

DTIC FILE COPY



AD-A201 420

Research Product 88-18

# Sources of Training and Lessons Learned Data from the National Training Center

ARI Field Unit at Presidio of Monterey, California  
Training Research Laboratory

July 1988

DTIC  
ELECTE  
S OCT 26 1988 D  
E



88 1025 030

U. S. Army Research Institute for the Behavioral and Social Sciences

Approved for public release; distribution unlimited.

# U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the  
Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON  
Technical Director

WM. DARRYL HENDERSON  
COL, IN  
Commanding

Technical review by

Michael W. Collins  
Combined Arms Training Activity  
Fort Leavenworth, Kansas

Robert H. Sulzen  
ARI-NTC Research Team  
Fort Irwin, California

<b>Accession For</b>	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

#### NOTICES

**FINAL DISPOSITION:** This Research Product may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

**NOTE:** This Research Product is not to be construed as an official Department of the Army document in its present form.



## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS ---	
2a. SECURITY CLASSIFICATION AUTHORITY ---		3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited.	
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE ---			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) ---		5. MONITORING ORGANIZATION REPORT NUMBER(S) ARI Research Product 88-18	
6a. NAME OF PERFORMING ORGANIZATION ARI Field Unit--Monterey	6b. OFFICE SYMBOL (if applicable) PERI-IOA	7a. NAME OF MONITORING ORGANIZATION ---	
6c. ADDRESS (City, State, and ZIP Code) P.O. Box 5787 Presidio of Monterey, CA 93944-5011		7b. ADDRESS (City, State, and ZIP Code) -	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Research Institute for the Behavioral and Social Sciences	8b. OFFICE SYMBOL (if applicable) PERI-I	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER ---	
9c. ADDRESS (City, State, and ZIP Code) 5001 Eisenhower Avenue Alexandria, VA 22333-5600		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO. 63743A	PROJECT NO. 2Q263 743A794
		TASK NO. 519	WORK UNIT ACCESSION NO. H1
11. TITLE (Include Security Classification) Sources of Training and Lessons Learned Data from the National Training Center			
12. PERSONAL AUTHOR(S) Carol A. Johnson			
13a. TYPE OF REPORT Final	13b. TIME COVERED FROM 1986 TO 1987	14. DATE OF REPORT (Year, Month, Day) 1988, July	15. PAGE COUNT 31
16. SUPPLEMENTARY NOTATION ---			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	National Training Center (NTC) Range Data Measurement System, Data requirements, Electronic clipboard, Core Instrumentation System,	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This document delineates the training and lessons learned data requirements from the National Training Center in a format that can be easily referenced according to the source required to provide input data. The precision with which each data element should be collected is provided, along with the priority of the data elements collected with the Range Data Measurement System (RDMS). Implementation of the RDMS data requirements has already begun. Core Instrumentation System inputs can be made through improved software and operating procedures. Implementation of observer/controller input requirements will require an electronic clipboard; other data will require extensive resource commitment to attain.			
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL James H. Bank's		22b. TELEPHONE (Include Area Code) (408) 647-5219	22c. OFFICE SYMBOL PERI-IOA

Research Product 88-18

# Sources of Training and Lessons Learned Data from the National Training Center

**Carol A. Johnson**

ARI Field Unit at Presidio of Monterey, California  
Howard H. McFann, Chief

**Training Research Laboratory**  
**Jack H. Hiller, Director**

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES  
5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

Office, Deputy Chief of Staff for Personnel  
Department of the Army

July 1988

---

Army Project Number  
2Q263743A794

Education and Training

Approved for public release; distribution unlimited.

## FOREWORD

---

The Army Research Institute has a major research program in support of the National Training Center (NTC). This program is sponsored by the Training and Doctrine Command and the Deputy Chief of Staff for Personnel. One of its principal goals is to develop lessons learned methodologies for training, doctrine, organization, personnel, and equipment. This report identifies the source of previously identified data requirements that would improve the utility of data from the NTC for training and lessons learned.

The research described in this report was conducted by ARI's Presidio of Monterey Field Unit, whose mission is to improve collective training.

