

Evolutionary Acquisition

Seven Ways to Know If You Are Placing Your Program at Unnecessary Risk

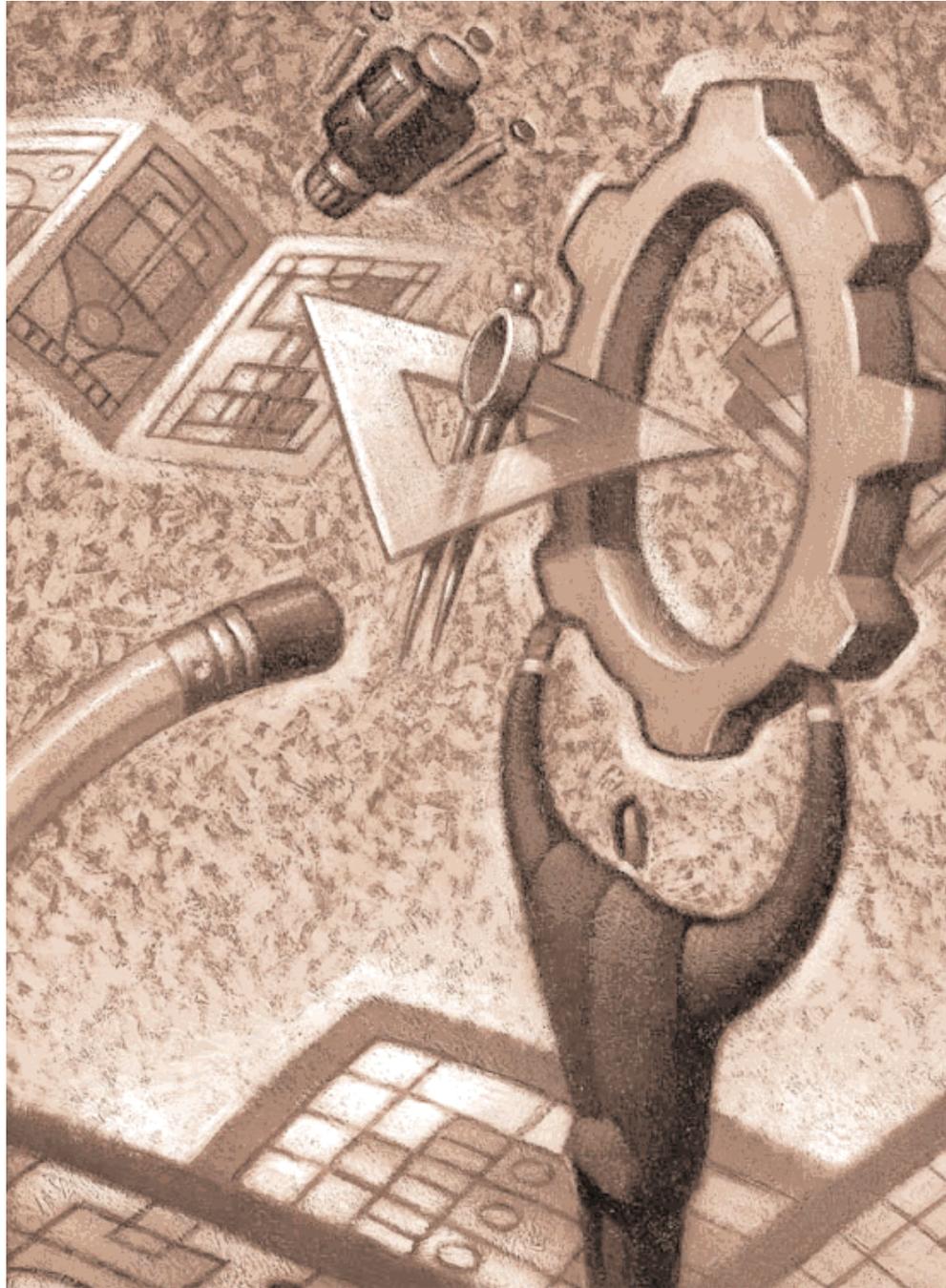
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Evolutionary acquisition is designed to get new military capability from the laboratory to the warfighter as quickly as possible. The new draft DoD 5000 series provides that new technology can enter the acquisition process at any one of several points, not just one, and it requires continuous integrated test and evaluation. These are good things. However, like any policies, how you deal with them is key.

Risktaking and Operational Testing

The terms "evolutionary acquisition" and "acquisition reform" have engendered occasional misunderstandings and actions on the part of Program Managers (PM) that are counterproductive to their own success. For example, PMs have correctly understood that acquisition reform gives them the flexibility to take greater risk. In the old days, we spoke of cost, performance, and schedule. Now you often hear programs spoken of in terms of cost, performance, schedule, **and risk**, with distinctions between high, low, and moderate risk. Of course, risk is much harder to measure than cost or schedule, and honest, well-meaning people can disagree about whether risk is "high" or "moderate."

