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PRODUCT DEVELOPMENT AND UTILIZATION WITHIN THE ARMY TRAINING SYSTEM:
OBSERVATIONS AND RECOMMENDATIONS FROM DEVELOPMENT AND IMPLEMENTATION
OF THE NEW BASIC RIFLE MARKSMANSHIP TRAINING PROGRAM

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for

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January 1986

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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ARI Research Note 86-16	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Product Development and Utilization Within the Army Training System: Observations and Recommendations from Development and Implementation of the New Basic Rifle Marksmanship Training Program		5. TYPE OF REPORT & PERIOD COVERED October 80 - October 81
		6. PERFORMING ORG. REPORT NUMBER --
7. AUTHOR(s) Judy A. Holley, Seward Smith and Arthur D. Osborne		8. CONTRACT OR GRANT NUMBER(s) --
9. PERFORMING ORGANIZATION NAME AND ADDRESS ARI Field Unit at Fort Benning, Georgia Post Office Box 2086, Fort Benning, Georgia 31905		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q263743A794
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Research Institute for the Behavioral and Social Sciences, 5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600		12. REPORT DATE January 1986
		13. NUMBER OF PAGES 43
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) --		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE --
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) --		
18. SUPPLEMENTARY NOTES --		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Basic Rifle Marksmanship Training Systems Training Program Individual Training		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Through the development of a new Basic Rifle Marksmanship (BRM) Program Of Instruction (POI) and the provision of technical assistance during its implementation, personnel at the U.S. Army Research Institute (ARI) Field Unit at Fort Benning, Georgia (further references to this organization will be "ARI-Benning") had the opportunity to be involved with, and observe the organizational change process pertaining to, the utilization of a Research and Development (R&D) product within the Army training system. While the observations have (over)		

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UNCLASSIFIED

1 SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ARI Research Note 86-16

20. ABSTRACT (continued)

implications for BRM POI sustainment, their broader implications are for managing change within the Army Training System.

Given a POI with demonstrated effectiveness, an established need for the POI, a formal requirement for POI use, extensive technical assistance from the developer, and full cooperation of Headquarters, Training and Doctrine Command (HQ, TRADOC) and its subordinate schools, US Army Infantry School (USAIS) and Army Training Centers (Forts Benning, GA; Bliss, TX; Dix, NJ; Jackson, SC; Knox, KY; Leonard Wood, MO; McClellan, AL; and Sill, OK), problems still arose. Issues raised by the problems are generic to R&D product development and utilization within the Army training system, specifically management of that process at organizational levels of Headquarters, Major Commands (HQ, MACOMS, e.g., HQ, TRADOC) and their subordinate organizations (e.g., USAIS).

In this report observations made during BRM POI development and implementation are integrated with scientific and applied literature to provide information directly applicable to research development and utilization within the Army Training System.

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BRIEF

Requirement:

The purpose of this report is to contribute to the development of improved R&D management and utilization within the Army Training System at organizational levels of HQ MACOM's (Headquarters, Major commands, e.g., HQ TRADOC) and of their subordinate organizations (e.g., USAIS) by providing a description of the organizational change process observed during the BRM POI development and implementation, including observed consequences of that process, and managerial implications.

Procedure:

Observations of the organizational change process currently used for R&D product utilization within the Army training system were made by ARI-Fort Benning researchers as they developed the new BRM POI and provided extensive technical assistance during its implementation in the 1st Infantry Training Brigade at Fort Benning and later at the seven other ATC's.

Current scientific and applied literatures on organizational change were searched and integrated with researcher observations to produce a description of the current change process and its managerial implications and to develop a managerial checklist (Appendix A) to guide implementation management at higher organizational levels of the Army.

Findings:

- Decentralized Training*, (*Key: individualized Training*)
1. Observations of the BRM POI development and implementation revealed two major factors that impair R&D product development and utilization. Both factors are determined by current organizational structure and processes at organizational levels of HQ TRADOC and USAIS. The two factors are (a) decentralized management of the change process (i.e., Instructional Systems Development [ISD] Model, which guides research development and utilization within the Army training system) and (b) decentralized management of the implementation phase of that process.
 2. Management of the change process is decentralized. Management responsibility is shared by several organizations rather than being clearly assigned to one organization. Without adequate safeguards, diffused management responsibility tends to degrade organizational performance.
 3. Problems created by decentralized management are exacerbated by shortages of personnel and TDY/Travel funds, degrading effectiveness of the change process, especially the implementation phase.
 4. Decentralization of the change process can result in unnecessary and costly duplication of effort among organizations sharing responsibility for management of the change process.
 5. Management of the implementation phase per se is decentralized, although management of each of the four other ISD model phases (analysis, development,

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design, and control) at USAIS is centralized. Management of each phase is clearly assigned to a USAIS Directorate, except for the implementation phase. For the BRM POI, implementation management responsibilities were shared by HQ TRADOC, USAIS, and the eight ATCs.

6. Decentralized management of the implementation phase is the opposite of what is recommended in the scientific and applied literatures on organizational change. During the BRM POI implementation, this resulted in: (a) duplication of effort among using agencies, (b) under-utilization of implementation support procedures, (c) suboptimal coordination across affected Army agencies, and (d) suboptimal use of developer expertise.

Conclusions and Recommendations:

Conclusions and recommendations pertinent to R&D development and utilization and to BRM POI sustainment will be given. Those pertaining to R&D development and utilization will concern (a) the change process (i.e., ISD model) and (b) the implementation phase of that process.

I. R&D Development and Utilization

A. The Change Process

1. Management of the change process needs to be centralized to alleviate, if not entirely eliminate negative consequences of decentralized management. Centralized management ("cradle to grave," i.e., inception to obsolescence) of an R&D product by one organization would (a) facilitate integration of the change process phases, (b) help protect organizational effectiveness, as well as organizational efficiency, (c) eliminate both unnecessary and costly duplication of effort and burdensome time-consuming coordination associated with decentralized management, and (d) facilitate the development of subject matter expertise pertaining to an R&D product (e.g., training program) which is vital to successful product development, implementation, and sustainment.

2. A systems approach to program development can insure that both organizational effectiveness and organization efficiency are safeguarded.

3. Periodic evaluations of R&D product utilization should continue as long as the product is used. This prevents undesirable shifts in the use of the product, which can result in a precisely executed but ineffective process.

4. An important issue concerning optimal use of developer expertise was perceived during BRM POI implementation. Because of its relationship to organizational effectiveness, the US Army needs to confront and resolve the issue.

B. The Implementation Phase of the Change Process

1. The US Army, as well as other government and private organizations, needs to give much greater emphasis to the implementation phase

of the organizational change process. The following factors are central to accomplishing this.

a. Increased implementation management from organizational levels such as HQ MACOMs (e.g., HQ TRADOC) and USAIS. This includes clear assignment of responsibility for implementation management of an R&D product, such as a training program, to an appropriate organization within the Army training system at the level of HQ MACOMs or their subordinate organizations, such as USAIS.

b. Allocation of sufficient manpower and budgetary resources for implementation management at the level of HQ MACOMs and their subordinate organizations, such as USAIS.

c. Provision of adequate decision-making and resource allocation authority to the organization responsible for implementation management.

d. Utilization of implementation techniques currently available in scientific and applied literatures. Recently identified implementation management processes can be used at organizational levels such as HQ TRADOC and USAIS to provide strong leadership that supports local commands of using organizations.

2. In addition to implementation of a R&D product (e.g., training program) at the primary using organizations (e.g., ATCs) the product may need to be coordinated with and integrated into other officer and NCO programs (e.g., Officer Basic and Advanced Courses; Noncommissioned Officers School; Cadre Training Centers (CTCs); and Pre-Command Courses).

3. Implementation management of an R&D product should include an assessment of new knowledge and skills required for all affected resident Army personnel (e.g., trainers, supervisors). Professionally developed, cost-effective training should be provided (e.g., "Train the Trainer" programs). For commanders, inspection targets should be emphasized. Establishment of minimum qualification standards for trainers should be considered.