The Program Task that supports this mission is entitled Impact of CTC/ Home Station on Army Systems and is organized under the "Maintain Force Readiness" program area. Providing sponsorship for the research was the Combined Arms Training Activity (CATA) under a letter of agreement, "National Training Center and Unit Home-Station Training and Feedback System," dated 16 September 1985. The CATA Lessons Learned Division was briefed in June 1987 on the information in this document. Utilization of the work described in this report has begun with the implementation of the Range Data Measurement System data requirements by the Directorate for Army Ranges and Targets. In addition, CATA analysts have found the explanation of the capabilities/limitations of the current NTC instrumentation system to be a resource of tremendous value.



EDGAR M. JOHNSON  
Technical Director

## SOURCES OF TRAINING AND LESSONS LEARNED DATA FROM THE NATIONAL TRAINING CENTER

### EXECUTIVE SUMMARY

---

#### Requirement:

A previous report (Training and Lessons Learned Data Requirements from the National Training Center) delineated specific data requirements from the National Training Center (NTC) within the general structure of the seven operating systems. While this structure ensured that military reviewers could most easily determine that all requirements were included, the implementation of improved data collection is enhanced by the current report, which structures the requirements according to the source required to provide input data.

#### Procedure:

The data requirements generated in the previous report were provided to the Directorate of Army Ranges and Targets (DART) so that they could be incorporated into the current contract to upgrade the NTC software and hardware. DART issued a task order to Engineering and Economic Research, Inc., to specify the engineering and analytical support necessary to implement all the data requirements. The Range Data Measurement System (RDMS) requirements were reviewed and prioritized. Requirements for other input sources were determined.

#### Findings:

Implementation of the Range Data Measurement System data requirements has already begun. Core Instrumentation System inputs can be improved through improved software and operating procedures. Implementation of the observer/controller input requirements will require an electronic clipboard to facilitate data collection, and other data will require extensive resource commitment to attain.

#### Utilization of Findings:

It is anticipated that the Combined Arms Training Activity (CATA) will be the primary agency involved in the process of developing a plan for how and when each of the data requirements will be met. This report is intended to facilitate that process. The data requirements identified in this report will be combined with additional information requirements that are being identified in research on the NTC Measurement System.

SOURCES OF TRAINING AND LESSONS LEARNED DATA FROM THE NATIONAL TRAINING CENTER

CONTENTS

---

	Page
PURPOSE . . . . .	1
BACKGROUND . . . . .	1
IMPLEMENTATION OF DATA REQUIREMENTS . . . . .	2
RANGE DATA MEASUREMENT SYSTEM REQUIREMENTS . . . . .	2
Pairings . . . . .	2
Firings . . . . .	3
Radio Transmissions . . . . .	3
Indirect Fire . . . . .	3
Obstacles . . . . .	4
Breaches . . . . .	4
Electronic Warfare . . . . .	4
On-going . . . . .	5
OBSERVER/CONTROLLER INPUT REQUIREMENTS . . . . .	6
Each Battle . . . . .	6
Support Installations . . . . .	8
Kills . . . . .	8
Communication . . . . .	8
Obstacles . . . . .	9
Positions . . . . .	10
Intelligence . . . . .	10
Vehicles . . . . .	11
Casualties . . . . .	11
CORE INSTRUMENTATION SYSTEM INPUT REQUIREMENTS . . . . .	12
DATA REQUIREMENTS NEEDING IMPROVEMENTS . . . . .	13
Software Modifications . . . . .	13
Additional Government Furnished Input . . . . .	14
Technology Improvements . . . . .	14
CONCLUSIONS . . . . .	16

CONTENTS (Continued)

---

	Page
REFERENCES . . . . .	17
APPENDIX A. TASK ORDER TO EER, INC. . . . .	A-1
B. ATTENDEES AT 20 JAN 87 ATSC MEETING . . . . .	B-1

SOURCES OF TRAINING AND LESSONS LEARNED DATA FROM THE  
NATIONAL TRAINING CENTER

Purpose

The purpose of this document is to delineate the training and lessons learned data requirements from the National Training Center (NTC) in a format that can be easily referenced according to the source required to provide input data. An earlier report (Training and Lessons Learned Data Requirements from the National Training Center) structured the requirements in terms of the seven operating systems as defined in FM 71-2J, The Tank and Mechanized Infantry Battalion Task Force. While this structure ensured that military reviewers could most easily determine that all requirements were included, the implementation of improved data collection will be enhanced by the current format. In addition, the precision with which each data element should be collected is provided, along with the priority of the data elements which should be able to be collected with the Range Data Measurement System.

