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ings in terms of potential operational consequences. Test and evaluation organizations, while not having direct control of systems under development, are nevertheless in a position to influence their fate. There often appears to be little communication or coordination among test and evaluation agencies. Consequently, their evaluations often lack the impact that a coherent, comprehensive evaluation might have on the decision process. Currently, there is no single agency/command with the responsibility to coordinate the evaluations of the different organizations.<sup>1</sup> This paper suggests that the Army create a Test and Evaluation Command and assign it overall responsibility for all Army operational test and evaluation matters, less those independent evaluator functions assigned to the Operational Test and Evaluation Agency (OTEA).

USAWC MILITARY STUDIES PROGRAM PAPER



AN ARGUMENT FOR A SINGLE TEST AND  
EVALUATION COMMAND

An Individual Essay

by

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## ABSTRACT

**AUTHOR:** Taylor L. Conley, Mr. DAC

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Evaluations of development and operational tests are used to assess the progress of new systems as they proceed through development. Because many Army organizations contribute to the preparation of these evaluations, the results reaching acquisition officials at critical decision points are often fragmented. Seldom do these evaluations adequately interpret the test findings in terms of potential operational consequences. Test and evaluation organizations, while not having direct control of systems under development, are nevertheless in a position to influence their fate. There often appears to be little communication or coordination among test and evaluation agencies. Consequently, their evaluations often lack the impact that a coherent, comprehensive evaluation might have on the decision process. Currently, there is no single agency/command with the responsibility to coordinate the evaluations of the different organizations.<sup>1</sup> This paper suggests that the Army create a Test and Evaluation Command and assign it overall responsibility for all Army operational test and evaluation matters, less those independent evaluator functions assigned to the Operational Test and Evaluation Agency (OTEA).

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## An Argument for a Single Test and Evaluation Command

Evaluations of development and operational tests are used to assess the progress of new weapon systems as they proceed through development. Because many Army organizations contribute to the preparation of these evaluations, the results reaching acquisition officials at critical decision points are often fragmented. Seldom do these evaluations adequately interpret the test findings in terms of potential operational consequences. Evaluations are often neither broad nor integrated enough to provide a meaningful and coherent picture of system development progress and potential operational effectiveness. Today, complex acquisition decisions require greater participation by Army analysts in planning evaluations and in determining the technical and operational implications of test findings.<sup>2</sup>

For some time now, I have watched a process in which the developing agencies of the Army have provided input to the "user" about the reasonable design objectives for materiel systems. These same agencies are often the source of cost and schedule information. It is my personal opinion that in most cases these inputs to the decision process were generated after the agencies making them had already decided what course of action was best for the Army and in full knowledge of what alternatives would be compared to their own preferred course of action.<sup>3</sup>

The "user" then proceeds, using a general "cost effectiveness" approach, to select the best of several alternatives. This is a logical process that biases the selection toward systems whose design objectives have been unrealistically stated and/or whose schedule and costs were understated. It therefore makes it most likely we will have selected the course of action with the maximum future difficulties.<sup>4</sup> (This presupposes, of course, that the deficiency we are correcting requires a materiel solution.)

After the "user" has chosen, we then make a very large institutional commitment to the validity of the original estimates. Alternatives disappear. Top managers in the acquisition cycle testify repeatedly that our homework was well done. Time passes. A prototype system appears for operational test.

During the passage of time "phase," two things normally happen. The "user" takes the estimates of system performance, converts these into estimates of quantitative requirements and works as best he can on the development of tactics to best exploit the technical potential. During the same time we usually get piecemeal announcements that we aren't quite meeting the design objectives and we aren't quite on the schedule or cost curves that were forecast. In nearly every case of failure to meet design objectives, we are told, or tell ourselves, that these are "normal technical problems" that we will solve in due course.<sup>5</sup>

By the time the system reaches operational test, nearly all alternatives have evaporated. Based on erroneous schedule information, we have programmed a shutdown of production and/or

product improvement of the system being replaced (e.g., similar to situation resulting from decision to field AHIP only in field artillery battalions. The alternative aircraft for the AH-64 is the OH-58C but the line that converts the "A" model to the "C" model was terminated.). More often than not we find that we have violated the very sensible process of ensuring that developmental testing is sufficient to provide a mature system for operational test.

The intent of our Army acquisition process is to allow production decisions to be made on the basis of operational test results of mature systems. To ensure that sufficient product maturity exists to warrant operational test, developmental tests are intended to be programmed far enough ahead to allow correction of obvious engineering deficiencies before beginning operational test.