4. Because of their expertise pertaining to an R&D product, developers of each product should be used to contribute implementation and product use.

5. Formal organizational procedures are needed for insuring that suggested product modifications are assessed in light of the originating organizational needs, values, and underlying rationalism.

6. A systematic search for all obsolete materials and information related to the product needs to be undertaken. Steps should be taken to modify, revise, or remove the obsolete material from the system.

7. Potential contributions of the research to Army organizations other than the primary using organizations need to be determined and actualized through development and implementation of a systematic plan for disseminating germane information, materials, and training aids.

II. BRM POI Sustainment - Conclusions and Recommendations

Conclusions and recommendations relevant to BRM POI sustainment are:

1. Periodic formative evaluations of the BRM POI need to be scheduled to insure that both organizational effectiveness and organizational efficiency are being maintained.
2. A formal procedure is needed for insuring that supported program modifications are assessed in light of the originating organizational needs and values and in light of the rationale underlying program components.
3. An audiovisual "Train the Trainer" program needs to be developed. For the short-term, the program needs period-by-period self instruction sessions. For the long-term, a professionally-developed job analysis of the trainer position is needed. Minimum qualification standards for trainers need to be set and tests developed by educational experts to insure those qualifications.
4. An audiovisual program that emphasizes BRM POI rationale and training inspection priorities is needed for resident commanders in using agencies.
5. Information about the BRM POI needs to be conveyed to all Active and Reserve Component Units Army wide, e.g., Forces Command (FORSCOM), and US Army Europe (USAREUR), to support unit marksmanship training.
6. In addition to implementation within ATCs, this POI needs to be coordinated with and integrated into other officer and NCO programs.
7. A systematic search for all obsolete materials, training aids, and information related to the BRM POI needs to be undertaken. Examples of obsolete materials include training circulars, TEC lessons, field manuals, and shot diagnosis cards. Steps should be taken to modify, revise, or remove the obsolete materials from the system.

Utilization of Findings:

This report potentially contributes to R&D management and product utilization within the Army training environment. It could be used as a base for a full assessment by the Army of its structures and processes at higher organizational levels to determine whether they hinder or facilitate R&D product development and utilization. Portions relevant to BRM POI sustainment can be used by the Army to protect their R&D investment and to insure its on-going contribution to military preparedness.

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INTRODUCTION

There are circumstances in the military that require timely and effective implementation of change. Examples are: system wide restructuring, curriculum changes, and new, improved equipment incorporation. Development of these candidates for change appears to be considerably easier than actual implementation of the change. The reasons for this difficulty are many. The purpose of this report is to explore the change process, citing a specific current example, and to offer some insights and recommendations for achieving implementation goals.

Interest in research utilization within the military services has rapidly expanded in recent years, paralleling an analogous growth within scientific and applied literatures (Gartner & Naiman, 1976; Human Interaction Research Institute and National Mental Health, 1976; Roberts & Frohman, 1978; Zaltman & Duncan, 1977). Impetus has come from several sources. Two major ones are (a) pressure at the federal level for a significant increase in the rate of R&D product use and (b) a desire on the part of military services to translate R&D investments into improved organizational effectiveness.

Despite the large and developing literature on research utilization, a need remains for information directly applicable to the Army training environment. As pointed out by Gray and Gray-Roberts (1980), "... the applied literature is too idiosyncratic and parochial for application to utilization problems in the Army's unique training environment."

While an advanced model for organizational and individual change oriented to the Army training unit environment has been developed (Gray & Gray-Roberts, 1980), little information is available regarding organizational change processes at management levels of HQ MACOMs (e.g., HQ TRADOC) and their subordinate organizations (e.g., USAIS). The Gray and Gray-Roberts (1980) model embodies all organizational management at these organizational levels in the project manager or "change agent" (usually the developer or sponsor of an innovation), who is assumed by the model to have "the resources and discretion to act as an effective change agent." While this bold embodiment in no way diminishes the usefulness of their model, it leaves the project manager with the need for more guidance in how to go about providing users with the educational, persuasive, facilitative, and power processes called for by the model. Much more importantly, it leaves the Army with two major needs. One is a need for assessing its own structures and processes at higher organizational levels to determine whether they function to facilitate or hinder R&D product development and utilization. The second need is to determine the appropriate role of higher organizational levels in this organizational change process, especially in the implementation phase.

Observations during BRM POI development and implementation revealed two major factors that impair optimal R&D product development and utilization within the Army training system: (a) decentralized management of the entire change process and (b) decentralization management of the implementation phase of that process. While these factors may appear to be the same, i.e., decentralized management, a distinction between the two is important for a clear perspective of the current change process in the Army training system.

Separating the two factors makes the necessary distinction between management of the entire change process and management of each phase of the change process. Management of the entire change process can be centralized (i.e., management responsibility for all phases of the change process can be given to one organizational agency) or decentralized (i.e., responsibility for management of the phases can be dispersed among two or more organizational agencies). The management of each phase of the change process can also be centralized or decentralized, regardless of whether the management of the entire process is centralized or decentralized. As will be discussed in the following sections of this report, in the Army training system, management of the entire change process is decentralized. Management of each phase of the training development process is centralized, with the notable exception of the implementation phase. The management of the implementation phase is decentralized.

The observed consequences and managerial implications of decentralized management of the entire change process and of the implementation phase will be respectively discussed. This will follow a description of the role of current organizational structure and processes in determining these factors.

USAIS Organizational Structure and R&D Product Development and Utilization

Within the United States Army Infantry School (USAIS), research development and utilization is guided by the Instructional Systems Development (ISD) model, which is an organizational change model with five phases: analysis, design, development, implementation, and control. There is a match between USAIS organizational structure and the five phases, with the notable exception of the implementation phase. The Directorate of Training Development (DTD) has responsibility for the first three phases while the Directorate of Evaluation and Standardization (DOES) has responsibility for the final phase. Responsibility for the implementation phase, at least in the case of the BRM POI, was shared by HQ TRADOC, USAIS, and ATCs.

Assignment of respective ISD model phases to two directorates and other agencies decentralizes the management of the change process. This is in contrast to management within each phase of the change process, which is centralized as a result of each phase being clearly assigned to a specific Directorate. The exception is the implementation phase in which management is decentralized. Not only was the management responsibility for implementation of the BRM POI shared by HQ TRADOC, USAIS and ATCs, but within USAIS two divisions of DTD had implementation responsibilities: Systems and Enlisted. Within TRADOC HQ at least two separate sections were involved: IET personnel and personnel responsible for the Cadre Training Centers (CTCs).

The BRM POI has indirect effects on major commands (MACOMs) other than TRADOC. These include all Active and Reserve Component Units Army wide. Coordination with these MACOMs is required if the Army is to have a rifle marksmanship training system that is integrated across BRM, Advanced Rifle Marksmanship (ARM), and unit rifle marksmanship. No single person or organization had responsibility for extending BRM POI implementation to include even preliminary steps for achieving this integration. Rather, one of the major implications of the problems encountered in BRM POI implementation, when integration among eight ATCs within only one MACOM was being attempted, is that very complex problems are likely to arise when changes in Army-wide rifle marksmanship training are attempted.

Contrast Between Formal Requirement and Implementation Processes

The delivery of the formal requirement for BRM POI implementation at the ATCs was characterized by a highly centralized organizational structure and formalized process; however, for the implementation phase per se, a less centralized structure with minimum formalization emerged. Specifically, after POI development and testing, the program proponent, USAIS, recommended adoption to HQ TRADOC, which in turn sent it to Deputy Commander, Operation and Plans (DCSOPS), Headquarters, Department of the Army (HQDA). Following HQDA approval, HQ TRADOC issued a formal requirement for implementation at the ATCs. After issuance of the formal requirement, the decentralized management described above emerged.

