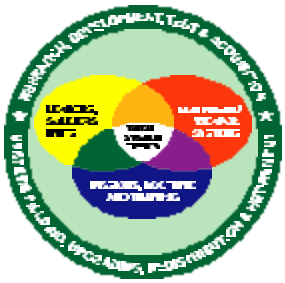

MANPRINT in Acquisition: A Handbook

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Other significant contributors included Dr. Ed Smootz, Frank Paragallo and his staff and Dr. Don Headley of the Army Research Laboratory - Human Research & Engineering Directorate.

Art Pridemore was a major contributor as he was to the entire MANPRINT effort. He will be missed by us all.

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1.0 INTRODUCTION

This handbook is an initiation to the Army's Manpower and Personnel Integration (MANPRINT) Program. It has been prepared specifically for those individuals (hereafter referred to as MANPRINT Action Officers (AO)) who are responsible for coordinating, guiding, implementing and managing MANPRINT in the acquisition of Automated Information Systems (AIS) and/or materiel systems and for the leadership which has ultimate responsibility for MANPRINT. The term MANPRINT AO refers to a responsibility rather than an official duty title. This AO may come from any of the acquisition disciplines or domains.

DoD 5000.2-R (Paragraph 4.3.8) requires that a comprehensive management and technical strategy for human systems integration (HSI) be initiated early in the acquisition process. MANPRINT is the Army's implementation of HSI. The program was established in 1984 with a primary objective to place the human element (functioning as individual, crew/team, unit and organization) on equal footing with other design criteria such as hardware and software. The entry point of MANPRINT in the acquisition process is through requirements documents and studies. TRADOC Pamphlet 71-9 provides excellent guidance. This handbook includes recent guidance from the MANPRINT General Officer Steering Committee (GOSC) members.

1.1 What is MANPRINT?

1.1.1 Overview

MANPRINT (Manpower and Personnel Integration) is a comprehensive management and technical program that focuses attention on human capabilities and limitations throughout the system's life cycle: concept development, test and evaluation, documentation, design, development, fielding, post-fielding, operation and modernization of systems. It was initiated in recognition of the fact that the human is an integral part of the total system. If the human part of the system can't perform efficiently, the entire system will function sub-optimally.

MANPRINT's goal is to optimize total system performance at acceptable cost and within human constraints. This is achieved by the continuous integration of seven human-related considerations (known as MANPRINT domains) with the hardware and software components of the total system and with each other, as appropriate. Each MANPRINT domain is described in greater detail in the following paragraphs. The Deputy Chief of Staff for Personnel, Department of the Army (DCSPER, DA) via the Personnel Technologies Directorate (PERTEC), exercises DA staff responsibility for the MANPRINT program. This is in keeping with the DCSPER'S DA staff responsibilities for the formulation, management, evaluation, and execution of manpower and personnel policies, plans and programs for all components of the Army.

1.1.2 Manpower (M)

Manpower addresses the number of military and civilian personnel required and potentially available to operate, maintain, sustain, and provide training for systems in accordance with Title 10, U. S. Code Armed Forces, Sec. 2434. It is the number of personnel spaces (required or authorized positions) and available people (operating strength). It considers these requirements for peacetime, conflict, and low intensity operations. Current and projected constraints on the total size of the Army/organization/unit are also considered. The MANPRINT practitioner evaluates the manpower required and/or available to support a new system and subsequently considers these constraints to ensure that the human resource demands of the system do not exceed the projected supply.

Combat Support (CS) and Combat Service Support (CSS) requirements are typically workload driven and determined by the system itself, the mission, the operational mode summary/mission profile (OMS/MP), and Manpower Requirements Criteria (MARC). Operator/combat requirements are more frequently determined by doctrine.

1.1.3 Personnel (P)

Manpower and personnel are closely related. While manpower looks at numbers of spaces and people, the domain of personnel addresses the cognitive and physical characteristics and capabilities required to be able to train for, operate, maintain, and sustain materiel and information systems. Personnel capabilities are normally reflected as knowledge, skills, abilities, and other characteristics (KSAOs). The availability of personnel and their KSAOs should be identified early in the acquisition process and may result in specific thresholds. On most systems, emphasis is placed on enlisted personnel as the primary operators, maintainers, and supporters of the system. Personnel characteristics of enlisted personnel are easier to quantify since the Armed Services Vocational Aptitude Battery (ASVAB) is administered to potential enlistees. The Armed Force Qualification Test (AFQT) determines if the individual is eligible for enlistment and the Aptitude Area scores will determine the Career Management Fields (CMFs) and Military Occupational Specialties (MOSs) the individual is qualified to enter (upon completion of basic training). Qualification requirements for Commissioned, Warrant Officers, and Enlisted are contained in DA Pamphlet 611-21. While normally enlisted personnel are operators and maintainers, that is not always the case, especially in aviation systems. In many cases, the technical and command and control demands placed on officers and warrant officers is a major concern in system acquisition. It must be remembered also that on information systems, the primary operators and maintainers may be civilians as is depot level maintenance and supply of materiel systems. X-118 contains the qualification requirements for civilian general schedule series and local crediting plans address wage

grade qualifications. The system that is being acquired must be evaluated taking this into account. Early in the requirements determination process, identification of the target audience should be accomplished and used as a baseline for assessment. Cognitive and physical demands of the system should be assessed and compared to the projected supply. MANPRINT also takes into consideration personnel factors such as availability, recruitment, skill identifiers, promotion, and assignment.

1.1.4 Training (T)

Training is defined as the instruction or education, on-the-job, or self development training required to provide all personnel and units with their essential job skills, and knowledge. Training is required to bridge the gap between the target audiences' existing level of knowledge and that required to effectively operate, deploy/employ, maintain and support the system. The MANPRINT goal is to acquire systems that meet the Army's training thresholds for operation and maintenance. Key considerations include developing an affordable, effective and efficient training strategy (which addresses new equipment, training devices, institutional, sustainment, and unit collective tactical training); determining the resources required to implement it in support of fielding and the most efficient method for dissemination (contractor, distance learning, exportable packages, etc.); and evaluating the effectiveness of the training.

Training is particularly crucial in the acquisition and employment of a new system. New tasks may be introduced into a duty position; current processes may be significantly changed; existing job responsibilities may be redefined, shifted, or eliminated; and/or entirely new positions may be required. It is vital to consider the total training impact of the system on both the individuals and the organization as a whole. Clearly, the cost and considerations of system ownership include initial and sustainment training, both unit and institutional. In addition, training must consider the unique needs of commissioned officers, warrant officers, enlisted, and civilian personnel such as leadership, command and control, etc. The System Training Plan (STRAP) is developed simultaneously with the Operational Requirements Document (ORD).

1.1.5 Human Factors Engineering (HFE)

The goal of HFE is to maximize the ability of an individual or crew to operate and maintain a system at required levels by eliminating design-induced difficulty and error. Human factors engineers work with systems engineers to design and evaluate human-system interfaces to ensure they are compatible with the capabilities and limitations of the potential user population. HFE is conducted during all phases of system development, to include requirements specification, design and testing and evaluation. HFE activities during requirements specification include: evaluating predecessor systems and operator tasks; analyzing user needs; analyzing and allocating

functions; and analyzing tasks and associated workload. During the design phase, HFE activities include: evaluating alternative designs through the use of equipment mock-ups and software prototypes; evaluating software by performing usability testing; refining analysis of tasks and workload; and using modeling tools such as human figure models to evaluate crew station and workplace design and operator procedures. During the testing and evaluation phase, HFE activities include: confirming the design meets HFE specification requirements; measuring operator task performance; and identifying any undesirable design or procedural features.

1.1.6 System Safety (SS)

System Safety is the design features and operating characteristics of a system that serve to minimize the potential for human or machine errors or failures that cause injurious accidents. Safety considerations should be applied in system acquisition to minimize the potential for accidental injury of personnel and mission failure. For example, one primary concern may be electrical safety. The SS engineer should determine the requirements for grounding the system, procedures that must be followed to safely power-up or power-down the system, and the potential system malfunctions that could cause an electrical fire.

1.1.7 Health Hazards (HH)

Health Hazards addresses the design features and operating characteristics of a system that create significant risks of bodily injury or death. Along with safety hazards, an assessment of health hazards is necessary to determine risk reduction or mitigation.

The goal of the Health Hazard Assessment (HHA) is to incorporate biomedical knowledge and principles early in the design of a system to eliminate or control health hazards. Early application will eliminate costly system retrofits and training restrictions resulting in enhanced soldier-system performance, readiness and cost savings. HHA is closely related to occupational health and preventive medicine but gets its distinctive character from its emphasis on soldier-system interactions of military unique systems and operations.

Health Hazard categories include acoustic energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes and humidity, trauma, vibration, and other hazards. Health hazards include those areas that could cause death, injury, illness, disability, or a reduction in job performance. For example, system evaluation should ensure that there is not excessive noise nor opportunity for exposure to dangerous emissions.

1.1.8 Soldier Survivability (SSv)

Soldier survivability addresses the characteristics of a system that can reduce fratricide, detectability, and probability of being attacked, as well as minimize system damage, soldier injury, and cognitive and physical fatigue. It was added to focus attention on those aspects of the total system that can minimize the loss of friendly troops' lives.

For example, survivability may be enhanced by ensuring the system does not have an identifiable electronic or thermal signature or create an unacceptable fratricide risk, or that there is adequate ballistic protection for crew survivability (e.g., application of anti-spalling material in crew compartments).

1.1.9 Domain Integration

Although each of the MANPRINT domains has been introduced separately, in practice they are often interrelated and tend to impact on one another. Changes in system design to correct a deficiency in one MANPRINT domain nearly always impact another domain. Consider the following examples:

- Working with the systems engineer, the human factors engineer determines that a number of particularly difficult tasks, currently performed manually, should be automated (analysis of function allocation to man, machine, or a combination). The result may be one or several of the following: 1) a reduction in operator manpower requirements, 2) personnel would no longer need extensive training on these tasks, 3) it is possible that someone with less experience or fewer qualifications could perform the job, or 4) an increase in personnel capabilities and training for new maintenance tasks. (Domains: human factors engineering, manpower, personnel, and training)

- A system is being designed for operation by two people in two shifts. It must operate 24 hours/day. An HFE workload assessment determines that the 12 hour shift produces intense fatigue. At the same time, a human factors engineering assessment determines that changing the background color of the screen from lime green to pacific blue will help to reduce, but not eliminate, the fatigue. The decision is made to change the background color, and a decision will have to be made between increasing manning or accepting the potential degradation of mission performance. (Domains: manpower and human factors engineering)

- A number of conceptual designs are being considered. The least costly requires maintenance by personnel in a job classification that is currently under-strength and is projected to remain so for the next 6 years. Another design, which will cost more, contains self-diagnostics. This system will not require the skills of the highly demanded personnel. The decision is made to acquire the second system because qualified personnel simply will not be available to maintain the first system. Because of the built-in test capability, additional training will not be required for maintenance personnel. (Domains: manpower, personnel, and training)

1.2 What is Your Role in MANPRINT?

As the MANPRINT Action Officer (AO) for the Program/Project/ Product Manager (PM) on an Integrated Product Team (IPT) or on an Integrated Concept Team (ICT) supporting a Functional Proponent (FP), Training Developer (TD) or Combat Developer (CD), your role is critical! You have been entrusted with ensuring that MANPRINT issues (risks), constraints, and opportunities for enhancing total system performance are identified and given adequate consideration and analysis. To do so, you must be both a skilled MANPRINTer and a marketeer -- you must be able to do and sell.

A truly effective MANPRINT program requires both management and technical skills. On the management side, the AOs must keep track of the schedule/status of the entire acquisition program to ensure that required MANPRINT actions are being accomplished. The AOs must assist the CD, TD, FP (as the originator of requirements and system support documents) in identifying and substantively attending to MANPRINT constraints, requirements, and T&E issues and criteria. The AOs should inform the CD, TD, FP and/or PM when MANPRINT coordination meetings should be held and must keep members of the MANPRINT Team (discussed in Section 3.0) informed as the acquisition proceeds.

On the technical side, MANPRINT AOs are responsible for recommending how to address/resolve issues (risks) as they arise. This will include recommending/performing analyses and studies and reviewing the program management and technical documentation produced by other disciplines (e.g., system engineering, integrated logistics support) involved in the acquisition process. You are also responsible for ensuring that MANPRINT gets crosswalked with other ongoing efforts and is reflected accurately and consistently in the documents that are produced as a result of these efforts (see Section 4 for a discussion of crosswalking).

As professionals with day-to-day responsibilities for MANPRINT, one of the most critical things that AOs must do is COMMUNICATE AND FOLLOW UP! This is the only way to keep informed and be able to influence vital decisions. Attendance at formal meetings and participation on Integrated Concept Teams (ICTs), Integrated Product Teams (IPTs), and other working groups is necessary, but not sufficient. Many decisions are made and are irrevocable by the time meetings are held.

Finally, it is critical that MANPRINT has high visibility and leadership acceptance. It is your job to make this happen. You must keep the Program Manager (PM) and FP, TD or CD informed about the status and contributions of the MANPRINT effort, and your interaction and communication with other groups will help to gain their acceptance.

1.3 What Governs MANPRINT?

MANPRINT is the Army's execution of DoD's Human Systems Integration (HSI). DoD 5000.2-R, Part Four, Paragraph 4.3.8, states, "A comprehensive management and technical strategy shall be initiated early...to ensure that human performance...is considered throughout the system design and development process." Paragraph 4.3.7 states that safety and health analysis shall be conducted on all programs, regardless of ACAT, to integrate these issues into the systems engineering process and support development of the programmatic safety and health evaluation.

While many Army documents contain references to MANPRINT, the MANPRINT program is governed by AR 602-2, "Manpower and Personnel Integration (MANPRINT). AR 602-2 prescribes policies and assigns responsibilities for the program. The MANPRINT AO should be certain to obtain a copy and study it. It is currently is draft form. In addition, Appendix F of this guide provides a list of documents that contain MANPRINT relevant information (along with domain references) to include brief synopses. The MANPRINT Web Page at www.manprint.army.mil is a valuable source of information and guidance on MANPRINT.

1.4 Is MANPRINT Training Available?

Yes! The proponent for MANPRINT training is the Directorate for Personnel Technologies (PERTEC), Office of the Deputy Chief of Staff for Personnel (ODCSPER). Instruction is provided by the Army Logistics Management College (ALMC). Two courses are regularly conducted: "MANPRINT for Action Officers" and "Tailored MANPRINT Training." Training primarily takes place at pre-designated Army installations. Arrangements can also be made to provide training at other locations (e.g., DoD contractor facilities, other service sites). In addition to the MANPRINT training that is available from ALMC, other DoD training courses contain information on MANPRINT and related disciplines. Appendix B provides more information on the training that is available.

Additional information on MANPRINT training is also available on the MANPRINT Web Page at:
http://www.manprint.army.mil/manprint/training/training.html.

The "MANPRINT Quarterly" is a bulletin published by the PERTEC Directorate and it is available on the MANPRINT Web Page at:
http://www.manprint.army.mil/manprint/references/references.html.

For those who do not have access to the Internet, the Quarterly is available by mail and is free of charge. It contains a great deal of useful, interesting information, including training schedules, and is a forum for communication among professionals in the MANPRINT community. Information on how to receive the "MANPRINT Quarterly" is below.

☆☆☆ To receive the "MANPRINT Quarterly," send the following information:

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1.5 Are MANPRINT Tools Available?

Since the inception of the MANPRINT program in 1984, MANPRINT-related tools have been developed by a number of agencies. They range from paper-based to PC- and main frame-based automated tools. Some provide general guidance for conducting MANPRINT and related activities. One is a guidebook containing domain-specific checklists for the MANPRINT practitioner and assessor. The MANPRINT Guidebook is available on the MANPRINT Web Page at: http://www.manprint.army.mil/manprint/references/guidebook.index.html.

Other tools offer specific domain analytical support, such as estimating manpower, personnel, and training resource requirements; identifying and rating soldier survivability issues; and performing workload, cost, and task analyses. The tools are discussed in detail in Appendix C.

2.0. THE ACQUISITION PROGRAM

This chapter briefly discusses the acquisition strategy, selected acquisition approaches, and system acquisition phases. It is concluded by a discussion of Integrated Concept Teams (ICTs) and Integrated Product Teams (IPTs).

2.1 Acquisition Strategy

Each PM develops and documents an acquisition strategy that serves as the roadmap for program execution from program initiation through post-production support and retirement. A primary goal is to minimize the time and cost of satisfying an identified, validated need, consistent with common sense and sound business practices. It evolves through an iterative process and becomes increasingly more definitive in describing the essential elements of a program. It is tailored to meet the needs of the individual program, to include management requirements imposed on the contractor.

The development of the acquisition strategy provides opportunities for the MANPRINT AO to embed MANPRINT and assist the PM. Some key actions/considerations might include:

- Participate in Working Level Integrated Product Team (WIPT) meetings associated with planning and developing the acquisition strategy.
- Ensure that sufficient time has been allocated to MANPRINT analyses and planned operational test and evaluation events.
- Review the logistics concept and ensure that it is synchronized with the target audience description.
- Review the PM and contractor management concept and ensure that MANPRINT is considered.
- Ensure that MANPRINT effort take the acquisition strategy (schedules, events, management structure) into account. For example, if an incremental acquisition strategy is planned, then the system will be fielded in capability "blocks." As successive blocks are designed and fielded, MANPRINT issues may either arise or be resolved. What may have been a problem with one version of the system may not be an issue when the next block is fielded. What wasn't a problem now may become a problem. (For example, will the upgrade affect the maintenance concept and hence the target audience ?)

2.2 Acquisition Approaches (Many systems will have components that are reflective of a combination of the following acquisition approaches)

2.2.1 Product Improvement

Priority consideration shall always be given to the most cost effective solution over the system's life-cycle. Generally, use or modification of a system or equipment that the government already owns is more cost effective than acquiring new materiel. There are two types of product improvement: pre-planned product improvement (P3I) and modification.

Pre-planned product improvement is used when market research or testing indicates current technology will not meet the requirements of the user but fielding a cost effective near term solution with current technology while planning to add or upgrade capabilities as technology matures.

Modification is a change to a weapon or information system that is in production.

2.2.2 NDI/COTS

The PM is strongly encouraged, wherever possible, to use non-developmental and commercial-off-the-shelf (NDI/COTS) products as the primary source of supply. Acquisition of NDI/COTS may be particularly attractive because the time and cost required to get the system to the user can be significantly reduced. DoD provides the following definitions pertaining to NDI/COTS:

Commercial item: any item, other than real property, that is of a type customarily used for nongovernmental purposes and that: (1) has been sold, leased, or licensed to the general public; or, (2) has been offered for sale, lease, or license to the general public; or any item that evolved through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation.

Modified commercial item: any item with modifications of a type customarily available in the commercial marketplace or minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements.

Non-developmental item: (1) any previously developed item of supply used exclusively for governmental purposes by a Federal Agency, a State or local government, or a foreign government with which the United States has a mutual

defense cooperation agreement; (2) any item described in (1) that requires only minor modification or modifications of the type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or (3) any item described in (1) or (2) solely because the item is not yet in use.

Acquisitions involving NDI/COTS pose unique challenges to the MANPRINT practitioner, because the ability to influence actual system design can be minimal. This is not to say, however, that MANPRINT does not play a role. In fact, MANPRINT issues (risks) and concerns should be a major determinant of whether an NDI/COTS solution is viable. Suitability to the aptitudes, knowledge and skills of the intended user population; trainability (anticipated training costs) of the system; the human-machine interface; and the ability of the NDI/COTS components to satisfy total system performance requirements are among the many MANPRINT considerations that should be addressed completely and early in the decision process, during market surveillance and market research.

Market surveillance activities are conducted on a continual basis by the Army Materiel Command (AMC) and Army Research, Development, and Engineering Centers (RD&ECs). The purpose is to keep abreast of developing trends and new technologies in the commercial marketplace with potential for military application. When the user defines the need (as expressed in the Mission Need Statement [MNS]), the AMC commodity-oriented Major Subordinate Command (MSC) will make a determination regarding whether NDI/COTS is feasible. If so, the MSC will begin market research.

Market research is used to identify what is currently available in the commercial marketplace or in use by other government agencies. Market research will also identify current and emerging technologies and their potential application to the specific Army need. If the market research indicates that a commercial solution is available, requirements documents must be written so they do not preclude the adoption of the commercial solution. If the research indicates that there isn't a commercial item available, the requirements must be supportable with the current technologies identified in the market research. The decision may also be made to assume the risk associated with writing requirements that depend on emerging technologies identified in the market research. This constitutes a Preplanned Product Improvement (P3I) program (discussed in Section 2.2.1).

MANPRINT considerations should be incorporated into market research. Issues (risks) and concerns identified by the ICT for inclusion in the Mission Need Statement (MNS) and the MANPRINT management plan (discussed in Section 4) will form the basis for MANPRINT evaluation of NDI/COTS hardware and/or software. This information should be crosswalked into independent evaluation plans and other

pertinent requirements documents (e.g., the Operational Requirements Document [ORD], the Test and Evaluation Master Plan [TEMP]). A primary avenue of MANPRINT influence in NDI/COTS acquisitions is to make MANPRINT (or preeminent domains thereof) a major criterion in the Request for Proposal (RFP) and source selection process.

The MANPRINT action officer should carefully evaluate any information provided by industry for MANPRINT implications. Most importantly, the MANPRINT AO should work closely with the PM to ensure that all relevant concerns and issues (risks) are fully understood as important decisions are made about the system.

2.2.3 Developmental

2.2.3.1 Grand Design

Grand design programs are characterized by design, development, test and evaluation, and deployment of the total functional capability in a single increment. It is most appropriate when the user requirements are well understood, supported by precedent, easily defined, and assessment of other considerations indicate a phased approach is not necessary. The entire system proceeds through the acquisition phases in a smooth, continuous path.

2.2.3.2 Incremental

Incremental programs are generally characterized by design, development, test and evaluation, and deployment of functionality through a number of clearly defined system "increments" that stand on their own. An initial core capability is defined, designed, and developed.

It should implement a significant portion of the full intended capability. At the same time, additional increments and their related capabilities are planned for and agreed upon. Each increment proceeds through the acquisition process based on its own development, not that of the whole. It is not appropriate when the user requirements are well understood and defined, but the assessment of other considerations (e.g., risks, funding, schedule, etc.) indicates a phased approach is more prudent or beneficial.

2.2.3.3 Evolutionary

Evolutionary programs are generally characterized by the design, development, test and evaluation, and deployment of a preliminary capability that includes provisions for the evolutionary addition of future functionality and changes as requirements are further defined. It is appropriate when the detailed user requirements are not well understood and defined. The total system functional capability is not

completely defined at inception, but evolves as the system is built.

2.2.4 Other Acquisition Strategies

2.2.4.1 Joint Programs

Any acquisition system, subsystem, component, or technology program that involves a strategy that includes funding by more than one DoD Component during any phase of a system's life cycle.

The designated lead DoD Component Head will select a single qualified program manager for the designated joint program. It will have one quality assurance program, one program change control program, one integrated test program and one set of documentation and reports to include one Joint ORD, one TEMP, one APB, etc. Human Systems Integration (HSI) is the MANPRINT equivalent for joint programs.

