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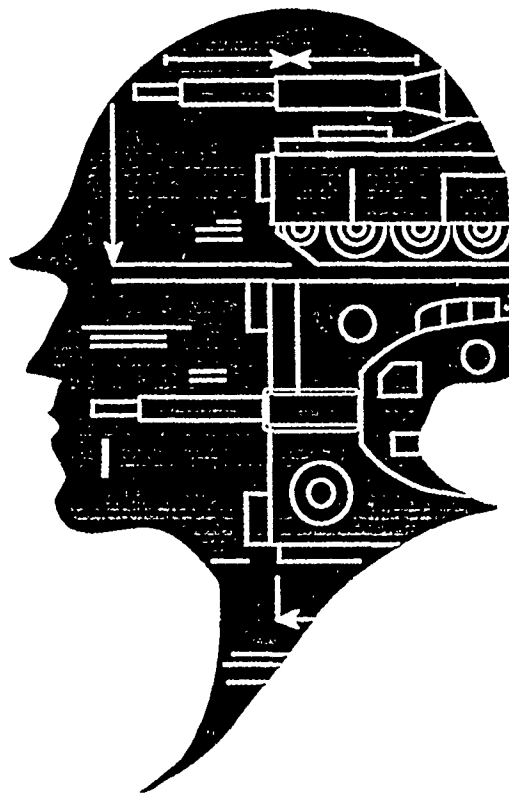
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August 1990

MANPRINT

Practitioner's Guide



Office of the Deputy Chief of Staff for Personnel

August 1990

MANPRINT Practitioner's Guide

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Background

With the introduction of the "volunteer Army" and a reduction in manning levels, the Army began to rely more heavily on technology as a force multiplier. It soon became apparent that technology for technology's sake was not the answer. If high-tech weapon systems are not used wisely, they can overburden the soldier and detract from force effectiveness. Studies indicate that half of equipment malfunctions can be traced to human error. Recent investigations have revealed the real culprit: insufficient attention given to soldier performance during system design and development.

The Army recognized the growing mismatch between soldiers and the equipment they were expected to operate and maintain. In 1984, the Manpower and Personnel Integration (MANPRINT) program was initiated to influence materiel system design by considering soldier capabilities and limitations as integral elements of total system performance. MANPRINT (which is addressed in terms of manpower, personnel, training, safety, health hazards, and human factors) supports the Army's requirements and constraints as they pertain to soldier performance capabilities for the system under development. The system's MANPRINT goals and constraints are identified and managed by the System MANPRINT Management Plan (SMMP) and are included in requirement and solicitation documents. Army Regulation 602-2, MANPRINT in the Materiel Acquisition Process, describes the program policies and procedures.

In December 1988, Department of Defense Directive 5000.53, Manpower, Personnel, Training and Safety (MPTS) in the Defense System Acquisition Process, was published and formally tasked DOD components to establish the methods and means to conduct MPTS analyses along with other system design criteria. It further established the requirement to report the manpower projections for major defense programs. Subsequent changes to DOD Directive 5000.1 and DOD Instruction 5000.2 incorporated these taskings.

The *MANPRINT Practitioner's Guide* Approach

The *MANPRINT Practitioner's Guide* addresses how MANPRINT applies to a system as it proceeds through each phase of its developmental life cycle. The purpose of the guide is to clarify the MANPRINT approach and its application in the materiel acquisition process. It is not intended to provide specific wording or to supplant specific advice available from subject-matter experts. Extensive references and a selected reading list are located at the end of this handbook to guide the practitioner to more detailed publications.

1.1 Purpose

The *MANPRINT Practitioner's Guide* is a practical reference for the development and application of the Army's Manpower and Personnel Integration (MANPRINT) program in the materiel acquisition process. This guide, which considers all stages of the MANPRINT process in both the traditional development and alternative acquisition strategies, will aid users in understanding:

- the concept of total system performance and the resulting requirements and constraints from a MANPRINT perspective;
- the issues for the six MANPRINT domains that affect those performance requirements and constraints;
- how MANPRINT is developed and applied throughout the acquisition process.

This guide provides a summary of the MANPRINT process, and cites extensive references for more detailed information. Although it reflects the most recent information available, it does not supersede current published policies.

1.2 Applicability

The proponent for this guide, and for the MANPRINT Program, is the MANPRINT Directorate, Office of the Deputy Chief of Staff for Personnel (ODCSPER). Successful MANPRINT implementation, however, requires the coordinated efforts of the Training and Doctrine Command (TRADOC), the Army Materiel Command (AMC), and the Program Executive Officer (PEO)/Program Manager (PM). Therefore, this guide has been written to address responsibilities from all perspectives.

1.3 Terms, Acronyms, and References

- **Terms and Definitions.** Key MANPRINT and MANPRINT-related terms are explained as they are introduced in the body of the text. Expanded definitions can be found in Appendix A.
- **Acronyms and Abbreviations.** A complete listing of the acronyms used throughout this guide can be found in Appendix B. Acronyms, where applicable, are cross-indexed to the glossary.

- **References and Selected Reading List**

Key references are listed at the end of each chapter. A consolidated listing of references used in developing this guide and related materials is contained in Appendix C, along with information on how to obtain the publications listed.

1.4 Guide Description

This guide is designed to show how MANPRINT can be developed and applied during the normal evolution of the acquisition process, from initial identification of a materiel need during preprogram activities, through follow-on test and evaluation in the Full Rate Production and Initial Deployment Phase, to evaluation and assessment in the Operation and Support Phase. Alternative acquisition strategies requiring greater detail are discussed in separate sections.

Because many acquisition strategies are possible, no section is comprehensive. Instead, a summary of MANPRINT-related activities is presented to describe the process, with extensive references to guiding policies and other publications which detail specific methodologies.

1.5 Chapter References

References used within each chapter will be cited by a book symbol and a number referring to the reference section located at the end of each chapter. (See example below.)



Reference 1a.

In this example, the reference (1a) refers to the chapter reference block at the end of Chapter 1, and specifies reference listing "a."

The end of each chapter will contain the appropriate references and related-reading materials for additional information.

2.1 What is MANPRINT?

2.1.1 MANPRINT Defined

The Regulatory Approach:

The Army's MANPRINT Program is governed by AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process. This regulation defines MANPRINT as a "comprehensive management and technical effort to assure total system effectiveness by continuous integration into materiel development and acquisition of all relevant information concerning manpower, personnel, training, human factors engineering, system safety, and health hazards."

The Practical Approach:

MANPRINT, in practice, is the recognition that the capabilities and limitations of the soldiers who operate, maintain, and support Army equipment must be an important consideration when designing or selecting hardware. MANPRINT achieves this objective by focusing attention on soldier performance as an integral part of total system performance and emphasizing front-end planning to achieve an optimum soldier-materiel system balance during the acquisition process.



Reference 2a.

2.1.2 MANPRINT Facts and Fiction

- *MANPRINT is a new idea.*

Fact: MANPRINT is not a new idea...it is a new program. Many MANPRINT goals have always been a part of the acquisition process, but have been overshadowed by the rush to capitalize on advances in technology and the increasing emphasis on cost. In the midst of this modernization effort, the soldier and his abilities and limitations did not receive sufficient attention by the system designer.

While the components of MANPRINT have been in place for some time, there are new ideas about integration that are woven into the MANPRINT philosophy. This fresh approach is supported by regulation (AR 602-2), a management document (the System MANPRINT Management Plan), an increased emphasis on front-end performance planning to control the impact of the new system on the soldier, and a requirement to recognize and integrate the six MANPRINT domains.

- *MANPRINT will increase program costs.*

Fact: MANPRINT's emphasis on front-end planning requires more analysis early in acquisition process to identify the deficiencies in the current system, and the projected impact of the new system on the soldier. These analyses may add to initial or start-up program costs in dollars and manpower.

In the long run, however, the MANPRINT program saves money. When the equipment is designed and built right the first time, costly retrofits and equipment modifications will be reduced or eliminated. Additionally, if the new equipment is easier to operate and maintain, the operation and support (O&S) costs will be reduced and system performance will be enhanced.

- *MANPRINT is derived from requirements imposed by Congress.*

Fact: It is true that Congress and the Government Accounting Office (GAO) have been critical of systems that prove costly in terms of MPT - Manpower (increases in the number of soldiers required to operate or maintain a system), Personnel (increases in the abilities of soldiers required to operate or maintain a system), and Training (increases in the time and cost it takes to teach a soldier how to operate or maintain a system). As a result, manpower impacts for major defense system must be reported to Congress prior to Milestone II or II Decision Reviews. However, the MANPRINT program was initiated prior to formal Congressional requirements and reflects concern for total system performance and the impact of system design on MPT resources.

The emphasis of MANPRINT is to design or select equipment that will achieve required system performance standards by considering soldier's capabilities and limitations.



Reference 2b.

- *MANPRINT is a cure-all approach.*

Fact: MANPRINT is an option-oriented approach. It recognizes that every system will require a compromise among the many factors (costs, time, user-needs, lethality, vulnerability, reliability, maintainability, etc.). MANPRINT includes the soldier (operators, maintainers, and supporters) as a factor so that optimum system performance can be achieved.

- *MANPRINT duplicates other acquisition-reform programs.*

Fact: MANPRINT complements other acquisition reform programs. The MANPRINT program grew out of a recognized need that was not being answered by any other existing program. MANPRINT addresses two major weaknesses of the current acquisition process: (1) No materiel acquisition requirement or program document provides an insight on what soldiers can or cannot do, and (2) there is no management visibility for controlling the impact on the soldier of fielding a new material system.

MANPRINT is often referred to as an “umbrella concept” because it encompasses the domains of manpower, personnel, training, human factors engineering, system safety, and health hazards from the perspective of their impact on soldier performance. It does not replace the need for an active human factors, training, or safety program within the materiel acquisition process.

2.2 The MANPRINT Domains

Soldier performance is addressed in MANPRINT through six domains: manpower, personnel, training, human factors engineering, system safety, and health hazards. To understand MANPRINT requires a knowledge of what each domain entails and how each impacts on soldier and system performance.

2.2.1 Manpower

Manpower addresses the affordability of fielding a new materiel system in terms of the Army’s military and civilian human resources. Manpower includes the numbers (reflected in spaces) and structure (reflected in organizational relationships) of people needed to operate, maintain, or support a new materiel system. Manpower changes are determined by comparing the workload and the technical skills required by the new system with those of the system being replaced. If the new materiel system requires an increase in the number or type of spaces, then modifications to the system design, organization, or doctrine may be required.



Reference 2c.

2.2.2 Personnel

Personnel refers to the quality of the soldiers and civilians required to operate, maintain, or support a new Army materiel system. From a MANPRINT perspective, it considers the Army’s ability to provide qualified people with specific capabilities, experience, and other human characteristics. Such an evaluation begins with a detailed assessment of the aptitudes of the soldiers expected to be in the Army at the time when the new item of equipment is to be fielded. Soldier aptitudes are measured by a standardized test called the Armed Services Vocational Aptitude Battery. Soldier aptitude must be an integral part of total system performance and should be considered early on in equipment design and selection. Ideally, a new system will be configured specifically to accommodate the capabilities of personnel projected to be available. Personnel assessments should also consider the availability and capability of the Army’s personnel management system to provide the right number of qualified personnel at the right place and the right time within established constraints and priorities.



Reference 2d.

2.2.3 Training

Training considers the time and cost required to provide the necessary skills and knowledge to qualify Army personnel for operation, maintenance, or support of a new materiel system. This includes the ability of the Army's training base to support the entry-level training requirements of the new system, as well as the ability to conduct sustainment training in the field. Training includes the formulation and selection of engineering design alternatives which are supportable from a training perspective, the documentation of training strategies, and the timely determination of training resource requirements to support the fielding of the new system.



Reference 2e and f.

2.2.4 Human Factors Engineering

Human factors engineering (HFE) is the technical effort to integrate design criteria, psychological principles, and human capabilities as they relate to the design, development, test, and evaluation of systems. The HFE goal is to maximize the ability of the soldier to perform at required levels by eliminating design-induced error. HFE provides the interface between the six MANPRINT domains and system engineers, while MANPRINT stresses the integration of soldier performance issues throughout the entire materiel acquisition process. HFE supports the MANPRINT goal of developing equipment which will permit effective soldier-machine interaction within the established allowable limits of training time, soldier aptitudes and skill, physical endurance, physiological tolerance limits, and soldier physical standards.



Reference 2g and h.

2.2.5 System Safety

System safety involves the application of both engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the new materiel system's life cycle. System safety deals with both the safety of the materiel system, as well as the operators, maintainers and support personnel. The goal of system safety is to improve the ability of the soldier to perform to specified standards, without unnecessary risk of injury or death, or equipment damage.



Reference 2i.

2.2.6 Health Hazards

Health hazards is the application of biomedical and psychological knowledge and principles to identify, evaluate, and eliminate or control risks to the health and effectiveness of

personnel who test, operate, maintain, and support new materiel systems. Closely aligned with safety, health hazards seeks to improve total system performance while protecting the soldier from the unnecessary risk of illness, injury, or death from the short or long-term exposure to the equipment, its component materiel, or its operation.



Reference 2j.

2.2.7 MANPRINT Domain Interdependence

While MANPRINT often focuses on the issues or concerns raised within one of its six domains, each domain shares a thin boundary with the others. Changes in one domain may have an impact in each of the others. A typical example of interdomain impacts is illustrated below in Figure 2.1.

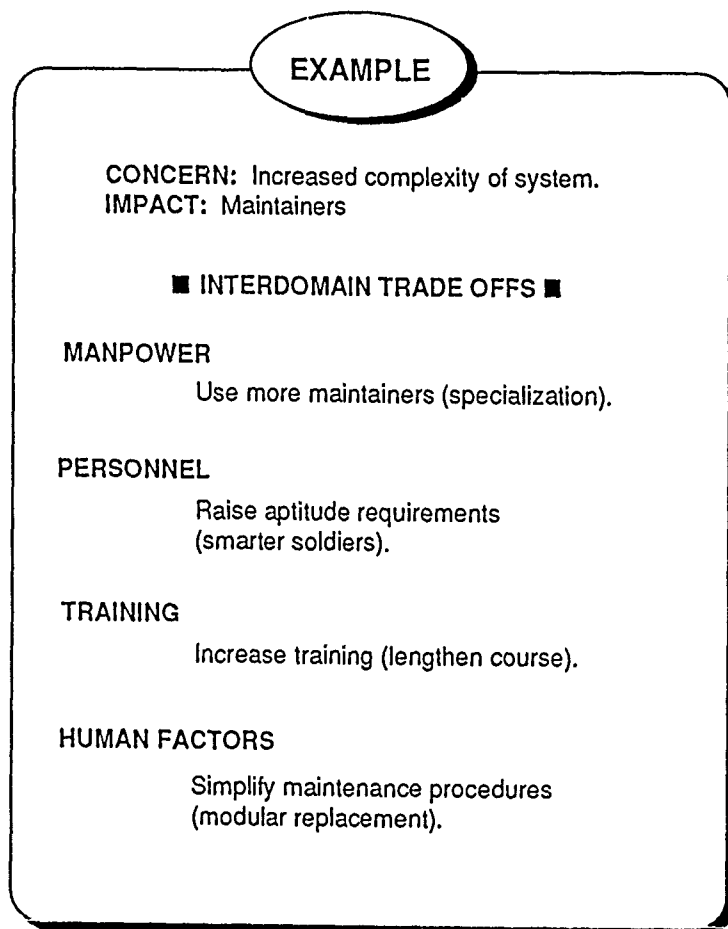


Figure 2.1. Domain Interdependence

The interdomain implications of changes must be considered when identifying trade-offs that may result in modification of initial requirements or impact the design or selection of a system.

2.3 MANPRINT and Total System Performance

MANPRINT seeks to optimize total system performance by considering the soldier as an integral part of the materiel system. Total system, from a MANPRINT perspective, includes the equipment (both hardware and software), its trained operators, maintainers, and support personnel, and the environment in which the system must perform.

MANPRINT objectives should be considered from a total system viewpoint. The new system must be evaluated at varying levels of interaction—the soldier (operator, maintainer, supporter), the organization, and the Army (mission)—in order to assess the impact of the total system on performance and supportability.

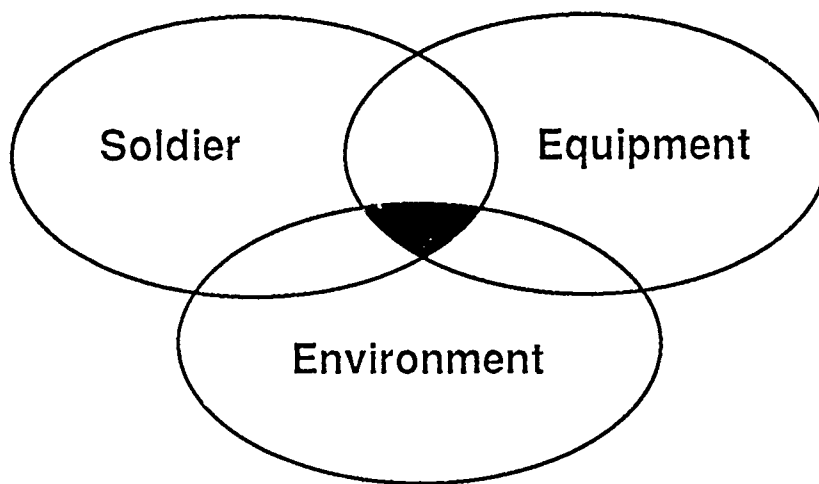


Figure 2.2. Total System Performance

2.3.1 System Variables

Understanding the term “total system” from a MANPRINT perspective allows us to address the performance variables within that system and to identify possible trade-offs to optimize performance. The three variables that have the most significant influence on total system performance are equipment, environment, and the soldier.

- Equipment

Factors affecting equipment variability (including reliability, redundancy, accuracy, safety, and the like) have an impact on soldier performance and can be designed to complement the soldiers who will operate, maintain, or support the equipment.

- Environment

Environmental variables include isolation, heat, noise, weather, continuous operations, the battlefield environment, including NBC and fear, and the organizational structure in which the system must operate. Environmental variables should be considered when assessing the ability of the soldier to perform as a part of the total system.

- Soldier

Soldier performance variables parallel the domains of MANPRINT. These variables include numbers (manpower), quality (personnel), skills (a combination of aptitude and training), soldier-machine interface (human factors), and risks (safety and health hazards). These variables must be consistent with those of the environment and equipment in choosing among design alternatives.

2.3.2 System Performance

The performance of the system depends upon these variables (equipment, environment, and the soldier). The consideration of soldier performance capabilities and limitations during system design is the key to the MANPRINT initiative. When addressing soldier performance, the focus of defining the essential characteristics will change with time:

- Soldier ("Man-in-the-Loop") Performance

Man-in-the-loop and soldier performance characteristics are usually used interchangeably. Soldier performance criteria are identified from predecessor system information early in the materiel acquisition process, and, as the system becomes better defined, system-specific issues that affect soldier performance are identified. Soldier performance is typically measured in terms of the time and accuracy with which critical tasks are completed. From a MANPRINT perspective, soldier performance must include consideration of the soldiers' physical, sensory, and cognitive capabilities to perform required equipment-related tasks in the expected operational environment.

- System Performance

System performance is the degree to which a system (soldier-machine) accomplishes its assigned tasks. It includes soldier performance, equipment performance, and the operational environment. System performance is usually measured based on effectiveness and availability.

2.4 Chapter References

- 2a. AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
- 2b. AR 570-4, Manpower Management
- 2c. AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties
- 2d. AR 350-35, Army Modernization Training
- 2e. TRADOC Reg 350-7, A Systems Approach to Training
- 2f. AR 602-1, Human Factors Engineering Program
- 2g. MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment, and Facilities
- 2h. AR 385-16, System Safety Engineering Management
- 2i. AR 40-1, Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process.

3.1 What is the MANPRINT Process?

The word “process” can be defined as a series of actions, changes, or functions that bring about an end or result. The MANPRINT process refers to those specific actions that must be accomplished to ensure that soldier performance issues are identified, addressed, and managed throughout the design, development, and acquisition of a new materiel system. (See Figure 3.1.) This integration process includes the identification of a materiel need, the front end analysis to provide information needed to resolve MANPRINT issues, the formation of a MANPRINT Joint Working Group (MJWG), the development of a System MANPRINT Management Plan (SMMP) to manage these issues, and the documentation of total system performance requirements and specifications.

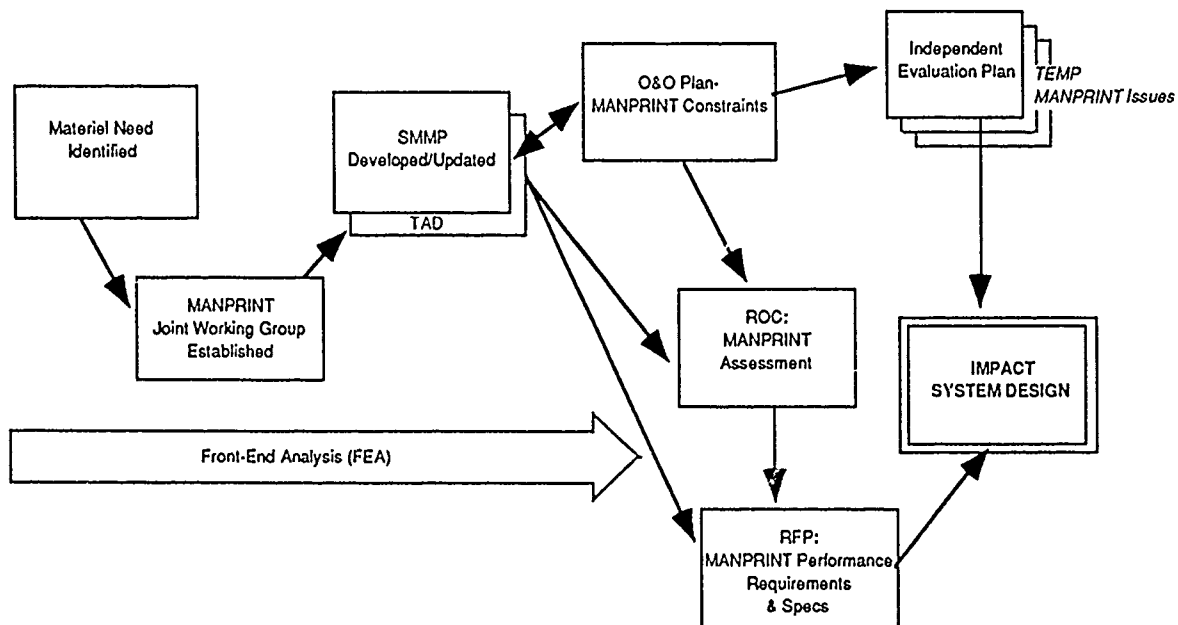


Figure 3.1. The MANPRINT Process

3.2 MANPRINT Responsibilities

Up to this point, MANPRINT has been addressed from the macro-level. However, if MANPRINT is to impact the design of the new materiel system, it will require active participation by both Army and Industry players. MANPRINT is an integration effort that involves many

different organizations and disciplines, as shown below in Figure 3.2.

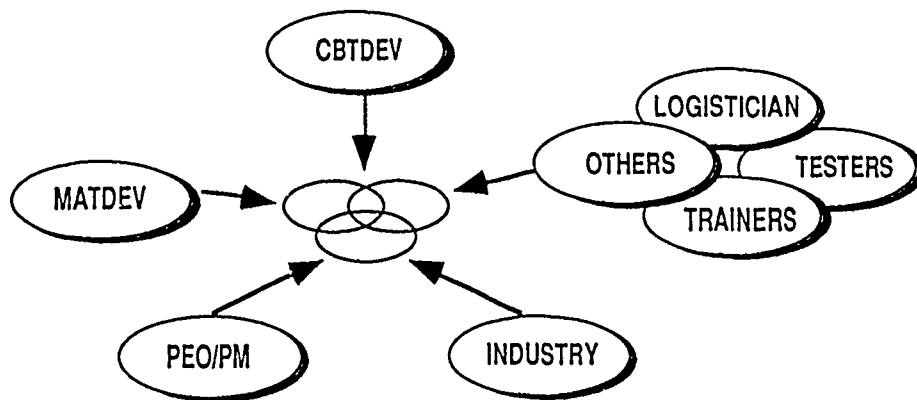


Figure 3.2. The MANPRINT Players

3.2.1 The Combat Developer (CBTDEV)

The CBTDEV begins the MANPRINT process with the identification of a battlefield deficiency that cannot be resolved with a change in doctrine, training, organization or leader development and instead requires a materiel solution. As promising technologies and concepts are explored to resolve the identified deficiency, the CBTDEV performs early studies and analyses to determine initial MANPRINT requirements. The CBTDEV establishes a MJWG, the formal body chartered with the responsibility to identify, address, and manage the system's soldier performance issues throughout the development and design process. The MJWG also initiates the SMMP and prepares the Target Audience Description (TAD). The CBTDEV represents the user and, in coordination with the materiel developer, performs MANPRINT Assessments for nonmajor level II and III systems.