The observed operational change following issuance of the formal requirement for implementation revealed an unexpected organizational management flexibility within the Army. Bureaucratic organizations are usually considered to be static entities incapable of change (Aiken, Bacharach, & French, 1980). The demonstrated capability for flexibility is clearly to the Army's advantage since optimal organizational structure and processes vary depending on whether the organization is seeking to develop proposals for change or trying to implement them (Zaltman, 1973). Current research indicates that a decentralized organizational structure is needed when proposals for change are being developed; however, for the implementation phase per se an organization needs to maintain its highly centralized structure and formalized processes (Shepard, 1967; Sapolsky, 1967; Carroll, 1967; Zaltman, 1973; Aiken, Bacharach, & French, 1980). This is the opposite of what was observed in the BRM POI implementation.

In the following two sections of this report decentralized management of the change (ISD) process (i.e., all five phases of the ISD model: analysis, design, development, and control) and decentralized management of the implementation phase will be discussed, respectively. Implications for BRM POI sustainment, R&D management, and product utilization will be included.

DECENTRALIZED MANAGEMENT OF THE CHANGE PROCESS (ISD MODEL)

While decentralized management of the change process (i.e., ISD Model) may, to some extent, be considered efficient from the traditional management science point of view (i.e., tasks are broken down into small units permitting specialization), the approach has potentially costly, if not fatal, consequences, when used for complex managerial processes, such as planned organizational change. It is well known that specialization increases the need for coordination. In their classic discussion of the division of work, March and Simon (1972) state: "The greater the specialization by subprogram (process specialization), the greater interdependencies among organizational subunits. Interdependence does not by itself cause difficulty if the pattern of interdependence is stable and fixed. . . Difficulties arise only if program's execution rests on contingencies that cannot be predicted perfectly in advance. . . the greater the elements of variability and contingency, the greater is the burden of coordinating activities that are specialized by process."

Organizational change, by its very nature, is a dynamic rather than stable process. Despite the best possible planning, all problems cannot be anticipated. Equally important for the Army, each POI may require coordination among a unique set of agencies. As previously pointed out, full implementation and sustainment of the BRM POI requires coordination among and within several MACOMs. This coordination is complicated by the widespread geographic distribution of the involved agencies.

Two major consequences of decentralized management of the change process are: (a) efficiency may overshadow effectiveness, and (b) duplication of effort among agencies sharing in the management responsibility.

Efficiency May Overshadow Effectiveness

With distribution of the ISD phases among USAIS Directorates and other agencies, there is a danger of the question of whether things are being done right, i.e., organizational efficiency, overshadowing the question of whether the right thing is being done, i.e., organizational effectiveness. While both efficiency and effectiveness must be assessed to obtain a meaningful picture of organizational productivity, effectiveness requires integration of the phases of planned change so that what is done and how it is done remain grounded in the original organizational values and needs that gave rise to the change. If program components become disassociated from their underlying rationale, efficiency may replace effectiveness.

An observation made by ARI researchers as they developed the new BRM POI provides an example of the disassociation of a program component and its underlying rationale. Pop-up targets were initially designed in the 1950's to provide transition to field firing at fleeting, indistinct, combat-like targets once the soldier had fully mastered the fundamentals of shooting. However, as a result of a series of cost-cutting measures that gradually changed the Army's BRM POI, pop-up targets were used as soldiers were trying to master the fundamentals of marksmanship accuracy (Smith & Osborne, 1981). The original purpose and underlying rationale for the use of a program

component had become cut off from the component and, for a period of time, efficiency overshadowed effectiveness. The pop-up target ranges were being run correctly, but the right thing was not being done to teach basic marksmanship. Detailed feedback on bullet strike location, necessary during initial marksmanship training, was not being provided.

This kind of shift can occur Armywide in a POI as modifications are made in response to budgetary and time constraints. It can also occur as a result of honest, but uninformed attempts to improve the POI.

Not all such shifts occur at an Army-wide level, but may occur within a using agency (e.g., ATC) or for an individual user (e.g., trainer). For example, the four fundamentals of rifle marksmanship, an important part of the new BRM POI, could become "an end in themselves." Emphasis could be placed on their memorization rather than on understanding and correct application. Another example is provided by firing with a protective mask. The weapon has to be canted (tilted) so that the soldier can see through the sights. This usually requires a cant of about 45 degrees. Efficiency has replaced effectiveness if a soldier is taught an exact angle rather than being taught to use least amount of cant permitting his use of the sights.

Managerial Implications. Recent developments within scientific and applied literatures provide methods for insuring that both organizational efficiency and organizational effectiveness are safeguarded during R&D product development as well as during implementation and sustainment. A systems approach to program development (see Figure 1) is one such means. This approach requires systematic evaluation and feedback for each stage that precedes program evaluation: Step 1 - Values or Needs; Step 2 - Specific Goals; Step 3 - Program Requirements; Step 4 - Program Design; and Step 5 - Program Implementation. Additionally this approach safeguards effectiveness by making explicit the link between program evaluation and program revision through a feedback discrimination and communication network that determines, based on the evaluation, what program changes are needed and where they are located in the system.

The fact that this approach requires evaluation and feedback for Step 1, the organizational needs stage, is of particular importance for safeguarding effectiveness. This requires that a POI as it is written and as it is being used face the stringent requirements posed by questions such as: Does the training deal with the problem it is supposed to? Would it work in the real world? Did the needs analysis and the program developers ask the right questions in the first place?

Unless a program is monitored during initial implementation as well as throughout its use, program effectiveness may be subtly shifted and because of other constraints, replaced by organizational efficiency. To prevent this, two types of evaluation have been developed and are recommended in the scientific literature: summative and formative evaluation.

Summative evaluation, the more common approach to program evaluation, provides a summary statement about the general effectiveness of a program.

RIFLE MARKSMANSHIP TRAINING

Step 1

VALUES OR NEEDS

Military Preparedness
A nation of competent
shooters
A corps of civilian and/or
military instructors
Skilled shooters in the
military

PROGRAM REVISIONS

Make the necessary
program changes

SPECIFIC GOALS

Improved Basic Rifle
Marksmanship in the
Army
(Initial entry training level)

FEEDBACK DISCRIMINATION

& COMMUNICATION NETWORK

What changes needed?
Where in the system?

PROGRAM REQUIREMENTS

Improve skill and
confidence, raise
qualification standards

PROGRAM EVALUATION

Quality shooters in
military? Is Army
marksmanship improved?
Skill and confidence
better? Problems
eliminated? Is program
practical & manageable?

PROGRAM DESIGN

Eliminate problems
in fundamentals, in
diagnosis & remediation
and in transition to
combat firing

PROGRAM IMPLEMENTATION

How to train, what
compromises, costs,
hours, use of devices,
etc.

Figure 1. A systems approach to program development.

The primary goal is to determine whether a program is achieving its intended purpose, e.g., are soldiers who have completed the BRM POI accurate shooters? This type of evaluation is performed only after the program has had sufficient time to correct problems and function smoothly. Used primarily for reporting purposes, a summative evaluation that uses a highly credible design and valid measures of outcomes constitutes a research study (Morris and Fitz-Gibbon, 1978).

Formative evaluation, developed for use throughout the entire implementation process, is a proactive mode of management that provides a means for systematically checking on both efficiency and effectiveness. Formative evaluators systematically monitor program activities, periodically test for progress in achievement, look out for potential problems, and identify areas where the program needs improvement (Morris & Fitz-Gibbons, 1978). This permits identification of any program components that are becoming disassociated from their underlying rationale. Additionally, mechanisms for systematic feedback from users (e.g., trainers and their commanders) are provided so that questions or reservations about the entire POI or its components can be frankly expressed, permitting identification and provision of needed explanations concerning program rationale.

The shift toward inappropriate use of pop-up targets indicates that formative evaluation in the form of periodic checks should continue throughout the life of a POI rather than ending after the summative evaluation. Even though both efficiency and effectiveness are being maintained at the time of the summative evaluation, which usually occurs after the program has time to function smoothly, inappropriate shifts in the use of program components can occur at a later time. At whatever point in the life-cycle of a program, all proposed changes need to be evaluated in light of (a) the organizational needs and values that provided impetus for the program and (b) the underlying rationale for the program component under consideration.