2.2.4.2 System of Systems

The Army is moving away from the stove pipe model of developing and acquiring systems in favor of a system-of-systems approach to requirements determination, development, acquisition, and fielding. The system-of-systems approach recognizes that every platform, weapon system, computer, radio, piece of equipment, and even every soldier is not only a unique entity, but also is a part of a greater system. The system-of-systems approach emphasizes seamless integration, cooperative development, and commonality of components wherever possible. Digitization represents the clearest example of the system-of-systems approach, where common technologies and requirements are leveraged across different systems to speed development, reduce costs, and enhance capabilities. The MANPRINT practitioner must ensure that MANPRINT activities not only address the soldier interface within the individual system, but the soldier's issues and concerns within the system-of-systems.

The system of systems concept allows the massing of effects, not forces. The synergistic effect is a force capable of dominating the battlespace and setting the conditions to ensure that dominance is maintained. The system-of-systems approach will be applied toward all future fieldings, with the Brigade Combat Teams (BCTs) serving as the cornerstone. However, the Army has, in reality, been fielding systems of systems for years. Family of systems use common parts and operate in similar ways. It is a rare system that is independent of any other system. The Capstone Requirements Document (CRD) is the requirements management document that sets common standards and requirements. The CRD cannot be used to justify procurement. Each individual system requires its own ORD. Reference Memorandum, HQ TRADOC, ATCD-RP, Subject: System of Systems Approach Within TRADOC, dated 2 March 1999.

2.2.4.3 Warfighting Rapid Acquisition Programs (WRAP)

WRAP implements the Army's accelerated procurement of systems identified through TRADOC warfighting experiments as compelling successes which satisfy urgent needs. It is implemented within existing Army structures and organizations. It is a process that links TRADOC experimentation with systems acquisition.

2.2.4.3.1 Advanced Warfighting Experiments (AWEs)

AWEs are the culminating efforts in evaluating major increases to warfighting capability. They cross TRADOC domains of doctrine, training, leader development, organization, materiel, and soldier (DTLOMS). They synergistically combine new force structure, doctrine, and materiel to counter a tactically competent opposing force. Moreover, they impact most, if not all, of the battlefield dynamics and battlefield operating systems. AWEs Managers must ensure that their technology demonstrations include appropriate consideration of MANPRINT, tailored to the scope and nature of their program.

2.2.4.3.2 Concept Experimentation Programs(CEP)

CEP is a separately funded TRADOC program providing sponsors the ability to evaluate and capitalize on emerging technology, materiel initiatives, and warfighting ideas. They facilitate experimentation (conducted primarily by TRADOC Battle Laboratories) to determine the military utility or potential of an idea to become a DTLOMS solution to Future Operational Capabilities (FOCs). CEP reports are the primary source for data supporting initiation of WRAP.

2.2.4.3.3 Advanced Technology Demonstrations (ATDs)

ATDs are a category of technology demonstrations. They are risk-reducing, integrated, "proof of principle" demonstrations designed to assist near-term system developments in satisfying specific operational capability needs. It accelerates introduction of new technologies into the operational systems. ATD Managers must ensure that their technology demonstrations include appropriate consideration of MANPRINT, tailored to the scope and nature of their program.

2.2.4.3.4 Advanced Concept Technology Demonstrations (ACTDs)

ACTDs accelerate the application of mature technologies configured in a way that is useful to the warfighter which is in response to a critical military operational need. ACTDs provide an evaluation of the military utility of proposed solutions, and are jointly planned by users and technology developers to enable operational forces to

experiment in the field with new technologies in order to evaluate potential changes to doctrine, warfighting concepts, tactics, modernization plans, and training. ACTD Managers must ensure that their technology demonstrations include appropriate consideration of MANPRINT, tailored to the scope and nature of their program.

2.3 Systems Acquisition Phases

This paragraph contains a brief description of systems acquisition phases, as described by DoDD 5000.1 and DoD 5000.2-R. Only summary information is presented. The reader is referred to the source documents for a more complete treatment.

Figure 2.1 depicts the system life cycle. While all programs must satisfy certain core activities (as defined in DoDD 5000.1 and DoD 5000.2-R), the number of phases and decision points should be tailored to meet the specific needs of individual PMs. Objective assessments of a program's category status, risks, the adequacy of proposed risk management plans, and the urgency of the user's need form the basis for the tailoring.

All acquisition programs are based on identified, documented, and validated requirements. These needs are generated as a direct result of continuing assessments of national security, military strategies, lessons learned from recent operational experiences and future conflict scenarios.

Mission needs must first be evaluated to determine if they can be satisfied by non-materiel solutions. Non-materiel solutions include changes in doctrine, organization, leader development, soldiers or training. When a need cannot be met by such changes, a broad statement of mission—expressed in terms of an operational capability (not a system-specific solution)—is identified in a Mission Need Statement (MNS). Approval of the MNS is gained at Milestone 0, "Approval to Conduct Concept Studies." Approval authorizes initiation of Phase 0, "Concept Exploration" and expenditure of resources for the activities of that phase, although it does not yet mean that a new acquisition program has been initiated. The MNS represents a formal request to begin defining requirements and exploring different technology concepts and typically leads to an Operational Requirement Document (ORD) which provides detailed requirements.

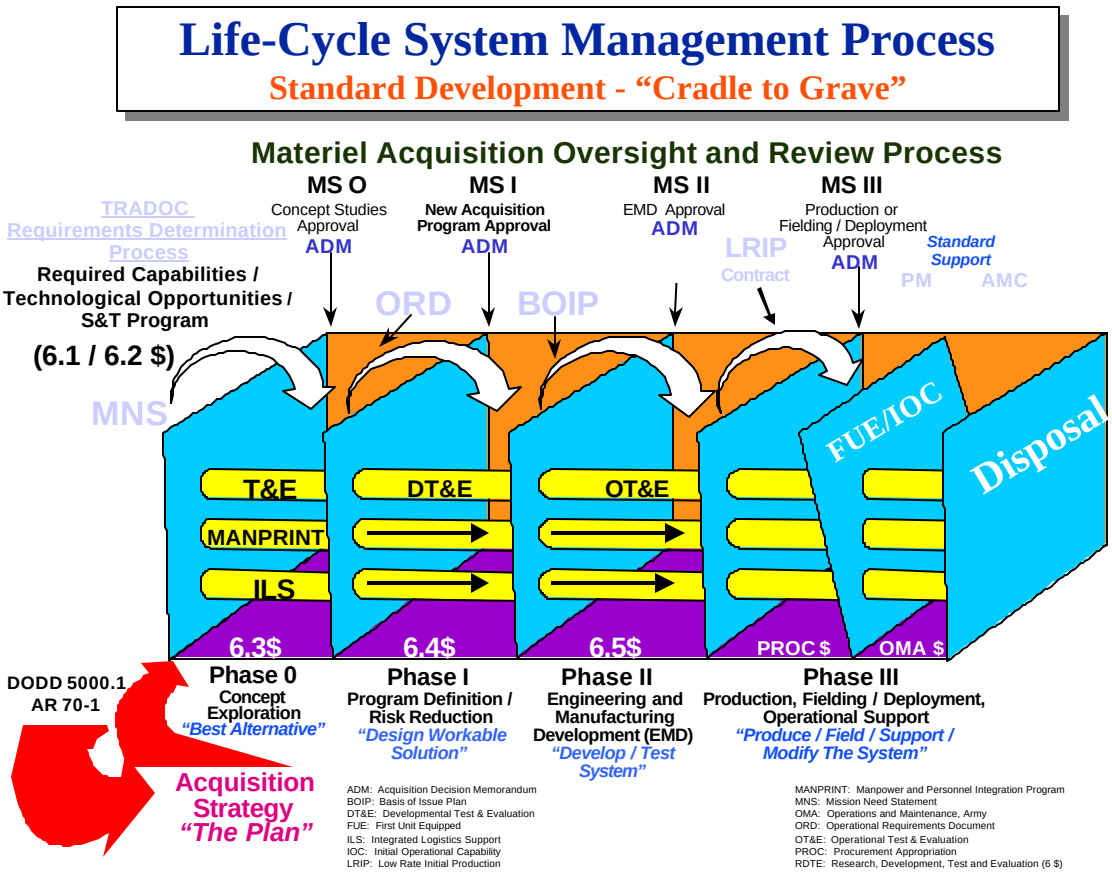

Figure 2.1—System Life Cycle

Phase 0—Concept Exploration—typically consists of competitive, parallel short-term concept studies. The focus of these efforts is to define and evaluate the feasibility of alternative concepts and to provide a basis for assessing the relative merits (i.e., advantages and disadvantages, degree of risk) of these concepts at Milestone I—Approval to Begin a New Acquisition Program. Analysis of alternatives shall be used as appropriate to facilitate comparisons of alternative concepts. The most promising system concepts are defined in terms of initial, broad objectives for cost, schedule, performance, software requirements, opportunities for tradeoffs, overall acquisition strategy, and test and evaluation strategy. An approved ORD (which contains MANPRINT requirements and constraints) is produced during Phase 0 and serves to define the "program" initiated at Milestone I. The ORD is a "living" document and can be (and often is) revised periodically during Phase I and II. A PM will usually be appointed within 3 months of a favorable Milestone I decision.

During the next phase, Phase I—Program Definition and Risk Reduction—the

program becomes defined. One or more concepts, design approaches, and/or parallel technologies are pursued as warranted.

Assessments of the advantages and disadvantages of alternative concepts are refined. Prototyping, demonstrations, and early operational assessments are considered and included as necessary to reduce risk so that technology, manufacturing, and support risks are well in hand before the next decision point (Milestone II—Approval to Enter Engineering and Manufacturing Development). Cost drivers, life-cycle cost estimates, cost-performance trades, interoperability, and acquisition strategy alternatives are considered, to include evolutionary and incremental software development.

During Phase II—Engineering and Manufacturing Development—the most promising design approach developed in Phase I is translated into a stable, interoperable, producible, supportable and cost effective system design. The manufacturing or production process is validated, and testing is conducted to demonstrate that the system capabilities meet contract specification requirements, satisfy the mission need, and meet minimum acceptable operational performance requirements. A favorable decision at Milestone III—Production or Fielding/Deployment Approval—authorizes entry into Phase III.

The focus in Phase III—Production, Fielding/Deployment, and Operational Support—is to achieve an operational capability that satisfies mission needs. Deficiencies encountered in Development Test and Evaluation (DT&E) and Initial Operational Test and Evaluation (IOT&E) are resolved and fixes are verified. During fielding/deployment and throughout operational support, the potential for modifications to the fielded/deployed system continues.

2.4 Integrated Concept Teams (ICTs) and Integrated Product Teams (IPTs)

The decision to acquire a new system is actually the end product of an ongoing series of warfighting experiments, simulations, discussions and analyses. The TRADOC Commander is responsible for development of the vision of our Army's future warfighting capabilities. This vision is translated into a more detailed concept by Integrated Concept Teams (ICT) approved and chartered by Headquarters TRADOC (Tier 1) or School/Center Commandants (Tier 2). ICTs formed by TRADOC School Commandants and selected non-TRADOC leaders augment this vision with more detailed operations and branch concepts. The ICT (Tier One and Two) is charged with developing products, which include Materiel Requirements Documents (MNS, ORD) if such a solution is warranted. Ultimately, ICTs transition into IPTs as concepts mature into tangible systems. ICT members are responsible for both horizontal and vertical coordination within their parent organization.

The ICTs meet to propose, discuss, and advance developmental concepts and to

define needs which may ultimately become mission needs statements. Experiments may play a role in developing concepts and requirements. There are two main categories of warfighting experiments—concept experiments and advanced warfighting experiments. The overwhelming majority are concept experiments pertaining to individual operations or branches. Usually, the concept proponent conducts the experiment or requests an Army battle lab to sponsor it.

The concept proponent and/or battle lab formulate hypotheses to be tested. The hypotheses can relate to modifications in doctrine, training, leadership development, organization, materiel and/or soldiers (DTLOMS). After the experiment has been conducted, the TRADOC Analysis Center (TRAC) analyzes the results.

TRAC analyses and recommendations from experiment participants form the basis for the final experiment report. At this point, the concept proponent can discard the hypothesis, modify it, continue to explore it, or define a DTLOMS requirement on the basis of what has been learned.

Warfighting experimentation, science and technology research, concept development, and contemporary issues all provide DTLOMS insights on means to achieve future operational capabilities. To translate these insights into requirements, the concept proponent will form focused ICTs to integrate and analyze them to determine the most effective, timely, and least costly means. The MANPRINT AO must ensure total life cycle costs are addressed, not just acquisition costs. TRADOC Pamphlet 71-9 states that a MANPRINT representative will be a core member of the ICTs.

There is a specific order to the analyses that are performed. Doctrine insights are analyzed first. If modifications to doctrine will not satisfy the requirement, changes in training, leader development, organizational design, and soldier capabilities are explored (in that order). Materiel solutions are considered last. This sequence has been established to explore the least costly and most rapid changes first.

In the event that the concept proponent decides a materiel solution is warranted, activities will be initiated to document the requirements for presentation to the CG, TRADOC. An ICT for the potential new system will be formed. Tier one ICTs established by HQ TRADOC normally will have the highest visibility. MANPRINT has a core representative but of all or most MANPRINT domains may need to participate. For Tier two ICTs conducted at TRADOC centers and schools, ARL-HRED field elements will have the lead for participating and coordinating MANPRINT expertise.

The Materiel Developer (MD) also plays a role in the pre-milestone 0 time frame. The MD may form a task force or working group that will work with the ICT. Like the ICT, the task force or working group may be composed of representatives from all

appropriate functional disciplines working together to build successful programs and enabling decision-makers to make the right decisions at the right time. Like IPTs, these groups should function in a spirit of teamwork. Participants should be empowered and authorized, to the maximum extent possible, to make commitments for the organization or the functional area they represent.

Prior to MDR 0, the ICT, with input from the MD IPT, will define users' requirements in broad operational terms. The two teams will explore the feasibility of satisfying them given the state of the art in technology, initiate market research into NDI/COTS, and examine acquisition strategies, among other things.

During Phase 0, the CD's ICT and the MD's IPT will further refine user requirements, system alternatives and concepts, acquisition strategy, program plans, and life cycle costs. They will prepare all of the necessary documentation for MDR I. This process will evolve through the Concept and DTLOMS Determination Analysis ICTs to the Materiel Requirements Document ICTs. After a favorable MDR I decision is obtained, a new program is initiated, and a PM is designated.

One of the first actions taken by the PM will be the formation of IPTs. At the PM level, there are generally two types: Working Level IPTs (WIPTs) and the Integrating Integrated Product Team (IIPT). The first team to be formed is the IIPT, and at least some of the members of the ICT and the MD's IPT will transition over to the IIPT. The IIPT assists the PM in determining a structure for the WIPTs (e.g., which WIPTs should be formed, who should participate, how much support is needed). The PM may appoint an ILS Manager and a MANPRINT Manager or the same individual may be dual-hatted.

One of the WIPTs that may be recommended, based on needs or issues, at this point is the MANPRINT WIPT. As with the transition from the new system ICT to the IIPT, the MANPRINT WIPT should contain MANPRINT members who have transitioned from the ICT. This structure ensures continuity throughout the acquisition process. In cases where a MANPRINT WIPT is inappropriate or unsupported, MANPRINT must be represented on another WIPT(s). ARL-HRED, will coordinate MANPRINT issues and activities.

The same basic process holds true for automated information systems, even when TRADOC is not the system proponent. The Functional Proponent would perform similar functions to that of a Combat Developer/ICT as described in TRADOC Pamphlet 71-9. A listing of ongoing ICTs will be maintained on the TRADOC DCSCD Homepage at: http://www.tradoc.army.mil/dcscd/index.htm.

3.0 TAILORED MANPRINT SUPPORT

3.1 Purpose

The nucleus of MANPRINT support is the MANPRINT Team consisting of MANPRINT domain experts with responsibilities to support Integrated Concept Teams (ICTs) and PM Integrated Product Teams (IPTs). ARL-HRED field elements will act as focal points for ensuring that appropriate domain experts are available to support the program.

The MANPRINT Team representation on ICTs, including Warfighting Concepts, DTLOMS Mission Needs and Materiel Requirement Documents will depend upon the estimated MANPRINT impact and availability of resources. Typically ARL-HRED will provide the MANPRINT representative and will be empowered to act, having the information required to proactively represent the domains that may not have a subject matter expert among the core ICT membership. Prior to Milestone 0, the MANPRINT Team should determine the extent and nature of their involvement in the ICT and inform the ARL-HRED representative. Working in tandem with the new system ICT, this group should focus on MANPRINT issues (risks) as the various alternatives are evaluated and explored. As part of their efforts, the MANPRINT Team should formulate MANPRINT issues (risks), objectives and thresholds for the MNS and ORD. Particularly for non-major (ACAT III & IV) systems, a MANPRINT Team can (and often does) consist of a single MANPRINT AO at a TRADOC-supporting ARL-HRED field element. This individual must define what MANPRINT domains are the most operative for an anticipated system and address them in requirements documents: in most cases, this person's responsibilities and efforts are augmented by enlisting the expertise of other ARL-HRED or discipline-specific (extra-HRED) professionals. This process will be discussed in greater detail in Section 5. The issues identified by the efforts of the team should be tracked by the ARL-HRED developed tracking system (see Section 4).

When a program is initiated (Milestone I), the PM should form a MANPRINT Working IPT if it is a major system and there is the possibility of significant MANPRINT issues. Otherwise, MANPRINT should be represented on any broader WIPT such as a Supportability WIPT. Ideally, many of the members of the ICT will transition over to the MANPRINT Working IPT. This allows for continuity in the MANPRINT program. As with the ICT, ARL-HRED will provide the focal point.

3.2 Key Members

The recommended composition of the MANPRINT Team is a matter of system-specific / situation-specific need. The following is the list of MANPRINT Team agencies and their functional expertise. For a listing of individuals and addresses, select

CONTACTS on the MANPRINT Web page at:
http://www.manprint.army.mil/manprint/contacts/contacts.asp

Agency	Functional Expertise
Personnel Technologies Directorate, Office of the Deputy Chief of Staff for Personnel, DA	MANPRINT policy
U. S. Army Research Laboratory - Human Research and Engineering Directorate (ARL-HRED)	Human Factors Engineering. Overall MANPRINT Focal Point Soldier Survivability and MPT (for non-major systems).
U.S. Total Army Personnel Command (PERSCOM), Deputy Chief of Staff for Operations (DCSOPS), Force Integration Division, MPT Domain Branch	Manpower, Personnel, Training (for major systems).
U. S. Army Research Laboratory - Survivability\Lethality Analysis Directorate (ARL-SLAD)	Soldier Survivability
U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM)	Health Hazards
U.S. Army Training and Doctrine Command (TRADOC)	User Representative
U.S. Army Safety Center (for materiel systems)	Materiel System Safety
U.S. Army Materiel Command	System Safety (for non-major systems and AIS).

Figure 3.1—Key Members of the MANPRINT Team

3.3 Participants

As can be seen, the core group possesses expertise in all seven of the MANPRINT domains. However, they, like other Army agencies, do not have sufficient resources to fully participate in all aspects of all systems. It is here that the ARL-HRED responsibility as focal point is key. Even though the entire MANPRINT Team may not physically participate, they can and should provide subject matter expert input to ARL-HRED and in turn, the ICT and/or IPT. There may be other participants in an ICT or IPT who have MANPRINT related domain expertise and they can also fill any void created by the reduced participation by the MANPRINT Team. Examples of such participants include: (This is not intended to be exhaustive but rather examples.)

Agency	Functional Expertise
Deputy Under Secretary of the Army (Operations Research) (DUSA(OR))	MANPRINT and test and evaluation

Agency	Functional Expertise
Deputy Chief of Staff for Logistics (DCSLOG)	Logistics
Deputy Chief of Staff for Operations and Plans (DCSOPS)	Force Structure
U. S. Army Test and Evaluation Command	MANPRINT and test and evaluation
U. S. Army Training and Doctrine Command: Combat Development Training Developers Personnel Proponent	 Manpower (TOE) Training Personnel
U.S. Army Information Systems Management Activity (USAISMA)	Logistics (AIS)
U.S. Army Intelligence and Security Command (USAI&SC)	System Security
U. S. Army Materiel Command Surgeon	Health Hazards
Contractor(s)	All domains, as needed

Figure 3.2—Potential Participants With MANPRINT Expertise in ICTs and IPTs

In addition to the agencies listed above, functional experts from the PM, CD, TD, and/or FP, and TRADOC System Manager (TSM) need to participate actively supporting MANPRINT. These are people who are actually designing/developing the system and who will ultimately interact with it. Their knowledge and insights are absolutely invaluable, and they can carry MANPRINT principles into the acquisition process on a daily basis, serving as informal MANPRINT representatives. Such individuals may include, but not be limited to, the ILS Manager, Systems Engineer, and the Test and Evaluation Manager.

There are a number of actions that should be accomplished once a MANPRINT WIPT has been established. A draft MANPRINT WIPT charter should be prepared and distributed to members for comment and approval. The purpose is to define responsibilities, ensure understanding, and promote a feeling of ownership. There are no formal regulations calling for this, and there is no prescribed format. At a minimum, it should define the purpose, membership, objectives, and procedures of the group. A sample charter is provided at Appendix E.

4.0 MANPRINT MANAGEMENT

4.1 MANPRINT Management

The Department of Defense (DoD) recognizes the critical importance of management control. Rigorous internal management control systems are integral to effective and accountable program management. The objective is to perform acquisition functions efficiently and effectively while maximizing the utilization and protection of resources. Previously, a System MANPRINT Management Plan (SMMP) was required for all systems. It was developed by a MANPRINT Joint Working Group (MJWG) early in the systems acquisition process (prior to Milestone I) and maintained as a living MANPRINT management tool throughout the system's life-cycle. It was initially primarily the responsibility of the Combat Developer or Functional Proponent and was turned over to the Program Manager when appointed. The SMMP is still highly desirable as a MANPRINT management control system. ARL-HRED, as the focal point for the MANPRINT effort on all systems, has the responsibility for developing guidance on coordination and communication between ARL-HRED and the MANPRINT team. Department of Defense Regulation Number 5000.2R requires that a comprehensive management and technical strategy for human systems integration be initiated early in the acquisition process. It should be noted that the Defense Acquisition Deskbook recommends that the PM develop a Human Systems Integration Plan (HSIP) when the system has complex human-systems interfaces; significant manpower or training costs; personnel concerns; or safety, health hazard, or survivability issues. The SMMP equates to a HSIP. The SMMP, if developed, can and should be tailored to fit the system.

4.2 System MANPRINT Management Plan (SMMP)

A recommended SMMP format that with minimum essential information contains:

System Information: This might include a brief system description and acquisition strategy.

Target Audience: As a minimum, identify the operators, maintainers, and supporters of the system. Highlight any significant changes from the predecessor system. If there is no predecessor system that will be replaced, identify the billpayers for the system.

Issues: The ICT Report will contain MANPRINT Common Data Elements (CDEs). This is a start point for continuous identification and resolution of issues. The CDE format is:

Each MANPRINT issue or opportunity

The impact of that issue or opportunity

What has been done

Potential solution(s) that have not been attempted

Proponent Agency

As issues are resolved, data on MANPRINT costs (analyses, support) and benefit (cost savings and cost avoidance) should be captured.

Coordination: Capture POCs for the system and MANPRINT POCs supporting the system.