Background

The Combined Arms Training Activity (CATA), with the support of the Army Research Institute (ARI), is conducting an on-going effort to improve the quality and utility of data from the NTC for use in Lessons Learned. The primary purpose of the NTC is training of battalion task forces in a simulated combat environment. However, an additional purpose of the NTC is to serve as a source of data. Trends from multiple engagements across multiple task forces can provide important information for training, doctrine, equipment, and procedures.

Working group meetings to improve the quality of NTC data and to determine specific data requirements were held in May and July, 1986. Agencies represented at the meetings included:

- NTC Operations Group
- ARI
- TRADOC Analysis Center, Monterey
- Arroyo Center
- Army Training Support Center
- United States Infantry Center
- Directorate of Army Ranges and Targets (DART)

The data requirements identified in this report will be combined with additional information requirements which are identified in research on the NTC Measurement System (Forsythe, 1985; Lewman, 1987a, 1987b). Trial implementation and evaluation of the new data collection system will then lead to refinements.

#### Implementation of Data Requirements

The data requirements generated were provided to DART so that they could be incorporated into the current contract to upgrade the NTC software and hardware. Accordingly, DART issued a Task Order (Appendix A) to Engineering and Economic Research, Inc. (EER) to specify the engineering and analytical support to be provided to DART/NTC in the development of the concept formulation plan, integration plan, and trade off analysis for implementation of the enhanced data collection capabilities for the National Training Center as identified in Training and Lessons Learned Data Requirements from the National Training Center.

An initial meeting with EER, Inc. was held on 20 January 1987 at the Army Training Support Center. Attendees at the meeting are at Appendix B. The attendees reviewed and revised the requirements under the following Range Data Measurement System (RDMS) section of the present report and prioritized each requirement, as shown. Subsequent sections of this report prescribe requirements for other input sources.

#### Range Data Measurement System Requirements

This section of the report documents data currently collected by the RDMS, as well as data elements desired in the upgrade of the system.

#### Pairings

For each pairing of instrumented vehicles and for all ground elements with tank-killing systems, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
Target ID:	Exact	1
Position Location (PL):	+/- 5 meters	1
Time:	+/- 100 milliseconds	1

Firer:	MILES & firer ID code	
	Tank	1
	TOW	1
	DRAGON	2
	VIPER	4
Aspect angle:	Front/rear/left/right	2
Range of engagement:	+/- 1 meter	1

Firings

For each firing, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
Player ID:	Exact	1
Time:	+/- 100 milliseconds	1
PL:	+/- 5 meters	1
Type of weapon:	Exact	1

Radio transmissions

For each radio transmission, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
Net:	Exact	1
Player ID:	Exact	1
Time:	+/- 1 second	1
Cipher:	On/off	1

Indirect fire

For each indirect fire, NBC, and FASCAM mission, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
Actual PL, impact:	+/- 5 meters	1
Time:	+/- 1 second	1
Battle damage assessment:	* vehicles, personnel	1

PL, indirect fire simulation elements	+/- 5 meters	3
PL, decon sites	+/- 5 meters	2
Source of each mission	Exact	1
Recording of TACFIRE data bases	All	

Obstacles

For each obstacle and barrier, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
PL, barriers and obstacles:	+/- 5 meters	1
PL, planned lanes through obstacles:	+/- 5 meters	1

Breaches

For each time breaching assets are used, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
PL, breaching vehicles	+/- 5 meters	1
PL, dismounted personnel	+/- 5 meters	2

Electronic Warfare

For each electronic warfare asset, the following data elements are required:

ELEMENTS	PRECISION	PRIORITY
Jamming assets:		
PL:	+/- 5 meters	2
Start/stop time:	+/- 1 second	2
Net:	Frequency	2
Radar:		
PL:	+/- 5 meters	2