3.2.2 The Materiel Developer (MATDEV)

The MATDEV translates the CBTDEV's MANPRINT goals and constraints into system specifications and solicitation documents. The MATDEV is an active member of the MJWG and needs to be involved in the early definition of the system. Soldier performance information requirements contained in the SMMP provide support for analyses, reports, and plans which the MATDEV has the responsibility to produce. These include the Human Factors Engineering Assessment (HFEA), Health Hazard Assessment (HHA), Safety Assessment Report (SAR), Test and Evaluation Master Plan (TEMP), and the Integrated Logistics Support Plan (ILSP).

3.2.3 The Program Executive Officer/Program Manager (PEO/PM)

The PEO/PM ensures that MANPRINT is performed for major defense acquisition programs (MDAP) and Army-designated acquisition programs (ADAP). The PEO/PM has overall management and decision authority for a program and considers MANPRINT requirements when establishing cost, scheduling, and performance baselines. Industry's responsiveness to MANPRINT issues is based, to a large extent, on its perception of MANPRINT's importance to the PEO/PM.

3.2.4 Industry

Industry as the designer and builder of military hardware and software is the implementor of MANPRINT. Communication between Industry and the Army must be clear so that the MANPRINT goals and constraints outlined in the SMMP and in requirement and solicitation documents are understood. Industry must recognize the Army's commitment to MANPRINT and be responsive to it in their proposals and in their design approaches.

3.2.5 Other Army Organizations

Army organizations and agencies involved in the acquisition of a new materiel system at all levels must understand the goals of the MANPRINT program. The logistician must include MANPRINT considerations when addressing ILS elements; the training developer must address the training implications and impacts of new materiel systems; and the testing and evaluation communities must include MANPRINT factors when defining test issues and criteria. The specific roles of these elements and others will be addressed in the application chapters of this guide.



Reference 3a.

3.3 The MANPRINT Joint Working Group (MJWG)

The CBTDEV is responsible for initiating and managing the early MANPRINT program. The variety of tasks to be accomplished and the number disciplines required to address MANPRINT issues make it necessary to establish an organization that can provide additional expertise and support. This is the MJWG.

3.3.1 What is the MJWG?

The MJWG is established by the TRADOC proponent service school responsible for developing a materiel solution to an identified battlefield deficiency. Usually chartered between three and six months prior to the start of the Operational & Organizational (O&O) Plan, the MJWG is responsible for developing and maintaining the SMMP and providing management oversight to ensure that MANPRINT is fully addressed.

The membership of the MJWG is tailored based on the soldier performance issues of the system. The MJWG's composition can be altered as the system progresses through its acquisition process and new MANPRINT issues are identified. Membership should include as a minimum those TRADOC proponent service school members with an interest in soldier performance (CBTDEV, training developer, personnel proponent, Directorate of Standardization and Evaluation, Safety Office). MATDEV involvement is particularly important to facilitate the transition of program management responsibilities to the PEO/PM at Milestone I. Additional MJWG support can be provided by the field offices of the Army Research Institute and the Human Engineering Laboratory, the test and evaluation community, and other supporting TRADOC schools.

3.3.2 Responsibilities

Prior to Milestone I, the TRADOC proponent service school CBTDEV is responsible to convene and chair the MJWG. At Milestone I and beyond, the CBTDEV will serve with the MATDEV as the MJWG co-chairs.

The MJWG, using its collective expertise, develops and maintains the SMMP throughout the system's acquisition process. The MJWG determines the level of MANPRINT involvement for each system and plans all MANPRINT inputs and activities for the system. Perhaps the most critical role of the MJWG is communication. The group ensures that identified issues and concerns are communicated to other acquisition organizations and are included in requirement, program, and solicitation documentation.



Reference 3b.

3.4 The System MANPRINT Management Plan (SMMP)

A review of the existing acquisition management process revealed two critical weaknesses: (1) Materiel acquisition program or requirement documents did not provide an insight on what soldiers can and cannot do, and (2) the impact of fielding a new system on the soldier was not controlled because of insufficient management visibility. The SMMP has been developed to address these deficiencies and to provide a management plan for use by all agencies involved in a system's development and acquisition. The SMMP ensures that MANPRINT issues are identified and addressed early in the acquisition process.

3.4.1 What is a SMMP?

The SMMP is the cornerstone of the MANPRINT program. As the sole-source MANPRINT document, it serves as a planning and management guide that is updated as changes occur to the emerging materiel system. The SMMP also provides an audit trail to track MANPRINT issues and concerns prior to and throughout the development and fielding of new systems.

The SMMP is structured in five sections, as explained below.

Section 1- Executive Summary: Provides an overview of the MANPRINT program as it applies to the system.

Section 2 - System Description: Defines the essential total system performance characteristics and identifies where potential man-machine problem areas exist.

Section 3 - MANPRINT Strategy: Lays out the objectives and the MANPRINT strategy for attaining the program objectives.

Section 4 - Critical Issues: Defines the major risk areas for the program.

Section 5 - Tabs: Provides the detailed planning necessary to achieve MANPRINT success and tracks the decision process.

The generic format for the SMMP is shown below.

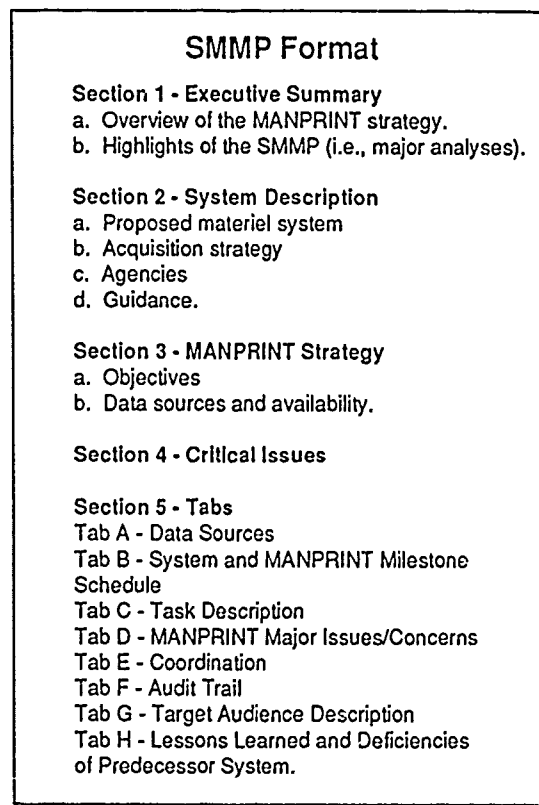


Figure 3.3. The SMMP Format

3.4.2 The Abbreviated SMMP

Because each acquisition is different, the role that MANPRINT plays will vary from acquisition to acquisition. Some systems, particularly those without an identified predecessor, lack soldier performance information and will require a complete SMMP. Better defined and simple systems, with a substantial predecessor data base, may only require an abbreviated SMMP.

An early assessment must be made by the MJWG to determine whether an abbreviated or a complete SMMP is appropriate. The decision criteria and format for the abbreviated SMMP are listed in AR 602-2, Appendix D.

3.4.3 The Target Audience Description (TAD)

MANPRINT focuses on soldier performance as an integral component of total system performance. Early in the acquisition process, the emphasis is on identifying essential man-in-the-loop characteristics: those areas where soldier performance is most critical to total system performance. The information required to answer these questions is provided in the Target Audience Description (TAD), Tab G of the SMMP.

- Purpose

The purpose of the TAD is to provide industry with consolidated information on the quantity, quality, and performance capabilities of the future soldiers, DOD civilian and contractor personnel who will operate and maintain the proposed system. The TAD answers questions such as: *How many soldiers are needed both now and in the future? How many are in the current inventory? What are the aptitude area scores for these soldiers? What is the mental category breakout? What are the physical requirements? What training is currently provided? What are the high-driver tasks?*

- Target Audience Description Preparation

The TAD is a compilation of the baseline military occupational specialty (MOS) descriptions for the probable operators and maintainers of a particular system. The baseline MOS descriptions are maintained by each TRADOC proponent service school for those MOS they oversee. MJWG membership should include representation from those proponent schools that have responsibility for the MOS proposed to maintain and support the new system.

3.4.4 SMMP Development

- SMMP Initiation

A SMMP is required for all materiel systems (developmental, non-developmental, or materiel change). The TRADOC system proponent combat or training developer initiates the

SMMP after a battlefield deficiency has been identified through the Concept Based Requirements System (CBRS) that will require the development of a new or improved materiel system. Normally the initial SMMP is written between three and six months prior to the start of the Operational & Organizational (O&O) Plan. The MANPRINT issues developed through early analysis for the initial SMMP are reflected in the O&O Plan. Although the combat or training developer will remain as the lead agency for the SMMP, assistance in addressing domain specific issues will be provided by the MJWG.

- **SMMP Approval**

The SMMP is jointly approved by the TRADOC proponent service school (the initiating agency and user representative) and AMC major subordinate command (the implementing agency and materiel developer) 30 days prior to each milestone decision review.

- **SMMP Content**

Pre-Milestone I: The SMMP, which may be incomplete or vague at this point, focuses on influencing design. The emphasis is on identifying existing guidance, predecessor systems, data sources, areas of concern, and analyses that will be required.

Post-Milestone I: The focus of the SMMP is on the system's operational supportability from a manpower, personnel, and training perspective; resolution of issues; and integration of soldier performance issues in other program documents to achieve system MANPRINT objectives.



Reference 3a and b.

3.5 Developing MANPRINT Information

The success of the MANPRINT process depends on the MJWG's ability to identify information needs, collect or develop that information, and then use the results to influence the design and system selection process. The SMMP not only manages the overall MANPRINT effort, but plans for the identification, collection, evaluation, and application of information.

3.5.1 MANPRINT Information Categories

MANPRINT information can be categorized into five main areas:

- **Deficiency Information/Performance Requirements**

What aspects of the current system will not counter the threat? What soldier tasks are difficult to train or perform? What man-machine interface problems have been identified in the predecessor system?

- Program Guidance

What decisions have been made that impact the system design (capabilities) or impose constraints or limitations on available resources (manpower, personnel, or training base resources)?

- Lessons Learned

What are the soldier performance deficiencies of the current system? What residual hazards have not been eliminated from the current systems?

- Prediction

Have the abilities and limitations of the future soldier been considered when computing the total system performance requirements of the new system?

- Assessment

What unresolved MANPRINT issues need to be addressed? What is the status of key information source documents and analyses?

3.5.2 Early MANPRINT Information Availability

Available information sources will change as a program matures or progresses through the phases of the life-cycle. Figure 3.4 depicts the sources that are available early in the program and describes the type of information that may be obtained from each. Key to this process is a clear understanding of the deficiencies of the predecessor system and the expected soldier-machine interface problems of any new technologies to be used in the new system.

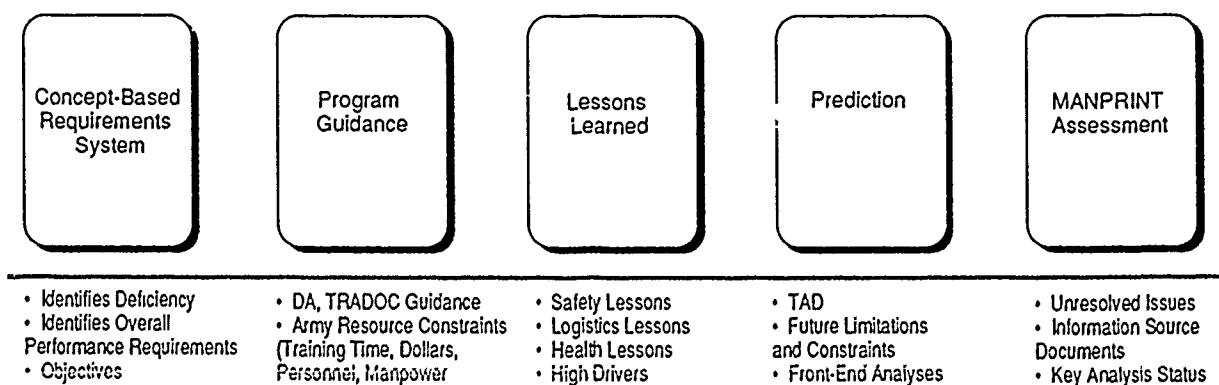


Figure 3.4. MANPRINT Information Sources

3.5.3 Front-End Analysis (FEA)

Front-end analysis (FEA) encompasses those various analytical techniques that are conducted early in the MANPRINT process. The information developed as a result of an FEA affects the direction of the acquisition program by influencing design or system requirements and may impact the resulting system selection. Included in the FEA are those analyses conducted under the LSA 200 Series tasks (Mission and Support System Definition).

During preprogram activities, TRADOC is responsible for conducting FEA such as the Early Comparability Analysis (ECA), which provides information on the strengths and weaknesses of any existing predecessor systems. This crucial data gives direction for the development of MANPRINT issues and concerns for new materiel acquisitions.

3.5.4 MANPRINT Reviews and Assessments

- MANPRINT Reviews

MANPRINT reviews are conducted to determine the status and adequacy of the MANPRINT efforts. These reviews are normally held in conjunction with Integrated Logistic Support Management Team (ILSMT) reviews for a system. The program sponsor (PM for MDAP, ADAP, and level I non-major programs and the project officer or equivalent for level II and III non-major programs) is responsible for MANPRINT reviews. The results of the review are documented in the appropriate program decision document (SCP, DCP).

- MANPRINT Assessments

MANPRINT assessments are conducted prior to each milestone decision review on all acquisition programs. These assessments determine the status and adequacy of the MANPRINT effort and present any unresolved MANPRINT issues or concerns to decision makers.

MANPRINT assessments for MDAP and ADAP programs are the responsibility of ODCSPER. HQ AMC, HQ TRADOC, and other applicable MACOMs are responsible for assessments for non-major programs.



Reference 3a.

3.6 Test and Evaluation

Test and evaluation provides the means to observe a system's performance during the acquisition process. MANPRINT looks beyond individual domain issues so that a system's total operational capability can be tested and evaluated.

Figure 3.5 depicts a schedule for potential testing. Not all testing is required or performed during the development of a system. The Test Integration Working Group (TIWG) has the responsibility to tailor the test program based on the information available and the acquisition complexity.

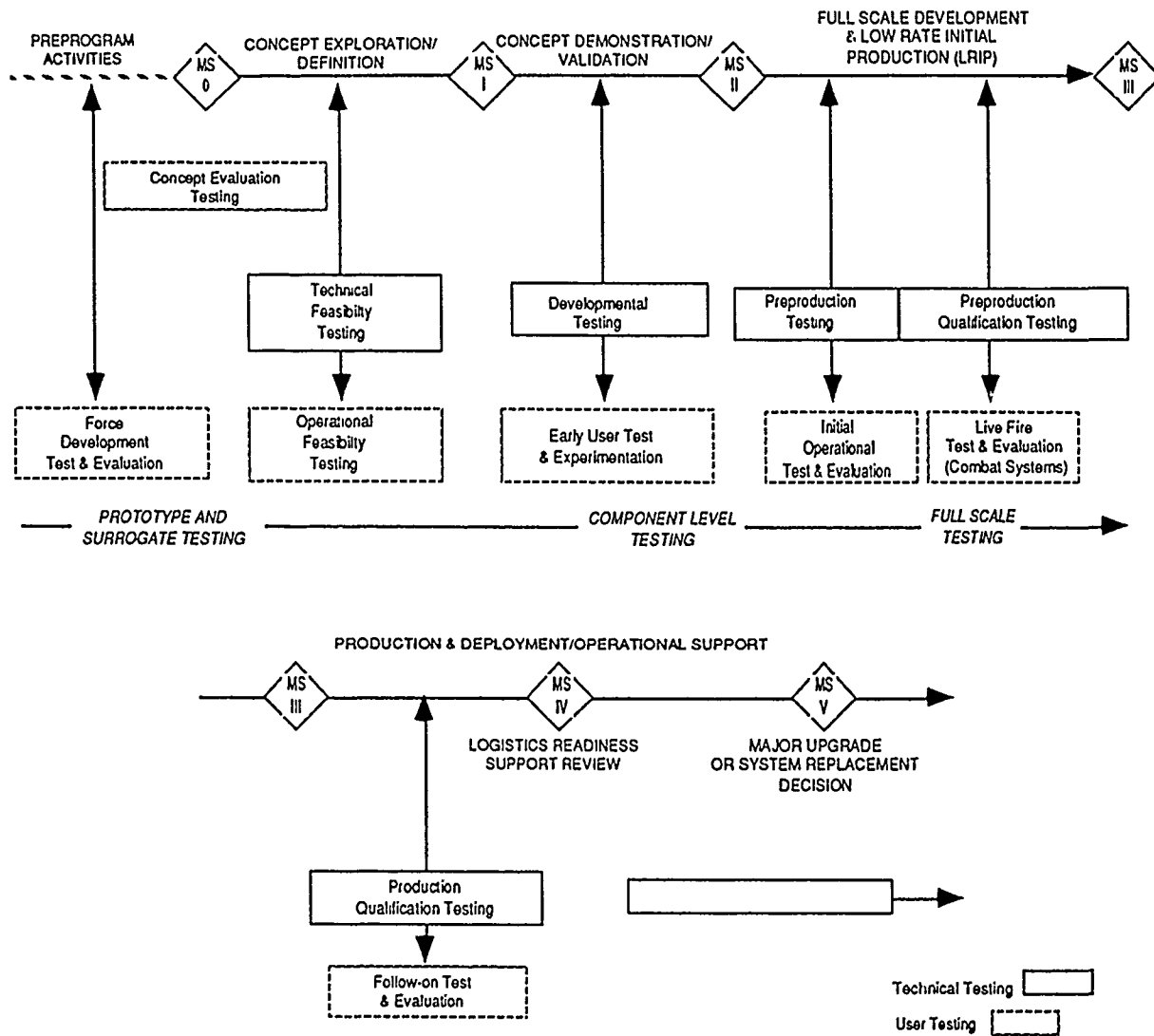


Figure 3.5. Testing in the Acquisition Process

3.6.1 Test and Evaluation Master Plan (TEMP)

The Test and Evaluation Master Plan (TEMP) is the basic planning document that identi-

fies critical technical and operational issues and all planned test activities. Prepared by the Test Integration Work Group (TIWG), the TEMP provides the interface between the TIWG and test requirements developed by other Army activities.

MANPRINT test issues and criteria must be jointly developed by the TIWG and the MJWG. The soldier performance concerns contained in the SMMP must be included as issues in the TEMP. Tests must be designed so that accurate, quantitative (measurable) data that addresses total system performance issues can be gathered and evaluated. Evaluation MANPRINT test issues, with associated scope, criteria, and rationale, will be used to support a complete assessment of the system. Evaluation of issues are included in the Independent Evaluation Plan (IEP). As a general rule, if an issue is not in the TEMP, it will probably not be tested. The TEMP, including MANPRINT issues, will be updated by the TIWG prior to each milestone decision review.

- Independent Evaluation Plan (IEP)

Both Technical and Operational IEP are prepared to support the evaluation of a system. The IEP defines the questions to be addressed and the scope of the evaluation to be performed (issues and criteria). MANPRINT issues which focus on soldier performance are generally found in the Operational IEP. Safety, health and human factors engineering issues are usually addressed in the Technical IEP.

- Test Design Plan (TDP)

The TDP describes the conditions and standards for required testing. The MANPRINT input such as how and where the test will be conducted (operational environment), number and quality of soldiers to be used (manpower and personnel) and the test player preparation program (training), are reflected in the TDP.

3.6.2 Technical Testing (TT)

Technical tests are the formal evaluations conducted by the Army and contractor personnel to ensure that a system performs within the specified operational and environmental ranges. These tests usually use preproduction hardware, fabricated to proposed production design specifications, and do not include typical soldiers. Technical testing includes contractual demonstration tests required prior to production release.

3.6.3 User Testing (UT)

User testing is conducted to determine the acceptability, operational effectiveness, and suitability of the new system under the conditions stated in the Operational Mode Summary/Mission Profile (OMS/MP). From a MANPRINT perspective, user testing provides the best opportunity to gather quantitative information for assessing MANPRINT issues and determining total system performance.

The extent of user testing for a system is decided jointly by AMC and TRADOC based upon information gathered through market investigation and technical testing. Unlike technical testing, which is oriented on the hardware, user testing provides a greater ability to determine the soldier influence on system performance. For this reason, it should be conducted under conditions that simulate the projected environment under which employment of the new system is envisioned.

3.6.4 Evaluation

Independent evaluation is performed on both technical and operational test results.

- **Technical Evaluation**

The U.S. Army Materiel Command (AMC) has primary responsibility for evaluating the results of technical testing. The evaluations are performed by the U.S. Army Materiel Systems Analysis Activity (AMSAA) and the U.S. Army Logistics Analysis Agency (LEA). Army programs, projects, and products that are not the subject of reviews by the Army Systems Acquisition Review Council (ASARC) and the Defense Acquisition Board (DAB) normally do not warrant an independent evaluation. Instead, these IPR-level items generally receive a technical assessment conducted under the auspices of TECOM or one of its supporting test agencies.

- **Operational Evaluation**

Operational independent evaluations are the responsibility of the Operational Test and Evaluation Command (OTEC) operational evaluation center. Materiel items and systems that are not subject to ASARC or DAB review receive an operational assessment, normally performed by the OTEC operational test center.



Reference 3c, d, and e.

3.7 MANPRINT Resourcing

Perhaps no area of MANPRINT is the source of greater concern than resourcing. Identifying where the manpower and dollar resources come from to do all the front-end work required by MANPRINT requires good planning and resourceful management.

3.7.1 Organizing for MANPRINT

As stated earlier, MANPRINT is not a new idea. Health hazard assessments, human factors engineering analyses, safety assessments reports, training effectiveness analyses, and cost and operational effectiveness analyses have always been required. What is new is that the information from these analyses is now being systematically requested and used by the decision review authorities.

From a manpower perspective, the same people who had the responsibility to perform these analyses before MANPRINT still have that responsibility. What has changed as a result of the MJWG's management oversight is that analyses are now being requested for systems that in the past may not have been performed. These additional requests have increased the analysis workload for the Army and Industry.

Other changes that are being experienced as a result of MANPRINT are the early-on involvement of many different organizations and the requirement for additional front-end analyses. These additional personnel assets will have to be projected, justified, and requested as necessary. If not forthcoming, assets may need to be taken "out of hide" (reallocation of personnel) or "out-of-pocket" (contractor support) until experience determines specific requirements.

3.7.2 MANPRINT Funding

Like the MANPRINT program activities, MANPRINT funding requires front-end planning. As potential programs are identified, funding to support the MANPRINT effort must be identified and programmed through the command's budgeting process. Other sources include MANPRINT analysis funds at U.S. Army Personnel Integration Command (HARDMAN and ECA), TRADOC's Concept Evaluation Program (CEP), Studies and Analyses Funds (AR 5-5), and Program Manager (PM) funding.



References 3f and g.

3.8 Chapter References

- 3a. AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
- 3b. The SMMP Procedural Guide
- 3c. AR 70-1, System Acquisition Policy and Procedures
- 3d. AR 70-10, Research, Development, and Acquisition Test and Evaluation
- 3e. AR 71-3, Force Development - User Testing
- 3f. AR 1-1, Planning, Programming, Budgeting, and Execution System
- 3g. TRADOC Pam 11-8, Studies and Analysis Handbook.

4.1 Overview: The Life Cycle System Management Model (LCSMM)

The Army's traditional materiel development process is often referred to as the Life Cycle System Management Model (LCSMM). Representing a sequence of events in flow chart form, the LCSMM provides a means for monitoring the acquisition of a new or improved materiel system. The LCSMM serves as a guideline for gauging the extent of coordination and correlation of combat development, research and development, production, logistics support, training, and MANPRINT requirements during materiel acquisition. The LCSMM is applicable to all Army systems, but should be tailored to reflect the acquisition strategy and program management level of the acquisition. (See Chapter 5 for alternative strategies.) An understanding of the activities associated with each phase of the LCSMM is required to comprehend how MANPRINT is integrated into the materiel acquisition process.



Reference 4a, b, and c.

4.1.1 Phases of the LCSMM

- **Concept Definition**

The Concept Exploration/ Definition Phase (formerly Concept Exploration) involves exploration of alternative materiel concepts, market investigation, selection of a course-of-action, and identification of system issues.

- **Feasibility Demonstration**

The Concept Demonstration/ Validation Phase (formerly Demonstration and Validation) includes exploration of preliminary designs, resolution of system issues, prototype testing, and validation of the materiel concept.