More often than not, we find that we somehow managed to compress the two test phases to the point where deficiencies uncovered in developmental testing were not corrected before the start of operational testing. Worse yet, we routinely begin development testing before we have properly engineered the bugs out of the individual components and thus practically guarantee that we cannot separate the easily correctable deficiencies which show up in systems' tests from those which may be much harder to fix.<sup>6</sup>

The result is that we sometimes find ourselves at the production milestone decision point without the definitive data needed to make an informed decision. We frequently have little

basis in test data to decide whether the problems discovered in tests are fixable, have already been fixed, or are fundamental and unfixable. We also have difficulty determining from test data the performance to be expected in the field, the maintenance problems to be encountered with them, or for that matter, the viability of the support concept itself. Nor can we validate the Cost and Operational Effectiveness Analyses (COEA) which were the basis for the original support for the program.<sup>7</sup>

This lack of data can be attributed to two primary general areas - adequacy of the testing itself and adequacy of the evaluation of the results. In truth, our ability to conduct adequate testing on sophisticated electronic systems is in the stone age. This is not meant to cast dispersions on the dedicated, hard-working and talented people in our testing community. Rather, it is simply that we have neither the time nor the money, not to mention a truly representative "battlefield," with which to subject candidate systems to a "complete" test scenario. While it may be necessary to accept our testing shortcomings for the time being, we can nevertheless make great strides in our ability to accurately evaluate what it is we have tried to test.

The two principal evaluation organizations for major system acquisitions are the Army Materiel Systems Analysis Activity (AMSAA), which evaluates developmental test results, and the Operational Test and Evaluation Agency (OTEA), which evaluates operational test results. Development testing verifies how well a weapon system has met performance specifications. Operational testing estimates the system's potential operational

effectiveness and supportability in a combat environment. However, other organizations, due to the the inherent expertise owned by each, have the responsibility, individually, to assess such things as demonstrated logistics supportability, cost-effectiveness, performance in a countermeasures environment, ease of operation and maintenance (MANPRINT) by troops, etc. It should be apparent that these "peripheral" evaluations must somehow be part of OTEA's focus in assessing the system's total operational effectiveness and supportability. And it is here, it seems, that the process breaks down. There does not appear to be a workable process for fostering communication and cooperation among the evaluators. As a result, their individual evaluations lack the impact that a coherent, collective, comprehensive evaluation might have on the decision process. Presently, no single agency coordinates the evaluations of the different organizations. Additionally, no single agency appears to have the requisite authority to ensure that each responsible organization satisfies its piece of the evaluation "puzzle" in accordance with the agreed-upon acquisition schedule. Worse yet, there appears to be no organization or agency that accepts responsibility for pulling it all together.<sup>8</sup> (The DOD Reorganization Act, and its subsequent impact, notwithstanding.)

I believe it's time to seek a different command structure for our testing community if we are to succeed in the future. But first, how did we get where we are now? Basically, before 1962, testing was decentralized with the Proving Grounds belonging to the materiel developer, i.e., the technical

services; and the Test Boards and combat developments belonging to the user, CONARC. Testing was then almost completely centralized under TECOM in 1962 (see figure 1). At that time, testing was considered an integral part of the development process and as such should not be divorced from the developing agencies. But still, no one wanted it isolated from the user. The biggest debate centered around the interface of the user and that equated to where to place the Test Boards. There were essentially three alternatives - leave them with the user, then CONARC; give them to the combat developer, then Combat Developments Command (CDC); or give them to the materiel tester, TECOM. The decision to give the Test Boards to TECOM rather than to CONARC or CDC was to avoid duplicating the problems encountered when they were with CONARC, i.e., the user would often propose new development items having only marginal performance increases and without considering investment costs. Following the Blue Ribbon Defense Panel (BRDP) report of 1970, the Army returned to decentralized testing (see figure 2). The concern was that we now had insufficient user and combat developer involvement in the development process. In 1971, CDC was designated as the Command responsible for planning, programming, budgeting and analysis of operational testing and evaluation. This decision turned out to be disastrous. Not only was CDC unable to effectively carry out its test and evaluation functions, but it couldn't adequately perform its combat developer functions as well. As a result of the opportunities offered by the establishment of the Office of the Project Manager for

Reorganization, in the spring of 1972, OTEA was created. CDC was ruled a failure and its functions went back to Ft. Monroe. The reorganization in 1972 offered the opportunity to design a testing organization that could be fully responsive to the desires of OSD and Congress. There was even then concern over allowing the calendar driven budget cycle to in turn drive the acquisition process; the undesirable redundancy of test activities which by then included MASSTER (now TCATA), CDEC, proving grounds, boards, etc.; shortening the acquisition cycle; and the adequacy of testing and evaluation in general. All developments and studies from 1962 to 1972 pointed toward the establishment of a single agency devoted to central planning, control, and operation of the entire materiel testing process. But for one bureaucratic reason or another, primarily AMC's concern over the possible loss of TECOM, the resulting compromise saw the creation of OTEA.