Start/stop: On/off 2

On-going

The position location of the following assets are required on an on-going basis during the battle:

ELEMENTS	PRECISION	PRIORITY
Vehicles:	5 min. or 15 meter move	1
Aircraft:	1 second	1
Dismounted personnel to fire team:	5 min. or 15 meter move	2
Command & Control facilities:	5 min. or 15 meter move	1
Intel gathering assets (OPs, GSRs):	5 min. or 15 meter move	1
Dismounted antitank weapons:		
DRAGONS	5 min. or 15 meter move	2
VIPERS	5 min. or 15 meter move	4
Fire markers:	5 min. or 15 meter move	1
Fire Support Officers:	5 min. or 15 meter move	1
Observer/controllers, mounted & dismounted:	5 min. or 15 meter move	1
Mortars:	5 min. or 15 meter move	1
Fire Direction Center:	5 min. or 15 meter move	1
Artillery:	5 min. or 15 meter move	2
TPQ 36/37 radars:	5 min. or 15 meter move	2
Air Defense Artillery:		
CHAPARRAL	5 min. or 15 meter move	1
VULCAN	5 min. or 15 meter move	1
STINGER	5 min. or 15 meter move	1
FAARs:	5 min. or 15 meter move	2
Combat Service Support (CSS) vehicles:	5 min. or 15 meter move	2

CSS personnel:	5 min. or 15 meter move	2
CSS support installations:	5 min. or 15 meter move	2

### Observer/Controller Input Requirements

Some of the required data are not currently, nor in the foreseeable future, amenable to being collected solely through instrumentation. This data will require manual input on the part of the observer/controllers (OCs). There is strong recognition that the OCs must be provided with improved technology to assist them in this effort. The OCs primary mission is clearly training and additional resources cannot be placed on them without supplying additional resources. In the course of conducting their training, they must make observations and notes regarding critical events and unit performance to provide feedback to the units. Currently, this is done using paper and pencil.

A major innovation which would support many of the following data requirements is an electronic clipboard. Such a device would assist the OCs in doing their jobs more efficiently and would also provide improved information for After Action Reviews and Take Home Packages. It would also have the advantage of standardizing observations and, thus, increase their value for Lessons Learned.

A prototype of an electronic clipboard has been developed by ARI and a Statement of Work will be developed by DART for the procurement and field testing of a new generation device. The following are data elements that it would be useful to collect through such a device. Priorities must be placed on the data elements in the remainder of this report as implementation occurs.

#### Each Battle

For each battle, the following data elements need to be input by the OCs:

ELEMENTS	PRECISION
Success/failure:	Scaled 1-9
Strengths/weaknesses:	Free format message
Visibility conditions:	Scaled 1-9
Operational status of	

each radio transmitter:	On/off
Effectiveness of smoke:	Scaled 1-9
Commander's intent:	Free format message
PL, planned intel targets:	X & Y map coordinates
Intel estimate:	Free format message
Location of night vision devices:	X & Y map coordinates
Status of night vision devices:	On/off
Status of GSRs:	On/off
Deception techniques:	Free format message
Accuracy of spot reports:	Scaled 1-9
Time of resupply:	+/- 10 minutes
Quantity of resupply:	Free format message
Method of resupply:	Free format message
Source of resupply:	Free format message
Temperature:	Free format message
Humidity:	Free format message
Wind speed/direction:	Free format message
Inversion layer changes:	Free format message
Precipitation	Free format message
Dew point:	Free format message
Hours worked without break/sleep:	+/- 15 minutes
Status of infantry:	Mounted/dismounted
Reconstitution:	Personnel/equipment strength

### Support Installations

For each support installation, the following data are required:

ELEMENTS	PRECISION
MOPP status of support units:	I/II/III/IV
Security measures planned:	Free format message
Security measures in place:	Free format message
Readiness status of support vehicles:	Not Mission Capable-Maintenance (NMCM) / Not Mission Capable-Supply (NMCS)

### Kills

For each kill by an OC, the following data are required:

ELEMENTS	PRECISION
Reason for kill:	Free format message or "Dial-A-Kill" on controller guns
Reason for resurrection:	Free format message