- **Prototype Development**

During the Full-Scale Development Phase, the system (to include all items necessary for its support) are fully developed, engineered, fabricated, tested, and evaluated.

- **Production and Deployment**

During the Full-Rate Production and Initial Deployment Phase (formerly Production and Deployment), systems are acquired and distributed, operational units are trained, and logistic support requirements are met.

- **Operation and Support**

During the Operation and Support (O&S) Phase, the system is operated, supported, and maintained in accordance with its intended operational concept. Opportunities for continued improvement in cost, performance, reliability, or capability are identified on the basis of actual experience. The system is sustained in the active inventory until a decision is made for upgrade, replacement, or disposal. Integral to the O&S phase are two reviews, described below.

(1) Milestone IV - Logistics Readiness and Support Review

Within two years of the first unit equipped date (FUE), a logistics readiness and support review is conducted to assess how well operational readiness/support and training objectives are being achieved and maintained.

Key issues addressed during this milestone include validity of support concepts; ability of the system to perform its mission and meet user requirements, including reliability and maintainability; validity of the Basis of Issue Plan (BOIP) and Qualitative and Quantitative Personnel Requirements Information (QQPRI) and their effect upon force structure; and adequacy and integration of support equipment.

(2) Milestone V - Major Upgrade/ Replacement Review

Approximately five to ten years after FUE, a Milestone V review is conducted to determine the current state of operational effectiveness, suitability, and readiness. Based on this assessment, the review board will recommend major upgrade/ acceleration of preplanned product improvements (P³I); replacement; or phase out/demilitarization/disposal.

The end of one life cycle marks the beginning of another. The LCSMM concept serves as the basis for the Army's continuing Mission Area Analysis (MAA), technology base assessment, and Mission Area Management Plan (MAMP) and Long Range Research, Development, and Acquisition Plan (LRRDAP). These processes are set in motion to initiate future developments.



Reference 4c.

4.2 MANPRINT and the LCSMM

MANPRINT's primary objective is to influence system design by considering soldier performance as an integral part of the system operation. This is achieved by integrating MANPRINT considerations and constraints into the program management documents that ultimately drive the design and supportability aspects of the developing system. This section of

the guide identifies the primary MANPRINT documents, and traces how the MANPRINT issues influence requirement, solicitation, program, and decision documents.



Reference 4d.

4.2.1 Preprogram Activities (See Figure 4.1.)

Because soldier/machine issues need to be addressed as early in the materiel acquisition process as possible, MANPRINT begins once a materiel solution to an identified Mission Area Analysis (MAA) deficiency has been chosen. The TRADOC proponent service school starts the process by chartering a MANPRINT Joint Working Group (MJWG) to identify these issues within the program.

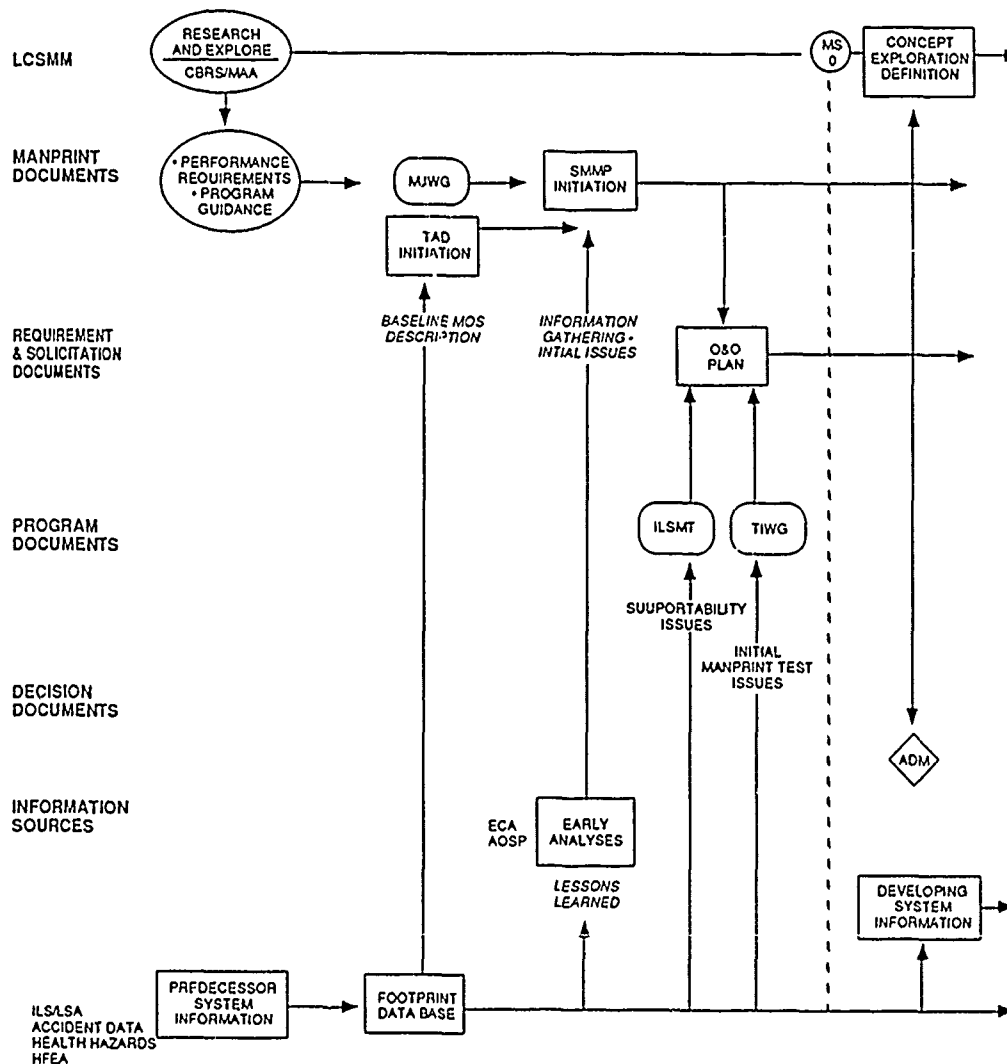


Figure 4.1. Preprogram Activities

Key to this phase is the definition of the total system to be acquired. A total system is more than just the end item under consideration to eliminate a battlefield deficiency. It includes the manpower (number of personnel), personnel (aptitudes of the soldiers), training (process to impart necessary skills), and required support equipment (hardware and software; technical, field and training manuals; test and diagnostic equipment; training program and devices; tactics and doctrine) necessary so that a materiel system can provide its stated operational capability in its intended operational environment.

- **MANPRINT Documents**

System MANPRINT Management Plan (SMMP). As the primary MANPRINT document, the SMMP is initiated during this phase of the LCSMM by the MJWG, relying in large part on predecessor system information (if available). Information of particular interest to the MJWG are those situations in which the operator, maintainer, or supporter of the predecessor system is unable to achieve expected performance levels.

Baseline military occupational specialty (MOS) descriptions on the proposed users are developed by the TRADOC proponent service school to provide a profile of the current population. These descriptions will then be refined into a system Target Audience Description (TAD) during the Concept Exploration/Definition phase.



Reference 4e.

- **Information Sources**

The critical information during this phase focuses on the capabilities and problems of the predecessor system. Within the TRADOC proponent service school, there are a number of sources of information for like systems or components. The key documents, analyses, training program and records, organizational documentation, test plans and reports, ILS/LSA data, and MOS-specific information should be reviewed to determine possible MANPRINT issues to be eliminated with the fielding of the new system.

Additional sources of lessons learned for the predecessor system outside of the TRADOC school should also be reviewed. These include the Army Safety Center for accident data, the Environmental Hygiene Agency for residual health hazards, Materiel Readiness Support Activity for sample data collection, the Human Engineering Laboratory for human factors engineering analyses (HFEA), and the supporting integrating center for performance data. The U.S. Army Personnel Integration Command-Soldier Support Center (Alexandria) provides manpower and personnel information. The FOOTPRINT data base provides historical and projected trends of accessions, authorizations, operating strength, and training for a selected MOS.

Front-end analyses also provide early information. An Early Comparability Analysis (ECA) may be initiated by the TRADOC proponent service school to identify "high driver"

tasks. The Army Occupational Survey Program (ASOP) data is available to identify critical tasks of a specified MOS.

- Requirement and Solicitation Documents

Operational and Organization (O&O) Plan. The O&O Plan is the initial requirement document. Early "man-in-the-loop" characteristics identified as potential performance drivers in the initial SMMP should be included as required system characteristics and constraints in the O&O Plan. This "crosswalk" of information between acquisition process documents provides the integration necessary to influence system design.

Mission Need Statement (MNS). The O&O Plan approval constitutes the formal Milestone 0 approval. If, based on early cost projections, the proposed program will exceed \$200 million in research, development, and test and evaluation (RDT&E) or \$1 billion in procurement (FY 80 constant dollars), then an MNS is developed in addition to the O&O Plan.

Normally, there are no formal solicitation documents directly associated with a developing system prior to O&O Plan approval. Limited service contracts may be considered to aid the information development effort, such as contracting out an Early Comparability Analysis (ECA) or a Hardware versus Manpower (HARDMAN) comparability analysis.



Reference 4f.

- Program Documents

Program documents are usually limited to early Logistic Support Analysis (LSA) tasks to identify the supportability implications for the new system. An Integrated Logistics Support Management Team (ILSMT) may be formed if the new system is anticipated to have significant supportability issues. A Test Integration Working Group (TIWG) may be held to identify initial critical evaluation issues to be submitted with the draft O&O Plan for approval.

- Decision Documents

Acquisition Decision Memorandum. Depending on the level and complexity of the program, an ADM may also be issued. The ADM is prepared by the appropriate milestone review forum and approved by the program decision authority following every milestone review. The ADM documents milestone decisions, including goals and thresholds for cost, schedule, and performance, and readiness and supportability. The information documented by the ADM should be reflected in revisions to the SMMP.



Reference 4c.

4.2.2 Concept Exploration/Definition (CED) Phase (See Figure 4.2)

Approval of the O&O Plan constitutes Milestone 0 and entry into the Concept Exploration/Definition Phase of the LCSMM. During this phase, threat projections, technological forecasts, operational requirements and potential materiel systems are examined. The MJWG will review the proposed materiel solutions to determine the critical soldier performance issues.

- **MANPRINT Documents**

The MJWG updates the SMMP as early analysis identifies and resolves system-specific issues. The MJWG will refine the MANPRINT strategy to be followed and will develop system performance data requirements. The analysis and tasks documented in the SMMP will be conducted so that information required for system decision reviews can be made available.

A system Target Audience Description (TAD) is developed through analysis of the individual baseline military occupational specialty (MOS) descriptions for the operators, maintainers and supporters proposed for the new system.

- **Information Sources**

Front-end analysis yields information from a variety of sources. Required program analyses such as the Initial Health Hazard Assessment (IHHA), Safety Assessment Report (SAR), and the Human Factors Engineering Assessment (HFEA) are performed.

- **Requirement Documents**

Required Operational Capability (ROC). The ROC is developed during this phase and contains the minimum essential requirements that will resolve the identified battlefield deficiency. By this time in the system's acquisition process, the early performance requirements of the O&O Plan will have been further defined through front-end analysis and initial testing. The ROC's operational characteristics and MANPRINT assessment paragraphs should reflect the SMMP's updated soldier performance issues.



Reference 4f.

- **Solicitation Documents**

During this phase, contracts may be awarded to provide prototype components and subsystems, as well as surrogate systems. Within the solicitation document, the system specifications should reflect an understanding of the soldier component of the new system, and the statement of work should describe those specific MANPRINT tasks to be performed by the contractor.

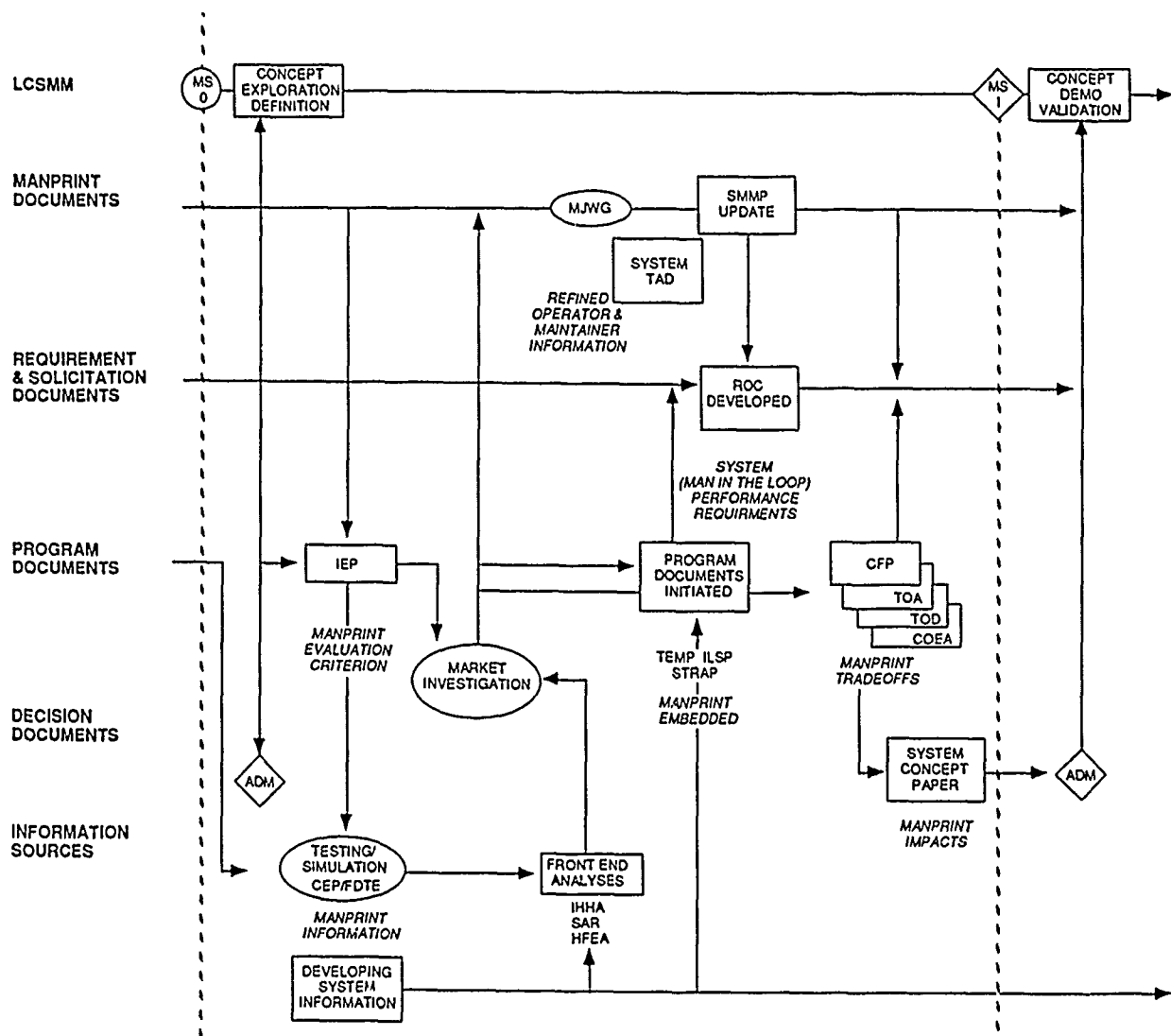


Figure 4.2. MANPRINT in the Concept Exploration/Definition Phase

• Program Documents

Program documents are initiated during this phase to support the development and acquisition of the new system. Key MANPRINT-related documents are outlined below.

Test and Evaluation Master Plan (TEMP). The TEMP is developed by the TIWG and identifies system-critical evaluation issues to be addressed during technical or user testing. Technical tests normally include safety, health hazard, and human factors issues and can identify potential soldier performance impacts. In operational tests conducted as part of the Concept Exploration Program (CEP) or Force Development Test and Experimentation (FDTE), prototype equipment is placed in the hands of users to allow the collection of soldier performance

information. Test planners and evaluators should be included in the MJWG to ensure that the issues contained in the SMMP are addressed during testing.

Integrated Logistic Support Plan (ILSP). The ILSP is developed by the MATDEV and details the overall ILS requirements, analyses and milestones for the system. MANPRINT issues, including supportability constraints identified in the SMMP, should be integrated into the ILSP to reduce duplication of effort.

System Training Plan (STRAP). The STRAP, produced by the training developer, outlines the initial training strategy for the system. It describes the training program for operators and maintainers and identifies the need for training devices. The training issues included in the SMMP should be reflected in the training strategy summarized in the STRAP.



Reference 4j, k, and l.

Concept Formulation Package (CFP). The CFP, produced by the CBTDEV and MATDEV, documents the results of the CED phase. It consists of four analyses; Trade-Off Determination (TOD), Trade-Off Analysis (TOA), Best Technical Approach (BTA) and the Cost and Operational Effectiveness Analysis (COEA). The TOD, TOA, and BTA provide the analytical rationale for the system concepts being considered. The COEA documents the selection of the preferred candidate based on cost and performance. The results of early MANPRINT analyses should provide the basis for the CFP's manpower, personnel and training estimates.

- **Decision Documents**

System Concept Paper (SCP). The SCP is prepared by the program sponsor in coordination with the MATDEV and supports the Milestone I decision review. It condenses the results of the activities conducted during this phase and describes any reasons for the elimination of alternative material solutions. The SCP establishes broad program, cost, schedule, operational effectiveness and suitability goals to be met prior to the next milestone decision review. MANPRINT issues should be considered by the program sponsor when developing the SCP's milestone schedule and effectiveness and suitability considerations.

4.2.3 Concept Demonstration/Validation Phase (Figure 4.3)

During the Concept Demonstration/Validation Phase, the proposed materiel solutions developed during the CED phase are confirmed. Extensive testing of advanced prototypes will be performed to review preliminary system design and to identify possible trade-offs in performance, supportability, and affordability. The MJWG will review the results of analysis and testing activities to determine their impact on soldier performance issues.

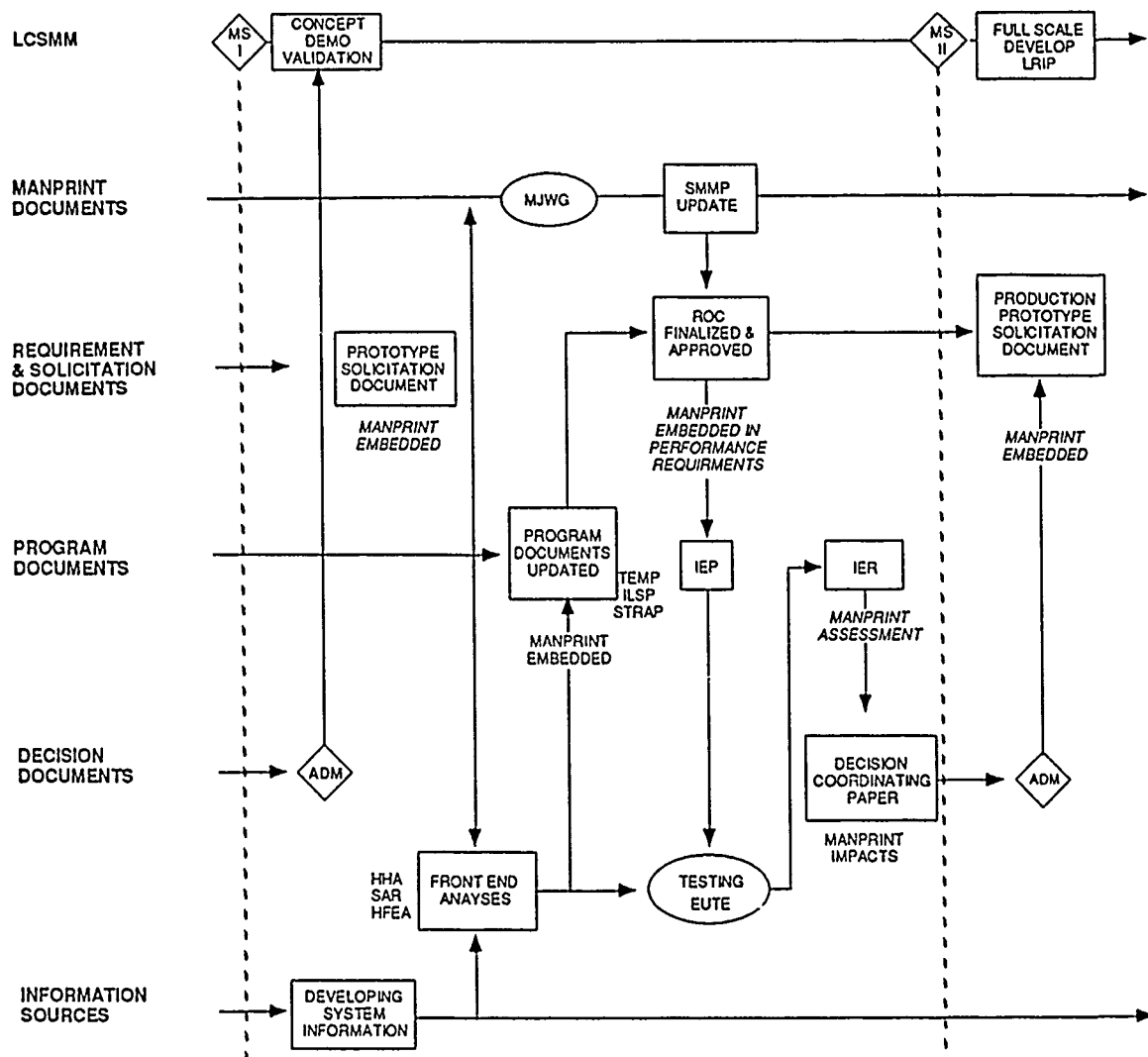


Figure 4.3. MANPRINT in the Concept Demonstration/Validation Phase

- **MANPRINT Documents**

The SMMP is updated as soldier performance issues are identified and resolved through prototype testing and subsequent hardware configuration changes. MANPRINT tasks to be performed (outlined in the SMMP) continue, and soldier performance information required to support the milestone decision review at the end of this phase is developed. The MANPRINT strategy is refined as information needs are satisfied.

- **Information Sources**

Front End Analysis. Information continues to be developed from a variety of sources. Required program analyses, such as the Health Hazard Assessment (HHA), Safety Assessment

Report (SAR), and the Human Factors Engineering Assessment (HFEA), are updated based on an examination of system prototypes. The information obtained through these analyses is used to assist in the development of the system's early design parameters.

Testing. Critical system performance information is derived from Early User Test and Experimentation (EUTE), which places prototype hardware in the hands of users. It is important that the test players are representative of the proposed operator and maintainer target audience. The MANPRINT test issues and criteria identified in the SMMP must be addressed in test planning documentation.



Reference 4m and n.

- **Requirement and Solicitation Documents**

The ROC's system performance requirements are finalized in this phase. MANPRINT issues must be fully articulated in the ROC so that developing designs will reflect soldier performance considerations. The ROC will become the basis for defining all system requirements during Full Scale Development. The ROC will only be approved after the CBTDEV has performed a cross check to ensure that its operational characteristics are accurately translated into the system's solicitation documents.

Solicitation during this phase is normally limited to advanced prototypes. Solicitation documents are generated based on the initial ROC developed during Concept Exploration/Definition and should reflect the SMMP's MANPRINT constraints. Contractor understanding of the MANPRINT program and system requirements should serve as a prime factor in source selection evaluation.



Reference 4o.

- **Program Documents**

Program documents are initiated in this phase to support the development, testing and acquisition of the new system. Other MANPRINT-related documents include updates of program documents initiated previously (TEMP, ILSP, and STRAP), as well as those outlined below.

Independent Evaluation Plan (IEP). The IEP includes the MANPRINT test issues and criteria identified in the SMMP. During this phase, technical and operational evaluators should become active members of the MJWG to ensure early MANPRINT test planning. MANPRINT issues concerning health, safety, and human factors are normally included in technical test and evaluation planning. All six MANPRINT domains and their performance implications can be evaluated during operational testing.

Basis of Issue Plan (BOIP). The BOIP reflects the manpower and personnel require-

ments of the new system. It defines the number of new systems to be acquired, the associated support items of equipment (ASIOE), and personnel changes required as a result of fielding the new item. The information in the BOIP is derived from the Qualitative and Quantitative Personnel Requirements Information (QQPRI). The manpower quantities of the BOIP should be consistent with the manpower projections determined by MANPRINT analyses.

Qualitative and Quantitative Personnel Requirements Information (QQPRI). The QQPRI provides the most current information concerning the numbers and qualifications for personnel involved in the use and maintenance of the proposed system. It will be used to determine the need for a new Military Occupational Specialty (MOS) or Additional Skill Identifier (ASI). Additionally, the QQPRI will assist in preparing plans to ensure that a sufficient number of trained operators and maintainers are available. The QQPRI is based on the results of logistic support analyses, training strategy research, and MANPRINT studies.



