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THE TEST OF COMPUTER ASSISTED TOTAL VALUE ASSESSMENT (CATVA) ON--ETC(U)
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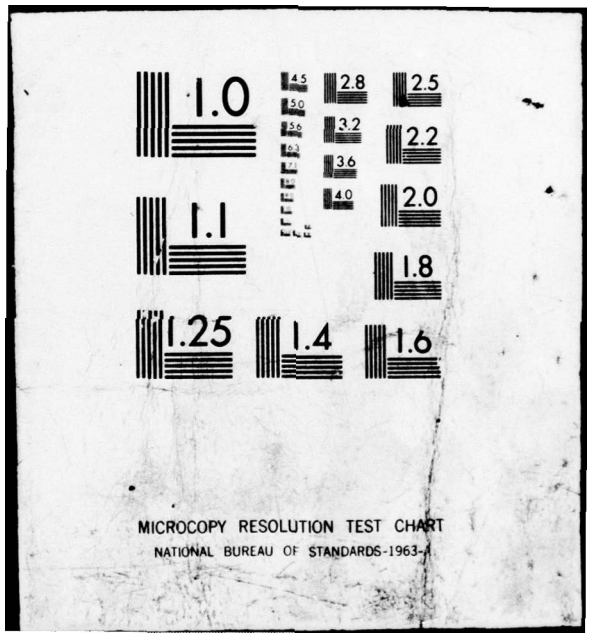
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# THE TEST OF COMPUTER ASSISTED TOTAL VALUE ASSESSMENT (CATVA) ON A MAJOR SOURCE SELECTION

DECEMBER 1977



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(6) # THE TEST OF COMPUTER ASSISTED TOTAL VALUE ASSESSMENT (CATVA) ON A MAJOR SOURCE SELECTION.

by

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Monte G. Norton

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US Army Logistics Management Center
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## EXECUTIVE SUMMARY

### BACKGROUND

This report describes the latest in a series of tests the Army Procurement Research Office (APRO) is doing to make the source selection technique, Computer Assisted Total Value Assessment (CATVA), operationally suitable for use in DARCOM. This test for the first time applies CATVA to an on-going source selection.

### OBJECTIVE

The specific objectives of this effort are to see if the CATVA model, heretofore merely feasible, can be of significant use in aiding an actual source selection decision and at the same time to seek more improvements to the model.

### METHODOLOGY

The test was done by instructing source selection personnel on the use of CATVA, letting them use CATVA in the source selection and then evaluating its use.

### FINDINGS

1. CATVA was useful as a backup tool in the source selection decision.

2. It was particularly useful in planning for the decision and in making sensitivity analyses on the impact of varying assumptions and systems configurations on proposal rankings.

3. CATVA did discriminate well in early runs, but lost considerable discriminating power in later ones, probably due to technical leveling.

4. Source selection management can avoid or minimize evaluator resistance to the rigorous CATVA analysis by requiring them to give the evaluated data in a proper format, without involving them in CATVA operation.

5. CATVA can handle non-linear utility (without reprogramming) by manual conversion before entering data into the computer (see Page 4).

### RECOMMENDATION

Distribute this report by letter from Procurement and Production Directorate, DARCOM, making complete references to all previous reports and suggesting each PM and major Command consider the technique for application. Indicate that APRO will assist in implementation.

TABLE OF CONTENTS

# CHAPTER I

# INTRODUCTION

## BACKGROUND

This report describes the latest in a series of tests of the Computer Assisted Total Value Assessment (CATVA) technique developed by the Army Procurement Research Office (APRO) for use in US Army Materiel Development and Readiness Command (DARCOM) source selections. The first effort was on a simulated source selection to assess the theoretical feasibility of the technique. The second test was a completed major source selection; that is, the research team used after-the-fact source selection data (augmented by interviews) to see how the technique would work on a real procurement.

This test involves the actual use of CATVA on an on-going selection, the XM1 engineering development procurement. It is the latest step in APRO's plan to help DARCOM make CATVA operationally suitable.

## REVIEW OF CATVA OPERATION

For readers not having seen APRO Report 501-1 and APRO Report 501-2, a short review of CATVA's operation is in order.

CATVA is based on the concept of value; that is, the best proposal will be that one giving the "best" combination of performance, management, and cost features. CATVA assesses the total value of proposal through a rigorous analysis of only the measurable (or scalable by adjectival gradations) performance, management, and cost parameters of the proposed system. Each performance, management and cost parameter is an evaluation factor in the

proposal evaluation; the value of each factor is based on a comparison of the contractor's response to what the Government requires.

The CATVA technique features computerized processing of the value assessments and a computer graphics display of these values. Included in CATVA's computerized processing is a statistical discrimination routine which aids the evaluators in discriminating among the proposals. This routine identifies the best proposal(s), based on the total value expression, by calculating a competitive range for various levels of confidence. The graphical display is unique to the CATVA concept. It is a dynamic representation of the individual value scores for the decision maker who with it can discern the relative strengths and weaknesses of proposals in a rapid and efficient manner. The CATVA model is based on a spatial analogy between a contractor's proposal and the total value of his proposal such that the larger the area representing a contractor's proposal the larger his proposal value.[1]

RESULTS OF TESTS

The test on the simulated source selection showed that the CATVA concept was feasible. A few minor programming adjustments were found to be necessary however.