In view of the fact that OTEA was organized without any resources to conduct testing, these early accomplishments were commendable. The first obstacle was that of resistance to change. While OTEA was to complement TECOM, there was no doubt that OTEA's mission and role in assessing operational suitability encroached into an area which TECOM had held since its formation in 1962.

The organizational location of the boards had perhaps been the most controversial aspect of the materiel acquisition process since before the 1962 reorganization. An IG inspection of AMC in 1973 stated that the boards under TECOM were underutilized and



recommended a study be made of the relationship between the boards and OTEA for the purpose of considering reassignment of the boards to TRADOC for OTEA use. The resultant study sent the boards back to the TRADOC centers in 1974.

We marched along under this organizational concept until early 1979 when several issues surfaced to once again question whether we were adequately organized and managed to fulfill our test and evaluation and acquisition responsibilities. OTEA had been created to comply with the OSD guidance to create and maintain an "independent evaluation capability...one that is separate and distinct from the using commands."<sup>9</sup> OTEA had evolved into more than that, however, as they found themselves caught up in the specifics of test design, test planning and test execution. In fact, they were assigned responsibility for the conduct of major systems OT as well as responsibility for independent evaluation.

Meanwhile, TECOM was experiencing a testing backlog growing worse annually. The pressures of the calendar driven budget process were creating havoc with materiel acquisition and testing and evaluation planning. Concerns over lengthening acquisition times increased. So we did more studies, some were in-house and some were external. The consensus in AMC was that additional personnel were needed to offset the difficulties that were created when TECOM lost the test boards. They concluded that testing assets were too fragmented to maximize efficiency. TRADOC's response was to suggest a combining of the DT/OT test load but in no case was return of the test boards to TECOM

considered a viable option. Various GAO reports simply concluded that the Army's operational and developmental testing needed improvement, and the Army's evaluations were seriously lacking. In response to this criticism, the Army examined a variety of possible fixes, being careful to suggest nothing too controversial or anything that would impinge on well-established "rice bowls." The predominant criteria upon which to base proposed structural changes appeared to center around those things that could be accomplished only within the separate commands currently responsible for a piece of the test and evaluation function. A consolidated Test and Evaluation Command option appeared to be dismissed outright.

The proposed solution for the development tester, TECOM, was to provide additional funding to implement a Contract Augmentation Plan designed to alleviate the backlog.

The proposed solution for the operational testers, OTEA and TRADOC, was to establish a TRADOC operational Test and Experimentation Command (TOTEK), with no other agency mission changes. TOTEK would centralize all TRADOC testing organizations under a single TRADOC command. This turned out to be no solution at all as TOTEK died before it was born.

Neither of these proposals, even had they been successful, addressed the central problems. Testing would have remained fragmented with AMC responsible only for development testing; OTEA responsible for independent evaluation and conduct of major operational testing; and TRADOC responsible for non-major operational testing, FDTE, and the TRADOC Concept Evaluation Program (CEP).

A few years ago we found ourselves struggling to come to grips with these same problems - only now they are even more complex. As if adequate testing and comprehensive evaluations were not enough to worry about, we found ourselves unable to cope with growing interoperability difficulties. In an attempt to solve this dilemma we established the Automated Tactical Systems Test Bed (ATSTB) at Ft. Hood, Texas. The intent was to place operational systems into the hands of typical user soldiers and have the Tactical Interoperability Support Element (TISE), a TRADOC cell, work out interoperability problems between systems. The program was terminated in 1982 because the Army was unable to fund the effort in terms of providing dedicated systems, funding and spaces. We did, however, discover a serious flaw in the manner in which we field systems. It serves no useful purpose to allow program/project managers to bring systems having a requirement to interface with other systems up to production decision review in isolation from the status of these other systems. The same problem exists today. There is little substantive data available to suggest that we are putting any kind of premium on interoperability in our services' procurement programs.

More recently, the Army created a concept called Total Systems Tactical Validation (TSTV). This concept attempts to tie in all new systems related to nodes on the SIGMA Star, i.e., Maneuver Control, Air Defense Control, CSS Control, Intelligence/EW Control, Fire Support Control. The effort is in its initial stages under the auspices of the Combined Arms Center and the Army Development and Employment Agency (ADEA) at Ft.

Lewis, WA. Software development and interface issues are being worked for those few systems that are now available, e.g., Maneuver Control System (MCS)/Distributive Command and Control System (DCCS) II. What's missing is the grand strategy for insuring that new systems, being nurtured along independently, and in some cases in isolation from other key systems, do in fact meet interoperability requirements when the decision is made to buy them. There is little to be gained in terms of accelerated operational capability, when we buy systems designed to work specifically with other systems only to find that key hardware and/or software interfaces are absent.