Reference 4p.

- **Decision Documents**

Decision Coordinating Paper. The DCP is an executive summary of past events, current status, and future plans and strategies concerning the acquisition of new or improved systems. The DCP serves as the coordinating paper in preparation for Milestone II and all subsequent reviews. The results of the MANPRINT program, as documented in the SMMP, should be an integral part of the system's planning and strategy considerations.

4.2.4 Full Scale Development Phase (Figure 4.4)

Up to this point, the MANPRINT focus has centered on influencing system design to improve total system performance. Once approval has been given to enter Full Scale Development, the opportunities available to change system design are limited due to schedule and cost constraints. During this phase, production prototypes are developed and initial tooling will take place in preparation for full rate production.

- **MANPRINT Documents**

The SMMP is updated during this phase as system-specific issues are identified and resolved based on analysis of production prototypes and subsequent hardware configurations. The MANPRINT strategy is fully implemented as final soldier performance information needs are satisfied.

- **Information Sources**

Front End Analysis. Information continues to be developed from a variety of sources. Analyses on the production prototypes, such as the Health Hazard Assessment (HHA), Safety

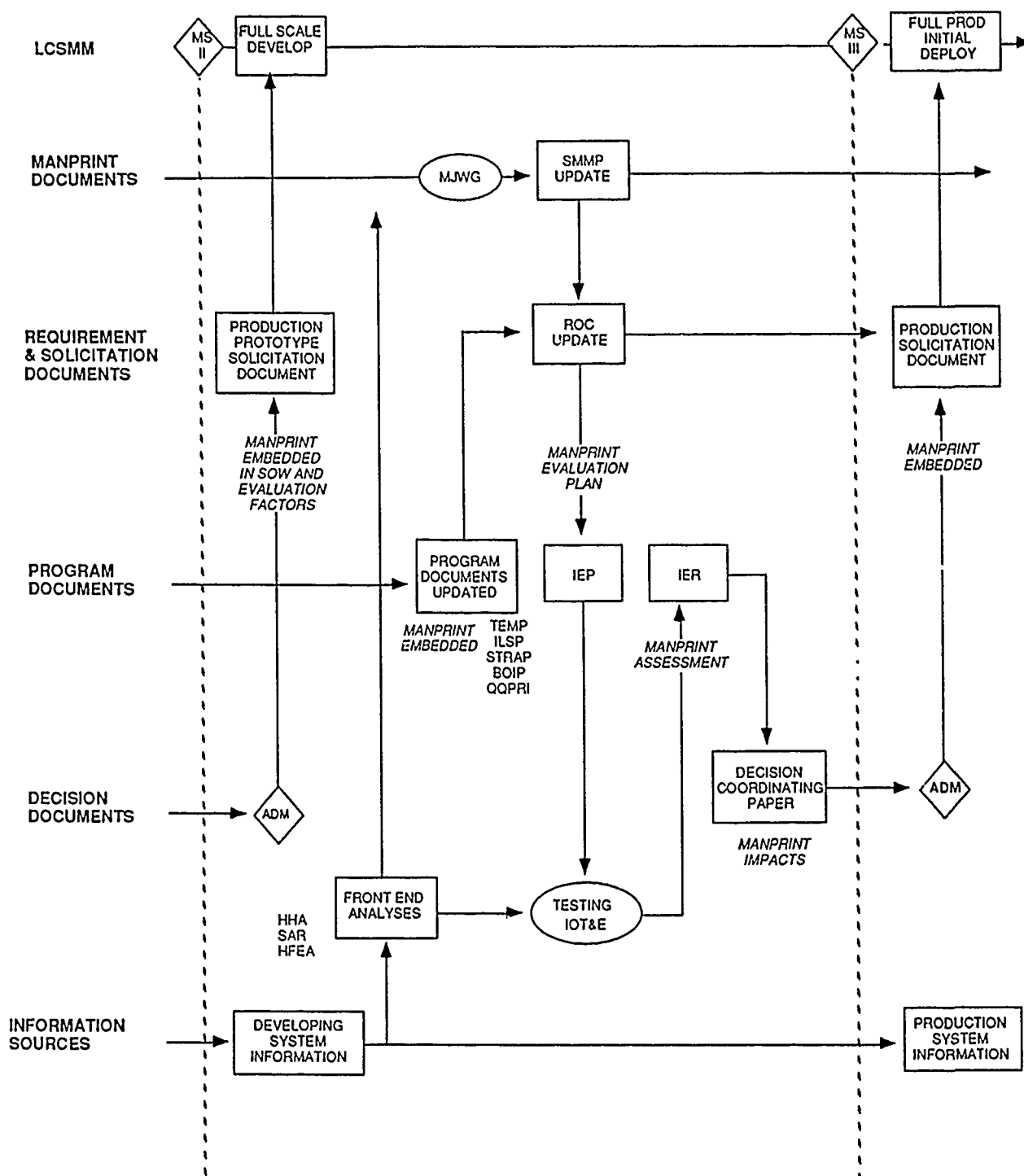


Figure 4.4. MANPRINT in the Full Scale Development Phase

Assessment Report (SAR), and the Human Factors Engineering Assessment (HFEA), are performed. This information is used to determine compliance with system specifications and to finalize system design. Once tooling for the system has begun, the cost for a major change is prohibitive and only limited changes are feasible. Alternatives to system redesign, such as training or protective devices, may be developed to resolve noncritical system issues.

Testing. System operational effectiveness and suitability are assessed through Initial Operational Test and Evaluation (IOT&E). During IOT&E, production prototypes are operated and maintained by target audience soldiers under simulated combat conditions. Test results are evaluated against previously identified MANPRINT criteria.

- **Requirement and Solicitation Documents**

The ROC is updated based on the results of analysis and testing conducted during the previous phase. The final ROC reflects the total performance requirements expected in the full rate production of the system. MANPRINT program goals and constraints must be fully integrated in the ROC so that the production contract performance requirements will reflect soldier performance considerations.

During this phase, production prototypes are solicited from industry. The basis for the contractual system specifications is the finalized ROC. Solicitation documents must reflect the MANPRINT requirements addressed in the SMMP. MANPRINT should also be included as a factor in the source selection evaluation process.

- **Program Documents**

Program documents are updated in this phase to support the development and acquisition of the new system. Key MANPRINT-related documents include updates of program documents initiated previously (TEMP, ILSP, STRAP, BOIP and QQPRI).

- **Decision Documents**

The DCP is updated to ensure that sufficient information is provided to demonstrate that the system fully meets all user and performance requirements. MANPRINT should be factor in the decision to produce and deploy the system.

4.2.5 Full Rate Production and Initial Deployment Phase (Figure 4.5)

The objective of this phase is the sustained production and delivery of the new system with its full complement of support equipment, publications, and services. Unit packages of the new system are distributed, operational units are trained, and logistic support is initiated.

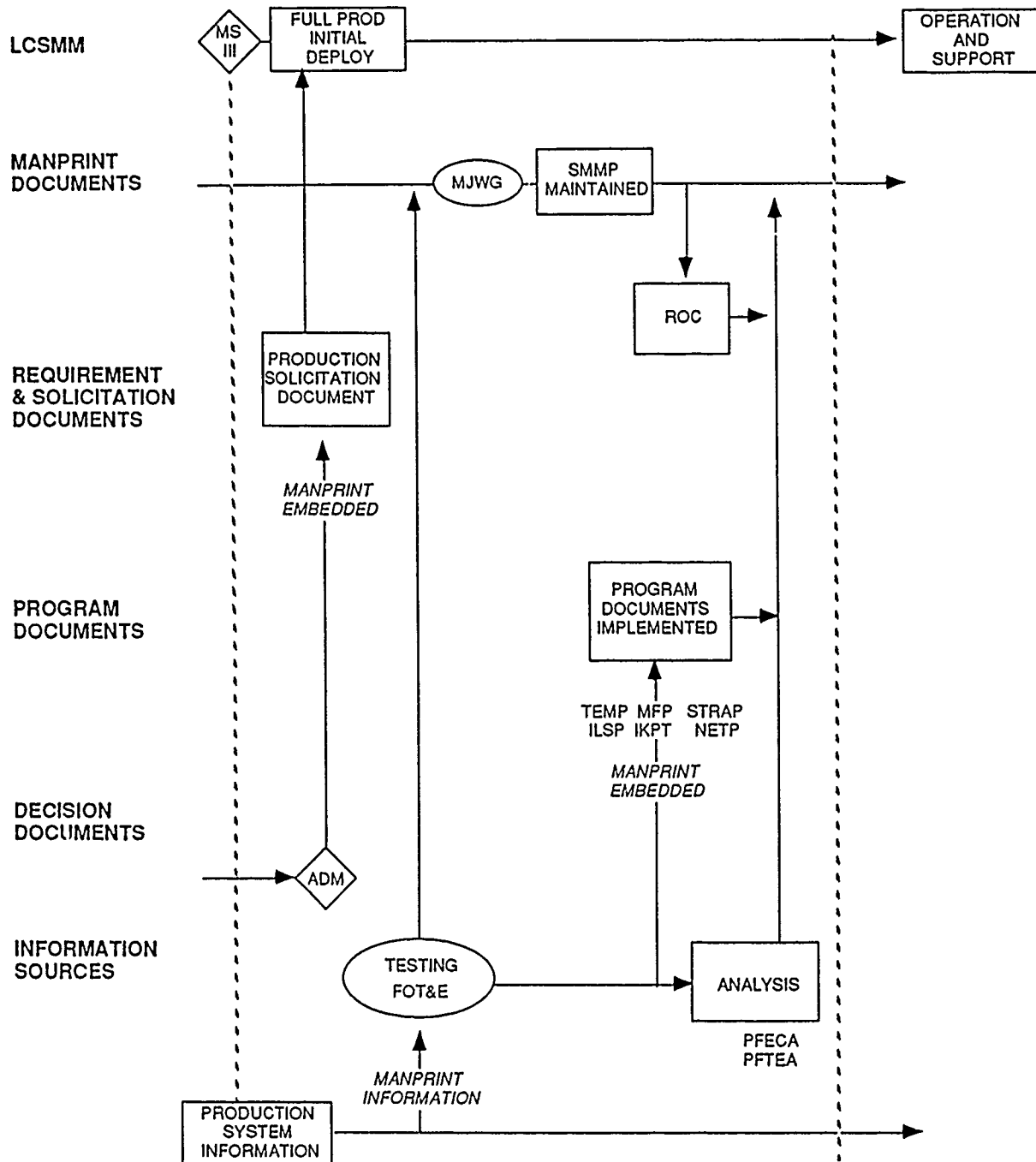


Figure 4.5. MANPRINT in the Full Rate Production and Initial Deployment Phase

- **MANPRINT Documents**

The SMMP is updated based on the production and distribution of the new system. The SMMP will serve as the means to document the impact of proposed system modifications, such as Engineering Change Proposals (ECP), on total system performance.

- **Information Sources**

Analysis. Continuing analysis, such as a Post Fielding Comparability Analysis (PFECA) or Post Fielding Training Effectiveness Analysis (PFTEA), may be used to assess the final equipment design based on actual operations.

Testing. Normally, post-production testing is limited unless specifically called for in the TEMP and approved by the decision authority. Follow-On Test and Evaluation (FOT&E) will be conducted to answer issues in the IEP not answered during previous testing or that are a result of previous testing.



Reference 4q and r.

- **Requirement and Solicitation Documents**

The approved ROC reflects the total system performance requirements expected of the new system. As stated above, the ROC will only be approved after a cross check has been performed to ensure that its operational characteristics are accurately translated into the system's solicitation documents.

Solicitation of industry in this phase is directed at full rate production of the system. The finalized ROC serves as the basis for this solicitation. It will reflect both the design improvements required as a result of IOT&E and any preprogrammed product improvements (P³I) to be applied later as technology is developed or sufficient funding becomes available. Solicitation documents must reflect the developed MANPRINT goals and constraints, as well as any MANPRINT factors resulting from unresolved test issues. MANPRINT must also be included as a primary factor in the source selection evaluation process to select the final production contractor. (See Chapter 7 for MANPRINT in source selection.)

- **Program Documents**

Program documents are fully implemented in this phase to support the deployment of the new system.

- **Decision Documents**

The Milestone III ADM will document the milestone decision, including approval for the system to be produced and deployed. Included will be finalized decisions reflecting cost,

schedule, performance, readiness, and supportability. Any exceptions to the normal acquisition process and other appropriate directions must be captured and reflected in revisions to the SMMP.

4.2.6 Operation and Support Phase (Figure 4.6)

At this point in the acquisition process, the system is fully deployed to operational units and integrated into battlefield doctrine and tactics. Two programmed events, Milestone IV, Logistics Readiness and Supportability Review, and Milestone V, Major Upgrade Review, occur during this phase.

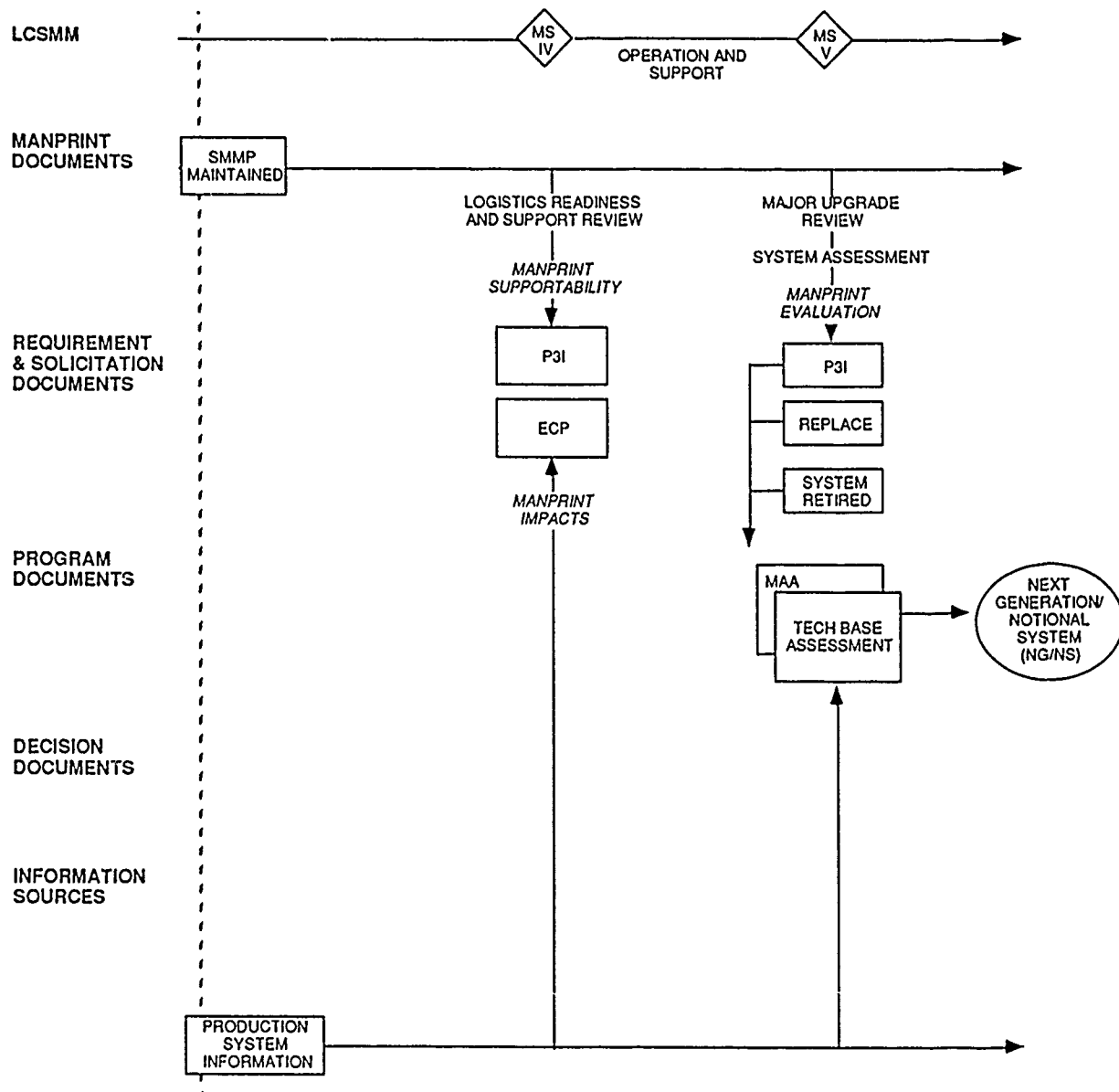


Figure 4.6. MANPRINT in the Operation and Support Phase

- MANPRINT Documents

During the Milestone IV (Logistics Readiness and Support) Review, the SMMP provides the basis for evaluating system supportability. Problems with manpower, personnel, and training are reviewed and included in proposed system changes. Proposed modifications, such as ECP or the addition of P³I, must be evaluated for MANPRINT impact.

During the Milestone V (Major Upgrade) Review, the SMMP serves as the means to evaluate how MANPRINT deficiencies impact on overall system effectiveness. The results of analysis from this review supports the maturing tech base of next generation/notional system (NG/NS) development.

4.3 Chapter References

- 4a. DODD 5000.1, Major and Non-major Defense Acquisition Programs
- 4b. DODI 5000.2, Defense Acquisition Program Procedures
- 4c. AR 70-1, System Acquisition Policy and Procedures
- 4d. AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
- 4e. The SMMP Procedural Guide
- 4f. AR 71-9, Materiel Objectives and Requirements
- 4g. AR 40-10, Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process
- 4h. AR 385-16, System Safety Engineering and Management
- 4i. AR 602-1, Human Factors Engineering Program
- 4j. AR 70-10, Research, Development, and Acquisition Test and Evaluation
- 4k. AR 700-127, Integrated Logistics Support
- 4l. TRADOC Reg 350-7, A Systems Approach to Training
- 4m. DODD 5000.3, Test and Evaluation

- 4n. AR 71-3, Force Development - User Testing
- 4o. AMC Pam 602-1, MANPRINT Handbook for RFP Development
- 4p. AR 71-2, Basis of Issue Plan (BOIP) and Qualitative and Quantitative Personnel Requirements Information (QQPRI)
- 4q. Early Comparability Analysis (ECA) Procedural Guide
- 4r. TRADOC Pam 71-8, Analyzing Training Effectiveness.

5.1 Overview: Acquisition Strategy Alternatives

The Army has traditionally used the Life Cycle System Management Model (LCSMM) described in Chapter 4 to develop and acquire its new equipment. However, due to declining resources and a need to field systems in the least possible time, the Army seeks alternatives to full developmental programs. The increased emphasis on streamlining the acquisition and fielding of equipment is reflected in the DOD Directive 5000.43, Acquisition Streamlining, and in the recent revision to AR 70-1, Systems Acquisition Policy and Procedures.

5.2 The Acquisition Strategy Spectrum

Available acquisition alternatives cover the full spectrum, from traditional development programs such as a new tank or air defense weapon system to "off-the-shelf" non-developmental items (NDI) such as a computer or commercial construction equipment. Acquisition alternatives can also include the use of commercial components and sub-systems for integration into a new system.

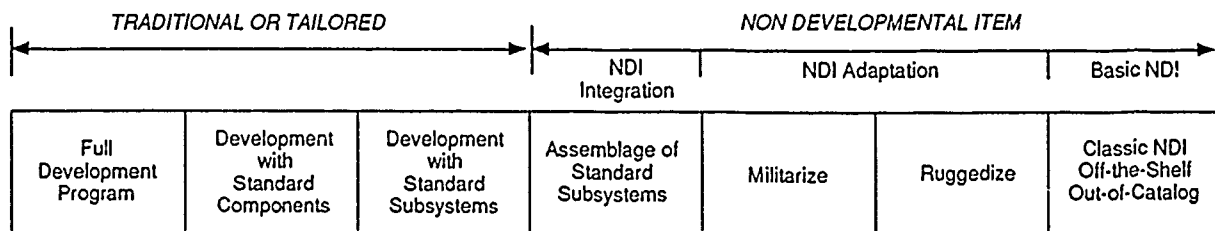


Figure 5.1. Available Acquisition Alternatives

5.2.1 The MANPRINT Challenge

From a MANPRINT perspective, the challenge of any acquisition alternative is the ability to influence system design. For most of these acquisition strategies, the time available to perform MANPRINT analyses is significantly reduced. For NDI programs, system design may already be complete, and MANPRINT may only serve as a means to discriminate between candidate systems.

5.2.2 Advantages and Disadvantages of Alternative Acquisition Strategies

Despite the reduced time expected with alternative acquisition strategies, they offer

significant advantages:

- The time to field equipment is reduced providing increased responsiveness to the field.
- Research and development costs are reduced, thereby lowering overall acquisition costs.
- State-of-the-art technology is utilized to satisfy user needs.
- The mobilization base is expanded to include available commercial production facilities.
- Available provisioning manuals and special tools can be used to reduce logistic support costs.

Along with these advantages, there are also areas of concern that must be considered:

- The new system may not meet all user requirements.
- Integrated Logistics Support (ILS) activities, normally accomplished in preproduction phases, must be accelerated increasing up-front costs.
- Proliferation of hardware and software systems may result, causing logistics support, training, and configuration management problems.
- Inherent safety deficiencies may pose unacceptable risks.
- Program management documents, such as the Basis of Issue Plan (BOIP) and the Table of Organization and Equipment (TOE), must be expedited for the shorter acquisition cycle.
- Human factors engineering issues may not be adequately addressed.



Reference 5a.

5.2.3 Acquisition Alternatives

Once the need for a materiel solution has been determined, the acquisition strategy selection order starts with improvement or reconfiguration of the existing materiel system, followed by the use of non-developmental items (NDI), and finally, the development of a new system. The MANPRINT procedures used to support the traditional LCSMM (described in chapter 4) are applicable to all acquisition strategy alternatives. However, each strategy requires a tailored MANPRINT approach, based on the complexity, cost, and schedule constraints of the program.



Reference 5a and c.

5.3 MANPRINT and Materiel Improvement Programs (formerly Product Improvements)

Materiel improvement programs are categorized as either Materiel Change (MC) or Preplanned Product Improvements (P³I). Both programs involve the modification of the design for an existing system.

5.3.1 Materiel Change (MC)

MC is the modification or reconfiguration of a type-classified, fielded system to provide new or improved capabilities, extend the system's useful life, improve safety or readiness, or reduce Operation and Support (O&S) costs. In some cases, an MC may be required to correct a system's MANPRINT deficiencies that have been documented in the SMMP.

An MC program can range in complexity from the modification of a subsystem for safety or health reasons to major modifications which will expand the operational performance envelope and result in an essentially new system. Figure 5-2 shows the more common MC program.



Reference 5d.

• MANPRINT in Materiel Change Programs.

A proposal for an MC can be originated by anyone, from commanders who operate and maintain the system in the field to project managers who monitor achievement of contractual performance requirements. Once an MC has been suggested, the TRADOC proponent school responsible for the system will confirm the need. The school's MANPRINT Joint Working Group (MJWG) should be involved early in the MC proposal process. In cases requiring urgent and limited urgent actions, such as health or safety problems, HQ AMC will validate the change.

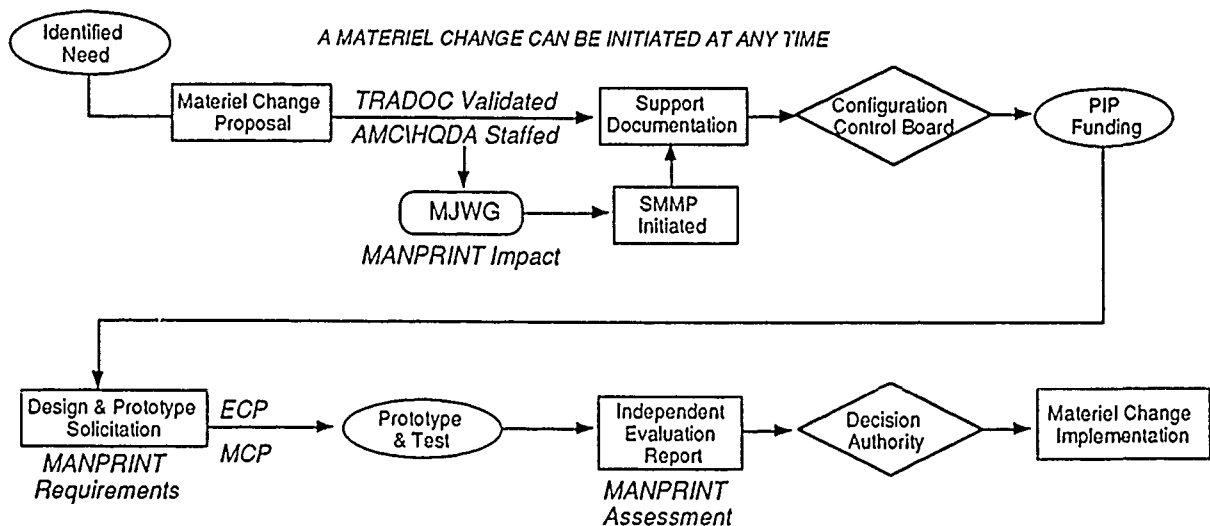


Figure 5.2. MANPRINT in Materiel Change Programs

When evaluating the impact of a proposed MC, a total system perspective must be used so that implications from all six MANPRINT domains can be adequately addressed. If a SMMP for the system already exists, the MJWG's MC assessment should be noted and appended to Tab F - Audit Trail.