Nevertheless, acquisition programs are taking more risk, and it is showing up in operational testing. Over the past three years or so, the Army has seen that 80 percent of their systems have not met 50 percent of their reliability requirements in operational tests. In the Air Force, AFOTEC [Air Force Operational Test and



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Evaluation Center] has had to stop two-thirds of their operational tests because the systems were not ready. The Army also has had to stop many operational tests, or not let systems enter operational testing, because they weren't ready.

The greatest current concern of the Service Operational Test Agencies is the so-called "rush to failure," a phrase that was used by retired Air Force Gen. Larry



Welch in his review of THAAD [Theater High Altitude Area Defense] and Theater Missile Defense. But all the Service Operational Test Agencies see a rush to failure too often now in many other programs – conventional programs – programs that have nothing to do with missile defense.



Are you taking too much schedule risk?

A truism in defense acquisition is: "Never place your program at unnecessary risk by betting it on a single test." This may seem to you to be pretty obvious advice, but programs do just that all the time. The NMD [National Missile Defense] program just did this when their latest flight intercept test failed. They didn't mean to do it. Originally, there were two or three more opportunities for success

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in the test schedule. But the schedule slipped and the milestone didn't; suddenly, the program was in the position of having only a single test remaining. So one of the ways you can get into this situation is simply through schedule slips.

My advice is that you always consider the impact of schedule slips in these terms. As Air Force Lt. Gen. Ronald Kadish, Director of the Ballistics Missile Defense Organization says so wisely, any time you get into a "binary" situation,

where the outcome is going to be all or nothing, black or white, you probably need to rethink your test program. Many acquisition programs don't do this.



Are you going into operational testing before you are ready?

Another way you can place your program at unnecessary risk is to go into operational testing before you are ready. The F-22 program is balancing this issue, which is why I have urged them to be careful and take the time they need in developmental testing first.

When programs do poorly in operational tests, frequently it is because they permit themselves to encounter for the first time some operational environment or requirement that they have never tried before, or **have** tried before in developmental testing, but only **unsuccessfully**. This can include environments like rain, dirt, dust, or wind; or it can be countermeasures, realistic threats, or realistic operational environments.

For example the Army's SADARM [Sense and Destroy Armament/Armor] program was doing fine in developmental tests in the clean desert at Yuma Proving Ground. But when they got into the operational test with interesting terrain, trees, and realistic countermeasures, they didn't do so well.

A model for how to do testing correctly is the Navy's F/A-18 E/F program. They were careful to selectively try each and every new environment and requirement **before** they got to OPEVAL [operational evaluation]. Long before OPEVAL, they did a series of small operational tests, what some would call DT/OT [Developmental Test/Operational Test], that helped them avoid any surprises in OPEVAL. Too often programs leave these steps out. The F/A-18 E/F OPEVAL was still very stressing, but did not expose the program to new environments or requirements.



Are you loading your system realistically in developmental testing?

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The Director, Operational Test and Evaluation (DOT&E) is the principal staff assistant and senior advisor to the Secretary of Defense (SecDef) on operational test and evaluation (OT&E) in the Department of Defense. DOT&E is responsible for issuing DoD OT&E policy and procedures; reviewing and analyzing the results of OT&E conducted for each major DoD acquisition program; providing independent assessments to SecDef, the Under Secretary of Defense for Acquisition, Technology and Logistics, and Congress; making budgetary and financial recommendations to the SecDef regarding OT&E; and oversight to ensure OT&E for major DoD acquisition programs is adequate to confirm operational effectiveness and suitability of the defense system in combat use.

Another way to place your program at unnecessary risk is to wait until operational testing before you load the system fully. For example, computer systems are often load tested with simulations, and usually are not loaded realistically until operational testing. These days, practically everything has a computer in it, and often it is a challenge to handle realistic data loadings, message formats, and nominal human errors. All of the Military Departments are experiencing this with battlefield digitization, the global information grid, interoperability, and information assurance.

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Are the requirements for each block set properly?

Evolutionary acquisition means using time-phased requirements where increasing military capability comes in successive blocks or phases. If those blocks extend over many, many years — perhaps even decades — the requirements, including the expected threats, may change substantially over time. As testers, it is not our job to set requirements. But how evolutionary acquisition requirements **are** set is very important.

Naturally, we should not expect systems to meet the final objective requirements nor demonstrate final objective capability in the early blocks. But we will test

to the requirements that are set for the early blocks as those early blocks reach test and evaluation. This includes the ability to meet expected threats as well as other operational requirements. If those requirements have not been set thoughtfully, you can have a situation where the bar has been set too high, too early, or conversely, where the bar has been set so low that the user has little interest in fielding the early blocks. Either extreme can place your program at unnecessary risk.

My advice is that you get with the testers and users early — very early — before the sequence of requirements for each block has been locked in. Yes, even before the RFP [Request for Proposal]. Those early conversations will pay great dividends as your program evolves toward better and better capability.

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Are you skimping on developmental testing?