Another recent Army initiative stemmed from the 1981 Army Science Board Summer Study, entitled "Equipping the Army, 1990-2000." The Board concluded that the Army must take advantage of those technologies for which the U.S. has a distinct edge and that it must use those technologies to produce "force multipliers" to offset the quantity and increasing sophistication of Soviet weapons. It added that TRADOC and AMC must jointly examine the multifunctional use of systems, equipment and personnel to insure that all parts work together, are combined in an optimum fashion, and accomplish the desired objectives. More recently, this effort has been called the Army's focus on the big five Key Operational Capabilities (KOC). These are: Very Intelligent Surveillance and Target Acquisition (VISTA); Distributed Command, Control, Communications and Intelligence (DC<sup>3</sup>I); Self-Contained Munitions (SCM); Soldier-Machine Interface (SMI); and Biotechnology (BIOTECH). The Army Technology

Integration Plan was published in 1985 and describes how the Army will identify new technology, demonstrate its applicability to battlefield situations, and transition selected technologies into accelerated development and acquisition programs. The plan also supports the DOD acquisition streamlining approach outlined by a DEPSECDEF Jan 1984 memorandum.

Another good idea that was implemented was the creation of an agency called the Army Development and Employment Agency (ADEA), once called the High Technology Test Bed, at Ft. Lewis, WA. This organization was designed to examine the potential to capitalize on innovative ideas generated from the "bottom-up," unfettered by the bureaucratic red tape associated with formal types of evaluation. Ideas could be solicited from industry, soldiers, commanders - anyone having an idea about how to do something better - and new unproven equipment could be obtained off the shelf and evaluated for operational suitability. ADEA is an excellent "laboratory" for doing exactly what it was designed to do - explore innovative ideas and technology. But throughout its entire existence it has struggled to push even one single piece of equipment or idea through to Army-wide application. Despite the high-level funding and support this agency enjoyed, it simply could not overcome the "it wasn't invented here" syndrome, encountered from the remainder of the test and evaluation and combat developer community.

The only purpose in outlining some of the more recent initiatives in the materiel acquisition process is to try to convey an appreciation for the degree of complexity associated with the

development of new systems. Granted we may well be able to continue as we are currently organized and we will undoubtedly have some successes and some failures. It seems, though that we would be better served to place some organization in charge of the entire materiel testing process. Whether it is OTEA, AMC, or TRADOC is immaterial. Properly organized and resourced, all could probably do the task. The key is to give control of the resources to the organization that is fixed with the responsibility for conducting the evaluations. The key to successful systems acquisition rests with being able to pull together the efforts of the different organizations.

For example, OTEA listed many deficiencies it found while testing the Sergeant York air defense gun, but did not analyze the effect of producing and fielding it with the deficiencies not corrected or how much better it would be than the current air defense gun system. Nor were they able to accurately estimate the retrofit costs, the loss in capability to engage and kill enemy aircraft, or the increase in personnel or in logistical support costs that fielding the system would require.<sup>10</sup> There are organizations responsible for evaluating each of these issues but at no point are their efforts brought together into a single overall evaluation of the weapon system. An effort is made to do so at Army System Acquisition Review Council (ASARC) meetings and presumably at Joint Resource Management Board (JRMB) meetings. However, the agency responsible for presenting the consolidated, comprehensive evaluation review does not also have control of the resources required.

Today there are more organizations trying to capitalize on exploding technology than anyone could possibly imagine. We never seem to do away with organizations, only create more. This seems to result in a proliferation of related programs developed almost in complete isolation from one another. We see this same phenomena in the increasing number of black programs that involve developmental equipment related to, but completely isolated from, other programs.

A very important factor resulting from our extremely decentralized acquisition structure is too frequently overlooked. That factor is resources. Webster defines resources as - a source of supply or support. Decentralization in the materiel acquisition arena often causes a very few visible systems to be driven along in isolation from not only other systems but other nonacquisition activities as well. The result is that all these various organizations demand dollars, people, equipment, real estate, time and structure without regard to any priority. All activity in the Army must compete for resources. This is as true for acquisition as it is for force structure, training, etc. What we have today are several prioritized lists often developed in total isolation from each other. There is not an unlimited amount of money -- everyone understands that. But there is also not an unlimited amount of equipment, time, land, or numbers of soldiers to accommodate all the materiel acquisition activities planned by all the organizations in the acquisition community - not to mention those outside the acquisition community. The organization hardest hit by this lack of prioritization is US Army Forces Command (see figure 3).

Where are we today? Well, little has changed from our acquisition structure of the early 80's (see figure 4). As I stated earlier, we could continue as we are currently organized and we would undoubtedly enjoy some successes and some failures. But we have been presented with the opportunity to make a quantum leap forward as a result of the DOD Reorganization Act. Although the specific details of the relationship between Program Managers and the Office of the Under Secretary of Defense for Acquisition have yet to be worked out, it is my opinion that now is the time to form a single Test and Evaluation Command. Why? Because for the very first time we are about to have a single agency at the OSD level in charge of operational test and evaluation as well as developmental testing. Although the political pressure causing this change was simply intended to bring developmental testing under an organization independent of the acquisition bureaucracy, someone apparently had the foresight to place it under the Director of Operational Test and Evaluation.

