contractors will participate and permit the exploitation of commercially developed technology; models of existing technology will determine if it can meet specific requirements.

Early in the process, we can decide to build a new system, exploit existing technology, or buy commercially available hardware. A new system concept or proposed system development must demonstrate that it will add value to our warfighting capability, ensuring that only those weapons systems that significantly influence the outcome of future battles will be produced. We will be able to run Early User Test and Experimentation and Force Development Test and Experimentation using virtual prototypes for systems that have already been modeled, and can determine required interfaces with existing and planned systems and exercises prior to construction.

We may not build new equipment, but we must continue to explore new technologies. The virtual world is the ideal place to explore, and will keep the Army modern by fielding quickly. The drive to stay modern could lead to fielding equipment for a specific use rather than for use anywhere, anytime. The synthetic environment will allow greater emphasis on cost/performance balance, at the beginning of a program and through its lifetime. A balance between capability and cost is crucial in an environment of limited funding. Even if inventories eventually can be filled, the buildout timeframe may be so extended that the service cannot wait for the capability.

Simultaneous testing, redesign

The ability to produce is intimately linked with product design "A" shape, features, and materials. Before we ever bend metal, "computer models can simulate manufacturing processes such as metal forming, machining, and casting to evaluate the ability to produce a design. CAD/CAM models allow the manufacturing and design communities to converge on a design that meets the requirement. Contractor, tester, developer, and user should be linked and should continually update information. Redesign and both operational and technical testing should occur simultaneously, a link that should be maintained throughout the development cycle.

Real hardware gradually can replace virtual and simulated modules, facilitating dynamic test and integration. Virtual instrumentation and realtime modeling capabilities can help assess and formulate potential system upgrades and enhancements. Virtual manufacturing will identify problems before prototypes are built, eliminating form, fit, and function problems. As the hardware comes on line, it can be interfaced with virtual prototypes and subsystems to design and test as the system

progresses. During previous phases, we will have determined what tests must be conducted and which can be scaled back or eliminated. Remember, many of these functions occur at the speed of computer calculations, not realtime. The result is a decision to field in a significantly reduced timeframe.

The ever-increasing speed of technological advances and decreasing funding profiles dictate a change in the way systems are developed and fielded. By integrating live and previous testing (ground truth), we can compress the acquisition cycle, avoid costly mistakes, and standardize modeling architecture and protocols of the future so they can be specified in contracts. We must ensure test and evaluation expertise is available to the program manager early, to prevent problems rather than report them. The synthetic environment presents a high-tech rapid response to the needs of the services and is the future of test and evaluation.