Duplication of Effort Across the Change Process Phases

The current decentralized management of the change (ISD) process requires numerous persons responsible for management of the respective phases to acquire extensive knowledge of POI purpose, tasks, conditions, standards, and underlying rationale. Again using the BRM POI as a specific example, extensive knowledge of the POI was necessary for personnel in the Systems Division of DTD since they requested anticipated POI deviations, and made decisions concerning deviation acceptability. Additionally, at an IET Conference, November 1980, the Systems Division briefed the new BRM POI, including a presentation of the validating research and a comparison of the new BRM POI with the then current POI. In March 1981, at a second IET Conference, the Systems Division presented requested POI deviations and responded on their acceptability. At the request of two ATCs (Fort Leonard Wood, MO, and Fort Dix, NJ) the BRM POI project officer in the Systems Division traveled with ARI-Fort Benning representatives to those ATCs to discuss the BRM POI and its implementation.

Extensive knowledge of the BRM POI was also needed by personnel within the Enlisted Division of DTD, USAIS, for two reasons. One, the BRM POI is part of a new IET POI. Personnel in the Enlisted Division of DTD worked with TRADOC HQ to organize two IET Conferences. A representative of this division served on a TRADOC IET team which inspected IET program implementation at the ATCs during Spring, 1981. All members of this team needed expert knowledge of the BRM POI. Two, the IET Division of DTD has responsibility for the POIs for ANCOC, BNCOC, and PNCOC. Full implementation of the BRM POI requires that these POIs be coordinated with the new BRM POI.

Personnel in DOES, USAIS, will need extensive knowledge of the BRM POI to effectively carry out their mission of program evaluation and standardization.

Managerial Implications. There are advantages to having numerous personnel within USAIS and TRADOC HQ with in-depth knowledge of a POI or other R&D product, but the cost-effectiveness of such an approach must be a considered. In a situation characterized by manpower shortages, heavy workloads, and high personnel turbulence, the cost is high, although it may not manifest itself directly or immediately. For example, personnel with heavy workloads may obtain only enough knowledge to "get by," which may lead to concurrence with suggested modification that function to impair short-term or long-term effectiveness of the POI.

A possible solution is found in an approach known as "cradle to grave" management (Montjoy & Holley, 1980). Used in Air Force base contracting for large-dollar contracts that require extensive specialized knowledge and complex administration, one person has responsibility for the contract from beginning (cradle) to end (grave). With the person who wrote the contract also administering it, the problem of duplication of learning effort is avoided.

For R&D products of the importance and complexity of the BRM POI "cradle to grave" responsibility could be tasked to one organizational unit. That organizational unit would be responsible for managing all phases of the change

process: needs analysis, design, development, implementation, and control. The control phase would include formative evaluation, but not summative evaluation. Summative evaluation needs to be performed by an agency other than the developer.

This approach would insure that program evaluation is grounded in the originating needs and values, providing a safeguard against efficiency overshadowing effectiveness. Additionally, it would reduce the observed duplication of effort across phases of the change process. An organizational unit with this responsibility would need the budgetary and manpower resources necessary to carry out its mission effectively. While this may appear expensive, the cost must be evaluated against the cost-effectiveness of the current procedures.

Duplication of learning would still exist. That is, many Army personnel would have knowledge of the POI tasks, conditions, standards, and underlying rationales. But it would be personnel who most need in-depth knowledge of the POI in order to carry out their job responsibilities.

DECENTRALIZED MANAGEMENT OF THE IMPLEMENTATION PHASE

Management of the BRM POI implementation phase was decentralized. Following delivery of the formal requirement for BRM POI implementation at the ATCs, a decentralized organizational structure with few formalized processes emerged. Decentralized management during implementation and sustainment of a POI may have costly negative consequences. One possible explanation for this is found in the increased coordination required by decentralization. In a situation with manpower shortages and work overloads, there simply may not be enough time to perform the necessary coordination. In an organization with a high rate of personnel turbulence, there may not be adequate breadth of knowledge concerning organizational policies and processes for achieving coordination nor sufficient understanding of the coordination needs of a given POI.

Another possible negative consequence of decentralized management of the implementation phase has been identified by social psychologists. Darley & Latane (1970) described an undesirable phenomenon known as "diffusion of responsibility," which is likely to occur in situations where no one person has the clearly designated responsibility for providing acutely needed help. Research findings indicate that in such cases personal responsibility for helping is not likely to be assumed by anyone, and the needed help probably will not be forthcoming. While these results need additional testing to establish generalizability to organizational processes, observations made during BRM POI implementation suggest that decentralization of management and diffusion of responsibility produce analogous results. Each division or agency may assume that other divisions and agencies are taking care of needed implementation tasks. Each person is likely to do only his assigned tasks leaving overall implementation management unattended. Further, and equally detrimental, each person may assume that assigned tasks, policies, and procedures, as they currently stand, will adequately accomplish R&D product implementation and sustainment when, in fact, they may not be adequate because of unique characteristics of a given product, wide-spread effects of the product across Army agencies, and other variables unique to the training environment at the time. The results can be problems that unnecessarily delay, impair, or threaten to degrade the demonstrated effectiveness of an R&D product.

Negative consequences of decentralized management observed during the BRM POI implementation were (a) duplication of effort among using agencies, (b) over-reliance on traditional implementation procedures, (c) suboptimal coordination across all affected Army agencies, and (d) suboptimal use of developer expertise.

Duplication of Effort Among Using Agencies

The wide-spread effects of BRM POI implementation together with decentralized management of the implementation phase resulted in several tasks being repeated at numerous places throughout the Army. Two selected examples will be discussed: the development of training for resident range personnel (Infantry Training Brigade and Infantry Training Group/Committee) and the preparation and delivery of briefings on the BRM POI.

These examples were selected because of their relationship to standardization and their critical role in BRM POI implementation and sustainment success. Additionally, they demonstrate ways in which higher command leadership can significantly facilitate timely, standardized implementation.

Development of Training for Resident Range Personnel. The BRM POI was specifically designed to give each IET soldier direct feedback on his shooting performance, thereby providing opportunity for independent learning. Even so, range personnel have a critical role in determining IET soldiers' shooting performance. The BRM POI makes great demands on trainers in terms of required knowledge, skills, and abilities.

After participating in an earlier (1978) BRM POI, ARI researchers concluded that the most serious instructional problem was a general lack of knowledge in marksmanship fundamentals on the part of the committee group and drill sergeant instructors, who had "come through a similar thin, non-instructional, non-feedback marksmanship program themselves. They had not seen firsthand the downrange effects of their bullets, and had received little, if any, instruction in how to teach BRM" (Smith & Osborne, 1981). ARI researchers concluded that the necessary experiences and knowledge required of US Army marksmanship program trainers did not exist to permit the new program to go to the field without resident cadre/committee group training (Osborne, Schroeder, & Heller 1980).

Four apparent options were available to the Army for providing needed training prior to POI use at each ATC:

- (1) Assume that any trainer ought to be able to read the BRM POI materials and then, on his own, identify and develop the necessary knowledge, skills, and abilities.
- (2) Assume any company commander ought to be able to read the BRM POI materials and then, on his own, develop and supervise a training program for trainers under his command.
- (3) Assume that each ATC will identify all personnel needing training, identify knowledge, skills, and abilities to be trained, and develop the necessary training.
- (4) Develop a standardized training program to be exported to using agencies (i.e., ATCs) that is based on a professional job analysis that utilizes technical assistance of educational and marksmanship experts as well as available technologies such as videotapes.

Because of the professionalism of individual trainers and their company commanders, they can be relied on to produce the best possible "Train the Trainer" program given time and resource constraints. However, the landmark study by Gross, Giacquinta, and Bernstein (1971) clearly demonstrated that leaving individuals or their commanders to identify knowledge, skills, and abilities required of trainers by a new program and to develop a training

program that would insure their achievement is not the best implementation procedure. Specifically they found that this procedure ignores the need of stimulating and professional leadership from higher management when subordinates, even professional ones, are learning new behaviors. Additionally, higher levels of management (e.g., HQ MACOM, USAIS) have access to resources not available to individuals and their commanders, and in some instances, not available to ATCs. Developed by higher levels of management, the training program could be based on a professionally developed job analysis, allowing minimum qualification standards for trainers to be set. Educational experts could serve as technical assistants in the selection of training methods (videotape lessons, TEC lessons, films, hands-on experience) and in the development of tests to challenge the knowledge of trainers in marksmanship and in teaching marksmanship. POI developers and proponents could provide input on training content. While each ATC may have the capacity for producing a "Train the Trainer" program, the questions of standardization and cost-effectiveness argue for one effort to be exported Army-wide. Development of such training programs for trainers can begin as soon as the POI is officially approved by the proponent, facilitating the earliest possible implementation.