The Army should take this opportunity to establish a single office within the ARSTAF to coordinate all test activities - this too would be a first; and establish a single Test and Evaluation Command with which to work.

We should be able to withstand any external criticism that may result from forming this command so long as we retain the vitality and credibility of OTEA as an independent evaluation agency. As for any internal criticism, we need only answer the following:<sup>11</sup>



- How can test and evaluation most efficiently and effectively support the calendar driven materiel acquisition process?
- Would the management of test and evaluation be improved if it were centralized under a single Test and Evaluation Command?
- Would ARSTAF management of Army test and evaluation be improved if it were centralized?
- How should the Army structure and resource itself to manage operational/developmental testing in view of the DOD Reorganization Act of 1986?

The answer to all of these questions lies in the creation of a single Test and Evaluation Command. Centralized management of test and evaluation assets should make it considerably easier to:

- match development test programs and schedules to operational test program requirements.
- support Army/DOD leadership selection of competitive acquisition strategies.
- provide acquisition decision makers a better analysis of system suitability, procurement options, and program risks.
- consolidate analytical and evaluation products to arrive at an overall consensus recommendation.
- capture and consolidate the ongoing initiatives of various independent organizations trying to exploit the "leading edges" of technology. (not stifle; consolidate the efforts)
- distribute scarce resources in accordance with established priorities.
- mass currently fragmented test instrumentation capabilities.

- formulate and obtain funding for a plan to develop and acquire sophisticated surrogate threat systems against which to better measure the operational capabilities of our own developing systems.

- insure that systems having interoperability requirements meet those requirements prior to or in concert with milestone II production decisions.

- manage isolated test/evaluation initiatives generated by individual ARSTAF agencies to insure that all efforts compete for the limited available resources.

- manage, collate, and filter all test, evaluation, and technology demonstration initiatives to eliminate our appetite for creating newer, more wonderful organizations designed to be responsible for the same functions that older, less wonderful organizations are already required to perform.

- cope with the pressures of the calendar driven acquisition process.

- improve the ultimate success of new programs by providing decision makers reliable data concerning trade-offs between performance and cost.

Test and evaluation activities are increasing in complexity and sophistication. We can no longer afford a disjointed, fragmented approach to our costly acquisition programs. Massing our resources to capitalize on the advantages that will ensue from a single, coherent, test and evaluation, and analytical organization is an idea whose time has come.

ENDNOTES

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2. Ibid.

3. US Department of the Army, Operational Test and Evaluation Study, unnumbered, 1974. (Memorandums and historical background)

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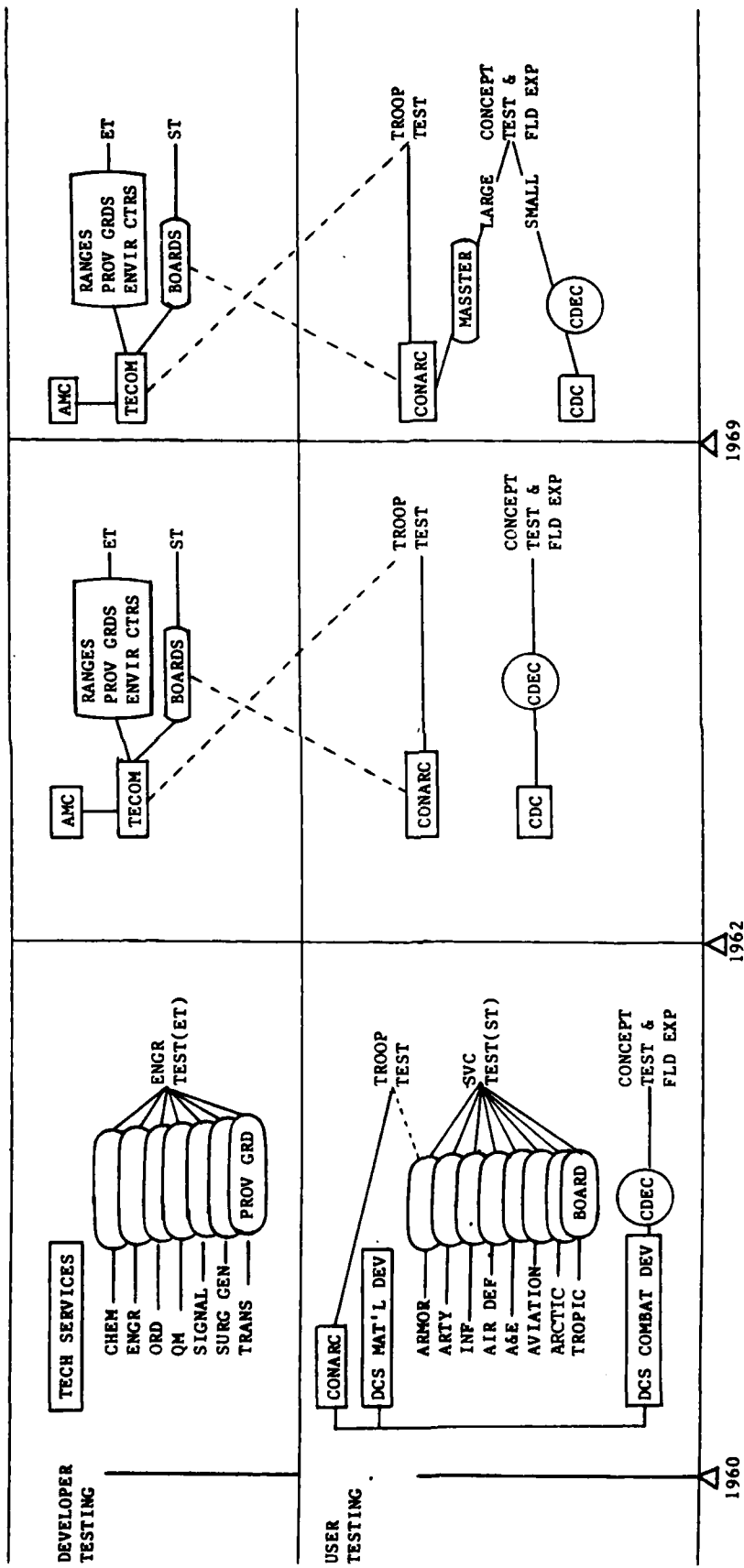
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THE TEST ORGANIZATION EVOLUTION