When a proposed MC has MANPRINT implications, a crosswalk of system performance information contained in key program documents is required. Supporting program documents should be modified to reflect MANPRINT considerations. Once the MC proposal and support documentation has been staffed, the Configuration Control Board (CCB) will meet to consider the proposed change. Based on the information presented, the CCB will develop the technical recommendation and validate the decision level for the MC.

In-house or contractor requirements for modifications should include MANPRINT constraints. Engineering Change Proposals (ECP) and Materiel Change Packages (MCP) should be reviewed to ensure that soldier performance problems, such as increased manpower requirements, additional skill requirements, or increased training times, are not unintentionally designed into the modified system.

Depending on the degree of the MC, testing will be required to ensure that the change is technically adequate and that it achieves the user's desired operational requirements. The need to assess an MC from a MANPRINT perspective must be included in the Independent Evaluation Plan (IEP) and the results reflected in the Independent Evaluation Report (IER). The decision authority (as determined by the anticipated MC cost) will review all data and either approve or disapprove the MC.



Reference 5b and c.

5.3.2 Preplanned Product Improvements (P³I)

P³I provides for the deferred insertion of emerging technologies in a new weapon system. P³I programs complement near-term acquisitions by providing for parallel or phased development and future incorporation of added capabilities without increasing the near-term risk. These planned improvements, or "block mods," are programmed during basic system development.

- **MANPRINT in Preplanned Product Improvement Programs**

P³I requires pre-planning and up-front equipment design to allow for specific future upgrades. MANPRINT implications should be addressed during the development of the primary system using the procedures described for the traditional acquisition strategy. However, since the definition of the final system is often not completed until late in the basic system development cycle, the MJWG must remain involved in the development throughout the acquisition and deployment process.



Reference 5a, c, and d.

5.4 MANPRINT in Non-Developmental Item (NDI) Acquisitions

Non-Developmental Item (NDI) procurement requires little or no development effort by the Army. Normal sources of NDI materiel include commercial products (which may or may not require modification), materiel use by other U.S. military services or Government agencies, and materiel use by other countries. NDI acquisitions are preferred when an MC is not feasible and when the market analysis process demonstrates that off-the-shelf items are currently available which meet user needs.

5.4.1 Types of NDI

A common misconception is that NDI and off-the-shelf commercial equipment are synonymous. As shown in the Acquisition Spectrum illustration (Figure 5), there are three categories of NDI procurements, and the MANPRINT applications will vary accordingly.

- NDI Basic (formerly Category A NDI)

NDI Basic procurement involves an off-the-shelf item (commercial, foreign, other service) that is to be used in essentially the same application and environment for which it has been designed. For this category, since the design is not changed, MANPRINT can serve as a means to discriminate between existing candidate systems.

- NDI Adaptation (formerly Category B NDI)

NDI Adaptation procurement involves an off-the-shelf item (commercial, foreign, other service) that will be used in an application or environment other than that for which it has been designed. In this case, the item often requires ruggedization or militarization. Although these modifications constitute "design changes," the opportunity for hardware redesign as a result of MANPRINT is usually minimal.

- NDI Integration (formerly NDI "Other")

This category of NDI refers to a procurement which makes maximum use of NDI items as subsystems, modules, or components in a low risk system integration. This category requires a dedicated R&D effort for systems engineering, modification, and testing to ensure that selected NDI work together as an integrated system that meets the user requirements. In this category, there may be opportunities for MANPRINT to input the system integration and design.



Reference 5a.

5.4.2 MANPRINT and NDI Acquisitions

For NDI acquisitions, MANPRINT must focus on the acceptability of using an existing

or a slightly modified system. While NDI acquisitions are promising from a time, cost, and technology standpoint, they require flexibility by the user of the system and an early awareness of possible requirement tradeoffs. Figure 5.3 provides an overview of MANPRINT in the NDI materiel acquisition process.

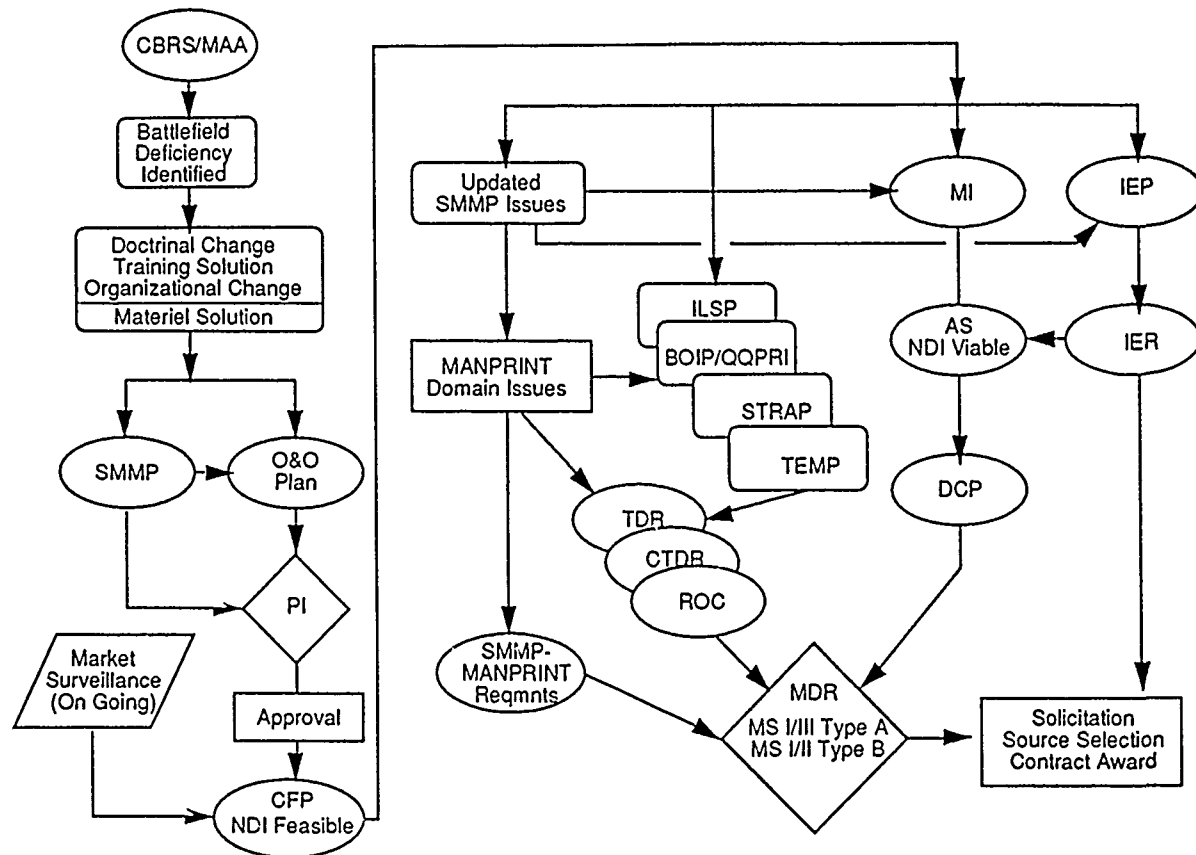


Figure 5.3. MANPRINT in NDI Acquisitions

One of the major differences between NDI and the traditional LCSMM is the emphasis on market analysis process. Market analysis activities provide the information necessary to determine whether to pursue an NDI solution, and to evaluate the MANPRINT implications of the candidate systems. Market analysis is conducted in two phases: market surveillance and market investigation.

Market surveillance establishes the feasibility of NDI as an acquisition strategy. Feasibility refers to the availability of commercial products with the potential to satisfy the materiel need. Market surveillance is a continuous activity of the AMC laboratories and research, development, and engineering (RDE) centers. It is the activity by which they maintain an awareness

of the technologies and products being developed in the private sector (including foreign products) that may be adaptable for Army use.

NDI feasibility is assessed by the AMC major subordinate commands (MSC) based on the initial operational requirements developed by TRADOC and the available market surveillance information. Since no formal method exists to ensure that soldier performance issues are identified during the NDI feasibility determination, the MANPRINT constraints and goals included in the SMMP and early requirements documents must be communicated to those responsible for conducting the market surveillance.

If an NDI acquisition strategy is determined feasible, a market investigation is conducted by the AMC MSC. In cases where there are unique user requirements, the market investigation will be supported by TRADOC. The market investigation involves a detailed search for information tailored to the specific materiel need. The SMMP and the Operational & Organizational (O&O) Plan serve as the basis for developing the operational issues and evaluation criteria to be addressed.

As a result of the market investigation, an assessment is made of the availability of hardware and software that meets the operational and performance requirements. Additionally, performance limitations and possible requirement trade-offs are identified. As the user's requirements become more defined, the Required Operational Capability (ROC) is developed which serves as the basis for the solicitation.

5.5 MANPRINT and the Army Streamlined Acquisition Program (ASAP)

While the traditional LCSMM (Chapter 4) considers the full range of complexity and risk factors for a wide spectrum of programs, DOD and Army policies now encourage streamlining for all acquisition alternatives. The ultimate goal of acquisition streamlining is to reduce the cost and time it takes to field operationally-suitable weapon systems and their supporting services.

5.5.1 The Army Streamlined Acquisition Program (ASAP)

The Army Streamlined Acquisition Program (ASAP) is a combination of common sense measures to achieve the "surest and shortest" path for low-risk development programs. It is a tailored development approach that emphasizes performance-oriented requirements and the pursuit of materiel solutions using mature components or subsystems. The application of MANPRINT to ASAP is essentially the same as for a traditional development program.



Reference 5a and b.

An overview of the ASAP process is shown in Figure 5.4.

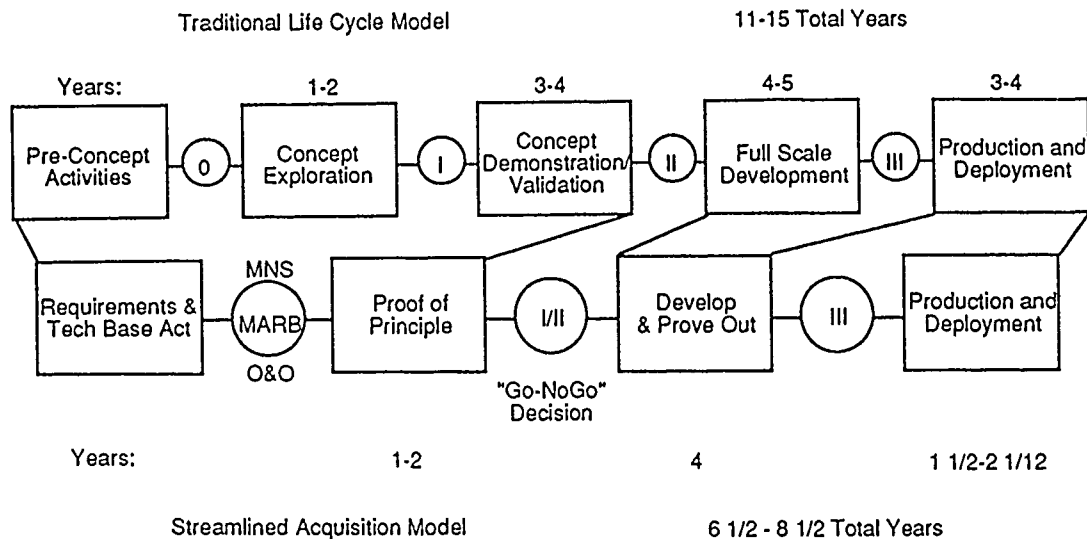


Figure 5.4. Overview of the ASAP Process

- Requirements/Tech Base Activities

Early emphasis on technology base efforts performed by the Army's laboratories and research, development, and engineering (RDE) centers lays the groundwork for this phase. ASAP relies on the selection of mature technology components and subsystems to resolve identified battlefield deficiencies. Advanced Technology Transition Demonstrations are used to confirm those technologies that appear to be mature enough to be applied in the new system. Although there is no formal program to insert MANPRINT in early technology base programs, the CBTDEV, working with AMC's Advanced System Concepts Office (ASCO) maintains an awareness of the ongoing tech base activities and considers their impact on the soldier.



Reference 5k.

The SMMP is the key soldier performance document for the streamlined approach. An early understanding of the MANPRINT issues associated with the application of new technology is necessary so that an acquisition strategy that addresses the full range of NDI, MC, and full development solutions can be developed. Front-end analyses specified in the SMMP will assist in defining the extent of MANPRINT issues and their impact on expected system performance.

The O&O Plan must reflect the same early soldier performance concerns identified in the SMMP. MANPRINT analyses and tech base activities will assist in the development of system requirements that are stated in operational terms with allowable bands of performance. Comments on the draft O&O Plan may be solicited from industry.



Reference 5a.

- **Proof-of-Principle Activities**

The Proof of Principle phase provides a two-year period to prove out the technologies selected for inclusion in the new system and to formalize the concept formulation process. It allows for an early "pulse check" with senior leadership on the system requirements and basic program acquisition strategy approach. The phase is concluded with a combined Milestone I/II "go/no go" decision that can permit a program to proceed directly to full scale development and then to production.

The approved O&O Plan serves as the basis for structuring the market investigation conducted during this phase. Since much of the information available early in the acquisition process will come from the market investigation, MANPRINT issues identified in the SMMP must be addressed. The results of the market investigation will form the basis for an acquisition strategy decision and will finalize the Required Operational Capability (ROC). Market-place features (equipment characteristics) that enhance soldier performance must be identified and included as system requirements in the ROC. Unrealistic requirements, those which add little value, and those that detract from soldier performance, must be eliminated.

The selection of the acquisition strategy (incorporation of NDI, MC, or full development) is closely linked with the requirements process. It is often necessary for the user to identify performance requirements that can be traded off to make an acquisition alternative viable. The results of MANPRINT analyses will provide the decision makers with information that will make this process easier. Care must be taken to ensure that undesirable features are not added for the sake of "making the system work."

Proof-of-principle activities stress user experimentation and troop demonstrations with "brassboard" systems, components, and surrogates or models to prove out the operational concept before proceeding to full scale development. Inclusion of critical MANPRINT issues and criteria in the Test and Evaluation Master Plan (TEMP) ensures that soldier performance information will be collected and addressed during the test program.



Reference 5 f and h.

- **Development Proveout Activities**

Development proveout activities focus on the integration of the mature technologies and systems demonstrated during proof-of-principle. This phase includes the full scale development of hard-tooled prototypes and low rate production items prior to actual entry into full rate production.

Residual MANPRINT issues documented in the SMMP are addressed through operational/ preproduction testing prior to a Milestone III decision. Integrated technical/user testing is used to the maximum extent possible to reduce test costs and time requirements. Early

testing and continuous evaluation reduce the risk that the hard-tooled prototypes will have soldier performance problems which may require significant engineering changes. The results of testing should allow type classification, thereby permitting a production decision.

Solicitation and contractual documents are streamlined by including a minimum of "how to" guidance and eliminating non-productive or non-cost effective data requirements. Tailoring of data items to the information absolutely necessary to satisfy specific MANPRINT and other requirements can result in substantial savings. Soldier performance information can be obtained by using safety, health hazards, ILS, and human factors engineering DID and data requests.



Reference 5g.

- **Full Rate Production and Initial Deployment**

The transition from hard-tooled prototypes to production items provides minimal opportunity for major design changes. Therefore, the MANPRINT efforts during this phase center on source selection and supportability.

MANPRINT must be accorded equal priority with other system characteristics to ensure effective soldier-equipment interface. MANPRINT criteria must be an integral part of all selection criteria in each area of proposal evaluation.



Reference 5 i and j.

During initial deployment, the system's supportability must be thoroughly reviewed to assess its MANPRINT impact and provide a baseline for evaluating proposed engineering change proposals (ECP). MANPRINT data collected will provide the foundation for the development of next generation and notional systems.

5.6 Chapter References

5a. AR 70-1, System Acquisition Policy and Procedures

5b. AMC/TRADOC Pam 70-2, Materiel Acquisition Handbook

5c. AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process

5d. AR 70-15, Product Improvement of Materiel

5e. AMC Pam 602-2, MANPRINT Handbook for Non-Developmental Item (NDI) Acquisitions

- 5f. AR 70-10, Research, Development, and Acquisition Test and Evaluation
- 5g. AMC Pam 602-1, MANPRINT Handbook for RFP Development
- 5h. AR 71-3, Force Development - User Testing
- 5i. AMC Pam 715-3, The Source Selection Process
- 5j. MANPRINT in the Source Selection Process, ODCSPER Pamphlet
- 5k. AMC Technology Base Transition Handbook, AMC Pamphlet.

6.1 Overview: The Solicitation Process

The solicitation process is an integral part of the acquisition of a new system. It is an extension of the requirement process, incorporating both the CBTDEV's performance requirements and the MATDEV's program requirements. The entire solicitation process, as illustrated below, can be viewed as the interrelated functions of solicitation, source selection, and contract award.

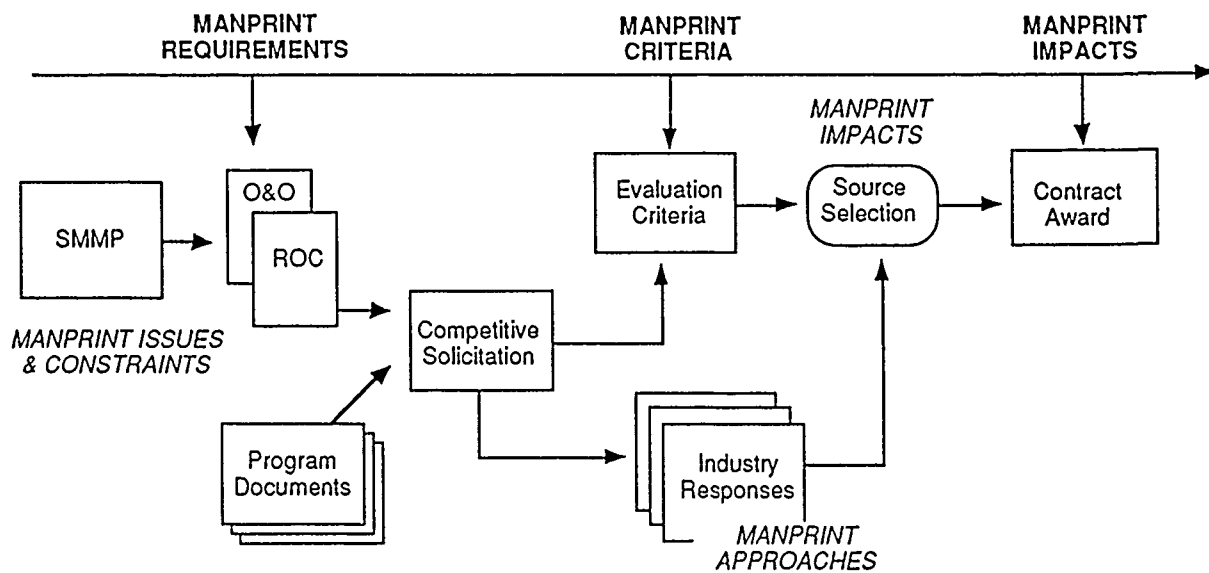


Figure 6.1. MANPRINT in the Solicitation Process

The MANPRINT program is dependent upon the integration of soldier performance concerns and constraints in all acquisition activities. The inclusion of MANPRINT in requirement, program, and decision documents is meaningless however, unless this same integration process occurs in solicitation documents. Through formal solicitation, industry must recognize that the Army is serious about MANPRINT and incorporate soldier performance considerations in their design of weapon systems.



Reference 6a.

6.2 MANPRINT in the Request For Proposal (RFP)

The Request for Proposal (RFP) is an extensive description to industry of the requirements and intentions of the Government for an imminent acquisition. It sets the stage and lays the

ground rules for competition between offerors. The task of preparing an RFP can be difficult depending on the size and complexity of the system being acquired. Although written and compiled by the AMC Major Subordinate Command (AMC) that supports the Program Manager's (PM) office, the RFP's author has many sources of support to which to turn for assistance.

The PM's MANPRINT Manager can assist the RFP author by reviewing the draft RFP to ensure that MANPRINT requirements contained in the System MANPRINT Management Plan (SMMP) are consistent with the technical effort to be performed. The MANPRINT Joint Working Group (MJWG) for the system is another important source of information. Finally, the system's requirement (Operational & Organizational Plan, Required Operational Capability), test (Test and Evaluation Master Plan) and program (Cost and Operational Effectiveness Analysis, Human Factors Analysis, Trade-Off Analysis) documents should be reviewed for MANPRINT constraints and requirements.

During the development of a system, several RFPs will be written. During the earliest acquisition phases, MANPRINT issues may focus on work space layout and crew workload. During later phases in the acquisition process, MANPRINT issues will concentrate on system supportability, such as the maintenance concept and training strategy. Although the RFP for a system will differ depending upon the phase of the acquisition process, each RFP will have the common elements of information outlined in MIL-HDBK, Preparation of Statement of Work, and MIL-STD 490, Specification Practices.

A typical government RFP includes several sections that define the total system. MANPRINT requirements are usually included throughout the RFP. Depending on the system's complexity, up to six areas can be identified where MANPRINT issues should be addressed:

- **Executive Summary.** The summary provides a synopsis of the key elements of the procurement. The importance that the Army places on MANPRINT is emphasized by describing the impact that MANPRINT will have on the source selection process. Normally, an Executive Summary will only be used with the more complex, major procurements.
- **Statement of Work (SOW).** The SOW and system specifications are the heart of the RFP. The SOW describes the management and technical effort to be provided under the contract. MANPRINT tasks in the SOW may include the scope of the contractor's MANPRINT effort, the qualifications of MANPRINT personnel, and the specific analyses to be performed to ensure that soldier performance goals meets specifications.



Reference 6b.

- **System Specifications.** This section describes how the system is to appear to the user. Included in the specifications are those expected soldier performance standards which must be

achieved by the fielded system. Additionally, the contractor may be asked to determine the soldier's contribution when calculating the total system performance. The means to verify the system's performance and physical characteristics (to include any special testing or studies such as trade-off analyses, mock-ups or prototype systems) are contained in the system specifications.



Reference 6c.

- **Contract Data Requirements List (CDRL).** The CDRL describes the information the contractor will be required to furnish to the Government. MANPRINT data needs will be tied to specific requirements or tasks outlined in the SOW or system specifications. Standardized Data Item Descriptions (DID) provide contract deliverable format and content guidance. In many cases, the content of the DID will be tailored based on the Government's information requirements and system complexity. DID are cataloged in the Acquisition Management Systems and Data Requirements List (AMSDL). (See Appendix C for MANPRINT-related DID.)

- **Instructions to Offerors, Section L.** This section provides specific details on the areas that must be addressed in an offeror's technical proposal. These normally include such activities as management, technical, ILS, cost, and MANPRINT. Since MANPRINT is an integration effort, offerors will be instructed to address MANPRINT as a separate major area and in every applicable portion of their proposals.

- **Basis for Award, Section M.** This section explains how the technical proposal will be evaluated by the Source Selection Evaluation Board (SSEB). Both the technical criteria for the evaluation and the relative importance of MANPRINT compared to the other separate major areas will be provided.



Reference 6f. *Note: This reference provides comprehensive "how to" guidance and examples on MANPRINT in the RFP.*

6.3 MANPRINT in Source Selection

MANPRINT will be included as part of the formal scoring and narrative assessment of each source solicitation. The specific approach used to evaluate MANPRINT will vary according to the nature of the acquisition process, the acquisition strategy chosen, and the complexity of the selected evaluation criteria.

6.3.1 The Source Selection Plan (SSP)

The document that most heavily influences the source selection process is the Source Selection Plan (SSP). Written by the program manager (PM), the SSP describes how proposals will be solicited from industry, how proposals will be evaluated and scored, who will make up the Source Selection Evaluation Board (SSEB), and which functional areas (including MANPRINT)

will be represented in the evaluation. Since the evaluation criteria established by the SSP will be used by the Request for Proposal (RFP) authors, there must be coordination and synchronization between the SSP and the RFP efforts.