4.3 MANPRINT Crosswalks

In TRADOC Pamphlet 71-9, there is a specific process to crosswalk requirements in the Operational Requirements Document (ORD) to the Request for Proposal (RFP) and the process must be documented (see Figure 4-1). The requirements of the ORD should also provide the basis for testing issues in the Test and Evaluation Master Plan (TEMP). MANPRINT AOs must ensure this process is used to manage MANPRINT requirements, objectives, and thresholds. When a specific MANPRINT requirement, objective, or threshold is not addressed, it should be brought to the attention of the combat developer and materiel developer. MANPRINT requirements should also be crosswalked to the Supportability Strategy.

Figure 4.1— ORD to RFP Crosswalk

ORD TO RFP Crosswalk
TRADOC Pam 71-9, 5 November, 1999

Requirement in ORD * KTT	Testament(s) in RFP	Rationale for Difference	Testing Impact (if any)

5.0 ACTIVITIES THROUGHOUT LIFE CYCLE PHASES

Certain activities should be accomplished in each life cycle phase for MANPRINT to exercise its full potential in the acquisition process. Prior to MDR 0, these activities focus around establishing the MANPRINT program as a part or extension of the related ICT. During Phase 0, events move rapidly and numerous activities (discussed in detail later in this chapter) occur. Prior to a favorable MDR I decision, MANPRINT should address these actions. The appropriate ARL-HRED Field Element will normally be the focal point complimented with other MANPRINT domain representatives as appropriate and available.

After a favorable MDR I decision, a PM will be designated. The PM will form an Integrating Integrated Product Team (IIPT) to help formulate recommendations regarding the structure and composition of Working Level IPTs (WIPTs) for the new program (see Section 2.3 for a more detailed discussion). One of these should be the MANPRINT WIPT, and the PM should appoint a MANPRINT Manager (may also be the ILS Manager). This individual should then be responsible for ensuring that necessary MANPRINT activities are accomplished in the day-to-day functioning of the PM Office. It should be stated, however, that the CD, FP, TSM and PM AOs must develop a synergy in working with each other. They all share an equal responsibility for ensuring that MANPRINT considerations are addressed during the acquisition process.

This section contains basic activities that may occur in the acquisition program. In the spirit of acquisition reform, PMs have been empowered to tailor their programs to undertake only those activities deemed necessary. The activities in this section are presented as being initiated in a particular acquisition phase. This is, however, only one of many possible scenarios. In reality, an action can be initiated when the PM deems it necessary, anytime during the process, or may not be initiated at all. It will be up to the MANPRINT AO to ascertain which of the activities pertain to her/his particular program and when they are occurring. For the sake of brevity and efficiency, detailed guidance is provided only for the phase in which the activity is first presented.

A high-level outline of Section 5.0 is presented below for convenience.

Development (EMD)

5.6 Activities Occurring During Phase III—Production, Fielding / Deployment and Operational Support

Guidance is provided on how to accomplish each activity, and on why it is important. (This guidance is not necessarily comprehensive. MANPRINT AOs may become involved in other system / situation-specific activities, or may develop other methods to accomplish them.) Also, where relevant, references are made to documents containing additional information. Appendix F of this guide contains a list of these documents with brief synopses of their contents and guidance on how to obtain them.

5.1 ACTIVITIES OCCURRING IN ALL PHASES

5.1.1 Communicate and Follow-up

WHY?

- Frequent communication with the people designing, testing and developing the system is the surest way to gain influence in the process. It provides day-to-day visibility, establishes credibility, and builds trust.
- Many important decisions are made informally, and the results are presented at formal reviews. At that point, it may be too late to make any changes.
- Open lines of communication with people guiding related efforts (e.g., testing, ILS) help to ensure that MANPRINT issues (risks) are crosswalked into those processes.

HOW?

- Coordinate with ICT/IPT POCs within the CD/FP, MD, TSM, and PM Offices for systems engineering (hardware and software), logistics, training, documentation, program scheduling, testing, and fielding.
- Inform the lead POC in these areas that you are an AO for MANPRINT. Explain who is working with you and what their MANPRINT responsibilities are.
- Find out who is working for them and what their individual functional responsibilities are.
- Explain to the lead POC/SMEs, when necessary, what MANPRINT is and why it is important.
- Explain how you can help them and how they can help you.
- Exchange schedules and check schedules against the master program schedule.
- Make it a point to talk to people as the program progresses.
- Attend informal and formal meetings (e.g., ICT meetings, IPT meetings, in-house In-Process Reviews [IPRs], Test Integration Working Group [TIWG] meetings, design reviews).

5.1.2 Coordinate Meetings and Agendas for MANPRINT Forums

WHY? MANPRINT team members possess the functional expertise necessary to assess the overall MANPRINT status of the system.

HOW?

- Determine when a meeting of the MANPRINT Team on the ICT or MANPRINT WIPT is necessary to discuss issues and solve problems.
- Formulate an agenda on topics to be addressed by the working group.
- Establish a set of tentative times and dates for the meeting. If possible, this should be planned in conjunction with other scheduled meetings to reduce resource costs.
- Forward your recommendations and the proposed agenda to the CD/FP, TSM and/or MD/PM (as appropriate). Offer to meet to discuss why you think the meeting is necessary. Upon approval:
  - — Send the agenda to group members. Coordinate meeting time.
  - — Put together a package of read-ahead material for prior review. The package should contain all relevant program/requirements documentation along with any reports/observations you have on program status. Allow sufficient time before meeting for review.
- Maintain a library of important program requirements and testing documentation for the MANPRINT Team.
- For those individuals who cannot attend, request that written input be provided or arrange for telephonic/electronic participation.
- Recommend to the CD/FP, TSM, and/or MD/PM the assignment of responsibilities for investigation/resolution of identified MANPRINT risks. Establish timelines (in keeping with the master program schedule) for resolution of risks.
- Publish minutes. Provide copies to the working group, to the FP/CD and MD/PM, and to key individuals in the FP, CD, TSM and MD/PM offices.
- Maintain a liaison with group members after the minutes are distributed.

5.1.3 Keep the MANPRINT Team Group Informed

WHY? The Team must be kept up-to-date and well-informed to allow members to apply their expertise on a timely and efficient basis.

HOW?

- Contact group members when issues (risks) arise.
- Provide drafts of program documentation when available. Allow sufficient time for members' comments to be incorporated, when relevant.

- On a periodic basis, prepare an update for distribution to group members informing them of program status, changes, issue resolution. Distribution may be accomplished via electronic means.
- Provide members with an up-to-date program calendar of events and system timelines.
- Arrange for Team members to observe the actual system, possibly at a test bed site or at other test events. If possible, coordinate meetings with other scheduled meetings (e.g., IPTs on Integrated Logistic Support, Testing, Systems Engineering; ICTs on system concepts and alternatives) and/or other system reviews to reduce travel costs.

5.1.4 Establish and Maintain a MANPRINT Support File for All Relevant MANPRINT Data, Analyses, Studies, and Documentation

WHY?

- The MANPRINT Support File will constitute an important audit trail for the MANPRINT Program.
- The data, analyses, assessments, test findings, studies, and documentation used and generated by the MANPRINT program during one phase may have to be consulted or used in a later phase.

HOW?

- Set aside a central repository for collecting and saving MANPRINT-related information. Examples of contents may include:
  - — Tables of Organization and Equipment (TOE)/Tables of Distribution and Allowances (TDA)
  - — Lessons Learned Data
  - — Reliability, Availability, & Maintainability (RAM) data
  - — Logistic Support Analysis Record (LSAR) data
  - — Operational Concept information
  - — MANPRINT domain Assessment Reports
  - — Minutes of MANPRINT Team meetings and other meetings attended
  - — Data on Target Audience
  - — Test and Evaluation Reports (TER)
  - — Operational Effectiveness Analyses and Operational Training Analyses results
  - — MANPRINT Analyses results

- — Basis of Issue Plan Feeder Data (BOIPFD)
- — Preliminary manpower information in CARD documents
- — Manpower Estimates (ME)
- — MANPRINT Assessments
- — System Training Plan (STRAP)
- — Operational Requirements Documents (ORD)

- Keep a bibliography of the information in the file. You may want to assign a numbering system to assist in identifying what the information was used for.
- NOTE: As indicated in Section 4, ARL-HRED will develop specific guidance / procedures for tracking MANPRINT issues and data.

5.1.5 Review Existing Program Documentation, Data, and Lessons Learned to Ensure that MANPRINT is Crosswalked Where Relevant/Required

WHY? Participants in the acquisition process rely on the data and documentation that is produced to guide the design / development process and to keep track of scheduled events. The information that is provided must, therefore, be up-to-date, correct, and consistent both internally and across functional areas.

NOTE: See Section 4 for a discussion on crosswalking.

HOW?

- Coordinate with the POC for each document / data source that requires MANPRINT input / review.
- Obtain copies of current drafts / documents.
- Determine whether the information should be reviewed by members of MANPRINT Team. If so, provide to members.
- Where needed, provide MANPRINT inputs.
- Review documents, data, and lessons learned.
- Provide comments.
- As necessary, identify MANPRINT issues (risks) arising from the reviews to be discussed by MANPRINT working groups.

5.2 ACTIVITIES OCCURRING PRIOR TO MDR 0

5.2.1 *General MANPRINT Focus Prior To MDR 0*

Prior to MDR 0, the major focus of MANPRINT at this earliest stage is to get the MANPRINT program initiated, ensure MANPRINT is adequately represented on Integrated Concept Teams (ICTs), and to identify MANPRINT needs and constraints. TRADOC Pamphlet 71-9, Requirements Determination, provides an excellent roadmap of activities that take place during Pre-Phase 0 and Phase 0 of the acquisition process. MANPRINT is clearly identified as one of the primary participants.

5.2.2 MANPRINT Activities

5.2.2.1 Participate in ICT (Warfighting Concepts).

Pre-Phase 0 To MDR 0	Phase 0 to MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
X				

WHY? This ICT develops Warfighting Concepts. Tier One ICTs are chartered by HQ TRADOC, are established for operational and functional concepts that impact multiple proponents, branches, functional/branch concepts, or Future Operational Capabilities (FOCs), have high management interest/visibility, have major joint service impact, or require HQ TRADOC resources to conduct. Tier Two ICTs are formed at TRADOC Centers or Schools and are used to develop or refine a branch or functional concept unique to a single proponent. Partipation in these ICTs allows MANPRINT representatives to ensure humans are considered in all decisions, that MANPRINT lessons learned are incorporated, and that the implications of each capability addressed considers MANPRINT concerns.

HOW? TRADOC Pamphlet 71-9 identifies a MANPRINT representative as a core member of these ICTs. As a general rule, ARL-HRED is the focal point for all systems. In the case of Tier One ICTs, most or all domains will be represented at some point in the ICT process. For Tier Two ICTs, ARL-HRED may be the only MANPRINT representative. While not all MANPRINT experts can participate due to limited resources, they should stay informed and provide their expertise, when appropriate, to the primary MANPRINT participant. Involvement at this earliest stage provides an excellent and necessary foundation for subsequent system/MANPRINT activities: identification of MANPRINT requirements and constraints in requirements documents (particularly the ORD) serves to sensitize, focus, and guide

subsequent MANPRINT attention and activities throughout the acquisition process.

5.2.2.2 Participate in Needs Analyses

Pre-Phase 0 To MDR 0	Phase 0 to MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
X				

WHY? The Needs Analyses address whether DTLOS (doctrine, training, leader development, organization, or soldier) will meet the identified need. The analyses may provide rationale as to why those non-materiel options are inadequate, infeasible, or undesirable, and thereby support rationale for a materiel requirement. This, along with the Technology Trade-offs conducted by the Materiel Developer, provide the basis for the Mission Needs Statement which identifies the need for a materiel solution.

HOW? MANPRINT methodologies such as ECA and IMPRINT can provide valuable data. ECA will identify problem tasks on the current system(s) and possible solutions. The lack of manpower, personnel, and training solutions help validate the need for a materiel solution. IMPRINT can use current system information and develop early system performance estimations, and manpower, personnel, and training constraints. MANPRINT experts can facilitate the conduct of these methodologies, where appropriate, to support the Needs Analyses. Particularly with non-major systems (ACAT III & IV), there is often a short suspense between when an ICT is formed and when requirements documents are desired which precludes the timely and desired application of formal MANPRINT tools. In such cases, which are not infrequent, there is no effective substitute for an on-site MANPRINT generalist who maintains frequent interactions with actual or potential customers and (evolving) programs.

5.2.2.3 Develop MANPRINT Shortfalls, Constraints, and Requirements for Inclusion in the Mission Need Statement (MNS)

Pre-Phase 0 To MDR 0	Phase 0 to MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
X				

WHY? The Mission Needs Statement (MNS), which is one of the few requirements documents required by DoD, lays the foundation for all subsequent activities in the acquisition process. Any known MANPRINT constraints should be

stated at the outset of the program.

HOW? Working as a member of the ICT, MANPRINT experts can provide a valuable service in development of the MNS. Paragraph 2 describes the short falls of existing capabilities. MANPRINT short falls, if not already identified, can be documented by conduct of an ECA and/or IMPRINT methodology. Results of these methodologies can also provide data on why non-materiel alternatives are inadequate (for Paragraph 3). Paragraph 5 should specify manpower, personnel, and training (MPT) constraints.

MANPRINT experts, working with combat developer, training developer, and personnel proponent representatives on the ICT should develop clear, supportable MPT constraints, when appropriate. Constraints on MPT may have already been identified by Headquarters, Department of the Army or other Headquarters. These constraints provide the basis for MPT objectives and thresholds developed for the Operational Requirements Document (ORD).

5.2.2.4 Initiate Identification and Tracking of Potential MANPRINT Issues

Pre-Phase 0 To MDR 0	Phase 0 to MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
X	X	X	X	X

WHY? Potential MANPRINT issues identified through analyses and/or reasoned logic pre-Milestone 0 should be addressed when alternative solutions are examined.

HOW? The MANPRINT issue tracking system developed by ARL-HRED can be initiated and include these preliminary potential MANPRINT issues. These issues may ultimately be addressed in the ORD and as Common Data Elements (CDEs). It is within program documents that we will ensure continuity as the program passes from the combat developer to the materiel developer.

5.3 ACTIVITIES OCCURRING DURING PHASE 0—CONCEPT EXPLORATION

5.3.1 General MANPRINT Focus in Phase 0

Entry into Phase 0 occurs after successful approval at MDR 0. For ACAT I systems, that is approval of the MNS. During this phase, alternatives are explored, to include the acquisition strategy. Considerations included are modifications to an existing system, NDI/COTS, and/or new system development. At the program level, numerous activities are accomplished. Market research is usually performed to determine the feasibility of NDI/COTS. Working groups are formed to develop Testing and Integrated Logistics Support plans. Studies and analyses are conducted to refine requirements and analyze alternatives. The primary effort is development of the Operational Requirements Document (ORD). If MANPRINT is not adequately addressed in the ORD, it will probably not be adequately addressed in contractual and test/evaluation documents.

The MANPRINT focus during Phase 0 is the development of performance parameters (considering the soldier) and objectives/thresholds. MANPRINT representative(s) should participate in DTLOMS Determination Analysis and Materiel Requirements Document ICTs, then prepare to support the Materiel Developer (MD)/Program Manager (PM) in development of the initial Request for Proposal.

5.3.2 MANPRINT Activities

5.3.2.1 Provide Input for Market Research

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X		

WHY? DoD acquisition policy dictates that commercial and non-developmental items are to be the primary source of new materiel. NDI/COTS items can be acquired, with little development cost to the government. These items also permit the government to keep abreast of the latest in emerging technologies. Nevertheless, the target audience and operating environments for which they are being acquired may be vastly different from those for which the systems were developed.

Manpower, personnel, and training (MPT) constraints (identified in the MNS) are applicable, regardless of acquisition strategy and must be considered when conducting market research.

HOW? The MNS identified MANPRINT short falls of existing capabilities and MPT constraints. MANPRINT experts must ensure these factors are considered by the Materiel Developer in conducting market research. The Army will ultimately acquire a total system, not just a hardware/software system. If the human component and operational environment are identified, the hardware and software components must be compatible with those elements. This is also the time to address any other MANPRINT issues such as human factors engineering, system safety, health hazards, and soldier survivability.

5.3.2.2 Provide Input for Requirements Trade-Off Analyses

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X			

WHY? The Requirements Trade-off Analyses are conducted by the Combat Developer (or Training Developer for training devices). Usually they are sensitivity, uncertainty, or risk analyses, at either the system level or force level, done to determine the impact of alternative system designs and cost variables. They further develop required capabilities and key performance parameters (KPPs) used in the ORD. They may evaluate manpower, personnel, and training constraints and help identify system performance and cost thresholds. There is no set format or scope.

HOW? MANPRINT experts should be available to advise the combat developer (or training developer) on MPT constraints, how they were developed, MANPRINT tools already applied or available, and what support the MANPRINT community can provide.

5.3.2.3 Provide Input for System Concept Studies

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III

	X	X		

WHY? System Concept Studies are conducted by the Materiel Developer. This analysis identifies the range of materiel possibilities from which to select system characteristics that best solve the operational requirement within given cost and program schedule constraints.

It establishes bands of performance and relationships between factors. It influences the ORD through interaction with the combat or training developer's Requirements Trade-off Analyses.

HOW? MANPRINT experts should be available to advise the Materiel Developer on how MANPRINT constraints impact system characteristics. Bands of performance must consider the human as part of the system. Where resources to conduct MANPRINT analyses is an issue, the Materiel Developer may be able to fund selected efforts as part of this process.

5.3.2.4 Provide Input to the Analysis of Alternatives (AoA)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X			

WHY? The Analysis of Alternatives (AoA) is an independent analysis check that primarily determines operational effectiveness and costs of all alternatives. The analysis considers logistics, training, and personnel impacts. It identifies opportunities for trade-offs between performance, costs, and schedules. The analysis agency develops study issues, alternatives, system performance data, cost data, and measures of performance (MOP) and measures of effectiveness (MOE). HQDA (DCSOPS) tasks TRADOC to conduct AoAs for ACAT I and II programs. HQ TRADOC then normally tasks the TRADOC Analysis Center (TRAC) to conduct the analysis.

HOW? MANPRINT experts should ensure that the analysis agency has access to the results of any relevant MANPRINT analyses and other MANPRINT information or data that may be useful in the conduct of the AoA. Points of contact should be established for MANPRINT experts and the analystical agency to share information and address issues. Where the analytical agency has received MANPRINT-related data from other agencies, MANPRINT experts should be available to review the data and identify discrepancies. MANPRINT AOs should, wherever possible, place comments in the intended users' language in terms of content and format.

5.3.2.5 Develop MANPRINT Requirements/Objectives/Thresholds for Inclusion in the Operational Requirements Document (ORD)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X	X	X	

WHY? An ORD is the definitive statement describing the operational capabilities needed to satisfy a mission need. It concisely states the minimum essential operational information needed for the acquisition of the materiel solution. MANPRINT representative(s) should be members of the DTLOMS Determination Analysis ICT and subsequently the Materiel Requirements Document ICT. These ICTs will identify performance parameters (and in turn, Key Performance Parameter (KPPs)), MANPRINT objectives/thresholds, maintenance concept, and many other elements ultimately to be embedded in the Operational Requirements Document (ORD). The requirements placed in the ORD provide the foundation for subsequent development of requests for proposal (RFPs) and testing plans. The importance of the ORD cannot be overemphasized. One can assume that if a requirement does not get in the ORD, it will not be met.

HOW? The development of MANPRINT-related performance parameters, objectives and thresholds should be **THE** primary MANPRINT effort. It will probably determine MANPRINT success or failure for the system. While MANPRINT potentially could be embedded throughout the acquisition process as the ORD is updated, early identification of needs is most cost effective and more likely to be succeed. While MANPRINT potentially could impact all portions of the ORD, two key paragraphs get special attention.

- Paragraph 4, Capabilities Required. Operational/system performance parameter thresholds must be met by hardware/software components operated by soldiers performing missions in operational environments. In other words, MANPRINT experts on the ICT must ensure that the system requirements mean total system requirements. Essential MANPRINT capabilities in the context of total system performance should be addressed. Those critical MANPRINT capabilities that clearly meet the definition of Key Performance Parameters (KPPs) should be addressed in Paragraph 4a. The term MANPRINT need not be specified. The critical point is that the human is considered in the performance parameters. When the ORD developer believes that any particular MANPRINT requirement is essential to system performance, that requirement should be included in para. 4a.

- Paragraph 5, Program Support. Paragraph 5c is devoted to Human Systems

Integration (HSI)/MANPRINT. MANPRINT experts, including combat developers, training developers, logisticians, personnel proponents, etc., must develop meaningful and supportable MANPRINT objectives and thresholds. The following is an extract from TRADOC Pam 71-9: "Address each HSI/MANPRINT domains:

(1) Establish broad manpower constraints for operators, maintainers, and support personnel. Identify requirements for manpower factors that impact system design (utilization rates, pilot-to-seat ratios, maintenance ratios).

(2) Establish broad cognitive, physical, and sensory requirements for the operators, maintainers, or support personnel that contribute to, or constrain, total system performance, including training constraints

(3) Establish requirements for human performance that will achieve effective human-system interfaces.

(4) Identify requirements for combining, modifying, or establishing new MOSs.

(5) Describe the training concept. State how individuals, units, and crews will be trained to operate, maintain, and manage the system; for both Active and Reserve Components. Include the new equipment training (NET) concept to initially transfer knowledge about the system to the gaining unit. The goal is for NET to be self-taught or taught by a small NET Team using distance-learning media with it is cost-and training-effective. The system Training Support Package (TSP) uses Interactive Multimedia Instruction (IMI) and is designed for multipurpose use in support of institutional training, NET, and unit sustainment training. State TSP requirements in terms of need, rationale, and projected quantities for each type of training product required to support training the system. Include requirements for Training Aids, Devices, Simulators, and Simulations (TADSS), targetry, training ammunition, and the logistical concept to support the TADSS. State what training capabilities are to be embedded in terms of functional requirements and category of embedded training. If no embedded capability is required, so state. State CTC instrumentation and interface requirements.

(6) Include safety or health and critical errors that reduce job performance or system effectiveness given the operational environment.

(7) Provide soldier survivability operational requirements to reduce detectability by the enemy, reduce fratricide, facilitate cover and concealment, minimize likelihood and extent of injuries if engaged,

and minimize physical and mental fatigue.

(8) Determine objectives and thresholds for the above requirements, as appropriate. Generally, routine priority HSI/MANPRINT requirements are placed in paragraph 5c. When the ORD developer believes that any particular HSI/MANPRINT requirement is essential to system performance, that requirement should be included in paragraph 4a. When a requirement is essential for logistics and readiness, it should be included in paragraph 4b. When a requirement describes an essential system characteristic, it should be included in paragraph 4c. When an HSI/MANPRINT consideration is vital to a requirement and it tests for a KPP, include it in paragraph 4a"

(Also refer to DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs.", AR 70-1, "Army Acquisition Policy," AR 602-2, "Manpower and Personnel Integration [MANPRINT], the Army's Human Systems Integration Process for Systems Acquisition," and TRADOC Pamphlet 71-9, "Requirements Determination".)