Preparation of Briefings. Briefings on the new BRM POI were given at all hierarchical levels of the Army's organizational structure, including a TRADOC General Officers Meeting and IET Conferences. Within the ATCs, briefings were given to key commanders and personnel in Infantry Training Brigades and Infantry Training Committees/Groups. Initial briefings can serve critical educative and persuasive functions. The education is necessary to insure product standardization and to facilitate timely implementation. Successful persuasion is especially important when initial attitudes toward a product are being formed. Negative attitudes will be difficult, if not impossible, to change. At whatever organizational level they exist, negative attitudes can function to impair implementation and sustainment. Additionally, for the BRM POI, much of the information could be more rapidly assimilated if presented visually (e.g., slides, videotape) as well as verbally. For example, new silhouette targets, arrangement of firing lanes, and new training aids could be more rapidly and accurately understood if visually presented.

Given the important role and high frequency of initial briefings, development of a standardized briefing appears warranted and cost-effective. When rapid and accurate understanding of a R&D product would be greatly facilitated by visual information, development of an audiovisual briefing appears efficacious.

Over-reliance on Traditional Implementation Procedures

Decentralization of management during the implementation phase placed primary reliance for implementation on the formal requirement and official changes in relevant field manuals (FMs) and POIs. This is in keeping with a traditional view of management held not only by the Army but by many academicians, organizational consultants, and organizational managers. Until recently, it was widely assumed that given a formal requirement, subordinate managers and other workers would implement a change in conformity with higher management intentions. A formal requirement does have a critical role in

determining utilization of an R&D product (Zaltman, 1973; Scott, 1980), but its limitations also need to be recognized. Although a formal requirement may constitute a necessary prerequisite for successful initiation of R&D product utilization, it is not sufficient for adequate implementation. Implicit in the assumption that subordinate managers and other workers will implement a change given a formal requirement are two additional assumptions.

The first is that if told what (e.g., tasks, conditions, and standards) to implement, subordinates will know how to implement. That is, they will know how to adequately identify and resolve issues involved in managing the change. Additionally, they will have or be able to achieve in a cost-effective, timely fashion any substantive knowledge and skills necessary to carry out the change.

The second implicit assumption is that any problem in implementing the change will be essentially one of overcoming organizational members' initial resistance to change (Gross, Giaquinta, & Bernstein, 1971). Given that any initial resistance is overcome, the change is assumed to proceed relatively smoothly.

Research evidence has seriously undermined the validity of these assumptions (Zaltman, 1973; Gross, et. al., 1971). Indications are that subordinates do not necessarily know how to adequately identify and resolve issues involved in managing the change. Nor do they necessarily have access to resources for performing managerial tasks or for obtaining substantive knowledge required for implementing a given organizational change. Further, even if subordinates initially have favorable attitudes toward a change, resistance to change can develop if significant barriers to implementation occur during the implementation process (Gross, et. al., 1971). Significant barriers to implementation identified by Gross et. al. (1971) were: (1) lack of clear understanding of the innovation, (2) teachers' lack of skills and knowledge to carry out the innovation, (3) unavailability of required materials and equipment, and (4) organizational arrangements existing prior to and during the innovation's introduction that were incompatible with the innovation.

Emphasis within the implementation literature has moved toward tailoring implementation processes to the training environment and the characteristics of the specific innovation. There was some evidence of this in the BRM POI implementation. A Trainer's Guide and a Shooter's Book were specifically designed to be used with the BRM POI. At the request of two ATCs, representatives of the developer and the proponent agencies traveled to the ATCs to facilitate implementation. Prior to implementation, a TRADOC IET inspection team visited each ATC for approximately two days.

Two additional opportunities existed to further tailor the implementation process to the training environment and the characteristics of the BRM POI. While not utilized, they demonstrate additional implementation procedures available to the Army. Scientific and applied literatures have clearly established the need for assessing the potential contribution of such methods to utilization of specific R&D products.

Model Program. The 1st Infantry Training Brigade, Fort Benning, GA, initiated the new BRM POI on 7 January 80, which was twelve months prior to implementation at Fort Leonard Wood and Fort Knox and 21 months prior to implementation at the other five ATCs. Recognizing the unique opportunity provided by the early implementation of the BRM POI in the 1st Infantry Training Brigade, ARI-Benning recommended that a BRM POI Conference be held at Fort Benning. Unfortunately, the recommendation was not implemented due to budgetary constraints and reliance on traditional implementation methods.

The value of a model program has been established. Glaser and his colleagues (1967) demonstrated that if potential users attend a conference where they can discuss an innovation and see it in operation, adoption will be significantly facilitated. This approach was especially promising because the ATCs are widely dispersed geographically. Communication decreases markedly with increasing distance, and with decreased communication comes diminished understanding, diminished trust, and greater resistance to the thrusts of the "outside" organization (Roberts and Froham, 1978). Inviting key personnel from each ATC to a conference at Fort Benning would have encouraged two-way communication between users and the proponent as well as between the users and the developer. Additionally, it would have encouraged communication among key personnel at the ATCs. This would have encouraged shared solutions to common implementation problems.

A model program also permits the use of visual as well as verbal information related to POI implementation management (e.g., arrangement of firing lanes, target placement, concurrent training station arrangements). In addition, visual information can be given on POI substantive content (e.g., effects of wind and gravity on bullet strike, use of long range sight with 25M silhouette target). Visual information would permit rapid assimilation at a critical time for facilitating implementation.

Mobile Training Team (MTT). One other implementation procedure that is especially promising in the case of widely dispersed using agencies is Mobile Training Teams (MTT), which would be TDA units responsible for (a) conducting briefings to introduce a new R&D product to key officers (i.e., Brigade Commanders and above) as well as to personnel who are the trainers (Company Commanders and Cadre) at each using organization; (b) providing technical assistance and advice to each installation on management of implementation and sustainment; (c) conducting model "Train the Trainer" programs or providing technical assistance and advice for use of self-instructing "Train the Trainer" programs; (d) monitoring implementation and sustainment and providing relevant feedback to the using agency and to higher organizational levels (e.g., HQ MACOMs, USAIS); (e) informing program proponents of improvements developed by using agencies; and (f) providing technical assistance and advice to all Army agencies affected by or involved with the implementation in order to facilitate Army-wide integration.

The knowledge, skills, and abilities required of members of a Mobile Training Team (MTT) are extensive. As an example, to qualify as a member of a MTT for the BRM POI a person would need subject matter expertise in marksmanship; history of RM training in the US Army; current RM training in other countries; tasks, conditions, standards, and underlying rationale of the

POI; validation research design and research findings; M16A1 design and capability; M16A1 ammunition design and capability; how to teach BRM in the IET environment; and management of BRM POI implementation and sustainment. Management issues include optimal utilization of range personnel, standardization of record fire scoring procedures (e.g., acceptable abilities, if any), re-cycling soldiers who do not qualify; reducing the number of soldiers who miss one or more training sessions; assistance for a soldier who has missed a session; optimal use of Weaponeer and/or other training aids; supplemental training to be provided by Infantry Training Brigade; and optimal use of concurrent training.

Equipping MTT members with such knowledge would be costly. Adding this to the cost of sending the teams to widely dispersed using agencies makes this a costly procedure (when compared with not sending the teams). But the cost of not sending them needs to be considered. The extensive knowledge and skills needed by MTT members are also the knowledge and skills needed by trainers and their commanders at using agencies. An effective way of getting it to them must be found if program implementation and sustainment are to succeed even minimally.