The SSP typically consists of two parts. The first part describes the organization, membership and responsibilities of the SSEB. The second part of the SSP identifies the evaluation criteria and detailed procedures for proposal evaluation.

- **Evaluation Criteria.** The evaluation criteria are weighted factors that reflect the value that the Army places on each element. The weighting of MANPRINT should reflect the degree to which soldier performance and supportability impact on the system effectiveness and availability.

- **Evaluation Procedures.** Two approaches are currently used to evaluate MANPRINT in source selection: MANPRINT as a single element, and MANPRINT as an integrated function. The method that is selected depends upon the complexity of the system being evaluated.

Also included in the criteria and procedures section of the SSP will be a brief, concise description of the essential mission and performance requirements of the system to be acquired. Additionally, acceptable trade-offs that do not compromise the overall mission performance of the system will be identified.



Reference 6d and e.

6.3.2 MANPRINT in Source Selection Evaluation

Army Acquisition Executive (AAE) guidance states that "MANPRINT shall be a separate major area of the same visibility as technical, management, and cost and shall be evaluated throughout all aspects of design, development, Integrated Logistics Support and program management. Using this basic philosophy, treatment of MANPRINT shall be tailored to suit the nature and priorities of the program/contract effort." An example of acceptable weighting structure is shown in Figure 6.2. This guidance should be clearly defined in Section M - Basis for Award of the RFP.

Source selection is not based solely on a compilation of evaluation scores. The decision is made by the Source Selection Authority (SSA) only after a detailed assessment of the evaluation results has been performed by the SSEB. As both a major area and an integrating effort, MANPRINT should be considered across the other major evaluation areas. Figure 6.3 provides a simple example of how properly weighted MANPRINT considerations can impact on the "best value" approach to selection of competing systems.

In this example, System A provides high performance when used by soldiers with rela-

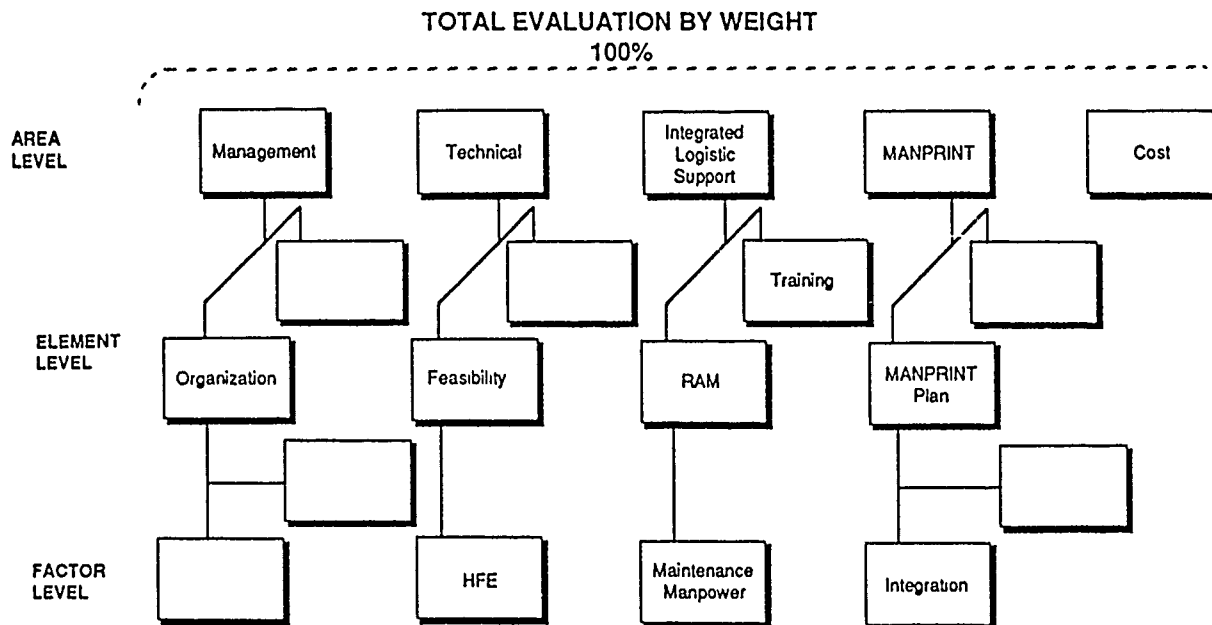


Figure 6.2. MANPRINT in Source Selection Evaluation

tively low ability, but at a higher life-cycle cost. System C can be procured at a relatively low life-cycle cost, but requires soldiers with high ability to achieve high system performance. To resolve the “best value” question requires SSEB consideration of the following questions:

- **What is the system performance requirement?** The primary MANPRINT goal is to optimize system performance. If the required total system (soldier-machine) performance level can be achieved by all three designs, then all are acceptable. Other criteria will then be used to select the final design. The best value approach attempts to avoid “gold plating” or developing systems with capabilities exceeding identified user needs.
- **Can the target audience operate and maintain the new system?** Early in the acquisition process, the target audience operators and maintainers must be identified and described in

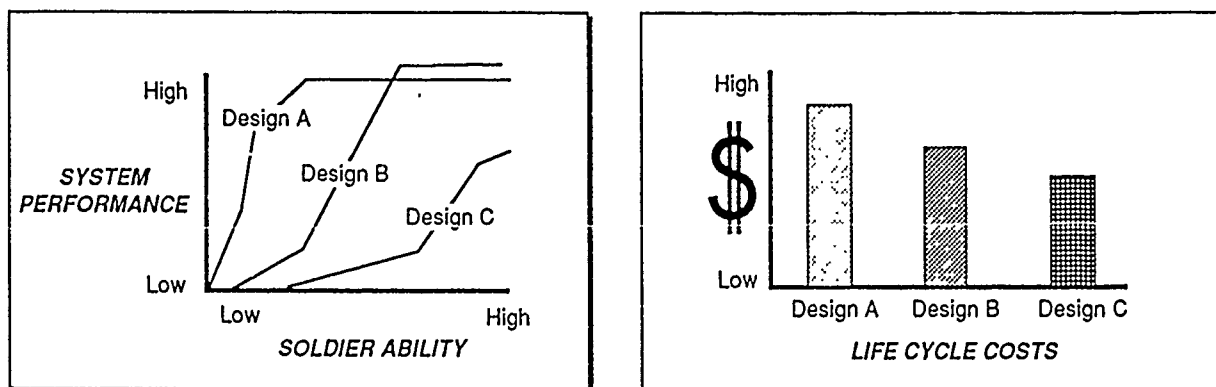


Figure 6.3. The Best Value Approach

terms of aptitudes (from minimum aptitude scores from ASVAB testing), skills (from type training), and ability. The results of testing and prototype demonstration of each system design using target audience soldiers should be reviewed by the SSEB and briefed to the SSA to provide an understanding of total system performance.



Reference 6g.

6.4 Chapter References

- 6a. AMC-TRADOC Pam 70-2, Materiel Acquisition Handbook
- 6b. MIL-HDBK-245, Preparation of Statement of Work (SOW)
- 6c. MIL-STD 490, Specification Practices
- 6d. AMC Pam 715-3, The Source Selection Process
- 6e. MANPRINT in the Source Selection Process, ODCSPER Pamphlet
- 6f. AMC Pam 602-1, MANPRINT Handbook for RFP Development
- 6g. MANPRINT in the Evaluation Process, ASARDA letter, 28 August 1986.

7.1 The Army - Industry Partnership

If MANPRINT is to achieve the goal of producing hardware and software systems that meet expected total system performance levels, it will require an active Army and Industry partnership. This relationship is supported by the Department of Defense throughout all echelons of each service. DOD Directives call for early industry involvement in the acquisition process. Industry's role in this process can be improved by a better understanding of the roles and responsibilities of the Army's key acquisition players.



Reference 7a, b, and c.

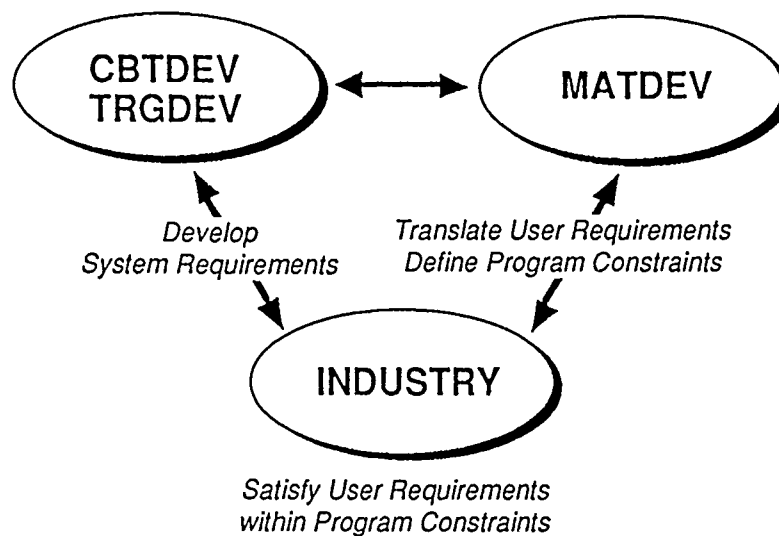


Figure 7.1. The Army-Industry Partnership

7.1.1 The Combat Developer (CBTDEV)

The CBTDEV focuses on deficiency resolution and system performance. Initial user requirements, including MANPRINT issues and constraints, are determined by the system proponent CBTDEV. Clearly stated performance-oriented requirements developed by the CBTDEV serve to better define the expected soldier characteristics of the final system. Early identification of the proposed operators' and maintainers' capabilities and limitations assists industry in determining the proper allocation of tasks required to achieve total system performance goals.

7.1.2 The Training Developer (TRGDEV)

The TRGDEV also plays an important role in the acquisition process. For training

devices not tied to a new system, the TRGDEV acts as the system proponent and assumes the responsibilities outlined above for the CBTDEV. Early front-end analyses, such as the Early Comparability Analysis (ECA), depend on input of critical task information from the TRGDEV. Additionally, the initial training strategy and MANPRINT constraints are generated by the TRGDEV.

7.1.3 The Materiel Developer (MATDEV)

The MATDEV's role is to manage cost, schedule, performance, and supportability of the new system. Another important aspect of the MATDEV responsibilities is the translation of the requirements developed by the CBTDEV and TRGDEV into solicitation and contractual terms. Many of the early MANPRINT tasks, including the integration of soldier performance issues into program documentation (ILSP, TEMP) and the analytical effort required to define and develop MANPRINT issues (LSA, HHA, SSRA, HFEA), also requires MATDEV support.

7.1.4 Industry

Industry is concerned with winning the contract and then developing the new system within time, cost, and performance constraints. Delivery of the final product to the Army must ultimately provide industry with reasonable compensation for time and effort expended. Profit is important to both the Army and Industry. Without it, the defense industrial base simply would not exist. Many of industry's technological improvements including recent MANPRINT initiatives, have resulted from industry's willingness to reinvest their profits into Independent Research and Development (IR&D) programs.

7.1.5 The Partnership

Industry's view of MANPRINT will reflect the emphasis placed by the Army on the importance of soldier performance issues. Clearly stated "man-in-the-loop" requirements in program, requirement and solicitation documents are the foundation for clear communication with Industry.

- **Defining Requirements**

The CBTDEV must clearly describe the minimum acceptable system performance requirements necessary to resolve the identified mission area deficiency. Early front-end analyses and the integration of information from the six MANPRINT domains performed by the CBTDEV will assist in the definition of requirements and in the identification of possible performance trade-offs.

Early MATDEV involvement in the system requirements determination process is critical. The MATDEV brings to this process a knowledge of the technology base so that an agreement can be reached between what is required and what is available and affordable. Each requirement

should be examined in the context of its value-added so that an early determination of essential system capabilities can be made.

Industry should be provided an opportunity to review draft materiel requirement documents. Unclear or contradictory Army requirements should be challenged, and additional information that impacts the technological feasibility and availability of the new system should be provided.

- The Solicitation

Although not a usual player in the preparation of solicitation documents, the CBTDEV should be involved to ensure that the soldier performance issues outlined in the SMMP and in the approved requirement documents are included in the Request for Proposal (RFP). The CBTDEV, as the user's spokesperson, should also be represented on the Source Selection Evaluation Board. For a separate MANPRINT evaluation panel, the CBTDEV should be considered as a candidate for its chair.

The MATDEV should coordinate the development of the solicitation documents with the CBTDEV. MANPRINT information needs and unique MANPRINT contractor tasks should be delineated in the RFP's specifications and statement of work sections. Additionally, the RFP must clearly state the overall importance of MANPRINT relative to other evaluation factors.

DOD directives encourage Industry reviews of draft solicitation documents. Review of a draft RFP can be used to identify cost driver and problem areas and request alternate approaches from industry. Such a review permits industry to start work on the problem and point out areas where further acquisition streamlining steps can be taken. Prospective contractors should be asked to identify innovative technological approaches that meet the requirements contained in the RFP. Pre-proposal conferences, held in conjunction with the issuance of the draft RFP also provide an opportunity for prospective contractors to gain a better understanding of the objectives of the solicitation.



Reference 7c.

Finally, the Army must understand that Industry cannot always design and produce "MANPRINTed" systems at no additional cost to the government. If MANPRINT is to result in "value added" contributions to total system performance, it may require dedicated and up-front funding within the contract.

7.2 Understanding the Army's MANPRINT Requirements

An effective Industry MANPRINT effort requires an understanding of both the Army's program objectives and the capabilities of the soldier expected to use and maintain the new system. Both are tailored to the specific acquisition.

- **MANPRINT Program Objectives**

The Army's System MANPRINT Management Plan (SMMP) is the cornerstone of the Army's MANPRINT effort for any system. A review of the SMMP will help Industry recognize the critical soldier performance that will ultimately have to be addressed by their design team. The SMMP also contains the Army's plan for conducting analyses to resolve identified MANPRINT issues. Since Industry may be required to support or perform some of these analyses, this plan should be reviewed for implied taskings. Finally, the SMMP is an excellent source of information for both the planned and predecessor system. It provides a detailed listing of documents, studies, analyses, and test reports that should be examined for additional soldier performance implications.



Reference 7d.

- **Soldier Performance Considerations**

Addressing soldier performance issues requires an understanding of the capabilities and limitations of the proposed operators, maintainers, and supporters of the new system. For each system, the Army has developed a Target Audience Description (TAD) that is included as Tab G of the SMMP. The TAD will provide designers with a better understanding of the role of the soldier in the performance of the final system. However, the TAD cannot replace the "hands on" experience gained by having soldiers operate and maintain early prototypes in the expected environment for the new system. The design team should take every opportunity to observe and gather information from soldiers performing operational missions in the field.



Reference 7e.

7.2.2 Industry Information Needs

Once involved in a program, Industry must be made a full partner in the information process. The contractor should be a regular member of the MANPRINT Joint Working Group (MJWG). Additional Government Furnished Information (GFI), including lessons learned from the predecessor system, updated MANPRINT information, program issues, manning and personnel decisions, and allowable performance trade-offs, should be provided to Industry as it becomes available.

7.3 Responding to MANPRINT Requirements

MANPRINT is more than a checklist with prescribed deliverables. MANPRINT is an interactive process that seeks to influence system design by focusing on the capabilities and limitations of its expected operators and maintainers. The outcome of this process should result

in improved total system performance. In evaluating industry proposals, the Army is looking for more than a "we'll do MANPRINT" response.

While the level of the Industry MANPRINT effort for a system is dependent on requirements in the Request for Proposal (RFP), the complexity of the system, and the potential for MANPRINT impact, two aspects will most likely be required to be addressed: MANPRINT organization and the Manufacturer's MANPRINT Management Plan (MMMP).

7.3.1 Industry MANPRINT Organization

There is no single "correct" corporate structure for MANPRINT. Instead of reorganizing for MANPRINT, each company should review its operating procedures to ensure that those involved in addressing soldier performance issues can easily cross traditional functional boundaries to gather data and to interact in the design process.

Functionally, MANPRINT can work successfully either as a single corporate office responsible for all company MANPRINT efforts, or as an element within an functional domain such as human factors, supportability (ILS) or systems engineering. Where MANPRINT is performed in an organization, however, is not as important as its access to the engineering designers and management. Those responsible for MANPRINT within an organization should be represented at all internal and external reviews.

An alternative to a single MANPRINT organization is an integrated approach with MANPRINT agents in each functional area. These MANPRINT domain subject matter experts ensure that MANPRINT concerns are translated into each function's unique language and assist in identifying issues and questions for the entire MANPRINT organization to address.

7.3.2 The Manufacturer's MANPRINT Management Plan (MMMP)

The common thread for any Industry MANPRINT effort is the contractor's Manufacturer's MANPRINT Management Plan (MMMP). Although similar to the Army's System MANPRINT Management Plan (SMMP), the MMMP should be adapted to reflect how each individual company will organize and conduct its MANPRINT program.

While there is no approved MMMP format or MANPRINT-specific Data Item Description, the MMMP should address the contractor's overall MANPRINT management structure, including the qualifications of his domain experts, their interface with other program elements for this system, and the level to which the MANPRINT organization reports to system's program manager. A more detailed description of the MMMP, including selected MANPRINT DIDs, can be found in AMC PAM 602-1, MANPRINT Handbook for RFP Development.

Another key item that must be discussed is the process by which soldier performance issues are identified and considered in the design process. The MMMP should describe how

issues and concerns developed by both the Government and Industry will be addressed. Included in this description are the tasks and analyses to be performed to provide the information necessary to answer critical issues. The means to integrate the results of the tasks and analyses that are typically prepared for most programs, i.e., task analysis, human factors engineering analysis, LSA tasks, safety hazard analysis, and training effectiveness analysis, should be discussed.

The MMMP should provide an audit trail of the issue identification and resolution process that is readily available to the design team. If the system to be developed has many issues to be resolved, it may be worthwhile to automate the MMMP. In this case, each issue would be maintained on a data base that could include the source of the issue; its specific program or contractual document reference; plans for issue resolution, including specific tasks or analyses to be performed; a rating of the severity of the issue; and all actions performed to date. Such an automated MMMP would serve as a means to document that the system is being designed within required Government constraints. It would also provide the members of the design team with a means to quickly ascertain the status of the program from a MANPRINT perspective. An example of a requirement for an MMMP is shown below:

Requirement:

The Contractor shall incorporate MANPRINT in the design process.

The Contractor shall:

- Establish a MANPRINT Program using AR 602-1 (para 1-8), AR 602-2, AMC Pam 602-1, and MIL-H-46855 as guides;
- Prepare a Manpower Estimate Report IAW DI-S-4057, addressing and incorporating sensitivity analyses for MOS consolidation, skill level reduction, and two-level maintenance;
- Prepare a MANPRINT report on all MANPRINT issues and concerns IAW DI-S-4057, to include proposed resolutions and lessons learned list identifying potential OMS personnel errors induced by hardware and software design;
- Identify the soldier performance requirements and critical human performance thresholds in time and accuracy dimensions with appropriate sensitivities to achieve...system performance.

(Reprinted from RFP DAA-J09-88-R-A073, June 1988, USAAVSCOM)

Figure 7.2 Sample MMMP

7.4 Chapter References

- 7a. DODD 5000.1, Major and Non-major Defense Acquisition Programs
- 7b. DODD 5000.43, Acquisition Streamlining
- 7c. AR 70-1, System Acquisition Policy and Procedures
- 7d. AR 602-2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
- 7e. MANPRINT in the Source Selection Process, ODCSPER Pamphlet
- 7f. AMC Pam 602-1, MANPRINT Handbook for RFP Development.

Appendix A: Terms and Definitions

ACQUISITION PLAN (AP)

The Acquisition Plan is derived from the Acquisition Strategy and summarizes acquisition background and need, objectives, conditions, strategy, and related functional planning (with emphasis on contractual aspects). It provides detailed planning for contracts and milestone charting.

ACQUISITION STRATEGY (AS)

The conceptual framework for conducting materiel acquisition, encompassing the broad concepts and objectives which direct and control the overall development, production, and deployment of a materiel system. It evolves in parallel with the system's maturation. Acquisition strategy must be stable enough to provide continuity, but dynamic enough to accommodate change. It is documented as an annex to the DCP at Milestone I.

ADDITIONAL SKILL IDENTIFIER (ASI)

A letter and number code that may be added to the basic five-character MOS code to identify certain highly specialized skills that are in addition to the skills required by the MOS.

ADDITIVE OPERATION PROJECT (AOP)

A project that consists of equipment requirements besides the initial issue allowances in MTOE, TDA, and CTA. It automatically increases the Army acquisition objective (AAO) by the quantities cited in the project. It is an authorization for major commands to acquire materiel for theaters or CONUS stockage for the purpose of supporting specific operations, contingencies, or war plans for specific geographic areas and worldwide base development.

ANTHROPOMETRIC

Of or relating to the study of human body measurements, especially on a comparative basis.

ARMED FORCES QUALIFICATION TEST (AFQT)

The AFQT is a combination of Verbal (VE), Arithmetic Reasoning (AR), and Numerical Operations (NO) ASVAB subtests. The AFQT is used to screen applicants whose mental characteristics are not sufficient for Army duties. The AFQT score is a good approximation of an individual's intelligence score.

ARMED SERVICES VOCATIONAL APTITUDE BATTERY (ASVAB)

The Armed Services Vocational Aptitude Battery (ASVAB) consists of a series of subtests

which, when combined in various ways, produces 11 composite scores. These composites are used for two purposes: (1) selection of applicants, and (2) assignment of new accessions.

Composites are used to assign new accessions to MOS which have a need for personnel with the requisite aptitudes in specific areas. Most MOS have entry requirements involving a minimum score on one or more of the ASVAB composites.

The ASVAB composites are good predictors for entry-level personnel in diagnostic, procedural, administrative, and clerical types of tasks. There is substantial confidence that assignment to job categories by ASVAB composites is considerably better than chance.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP)

With the cooperation of service schools, the AOSP provides research on each Military Occupational Specialty (MOS). Using soldier tasks as the basic unit of analysis, data are collected on such variables as percent performing, task learning difficulty, and relative time spent. After the survey data have been analyzed, a report on the MOS is prepared.

ARMY PROGRAM FOR INDIVIDUAL TRAINING (ARPRINT)

A computer-developed document that identifies officer and enlisted training requirements. It contains programs for the Active Army, Reserve Components, other U.S. Services, and foreign military.

ASSOCIATED SUPPORT ITEMS OF EQUIPMENT (ASIOE)

An end item required for the operation, maintenance, and/or transportation of a BOIP item. ASIOE are listed on the BOIP of the item they support. ASIOE have their own LIN and are separately documented into TOE/VTADS.

AUTOMATED UNIT REFERENCE SHEET (AURS)

A document which generally proposes or portrays certain basic personnel and equipment data for organizational development. It provides information for use in developing BOIP and Draft Plan TOE to support concepts and doctrine studies, computer-assisted war game simulations, and operational testing.

AVAILABILITY (OPERATIONAL)

A measure of the degree to which a system is either operating or is capable of operating at any time when used in its typical operational and support environment.

BASELINE COST ESTIMATE (BCE)

A document prepared by the materiel developer that provides a detailed estimate of acquisition and ownership costs. It is normally required for high-level decisions and provides the basis for subsequent tracking and auditing.

BASIS OF ISSUE PLAN (BOIP)

A planning document that lists specific levels at which a new item of materiel may be placed in a unit/organization; the quantity of the item proposed for each organization element; and other equipment and personnel changes required as a result of the introduction of the new item. The BOIP is not an authorization document.

BEST TECHNICAL APPROACHES (BTA)

A document prepared by a Special Task Force (STF) or Special Study Group (SSG), or jointly by the combat developer and materiel developer during concept exploration. It identifies the best general technical approach(es) based on the results of the Trade-Off Determination (TOD) and an analysis of trade-offs among support and technical concepts, life-cycle costs, and schedules.

BIOMEDICAL

Of or relating to a branch of medical science concerned especially with the capacity of human beings to survive and function in abnormally stressful environments and with the protective modification of such environments.

COMMON TABLE OF ALLOWANCES (CTA)

An authorization document for items needed for common usage by individuals and by MTOE, TDA, or JTA units and activities Army-wide.

CONCEPT FORMULATION PACKAGE (CFP)

The documentary evidence that the concept formulation effort has satisfied the concept formulation objectives. The package consists of a Trade-Off Determination (TOD), Trade-Off Analysis (TOA), Best Technical Approach (BTA), and Cost and Operational Effectiveness Analysis (COEA).

CONTINUOUS COMPREHENSIVE EVALUATION (C²E)

A continuous process extending from concept definition through deployment which evaluates the operational effectiveness and suitability of a system by analyses of all available data.