...THE '60'S SAW CENTRALIZATION OF T&E EFFORTS....

...BUT....



ARMY REORGANIZATION

- o Establish AMC
- o Establish TECOM
  - oo Prov Grds, Ranges
  - oo Boards & Envir Ctrs
  - oo Supervise Troop Tests
  - oo Consolidation under TECOM resulted in reduction of test activities
- o Establish CDC

FULTON COMMITTEE

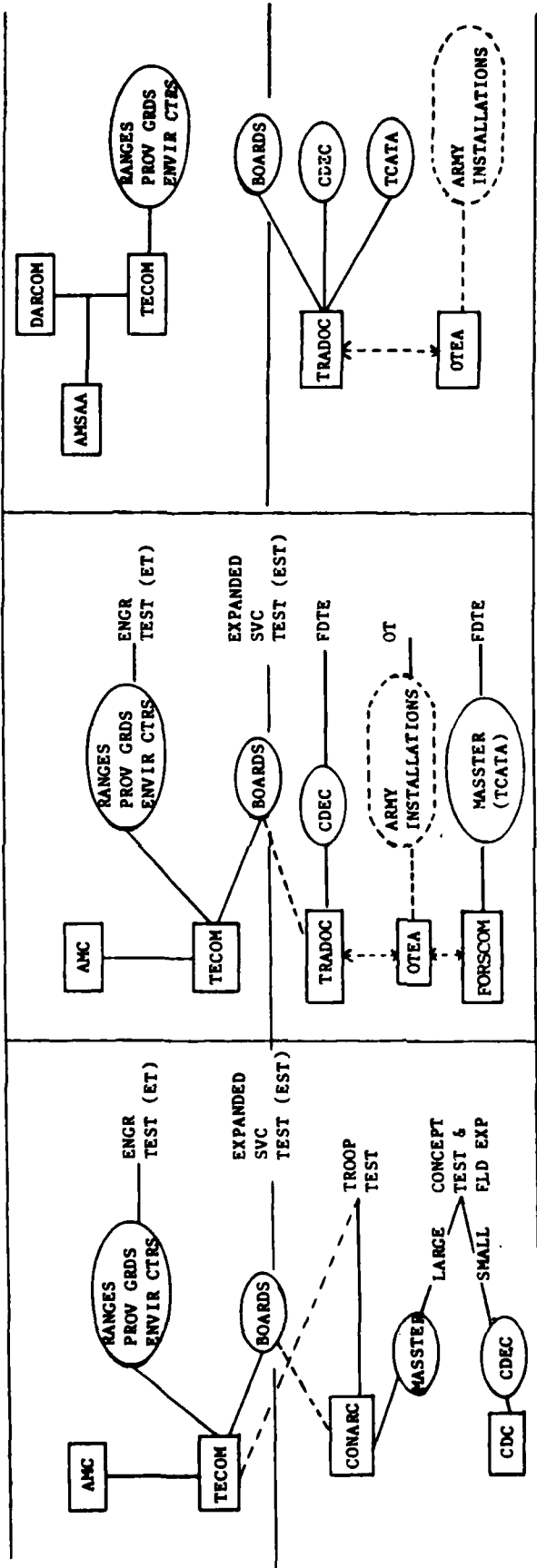
- o Establish MASSTER to expedite STANO Equip (Function expanded in 1971 to include general force dev testing)

Figure 1

THE TEST ORGANIZATION EVOLUTION

...PROCESS REVERSED IN THE '70'S....

