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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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MARCH 3, 1980

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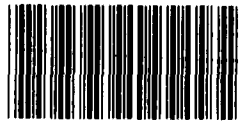
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The Honorable Joseph P. Addabbo
Chairman, Subcommittee on Defense
Committee on Appropriations HSE00302
House of Representatives

Dear Mr. Chairman:

Subject: Review of the Battlefield Exploitation and Target Acquisition System (LCD-80-38)

As requested by your office, we are providing information obtained on the Battlefield Exploitation and Target Acquisition (BETA) project for your consideration during the forthcoming hearings on the Department of Defense's fiscal year 1981 budget. This information summarizes our work as of February 15, 1980; however, the review is still in progress and we plan to issue a final report by November 1980. AGC00004

CURRENT STATUS OF DEVELOPMENT

The BETA project is a high risk, joint service effort to develop an experimental test bed for automated collection, analysis, correlation, and dissemination of tactical intelligence data. Systems which perform these functions are generally referred to as intelligence fusion centers. The Office of the Secretary of Defense (OSD) established the BETA project in September 1977 to demonstrate the feasibility and combat utility of prompt coupling of data from target acquisition sensors into tactical combat situation displays and firepower systems. OSD asked that the demonstration be conducted during European military exercises in 1980.

In January 1978, OSD established a $46.5 million funding ceiling through fiscal year 1980 to accomplish project objectives. In January 1980, the project office estimated that it would cost about $88.2 million through fiscal year 1984 to achieve the original objective, including $29.4 million for future development after the planned 1980 demonstration.

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Experience with the BETA test bed is expected to provide technology transfer benefits to service fusion centers, to be developed in the near future, such as the Army's All Source Analysis System and the Air Force's Tactical Fusion Division System. These benefits include providing techniques for responsive dissemination and processing of sensor products to multi-echelon users, an assessment of the utility of information exchanged between the services and between echelons of the same service, and direct transfer of software to fusion center development projects.

Currently, TRW, Inc., the system contractor, is developing software for the test bed and is integrating hardware obtained from subcontractors. So far, the contractor has completed a limited demonstration of test bed communications capability. Full system integration tests and an operator training phase are planned prior to the European demonstration.

PROJECT DEVELOPMENT ISSUES

We are reviewing project development status to identify problems which might hinder the achievement of project goals. To date, we have reviewed development plans, changes in test bed functional requirements provided to the contractor, and the status of software development. We found the following:

--As shown by changes in system specifications, the level of automation has been reduced in the test bed being developed for the September 1980 demonstration in Europe. Both hardware and software 1/ changes were made to absorb cost growth in the development contract. Project officials have designated the current configuration "Bare Bones BETA." The Bare Bones BETA test bed is designed for automated correlation of sensor data inputs; however, some of the automated functions, needed by the system operator to use the intelligence data, have been eliminated and must now be performed manually.

1/The changes were made in two phases. First, a January 1979 change in system specifications, and second, an August 1979 engineering change order.

(See encs. I and II for details on two sets of requirements changes.) In addition, the number of sensors planned to provide input for BETA processing during the demonstration has been significantly reduced.

--The limited scope of the September 1980 demonstration will in no sense stress the test bed at wartime loads. Report rates are estimated at 100 to 300 reports an hour versus the expected wartime load of 4,000 to 6,000 reports an hour. Accordingly, automated functions were deleted which were designed to process massive amounts of data under combat load conditions.

--Changes in BETA hardware include deletion of a correlation center at the Army division echelon, with substitution of a remote display subsystem to partially offset the loss of correlation center capability. Therefore, the September 1980 demonstration will not fully test division interoperability with BETA correlation centers at the corps echelon or at the Air Force tactical operations center. Project officials advised that software routines are the same for each correlation center. However, eliminating the division correlation center, together with software needed to process large amounts of data, precludes a demonstration that correlation and fusion software routines can adequately provide near real-time targeting data in the target-rich environment of the division. Although the BETA project director believes that deleting the division correlation center is a major loss in planned capability, he feels that the Bare Bones configuration is still worth testing because it provides a capability that does not currently exist.