CONTRACT DATA REQUIREMENTS LIST (CDRL)

A form (DD Form 1423) used as the sole list of data and information which the contractor is obligated to deliver under the contract, with the exception of that data required by standard Defense Acquisition Regulation (DAR) clauses.

COST AND OPERATIONAL EFFECTIVENESS ANALYSIS (COEA)

A documented investigation of: the comparative effectiveness of alternative means to meet a defined threat; the cost of developing, producing, distributing, and sustaining each alternative system in a military environment for a time preceding the combat application; also a documented investigation of a valid requirement that HQ TRADOC and HQDA have approved.

COST AND TRAINING EFFECTIVENESS ANALYSIS (CTEA)

A methodology which involves a documented investigation of the comparative effectiveness and costs of alternative training systems for attaining defined performance objectives, taking into consideration usage pattern and training scenarios. A CTEA can examine training concept, equipment and strategies; programs of instruction; and training implications of new materiel, organization, tactics, employment techniques, or families of systems. CTEA is used in conjunction with the COEA.

CRITICAL ISSUE

Those issues associated with the development of an item or system that are of primary importance to the decision authority in deciding whether to allow the item or system to continue into the next phase of development.

DECISION COORDINATING PAPER (DCP)

A decision paper that gives the reason for starting, continuing, reorienting, or stopping a development program at each critical decision point during the acquisition process.

DESIGNATED ACQUISITION PROGRAM (DAP)

A program designated by the AAE for ASARC milestone review. Selection is based on resource requirements, complexity and Congressional interest.

DEVELOPMENT TESTING (DT)

Testing of materiel systems conducted by the materiel developer using the principle of a single, integrated development test cycle to demonstrate that the design risks have been minimized; the engineering development process is complete; and the system meets specifications. Also used to

estimate the system's military utility when it is introduced. DT is conducted in factory, laboratory, and proving ground environments.

EARLY COMPARABILITY ANALYSIS (ECA)

Early Comparability Analysis (ECA) is a front-end analysis tool used to identify high-driver tasks on a predecessor item of equipment or reference components (components representative of those associated with a proposed new system). High-driver tasks are those operator and maintainer tasks that are costly in terms of manpower, personnel and training requirements, which can have a significant impact on a system's life-cycle cost. The ECA will partially satisfy the requirements of LSA Task 203 (Comparability Analysis).

EMBEDDED TRAINING

Training that results from features designed and built into a specific end item of equipment to provide training in its use.

ENLISTED MASTER FILE (EMF)

A file which contains personnel record data on all enlisted personnel. From this file, qualification data can be obtained for every soldier in any MOS.

FIRST ARTICLE TEST (FAT)

Production testing that is planned, conducted, and monitored by the materiel developer. FAT includes pre-production and initial production testing conducted to ensure that the contractor can furnish a product that meets the established technical criteria.

FIRST UNIT EQUIPPED (FUE)

The first troop unit to be equipped with the first production items/systems.

FIRST UNIT EQUIPPED (FUE) DATE

The scheduled date a system or end item and its support elements are issued to the designated initial operational capability unit, and training specified in the new equipment training plan has been accomplished.

FOLLOW ON EVALUATION

Testing conducted subsequent to the full production decision to provide data to answer operational issues that were not resolved by earlier operational testing.

FOLLOW ON OPERATIONAL T&E (FOT&E)

Test and evaluation conducted subsequent to a Milestone III production decision to obtain information lacking from earlier initial operational test and evaluation. Normally, FOT&E is conducted subsequent to the decision to proceed beyond low rate initial production.

HEALTH HAZARD

An existing or likely condition, inherent to the operation or use of materiel, that can cause death, injury, acute or chronic illness, disability and/or reduced job performance of personnel by exposure to: shock/recoil; vibration; noise (including steady state, impulse, and blast over-pressure); humidity; toxic gases; toxic chemicals; ionizing or non ionizing radiation (including X rays, gamma rays, magnetic fields, microwaves, radio waves, and high intensity light); lasers; heat and cold; oxygen deficiency; blunt/sharp trauma; pathogenic microorganisms.

HEALTH HAZARD ASSESSMENT (HHA)

The application of biomedical and psychological knowledge and principles to identify, evaluate, and control the risks to the health and effectiveness of personnel who test, use, or service Army systems.

HIGH DRIVER TASK

A task identified, through analysis of task criteria, as costly in manpower, personnel and training resources. The primary objective of ECA is to aid combat developers in identifying "high drivers" requiring a design change so that these tasks can be reduced in number or completely eliminated from new system design. Information from tasks derived from predecessor or reference systems are the key to determining the impact these tasks have on the Army MPT resources.

HUMAN FACTORS ENGINEERING ASSESSMENT (HFEA)

HFEA deals with the comprehensive integration of soldier characteristics into Army doctrine and systems. It is used in system definition, design, development and evaluation in order to optimize the capabilities and performance of human machine combinations. It includes the principles and techniques of the science of human engineering, and covers all aspects of the soldier-machine interface.

Application of human factors engineering assessments involves considerations of all relevant information pertaining to the following: human characteristics; anthropometric data; system interface requirements; human performance; biomedical factors; and safety factors.

In addition, human factors engineering assessments pertaining to system manning levels and

user, operator and maintainer capability requirements are used as inputs to the consideration of manpower, personnel, and training issues in the MAP.

The adequacy of system HFE is evaluated during both development and operational testing.

IN PROCESS REVIEW (IPR)

Reviews Army acquisition programs other than DOD major or Designated Acquisition Programs.

INDIVIDUAL AND COLLECTIVE TRAINING PLAN (ICTP)

The plan that identifies the training concept, strategy, and requirements for a system from initial qualification through sustainment and follow-on training for all MOS and at all levels.

INTEGRATED LOGISTICS SUPPORT (ILS)

A composite of all support considerations necessary to assure the effective and economical support of a system at all levels of maintenance for its programmed life cycle. A unified and iterative approach to the management and technical activities needed to:

- a. Influence operational and materiel requirements and design specifications.
- b. Define the support requirements best related to system design and to each other.
- c. Develop and acquire the required support.
- d. Provide required operational phase support at lowest cost.
- e. Seek readiness and LCC improvements in the materiel system and support systems during the operational life cycle.
- f. Repeatedly examine support requirements throughout the service life of the system.

INTEGRATED LOGISTIC SUPPORT PLAN (ILSP)

Provides a composite of all support considerations necessary to assure the effective and economical support of a system for its life cycle and serves as the source document for summary and consolidated information required in other program management documentation.

INTEGRATED PROGRAM SUMMARY

Summarizes, in greater detail than the DCP, various facets of the implementation plan for a system acquisition at Milestones I and III.

JOB ANALYSIS

The basic method used to obtain salient facts about a job, involving observation of workers, conversations with those who know the job, analysis questionnaires completed by job incumbents, and study of documents involved in performance of the job.

JOINT TABLE OF ALLOWANCES (JTA)

The JTA is a requirements/authorization document of equipment for units operated jointly by two or more military services, such as MAAG and missions.

JUSTIFICATION FOR MAJOR SYSTEM NEW START (JMSNS)

Defines a deficiency or opportunity such that there is a reasonable probability of satisfying a need by the acquisition of a single system.

LEARNING ANALYSIS

A procedure for identifying the supporting skills and knowledge of each stated objective that must be acquired before a soldier can demonstrate mastery of the objectives.

LOGISTIC SUPPORT ANALYSIS (LSA)

An analytical technique used by integrated logistic support management to provide a continuous dialogue between designers and logisticians. LSA provides a system to identify, define, analyze, quantify, and process logistics support requirements for materiel acquisition programs.

LOGISTIC SUPPORT ANALYSIS RECORD (LSAR)

A file of logistic support information in standardized format on acquisition programs for specific new or modified systems and equipment. Serves acquisition process by using logistic data derived during all phases of the process to support logistic support analysis processes.

LONG RANGE RESEARCH, DEVELOPMENT AND ACQUISITION PLAN (LRRDAP)

Two basic plans make up the overall Army Long Range Plan: (a) The LRRDAP. This plan displays R&D programs in support of requirements identified by the MAA and summarized in the Battlefield Development Plan, portrays programs over a 15 year period, displays RDT&E programs that support procurement, is fully compatible with the PPBES, reflects a by-year prioritization, and is the starting point for RDA program building; (b) The AMC LRRDAP. This plan consists of two parts: (1) AMC Long Range Science and Technology Plan. This plan defines technology in terms of deliverables to solve system deficiencies identified by MAA; provides a document which identifies technology base efforts (6.1, 6.2, and 6.3A) being conducted by major

subordinate commands and laboratories, and provides management a baseline for decisions affecting technology base efforts; and serves as a means of communicating to the user those technologies that will improve mission performance in the 10 to 20-year future. (2) AMC Long Range Development and Acquisition Plan. This plan specifies system development time lines and the relationship between the technical base and planned developments and acquisitions.

MANPOWER

The personnel strength (military and civilian) as expressed in terms of the number of men and women available to the Army. Manpower refers to the consideration of the net effect of Army systems and items on overall Army human resource requirements and authorizations (spaces, to ensure that each system is affordable from the standpoint of manpower). It includes analysis of the number of people needed to operate, maintain, and support each new system being considered or acquired, including maintenance and supply personnel and personnel to support and conduct training. It requires a determination of the Army manpower changes generated by the system, comparing the new manpower needs with those of the old system(s) being replaced, and an assessment of the impact of the changes on the total manpower limits of the Army. If, given manpower priorities established by the Department of the Army, systems cannot be supported by projected manpower resources, then changes in system design, organization, or doctrine are made to achieve affordability. In the MAP, manpower analyses and actions are necessarily conducted in conjunction with force structure and budget processes.

MANPOWER REQUIREMENTS CRITERIA (MARC)

The number of direct workers required to effectively perform a specified work activity. A principal computational component of MARC is the estimate of Annual Maintenance Man Hours (AMMH) and its variations (AAMMH, IPAMMH, and DPAMMH), each of which represents different contributing factors to the overall maintenance manpower and personnel determination. AAMMH, AMMH, DPAMMH and IPAMMH are MARC components of a system from the perspective of the factors each represents. These MARC components are defined below:

- Annual Available Maintenance Man Hours (AAMMH). The number of annual man hours each repairer is expected to be available for under sustained operating conditions (e.g., wartime).
- Annual Maintenance Man Hours (AMMH). The sum of the direct and indirect productive time required to repair an item.
- Direct Productive Annual Maintenance Man Hours (DPAMMH). The estimated wrench-turning time required to repair a component or assembly.

MANPRINT (MANPOWER AND PERSONNEL INTEGRATION)

MANPRINT refers to the comprehensive technical effort to identify and integrate into materiel development and acquisition (to assure system effectiveness) all relevant information and con-

siderations concerning six domains: human factors engineering; manpower; personnel; training; system safety; and health hazards.

MANPRINT ASSESSMENT

A MANPRINT Assessment is conducted prior to each milestone decision review for all materiel acquisitions, including materiel change and NDI. The MANPRINT Assessment is used to determine the status and adequacy of the MANPRINT effort in a materiel acquisition program. The assessment also provides a forum for presenting unresolved MANPRINT issues and concerns to decision makers. ODCSPER is responsible for the MANPRINT Assessment of MDAP, ADAP, and level-I non-major systems. AMC, TRADOC and the applicable MACOM are responsible for assessments of level II and III non-major systems.

MANPRINT REVIEW

A MANPRINT review is conducted in conjunction with scheduled ILS management team (ILSMT) reviews. The MANPRINT review determines the adequacy and status of the MANPRINT efforts associated with each acquisition program. Responsibility for conducting these reviews rests with the applicable program sponsor (i.e., the Program Manager for MDAP, ADAP, and level I non-major systems; project officer or equivalent for level II and III non-major systems). Results are documented in the appropriate decision documents (i.e., system concept paper or decision coordinating paper).

MARKET INVESTIGATION

The process of gathering information before making acquisition decisions. It is conducted initially during the Requirements/Technology Base Activities Phase and, in greater depth, during the Proof-of-Principle Phase.

MATERIEL ACQUISITION DECISION PROCESS REVIEWS (MADP)

Major management decision reviews conducted prior to entry into each successive phase of the materiel acquisition process. The purpose of the reviews is to evaluate the development and surface critical issues prior to approval for entry into the subsequent phase. There are three levels of reviews:

- a. The Defense Acquisition Board (DAB) reviews for major systems requiring Secretary of Defense approval of program decisions. After a weapons program progresses beyond Milestone II, the Service Secretaries may assume responsibility for DAB programs as directed by the Deputy Secretary of Defense.
- b. The Army Systems Acquisition Review Council (ASARC) reviews for major systems requiring the Secretary of the Army approval of program decisions, including those requiring subsequent approval by the SECDEF.

c. In-process Reviews (IPR) for non-major systems.

MATERIEL ACQUISITION PROCESS (MAP)

The sequence of acquisition activities starting with the identification of an unmet mission need extending through the introduction of a system into operational use.

MATERIEL RELEASE PROCESS

The authority granted by the designated officer to issue materiel to the user.

MILITARY OCCUPATIONAL SPECIALTY (MOS)

A term used to identify a grouping of duty positions possessing such close occupational or functional relationship that an optimal degree of interchangeability among persons so classified exists at any given skill level.

MISHAP DATA BASE

The Army Safety Management Information (ASMIS) is available to a wide variety of computer terminals or minicomputers via voice grade telephone lines and provides for rapid access of information from safety offices throughout the Army. ASMIS consists of data recorded from: preliminary reports of aviation mishaps (PRAM); Federal Employees Compensation Act data; aviation flying hours; and the safety library.

MISSION AREA ANALYSIS (MAA)

An assessment of the capability of a force to perform within a particular battlefield or functional area. The analysis is designed to discover deficiencies in doctrine, training, organizations, and materiel and to identify means of correcting these deficiencies. MAA also provides a basis for applying advanced technology to future Army operations.

MISSION AREA DEVELOPMENT PLAN (MADP)

Transitions the MAA corrective actions to specific projects with milestone schedules so that resources can be applied to the elimination of the MAA deficiency. Each mission area proponent (TRADOC school) publishes a MADP annually. MADP contains sections on materiel, doctrinal, organizational, and training corrective actions.

NON DEVELOPMENT ITEM (NDI)

Those items determined by a Materiel Acquisition Decision Process (MADP) Review (i.e., DSARC, ASARC, or IPR, as appropriate) to be available for acquisition to satisfy an approved

materiel requirement with no expenditure of Army research, development, test, and evaluation (RDTE) funds for development, modification, or improvement. The item may be a commercial product or an item which has been developed and used by another Service, county, or government agency.

OPERATIONAL AND ORGANIZATIONAL PLAN (O&O PLAN)

An operational, organizational, training, and logistical plan for the employment of specific hardware systems within Army organizations. O&O Plans are based on operational concepts and are developed in conjunction with those concepts. Each O&O Plan should be able to trace its lineage through one or more functional concepts to the basic (umbrella) concept.

OPERATIONAL TESTING (OT)

Testing and evaluation of materiel systems accomplished with typical user operators, crews, or units in as realistic an operational environment as possible to provide data for estimating:

- a. The military utility, operational effectiveness, and operational suitability (including compatibility, interoperability, reliability, availability, maintainability, supportability, operational man (soldier) machine interface, and training requirements) of new systems.
- b. From the user viewpoint, the system's desirability considering systems already available and the operational benefits and/or burdens associated with the new system.
- c. The need for modification to the system.
- d. The adequacy of doctrine, organization, operating techniques, tactics, and training for employment of the system, and, when appropriate, its performance in a countermeasures environment.

OUTLINE TEST PLAN (OTP)

The formal document included in the Five Year Test Plan (FYTP) containing administrative information; and the test purpose, objective, scope, tactical context, resource requirements, and costs estimates. Once approved by DA, the OTP becomes a tasking document.

PERSONNEL

Military and civilian persons of the abilities, skill level and grades required to operate, maintain, and support a system in peacetime and war.

Personnel refers to the consideration of the ability of the Army to provide qualified people in terms of specific aptitudes, experience and other human characteristics needed to use, operate,

maintain and support Army systems or items. It requires detailed assessment of the aptitudes which soldiers must possess in order to complete training and use, operate and/or maintain the system successfully. Iterative analyses must be accomplished as integral components of the new system design process, comparing projected quantities of qualified personnel with requirements of the new system, any system(s) being replaced, overall Army needs for similarly qualified people, and priorities established by the Department of the Army. As necessary, the system is configured specifically to accommodate the probable capabilities of personnel projected to be available, so that the new system is supportable from a personnel standpoint. Analysis of specific system personnel requirements using human factors engineering is necessary for each system design option considered, using "best available" information early in the acquisition process and improved information as the system design becomes more mature. Personnel analyses must consider not only simple availability, but also the capability of the Army personnel management system to provide the needed numbers of properly qualified people at a reasonable cost. Personnel must be included in system life cycle cost estimates and system design tradeoffs between machine costs versus personnel costs. Personnel analyses and projections are needed in time to allow orderly recruitment, training and assignment of personnel in conjunction with equipment fielding.

PLANNING, PROGRAMMING, BUDGETING AND EXECUTION SYSTEM (PPBES)

An integrated system for the establishment, maintenance and revision of the Five Year Defense Plan (FYDP) and the DOD budget.

PRELIMINARY HAZARD ANALYSIS (PHA)

As implied by the title, PHA is the initial effort in hazard analysis during the system design phase or the programming and requirements development phase for facilities acquisition. It may also be used on an operational system for the initial examination of the state of safety. The purpose of the PHA is not to affect control of all risks but to fully recognize the hazardous states with all of the accompanying system implications.

PRELIMINARY HAZARDS LIST (PHL)

The PHL provides to the materiel developer a list of hazards that may require special safety design emphasis or hazardous areas where in depth analyses need to be done. The MATDEV may use the results of the PHL to determine the scope of follow on hazard analyses.

PREPLANNED PRODUCT IMPROVEMENTS (P³I)

Planned future evolutionary improvement of developmental systems for which design considerations are effected during development to enhance future application of projected technology. Includes improvements planned for ongoing systems that go beyond the current performance envelope to achieve a needed operational capability.

PRODUCT IMPROVEMENT PROGRAM (PIP)/PRODUCT IMPROVEMENT PROPOSAL

A program to incorporate a configuration change involving engineering and testing effort on major end items and depot-repairable components or changes on other than developmental items to increase system/combat effectiveness or extend the useful military life.

A reconfiguration of an end item of Army or multi-service materiel type classified standard that is funded, managed, and completed as a single project. The term "PIP" is applied to the project from its start as a proposal through its completion. A PIP is initially constituted in the form of a PIP package and its status is periodically reported on Product Improvement Information Reports (PRIMIR).

PROGRAM MANAGEMENT CONTROL SYSTEM (PMCS)

Consists of management actions in a single interacted process to control selected programs and their costs.

PROGRAM OBJECTIVES MEMORANDUM

A document submitted to the Office of the Secretary of Defense (SECDEF) by the heads of the DOD components which recommends the total resource requirements within the parameters of the SECDEF fiscal guidance.

PROTOTYPES

A model suitable for evaluation of design, performance, and production potential.

RELIABILITY

A fundamental characteristic of materiel expressed as the probability that an item will perform its intended function for a specified interval under stated conditions. Durability is a special case of reliability.

RELIABILITY, AVAILABILITY, MAINTAINABILITY (RAM)

RAM requirements are those imposed on materiel systems to insure they are operationally ready for use when needed, will successfully perform assigned functions, and can be economically operated and maintained within the scope of logistics concepts and policies. RAM programs are applicable to materiel systems, test measurement and diagnostic equipment (TMDE), training devices and facilities developed, produced, maintained, procured or modified for Army use. Reliability is the duration of probability of failure free performance under stated conditions. Availability is a measure of the degree to which an item is in an operable and committable state at the start of the mission. Maintainability is the ability of an item to be retained in or restored to

specified condition within a given time when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair.

REQUEST FOR PROPOSAL (RFP)

Request for the manufacturer to submit a proposal supported by cost breakdown. It provides a description of the items to be procured. It may include specifications, quantities, time and place of delivery, method of shipment, packaging and instruction manual requirements, materiel to be furnished, and data requirements, both support and administrative.

REQUIRED OPERATIONAL CAPABILITY (ROC)

A document which states concisely the minimum essential operational, technical, logistical, and cost information necessary to initiate full scale development or procurement of a materiel system.

RESIDUAL HAZARDS

Hazards that are not eliminated by design.

RETROFIT

The application of measures or controls to correct deficiencies in fielded systems.

SAFETY ASSESSMENT REPORT (SAR)

A formal summary of the safety data collected during the design and development of the system. In the SAR, the materiel developer summarizes the hazard potential of the item, provides a risk assessment, and recommends procedures or other corrective actions to reduce these hazards to an acceptable level.

SAMPLE DATA COLLECTION (SDC)

A method for obtaining information on the performance and maintainability of an item of equipment. Data are obtained directly from observations made in the field. An effort is made to see that the sample from which the feedback is obtained is representative of the total population.

SOLDIER/MACHINE INTERFACE

Consideration through system analysis and psychophysiology of equipment design and operational concepts to insure they are compatible with the capabilities and limitations of operators and maintenance personnel. Also referred to as soldier-materiel interaction and man-machine interface.

SOURCE SELECTION EVALUATION (SSE)/SOURCE SELECTION PROCESS

The process wherein the requirements, facts, recommendations and Government policy relevant to an award decision in a competitive procurement of a system/project are examined and the decision made.

SPECIAL STUDY GROUP (SSG)

A group composed of representatives of HQDA, CBTDEV, operational tester, MATDEV, logistician, trainer, and PM designee, that convenes during Requirements/Technology Base Activity phase to conduct analysis, ensures inclusion of all alternatives within an analysis, monitors experimentation, or undertakes other such tasks that may require concentration of special expertise for a short duration. Normally chaired by a CBTDEV representative. MATDEV representative on the SSG develops the Acquisition Strategy (AS).

SPECIAL TASK FORCE

A group that is normally composed of the chartered task force director and representatives of the user, materiel developer, trainer, combat developer, HQDA, and operational tester, and the project manager designee. This task force conducts an in depth investigation of the need for the system described in the requirements documents and of any necessary alternative system designs, monitors experimentation, and arrives at a recommended approach to provide the system described in an approved ROC document.

SUPPORTABILITY

That characteristic of materiel indicative of its ability to be sustained at a required readiness level when supported in accordance with specified concepts and procedures.

SYSTEM

A composite, at any level of complexity, of personnel, procedures, materials, tools, equipment, facilities, and software. The elements of this composite entity are used together in the intended operational or support environment to perform a given task or achieve a specific production, support, or mission requirement.

SYSTEM MANPRINT MANAGEMENT PLAN (SMMP)

The System MANPRINT Management Plan (SMMP) serves as a planning and management guide and as an audit trail for a MANPRINT effort. The SMMP identifies the MANPRINT-related tasks, analyses, trade offs, and decisions that are effected during the materiel acquisition process. A SMMP is normally developed for each acquisition by either the combat or training developer in response to a materiel need (e.g., weapon system or training device).

SYSTEM SAFETY

The application of engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system or facility life cycle.

SYSTEM SAFETY PROGRAM PLAN

A description of the planned methods to be used by the contractor to implement the tailored requirements of MIL STD 882B, including organizational responsibilities, resources, methods of accomplishment, milestones, depth of effort, and integration with other program engineering and management activities and related systems.

TABLE OF DISTRIBUTION AND ALLOWANCES (TDA)

A requirements/authorization document which prescribes the organizational structure, personnel and equipment authorizations, and requirements of a military unit to perform a specific mission for which there is no appropriate TOE.

TABLE OF ORGANIZATION AND EQUIPMENT (TOE)

A table which prescribes the normal wartime mission, organizational structure, and personnel and equipment requirements for a military unit, and is the basis for an authorization document, the MTOE. The TOE is not an authorization document.

TARGET AUDIENCE DESCRIPTION (TAD)

A target audience description (TAD) delineates the quality, quantity, and performance of the soldiers and civilians who are expected to maintain, and support an Army system. The TAD describes the range of qualifications on all relevant physical, mental, physiological, biographical, and motivational dimensions. The TAD relates these qualifications to the emerging system to determine if the selected soldiers and civilians will be able to successfully operate and maintain the system. The earlier a TAD is identified, the more flexibility designers will have in making trade-offs between a system's cost, schedule, performance, and supportability. The TAD is found at Tab G of the SMMP.

TARGET POPULATION

The population defined for a training developments effort to ensure the training products produced are compatible with the personnel in the field or to establish the parameters for the baseline (skills and knowledges) entry point for any officer or enlisted specialty training requirement.