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[1]This is essentially the same description from APRO Report 501-1, Computer Assisted Total Value Assessment, February 1975, p. vii.

The after-the-fact test was also reasonably successful. CATVA was useable and did discriminate. There were, of course, inherent problems with using a source selection not designed for CATVA, but they were felt to be truly peculiar to the test. Longer term difficulties identified include: some original CATVA design specs limited scope of technique (i.e., independent factors, linear utility, deterministic in nature); some data such as RAM-D, is highly unreliable for estimation; evaluators do not have a high level of confidence in their estimates; and source selection personnel perceive that an automated system limits or inhibits their individual judgement and discretion.

The text that follows describes the results of the XM1 source selection test.

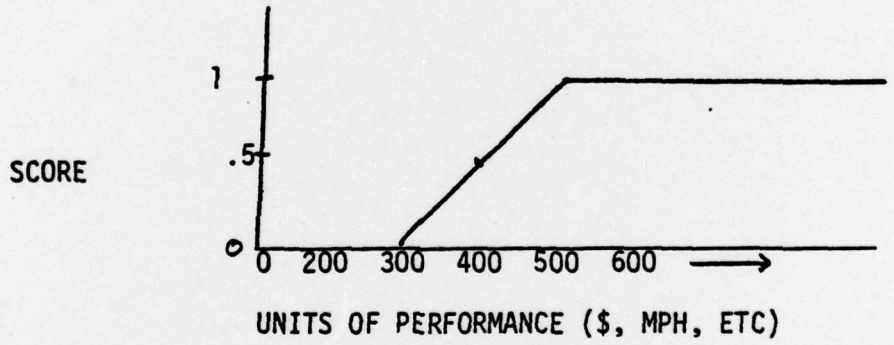
## CHAPTER II

## CHARACTERISTICS OF THE XM1 CATVA TEST

The XM1 CATVA test* differed from previous tests in that:

1. Extensive sensitivity analysis was done to see effects of different score and weight inputs.

2. Scores were manually bounded high and low; that is, after a certain point, an increase in a factor value received no more score, or a decrease received no less score, as shown in Figure 1. This is, in effect, a manual solution to the measurement of non-linear utility.




EXAMPLE OF BOUNDED SCORE

FIGURE 1

*A detailed description of CATVA's use during the XM1 source selection is provided in references 3 and 4. These documents are classified and sensitive and may be available to authorized personnel through the XM1 Project Office, Universal City Professional Building, 28150 Dequindre, Warren, Michigan 48092.

3. An abstract "benchmark" was put into the computer to indicate desired level of performance. In Figure 1 for example, if .5 were put into the computer, this would indicate 400 units of performance were desired. These benchmarks were established on a common scale for easy factor comparisons and were not required for CATVA.

4. The translation from actual performance to score (e.g., from 400 units to .5) was done by hand and the score then put into the computer. This was, of course, in lieu of reprogramming the basic CATVA to have the computer make this translation.

5. The XM1 resolicitation brought on multiple proposals from the two offerors and thereby allowed for the first CATVA multiple evaluation.

6. The evaluators themselves did not need to be involved in direct usage of CATVA. The SSEB management staff simply needed input in the correct format from individual evaluators or teams.

## CHAPTER III

## TEST RESULTS

### FINDINGS

1. One of the main uses of CATVA was the sensitivity analysis performed on different types of inputs. The iterative runs let decision makers know quickly the impact of varying assumptions and system configurations on the proposals rankings. In this way, CATVA gave decision-makers a lot of insight into the relative merits of the proposals. For this reason CATVA can be just as useful (if not more useful) in planning for the source selection decision as in helping to actually make it.

2. Rather than reprogramming CATVA, evaluators made high and low "cutoff" scores (see Fig 1) by manually converting evaluated performance figures into scores. This avoided the problem of unrealistically high and low scores.

3. The resistance of evaluators to the CATVA concept can be minimized by simply not involving them in the technique. By asking for evaluated input in the proper format, SSEB managers can use CATVA as a strict management tool.

4. CATVA did discriminate well in early proposal evaluation runs, but lost considerable discriminating power in the later ones with updated proposals. It is probable that considerable technical leveling took place as time passed.

5. The concept is again held to be feasible. Users said that CATVA was useful particularly in the early deliberations in (i) organizing the source selection data; (ii) expressing each contractor's proposal quantitatively

with a total value expression; (iii) discriminating among the proposals where possible; (iv) analyzing the sensitivity of the total value to various factors, and (v) summarizing the results in convenient replicable displays.

RECOMMENDATION

Distribute this report by letter from Procurement and Production Directorate, DARCOM, making complete references to all previous reports and suggesting each PM and major Command consider the technique for application. Indicate that APRO will assist in implementation.

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**13. ABSTRACT**

This report describes the latest in a series of tests the Army Procurement Research Office (APRO) is doing to make the source selection technique, Computer Assisted Total Value Assessment (CATVA), operationally suitable for use in DARCOM. This test was done by instructing source selection personnel on the use of CATVA, letting them use CATVA in an on-going source selection, and then evaluating its use. CATVA was useful in the source selection decision, particularly in planning for the decision and making sensitivity analyses on the impact of varying assumptions and systems configurations on proposal rankings. The CATVA technique will be considered for future applications where appropriate.