...NOW WE'VE BEEN FULL CIRCLE....



1970  
BLUE RIBBON PANEL  
Estab OSD (OT&E)

- oo Emphasis on OT Bds
- oo Service Test
- oo Expanded Service Test
- oo Recommended Indep Agency for OT&E; separate OT from DT
- oo CDC approved Service Test plan
- oo CDC monitored test
- oo CDC conducted indep evaluation

1972-73  
ARMY REORGANIZATION

- oo Inactivate CONARC, CDC
- oo Activate TRADOC, FORSCOM and OTEA
- oo TRADOC picked up CD mission of CDC
- oo Indep Agency Established for OT&E
- oo OTEA responsible for Operational Testing
- oo TRADOC, FORSCOM supports

1974  
AMARC STUDY

- oo TECOM Test Bds transferred to TRADOC
- oo Greater separation of DT and OT
- oo TCATA transferred to TRADOC
- oo AMSAA to perform independent evaluation for DT (major and DESIC non-major sys)
- oo OTEA independent of AMSTAFF -- but day-to-day supervision by DCSOPS

Figure 2

**FORSCOM AND THE MATERIEL ACQUISITION/RDTE PROCESS**

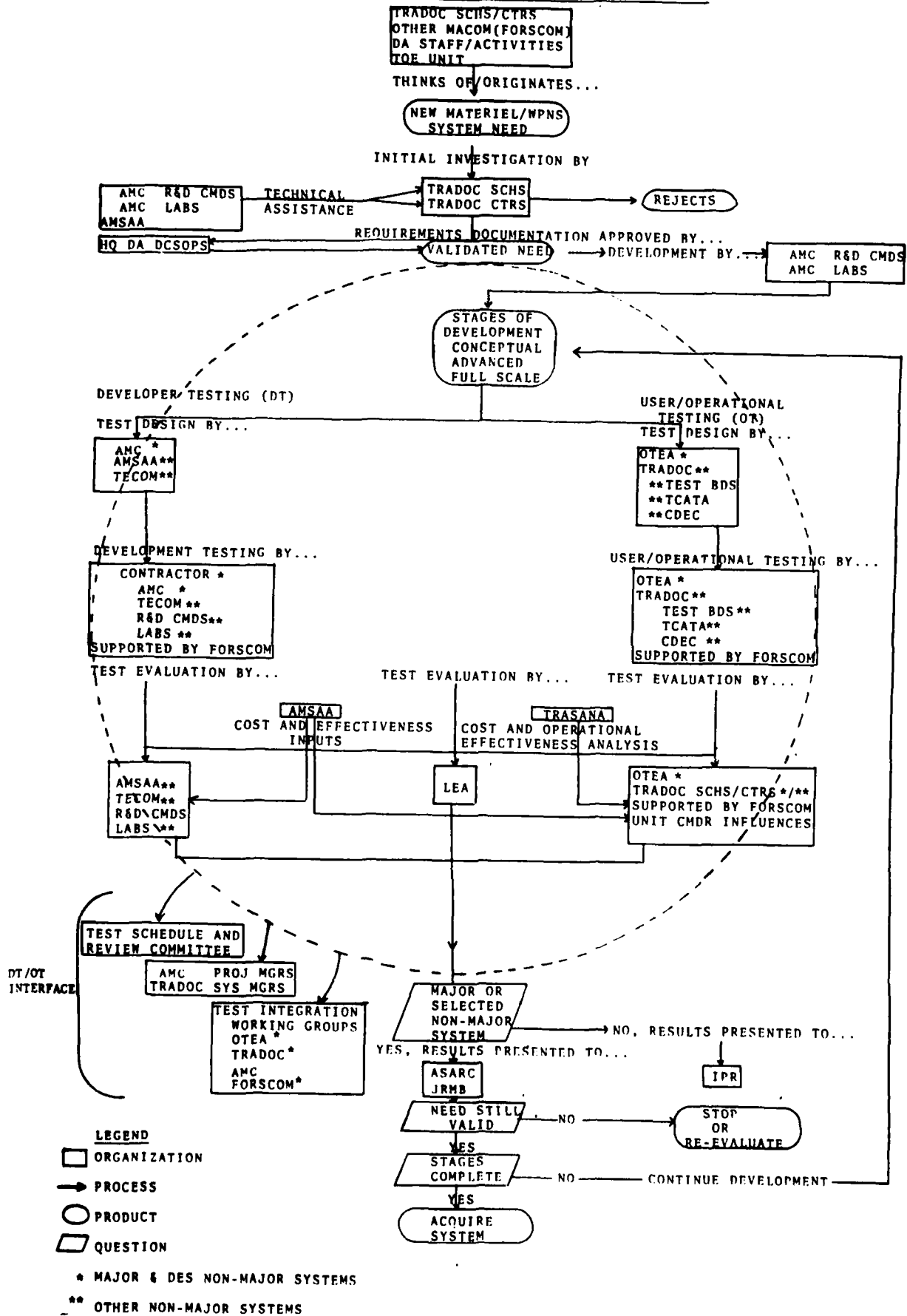
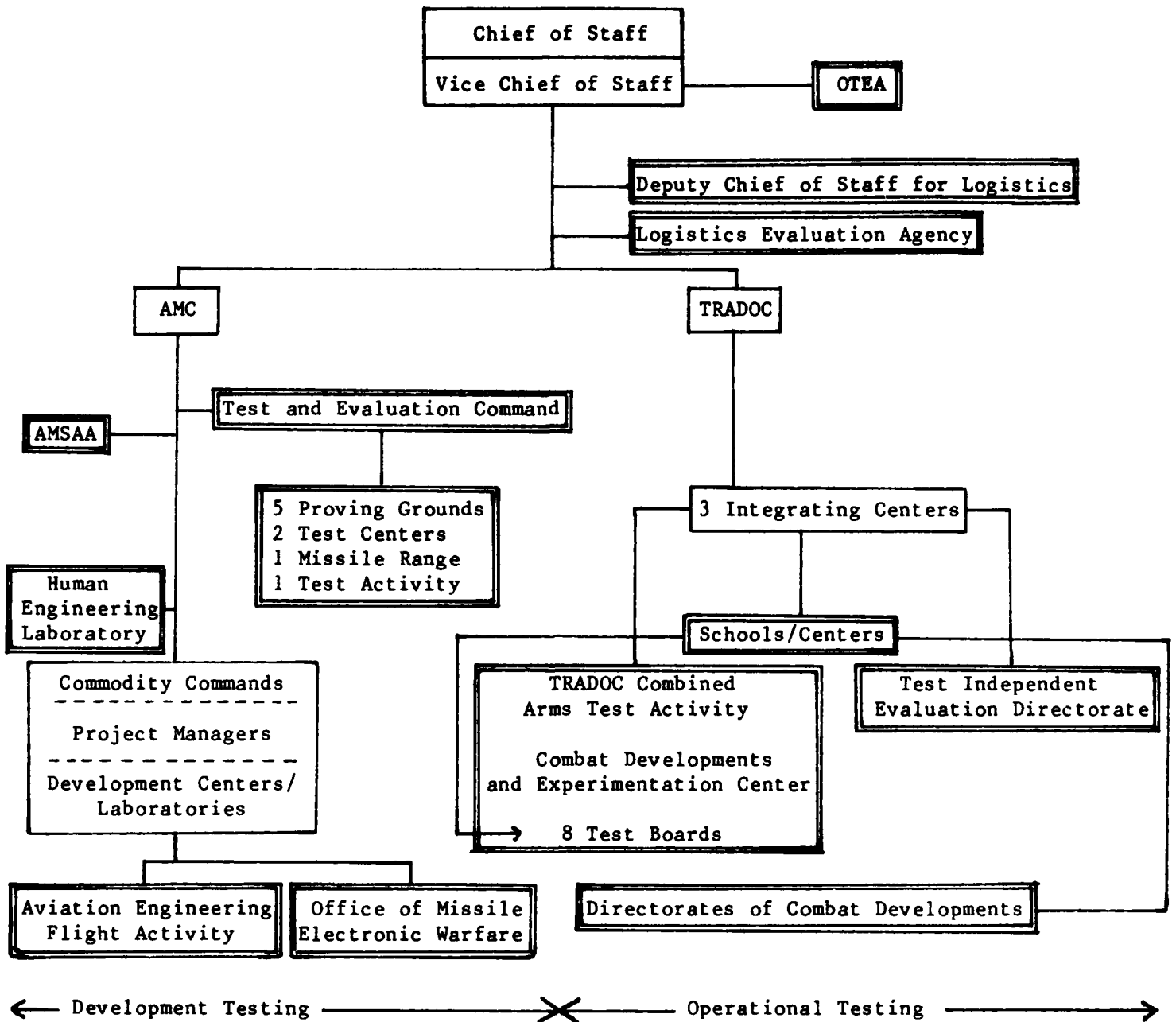


Figure 3

CURRENT ARMY STRUCTURE FOR TESTING AND TEST EVALUATION



Note: Double lined boxes represent test and test evaluation organizations. Single lined boxes show the organizations to whom they report.

Figure 4



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