--The All Source Analysis System project plans on using BETA field test results to help define operational requirements for a follow-on division system. Although the BETA project plans to add back the division correlation center in the next development phase, comparison of BETA plans with the All Source Analysis System development schedule raises a question whether division level capability can be demonstrated by the end of 1981, in time to define requirements for the All Source Analysis System.

--OSD recently approved a BETA project plan for post-1980 test bed development. This plan adds back the hardware and software deleted from the Bare Bones configuration. In addition, the planned effort includes software upgrades; electrical interface with systems that could use BETA products, such as the Tactical Fire Direction System; and field exercises to test interoperability with Navy command and control systems. As previously noted, estimated cost of this planned effort is $29.4 million, with completion scheduled for fiscal year 1984.

--The cost plus fixed fee development contract with TRW, Inc., established a $21.2 million cost goal. Since the contract was awarded in March 1978, estimated costs have exceeded the contract's original cost goal by $20.1 million and now totals $41.3 million. The project office estimates it will reach the $48.8 million limit on approved funding in March 1980; therefore, OSD will probably request the Congress to approve additional fiscal year 1980 funds to complete the Bare Bones BETA effort. Project management officials estimate that BETA will require an additional $10 million through completion of planned military field tests in September 1980, including $5.8 million as a management reserve for additional cost growth.

--Even with reduced requirements, the contractor's software development effort is behind schedule, and it is questionable whether the software will be completed in time for the September 1980 demonstration. For example, the contractor is over 6 months behind schedule in developing support software and over 3 months behind schedule in developing software for the operator terminals. This latter segment is considered a major problem by the project office, and it must be completed before the operator training phase can be properly conducted. Shortcuts may have to be taken in system integration tests and/or operator training if BETA is to participate in the September 1980 demonstration. The estimated cost of BETA participation in these exercises is $2.5 million.

--The system integration test will provide the basis for contractually accepting the Bare Bones BETA test bed. Although the project conducted a Multi-Center Demonstration in December 1979, a meaningful assessment of test bed performance cannot be made until the system integration test is held. This is because simultaneous execution of numerous software functions will not be demonstrated until this test event. System integration tests were scheduled for completion in mid-April 1980, but contractor personnel are now unable to predict when these tests will be completed since they do not know how long it will take to integrate the various software modules and hardware subsystems.

--Project office personnel attribute cost growth and schedule slippage to the contractor's difficulty in (1) understanding functional requirements initially, (2) obtaining experienced computer programmers in the California job market, and (3) obtaining hardware and software from subcontractors. For example, TRW personnel advised that a subcontractor was about 5 months late in delivering acceptable operator terminals, which TRW personnel needed to develop the operator terminal software modules.

--The December 1979 Multi-Center Demonstration was essentially a limited laboratory test of communications capability among the BETA subsystems. Also, several operator terminal functions were tested using simulated inputs to represent one sensor. The demonstration showed that system communications were operable and no major software problems were disclosed. On April 1, 1980, another intermediate laboratory demonstration is planned before full system integration tests. The objective is to demonstrate the capability to process messages from a complete sensor suite; however, only one function will be exercised at a time.

--Project officials recently briefed OSD management on development problems. Three options were then proposed: continue as planned, delay Bare Bones BETA field test for 6 to 12 months, or terminate the

project. The dilemma is that a decision must be made before system integration test results are available. At this time, project officials cannot guarantee participation in the September 1980 demonstration because of high risk problems which remain and the uncertainty over the software development schedule. Meanwhile, the project has almost reached its approved funding limit. Also, the European commanders want to know whether BETA is committed to the September 1980 participation so that appropriate resources can be allocated. On February 1, 1980, the Under Secretary of Defense for Research and Engineering decided to continue the project as planned.