TASK ANALYSIS

A process of reviewing actual job content and context to classify information into units of work within a job. The process provides a procedure for isolating each unique unit of work, provides a procedure for describing each unit accomplished and provides descriptive information to assist in the design and testing of training products.

TECHNICAL DATA PACKAGE (TDP)

A generic term applicable to types of technical data when used for procurement purposes. It is a composite of specifications, plans, drawings, standards, and such other data as may be necessary to describe existing materiel so they may be procured by the method contemplated.

TECHNOLOGY BASE

The Army's science and technology base consisting of basic research (6.1), exploratory development (6.2), and advanced development (6.3a).

TEST AND EVALUATION MASTER PLAN (TEMP)

A document used in the Army review and decision process to assess the adequacy of the planned testing and evaluation. It is prepared for all defense system acquisition programs. The TEMP is a broad plan that relates test objectives to required system characteristics and critical issues and integrates objectives, responsibilities, resources, and schedules for all T&E to be accomplished.

TEST DESIGN PLAN (TDP)

A formal document developed by the test organization which states the circumstances under which a test and/or evaluation will be executed, the data required from the test, and the methodology for analyzing test results.

TEST INTEGRATION WORKING GROUP (TIWG)

A formally chartered organization chaired by the materiel developer and having as a minimum membership representatives (with authority to act for their respective commands/activities) from the combat developer, the logistician, the operational tester, the materiel developer and, when appropriate, the contractor. The primary purpose of the TIWG is to provide a forum for direct communication to facilitate the integration of test requirements and speed up the TEMP coordination process. The objective of the TIWG is to reduce costs by integrating testing to the maximum extent, eliminate redundant testing and facilitate the coordination of test planning, interchange of test data and use of test resources to achieve cost effective testing.

TEST SUPPORT PACKAGE (TSP)

Test support packages are provided by the proponent materiel developer and the combat developer/trainer. The proponent materiel developer provides packages consisting of the maintenance support for the item/system and a new equipment training package. The combat developer/trainer provides the following: statement of doctrine and techniques for employment; description of organization; basis of issue and training plans; logistic support concepts; mission profiles; identification of suitable threat for test; and a description of test setting, including terrain and friendly forces situations.

TRADE-OFF ANALYSIS (TOA)

A document prepared by an STF or SSG, or jointly by the combat and materiel developers, to determine which technical approach offered in the Trade-Off Determination (TOD) is best.

TRADE -OFF DETERMINATION (TOD)

The document prepared by the materiel developer. It is sent to the combat developer or to an STF or SSG to convey the feasibility of a potential system. Included are technical risks related to each approach, estimated RDTE and procurement costs and schedules.

TRAINING

Consideration of the training necessary and time required to impart the requisite knowledge, skills, and abilities to qualify Army personnel for use, operation, maintenance and support of Army systems or items. It involves (1) the formulation and selection of engineering design alternatives which are supportable from a training perspective, (2) the documentation of training strategies, and (3) the timely determination of resource requirements to enable the Army training system to support system fielding. Human factors engineering techniques are used to determine the tasks which must be performed by system user, operator, maintenance and support personnel; the conditions under which they must be performed; and the performance standards which must be met. Training is linked with personnel analyses and actions in that availability of qualified personnel is a direct function of the training process. As a minimum, the following must be considered:

- Training effort and costs versus system design
- Training times
- Training program development, considering aptitudes of available personnel
- Sustainment training, as distinguished from training associated with initial system fielding
- Developmental training, as distinguished from Initial Entry Training
- Training device design, development, and use
- Training base resourcing manpower and personnel implications

- New Equipment Training (NET)
- Formal training base instruction, versus on the job training (OJT) in units
- Unit training
- Operational testing of the adequacy of training programs and techniques.

TRAINING DEVICE (TD)

Any three dimensional object developed, fabricated or procured specifically for improving the learning process. Training devices may be either system devices or non-system devices. System devices are designed for use with one system or item of equipment, including subassemblies and components. Non-system devices are designed to support general military training and/or for use with more than one system or item of equipment, including subassemblies and components.

TYPE CLASSIFICATION (TC)

Identifies the life-cycle status of a materiel system by the assignment of a type classification designation after a production decision by the appropriate authority, and records the status of a materiel system in relation to its overall life history as a guide to procurement, authorization, support, asset and readiness reporting.

Appendix B: Acronyms and Abbreviations

AFQT	Armed Forces Qualification Test
AMC	U.S. Army Materiel Command
AMEDD	Army Medical Department
AMMH	Annual Maintenance Man Hours
AMSAA	U.S. Army Materiel Systems Analysis Activity
AOP	Additive Operational Project
AOSP	Army Occupational Survey Program
AP	Acquisition Plan
AR	Army Regulation
ARI	Army Research Institute
ARPRINT	Army Program For Individual Training
AS	Acquisition Strategy
ASA (RDA)	Assistant Secretary of Army for Research Development, and Acquisition
ASAP	Army Streamlined Acquisition Process
ASARC	Army Systems Acquisition Review Council
ASI	Additional Skill Identifier
ASIOE	Associated Support Items of Equipment
ASVAB	Armed Services Vocational Aptitude Battery
ATSC	Army Training Support Center
AURS	Automated Unit Reference Sheet
BCE	Baseline Cost Estimate
BDP	Battlefield Development Plan
BOIP	Basis of Issue Plan
BOIPFD	BOIP Feeder Data
BTA	Best Technical Approach
CBTDEV	Combat Developer
C ² E	Continuous and Comprehensive Evaluation
CDRL	Contract Data Requirements List
CEP	Concept Evaluation Program
CFP	Concept Formulation Package
COEA	Cost and Operational Effectiveness Analysis
CTA	Common Table of Allowances
CTDR	Commercial Training Device Requirement
DA	Department of the Army
DAB	Defense Acquisition Board
DALSO	Department of Army Logistics Staff Officer
DAMPL	DA Master Priority List
DAP	Designated Acquisition Program
DCP	Decision Coordinating Paper

DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations
DCSPFR	Deputy Chief of Staff for Personnel
DID	Data Item Description
DMDC	Defense Management Data Center
DOD	Department of Defense
DOD STD	Department of Defense Standard
DTTP	Doctrine and Tactics Training Plan
E	Environment
ECA	Early Comparability Analysis
ECP	Engineering Change Proposal
EMF	Enlisted Master File
EPMS	Enlisted Personnel Management System
FAT	First Article Testing
FEA	Front End Analysis
FISO	Force Integration Staff Officer
FM	Field Manual
FOT&E	Follow on Operational Test and Evaluation
FUE	First Unit Equipped
FYDP	Five Year Defense Program
HARDMAN	Hardware versus Manpower
HEL	Human Engineering Laboratory
HFE	Human Factors Engineering
HFEA	Human Factors Engineering Assessment
HHA	Health Hazard Assessment
HHAR	Health Hazard Assessment Report
ICE	Independent Cost Estimate
ICTP	Individual and Collective Training Plan
IEP	Independent Evaluation Plan
IER	Independent Evaluation Report
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
IOC	Initial Operational Capability
IPR	In Process Review
IPS	Integrated Program Summary
IR&D	Independent Research and Development
JRMB	Joint Requirements and Management Board
JTA	Joint Table of Allowances
LCSMM	Life Cycle System Management Model
LOA	Letter of Agreement
LOGSACS	Logistics Structure and Composition System
LRRDAP	Long Range Research, Development, and Acquisition Plan
LSA	Logistics Support Analysis

LSAR	Logistics Support Analysis Record
MAA	Mission Area Analysis
MACOM	Major Army Command
MADP	Materiel Acquisition Decision Process; Mission Area Deployment Plan
MAMP	Materiel Acquisition Management Plan; Mission Area Materiel Plan
MANPRINT	Manpower and Personnel Integration
MARC	Manpower Authorization Requirements Criteria
MATDEV	Materiel Developer
MDEP	Management Decision Package
MDV	MANPRINT Domain Verification
MEPSCAT	Military Entrance Physical Strength Capacity Tests
MER	Manpower Estimate Report
MFA	Mission Functional Analysis
MIL STD	Military Standard
MJWG	MANPRINT Joint Working Group
MNS	Mission Needs Statement
MOS	Military Occupational Specialty
MPT	Manpower Personnel Training
MPTTOA	Manpower, Personnel and Training Trade-off Analysis
MRSA	U.S. Army Materiel Readiness Support Activity
MSC	Major Subordinate Command
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
NDI	Nondevelopment Item
NETP	New Equipment Training Plan
NTC	National Training Center
O&O	Operational and Organizational
OBCE	Operational Baseline Cost Estimate
ODCSOPS	Office of the Deputy Chief of Staff for Operations and Plans
ODCSPER	Office of the Deputy Chief of Staff for Personnel
OMA	Operation and Maintenance, Army
OMF	Officer Master File
OSE	Other Support Equipment
OTEA	U.S. Army Operational Test and Evaluation Agency
OTP	Outline Test Plan
P ³ I	Pre-Planned Product Improvement
Pe	Equipment Performance
Ph	Human Performance
Ps	System Performance
PDM	Program Decision Memorandum
PEO	Program Executive Officer
PERSACS	Personnel Structure and Composition System
PERSO	Personnel System Staff Officer
PHL	Preliminary Hazards List

PIP	Product Improvement Program; Product Improvement Proposal
PM	Program Manager/Project Manager/Product Manager
PM TRADE	Project Manager, Training Devices
PMAD	Personnel Management Authorization Document
PMCS	Program Management Control System
PMD	Program Management Document
POI	Program(s) of Instruction
POM	Program Objective Memorandum
PPBES	Planning, Programming, Budgeting, and Execution System
PULHES	P-Physical capacity or stamina; U-Upper extremities; L- Lower extremities; H- Hearing and ears; E- Eyes; and S-Psychiatric
QQPRI	Qualitative and Quantitative Personnel Requirements Information
RAM	Reliability, Availability, and Maintainability
RDA	Research, Development and Acquisition
RDTE	Research, Development, Test, and Evaluation
RFP	Request for Proposal
RFQ	Request for Quotation
ROC	Required Operational Capability
SAR	Safety Assessment Report
SCP	System Concept Paper
SDC	Sample Data Collection
SECDEF	Secretary of Defense
SMMP	System MANPRINT Management Plan
SOW	Statement of Work
SPE	System Performance Estimation
SQI	Skill Qualification Identifier
SQT	Skill Qualification Test
SSC	Soldier Support Center
SSEB	Source Selection Evaluation Board
SSG	Special Study Group
STF	Special Task Force
TC	Type Classification
TDA	Table of Distribution and Allowances
TDAC	Training Data Analysis Center
TDP	Test Design Plan
TDR	Training Device Requirement
TEA	Training Effectiveness Analysis
TEMP	Test and Evaluation Master Plan
TIWG	Test Integration Working Group
TMDE	Test, Measurement, and Diagnostic Equipment
TOA	Trade-off Analysis
TOD	Trade-off Determination
TOE	Table of Organization and Equipment

TPCA	Task Performance Capability Analysis
TPRA	Task Performance Requirements Analysis
TRAC	TRADOC Analysis Center
TRADOC	U.S. Army Training and Doctrine Command
TRASSO	TRADOC System Staff Officer
TSARC	Test Schedule and Review Committee
TSG	The Surgeon General
TSM	TRADOC System Manager
TTHS	Trainees, Transfers, Holdees, and Students
TT/UT	Technical Test/User Test
UIC	Unit Identification Code

Appendix C: References and Selected Reading

Department of Defense Directives (DODD)

- 4105.62 Selection of Contractual Sources for Major Defense Systems
- 5000.1 Major and Non-major Defense Acquisition Program
- 5000.3 Test and Evaluation
- 5000.39 Acquisition and Management of Integrated Logistics Support for Systems and Equipment
- 5000.40 Reliability and Maintainability
- 5000.43 Acquisition Streamlining
- 5000.53 Manpower, Personnel, Training, and Safety (MPTS) in the Defense System Acquisition Process

Department of Defense Instructions (DODI)

- 5000.2 Defense Acquisition Program Procedures
- 5000.36 System Safety Engineering and Management

Army Regulations (AR)

- 15-14 System Acquisition Review Council Procedures
- 40-5 Health and Environment
- 40-10 Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process
- 40-14 Control and Recording Procedures for Exposure to Ionizing Radiation and Radioactive Materials
- 40-46 Control of Health Hazards from Lasers and Other Optical Sources
- 40-501 Standards of Medical Fitness

40-583	Control of Potential Hazards to Health from Microwave and Radio Frequency Radiation
70-1	System Acquisition Policy and Procedures
70-8	Personnel Performance and Training Program (PPTP)
70-10	Test and Evaluation
70-15	Product Improvement of Materiel
71-2	Basis of Issue Plan (BOIP) and Qualitative and Quantitative Personnel Requirements Information (QQPRI)
71-3	User Testing
71-9	Materiel Objectives and Requirements
310-3	Preparation, Coordination, and Approval of Department of the Army Publications
310-49	The Army Authorization Document System
350-35	Army Modernization Training
350-38	Training Device Policies and Procedures
385-10	The Army Safety Program
385-16	System Safety Engineering and Management
570-1	Commissioned Officer Position Criteria
570-2	Manpower Requirements Criteria (MARC) of Organization and Equipment
570-4	Manpower Management
570-5	Manpower Staffing, Standards System
602-1	Human Factors Engineering Program
602-2	Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process
611-101	Commissioned Officer Specialty Classification System

- 611-112 Manual of Warrant Officer Military Occupational Specialties
- 611-201 Enlisted Career Management Fields and Military Occupational Specialties
- 700-127 Integrated Logistic Support

Chief of Staff Regulations (CSR)

- 71-3 Operational Testing and Evaluation Methodology and Procedures Guide
- 11-2 Research and Development Cost Guide
- 11-3 Investment Costs Guide for Army Materiel Systems
- 11-4 Operation and Support Cost Guide for Army Materiel Systems
- 11-5 Standards for Presentation and Documentation of Life Cycle Cost Estimates
- 11-15 The Army Long-Range Planning System

Department of the Army Pamphlets (PAM)

- 11-25 Life Cycle System Management Model for Army Systems
- 70-21 A Test and Evaluation Guide
- 385-16 System Safety Management Guide

Department of the Army Circulars (CIR)

- 600-82-2 The New Manning System

AMC Regulations (AMC-R)

- 700-15 Integrated Logistic Support

AMC Pamphlets (AMC-P)

- 602-1 MANPRINT Handbook for RFP Development
- 602 2 MANPRINT in Nondevelopmental Item (NDI) Acquisitions
- 715-3 The Source Selection Process

AMC Circular (AMC-C)

- 602-1 Manpower and Personnel Integration (MANPRINT)

TRADOC Regulations (TRADOC-R)

- 350-7 A Systems Approach to Training
- 351-1 Training Requirements Analysis System
- 351-5 Designation of Military Occupational Specialties (MOS) and Additional Skill Identifier (ASI) Propensity
- 700-1 Integrated Logistic Support

TRADOC Pamphlets

- 11-8 Studies and Analysis Handbook
- 71-8 Analyzing Training Effectiveness

AMC-TRADOC

- 70-1 System Acquisition Policy and Procedures
- PAM 70-2 Materiel Acquisition Handbook
- MOU, dtd 15 MAR 84, Integrated Logistic Support

Field Manuals (FM)

- 22-9 Soldier Performance in Continuous Operations

101-10-1 Staff Officer's Field Manual, Organizational, Technical and Logistical Data

Military Standards (MIL-STD)

490 Specification Practices

882 System Safety Program Requirements

1379-3 Contract Training Programs

1388-1A Logistics Support Analysis

1388-2A Logistics Support Analysis Record

1472 Human Engineering Design Criteria for Military Systems, Equipment
and Facilities

1474 Noise Limits for Army Materiel

1478 Task Performance Analysis

Military Specifications

T-23991 Training Devices, Military, General Specification for

H-46855 Human Engineering Requirements for Military Systems, Equipment
and Facilities

Military Handbooks

MIL-H 245 Preparation of Statement of Work (SOW)

DOD-H 743 Anthropometry of U.S. Military Personnel

MIL-H 759 Human Factors Engineering Design for Army Materiel

DOD-H 763 Human Engineering Procedures Guide

Other Related Publications

Aero	Human Engineering Design
Std	Requirements for Measurement ADS-30 of Operator Workload

MANPRINT-Related Authorizations Data Item Descriptions

A. Manpower

<u>Number</u>	<u>Title</u>
DIS-HFAC-80243	Personnel Planning Report
DI-ILSS-80077	Manpower, Personnel and Training Analysis Report
DI-ILSS-80114	Logistic Support Analysis Record (LSAR) Data

B. Personnel

<u>Number</u>	<u>Title</u>
DI-H-1300	Personnel and Training Requirements
DI-H-7059	Human Engineering Test Report
DI-H-7068	Task and Skill Analysis Report
DI-H-25713B	Task Listings Report
DI-H-33059	Qualitative and Quantitative Personnel Info
DI-HFAC-80243	Personnel Planning Report
DI-ILSS-80078	Personnel Performance Profiles
DI-ILSS-80115	LSA-015, Sequential Task Description

C. Training

<u>Number</u>	<u>Title</u>
DI-H-1300	Personnel and Training Requirements
DI-H-7066	Training and Training Equipment Plan
DI-H-7067	Training Course Proposal
DI-H-7069	Training Course and Curriculum Outlines
DI-H-7072	Audio Aids, Master Reproducibles and Review Copies for Training Equipment and Training Courses
DI-H-7076	Instructor's Utilization Handbook for Simulation Equipment
DI-H-25711B	Training Development and Support Plan Report
DI-H-25713B	Task Listing Report
DI-H-25718B	Trainer Functional Description Report

DI-H-25721B	Training Support Requirements Report
DI-H-25724B	Student Training Materials
DI-H-25728B	Instructor Training Course Materials
DI-H-25774B	Training Program Work Report
DI-ILSS-80047	Training Course Standards
DI-ILSS-80076	Training Program and Training Equipment Plan
DI-ILSS-80077	Manpower, Personnel and Training Analysis Report
DI-ILSS-80084	Training Material Outline
DI-ILSS-80143	Training Plan

D. Human Factors Engineering

<u>Number</u>	<u>Title</u>
DI-H-7051	Human Engineering Program Plan
DI-H-7052	Human Engineering Dynamic Simulation Plan
DI-H-7053	Human Engineering Test Plan
DI-H-7054	Human Engineering System Analysis Report
DI-H-7055	Critical Task Analysis Report
DI-H-7056	Human Engineering Design Approach Document - Operator
DI-H-7057	Human Engineering Design Approach Document - Maintainer
DI-H-7058	Human Engineering Test Report
DI-H-7059	Human Engineering Progress Report
DI-HFAC-80241	Human Factors Technical Report
DI-HFAC-80242	Human Factors Design Analysis Report
UDI-H-20002A	Report, Design Review

E. System Safety

<u>Number</u>	<u>Title</u>
DI-H-1321B	Explosive Hazard Classification Data
DI-H-1329A	Accident or Incident Report
DI-H-1336	Noise Measurement Report
DI-H-1838	Standard Operating Procedures for Hazardous Materials
DI-SAFT-80100	System Safety Program Plan
DI-SAFT-80101	System Safety Hazard Analysis Report
DI-SAFT-80102	Safety Assessment Report
DI-SAFT-80103	Engineering Change Proposal System Safety Report
DI-SAFT-80104	Waiver or Deviation System Safety Report
DI-SAFT-80105	System Safety Program Progress Report

F. Health Hazards

<u>Number</u>	<u>Title</u>
DI-SAFT-80106	Occupational Health Hazard Assessment
DI-MISC-80123	Medical and Health Plan

Other Publications:

ALTMAN, James W., *Human Engineering Guide to Equipment Design*. Washington, D.C.: U.S. Govt. Printing Office, 1963.

CHAIKIN, G. and McCOMMONS, R., *Human Factors Engineering Material for Manpower and Personnel Integration (MANPRINT) Provisions of the Request for Proposal (RFP)*. Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 13-86, October 1986.

Early Comparability Analysis (ECA) Procedural Guide. Alexandria, VA: U.S. Army Personnel Integration Command-Soldier Support Center, July 1987 (under revision).

GUERRIER, Jose H., LOWRY, John C., JONES, Robert E. Jr., GUTHRIE, Jerry L., and MILES, John L., *Handbook for Development of MPT Elements in the MANPRINT Assessment*. Alexandria, VA: U.S. Army Research Institute, ARI Research Product, draft dated July 1988.

KATZNELSON, Judah., *A Computer Program for Assessing Readability*. Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 4-80, February 1980.

KAPLAN, Jonathan C. and CROOKS, William H., *A Concept for Developing Human Performance Specifications*. Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 7-80, April 1980.

LOWRY, John and SEAVER, David, *Handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems*. Alexandria, VA: Allen Corporation of America Report TR-86-1, June 1986.

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MANPRINT Primer. Washington, D.C.: HAY Systems, Inc. for Office of the Deputy Chief of Staff for Personnel, HQDA, April 1987.

MANPRINT Risk Assessment. Alexandria, VA: Analysis Integration Branch, Soldier Support Center-National Capital Region, September 1987.

MANPRINT in the Source Selection Process. Washington, D.C.: Automation Research Systems, Ltd. for Office of the Deputy Chief of Staff for Personnel, HQDA, December 1986.

MEISTER, David., *Behavioral Analysis and Measurement Methods.* New York: John Wiley & Sons, Inc., 1985.

MYERS, Louis B., TIJERINA, Louis, and GEDDIE, James C., *Proposed Military Standard for Task Analysis.* Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory Technical Memorandum 13-87, July 1987.

System MANPRINT Management Plan Procedural Guide. Alexandria, VA: Soldier Support Center - National Capital Region (ATNC-NMF-B), February 1987 (under revision).

Training Developer's Procedural Guide - Training Device Documentation. Fort Eustis, VA: U.S. Army Training Support Center, Devices Management Directorate, January 1987.

Training Developer's Procedural Guide - Training Device Documentation Checklist. Fort Eustis, VA: U.S. Army Training Support Center, Devices Management Directorate, July 1987.

Training Developer's Procedural Guide - Conduct of Training Effectiveness Analyses in Support of Non-system Training Devices. Fort Eustis, VA: U.S. Army Training Support Center, Devices Management Directorate, October 1987.

WOODSON, Wesley E., *Human Factors Design Handbook.* New York: McGraw Hill Book Co., 1984.

••Ordering Information••

DOD and Army Publications

Department of Defense Directives (DODD), Department of Defense Instructions (DODI), Army Regulations (AR), Chief of Staff Regulations (CSR), Department of the Army Pamphlets (DA PAM), and Department of the Army Circulars (DACIR) should be requested through official publication channels (for Army employees). All others may request Army publications from Commander, Army AG Publications Center 2800 Eastern Boulevard, Baltimore, MD 21220 and DOD publications from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Military Specifications (MIL-SPEC), Standards (MIL-STD), Handbooks (MIL-HBK), and Data Item Descriptions (DIDs) should be requested on DD Form 1425 from Commander, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

Army Materiel Command (AMC)

AMC Regulations (AMC-R), Pamphlets (AMC-P), and Circulars (AMC-C) should be requested from Headquarters, U.S. Army Materiel Command, ATTN: AMXDO-SP, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.

Training and Doctrine Command (TRADOC)

TRADOC Regulations (TR-R), Pamphlets (TR-P), and Circulars (TR-C) should be requested from Headquarters, U.S. Army Training and Doctrine Command, ATTN: ATCD-SP, Fort Monroe, VA 23651-5000.

U.S. Army Human Engineering Laboratory (HEL)

HEL Technical Memorandums and Reports may be requested from Director, U.S. Army Human Engineering Laboratory, ATTN: Technical Reports Office, Aberdeen Proving Ground, MD 21005-5001.

U.S. Army Research Institute (ARI)

ARI Research Reports and Products may be requested from Commander, U.S. Army Research Institute, ATTN: PERI-SM, 5001 Eisenhower Avenue, Alexandria, VA 22333-5600.

U.S. Army Personnel Integration Command-Soldier Support Center

USAPIC and SSC-NCR publications can be requested from Commander, U.S. Army Personnel Integration Command, ATTN: ATNC-NMF-B, 200 Stovall Street, Alexandria, VA 22332.

HQDA, Deputy Chief of Staff for Personnel (DCSPER)

Assistance can be requested from Director, MANPRINT Policy Office, HQDA (DAPE-MRP), Pentagon, Washington, D.C. 20310-0300.

Defense Technical Information Center (DTIC)

A general source (for government personnel and current contractors only) of R&D reports which have completed the editorial and clearance processes is Defense Technical Information Center, Building 5, Cameron Station, Alexandria, VA 22304-6145.

If in doubt about how to obtain a document, consult *How to Get It - A Guide to Defense Related Information Resources*, published by the Institute for Defense Analysis and available from DTIC under AD Number A110000.