5.3.2.6 Provide Input to Models and Simulations

Pre-Phase 0 To MDR 0	Phase 0 to MDR I	Phase I To MDR II	Phase II To MDR III	Phase III
X	X	x	X	

WHY? Modeling and simulation planning is an integral part of system development. Accredited modeling and simulation shall be applied, as appropriate, throughout the system life-cycle in support of the various acquisition activities: requirements definition; program management; design and engineering; efficient test planning; result prediction; and to supplement actual test and evaluation; manufacturing; and logistics support. PMs shall integrate the use of modeling and simulation within program planning activities, plan for life-cycle application, support, and reuse models and simulations, and integrate modeling and simulation across the functional disciplines. Management of the identification, review, and approval of Models and Simulations (M&S) is based on three domains: Advanced Concepts and Requirements (ACR) (concept evaluations, requirements determination, tactics, and doctrine); Research, Development and Acquisition (RDA) (technology development and evaluation, system development, test and evaluation, and force modernization); and training, exercise, and military operations (TEMO) (individual, crew, and unit training, command and battle staff training, mission planning, mission rehearsal, and joint operations). Some M & S serve more than one domain. Simulation Support Plans (SSPs) are created from concept

exploration through full system development to implement the Army'sSimulation and Modeling for Acquisition, requirements, and Training (SMART) objectives. The purpose of a SSP is to provide a tool to use in thinking through modeling and simulation requirements throughout the acquisition life cycle to reduce time, resources, and risk, as well as improve program implementation. SSP guidelines are available on the Internet at http://www.sarda.army.mil/zd. Any program includes four functional areas: engineering development, combat development, test and evaluation, and training. The Army Model and Simulation Office (AMSO) under the DCSOPS is the Aemy's central management office. This discussion addresses the Army's M & S program. It does not address models and simulations developed by contractors in the development systems. Many of these may be proprietary in nature and in the case of commercial/non-developmental systems, may have been used prior to the Army's involvement.

HOW? MANPRINT AOs must continuously ensure that the human operators, maintainers, and supporters are considered in the development of system models and simulations. The fact that a component will physically fit in a contractor model does not mean that it can be operated or maintained by the target audience. M & S provide the opportunity for a myriad of "what if" excercises without bending metal. If used wisely, they can greatly expedite the acquisition process and enhance total system performance. Early development of MANPRINT thresholds, objectives, and performance parameters (especially key performance parameters (KPPs)), will provide the baseline needed to insert the human dimension. M & S can facilitate continuous evaluation and help reduce or eliminate subsequent system testing**,** improve evaluations and reduce costs. System simulations and models required for testing and/or evaluation must be listed in the TEMP. Simulations can now be developed that address some of the concerns of "Systems of Systems". The need for "human-in-the-loop**"** does not diminish with the sophistication of models.

5.3.2.7 Develop the ICT Report

Pre-Phase 0 To MDR 0	**Phase 0 To MDR I**	**Phase I To MDR II**	**Phase II to MDR III**	**Phase III**
X	**X**			

WHY? The ICT Report or Minutes documents the efforts and findings of the ICT. The format is unspecified but it is essential to justify requirements and transition to a subsequent IPT. MANPRINT requirements, thresholds, and objectives are elements of the ORD and thus, justification for them should also be included in the ICT report.

HOW? The ICT Report/Minutes will provide the baseline for initiation of MANPRINT actions by a subsequent MANPRINT WIPT or MANPRINT representative(s) on another WIPT. As a minimum, the ICT Report should specify the following Common Data Elements (CDEs):

- Each MANPRINT issue or opportunity,
- The impact,
- What has been done,
- Potential solution(s) that have not been attempted, and
- Proponent agency.

(Additional format guidance will be included in updates to TRADOC Pamphlet 71-9, as appropriate).

5.3.2.8 Participate in the Test Integration Working Group (TIWG)/TEMP Development

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? The Test Integration Working Group (TIWG) (or Test Working Integrated Product Team) is formed by the Materiel Developer during Phase 0. The purpose or goals of the TIWG are:

- Develop a mutually agreeable T & E program that will provide the necessary test data for evaluations;
- To provide for development, staffing, coordination, and approval of all required T & E documentation;
- Establish the necessary subordinate working groups (subgroups) to address related T & E issues;
- Assure that all participants have the opportunity to be involved and are not excluded;
- Establish and manage the corrective action process;
- Participate in developmental test readiness reviews (DTRRs) and operational test readiness reviews (OTRRs); and
- Support the CE and integrated T & E.

The initial TIWG meeting should be held together with a review of the draft ORD. In

developing the Test and Evaluation Master Plan (TEMP), the ORD requirements must be crosswalked (just like they will be in RFP development). The TEMP has a mandatory format and content specified in DoD Regulation 5000.2R.

The combat developer is responsible for development of Critical Operational Issues and Criteria (COIC) upon which the operational T & E of the system will proceed.

Test and evaluation will provide the final validation that the total system has or has not been adequately MANPRINTed.

HOW? MANPRINT AOs should actively participate in the TIWG. While current publications do not specify MANPRINT representative(s) as participants, it is impossible to conduct operational test and evaluation without MANPRINT considerations. Key portions of the TEMP must have MANPRINT issues included (as a result of crosswalk from the ORD). For example:

- The critical operational effectiveness and suitability parameters and constraints include manpower, personnel, and training.
- As discussed with the ORD, performance parameters should include the hardware and software components, the soldier, and the environment.
- Measures of effectiveness (MOE) and measures of performance (MOP) should include the soldier as part of the system.
- Operational tests must evaluate the system with typical users and maintainers.

Test and evaluation highlight the importance of the ORD to the MANPRINT program. If MANPRINT is not embedded in the ORD, it probably will not be embedded in the RFP and not be tested / evaluated.

Operational test and evaluation will be the final validation that MANPRINT has or has not been successfully implemented in the system acquisition. Later, MANPRINT experts may be able to identify additional operational issues and criteria that should be included in Detail Test Plans.

(Additional information on TIWG/TEMP is contained in DoD Regulation 5000.2R, AR 73-1, and DA Pams 73-1 and 73-2)

5.3.2.9 Participate in the Supportability Integrated Product Team (SIPT)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? MANPRINT and ILS are mutually supportive efforts. There are many MANPRINT-related ILS considerations, and many of the outputs of MANPRINT and ILS studies and analyses can meet data requirements of the other discipline The two efforts must be closely coordinated to ensure that all needed data is produced, that vital information is shared, and that no redundancy exists in data collection and analysis.

HOW?

- Coordinate with the ILS Manager (the ILS Manager may also be the MANPRINT Manager).
- Obtain a schedule of planned ILS activities and milestones.
- Participate in SIPT meetings.
- Provide MANPRINT inputs (e.g., manpower, personnel, and training issues) to the Supportability Strategy. Coordinate with the ILS Manager on data requirements and activities. Take into consideration Additional Support Items of Equipment (ASIOE) and each ILS element.
- Ensure there is not a redundancy of effort (and resource expenditure) on studies and analyses.
- Review ILS requirements in the RFP/contract.
- Invite the ILS Manager to MANPRINT WIPT meetings.

5.3.2.10 Participate in Integrated Product Teams (IPT)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? Integrated Product Teams (IPTs) form the nucleus of the acquisition program. They are composed of representatives from all appropriate functional disciplines, working together to build a successful system. The MANPRINT AO must interact closely with IPTs to ensure MANPRINT is given full consideration. One or more IPTs may be established early in the acquisition by the materiel developer (a commodity command or the PM-designee). These IPTs will support the combat developer in early analytical efforts and provide essential system-related data. The IPTs will also help transition primary responsibility for the system from the combat developer to the Program Manager. IPTs operate under the following broad principles:

1. Open discussions with no secrets.
2. Qualified, empowered team members
3. Consistent, success-oriented, proactive participation
4. Continuous "up-the-line" communications
5. Reasoned argument
6. Issues raised and resolved early.

HOW? MANPRINT AO participation in IPTs as well as ICTs helps ensure MANPRINT issues, thresholds, and aspects of Key Performance Parameters (KPPs) are transitioned to the PM. MANPRINT representatives should assist in the preparation of the ICT Report which will include MANPRINT issues. In addition, MANPRINT representatives should begin to justify the need for a MANPRINT Working Integrating Product Team, the makeup of the Team, and it's roles and responsibilities, if appropriate. MANPRINT domain representatives should initiate development of resource requirements for analyses and assessments.

5.3.2.10.1 Assist the MD/PM in Developing the Acquisition Strategy

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	

WHY? The acquisition strategy serves as the roadmap for program execution from program initiation through post-production support. A primary goal in developing an acquisition strategy is to minimize the time and cost of satisfying an identified, validated need, consistent with common sense and sound business practices. The Materiel Developer (MD)/Program Manager (PM) must consider all prospective sources with priority to commercial and non-developmental items. Cost/performance tradeoff analyses must be conducted before an acquisition approach is finalized. The best time to reduce life-cycle costs is early in the acquisition process and the human element is, in most cases, the predominant operation and support cost.

HOW? The MD/PM should coordinate the acquisition strategy with MANPRINT support organizations. MANPRINT may be a pivotal factor in the strategy development. The preferred program concept and acquisition strategy are selected after consideration of the associated technical and managerial considerations, risks, schedule, and costs. MANPRINT is integral to all of these. Potential MANPRINT implications of alternative concepts that should be reviewed by MANPRINT domain experts to ensure MANPRINT-related requirements and thresholds required by the ORD are addressed and met by selected concepts.

5.3.2.10.2 Provide MANPRINT Inputs to RFPs

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? The RFP is where the "rubber meets the road." MANPRINT issues should be incorporated in the RFP to ensure that contractors embrace the MANPRINT concept and actually develop a total system.

The combat developer and materiel developer (or training developer and materiel developer for NSTD) will conduct an ORD to RFP crosswalk to verify that the RFP (to include system specification or purchase description, and the SOW) accurately reflect all requirements in the approved ORD. This process will be documented and include thresholds and objective values of ORD requirements and identify which ORD requirements are KPPs. Differences between ORD and RFP must be documented. When the crosswalk indicates that the RFP does not accurately reflect the approved ORD, the materiel developer is expected to modify the RFP to reflect the ORD..

HOW? The MANPRINT AO should assist the materiel developer by recommending MANPRINT input to the RFP and by reviewing the draft RFP prior to dissemination. While Military Standards (MIL-STD) and Military Specifications (MIL-SPEC) normally cannot be required, there are exceptions and they may be useful as guidelines. A Target Audience Description (TAD) should be provided to potential contractors (and certainly to contract awardees). Other recommendations include:

- Incorporate MANPRINT requirements into the Statement of Work (SOW).
    - — General MANPRINT program requirements
    - — Requirements for total system operational performance with target audience soldiers
    - — Domain-specific requirements
    - — Contractor's plans for accomplishing the MANPRINT/HSI program
    - — MANPRINT-related tests and evaluations
    - — MANPRINT in program reviews
    - — Detailed descriptions of required MANPRINT data and reports
- Coordinate data requirements with the Integrated Logistic Support (ILS) manager. Refer to Data Item Descriptions (DIDs) for assistance in describing technical data requirements. (A complete list of DIDs can be found in the Acquisition Management Systems and Data Requirements List [AMSDL]). Order delivery of required technical data by including MANPRINT in the Contract Data Requirements List (CDRL). Order only the data required to manage the contractor’s effort. Much of the information needed to assess the contractor MANPRINT program will be available through the IPT process.
- Provide for inclusion of the contractor's MANPRINT-related labor in the Work Breakdown Structure (WBS).

- Provide MANPRINT inputs to the System Specification (Section 2, "Applicable Documents" and Section 3, "Requirements").
  - — Para 3.2.1: Total System Performance Characteristics
  - — Para 3.2.2: Physical Characteristics
  - — Para 3.3.6: Safety
  - — Para 3.3.7: Human Factors Engineering Program
  - — Para 3.3.8: Soldier Survivability
  - — Para 3.3.9: Health Hazards
  - — Para 3.6: Manpower, Personnel, and Training
- Include a MANPRINT paragraph in the Instructions to Offerors (Section L). The contractor should demonstrate:
  - — How the MANPRINT program will be implemented
  - — Offeror's MANPRINT organization and its approach to MANPRINT domain integration
  - — Approach to identifying MANPRINT issues (risks) in system development and engineering
  - — Plans for ensuring MANPRINT participation in system design efforts
  - — How to address training and develop an integrated system training plan
  - — Plans for integrating MANPRINT into contractor's test and evaluation
  - — Approach to coordinating and integrating MANPRINT with ILS activities
- Develop recommendations for the on evaluation criteria for MANPRINT, to be included in Section M of the RFP. Additionally, prepare a recommended statement on the relative importance of MANPRINT for inclusion in the Executive Summary.
- Assist MANPRINT SMEs on the Source Selection Evaluation Board (SSEB), as required / requested.

5.3.2.11 Support Warfighting Rapid Acquisition Programs (WRAP)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? WRAP implements the Army's accelerated procurement of systems identified through TRADOC warfighting experiments as compelling successes which satisfy urgent needs. Subelements of WRAP such as Advanced Warfighting Experiments (AWEs), Concept Evaluation Programs (CEPs), Advanced Technology Demonstrations (ATDs), and Advanced Concept Technology Demonstrations (ACTDs) are addressed in Section 2.2.4.3.

It is implemented within existing Army structures and organizations. It is a process that links TRADOC experimentation with systems acquisition.

HOW? MANPRINT AOs must ensure that MANPRINT is embedded in WRAP planning and execution. ACTD Concept Documents are to be staffed with MANPRINT. HQDA DCSPER is on the ACTD Candidate Development Team to represent MANPRINT and HQDA DCSPER is a member of the WRAP ASARC. Recognizing that successful system demonstration will probably lead to accelerated acquisition, MANPRINT considerations must be addressed early in the demonstration planning. This needs to be a coordinated effort of all relevant MANPRINT domains.

(TRADOC Pamphlet 71-9 has more detailed information on WRAP and the other aspects of experimentation / demonstration)

5.3.2.12 Assist in Development of the System Training Plan (STRAP)

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? The System Training Plan (STRAP) is the master training plan for materiel systems. It:

- Documents the results of early training analyses and training design.
- Starts the planning process for necessary courses and course revisions, training products, and training support required for the system.
- Sets milestones to ensure development of training and training support to permit testing and fielding of a total system.
- Communicates training requirements to schools and centers, HQ TRADOC, materiel developers, user major commands (MACOMs), and HQDA and STRICOM (for TADSS).

- Establishes the basis to assess training support progress in support of Requirements Review Committee (RRC) actions, ILS reviews, Training Test Support Package (TTSP), In-Process Reviews (IPRs), and milestone decision reviews (MDR).
- Is a required enclosure to the ORD coordination package.

HOW? MANPRINT AOs must coordinate with the TRADOC proponent school training developer to ensure training development considers MANPRINT aspects of system performance and the target population and MANPRINT thresholds. In addition, the MANPRINT AO should:

- Ensure that the training developer has access to the results of any relevant MANPRINT studies or analyses that have been conducted. Results of Early Comparability Analysis (ECA) and Improved Performance Research Integration Tool (IMPRINT) would provide invaluable information.
- Ensure they share information that would be useful for input to a MANPRINT assessment.
- Provide any possible assistance / advice in development of the STRAP.
- Review the draft STRAP and provide any appropriate comments.
- Ensure training developer(s) are invited to meetings of MANPRINT representatives.

(Refer to AR 350-35 for Army STRAP requirements and TRADOC Reg 350-70 for detailed guidance on content and format.)

5.3.2.13 Assist in the Development of Plans, Summaries, and Estimates

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
	X	X	X	X

5.3.2.13.1 User Functional Description

WHY? The User Functional Description (UFD) is a document prepared as a follow-up to the ORD to specifically address requirements related to Information Technology (IT). It is prepared by the combat developer when needed based

on anticipated degree to which the system will use IT. It provides general information, system summary, detailed characteristics, operational mode summary/mission profile, external environments, security, system development, and domain impacts.

HOW? MANPRINT AOs should participate in the development or as a minimum, the review of the UFD. The results of MANPRINT analyses that provided input to the ORD may also provide human factors, training, or other MANPRINT constraints for the UFD. Functional requirements should address man-machine interface issues. Security requirements may have an impact on personnel requirements of user and/or maintainer occupational specialties. Domain impacts specifically address MANPRINT-related system characteristics and issues. MANPRINT thresholds contained in the ORD must be crosswalked to this section of the UFD.

(Additional information on UFD policies, procedures, and format is contained in TRADOC Pam 71-9)

5.3.2.13.2 Life Cycle Cost Estimates

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? DoD requires the MD/PM to prepare a life cycle cost estimate to assist in making informed decisions regarding the program. The estimate is part of the package for MDR I, and is updated for each successive milestone decision. The life-cycle cost estimates shall be:

- Explicitly based on the program objectives, operational requirements, contract specifications for the system and a DoD WBS for ACAT I and life-cycle cost and benefit element structure of ACAT IA;
- Comprehensive in character, identifying all elements of cost that would be entailed by a decision to proceed with development, production, and operation of the system regardless of funding source or management control,
- For ACAT I programs, consistent with the cost estimates used in the analysis of alternatives, the manpower estimates behind the operation and support costs shall be consistent with the manpower estimate, and
- Neither optimistic nor pessimistic, but based on a careful assessment of risks and reflecting a realistic approach of the level of cost most likely to be realized.

HOW? MANPRINT AOs should ensure that results of MANPRINT analyses are available for development of lifecycle cost estimates. When possible, review developed lifecycle cost estimates to ensure MANPRINT impacts on the total system are included.

For most systems, the bulk of operation and support costs will be MANPRINT related. This will also be an opportunity to address MANPRINT related cost savings/avoidance, especially in documenting benefits.

(The IMPRINT and AIS MANPRINT Management Tool are good tools to estimate MPT costs)

5.3.2.13.3 Continuity of Operations Plan (COOP)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? This plan applies to AIS and command and control systems and ensures continuity of operations in case of a major system failure. Potentially such a failure could have significant implications.

HOW? The MANPRINT AO should coordinate with the COOP POC to ensure MANPRINT implications are included in the COOP and in turn, MANPRINT issues identified in the COOP are addressed where appropriate. It is conceivable that a major system failure could have immediate manpower and personnel impacts. If training does not already address such a contingency, there may also be significant training requirements. Review of the draft COOP should ensure MANPRINT risks are identified.

(Additional information on the COOP is contained in AR 25-1)

5.3.2.13.4 Modified Integrated Program Summary (MIPS)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
	X	X	X	X

WHY? MIPS is the only document used for review by the Army System Acquisition Review Council (ASARC). For this reason, it is important that it contain all information necessary for the ASARC to make an informed decision. The PM maintains primary responsibility for the production and content of the MIPS, except for the Assessment Memoranda. The Assessment Memoranda are prepared by the DA staff and associated activities to address specific points.

HOW? The DCSPER is represented on tailored ASARC IPTs specifically to address MANPRINT. The ASARC IPT is to identify issues and risks. The primary source of MANPRINT issues is the MANPRINT Domain Assessments and in turn, the draft and final MANPRINT Assessment. Certainly MANPRINT issues and risks are coordinated with the PM but if unresolved or there is no plan to resolve them, those issues and risks may be appropriate for the Assessment Memoranda. This serves to point out the significance of MANPRINT Domain Reports and the need to ensure that all items identified

as issues and/or risks are supportable.

(Information on MIPS is contained in the SARDA Guide for the Preparation of Army Acquisition Programs for Review by the Army Systems Acquisition Review Council (ASARC))

*5.3.2.13.5 Assist the CD/FP (PM after Phase 0) in Preparing the Quarterly MAIS Report**

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II To MDR III	Phase III
	X	X	X	X

WHY? The Quarterly MAIS Report is provided to the DoD Senior Information Management (IM) Official 30 days after the close of each quarter. It provides an overview of the status of the AIS acquisition program.

HOW?

- Review the report requirements to determine where MANPRINT inputs should be included (e.g., product quality, quarter's activities and accomplishments).
- Review the MANPRINT-related documentation.
- Formulate the input and provide it to the Quarterly MAIS Report preparer.
- (Refer to DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs.")

* This report is not required for materiel systems.

5.3.2.14 Develop/Review MANPRINT Domain/MANPRINT Assessments

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II To MDR III	Phase III
	X	X	X	

WHY? MANPRINT/MANPRINT Domain Assessments are developed when needed or requested. The incoming Program Manager should request an assessment of the MANPRINT "health" of the program before major decisions are made. The DCSPER will want an independent assessment of the program before the Milestone I (and subsequent milestones) Decision Review.

HOW?

- Assist the PM to initiate the MANPRINT Assessment process when issues do not appear to be getting resolved or when otherwise required by Army regulations. Assist the PM, as necessary, in requesting Domain Assessments.

— USACHPPM will prepare a Health Hazards Assessment.

— PERSCOM will prepare the MPT Assessments on major systems

— ARL-HRED will prepare a Human Factors Engineering Assessment and MPT Assessment and Soldier Survivability Assessment on non-major systems. ARL-HRED will also prepare a draft MANPRINT Assessment for major systems and non-major systems.

— ARL-SLAD will prepare a Soldier Survivability Assessment.

— U.S. Army Safety Center will prepare a System Safety Assessment for major materiel systems (AMC for non-major).

The U.S. Army Materiel Command will prepare a System Safety domain Assessment for automated information systems.

(See Section 6 for additional information on MANPRINT/MANPRINT Domain Assessments).

5.4 ACTIVITIES OCCURRING DURING PHASE I—PROGRAM DEFINITION AND RISK REDUCTION

5.4.1 General MANPRINT Focus in Phase I

Those system concepts considered promising at MDR I are further refined during Phase I. Prototyping, demonstrations, and early operational assessments are considered and included as necessary. To support this, major systems engineering efforts take place by system developers. System functional capabilities are determined, allocations of tasks between hardware/software and human are made, software programming is accomplished, and system engineers conduct technical tests to validate the concept(s).

If not already accomplished, early in this phase a PM is designated. The MANPRINT lead agency, normally ARL-HRED, should assist in orienting the PM on MANPRINT aspects of the program and the need for MANPRINT support. The ICT Report will contain MANPRINT issues, impacts, status, and potential solutions. The PM must determine how MANPRINT will be tracked and resolved. On major systems, the PM should create a MANPRINT Working Integrated Product Team (WIPT) and appoint a MANPRINT AO to chair the WIPT. On non-major systems, especially those with minimal MANPRINT impact or risk, the PM may chose to give MANPRINT a seat on a more global WIPT. The MANPRINT lead agency should provide the PM all appropriate advice and assistance in achieving the MANPRINT objectives. As a result of Phase I activities, the program documentation that was developed during Phase 0 may be updated to support MDR II. The PM and CD/FP and/or TSM as well as members of the MANPRINT WIPT contribute to this process.

5.4.2 MANPRINT Activities

5.4.2.1 Provide MANPRINT Input to the Acquisition Program Baseline (APB)

Pre-Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
		X	X	X

WHY? Every acquisition program shall establish an APB to document the cost, schedule, and performance objectives and thresholds of that program, starting at program initiation (MDR I approval). It is prepared by the PM in coordination with the user. It shall contain only the most important parameters (those that, if the thresholds are not met, the MDA would require

a reevaluation of alternative concepts or design approaches).

Key performance parameters (KPPs) values should not differ from like values in the ORD. Schedule parameters should include program initiation, MDRs, initial operating capability, and other critical system events. Cost parameters would normally not include Operation and Support (O&S) costs unless designated by the MDA.