### Communication

There are additional methods of communication which are not captured through instrumentation. For these, the following data are required:

ELEMENTS	PRECISION
Effectiveness of non-verbal communication:	Scaled 1-9
Use of non-verbal communication:	Yes/no
Effectiveness of wire communication:	Scaled 1-9
Effectiveness of jamming:	Scaled 1-9

## Obstacles

For each obstacle in a battle, the following data are required:

ELEMENTS	PRECISION
X, Y, & Z configuration:	+/- 5 meters
Density of materiel:	Free format message
Number of breaches attempted:	Exact
Effectiveness of suppression:	Scaled 1-9
Quantity of resources to construct:	Free format message
Source of construction resources:	Free format message
How resources transported:	Free format message
Time to construct:	+/- 15 minutes
Fire plan for obstacle:	Free format message
Total idle time:	+/- 15 minutes
Type of obstacle:	Free format message
Status of planned lanes through obstacles:	Free format message
Resources available in brigade support area:	Free format message
Resources requested by unit:	Free format message
Resources transported forward:	Free format message
Resources used:	Free format message

Time to emplace resources: +/- 15 minutes

Total work time: +/- 15 minutes

### Positions

For each tank survivability position, the following data are required:

ELEMENTS	PRECISION
PL, survivability positions:	X, Y, & Z coordinates
Amount of overhead cover:	Free format message
Type of overhead cover:	Free format message
Type of position:	C & C, CSS, fighting
Resources available for construction:	Free format message
Total travel time:	+/- 5 minutes
Total idle time:	+/- 5 minutes
Degree of defilade of protected items:	Full/turret/hull/full def
Quality of completed positions:	Scaled 1-9
Frequency positions utilized:	Count
Time positions utilized:	+/- 5 minutes

### Intelligence

For each intelligence asset, the following data are required:

ELEMENT	PRECISION
Cycle time for intelligence information:	+/- 30 seconds

Use of Intelligence  
Preparation of the Battle-  
field for each air avenue  
of approach: Yes/no

### Vehicles

For each vehicle, the following data are required:

ELEMENT	PRECISION
Repair state of damaged/ inoperable vehicles:	Free format message

### Casualties

For each casualty, the following data are required:

ELEMENT	PRECISION
Status:	Free format message
Location:	X # Y coordinates
Nature of wound:	Free format message
Nature of treatment:	Free format message
Time of treatment process:	+/- 5 minutes
Who performed initial treatment:	Free format message
Adequacy of initial treatment:	Scaled 1-9
Appropriateness of initial treatment:	Scaled 1-9
Status of medical supply:	Free format message
Displacement time for battalion aid station:	+/- 5 minutes
Casualties in each triage category:	Number

IMMEDIATE triage  
casualties due to delay: Number

Casualties lost to  
improper treatment: Number

Method of evacuation: Free format message

### Core Instrumentation System Input Requirements

The Core Instrumentation System (CIS) is located away from the training areas. It contains voice and video recording and editing equipment, consoles which portray the on-going battle, and displays for the After Action Review van. It is in the CIS that pre-exercise initialization takes place in which player information, control measures, task force organization, live fire scenarios, and pre-planned artillery is entered. Statistical measures are also calculated.

The current software supports many data elements which are not routinely entered. For example, the segment header provides an opportunity to enter an intensity index for OPFOR and BLUEFOR fire support, planning time, mortar, artillery, chemical, nuclear, smoke, biological, engineer, air defense, and electronic warfare. Visibility conditions may also be entered. While many of these factors change during the course of a battle, and entering them only at the beginning may not be sufficient, until there is a simple method of providing this data, it would assist in reviewing historical data tapes to have at least some information on battlefield conditions.