Suboptimal Coordination Across All Affected Army Agencies

Utilization of an R&D product may have consequences and managerial implications beyond the primary or targeted using agencies. Certainly this is true of the BRM POI. While the first major impact of the new BRM POI was on ATCs with an IET mission, its total effects are potentially much more far-reaching, including all active and Reserve Component Units and all Army Service Schools. Proactive, systematic management of these effects would optimize attainment of maximum returns from R&D investments. One, it would insure full, coordinated support of product implementation and sustainment within primary using agencies by other key Army organizations. Two, it would insure that potential contributions of the research to Army organizations other than the primary users would be identified and optimized.

Specific effects of the BRM POI beyond the ATCs are the result of:

- (1) The reciprocal relationship between BRM training and unit training.
- (2) The potential contribution of Army training programs for trainers and their commanders to BRM POI implementation and sustainment.
- (3) The need for systematic identification and correction of obsolete materials and training aids.
- (4) The usefulness of BRM training materials and aids to rifle marksmanship training throughout the Army.

Reciprocal Relationship Between BRM Training and Unit Training. Unit training builds on the BRM POI and, in turn, some soldiers who go through unit training later become IET trainers. Since the BRM POI produces soldiers with known skills, it provides a standardized base for unit marksmanship training programs. Information concerning the skill level of soldiers completing IET

must be effectively communicated to commanders of other Army MACOM and RC units in order for them to adequately assess unit training needs. While ARI-Fort Benning and DTD, USAIS, are developing a unit marksmanship POI, commanders will need an overall picture of the content and rationale of the BRM POI to fully understand and adequately use the unit program.

Because some soldiers who go through unit training later become IET trainers, coordination between BRM and unit training is needed to insure that trainers have come through a strong rifle marksmanship program themselves (Smith & Osborne, 1980). While developing the BRM POI, ARI-Benning researchers noted the general lack of knowledge and skill in marksmanship on the part of drill sergeant and committee/group personnel. This was attributed to ineffective marksmanship programs through which these personnel had come (Smith, Osborne, Thompson, 1980; Osborne, Schroeder, and Heller, 1980).

Potential Contribution of Army Training Programs for Trainers and Their Commanders to R&D Product Implementation and Sustainment. Unit training is not the only Army training program that could support the BRM POI. The critical role of trainers and their commanders in determining BRM POI success suggests that optimal implementation management would address this. Train the Trainer Programs should be developed and implemented in all officer and NCO professional development courses (Officer Basic and Advanced Courses, NCOES, Pre-Command Courses, and possible a local course at each Army Training Center). This would facilitate selection of targets for command inspection that are directly related to the primary training mission as was emphasized by GEN Meyer.

Coordination of the Pre-Command Course POI with newly developed POIs, such as the BRM POI, would significantly facilitate valid inspection target selection. Additionally, coordination between Pre-Command Courses and the organizations providing training for trainers would insure that commanders are taught to inspect the same tasks, conditions, and standards that trainers are taught to carry out. Priorities for training inspection would be in accord with priorities for training.

Having identified all relevant training agencies, major questions for implementation management are: (1) What training should these agencies provide to support the new POI? (2) When should the training be initiated for optimal support of initial POI implementation? (3) How can revision of the commander and trainer POIs be facilitated within this optimal framework? For example, the pre-command course at Fort Jackson, SC has added a two-hour unit on training inspection. Because of time limitations and the wide diversity of commands, this unit is being limited to generic issues. However, it could be supplemented with materials for specific POIs. These materials could include literature (e.g., fact sheets), audiovisuals for self-instruction, and inspection checklists. In some cases it may be efficacious to include the development of training materials for commanders and trainers in the POI developer's contract. Having the POI developer and proponent involved in the development of the training materials has the advantage of facilitating emphasis on the correct priorities since they are subject matter experts on the POI objectives, tasks, standards, and conditions.

With effective coordination of all POIs that address BRM POI subjects, these BRM standards can possibly be identified as major performance objectives for officer and NCO duty assignments and may possibly be used within Officer and NCO efficiency reporting system.

Need for Systematic Identification of and Remedial Action in Relation to All Obsolete Material and Training Aids. Observation of the BRM POI implementation revealed the need for coordination across affected Army agencies to identify all materials (e.g., TEC lessons, training aids, field manuals) that will become obsolete with the adoption of a new POI or other R&D product. A systematic search for obsolete materials and their removal or revision needs to be included in implementation management. Conversations with range personnel indicated that they experience frustration when obsolete material is not revised or removed in a timely manner. Comments made to ARI personnel indicated that range personnel are very knowledgeable about Army marksmanship documents and that they want to abide by Army doctrine. However, when obsolete materials are not revised or removed, range personnel feel caught in a bind between two or more conflicting sources of doctrine. While none of the observed frustrations was extreme, each can contribute to turning initially positive attitudes toward a POI to negative ones. Gross, et. al. (1971) clearly demonstrated that frustrations of this type can impair program effectiveness.

Usefulness of BRM Training Materials and Aids to RM Training Throughout the Army. Many of the BRM POI training procedures and aids are useful for advanced rifle marksmanship training, including but not limited to the 25 meter scaled silhouette zeroing target, other scaled silhouette targets, the Riddle device, the Paige device, and dry fire procedures. Additionally, much of the POI substantive content is directly applicable to advanced marksmanship training, including but not limited to, information on the effects of wind and gravity on bullet strike, target detection, firing with the protective mask, night firing, automatic firing, M16A1 capability, and maintenance of the M16A1 rifle. Again, proactive, systematic leadership on the part of higher management levels of the Army is needed for disseminating these materials, aids, and information throughout the Army.

Suboptimal Use of Developer Expertise

At the risk of having the authors' motives for writing this section questioned, it is nevertheless included for three compelling reasons:

- (1) An important issue concerning optimal use of developer expertise was perceived during BRM POI implementation. Because of its importance to organizational effectiveness, the Army needs to confront and resolve the issue.
- (2) The issue exists whether a R&D product is developed "in-house" (e.g., by personnel in Systems Division, DTD, USAIS) or by a Department of Defense Laboratory (e.g., ARI) or by a contractor.
- (3) Observations made during BRM POI development and implementation are relevant to the on-going discussion within the research community concerning the role of researchers in research utilization. Indications from these observations are that provision of technical assistance by researchers is not only a legitimate role, but in fact ought to be a professional responsibility. Participation in research utilization may not be as optional for the researcher as the discussion has implied.

Areas of Developer Expertise. Through their work in an area, developers tend to become experts in that area. Researchers at ARI-Benning and Litton-Mellonics (ARI-Benning contractor) became subject matter experts (SMES) in the following areas as they developed and validated the BRM POI:

- (a) rifle marksmanship and marksmanship training
- (b) rifle marksmanship ranges, targets, training aids and equipment
- (c) BRM POI tasks, conditions, standards, and the rationale underlying program components
- (d) roll of BRM POI in unit readiness and US Army military preparedness
- (e) BRM training management and instruction
- (f) M16A1 design, capability, and maintenance

These researchers also became knowledgeable about current rifle marksmanship training in the US Marines, Australia, Germany, Great Britain, and Russia.

For the Army, an important issue is how such broad, indepth knowledge can be optimally used? This expertise is of potential benefit in two obvious areas: the implementation and sustainment of the BRM POI as well as other areas where decisions are being made related to infantry rifles and marksmanship training.

Provision of technical assistance during implementation of an R&D product is recognized as a needed, legitimate role for developers. During the BRM POI implementation, however, requests and needs for technical assistance far exceeded manpower, time, and budgetary resources. Researchers at ARI found themselves in a bind similar to that faced by personnel in the Systems Division, DTD, USAIS: having completed the validation of the BRM POI, researchers needed to move on to the development and validation of other POIs, specifically in this case, the Advanced Rifle Marksmanship (ARM) and unit marksmanship POIs. However, their expertise was needed for BRM POI implementation by the ATCs. The bind was especially difficult since ARM and unit marksmanship POIs build on the BRM POI. Until the BRM POI is successfully implemented, validated ARM and unit training POIs are impaired.