HOW? The primary role of the MANPRINT AO in development of the APB is to provide the PM necessary support. The PM should be advised on the MANPRINT impacts of KPPs and reinforce the need to acquire a total system. MANPRINT can help get the system developed properly and facilitate test and evaluation, thus precluding rework and rescheduling. MANPRINT can provide significant cost savings/avoidance on R&D/procurement costs and especially on O&S costs. The MANPRINT AO needs to facilitate the identification and capture of relevant MANPRINT cost data. Other actions might include:

- Review the results of manpower and personnel analyses (e.g., predecessor system manpower requirements, new system manpower requirements prepared for the life cycle cost estimate, the target audience description, lessons-learned).
- Review the results of any available tests, evaluations, and assessments (e.g., early user tests, contractor developmental tests, prototype demonstrations).
- When available, review MANPRINT Domain assessments.
- Consult with MANPRINT WIPT SMEs.
- Coordinate with other individuals preparing input for the APB.
- Consult with the Training Developer; review the STRAP.

5.4.2.2 Requirements Trade-Off Analyses

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
		X	X	

WHY? The Combat Developer or Training Developer may need to conduct further requirements trade-off analyses to finalize the ORD based on results of the AoA, the Materiel Developer system concept studies and cost performance trade-off analyses, or

additional guidance from HQDA. These analyses may show a need to refine the minimum performance thresholds and objectives for the KPPs. These Phase I requirements trade-offs allow for final refinement of the threshold and objective requirements.

HOW? The MANPRINT AO's relationship with the Combat or Training Developer does not end with the completion of the initial ORD and subsequent ICT Report / Minutes. As there are opportunities to modify or enhance the requirements, threshold, and objectives in the ORD, MANPRINT AOs must ensure that MANPRINT is adequately addressed. The human operator and / or maintainer must still be considered as part of the system in developing performance parameters. Results of MANPRINT analyses may require modification to MANPRINT thresholds and / or objectives.

5.4.2.3 Cost Performance Trade-Off Analyses

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
		X	X	

WHY? The PM-led Cost and Performance Integrated Product Team (CPIPT) conducts cost, performance, and schedule trade-off analyses to explore the relationships between cost and performance, to review potential performance enhancers, to identify cost drivers, and to identify costs and risks of alternative program schedules. These analyses consider what is technologically feasible as a means to meet the user requirements and support the establishment of meaningful, aggressive, and achievable cost, schedule, and performance thresholds and objectives. The PM uses this information to manage the program's acquisition strategy, cost objectives, and APB. The objective is to ensure an affordable system by the linking of cost and performance.

HOW? If not a member of the CPIPT, the MANPRINT AO must keep informed as to their efforts and identify opportunities to provide them input. Significant MANPRINT contributions might include:

- Identification of MANPRINT costs (as part of RDT&E costs) that may result in significant cost savings / avoidance as part of O&S costs.
- Identification of MANPRINT costs (as part of RDT&E costs) that may result in significant schedule savings. MANPRINT can help preclude extensive milestone decision reviews (reduce issues) and expedite testing (do it right the first time rather than test, modify, test, modify, test, etc.).

- Identification of the human's impact on total system performance helps ensure the system can meet all performance parameters, including KPPs..

5.4.2.4 Prepare, or Assist in the Preparation of, Basis of Issue Plan Feeder Data (BOIPFD)

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I To MDR II	Phase II to MDR III	Phase III
		X		

WHY? The Basis of Issue Plan Feeder Data (BOIPFD) is a compilation of information about a new or improved item of equipment. It is prepared by the MATDEV and typically addresses functions, capabilities, intended use, basis-of-issue, and support requirements. It includes QQPRI information.

BOIPFD provide information on the following:

- Operators, MOS, crew size, and special tasks.
- Maintainers, MOS, and direct productive annual maintenance man-hours.
- Item description, capabilities, power consumption (or output) data, and references to the specific requirements that is the basis for the equipment or system.

The equipment is useless unless properly trained personnel are available to operate and maintain it. As a result, once the item and its associated support equipment are identified on the BOIPFD, the personnel required to operate and maintain the equipment must be identified, resourced (or authorized) and training requirements established.

HOW? Clearly, MANPRINT is an integral part of the process and the results of MANPRINT efforts performed to date provide much of the raw data needed to prepare the BOIPFD. Specific actions might include:

- Review the MANPRINT support file maintained by ARL-HRED.
- Provide any relevant information to the individual responsible for preparing the BOIPFD.
- Review draft BOIPFD to ensure that the information contained is up-to-date and accurate.

* The BOIPFD is required for all materiel systems. Software is exempt, but

QQPRI is required for software being developed for integration into current equipment and for Army-developed software that involves a hardware buy.

5.4.2.5 Conduct MANPRINT Tradeoffs

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
		X	X	

WHY?The Combat Developer or Training Developer may need to conduct further Tradeoff analysis between design, operational, and support alternatives is an inherent part of system development. The nature of tradeoff models and techniques used and the magnitude, scope, and level of detail of the analysis will depend on both the acquisition phase and the system complexity. As the system is designed and developed, there are continuous tradeoffs. Many are made by system engineers and are not readily visible. Others are significant and require decisions at a higher level. An obvious area of tradeoffs in functional allocation. In determining the allocation of functions and tasks among hardware, software, and humans, cost and availability are key factors. In conducting tradeoffs, the system developer and PM must always consider the parameters, constraints, and thresholds contained in the ORD. Insufficient personnel to man the system is no less a problem than excessive size or weight (not air transportable).

HOW? The development of MANPRINT objectives and thresholds in the Operational Requirements Document (ORD) is critical to subsequent MANPRINT tradeoff analyses. The difference between objective (what the user wants) and threshold (what the user must have) is the trade space. The trade space is what can be traded off if necessary. If no threshold is identified, it can be assumed that there are no limits to the demands that can be placed on that domain. Thresholds must be justifiable.

Any MANPRINT tradeoff analysis strategy must be flexible and tailored to each system. For each constrained MANPRINT characteristic, it must be determined if the new system exceeds the threshold or is within the trade space. If a characteristic exceeds the threshold, then a sensitivity analysis should be performed to see if an increase in requirements of any other characteristic (not to exceed the threshold) will result in reduction in the requirements of the problem characteristic. A common example might be: If the training time threshold for a MOS is exceeded, can it be

reduced if the aptitude cutoff score is increased or if pre-entry educational requirements can be increased (such as requiring algebra or chemistry prior to enlistment). This must be an iterative process since data on system demands may not be available or accurate early in the acquisition process.

The following steps are appropriate for a MANPRINT tradeoff analysis:

Step 1: Identify the MANPRINT characteristic objectives, thresholds, and trade space.

Step 2: Determine the system demands on those characteristics.

Step 3: Where MANPRINT characteristic thresholds have been exceeded, conduct sensitivity analyses with other MANPRINT characteristics.

Step 4: Determine if increases in other MANPRINT characteristic demands (within trade space) can result in reduction of the problem MANPRINT characteristic demands to below the threshold value.

Step 5: In cases where MANPRINT characteristic thresholds are exceeded and cannot be resolved with MANPRINT characteristic tradeoffs, identify potential hardware and/or software tradeoffs.

5.4.2.6 Provide MANPRINT Support to EUTE

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
		X		

WHY? Early user test and experimentation (EUTE) is a generic term encompassing all system tests or experiments employing representative user troops during the Program Definition and Risk Reduction Phase prior to Milestone II. The EUTE may test a materiel concept, support planning for training and logistics, identify interoperability problems, and identify future testing requirements.

HOW? Operational testing is the primary means of ensuring MANPRINT requirements and thresholds are being achieved. The earlier this can be achieved allows for less costly system modifications. MANPRINT representatives can ensure the user troops are representative of the target audience and that MANPRINT issues, requirements, and thresholds are addressed in the test planning.

5.4.2.7 Continue Coordinated Activities Begun in Phase 0

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
		X		

WHY? This is a critical time of transition where control of the program passes from the Combat Developer to the Program Manager. The ensure that the Program Manager develops a total system that meets all requirements and thresholds, matrix support must be provided by all appropriate disciplines, including MANPRINT.

HOW? The ICT Report will contain MANPRINT issues or opportunities, impact, what has been done, potential solutions and proponent agency. The ORD will contain MANPRINT aspects of KPPs (with soldiers considered in the performance requirements) as well as specific MANPRINT objectives and thresholds. The MANPRINT representative should advise the PM of the significance of MANPRINT to the total system and recommend an appropriate level of effort. In the case of major systems, the formation of a MANPRINT Working Integrated Product Team (WIPT) may be appropriate (if not already done). If this is the case, the makeup of the Team and it's roles and responsibilities should be negotiated, along with projected resource requirements (a sample charter is at Appendix E. If a MANPRINT WIPT is not appropriate, determine how MANPRINT will be represented on other WIPTs and who will participate. Resource requirements still should be estimated. Other activities might include:

- Continue to participate as an active member of the TIWG (Testing IPT) and SIPT.
- Continue to be actively involved in the system design/development process:
    - — Consult frequently with system engineers;
    - — Attend informal design meetings;

  - — Attend formal design reviews.
- Continue to review program documentation as it is updated or developed.
  - — Ensure that MANPRINT-related inputs are up-to-date and consistent across documents.
- Ensure that MANPRINT-related issues (risks) are documented.
- Ensure that, when necessary, members of the MANPRINT WIPT are provided the opportunity to review and comment.
- Keep the MANPRINT WIPT and functional SMEs up-to-date as the acquisition program progresses.
- Coordinate meetings of the MANPRINT WIPT.
- Consult with domain and functional experts on MANPRINT-related risks as they arise.
- Update MANPRINT Domain Assessments, as available.

5.5 *Activities OCCURRING During Phase II—Engineering and manufacturing Development (EMD)*

5.5.1 General MANPRINT Focus in Phase II

The purpose of the EMD phase is to design, fabricate, test and evaluate a total system. This includes the principal items necessary for its production, operation, and support.

MANPRINT continues to be integrated into the overall systems engineering process. Significant effort is focused on determining/validating:

- What are the MANPRINT constraints?
- What MPT resources are available?
- What are appropriate tradeoffs?

During this phase, Initial Operational Test and Evaluation (IOT&E) is conducted and should provide significant data for all MANPRINT domains. The CD/FP and/or TSM and PM MANPRINT AOs should:

- Continue to get as much hands-on experience with the system as possible.
- Attend test events and review results.
- Be sure that MANPRINT issues (risks) identified receive visibility, are tasked out for resolution, and that actions taken are tracked.
- Assess the adequacy of training (e.g., through limited user testing results and the results of other test events) and the STRAP.
- Crosswalk materiel fielding plans; updated program requirements and testing documents; the STRAP; and the MANPRINT issues (risks).
- Assist, as necessary, in the preparation for and conduct of testing.

5.5.2 MANPRINT Activities

5.5.2.1 Continue Coordinated Activities from Phase I

5.5.2.2 Provide MANPRINT Support to OT&E

Pre Phase 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II to MDR III	Phase III
			X	

WHY? Initial Operational Test (IOT) is a field test, under realistic operational conditions, of a production or production-representative system (or key component of such a system) to determine its operational effectiveness and operational suitability for use by typical users in combat or when otherwise deployed. Typical users operate and maintain the system under conditions simulating actual deployment conditions.

HOW? MANPRINT representatives must ensure that the operators and maintainers reflect the target audience of the developed system and that MANPRINT issues, requirements, objectives, and thresholds are addressed in the Detailed Test Plan (DTP). This can be accomplished by assisting the testing community in developing the DTP. MANPRINT representatives can then assist ATEC in conducting MANPRINT evaluations of the tested system. Operational Test and Evaluation (OT&E) is the primary method of validating that MANPRINT requirements and thresholds have been met.

5.6 ACTIVITIES OCCURRING DURING PHASE III—PRODUCTION, FIELDING/DEPLOYMENT, AND OPERATIONAL SUPPORT

5.6.1 General MANPRINT Focus in Phase III

The focus of Phase III is to achieve an operational capability that satisfies the mission need. Deficiencies identified during testing are resolved, and fixes are verified. The MANPRINT AOs should verify that MANPRINT risks have been addressed. In addition, attention should be paid to ways that the system could be improved from a MANPRINT standpoint in future modifications.

5.6.2 MANPRINT Activities

5.6.2.1 Continue Coordinated Activities Begun in Phase II

5.6.2.2 Facilitate Post-Fielding MANPRINT Analyses

Pre-MDR 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II To MDR III	Phase III
				X

WHY? Post-fielding analyses may be critical in validating earlier estimates relating to cost and performance. This is the opportunity to gather data on real world operators, maintainers, and supporters performing tasks on true production systems. The results of analyses could lead to changes in supply requirements, manning levels, or even modifications/improvements. It can determine if program objectives have been met and if the system is ready to transition from the PM to functional management.

HOW? MANPRINT can be a significant contributor to this effort, especially if the PM has included funding to support MANPRINT analyses. ECA and IMPRINT are just two MANPRINT tools that can provide valuable information validating resource requirements and identifying problem tasks. A vehicle to incorporate MANPRINT activities is the Post-Production Support Plan (PPS).

5.6.2.3 Identify MANPRINT-Related Modifications/Improvements

Pre-MDR 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II To MDR III	Phase III
				X

WHY? Frequently systems are developed that require substantial modification and/or improvement after initial fielding. These may be pre-planned (planning to take advantage of technological advances not available for initial production) or required as a result of test and evaluation and/or post-fielding analyses. These system changes may have significant MANPRINT-related impacts. In fact, MANPRINT-related issues may be a reason for the modification/improvement.

HOW: MANPRINT tools, such as ECA and IMPRINT, can provide information useful in justifying an unplanned product modification/improvement. Problem soldier tasks may not have an acceptable manpower, personnel, or training solution. Human resource requirements may turn out to be excessive and unacceptable. Where there is a pre-planned product improvement, there has already been identified a need but MANPRINT can help clarify and expand on that need. If a system is to be modified or upgraded, it may be best to make all changes at one time rather than piecemeal. System modifications can also impact legacy or programmed TADSS.

5.6.2.4 Document MANPRINT Lessons Learned and Benefits

Pre-MDR 0 To MDR 0	Phase 0 To MDR I	Phase I to MDR II	Phase II To MDR III	Phase III
				X

WHY? As with any program, MANPRINT must demonstrate value-added, especially in times of austere budgets. The benefits of maintaining a MANPRINT program must exceed the costs. To accomplish this, the benefits of MANPRINT must be captured and to the extent possible, cost savings/avoidance must be quantified.

HOW? The MANPRINT tracking system developed and maintained by ARL-HRED may be an appropriate vehicle to capture lessons learned and benefits. Since the ARL-HRED representative has participated in all MANPRINT activities, he/she can record lessons learned identified by MANPRINT domain

representatives.

Similarly, MANPRINT domain representatives should, to the extent possible, identify and quantify MANPRINT benefits, primarily through cost savings or cost avoidance. This can result from fewer accidents, reduced hospitalization, reduced manpower, lower skill requirements, reduced training, or other related efforts accomplished right the first time as a result of MANPRINT, or other quantifiable aspects. Benefits of

specific systems can be used to validate and publicize the value-added of MANPRINT.

6.0 THE MANPRINT ASSESSMENT

The MANPRINT Assessment is an independent review of the MANPRINT status of the system. The objective is to present any unresolved MANPRINT risks/issues to PMs and to decision makers at MDRs I, II, and III (if appropriate) so that informed decisions regarding milestone approval can be made.

The U.S. Army Research Laboratory—Human Research and Engineering Directorate (ARL-HRED) is responsible for preparing the draft assessment. To do this, they integrate information from numerous sources, described below.

- **MPT Domain Assessments *(AR 602-2)***: The MPT Assessments, which are prepared by the MPT Domain Branch, DCSOPS, PERSCOM, assess the manpower, personnel, and training risks of the system. They identify all positive elements and critical or major risks/issues. They address the impact the system will have on MPT resources by examining a myriad of domain characteristics. PERSCOM is only resourced to conduct assessments on major systems. ARL-HRED would prepare the MPT Domain Assessment on non-major systems, if required.

- **Human Factors Engineering Domain Assessment *(AR 602-1)***: The Human Factors Engineering Domain Assessment is prepared by ARL-HRED. It reviews the status of human factors engineering as it approaches the end of a life cycle phase. A major purpose of the report is to identify any design flaws which, taken singularly or collectively, may be so problematical that, if not remedied, might warrant a decision against transitioning to the next phase. It will also identify issues that should be resolved to enhance total system performance.

- **System Safety Domain Assessment *(AR 385-16)***: The purpose of the System Safety Domain Assessment is to assess the overall safety of the emerging or changing system and ensure that system safety risks and recommended solutions are integrated into the acquisition program. For AIS, the assessment is prepared by the U.S. Army Materiel Command. For materiel systems, the assessment is prepared by the U.S. Army Safety Center. (For non-major materiel systems, the safety assessment is done by a local safety office [AMC, installation].)

- **Health Hazards Domain Assessment *(AR 40-10)***: The Health Hazards Domain Assessment identifies potential health hazards which may be associated with the development, acquisition, operation, and maintenance of Army systems.

  The purpose is to preserve and protect the humans who will operate,

maintain and support the equipment; enhance total system effectiveness; reduce system retrofit needed to eliminate health hazards; reduce readiness deficiencies attributable to health hazards; and reduce personnel compensation. The Health Hazard Assessment is prepared by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM).

- **Soldier Survivability Domain Assessment *(AR 70-75)***: The Soldier Survivability Domain Assessment addresses the system's ability to reduce fratricide; reduce detectability; reduce the probability of being attacked; prevent damage if attacked; minimize injury, and reduce mental and physical fatigue. This assessment is prepared by the U.S. Army Research Laboratory—Survivability/Lethality Analysis Directorate (ARL-SLAD). (For non-major programs, the survivability assessment is performed by ARL-HRED.)

The completed Domain Assessments are collected by ARL-HRED and simultaneously sent to the PM and TSM/CD. ARL-HRED reviews them, prepares the Draft MANPRINT Assessment and staffs it with the domains as well as with the PM and TSM/CD. The Draft Assessment is then sent to PERTEC, ODCSPER. At this stage, the assessment is still draft and is not official. The PERTEC, ODCSPER prepares and signs the final MANPRINT Assessment, then forwards it through the ASARC Secretary for the ASARC members; to the IT OIPT; or the Milestone Decision Authority (MDA), as appropriate.

The MANPRINT Assessment presents the ODCSPER's formal position on MANPRINT issues. It is for this reason that the ODCSPER and ARL-HRED work closely with the PM and CD/FP and/or TSM. The PM and FP/CD and/or TSM thus have an opportunity to correct or address any previously unidentified MANPRINT issues (risks), and to provide input to the assessment process. Critical and major issues (risks), as reflected in the assessment, should be well-known by the time the assessment is prepared. MANPRINT Assessments are prepared when needed/requested and are subject to resource limitations. (Refer to Appendix I for definitions of “critical issue” and “major issue.”)

APPENDIX A

ACRONYMS

—*A*—	
ACAT	Acquisition Category
ACTD	Advanced Concept Technology Demonstration
AEC	Army Evaluation Center
AFQT	Armed Forces Qualification Test
AIS	Automated Information System
ALMC	Army Logistic Management College
AMC	Army Materiel Command
AMCOS	Army Manpower Cost System
AMC PAM	Army Materiel Command Pamphlet
AMSAA	Army Materiel Systems Analysis Activity
AMSDL	Acquisition Management Systems and Data Requirements List
AO	Action Officer
AoA	Analysis of Alternatives
AOIC	Additional Operational Issues and Criteria
APB	Acquisition Program Baseline
AR	Army Regulation
ARL-HRED	Army Research Laboratory—Human Research and Engineering Directorate
ARL-SLAD	Army Research Laboratory—Survivability/Lethality Analysis Directorate
ARNG	Army National Guard
ASARC	Army System Acquisition Review Council
ASI	Additional Skill Identifier
ASIOE	Associated Support Item of Equipment
ASMIS	Army Safety Management Information System
ASVAB	Armed Services Vocational Aptitude Battery
ATD	Advanced Technology Demonstration
ATEC	Army Test and Evaluation Command
AWE	Advanced Warfighting Experiment

—B—	
BCT	Brigade Combat Team
BOIP	Basis of Issue Plan
BOIPFD	Basis of Issue Plan Feeder Data

—C—	
CALL	Center for Army Lessons-Learned
CARD	Consolidated Acquisition Reporting System
CD	Combat Developer
CDE	Common Data Elements
CDRL	Contract Data Requirements List
CEP	Concept Experimentation Program
CHPPM	Center for Health Promotion and Preventive Medicine
COIC	Critical Operational Issues and Criteria
COMSEC	Communications Security
COOP	Continuity of Operations Plan
COR	Contracting Officer Representative
COTS	Commercial Off-The Shelf
CRD	Capstone Requirements Document
CS	Combat Support
CSS	Combat Service Support
CTC	Combat Training Centers

—D—	
DA	Department of the Army
DASAF	Director of Army Safety
DASC	Department of the Army System Coordinators

DCSCD	TRADOC Deputy Chief of Staff for Combat Developments
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations (PERSCOM)
DCSOPS	Deputy Chief of Staff for Operations and Plans (HQ, Department of the Army)
DCSPER	Deputy Chief of Staff for Personnel
DCSPLANS	Deputy Chief of Staff for Plans, Force Integration and Analysis (DCSPLANS)
DID	Data Item Description
DISC4	Director of Information Systems for Command, Control, Communications and Computers
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DOIM	Director of Information Management
DT&E	Developmental Test and Evaluation
DTC	Developmental Test Command
DTLOMS	Doctrine, Training, Leadership Development, Organization, Materiel, and Soldiers
DTP	Detailed Test Plan
DTRR	Developmental Test Readiness Review
DUSA(OR)	Deputy Under Secretary of the Army (Operations Research)

—E—	
ECA	Early Comparability Analysis
ECP	Engineering Change Proposal
ELSEC	Electronic Security
EMD	Engineering and Manufacturing Development
EUTE	Early User Test and Evaluation

—F—	
FMBB	Force Management Bulletin Board
FOC	Future Operational Capability
FoS	Family-of-Systems
FP	Functional Proponent

—G—	
GOSC	General Officer Steering Committee
GS	General Schedule

—H—	
HARDMAN	Hardware vs. Manpower
HCM	HARDMAN Comparability Methodology
HFE	Human Factors Engineering
HH	Health Hazards
HHA	Health Hazard Assessment
HLFD	High-Level Functional Description
HIS	Human Systems Integration
HSIP	Human Systems Integration Plan

—I—	
ICT	Integrated Concept Team
IIPT	Integrating Integrated Product Team
ILS	Integrated Logistic Support
ILSMT	Integrated Logistic Support Management Team
ILSP	Integrated Logistic Support Plan
IM	Information Management
IMA	Information Mission Area
IMPRINT	Improved Performance Research Integration Tool
IOT&E	Initial Operational Test and Evaluation
IPR	In-Process Review
IPT	Integrated Product Team
IT	Information Technology
ISS	Information Systems Security

—K—	
KPP	Key Performance Parameter
KSAO	Knowledge, Skills, Abilities, and Other Characteristics

—L—	
LAN	Local Area Network
LCM	Life Cycle Model
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Record