For each battle, the following data needs to be input by the CIS:

ELEMENTS	PRECISION
Mission:	By battle
Start/stop times:	+/- 5 minutes
Operations maps:	All
Intelligence maps:	All
Fire support maps:	All
Graphic fire control measures:	Platoon to brigade
Graphic control measures:	All

Manually calculated firing data:	All
Intel collection plan graphics:	All
CSS graphic control measures:	All
Time units go in/stay in MOPP I, II, III, IV:	+/- 5 minutes
Social Security Numbers, by duty position:	Updated with change in positions
Task Organization:	Updated with any changes
Battalion mission:	All
Company missions:	All
Training area:	X & Y Coordinates
Major scenario events:	All, with start and end time
Key training objectives:	All
Battalion designator:	All
Number of days at NTC:	By battle

#### Data Requirements Needing Improvements

Many of the data requirements need either technological innovation, software modifications additional input from the Army, or major shifts in priorities in order to be implemented. While these requirements may not currently be feasible, it is desirable that they be identified so that, in the future, they can be executed.

#### Software Modifications

The following data requirements would require software modifications, but should be feasible from data collected either currently or through the upgrade of the system:

- automatic display of planning ranges for specific equipment, e.g., TOC (tactical operations center), command group, scouts, ground surveillance radar (GSR),

- automatic analysis of the effect of terrain, weather, and time of day on radio transmission capability,
- number of rounds fired to achieve kill (killer/killing system),
- position location symbol size on a scale commensurate with the scale of the map being used,
- speed of movement of engaging and engaged system/unit,
- changes in rate of movement (of units and weapons systems on both sides when BLUEFOR is firing) linked to the number of weapons firing,
- rate of movement for all personnel and vehicles and as units (platoon, company battalion),
- reported enemy kills versus actual kills,
- total hours of operation of each equipment per day, by weapon system (and subsystem, where applicable),
- time between wounding and arrival of medic,
- types of direct fire fratricides (hit, near miss, kill),
- indirect fire fratricides.

#### Additional Government Furnished Input

Some of the data requirements are technically feasible, but require additional, government furnished input. These requirements are:

- soil conditions,
- trafficability analysis,
- improved resolution of terrain data for visual display (1:25,000 or 1:12,500 with 3X enlargement) or contour interval to one meter.

#### Technology Improvements

Many of the data requirements require improved technology in order to implement. There is a need to automatically record the information on all written documents associated with the operation. This includes operations orders, Communications-

Electronics Operation Instructions (CEOIs), FRAGOs, and any other written plans and procedures. Currently, the written documents are collected, and there is an ARI effort underway to design a rule-based automation approach for searching and summarizing written sources. Recording written information in the computer database would ensure availability. A text scanner which can accept hand-written or typed documents would be a major improvement.

Other requirements which depend upon improved technology are:

- audio/visual recording of backbriefs,
- type of transmitter on each vehicle equipped with a radio,
- capability of monitoring and recording secure and non-secure voice/RATT transmissions,
- automatic analysis of the effect of terrain, weather, and time of day on transmission capability,
- the ability to determine how TOWs are employed,
- separation of catastrophic versus mobilization hits,
- angle of engagement (+/- 5 degrees) of firing to target system,
- X, Y, and Z coordinate orientation for all vehicles to include turret orientation for all vehicles so equipped,
- target detection and target prioritization procedures,
- instrumentation to provide visibility conditions,
- benign realism of direct and indirect fire simulation,
- degree of target exposure at the time of engagement,
- automatic indirect fire battle damage assessment with SAWE-RFs (simulated area weapons effects-radio frequency),
- intelligence data collected on enemy obstacles to include position location, density of mines, wire, pickets, and other construction materials, time of report, reporting agency, and action taken on report,
- density of minefields, other than FASCAM,
- position location of all Army and Air Force aviation

assets on the X, Y, and Z coordinates,

- recording of identification of friend or foe (IFF) data,
- pairings between air and ground weapon systems,
- type and capacity of all support installations and actual availability to include resources stored and loaded on vehicles,
- location of all medical units, medical and evacuation vehicles, casualty collection points and transfer points, and other medical assets,
- time between wounding and arrival of medic,
- effects of bispectral smoke/dust and smoke operations on weapon acquisition and fire control equipment.

#### Conclusions

A plan needs to be developed for how and when each of these data requirements will be met. As described in the beginning of this report, implementation of the Range Data Measurement System data requirements has already begun. CIS inputs can be improved through improved software and operating procedures. Implementation of the OC input requirements will require an electronic clipboard to facilitate data collection. And, other data will require extensive resource commitment to attain.