ARI-Fort Benning and Systems Division, DTD, USAIS, provided extensive technical assistance during BRM POI implementation through responses to phone inquiries, publication of articles, distribution of technical reports, visits to two ATCs, and assistance with the Cadre Training Center's POI. Since there was no systematic plan for integrating their expertise into the implementation process, it is doubtful that developer expertise was optimally utilized.

Potential Uses for Developer Expertise. The expert knowledge of developers could make significant contributions to each of the four implementation processes included in the Gray and Roberts-Gray (1980) model for organizational and individual change: power, persuasion, education, and facilitation.

(a) Power. While developers have either limited or no formal command power, they have power that derives from subject matter expertise (French and Raven, 1960). This power base is very effective in "selling" or persuading users of the value of a POI. Persuasion is critical during the early stages of implementation when initial attitudes about the POI are being formed. As already noted, initial impressions may be difficult, if not impossible, to change. Developers may assist through direct contact with users or by providing technical assistance for the development of audiovisuals and other literature to be used in the numerous briefings that occur throughout all affected agencies. Additionally, developers can provide invaluable assistance in training mobile training teams (MTTs).

(b) Persuasion. Developers are thoroughly familiar with the organizational needs which provided impetus for a product, how the product meets those needs, the rationale for program components, and the research data that support the program. Questions posed to Systems, DTD, USAIS, and ARI-Fort Benning during BRM POI implementation at the ATCs indicated that this kind of information was needed by users to assess the value of the POI. For example, the position that the new qualification standard is more difficult was challenged. The lack of a reference point on the zeroing target was questioned as was the need for re-zeroing the M16A1 rifle when firing with a bipod. These questions came from dedicated, interested professionals who wanted evidence that the program had been carefully thought through and tested.

(c) Education. Developers are an excellent source of data for job analyses of trainer positions. Developers also have a valuable contribution to make when organizational policies and procedures are being designed to prevent undesirable gradual shifts in the use of program components, resulting in the components becoming ends in themselves rather than being a means to an end, such as the development of accurate shooters.

(d) Facilitation. Gray and Roberts-Gray (1980) point out that contact between the developer and the user facilitates implementation and sustainment. The large number of user-developer contacts initiated by users during the BRM POI implementation indicated that this contact needs to be systematically arranged. In scientific literature, it is recognized as a key part of formative evaluation. Another potentially valuable contribution is the development of a checklist for resident commanders to use in inspecting each period of the POI.

Developer Responsibility in Product Utilization. Events during the BRM POI implementation indicated that not only is there a need for developers to be available to assist during implementation, but they may in fact have a responsibility for taking a proactive role. In developing and validating the BRM POI, ARI researchers became aware of the need for several managerial actions that could significantly contribute to implementation and sustainment success. Three examples are clarification of the roles of Drill Sergeants and Infantry Training Group/Committee personnel, intensive training for all range personnel prior to POI implementation at the ATCs, and the use of Fort Benning as a model program. Seeing the critical facilitating role of these actions, ARI researchers actively communicated the need for them to the POI proponent through letters (see Appendix B), technical reports, verbal suggestions, and an informal paper. Because of budget and manpower constraints as well as reliance on traditional implementation procedures, ARI's suggestions were not utilized.

While a systematic procedure for overall implementation and sustainment management at higher organizational levels would help assure that such needs are identified and responded to in a timely manner, it may be that researchers need to use even more effective means of communications with R&D product proponents and users. One powerful potential is the staff study, a traditional method within the Army for making recommendations to a commander.

The staff study (FM 101-5) presents in concise form the problem, assumptions, facts bearing on the problem, discussion, conclusions, and action recommended. These are supported by documentation in annexes. The commander, if concurring, can immediately "sign off" on the recommendation, which is the authorization needed to bring about the recommended action. An obvious strength of this approach is that the researcher has presented the recommendation in the Army's decision making language and format. The preparation of staff studies is clearly outside the traditional role of researchers, but researchers need to re-evaluate their role and responsibilities when the research has been designed to solve an operational problem and when researchers develop expertise and insights that can contribute, not only to successful utilization of their research, but to total organizational effectiveness.

Observation of the BRM POI implementation revealed that, in this case at least, developers become subject matter experts (SMEs) in several areas and are qualified to make valuable contributions to the Army, not only in POI implementation and sustainment, but also in other areas. Given this, it is hard to justify removing developers from a project immediately after the product development is completed. It is probable that the need for researcher expertise will be high whenever the research is conducted to solve an operational problem. sufficient time and funding need to be included either in the researcher's contract or the developer's job description to permit full utilization of this expertise.

DISCUSSION

Throughout this report information, whether from observations of the BRM POI change process or from the scientific and applied literatures, has pointed toward two related conclusions. One is the need for centralized management of R&D product development and utilization, including in particular the implementation phase. The second is the critical role of higher organizational levels in the management of the entire process and of every phase of the process. The advocated proactive role by higher management need not diminish the local command authority of using agencies; in fact, it probably will have the exact opposite result. It will likely strengthen and support local command. Following issuance of a formal requirement for implementation, centralized management could be retained by higher organizational management. However, implementation processes other than power ones can then be used, specifically educative, persuasive, and facilitative processes. This is not to say that "power" processes will no longer be needed or recommended. They may be critical. However, utilization of educative, persuasive, and facilitative management processes will decrease the probability that additional power processes will be needed. The point being made here is that management processes and necessary resources should be made available to permit strong leadership from higher management throughout the entire change process, and this, in turn, strengthens local command.

One other issue important to the Army is that of who should be responsible for centralized management of R&D product development and utilization.

In their model of organizational and individual change developed for the Army unit training environment, Gray and Roberts-Gray (1980) assume that the developer or the sponsor will function as implementation manager or "change agent." Their model further assumes that the developer or the sponsor of an innovation has the resources and discretion to act as an effective change agent. Observations made during the BRM POI implementation revealed that this assumption may not be justified. Neither the developer, ARI-Fort Benning, nor the proponent, USAIS, had the funds, manpower, or discretion to engage in the needed broad-scale implementation processes. DTD, USAIS, has limited personnel who are responsible for producing numerous POIs and carrying out many other actions. Having produced a POI, personnel experience continuous, urgent pressure and incentives to move on to producing others. At best limited funds can be converted to implementation support. Given the widespread effects of the BRM POI across MACOMs and the resulting complex management requirements, it is doubtful that the developer or proponent will be given the broad resource allocation and decision making authority necessary to act as an effective agent.

A possible solution to the problem of assigning responsibility for management of R&D product development and utilization will be provided to demonstrate possibilities available to the Army. This particular one provides a means for working through recognized command structure. As described, it is an elaborate procedure, but it can be modified to fit a particular R&D product and the relevant organizational structure.

The approach, reported by Roberts and Frohman (1978) has been modified for the Army training system. A representative of the proponent (e.g., project manager) serves as manager or "change agent" and has the clearly designated responsibility for overseeing and coordinating the total change process. The project manager heads a team composed of working-level members (e.g., BRM Chiefs) from each affected agency (ATCs). The project manager reports to a coordinating board on which sits one high-ranking member from each affected agency (e.g., ATC). Each agency's board representative is someone with broad resource allocation and decision making authority. The coordinating board would meet periodically during all phases of the change process to review progress and revise milestones.

The structure of this approach would need to be varied as a function of the number of affected MACOMs and the inter-relationships of affected agencies within MACOMs. In the case of the BRM POI the project manager would have worked with a coordinating board for each affected MACOM. More than one team composed of working-level members might be needed. This procedure centralizes management. It provides a formal organizational structure and processes for identification and minimization, if not elimination, of potential barriers to product development implementation, and sustainment at both higher organizational levels and within using agencies. It would also facilitate the earliest possible implementation.

APPENDIX A

POI IMPLEMENTATION AND SUSTAINMENT CHECKLIST

POI IMPLEMENTATION AND SUSTAINMENT CHECKLIST

Objectives:

1. To insure timely, standardized, successful initial implementation.
2. To insure full, coordinated support of initial program implementation and sustainment of that program at primary using agencies.
3. To optimize contributions of the program and its supporting research to all Army agencies.