—M—	
M	Manpower
M3P	Manufacturer's MANPRINT Management Plan
MACOM	Major Command
MAIS	Major Automated Information System
MAISRC	Major Automated Information Systems Review Council
MANPRINT	Manpower and Personnel Integration
MARC	Manpower Requirements Criteria
MATRIS	Manpower and Training Research Information System
MD	Materiel Developer
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MDR	Milestone Decision Review
ME	Manpower Estimate
MI	Market Investigation
MIL-SPEC	Military Specification
MIL-STD	Military Standard
MIPS	Modified Integrated Program Summary
MJWG	MANPRINT Joint Working Group
MMDB	MARC Maintenance Data Base
MNS	Mission Need Statement
MOE	Measure of Effectiveness
MOP	Measure of Performance
MOS	Military Occupational Specialty

—M—	
MPT	Manpower, Personnel, and Training
MSC	Major Subordinate Command

—N—	
NDI	Non-developmental Item
NET	New Equipment Training
NETP	New Equipment Training Plan
NSTD	Nonsystem Training Device
NTIS	National Technical Information Service

—O—	
O&S	Operating and Support
OJT	On-the-Job Training
OMS / MP	Operational Mode Summary / Mission Profile
ORD	Operational Requirements Document
OT&E	Operational Test and Evaluation
OTC	Operational Test Command
OTRR	Operational Test Readiness Review

—P—	
P	Personnel
P3I	Pre-planned Product Improvement
PAL	Parameter Assessment List
PAL-MATE	Parameter Assessment List - MANPRINT Automated Tool Edition
PAM	Pamphlet
PEO	Program Executive Officer
PERSCOM	U.S. Total Army Personnel Command
PERTEC	Personnel Technologies Directorate
PM	Program / Project / Product Manager
POC	Point of Contact

—Q—	
QQPRI	Quantitative and Qualitative Personnel Requirements Information

—R—	
R&D	Research and Development
RAM	Reliability, Availability, and Maintainability
RD&EC	Research, Development, and Engineering Center
RFI	Request for Information
RFP	Request for Proposal
RRC	Requirements Review Committee

—S—	
SCP	Software Change Package
SIPT	Supportability Integrated Product Team
SME	Subject Matter Expert
SMMP	System MANPRINT Management Plan
SoS	System-of-Systems
SOW	Statement of Work
SS	System Safety
SSEB	Source Selection Evaluation Board
SSG	Special Study Group
SSv	Soldier Survivability
STD	Software Test Description
STF	Special Task Force
STRAP	System Training Plan
STRICOM	Simulation, Training and Instrumentation Command

—T—	
T	Training
TAADS	The Department of the Army Authorizations Documents System
TAD	Target Audience Description
TADSS	Training Aids, Devices, Simulators and Simulations
TD	Training Developer
TDA	Table of Distribution and Allowances
TEA	Training Effectiveness Analysis
TEMP	Test and Evaluation Master Plan
TEP	Test Evaluation Plan
TER	Test and Evaluation Report
TIWG	Test Integration Working Group
TOE	Table of Organization and Equipment
TRAC	TRADOC Analysis Center
TRADOC	Training and Doctrine Command
TSM	TRADOC System Manager
TTSP	Training Test Support Package

—U—	
UFD	User Functional Description
USAFMSA	U.S. Army Force Management Support Activity
USAI&SC	U.S. Army Intelligence and Security Command
USAMRMC	U.S. Army Medical Research Materiel Command
USAPA	U. S. Army Publishing Agency
USAR	U.S. Army Reserves

—W—	
WBS	Work Breakdown Structure
WIPT	Working Level Integrated Product Team
WRAP	Warfighting Rapid Acquisition Program

APPENDIX B

I. MANPRINT COURSES

The following courses are MANPRINT-specific, sponsored by the Directorate for Personnel Technologies (PERTEC), Office of the Deputy Chief of Staff for Personnel (DCSPER) and offered by the U.S. Army Logistics Management College (ALMC).

Agency POC:	***Address:***	***Telephone:***
DCSPER	Office of the Deputy Chief of Staff for Personnel Directorate for Personnel Technologies (PERTEC) ATTN: DAPE-MR 300 Army Pentagon Washington, DC 20310-0300	COM: (703) 695-7035 DSN 225-7035 FAX: (703) 697-1283
ALMC	Commandant U.S. Army Logistics Management College ATTN: ATSZ-ATR Ft Lee, VA 23801-6041	COM: (804) 765-4965 DSN 539-4965

Course Title:	***Duration:***
MANPRINT for Action Officers ALMC POC: Mr. Len Girling COM Phone: 804-765-4361	8 Days

This course is designed for military, civilian, and Defense contract personnel in organizations with MANPRINT responsibilities. Such individuals should be involved in either the identification or resolution of issues, goals, constraints, and concerns of manpower, personnel, training, human factors engineering, health hazards, system safety, and soldier survivability in the acquisition of

military equipment, weapons, and systems.

The MANPRINT Action Officers Course was revised in October 1998 and provides an overview of the MANPRINT program and how it relates to the acquisition process. The course now consists of four modules: Program Overview; MANPRINT and Integrated Concept Teams (ICTs); MANPRINT and Integrated Product Teams (IPTs); and MANPRINT and Test and Evaluation (T&E). Embedding MANPRINT in requirements documents and subsequent crosswalking and tracking of issues are fully addressed. A review of the contracting process and the incorporation of MANPRINT requirements into contractual documents is also addressed. Additional information, to include scheduled course dates, can be found on the MANPRINT Web Page at www.manprint.army.mil/manprint/training/training.html.

Course Title:	***Duration:***
Tailored MANPRINT Training ALMC POC: Mr. Len Girling COM Phone: 804-765-4361	2-4 Days

Tailored MANPRINT Training is a course from 2 to 4 days in length with a focus on customer needs. Applications are offered on a scheduled basis, but can also be provided by special request. This tailorable course focuses on such issues as: how MANPRINT applies during the system life cycle; how the MANPRINT process can influence hardware/software design and development; MANPRINT domains, MANPRINT in the ICT, IPT and/or T & E. Additional course information, to include scheduled course dates, can be found on the MANPRINT Webpage at www.manprint.army.mil/manprint/training/training.html. The ALMC instructors will help you decide which blocks would be best for your organization. An example of tailored training would be: Personnel in DCD and DOTD at a TRADOC Center and School receive MANPRINT Program Overview and MANPRINT and ICTs.

NOTE: Personnel who attended MANPRINT training prior to October 1998 are encouraged to attend the tailored training as it provides critical revised information about MANPRINT.

II. MANPRINT-RELATED COURSES

The following courses, offered by the U.S. Army Logistics Management College, contain MANPRINT-related blocks of instruction.

Agency POC:	***Address:***	***Telephone:***
ALMC	Commandant U.S. Army Logistics Management College ATTN: ATSZ-ATR Ft Lee, VA 23801-6041	COM: (804) 765-4965 DSN: 539-4965

Course Title:	***Duration:***
Logistics Executive Development Course (LEDC) ALMC POC: Mr. Jones COM Phone: 804-765-4752	15 Weeks, 2 Days

LEDC serves as the Army's senior logistics course designed to prepare civilian and military managers for key executive positions within the Army and DoD logistic systems.

Course Title:	***Duration:***
Logistics Management Development Course ALMC POC: Mr. Cox COM Phone: 804-765-4752	4 Weeks

This course provides an overview of the Army logistics system. The life-cycle management model is the common thread of the course and is used to highlight the more significant considerations of RDTE, distribution, contracting, inventory management, maintenance, and disposal of Army materiel.

Course Title:	***Duration:***
Materiel Acquisition Management Course ALMC POC: Mr. East COM Phone: 804-765-4460	7 Weeks

This course is designed to provide a broad spectrum of knowledge pertaining to the materiel acquisition process. It covers national policies and objectives that shape the acquisition process and the implementation of these policies and objectives by the U.S. Army.

Course Title:	***Duration:***
Intermediate Acquisition Logistics Course ALMC POC: Mr. Cibula COM Phone: 804-765-4336	3 Weeks

This course is designed for acquisition logistics managers and their supervisors. The course provides a hands-on approach for building acquisition logistics skills. The overall goal of the course is to ensure the students have attained the course learning objectives and can function as Level II acquisition logisticians in the DoD.

Course Title:	***Duration:***
Manpower and Force Management Course ALMC POC: Ms. Scott-Dumore COM Phone: 804-765-4208	2 Weeks

The curriculum concentrates on manpower and force management functions. The subject areas covered during the manpower blocks of instruction are tailored to the manpower and management functions described in AR 570-4. These functions address the fundamental aspects of planning and programming, requirements, determination, standards and guidance, documentation, allocation, and analysis and evaluation.

Course Title:	***Duration:***
Course Developments Course ALMC POC: MAJ. Ogburn COM Phone: 804-765-4490	2 Weeks

This course introduces the processes used to achieve desired joint, and Army warfighting capabilities needed for the 21st Century. These processes focus on determining, documenting, and processing warfighting concepts, future operational capabilities, and doctrine, training, leader development, organization, materiel and soldiers (DTLOMS) requirements. Students also gain familiarity with various TRADOC and other acquisition organizations they will interact with during their assignment as combat developers.

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APPENDIX C

TOOLS

Automated Information Systems (AIS) MANPRINT Management Tool

The AIS MANPRINT Management Tool was designed to provide support to MANPRINT analysts in estimating manpower, personnel, and training resources associated with an automated information system. The tool runs under Windows 3.1 or higher and uses a mouse for operation.

The first step in using the tool is to define the system. Attributes of the system inclued the name of the system, a brief description, the first year the system is operational (which is called the base year), and the number of years the system will be operational (which is called the system life). The base year and number of operational years determine the years for which manpower and training resources are estimated and are used in the computation of costs in terms of then-year dollars.

After the system is defined, the next step is to develop the Target Audience Description (TAD). To build the TAD, the user first defines the type of unit (ground, aviation, logistics, etc.) associated with the AIS and then assigns occupational categories (i.e., enlisted, warrant officer, commissioned officer, and civilian), specialty and grade, to each unit. The tool accesses specialty data in the Army Manpower Cost System (AMCOS) database to help the user assign specialties. Specialty data includes enlisted, warrant officer, commissioned officer, and general schedule (GS) civilian specialty designations, descriptions, and valid grade ranges. The user is allowed to define new specialties and assign them to units.

The next step is to estimate manpower requirements. The fielding plan spreadsheet lists each unit from the TAD as a row and each year of a system life as a column. For each row, the user enters the number of units that will be operational for each year. There is a manpower spreadsheet for each type of unit. The user enters the number of manpower positions of each category needed by a single unit and the tool computes the total number of positions for the category each year by multiplying the number of units operational as indicated in the fielding plan. The user can view manpower totals and costs by category by year.

The tool develops four lists of affected training courses, one for each of the four personnel categories. The lists are used to manage the estimation of training costs, which is done one course at a time. Two types of training costs are estimated: the costs of developing or writing the course and costs of delivering or teaching the course. Development costs are assumed to be one-time costs that are incurred in the base year of the system. Delivery costs are assumed to be in each year of system life and are a function of the costs per graduate and the number of graduates. Both developmental and delivery cost estimation methodologies access the AMCOS database to compute personnel costs. When these steps have been completed, the user has developed a TAD,

estimated manpower required, and estimated training costs. The conduct trade-offs section can be used to display manpower estimates and training delivery costs in spreadsheets or graphs.

Also, manpower costs are computed in the tradeoff section and can be displayed in a spreadsheet or graph. However, the primary use of the tradeoff section is to compare two or more versions of a system, such as a baseline and one or more of the alternatives.

The user first completes the steps from Define the System to Estimate Training for each version of the system. The user then uses the Conduct Tradeoffs step to compare the versions using spreadsheets and graphs.

Information on how to obtain the ARL AIS MANPRINT Management Tool is available from the sources listed below:

- U.S. Army Research Laboratory
  Human Research and Engineering Directorate
  ATTN: AMSRL-HR-MB (Andrea Krausman), Bldg. 459
  Aberdeen Proving Ground, MD 21005-5879
  (410) 278-5814, DSN 298-5814

Army Manpower Cost System (AMCOS)

The Army Manpower Cost System (AMCOS) is a family of manpower cost models used to forecast the life cycle cost of a new system by year for each Military Occupational Specialty (MOS). The models incorporate data from a variety of sources and compute cost elements such as military compensation, recruiting, training and medical support for each MOS. The output is used to develop the most cost-efficient system and develop a cost-effective manpower and hardware configuration for the system.

Sponsor: Army Cost and Economic Analysis Center
POC: Mr. George Michael, (703) 681-3336, E-mail: machag@hqda.army.mil

Improved Performance Research Integration Tool (IMPRINT)

IMPRINT, developed by the Human Research & Engineering Directorate of the U. S. Army Research Laboratory, is a stochastic network modeling tool designed to help assess the interaction of soldier and system performance throughout the system life-cycle--from concept and design through field testing and system upgrades. IMPRINT is the integrated, Windows follow-on to the Hardware vs. Manpower III (HARDMAN III) suite of nine separate tools.

IMPRINT is appropriate for use as both a system design and acquisition tool and a research tool. IMPRINT can be used to help set realistic system requirements; to

identify soldier-driven constraints on system design; and to evaluate the capability of available manpower and personnel to effectively operate and maintain a system under environmental stressors. IMPRINT incorporates task analysis, workload modeling, performance shaping and degradation functions and stressors, a personnel projection model and embedded personnel characteristics data.

IMPRINT uses Micro Saint, an embedded discrete event task network modeling language, as its engine. Task-level information is used to construct networks representing the flow and the performance time and accuracy for operational and maintenance missions. IMPRINT is used to model both crew and individual soldier performance. For some analyses, workload profiles are generated so that crew-workload distribution and soldier-system task allocation can be examined. Using the "Advanced" workload method (which is essentially the same as the WinCrew tool capability) detailed interface designs can be evaluated, as can workload coping strategies. In other cases, maintainer workload is assessed along with the resulting system availability. Also, using embedded algorithms, IMPRINT models the effects of personnel characteristics, training frequency, and environmental stressors on the overall system performance. Manpower requirements estimates can be generated for a single system, a unit, or Army-wide. IMPRINT outputs can be used as a basis for estimating manpower lifecycle costs.

The minimum requirements are an IBM-compatible PC running Windows 95, or Windows NT, 32MB RAM, minimum of 50MB disk space, and VGA monitor. No additional software is required although IMPRINT is copy and paste compatible with popular Windows text editors, spreadsheets, and graphing packages.

Input requirements vary according to type of analysis performed. Examples of input include mission-function-task breakdown, task time and accuracy, failure consequence, system-subsystem-component breakdown, mean operational units between failure (MOUBF), level of environmental stressors (e.g., heat, cold, noise, etc.).

IMPRINT outputs also vary depending on the particular analysis performed. Reports range from detailed task timelines, diagnostic reports of subfunction and tasks failures, and overall mission success reports. Other reports include detailed workload timelines and percent-time in a high workload condition. Still others include time spent in direct maintenance and overall system availability and readiness. The various analysis capabilities in IMPRINT provide output appropriate for use by the system design and acquisition communities, MANPRINT practitioners, researchers, managers and decision and policy makers.

For further information, please contact:

U.S. Army Research Laboratory—Human Research and Engineering Directorate (ARL-HRED)
ATTN: AMSRL-HR-MB (Dr. Laurel Allender)
Aberdeen Proving Ground, MD 21005-5425

(410) 278-6233, DSN 298-6233
Website: http://www.arl.mil/ARL-Directorates/HRED/imb/imprint.htm

E-MAIL: lallende@arl.mil

Early Comparability Analysis (ECA)

Early Comparability Analysis (ECA) provides systematic, standardized procedures for evaluating soldier tasks. During the conduct of an ECA, currently fielded equipment is selected to serve as an analytical "stand-in" for the new or proposed weapon system. (Usually the stand-in equipment is the predecessor to the new system.) Experts who work with the selected equipment are queried, using standardized questions, to identify problem tasks performed (i.e., high driver tasks). The standardized questions concern task learning difficulty, learning decay rate, task frequency, percentage of time performing task, and time to train task. Similar data is collected from other sources. The high driver tasks are identified for the purpose of assuring that similar problem tasks do not recur on the new system. The analysis can also have the secondary benefit of identifying ways to lessen these impacts on the existing system(s).

For further information, please contact:

U.S. Army TRADOC Analysis Center (TRAC)
ATTN: ATRC-L (Dr. Gordon Goodwin)
401 First Street
Ft Lee, VA 23801-1511
(804) 765-1822
DSN 221-1822

WinCrew

WinCrew is the ideal tool for studying systems when a central issue is whether the humans will be able to handle the workload. It allows the system analyst to predict and assess changes in system performance as a result of varying function allocation, number of operators or crew, level of automation, task design, mode of information presentation, and response to high workload. Through iterative use, the analyst can determine high drivers affecting human and system performance.

WinCrew is most useful before Milestone II, both for identifying feasible crewstation designs and for evaluating prototypes and mock-ups of proposed crewstation systems. Human Factors analysts and project managers involved in source selection evaluation boards, required operational capability formulation, and proof-of-principle activities will find WinCrew valuable. A background in operations research analysis, basic task analysis methods, and workload concepts, are helpful for using the tool. However, a bachelor's degree in a Human Factors Engineering related field is usually sufficient.

Sponsor: U.S. Army Research Laboratory—Human Research and Engineering Directorate (ARL-HRED)

POC: Mr. John Lockett, (410) 278-5875, DSN 298-5875.

Operator Workload Knowledge-Based Expert System Tool (OWLKNEST)

OWLKNEST is a microcomputer-based methodology that guides selection of the appropriate techniques for assessing operator workload in developing Army systems. The outputs of OWLKNEST serve as a guide to indicate the order in which the user should consider applying the techniques.

Sponsor: Army Research Institute
POC: Dr. Richard E. Christ, (913) 684-4933

HARDMAN Comparability Methodology (HCM)

The HARDMAN (Hardware vs. Manpower) Comparability Methodology (HCM) provides a structured technique for estimating the manpower, personnel, and training resource requirements associated with a new system. As the name suggests, HCM utilizes comparability analysis techniques. The new system's manpower requirements are estimated using data on existing systems/subsystems/components that closely match the new system, in terms of functionality and supportability. Personnel requirements are developed by applying historical flow rates to the estimated manpower requirements for each Military Occupational Specialty (MOS) involved in maintaining, operating, and supporting the system. Existing training courses of instruction are modified to reflect the expected training requirements of the new system, and annual graduate and instructor requirements are also computed. The HCM analysis should be performed very early in the acquisition process, and should be updated as information on the new system becomes available. HARDMAN has historically been an expensive, time-intensive process requiring a mainframe computer. For those reasons, a complete HARDMAN application is impractical. However, the basic methodology is sound and portions (steps) may be used to meet specific needs.

For more information, please contact:

U.S. Army TRADOC Analysis Center (TRAC)
ATTN: ATRC-L (Dr. Gordon Goodwin)
401 First Street
Ft. Lee, VA 23801-1511
(804) 765-1822
DSN 539-1822

Parameter Assessment List—MANPRINT Automated Tool Edition (PAL-MATE)

To support the assessment process of MANPRINT's newest domain, called Soldier Survivability, the Army Research Laboratory's Human Research and Engineering Directorate and Survivability/Lethality Analysis Directorate have developed an assessment guideline, referred to as the Parameter Assessment List (PAL). The List

consists of rating sheets which outline a series of issues under each of six broad categories. This methodology is a paper-and-pencil process. The completion of the rating sheets can be a time consuming and onerous process. An automated version was created to alleviate these problems. Additionally, because multiple agencies contribute to an assessment, an automated format will provide more conformity in domain report assessment and preparation. The PAL-MATE is a PC-based automated version of the PAL. PAL-MATE, like the manual PAL, is a comprehensive accounting of what to rate, but not how to rate it. The tool's features include: (a) a user-friendly front-end interface; (b) a menu to easily select a given portion of the PAL to work on; (c) rating sheet screens; (d) navigation aids; (e) embedded user guide; (f) provision for easy changes to be made to the issues contained in the rating sheets (additions, deletions, edits); (g) roll-up of information from the issue level to the component-level summary sheets; (h) search function; (i) glossary; and (j) report generation.

IMPLEMENTATION: IBM compatible with at least 386 CPU, 4 megabytes RAM, hard disk drive with 15 megabytes of free space, Windows 3.1 (or higher).

Sponsors: U.S. Army Research Laboratory—Human Research and Engineering Directorate.
ATTN: AMSRL-HR-MB (Headley)
Aberdeen Proving Ground, MD 21005-5425

U.S. Army Research Laboratory—Survivability/Lethality Analysis Directorate
ATTN: AMSRL-SL-I (Zigler)
Aberdeen Proving Ground, MD 21005-5068

Point of Contact to Obtain a Copy:

Name: Mr. Richard Zigler
Commercial Phone: 410-278-8625, DSN Phone: 298-8625
E-mail: rzigler@arl.mil
There are a number of automated tools which are used along with testing and experimentation in the survivability work involved with personnel and/or systems in the areas of ballistics, atmospherics and obscurants, nuclear warfare, biological warfare, chemical warfare, and electronic warfare. For further information, contract ARL-SLAD and/or review the ARL-SLAD web site at *http://www-slad.arl.mil/*"

MANPRINT GUIDEBOOK FOR SYSTEMS' DESIGN & ASSESSMENT, July 1997

This paper tool is intended to be a training aid for the new MANPRINT practitioner and a convenient reminder checklist for an experienced MANPRINT assessor. It provides a domain-specific listing of what one should look for in assessing a system. As such, the checklist makes up a rating guide and gives the practitioner a feel for the typical coverage of each domain; it can also serve the same purpose for the program manager's

office.

Sponsor:

Office of the Deputy Chief of Staff for Personnel
Personnel Technologies Directorate
ATTN: DAPE-MR
300 Army Pentagon
Washington, DC 20310-0300

APPENDIX D

MANPRINT POINT OF CONTACT (POC) LIST

KEY MEMBERS

AGENCY	ADDRESS	POC/TELEPHONE	REMARKS
DCSPER	Office of the Deputy Chief of Staff for Personnel Personnel Technologies Directorate HQDA (DAPE-MR) 300 Army Pentagon Washington, DC 20310-0300	**Dr. Robert Holz, Acting Director** (703) 697-1608 DSN 225- FAX (703) 697-1283 holzh@hqda.army.mil **MAJ Andrew Stass** (703) 695-9215 DSN 225-9215 FAX (703) 697-1283 **stassam@hqda.army.mil** **Mrs. Marjorie Zelko** (703) 695-9213 DSN 225-9213 FAX (703) 697-1283 **zelkomh@hqda.army.mil** **Ms. Peggy Simmons** (703) 695-7035 DSN 225-7035 FAX (703) 697-1283 **simmoms @hqda.army.mil**	Provides MANPRINT expertise; Develops MANPRINT policy and guidance; Develops MANPRINT Assessments.
DCSOPS	Office of the Deputy Chief of Staff for Operations and Plans HQDA ODCSOPS ATTN: DAMO-FDC 400 Army Pentagon Washington, DC 20310-0400	(703) 693-2263 DSN 223-2263 FAX (703) 693-5774	Provides manpower/force structure expertise.
DCSLOG	Office of the Deputy Chief of Staff for Logistics HQDA DCSLOG ATTN: DALO-SMR 500 Army Pentagon Washington, DC 20310-0500	**Mr. Larry Hill** (703) 614-7053 DSN 224-7053 FAX (703) 614-7328	Provides MANPRINT/ILS interface expertise.