Certainly, trade-offs will have to be made which balance the cost of data collection with the value of having the data. These judgements will have to be based on the importance of militarily relevant questions and, thus, require the involvement of military subject matter experts to resolve them. It is anticipated that CATA will be the primary agency involved in this process.

#### REFERENCES

- Forsythe, T. K. (1986). A Research Concept for Developing and Applying Methods for Measurement and Interpretation of Unit Performance at the National Training Center (ARI Research Report 1435). Alexandria, VA: U.S. Army Research Institute. (AD A181 073)
- Lewman, T. J. (1987a). Mission Critical Tasks at the National Training Center (in review). Monterey, CA: The BDM Corporation.
- Lewman, T. J. (1987b). Mission Critical Effectiveness at the National Training Center (in preparation). Monterey, CA: The BDM Corporation.

APPENDIX A: TASK ORDER TO EER, INC.

DEPARTMENT OF THE ARMY  
U. S. ARMY TRAINING SUPPORT CENTER  
FORT EUSTIS, VIRGINIA 23604-5166



REPLY TO  
ATTENTION OF  
ATIC-RTI

SUBJECT: Task Order 87-13, Concept Formulation for Enhanced  
Data Collection Capability for the National Training  
Center

Engineering and Economic  
Research, Inc.  
1951 Kidwell Drive  
Vienna, VA 22180

In accordance with the provisions of Contract No. DABT  
60-86-C-0972, in support of the Directorate for Army Ranges  
and Targets/National Training Center (DART/NTC), U.S. Army  
Training Support Center, Fort Eustis, VA, Engineering and  
Economics Research (EER), Inc., is hereby tasked to perform  
the subtask(s) specified in this Task Order.

a. PURPOSE. The purpose of this Task Order is to specify  
the engineering and analytical support to be provided to  
DART/NTC in the development of the concept formulation plan,  
integration plan, and trade off analysis for implementation of  
the enhanced data collection capabilities for the National  
Training Center as identified by the Army Research Institute  
Special Report Training and Lessons Learned Data Requirements  
from the National Training Center.

b. BACKGROUND. The Army is conducting an on-going effort  
to improve the quality and utility of data from the National  
Training Center (NTC) for use in Lessons Learned. The primary  
purpose of the NTC is training of battalion task forces in a  
simulated combat environment. However, an additional purpose  
of the NTC is to serve as a source of data. Trends from  
multiple engagements across multiple task forces can provide  
important information for training, doctrine, equipment, and  
procedures.

c. NATURE AND SCOPE OF TASK. EER shall provide  
engineering and analytical support to DART/NTC in the  
development of a concept formulation plan, integration plan,  
and trade off analysis for the incorporation of enhanced data

ATIC-RTI

SUBJECT: Task Order 87-13, Concept Formulation for Enhanced  
Data Collection Capability for the National Training  
Center

collection capabilities at the NTC consistent with the on  
going software development effort for the enhanced  
configuration at the NTC. Specific subtasks are:

(1) Subtask 1. In conjunction with DART/NTC conduct  
an analysis of the requirements identified in the attached ARI  
report entitled Training and Lessons Learned Data Requirements  
from the National Training Center.

(2) Subtask 2. Based on the analysis conducted in  
Subtask 1 above, prepare a preliminary concept formulation  
package and trade-off analysis on incorporation of the  
requirements at the NTC as delineated in the report identified  
in Subtask 1 above. Include rough order of magnitude (ROM)  
costs for incorporating capabilities at the NTC. Submit per  
schedule of deliverables (Encl 1). Use format outlined in  
Data Item Description (DID) DI-S-4057.

(3) Subtask 3. Conduct a briefing at an in-process  
review (IPR) on the preliminary concept formulation  
package/trade-off analysis/ROM developed in Subtask 2 above.  
Briefing shall be conducted per schedule of deliverables (Encl  
1). Use contractor format.

(4) Subtask 4. Based on government comments/input at  
the IPR, provide a final concept formulation package/trade-off  
analysis/ROM on the incorporation of the requirements at the  
NTC. Submit per schedule of deliverables (Encl 1). Use  
format previously described in Subtask 2 above.