Implementation at Primary Using Agencies:

1. Provide adequate initial communication about the new POI.
 - a. Provide communication that will "sell" the new POI as personnel are forming initial attitudes about it.
 - b. Arrange for two-way communication between developers/proponents and using agencies.
 - c. Arrange for communication among key personnel at using agencies to facilitate sharing solutions to common implementation problems.
 - d. Utilize available implementation techniques such as model programs and mobile training teams.
2. Identify and produce needed supplemental materials for commanders, trainers, and soldiers (e.g., Trainer's Guide, Shooter's Book).
3. Identify implementation management issues and provide suggestions to appropriate personnel at using agencies:
 - a. Facilities required; modifications needed in current facilities.
 - b. Manpower utilization alternatives (e.g., assign committee group personnel to a specific range or have them move with the soldiers from range to range).
 - c. Materials, training aids, and equipment required.
 - (1) How and when these can be obtained.
 - (2) Amounts needed (e.g., number of zeroing targets per 1000 soldiers).
 - d. Optimal use of training aids (e.g., Weaponeer, Riddle device).

- e. Reducing number of soldiers who miss one or more training sessions. Assistance for soldiers who do miss sessions.
 - f. Management for soldiers who are unsuccessful in the program.
 - g. Scheduling training sessions.
4. Provide training for resident commanders by developing a standardized briefing to be exported to using agencies. Emphasize:
- (1) Purpose of POI
 - (2) Rationale underlying program components
 - (3) Training inspection priorities
5. Provide a training inspection checklist for each POI session.
6. Provide self-instructing, audiovisual training for resident trainers. Emphasize:
- (1) New POI substantive content
 - (2) How to teach in the specific training environment
7. Insure that trainers and commanders assigned in the future will be qualified in the new POI.
- a. As soon as the new POI has been adopted, identify all Army agencies that need to be coordinated with the new POI (e.g., Pre-Command Course, Drill Sergeant Schools, ANCOC, BNCOC, PNCOC, unit training).
 - b. Notify personnel responsible for trainer/commander POIs of the need for revision.
 - c. Supply information and other support to get trainer/commander POIs revised in a timely manner, preferably some time prior to the initial implementation date for the new POI.
 - d. Supply appropriate support materials for the trainer/commander POIs, such as fact sheets and training inspection checklists. Audiovisuals developed for resident trainers and commanders could easily be edited for use in trainer/commander training agencies.
8. Arrange for formative evaluation during implementation and sustainment. Formative evaluation should:
- a. Systematically monitor the program at all using agencies.

- b. Periodically test for progress in achievement (e.g., Are soldiers shooting more accurately?).
 - c. Look out for potential problems (e.g., Are required training aids available? Is efficiency overshadowing effectiveness? Are program components becoming "an end in themselves?").
 - d. Identify areas where the program needs improvement (Is some session or program component not working out as expected?).
9. Identify and appropriately correct (remove, revise, modify) all obsolete information, materials, and training aids (e.g., TEC lessons, field manuals, old Paige devices, shot group diagnosis cards). This action is most effectively accomplished prior to initial implementation of the POI at using agencies.
10. Arrange for an external audit (summative evaluation) of the program by DOES after the program has had time to correct problems and function smoothly.

Utilization in Other Army Agencies:

Identify and disseminate information, materials, and training aids resulting from development of the new POI to Army agencies other than the primary users that can benefit from them.

APPENDIX B

SUGGESTIONS FOR FIELD IMPLEMENTATION OF THE
M16A1 RIFLE MARKSMANSHIP TRAINING PROGRAM

13 June 1980

MEMORANDUM FOR RECORD

SUBJECT: Suggestions for Field Implementation of the M16A1 Rifle Marksmanship Training Program

1. ARI-Benning's role in implementing the new marksmanship program is rapidly diminishing, but we wish to call attention to some of the details of implementation that might be overlooked.

2. Program Implementation at the Army Training Centers.

a. ARI-Benning suggests that the best way to guarantee rapid and effective implementation of the new marksmanship program is: 1) to bring relevant personnel from the other eight Army Training Centers (ATC) conducting Initial Entry Training to Fort Benning to observe the "model" program in operation at the Infantry Training Brigade, 2) to train them in all features of the new program and 3) to send them back to their posts with full packets of implementing information (procedures, training scripts, range modifications, target samples, etc.). It is our feeling that without proper orientation, under controlled conditions at Fort Benning, many of the beneficial effects of the new program could be lost as it is fielded. Each ATC or similar user will make necessary local decisions to place the program into operation on existing ranges. Our concern is that USAIS, through indoctrination of cadre members from user installations, teach the basic concepts of the program to minimize improper decisions.

b. The advantages of the new program are based, in part, on an instructor cadre of professionals who understand the concepts of rifle marksmanship and who are able to transmit them to trainees. To be candid, the necessary experience and knowledge required of US Army marksmanship instructors does not exist in sufficient quantity to permit the new program to go to the field without resident cadre training. The new instructor's manual has been designed to fill the knowledge gap that has developed over the last fifteen or more years. The instructor's manual cannot fill the gap by itself. The experience we've had with committee group personnel suggests that instructors, while motivated, need considerable attention and practice to attain the skills necessary to train marksmen.

c. We are aware that very limited training time and resources are available to produce US Army marksmen, however, adequately prepared instructors are critical to efficient and effective expenditure of these resources. Those marksmanship personnel brought to and trained at Fort Benning could become instructors in a "train the trainer" program back at their posts and could save a great deal of travel by Fort Benning personnel trying to get the new marksmanship program operational.

PERI-IJ

13 June 1980

SUBJECT: Suggestions for Field Implementation of the M16A1 Rifle Marksmanship Training Program

3. Additional Program Support.

a. Manuals are already being revised to bring them into accord with the new program but there are clear media implications that should be thought through. What are the best ways to get material across to the student? Should films of any program parts be prepared (e.g., capability of the weapon, assembly/disassembly, firing positions)?

b. Another important area is what corrections are needed in current TEC lessons (and other exportable training materials) and what new material should be developed to support the new marksmanship program.

c. Care needs to be taken to insure that each training course that deals with marksmanship or its training is corrected/modified to agree with the new program.

4. ARI has few resources to aid in carrying out any of this work but would willingly advise on such matters within our expertise. We would also appreciate the opportunity to review any new or revised products to aid in achieving program consistency and continuity.



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GLOSSARY

BRM	Basic rifle marksmanship
POI	Program of instruction
ARI	US Army Research Institute for the Behavioral and Social Sciences
ARI-Benning	US Army Research Institute Field Unit, Fort Benning, GA
R&D	Research and development
TRADOC	US Army Training and Doctrine Command
FORSCOM	US Army Forces Command
MACOM	Major commands of US Army such as TRADOC and FORSCOM
HQ	Headquarters
USAIS	US Army Infantry School
IET	Initial Entry Training
RM	Rifle Marksmanship - This includes fundamentals, knowledge, skill and abilities
URM	Unit Rifle Marksmanship
ARM	Advanced rifle marksmanship
ATCs	US Army Training Centers which include Forts Benning, GA; Bliss, TX; Dix, NJ; Gordon, GA; Jackson, SC; Knox, KY; Leonard Wood, MO; McClellan, AL; and Sill, OK.
MTT	Mobile Training Team. A concept introduced in the report. Modeled after NETT (New Equipment Training Team), these teams would be TDA units responsible for providing extensive expert assistance with the implementation and sustainment of an R&D product.
DTD	Directorate of Training Development, USAIS
ISD	Instructional systems Development, the organizational change model which guides research development and utilization within USAIS. The model has five phases: analysis, design, development, implementation, and control.
DEV	Directorate of Evaluation, USAIS. While this Directorate is now the Directorate of Evaluation and Standardication (DOES), at the time of the BRM POI implementation at the ATCs it was DEV.

DOES Directorate of Evaluation and Standardization. See DEV.
DA Department of the Army.
CTC Cadre Training Center