KEY MEMBERS (Continued)

AGENCY	ADDRESS	POC/TELEPHONE	REMARKS
DISC4	Director of Information Systems for Command, Control, Communications, and Computers	**Mr. Don Routten** (703) 614-0514 routtdw@hqda.army.mil	Provides expertise on AIS effectiveness.
HQ, AMC	HQ Army Materiel Command ATTN: AMCAQ-M 5001 Eisenhower Avenue Alexandria, VA 22333-0001	**Mr. Herman Tarnow** (703) 617-8218 DSN 767-8218 FAX (703) 274-3198 htarnow@hqamc.army.mil	Provides assistance from the standpoint of materiel developers. AMC MANPRINT POC.
HQ, TRADOC	Commander, TRADOC ATTN: ATCD-RP Ft Monroe, VA 23651-5000	**Mr. Steve Dwyer** (757) 727-3477 DSN 680-3477 FAX (757) 727-2483 dwyers@monroe.army.mil	Provides assistance from the standpoint of combat developments. TRADOC MANPRINT POC.
PERSCOM	U.S. Total Army Personnel Command ATTN: TAPC-PLM 200 Stovall Street Alexandria, VA 22332-0406	**Ms. Denise McCauley** (703) 325-2024 DSN 221-2024 FAX (703)325-0657 mccauleyd@hoffman.army.mil	Provides MPT expertise; Supports ICTs/IPTs on major systems; Performs MPT Assessments on major systems.
USARL-HRED	U.S. Army Research Laboratory Human Research & Engineering Directorate ATTN: AMSRL-HR-M Building 459 Aberdeen Proving Ground, MD 21005-5425	**Dr. Edwin Smootz** (410) 278-5817; DSN 298-5817; FAX (410) 278-8823 Esmootz@arl.mil	Provides MANPRINT focal points to ICTs and IPTs; Provides Human Factors Engineering (HFE) expertise; Develops HFE and draft MANPRINT Assessments; Provides MPT and Soldier Survivability expertise on non-major systems.

USARL-SLAD	U.S. Army Research Laboratory Survivability/Lethality Analysis Directorate ATTN: AMSRL-SL-BE Aberdeen Proving Ground, MD 21005-5068	**Mr. Rich Zigler** (410) 278-8625 DSN 298-8625 FAX (410) 278-7254 rzigler@arl.mil	Performs Soldier Survivability Assessments; Provides Soldier Survivability-related expertise.
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine ATTN: MCHB-TS-OHH Aberdeen Proving Ground, MD 21010-5403	**MAJ. John V. Teyhen, III** **Mr. Robert Gross** (410) 436-2925 DSN 584-2925 FAX (410) 436-1016 john.teyhen@apg.amedd.army.mil robert.gross@apg.amedd.army.mil	Provide Health Hazard-related expertise; Performs Health Hazard Assessments.
U.S. Army Safety Center (Materiel Systems)	U.S. Army Safety Center ATTN: CSSC-ISE Ft Rucker, AL 36362-5363	**Mr. Dwight Lindsey** (334) 255-2046 DSN 558-2046 FAX (334) 255-9528 lindseyd@rucker-safety.army.mil	Performs Independent System Safety Assessments for Materiel Systems; Provides System Safety expertise for Materiel Systems.
Army Safety Office	Office of the Director of the Army Staff ATTN: DACS-SF Washington, DC 20310-0200	**Mr. Edwin Lowe** (703) 695-7293 DSN 225-7293 loweec@hqda.army.mil	Safety policy.
ATEC	U.S. Army Test and Evaluation Command ATTN: CSTE-EIN-P-DB 4501 Ford Avenue Alexandria, VA 22302-1458	**Dr. Uldi Shvern** (703) 681-9777 DSN 761-9777 FAX (703) 681-5809 shvern-uldi@hq.ATEC.army.mil	Provides expertise on operational test and evaluation (OT&E)

NOTE: This is only a partial listing of MANPRINT POCs. For a more complete list, visit CONTACTS on the MANPRINT Web Page at: http://www.manprint.army.mil/manprint/contacts/contacts.asp

APPENDIX E

SAMPLE MANPRINT WORKING *INTEGRATED PRODUCT TEAM (WIPT)* CHARTER

SYSTEM NAME

MANPRINT Working Integrated Product Team CHARTER

1. PURPOSE: To formally charter the (system name) MANPRINT WIPT comprised of representatives of the agencies listed in paragraph 2 below. The primary purpose of the (system name) MANPRINT *WIPT* is to provide for the comprehensive management and technical effort necessary to assure total system effectiveness. This will ensure continuous integration into system development and acquisition of all relevant information concerning manpower, personnel, training, human engineering, system safety, health hazards, and soldier survivability.

2. MEMBERSHIP: The (system name) MANPRINT *WIPT* will include only those personnel designated as representatives by the member agencies. Changes must be made in writing to the MANPRINT *WIPT* Chairperson. The (system name) MANPRINT *WIPT* will be composed of one representative from each of the following organizations:

a. Materiel Developer: Agency Name

b. Materiel Developer's Representative (prior to MDR I for Materiel Systems): Agency Name

c. Program Manager: Agency Name (Provides Chairperson once appointed)

d. Functional Proponent (for AIS) or Combat Developer (for Materiel Systems): Agency Name

e. Subject Matter Experts:

(1) Manpower, Personnel, Training: U.S. Total Army Personnel Command (PERSCOM), Deputy Chief of Staff for Operations, Force Integration Division, MPT Domain Branch

(2) Health Hazards: U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM)

(3) Human Factors Engineering: U.S. Army Research Laboratory-Human Research and Engineering Directorate (USARL-HRED)

(4) System Safety:

- For AIS: U.S. Army Materiel Command
- For Materiel Systems: U.S. Army Safety Center or U.S. Army Materiel Command

(5) Soldier Survivability: U.S. Army Research Laboratory-Survivability/Lethality Analysis Directorate (USARL-SLAD). (For non-major programs, the SSv assessment is often performed by ARL-HRED if ARL-SLAD does not have available resources. Check with either ARL-HRED or ARL-SLAD to determine which organization will be performing SSv for a specific ACAT III or IV system, project or product)

(6) Operational Test and Evaluation: U.S. Army Test and Evaluation Command (ATEC)

(7) Training: Training and Doctrine Command (TRADOC)

f. Additional members or associate members may be added to the MANPRINT Working Group as the need arises.

3. OBJECTIVE: The objective of the (system name) MANPRINT *WIPT* is to ensure that MANPRINT goals, objectives and issues/risks are adequately addressed. The (system name) MANPRINT *WIPT* members will:

a. Develop and be responsible for tracking MANPRINT issues.

b. Provide a forum for direct communications among members to address MANPRINT goals, objectives and issues/risks.

c. Participate in the conduct of MANPRINT studies and analyses.

d. Provide recommended positions to the PM and the Functional Proponent (for AIS) and/or Combat Developer (for Materiel Systems).

e. Ensure unresolved issues are surfaced to the MANPRINT WIPT Chairperson for resolution.

f. Maintain an audit trail of MANPRINT activities and decisions.

4. PROCEDURES:

a. Meetings of the (system name) MANPRINT *WIPT* will be held at the times and frequencies deemed appropriate by the Chairperson; however, a meeting should be held 6 months prior to each milestone decision. The Chairperson will provide each member with notification of the time, place, and agenda for each meeting, normally not less than 15 working days prior to the meeting.

b. The Chairperson will provide for the recording and distribution of minutes of all meetings within ten working days after the meeting. The minutes will include any action items that were assigned as a result of the meeting.

c. Members

(1) Members' agencies will be responsible for ensuring their own representation and such additional supplemental representation as may be indicated by the agenda. The MANPRINT *WIPT* will include only those personnel designated as representatives by the member agencies. Changes must be made in writing to the Chairperson.

(2) Primary or alternate representatives will be present at each MANPRINT *WIPT* meeting. The senior member present from each agency will be the spokesperson for that agency and will have the authority to make decisions in their areas of expertise.

(3) Members will be responsible for ensuring any supplemental representation as may be required by the agenda with prior approval of the Chairperson.

(4) Activities having limited MANPRINT responsibilities/interests will be requested to attend those meetings, which specifically address their areas of interest.

d. Subcommittees, if required, will be established by the Chairperson.

5. DISTRIBUTION:

Upon approval, a copy of this charter will be provided to each MANPRINT WIPT principal member. Minutes of all MANPRINT WIPT meetings will be distributed

within ten working days after the meeting.

APPENDIX F

PUBLICATIONS

This appendix contains a list of documents, along with brief synopses, that the MANPRINT AO may consult for more specific information. The list includes Department of Defense Directives and Regulations (DoDD and DoD XX-R), Army Regulations (AR), Department of the Army Pamphlets (DA PAM), Training and Doctrine Command publications, Army Materiel Command publications, and other miscellaneous documents.

Cited AR, DA PAM, TRADOC and AMC publications can be obtained from:

Commander
U.S. Army Publications Distribution Center
1655 Woodson Road
St. Louis, MO 63114

You must have a valid account number to order publications. Questions about establishing an account should be referred to the U. S. Army Publications Distribution Center. This is a source for Government activities only. Government contractors should receive publications through their Contracting Officers Representative (COR).

The U.S. Army Publishing Agency (USAPA) also maintains a home page (ftp://pubs.army.mil/pub/epubs/pdf) on the World Wide Web for those that have Internet access. Many other publications are now available on the Internet through the proponent agency's web page.

In the event that you need a DoD document that is not carried at the U.S. Army Publications Distribution Center, you can obtain it from the National Technical Information Service (NTIS). The documents provided from NTIS are not free of charge, and prepayment in the form of a credit card or check is required. It is also possible to establish an NTIS deposit account. In addition to the basic cost of the document, NTIS charges a handling fee.

National Technical Information Service (NTIS)
5285 Port Royal
Springfield, VA 22161
1-800-553-6847

Guidance on how to obtain the miscellaneous documents cited in this appendix is provided after the synopsis.

- **DoDD 5000.1, "Defense Acquisition", 15 March 1996**

  The primary objective of the defense acquisition system is to acquire quality products that satisfy the needs of the operational user with measurable improvements to mission accomplishment, in a timely manner, at a fair and reasonable price. Acquisition policies and principles are divided into three major categories: (1) Translating Operational Needs into Stable, Affordable Programs, (2) Acquiring Quality Products, and (3) Organizing for Efficiency and Effectiveness. MANPRINT can make major contributions to each of these categories.

- **DoDR 5000.2R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs", 15 March 1996**

  This regulation establishes mandatory procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information Systems (MAIS) acquisition programs. It also describes the Human Systems Integration (HSI) concept and requirements. The regulation is organized into six parts, which focus on major management and programmatic elements of the acquisition process. MANPRINT can have a major role in each part. The parts of the regulation are listed below:

  1. Acquisition Management Process
  2. Program Definition
  3. Program Structure
  4. Program Design
  5. Program Assessments and Decision Reviews
  6. Periodic Reporting

- **AR 25-1, "The Army Information Resources Management Program", 25 March 1997**

  This regulation addresses information mission area (IMA). It defines the scope, establishes policies and assigns responsibilities. IMA encompasses the disciplines of telecommunications, automation, visual information, records management, publications and printing, and libraries. The Continuity of Operations Plan (COOP) ensures the Army mission and processes continue to function, even in the event of a disaster, and has MANPRINT implications.

- **AR 40-10, "Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process", 1 October 1991**

(THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

This regulation prescribes specific responsibilities of developers for Health Hazard Assessments (HHAs) in support of the Army Materiel Acquisition Decision Process. It describes the HHA program and addresses program objectives and policies. While this regulation is obviously dated, the U. S. Army Center for Health Promotion and Preventive Medicine has published a Health Hazard Assessment Manual, dated October 1994 and a Health Hazard Assessor's Guide, dated August 1996. These publications offer detailed and current guidance on Health Hazards and the conduct of HHAs.

- **AR 70-1, "Research, Development, and Acquisition – Army Acquisition Policy", 15 December 1997**

This regulation governs the research, development, acquisition, and Life Cycle Management (LCM) of Army materiel and automated information systems to satisfy approved Army requirements. It applies to major, nonmajor, and highly sensitive classified programs. It complements AR 602-2 in assigning MANPRINT and MANPRINT domain responsibilities in the system acquisition program. It consolidates AR 25-3, AR 700-86, and AR 702-3. It is the Army's implementation of DoDD 5000.1 and DoDR 5000.2R.

- **AR 70-75, "Research, Development, and Acquisition – Survivability of Army Personnel and Materiel", 10 January 1995**

(THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

This regulation provides policies, responsibilities, and procedures for ensuring that survivability of Army personnel and materiel are addressed in the materiel acquisition process. While survivability is addressed as an Army program, soldier survivability is identified as a domain of MANPRINT. It addresses survivability in the requirements process, the threat process, analysis, system design, testing, evaluation and assessment.

- **AR 71-9, "Materiel Requirements", 30 April 1997**

This regulation delineates specific responsibilities for materiel requirements and materiel requirement documents. Specific MANPRINT responsibilities are identified for DCSPER, DA (monitoring requirements); DISC4 (implementation of MANPRINT in

IT); and AMC (MANPRINT support to PEOs and PMs).

- **AR 71-32, "Force Development and Documentation—Consolidated Policies", 3 March 1997**

  This regulation consolidates and updates the objectives, procedures, and responsibilities for development and documentation of Army force personnel and equipment requirements and authorizations. It includes information previously contained in: AR 71-2, Basis-of-Issue Plans (BOIPs) and Qualitative and Quantitative Personnel Requirements Information (QQPRI); AR 71-13, The Department of the Army Equipment Authorization and Usage Program; AR 71-31, Management System for Tables of Organization and Equipment; AR 310-49, The Department of the Army Authorizations Documents System (TAADS); AR 310-49-1, The Department of the Army Authorizations Documents System (TAADS) Documentation, Procedures, and Processing; and AR 570-2, Manpower Requirements Criteria. It establishes the Force Management Bulletin Board (FMBB) as the official medium for publishing technical and other non-policy information previously contained in the superseded regulations. This regulation primarily impacts the manpower domain but also impacts the personnel capabilities domain of MANPRINT.

- **AR 73-1, "Test and Evaluation Policy", 27 February 1995**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  AR 73-1 prescribes implementing policies for the Army's testing and evaluation program. It applies to all systems acquired under the auspices of the AR 70-series and AR 25-series. It defines specific agency responsibilities and that of test and evaluation organizations. It describes test and evaluation support of the system acquisition process, to include developmental and operational testing and evaluation. It provides for interface with the MANPRINT Joint Working Group (MJWG) (now MANPRINT team or MANPRINT WIPT) and incorporates MANPRINT in the Developmental Independent Assessment Report and the Independent Operational Evaluation.

- **AR 350-35, "Army Modernization Training", 30 May 1990**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  This regulation provides guidance for the execution of new and improved equipment training, displaced equipment training, doctrine and tactics training, and sustainment training for the total Army. DCSPER, DA has the responsibility to

monitor, assess, and recommend to DCSOPS appropriate action on training as part of Manpower and Personnel Integration (MANPRINT). This regulation also requires that all Army modernization initiatives be examined by the materiel developer or provider, the combat or training developer and considered in MANPRINT. This regulation requires the System Training Plan (STRAP) and the New Equipment Training Plan (NETP).

- **AR 380-19, "Information Systems Security", 1 August 1990**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  AR 380-19 introduces Information Systems Security (ISS) as a discipline which encompasses the sub-areas of communications security (COMSEC), computer security (COMPUSEC), control of compromising emanations (TEMPEST), and electronic security (ELSEC). It defines the Army Information Systems Security Program and prescribes a structure for implementing the program. There are obvious implications for security clearances, which impact personnel capabilities. Of special interest was the requirement for maintenance personnel to be cleared for the highest level of security processed on the system.

- **AR 385-10, "The Army Safety Program". 23 May 1988**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  AR 385-10 prescribes DA policy, responsibilities, and procedures to protect and preserve Army personnel and property against accidental loss. It provides for public safety incident to Army operations and activities, and safe and healthful workplaces, procedures, and equipment. The DCSPER, DA will ensure systems safety is integrated into materiel development and acquisition phases through MANPRINT and include safety concerns and issues on Army materiel in MANPRINT presentations at ASARCs.

- **AR 385-16, "System Safety Engineering and Management", 3 May 1990**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  AR 385-16 prescribes policies and procedures, and identifies responsibilities to ensure hazards in Army systems and facilities are identified and the risks associated with these hazards are properly managed. The Director of Army Safety (DASAF) will manage the Army System Safety Program and its interface with MANPRINT.

The Commander, U. S. Army Safety Center will provide an independent safety assessment of ASARC systems to the ASARC secretary and a copy to ODCSPER for MANPRINT use. System safety will be applied and tailored to all Army systems and facilities throughout their respective life cycles and integrated into other MANPRINT concerns.

- **AR 602-1, "Human Factors Engineering Program", 8 February 1991**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  This regulation covers policies and procedures for human factors engineering (HFE) in the Army. Responsibilities are identified and guidance is provided on implementing a HFE program throughout the life cycle system management of Army materiel. This regulation also implements HFE policies and procedures specified in AR 602-2.

- **AR 602-2, "Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process", 7 October 1994**

  (THIS REGULATION IS DATED PRIOR TO THE DoD 5000 SERIES)

  This is the MANPRINT regulation. It describes the MANPRINT concept, objectives, domains, and program. It delineates MANPRINT responsibilities as applicable to materiel, automated information, and clothing and individual equipment systems. It provides guidance on the System MANPRINT Management Plan and provides references and terms. IT IS CURRENTLY UNDER REVISION.

- **AR 700-127, "Integrated Logistic Support", 10 November 1999**

  This regulation delineates DA policies and assigns responsibilities for management of ILS. The 10 ILS elements are:

  1. Maintenance planning
  2. Manpower and personnel
  3. Supply support
  4. Support equipment
  5. Technical data
  6. Training and training support
  7. Computer resources support
  8. Facilities

9. Packaging, handling, storage and transportation
10. Design interface

The specific goal/objective of the ILS program is to introduce and sustain fully supportable materiel systems in current and projected environments that meet established operational and system readiness objectives (SRO) at minimum life-cycle cost (LCC). The ILS and MANPRINT processes are mutually supporting and will be integrated in materiel development and acquisition efforts. The MANPRINT is a mandatory consideration for attaining the desired level of supportability. A fundamental precept of ILS is that each element will be integrated with every other element. The MANPRINT considerations must be afforded this same management information. The regulation directs that the ILS Manager will also serve as the MANPRINT manager when program size, complexity, or other factors permit. When it is not practical for the ILSM to serve as the MANPRINT manager, the two will be aligned to serve mutually supporting roles to prevent duplication of effort. The regulation clearly demonstrations the relationship of MANPRINT to each of the 10 ILS elements.

- **DA PAM 73-1, "Test and Evaluation in Support of System Acquisition", 28 February 1997**

DA Pamphlet 73-1 provides guidance and procedures to implement test and evaluation policy for materiel and information systems as promulgated in AR 73-1.

While a MANPRINT representative is not indicated as a member of the Test Integration Working Group (TIWG), there is a requirement to interface with the MANPRINT Joint Working Group (MJWG). Specific MANPRINT responsibilities as relate to Test and Evaluation are assigned to the Deputy Chief of Staff for Personnel (DCSPER). The U. S. Army Research Laboratory is identified as having the function of conducting MANPRINT analyses.

- **DA PAM 73-2, "Test and Evaluation Master Plan Procedures and Guidelines", 11 October 1996**

This pamphlet provides procedural guidance to implement the policies in AR 73-1 with regard to planning, executing, and reporting testing and devaluation in support of the acquisition process. It identifies specific responsibilities and describes in greater detail the purpose and development of the Test and Evaluation Master Plan (TEMP). The Operational Requirements Document (ORD) is crosswalked to the TEMP to insure all requirements and thresholds are addressed. It is especially important that KPPs and thresholds contained in Paragraphs 4 and 5 of the ORD get

crosswalked into the TEMP.

- **DA PAM 385-16, "System Safety Management Guide", 4 September 1997**

  This system safety "how to" guide discusses MANPRINT and the relationship of system safety to MANPRINT. Included is relationship with the System Safety Working Group and input to MANPRINT assessments.

- **DA Pam 611-21 Military Occupational Classification and Structure", 31 March 1999**

  This pamphlet describes the occupational series, identify qualifying criteria, and provides guidance for classification of positions. It also identifies unique skill identifiers and the use of those codes in positions. This is a key personnel capabilities publication and it also impacts the MANPRINT domains of manpower, training, and human factors engineering.

- **"SARDA Guide for the Preparation of Army Acquisition Programs for Review by the Army Systems Acquisition Review Council (ASARC)," Assistant Secretary of the Army for Research, Development and Acquisition, dated 20 November 1996.**

  This document provides general guidance to the Department of the Army System Coordinators (DASCs) involved in the preparation of Army programs for the Army Systems Acquisition Review Council (ASARC). It also addresses similar procedures for the Army Major Automated Information System Review Council (MAISRC). The Assistant Secretary of the Army (Manpower and Reserve Affairs) and the Deputy Chief of Staff for Personnel (DCSPER), as members of the ASARC/MAISRC, have identified MANPRINT responsibilities. The ASARC or MAISRC will only meet if issues E-mail after the pre-ASARC/MAISRC. The ASARC IPR is responsible for preparing the Modified Integrated Program Summary (MIPS), the only document used for review by the ASARC. DCSPER is not a member of the ASARC IPT unless tailored (MAISRC is now IT OIPT).

  The guide provides for ASARC Working Integrated Product Teams (WIPT). Typical teams include Test/Performance Analysis and MANPRINT, both of which should have MANPRINT representatives. The System MANPRINT Management Plan (SMMP) is identified as a Program Management Document and the MANPRINT Assessment (with domain input) is identified as an Oversight Document.

- **TRADOC Reg 350-70, "Systems Approach to Training Management, Processes, and Products", 9 March 1999**

  This regulation provides complete, comprehensive policy and guidance on Army training. Of special interest are portions of the regulation applicable to the system acquisition process and MANPRINT.

- **TRADOC Pam 71-9, "Requirements Determination – Force Development", dated 5 November 1999**

  This pamphlet describes the processes for determining, documenting, and approving warfighting requirements in the domains of doctrine, training, leader development, organization, materiel, and soldier (DTLOMS). Of special interest to MANPRINT is the analytical effort leading to a Mission Needs Statement (MNS) and the Operational Requirements Document (ORD). Also of special interest is the guidance on the Integrated Concept Team (ICT) and MANPRINT representation. Specific guidance on preparation of the ORD includes MANPRINT influence on performance parameters (especially Key Performance Parameters (KPPs)) in Paragraph 4 and the MANPRINT subparagraph (5c).

- **"Acquisition Strategy Guide—Third Edition," Defense Systems Management College Press, dated January 1998**

  This guide was developed for use by Program Managers. The guide states that Army materiel developers coordinate the Acquisition Strategy with the Human Systems Integration (HSI) Office. This is the Personnel Technologies Directorate of DCSPER,DA. The Human Systems Integration Plan is listed as a functional plan.