As described above, the Department of Defense is having considerable difficulty in developing a BETA test bed with even minimal capability. Currently, the development is at least 4 years and $29.4 million away from achieving the original objective. Further, we question whether testing a Bare Bones configuration can provide much in the way of technology transfer benefits to projects, such as the All Source Analysis System, which need the results in the near future. Therefore, your Subcommittee may wish to consider the following options before authorizing any additional funds for BETA.

--Terminate the BETA project after the Bare Bones system tests are completed. Require the services to provide for direct transfer of available BETA software into their fusion center developments, to the extent that this is technically feasible. This action could save considerable money for software development and salvage something tangible from the BETA project.

--Delay the project about 1 year and make additional funding conditional on conducting a more comprehensive field test that comes closer to achieving project objectives. This would require the project to add back software functions for processing large amounts of sensor data and intelligence analysis aids for

the BETA terminal operator. It is especially important to test interoperability of a division correlation center with the correlation centers at other command echelons.

--Do not approve any funds for future test bed development until complete test results are available on the Bare Bones configuration. If this option is chosen and additional funds are requested to complete the Bare Bones phase, the Subcommittee should question the reasonableness of the amount requested and explore steps which can be taken to minimize additional cost growth.

Due to the Subcommittee's urgent reporting requirements, we did not obtain Defense comments. As arranged with your office, this report will be made available to interested parties upon request.

Sincerely yours,

Comptroller General
of the United States

Enclosures - 2

ENCLOSURE I

DELETIONS IN BETA SYSTEM

FUNCTIONAL REQUIREMENTS (note a)

(BARE BONES BETA)

Deleted function	Impact
Automated BETA interface module filtering	Reduced system capability to handle high message volumes (for sensor ground stations without filtering capability).
Division correlation center	System no longer able to validate division level fusion requirements and corps/division level interoperability processes/activities.
Sensor bias correction	System no longer able to correct for location error in sensor input data. Location error correction cannot be manually performed by terminal operator.
Accounting for sensor cueing request	System no longer able to monitor status of operator requests to direct sensors to special geographic areas. Operator must perform this task manually.
Automated correlation of mover reports	System no longer able to correlate reports of moving targets, e.g., a tank column. Function can be done by using query function and additional manual terminal operator functions.
Sensor coordinated unique tools	System no longer able to aid sensor coordinator perform such tasks as mission planning and sensor coverage areas and times. Tasks must be done manually.
Hold capability	System no longer able to automatically prevent or inhibit purge of target sightings placed in "HOLD" status.
Terminal response time criteria	System response time specification changed from "not to exceed" to an "average time" for all responses. Could result in slower system response time.
Automatic data base updates	System no longer able to automatically notify operator of possible target aggregation. Additional manual steps required.

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a/Per system specification change in January 1979.

ENCLOSURE II

SECOND PHASE OF

DELETIONS IN BETA SYSTEM FUNCTIONAL REQUIREMENTS (note a)

Deleted function	Impact
Correlation ambiguity	System no longer able to differeniate between "possible correlation and "non-correlation" of target. This differentiation must be done manually by operator.
Component collection	System is no longer able to look at lower level entities in order to link with a higher entity. Replaced by additional manual linking operations and increased use of cross correlation.
Automatic shared situation displays	System no longer able to automatically send snapshot of current situation to other correlation centers. Requires additional manual operations by terminal operator.
Automatic data base saturation maintenance	System no longer able to automatically purge data base. "Operator inhibit purge" no longer needed. Manual purge must be used.
Dynamic filter maintenance for sensor reports	System no longer able to change filter requirements in response to changes in the target situation. Filtering will be done by static requirements which can be changed at each system startup.
Saved displays	System no longer able to differentiate between messages and displays stored in terminal operator working file from routine messages and displays sent to operator for action. Additional manual sort operations required by terminal operator.
Boolean template processing	System no longer has factory preset unit identification parameters. Parameters must now be input to system by terminal operator as an additional manual step.

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a/These deletions were directed by the BETA project office in August 1979.