Under acquisition reform and evolutionary acquisition, you have the freedom to decide how much developmental testing to do and who will do it. Your contractors may assert that they can do your developmental testing faster and cheaper than, say, Aberdeen Proving Ground, or Edwards Air Force Base, or Paxtuxent River. However, contractor testing is sometimes conducted with greater

limitations and less realism than government developmental testing, and this can cause your programs to be even less prepared for **operational** testing when the time comes. Also, some program managers think that acquisition reform makes developmental testing **discretionary**, which some interpret as **optional**. Regarding developmental testing as optional is a recipe for failure when you get to operational testing.

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Are you using Modeling and Simulation effectively?

Finally, how you use Modeling and Simulation (M&S) is important. If you use it to **interpolate** between demonstrated test results, it can be quite effective. If you use it to **extrapolate**, beyond the bounds of known results, it practically never works. Another factor often overlooked by acquisition programs is the need to reconcile M&S with both real hardware and real software. First, there is how the system really works. Second, there is how the model predicts it will work. And third, there is how the software designer contemplated it would work. These are often quite different and require substantial early investment to ensure the models reflect reality.

For example, in the Crusader howitzer, there are many variables: how all those gears and conveyer belts actually move, the manufacturing tolerances in them, and how they change with wear. Then, there is the model of all that activity, which may not include all the variables. Added to that is how the software designer planned for it to work. Also, totally different contractors may have developed the software and the hardware, so the software designer may assume that the hardware will work differently than it was actually built to work.

Whether you are talking about howitzers, or aircraft, or ships, these interactions are central to effective use of M&S. Failing to understand them is another way in which you can be misled into placing your program at unnecessary risk by misunderstanding what models and simulations really predict.



Are you including the operational testers up front?

Under evolutionary acquisition and the new DoD 5000 series, test and evaluation is to be integrated throughout the acquisition process, with up-front involvement of the T&E [test and evaluation] community in the requirements process and in the design of an integrated test and evaluation strategy.

The new DoD 5000 series creates integrated Service/OSD [Office of the Secretary of Defense] test teams and emphasizes early T&E involvement. Particularly important is that you include

the Service Operational Test Agencies. They can help you early with requirements issues, with operational emphasis in the RFP, and with test and evaluation planning. Confronting such matters later will only increase costs and delay schedules, placing your program at unnecessary risk. If you follow the new DoD 5000 series, and involve the operational testers very early, it will help you avoid putting your program at unnecessary risk.

In Conclusion, "Don't Skimp"

So my advice for you is pretty simple. Don't skimp on DT, because if you do it will kill you when you get to OT. Don't assume that contractor DT is as good as

government DT. Worry about realistic operational loadings and realistic operational environments. Don't believe that models and simulations tell you things they were never programmed to do. And don't wait until OT to try things for the first time. And ask yourselves again and again, "Am I betting my entire program on this one test?" "Am I placing my program at unnecessary risk?" If you are, you need more, and earlier testing — which is exactly what the new DoD 5000 series calls for.

Editor's Note: The author welcomes questions or comments on this article. Contact him at director@dote.osd.mil.

ATTENTION DAU STUDENTS

Important Information on Accreditation

Since its inception, the Defense Acquisition University (DAU) has been committed to maintaining the highest possible educational standards and providing the acquisition community with the right learning products and services to make smart business decisions. This commitment requires high standards for excellence and continual drive to improve everything we do.

With this in mind, DAU is now working in partnership with the DoD Chancellor for Education and Professional Development to comply with a recent directive from the Deputy Secretary of Defense stating: "DoD civilian education and professional development activities shall meet the standards established by external accreditation entities recognized by the Department of Education."

After researching several national institutional accreditation agencies recognized by the Department of Education, DAU chose the Council on Occupational Education (COE). COE's fundamental goals match DAU's in the areas of quality assurance, continuous improvement, and involving top leadership, staff, and faculty in supporting the DAU mission.

Accreditation requires DAU to evaluate itself against a set of 10 standards, referred to by COE as a *Self-Study*. This evaluation offers the opportunity to identify areas for improvement or assess and validate DAU's approach to education and training.

On Sept. 19, 2000, DAU sent a *Letter of Intent* seeking candidacy with COE to begin the process that will continue until February 2002 when the COE Commission will convene to review and grant accreditation based on the *Self-Study*. The Commission also sends visiting teams to each campus to determine if DAU is in compliance with its own policies and criteria as well as those of the Commission.

A Steering Committee led by the DAU Provost, Rich Reed, will be comprised of the four campus Deans. The Committee is empowered to develop strategies, goals, and milestones and establish working groups to assess DAU's strengths and areas for improvement in relationship to each of the 10 standards of the *Self-Study*. These working groups will consist of a cross-section of DAU's faculty and staff.

Through this rigorous criteria-based self-evaluation, DAU will have an opportunity to reinforce its training mission, strategic vision, and institutional value of academic excellence.

Dr. Lenore Sack (sack_lenore@dau.mil) and Evelyn Layton (layton_evelyn@dau.mil) will lead this initiative. Sack is Chief Administrative Officer and Layton is the Accreditation Liaison Officer. They have full responsibility to ensure an effective evaluation is conducted to meet DAU's accreditation goal.