(5) Subtask 5. After approval of the deliverable in  
Subtask 4 above, prepare a preliminary integration plan for  
incorporating capabilities identified in the ARI report.  
Submit per schedule of deliverables (Encl 1). Use contractor  
format.

(6) Subtask 6. Conduct a briefing on the preliminary  
integration plan at an IPR per schedule of deliverables (Encl  
1). Use contractor format.

(7) Subtask 7. Based on government input/comments at  
the IPR, submit a final integration plan per schedule of  
deliverables (Encl 1). Use contractor format.

ATIC-RTI

SUBJECT: Task Order 87-13, Concept Formulation for Enhanced Data Collection Capability for the National Training Center

d. EXCLUSIONS AND EXEMPTIONS. No personal services shall be required of the contractor and all work to be performed shall be within the scope of work set forth in EER contract number DABT 60-86-C-0972.

e. TIME PHASING AND PRODUCTS. In execution of this Task Order, the technical/analytical support will be provided between 16 January 1987 and 30 March 1987. Required deliverable products and dates for delivery are reflected in the schedule of deliverables, attached. Changes to submission dates for required deliverable products will be contained in amendments to this Task Order or defined by other correspondence as required.

f. RESOURCES. An estimated level of resources required in execution of this Task Order will be provided by the contractor upon acceptance of this Task Order.

g. GOVERNMENT FURNISHED EQUIPMENT (GFE), GOVERNMENT FURNISHED MATERIAL (GFM) AND SUPPLIES. The Army Research Institute Report Entitled Training and Lessons Learned Requirements from the National Training Center is provided herein as Government furnished information.

h. DART/NTC ACTION OFFICER. ATIC-RTI/MAJ Weaver.

i. REFERENCE. Contract No. DABT 60-86-C-0972.

j. CONTRACT PERFORMANCE PLAN AND PERFORMANCE AND COST REPORT. In addition to reports and other deliverables previously described in this Task Order, the contractor shall submit the following as outlined in the Contract Data Requirements List (DD Form 1423):

(1) Contract Performance Plan (Data Item Description DI-A-101F).

(2) Performance and Cost Report (Data Item Description DI-FU-1208A).

Technical and Scientific Reports (Data Item Description DI-S-4057).

ATIC-RTI

SUBJECT: Task Order 87-13, Concept Formulation for Enhanced  
Data Collection Capability for the National Training  
Center

k. SPECIAL REQUIREMENTS. No special requirements are  
anticipated in execution of this Task Order.

3 Encls

GEORGE H. SCHERER  
Contracting Officer's  
Representative

DISTRIBUTION:

Contracting Officer  
Project Leader, EER  
COR

Concur/Nonconcur _____	Dir, DART/NTC
Concur/Nonconcur _____	COR
Concur/Nonconcur _____	EER, Project Leader

In the event of nonconcurrency, the reason(s) for  
nonconcurrency is to be provided in writing and all  
documentation relating to the task returned to the COR for  
resolution.

SCHEDULE  
OF  
DELIVERABLES  
(Task Order 87-13)

<u>DELIVERABLE</u>	<u>DUE DATE</u>
Preliminary Concept Formulation/ ROM	16 Feb 87
Preliminary IPR on Concept Formulation	20 Feb 87
Final Concept Formulation Package/ROM	27 Feb 87
Preliminary Integration Plan	13 Mar 87
IPR on Preliminary Integration Plan	18 Mar 87
Final Integration Plan	30 Mar 87

APPENDIX B: ATTENDEES AT 20 JAN 87 ATSC MEETING

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Carol Johnson	ARI	AV 878-5219
Atwood C. Cherry	US Army NTC	AV 470-5085
Willie Weaver	US ATSC	AV 927-2084
Ben B. Covington	HQ TRADOC	AV 680-2377
Robert C. Coon	HQ CATA	AV 552-2191
Izzy Shevor	Engineering and Economic Research, Inc. (EER)	Com (804) 873-3251
Frank Bettingor	EER	Com (804) 873-3251
Cliff Letts	DART/NTC	AV 927-2383