- **"Rules of the Road—A Guide for Leading Successful Integrated Product Teams," Department of Defense, dated November 1995.**

  (THIS GUIDE IS DATED PRIOR TO THE DoD 5000 SERIES)

  This guide is intended to facilitate organizing and leading effective Integrated Product Teams (IPTs). It includes guidelines for meeting management. It complements DoDD 5000.1 and DoDR 5000.2R.

- **AMC PAM 602-2, "MANPRINT Handbook for Non-developmental Item (NDI) Acquisition," dated July 1988.**

  (THIS PAMPHLET IS DATED PRIOR TO THE DoD 5000 SERIES)

  While somewhat dated, this pamphlet clearly delineates how MANPRINT can and should impact non-developmental acquisitions. While system design cannot be influenced, MANPRINT goals and constraints (objectives and thresholds) clearly influence which system is acquired. The pamphlet identifies appropriate MANPRINT actions throughout the life cycle and provides examples and suggestions.

APPENDIX G

EXECUTIVE DOCUMENTS

EXECUTIVE GUIDANCE SUMMARY

Recently there have been numerous policy statements and guidance from executives, which reinforce the importance of MANPRINT to the U. S. Army. The following are excerpts:

"Effective this date, all required and appropriate MANPRINT requirements and opportunities will be evaluated and considered in the best value trade-off analyses associated with source selection for acquisition of all Army systems."
Memorandum, Subject: MANPRINT Inclusion in Army Acquisition Source Selection Process, dated 21 August 1998 from Mr. Paul J. Hoeper, Army Acquisition Executive.

"Effective this date, MANPRINT requirements and issues will be addressed for all Army acquisition programs. The MANPRINT process should begin at program conception and continue through the development and fielding phases...."
Memorandum, Subject: Manpower and Personnel Integration, dated 7 October 1997 from Mr. Robert M. Walker, Army Acquisition Executive.

"The soldier should be taken into account on every system. Soldier requirements should be in every requirement document for every acquisition category...."
At a MANPRINT General Officer Steering Committee Meeting on 28 August 1997, stated by General Griffith, Vice Chief of Staff of the Army.

"Early MANPRINT planning and resourcing can be important as we seek to identify technology solutions that enhance mission performance and capability while reducing the long term operating and support (O&S) costs of Army Systems...."
Memorandum, Subject: Manpower and Personnel Integration (MANPRINT) Support to Advanced Technology Demonstrations (ATDs), dated 24 June 1998 from Mr. A. Fenner Milton, Deputy Assistant Secretary for Research and Technology.

"There is no doubt that Manpower and Personnel Integration (MANPRINT) is a vital input to our considerations of ensuring the well-being of our uniformed members. The Army is totally committed to its application to ensure the survivability and effectiveness of our soldiers."
Memorandum, Subject: Revised Operational Requirements Document (ORD) Format, dated 12 February 1998 from Mr. Kenneth J. Oscar, Acting Assistant Secretary of the Army (Research, Development and Acquisition).

"....MANPRINT has, in fact, already saved hundreds of soldiers' lives and billions of

dollars. It has returned thousands of percent on a trickle of investment dollars. It is, or should be, a governmental downsizer's dream come true."

"In closing, I want to congratulate the Army for developing MANPRINT for continuing to support the program in a time of very scarce resources."

"....We have not been in such an enviable position to take advantage of a technological cultural change since Deming's total quality management. Let's not miss our opportunity this time around."
Congressman Ike Skelton's Speech in the Congressional Record dated October 1, 1997.

"…Clearly, early application of MANPRINT practices and recommendations will result in reducing total ownership costs by ensuring that systems are designed with the soldier, leader, and unit in mind from the onset."
Memorandum For the Vice Chief of Staff, Army, Subject: Total Ownership Cost Initiatives, dated 21 December 1999 from LTG David H. Ohle, Deputy Chief of Staff for Personnel.

"The MANPRINT Pay Off
- Improved manpower utilization
- Reduced training costs
- Reduced maintenance time
- Improved user acceptance
- Fewer errors and accidents
- Improved system performance
- Eliminates expensive redesigns after fielding"

Briefing given by MG A.J. Madora, Commanding General, U.S. Army Test and Evaluation Command, 18 August 1999, at the MANPRINT Symposium

"MANPRINT is a critical factor of Digitization. It can significantly impact on the synergism and benefits of digitization. It is also critical to the Army Vision." "MANPRINT is needed to help transition from the old single system approach to a "System of Systems" approach. MANPRINT must be an integral part of Spiral development and Brigade Set Fielding."
Mr. Stan Levine, Deputy Director, Army Digitization Office

APPENDIX H

SAMPLE MANPRINT ASSESSMENTS

D R A F T

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
300 ARMY PENTAGON
WASHINGTON, DC 20310-0300

DAPE-MR 28 February 19XX

MEMORANDUM FOR MEMBERS OF THE ASARC

SUBJECT: Manpower and Personnel Integration (MANPRINT) Assessment for the XXXX Program, Milestone III

1. Reference memorandum, Commander, XXXXX, XXXXX-XXX, 10 January 19XX, subject: MANPRINT Assessment for the XXXX Program.

2. XXX Launcher concerns: The XXXX will be fired from the XXX launcher. This assessment will only address the issues created by adding the XXXX munition to the XXXXX. However, hazards exist for the XXX Launcher that if not addressed will affect the XXXX system effectiveness and could result in operator incapacitation or mission failure.

3. The assessments for each MANPRINT Domain are:

a. Manpower, Green.

b. Personnel, Green.

c. Training, Green.

d. Human Factors Engineering (HFE), Green.

e. System Safety (SS), Green.

f. Soldier Survivability, Green.

g. Health Hazards (HH) - Unknown. However, as this is a upgrade to an existing system there are no anticipated concerns sufficient to slow the program. Data does not exist measuring the impulse noise at normal personnel locations. Data is also required to assess crew exposure to rocket motor combustion products when the engine fan is on high and positive pressure cannot be maintained. Whole body vibration data does not exist. In all cases where data does not exist, The Surgeon General has requested that the data be collected so that a definitive assessment can be made. As these data are collected and analyzed, the end user should implement appropriate administrative controls to attenuate the problem, e.g., excessive steady state noise requires double hearing protection at all times.

4. Questions regarding the MANPRINT Assessment should be directed to XXXXXXXX, MANPRINT Division of the Personnel Technologies Directorate (PERTEC) at DSN 225-XXXX or commercial 703-695-XXXX.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

ROBERT F. HOLZ
Acting Director for Personnel
Technologies

D R A F T

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
300 ARMY PENTAGON
WASHINGTON, DC 20310-0300

DAPE-MR 2 May 19XX

MEMORANDUM THRU THE ASARC SECRETARY

FOR THE ASARC MEMBERS

SUBJECT: Manpower and Personnel Integration (MANPRINT) Assessment for the XXXX System

1. The program is rated Green. The XXXX has demonstrated through testing that it is a tremendous weapon, and far superior to the predecessor system, XXXXX, from a MANPRINT perspective. Health Hazard, Human Factors Engineering, and Soldier Survivability concerns are addressed below.

2. Health Hazards - Green. There persist two Health Hazard issues that are most practically mitigated by training and proper administrative control procedures:

a. The laser in the training device can cause eye damage so it needs to be well labeled, with trainers alerted to the need to carefully manage its use.

b. The blase fumes are noxious, so that exposure needs to be constrained by proper administrative control procedures.

3. Human Factors Engineering - Green. There is a continuing value in achieving a lighter load for future weapons designs, but I am satisfied that the modular configuration, controlled in the field by doctrine and training, make the system manageable by dismounted infantry.

4. Soldier Survivability - Green. Because of the weapon's range and lethality, training for target discrimination of friend or foe may need to be increased to reduce the risk of fratricide.

5. The POC is XXXXXXXXX, (703) 695-XXXX, DSN 225, FAX DSN 227-1283.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

ROBERT F. HOLZ
Acting Director for Personnel
Technologies

D R A F T

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
300 ARMY PENTAGON
WASHINGTON, DC 20310-0300

DAPE-MR 10 September 19XX

MEMORANDUM THRU THE ASARC SECRETARY

FOR THE ASARC MEMBERS

SUBJECT: MANPRINT Assessment for the XXXXXXX

1. This MANPRINT Assessment is based on a review of the Domain Reports.

2. An overall system rating for the XXXXXXX could be set at RED, but we have registered AMBER to have the program continue. We see this program in a critical risk status because of the critical and major issues described below.

a. Manpower is rated AMBER. Although rated Amber, MANPRINT is verging on Red because the potential billpayers have not been identified for an estimated 39 maintenance MOS XXX spaces. Based on Title 10, U.S.C. Sec 2434, DoD regulation 5000-2R states, "no acquisition program shall be approved to proceed beyond program initiation unless sufficient resources including manpower are programmed... The Manpower Estimate for the program shall address manpower affordability in terms of end strength and civilian work years." With continuing pressures for reductions in force structure, billpayer issues are paramount; however, the clock continues to run and we may well run out of the lead time necessary for MPT actions.

b. Personnel is rated AMBER. Although rated Amber, personnel is also verging on Red because several critical program documents, such as the Basis of Issue Plan (BOIP) and the Qualitative and Quantitative Personnel Requirements Information (QQPRI), have not been approved. These documents are crucial to development of Tables of Organization and Equipment (TOE) and should be in place 39 months prior to the First Unit Equipped (FUE).

In addition, the Operator and Maintainer (O & M) decision, which is based on those documents, has not been developed. Therefore, job task analyses and the full spectrum of duties to operate and use the new technology have not been estimated well enough for essential MPT planning. It appears that soldier tasks will include a "Crew Chief/Local Area Network (LAN) Manager" function. This is a significant new and highly skilled function with many new tasks, and may result in training and task overload on the soldier.

c. Training is rated AMBER. The STRAP is missing several paragraphs and annexes. It does not address Army Reserve or National Guard training requirements. In addition, courses of action on the "who, what, when, and where" for training, to include the Automation Expert and the Battle Staff NCO, have not been made.

d. Human Factors Engineering is rated AMBER. The human-machine interface has potential risks that have yet to be analyzed and resolved. This is compounded due to the lack of operator and maintainer decisions.

e. System Safety (SS) is rated AMBER. This rating is based on the Safety Center's Systems Safety Assessment. "Emergency ventilation for Mission Module egress: The mission module construction and ventilation creates a hazard for the XXXXXXX crew during fire emergency egress. Several instances during testing had the XXXXXXX quickly filling up with smoke when an electronic device failed. The smoke quickly rose to the ceiling and engulfed the breathing zones of all the XXXXXXX crew... The hazard is the amount of CO, CO2 and toxic byproducts from electrical insulations. These byproducts could cause the XXXXXXX crew to be overcome, causing unconsciousness and significant lung damage. " (see paragraph f. below)

f. Health Hazards (HH) is rated AMBER. The Health Hazards Assessment Report (HHAR) supports the passage of XXXXXXX into LRIP. However, HH is rated AMBER due to the following previously unresolved HH: Chemical substances (fire extinguishing agents), acoustic energy (steady-state noise), and whole-body vibration.

(1) The enclosure crew compartment is equipped with two 2.3 pound, hand-held, CO2 extinguishers in the carrier cab. A fire inside the confined space will quickly make it difficult for personnel to breathe. When the CO2 is released on the fire it denies the oxygen required for burning. Depending on the amount released and the length of exposure, personnel may become unconscious, experience other ill effects. Carbon dioxide (CO2) data collected in the XXXXXXX indicated the potential for very high CO2 concentrations at face level and deadly concentrations at the floor level. In all test scenarios, if soldiers breathe the atmosphere at the extinguisher discharged point or at the floor, unconsciousness or death could occur unless they are removed to a normal atmosphere or given oxygen quickly.

(2) Acoustic energy, steady-state noise. The major sources of steady-state noise capable of propagating to the ear through the helmet are the drive train and the intercom/radio. The headset worn by crewmembers is the XXXXX helmet from the XXXX System. The XXXXX provides hearing protection with an attentive ear-cup and also employs Active Noise Reduction (ANR). The Aberdeen Test Center (ATC) also measured the noise levels inside the XXXXX headsets using miniature microphones; the objective was to determine at-ear-level for audio alarms. The measurements show almost no noise attenuation for the XXXXX headsets and severe overexposure of the of the crew wearing XXXXX headsets. Prolonged unprotected exposure to hazardous noise levels will cause loss of hearing and may reduce soldier survivability. All personnel exposed to hazardous noise must wear hearing protective devices. The test equipment and test procedures should be reviewed to determine the cause of the apparent failure to attain the expected noise attenuation in the XXXXX.

(3) Whole-body vibration (WBV). Some of the XXXXXXX components that affect the transmission of the WBV to the crew include the steel road wheels, a "big-foot" track, torsion bar assemblies, and a seating subsystem which consists of the seat, a five-point restraining system, and a motion damping base. The XXXXXXX is likely to present a high level risk of injury to the driver during normal operations. This is based on the mobility requirement to travel cross-country terrain approximately 100 miles in 24-hour period. The highest risk of injury is associated with the driver position, and with vertical WBV direction.

Recommendations:

(1) Chemical substances. Ensure the technical and training manuals warn personnel of the presence of high concentrations of CO2 near the floor of the enclosure, at the discharge point, and in the cab. The inclusion of this warning in the appropriate technical and training manuals should reduce to a negligible level the probability of personnel adversely affected by this hazard. In addition, conduct hands-on training in proper use of the portable fire extinguishers that are provided for use in the XXXXXXX. Explore the possibility of using a safer extinguisher material. After accidental or deliberate discharge, if able crewmembers' first priority is to exit the XXXXXXX to prevent overexposure to CO2 then ventilate the XXXXXXX prior to reentry. If unable to exit, ventilate to remove the extinguisher gas. Place warnings in all technical and training manuals regarding the high CO2 concentrations. Include following or similar information in the applicable technical manual: "Warning: DO NOT PANIC". Ensure soldiers are provided with an educational program to familiarize them with generic principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.

(2) Acoustic energy, steady-state noise. Wear hearing protection when in the vehicle or the XXXXXXX, moving at speeds above 8 km/hr. Hearing protection when within 40 feet, engine operating at idle at 1250 rpm or within 19 feet, idling at 750

rpm. Turn the XXXX volume down to the lowest level that is consistent with understanding the voice traffic. Investigate the apparent failure of the XXXXX to provide attenuation of the ambient noise during the ATC noise tests.

(3) Whole-body vibration. Modify the vehicle seats, particularly the driver and jump seats, to eliminate WBV transmitted to the operators. Target the design modifications to WBV frequencies and magnitudes produced by the XXXXXXX when traveling over cross-country terrain. In the interim, limit travel to a maximum of 6 miles per move over cross-country, driver should switch positions with other crewmembers in order to reduce their injury risk. Until the driver's seat design is improved, avoid speeds between 15-25 mph when traveling over primary roads or restrict movement to a total of 60 miles.

g. Soldier Survivability (SSv) is rated AMBER. The memorandum describing the specific detailed concerns was transmitted 9 Sep XX directly to the Program Executive Office, XXXXXX and is the source for this rating.

3. MANPRINT point of contact is XXXXXXXX, DSN 221-XXXX, or commercial (703) 695-XXXX.

ROBERT F. HOLZ
Acting Director for Personnel
Technologies

D R A F T

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
300 ARMY PENTAGON
WASHINGTON, DC 20310-0300

DAPE-MRA 13 Jan 19XX

MEMORANDUM FOR OFFICE, DIRECTOR OF INFORMATION SYSTEMS FOR COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTERS, ATTN: SAIS-PP

SUBJECT: Abbreviated Integrated Program Assessment (IPA)/MANPRINT Assessment for the XXXXX Program.

1. Due to the very short suspense for the XXXXX IPA, several of the MANPRINT domain agencies were not able to successfully complete their domain assessments. Therefore, this assessment does not address all potential MANPRINT risks in the areas of System Safety, Health Hazards, Human Engineering, or Soldier Survivability.

2. There is one critical System Safety/Health Hazard/Human Engineering/Soldier Survivability/Intelligibility issue that we are aware of involving high noise levels within the shelter. This issue would normally mandate a RED rating on the XXXXX Program. However, since we have proposed MANPRINT exit criteria to ensure resolution of all known MANPRINT issues prior to proceeding to Full Rate Production, we have rated the program AMBER. This AMBER rating on the XXXXX Program is contingent upon full acceptance of all of the following proposed MANPRINT exit criteria; otherwise, the program is rated RED. The noise issue as well as other Manpower, Personnel, and Training issues are addressed below:

a. Eight months ago during a combined IOTE/DT Test at Fort XXX, a significant noise problem was identified. When the XXXXX Terminal is operating in the shelter along with other equipment - including three fans, the noise level (88 dB(A)) exceeds the maximum acceptable level. High noise presents several hazards/performance risks. These include: 1) Hearing loss: For an 8-hour exposure, 85 dB(A) is the maximum noise level acceptable to prevent hearing loss. Since harmful noise effects are accumulative, exposures of longer duration would mandate lower dB(A) levels. 2) Degrade mission performance:

The maximum noise level for voice intelligibility is 75 dB(A). Noise that exceeds that level results in a decreased capability to correctly interpret voice transmitted over radios and telephones. 3) Degraded human/mission performance: Continued exposure to high noise levels can lead to operator fatigue, confusion, and increased errors. 4) Degraded mission performance: In the XXXXX configuration, noise levels that exceed the 65 dB(A) safety thresholds diminish the operator's capability to distinguish early warning audio cues/signals. As a possible resolution, the safety engineers have recommended that soldiers wear headsets to reduce the hazard. (Perhaps the new XXX headsets should be closely examined as a possible solution.) We have been unable to determine the current status of this issue as well as that of the recommended solution. Therefore, rather than delay the program from entering LRIP until resolution has been accomplished, recommend instead that the following language be included as exit criteria: "Satisfactory resolution to the safety/health hazard/intelligibility issue involving high noise levels must be identified, planned, and resourced prior to entering Full Rate Production."

b. Certain critical MANPRINT-related program documents are either outdated or incomplete. These include the BOIP, QQPRI, and the STRAP. These documents direct vital efforts involving planning, resourcing and documenting actions for manpower, personnel, and training. Therefore, to ensure that XXXXX can be supported with properly trained soldiers at system fielding, we strongly recommend the following exit criteria be established: "Require an approved BOIP, QQPRI, and STRAP (to include update, if necessary) before proceeding to Full
Rate Production."

c. Since test results from the Limited Users Test are not yet available and hence, could not be addressed in this assessment, recommend that the following exit criteria be established: "Require all MANPRINT issues being tested receive either a satisfactory performance rating, or that recommended fixes be funded and tested before proceeding to Full Rate Production."

d. Another area of concern involves the lack of institutional training for the maintenance personnel (MOS XXX - which converts to MOS XXX in 2QFYXX). Since this training will be accomplished by an exportable training package, there is concern regarding the adequacy of the training. Since the competence of the maintainers will have a direct bearing on the turn-around time of the LRUs in the XXXXX, poorly trained soldiers would adversely impact the unit mission performance. Therefore, to ensure sufficient competency of the training package, recommend the following exit criteria be established: "Require the exportable training package be thoroughly tested for adequacy and that it receive a satisfactory performance rating."

e. One last concern involves a deficiency in equipment planning for the National Guard. As noted in the Manpower Estimate Report, although there are requirements

for XXXXX in two National Guard units, there are no XXXXX radios available for those units. This could result in a serious operational and training problem for the Army.

3. Ordinarily, lacking four of the seven MANPRINT domain assessments would automatically mandate a RED program rating from this office. However, considering this is a limited production decision, we believe that by (1) using sufficient MANPRINT exit criteria at the end of the LRIP phase, (2) requiring IOTE test results prior to the Milestone III ASARC, and (3) requiring all seven domain MANPRINT domain assessments for the Milestone III ASARC Review, we can ensure there will be adequate safeguards in place to reduce potential MANPRINT performance risk.

4. Telephonic inquiries regarding this action may be addressed to XXXXXXXX, at DSN 225-XXXX, or COM (703) 695-XXXX.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

ROBERT F. HOLZ
Acting Director for Personnel
Technologies

D R A F T

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
300 ARMY PENTAGON
WASHINGTON, DC 20310-0300

DAPE-MR 1 Dec XX

MEMORANDUM THRU THE ASARC SECRETARY

FOR THE ASARC MEMBERS

SUBJECT: Manpower and Personnel Integration (MANPRINT) Assessment for the XXXXXX

1. Program is rated AMBER. There are no known issues that will prevent XXXXXX from proceeding to Phase III Production and Deployment. However, there are several issues that will require intensive management by the materiel and combat developers before fielding to ensure XXXXXX total system performance is optimized. The issues and specific domain ratings for each domain are addressed below:

a. Manpower - GREEN. There are no known issues.

b. Personnel - AMBER. There are two major personnel issues: late processing/approval of the Basis of Issue Plan (BOIP)/Qualitative and Quantitative Personnel Requirements Information (QQPRI) and late initiation of the process to create a transitional Additional Skill Identifier (ASI). The PM has obtained a deferment to the requirement for an approved BOIP/QQPRI 39 months prior to First Unit Equipped (FUE), and the U. S. Army XXXXXX School has made final MOS decisions and initiated a formal request to PERSCOM to create ASI XX, but these actions will not alleviate the need to intensively coordinate, manage and work both processes over the next year. BOIPs will be approved in September XX and ASI approval will take 8 months to one year. Both timeframes coincide with Initial Operational Capability (IOC) in 4QFYXX. Any delay in either process will have a negative impact on XXXXXX fielding. DAPE-MR will continue to work with the PM to support this action.

c. Training - GREEN. Although rated as Green, we yet have a concern regarding reading grade level (RGL) and completeness of XXXXXX training documentation.

Preliminary analysis of Initial Operational Test and Evaluation (IOTE) results indicate that a substantial amount of work will be needed to revise training material RGL to meet TRADOC requirements. In addition, results point to a deficiency of emphasis in training documentation on troubleshooting procedures and commonly encountered problems. IOTE results indicate the need for training enhancements in some areas, especially power supply. Losses of power that occurred during IOTE that caused the system to crash indicate the need for increased hands-on XXXX training, checklists of power switch procedures, and training enhancements to drill soldiers on correct procedures for switching power between the generator and the track. Other training enhancements are needed in the areas of guidance alerts and meanings of alerts and warnings. SMEs report that XXX software fixes may eliminate the need for some of these training enhancements, but the software solutions must be verified during Technical Testing (TT) next year. DAPE-MR recommends that the system documentation be updated to reflect these training issues at risk and document their closure in the future.

d. Safety - AMBER. Nine high risk hazards in the XXXXXX software are scheduled to be fixed in the next release of software, XXX. The required software fixes have been identified by the XXXXXX contractor and are scheduled for technical testing (TT) and verification in March XX. The Operational Test and Evaluation Command (ATEC) will provide test oversight. XXX will be fielded in Jan XX if the TT is successful and the version proceeds through CECOM materiel release. The XXXXXX System Safety Working Group (SSWG), the Army Safety Center, and Director, MANPRINT, expect these hazards to be fully mitigated with the software fixes. TECOM's materiel release is dependent upon tested and proven correction of the high risk hazards.

e. Human Factors Engineering - AMBER.

(1) Heat stress in the XXXXX is identified as a significant risk in terms of mission failure, degradation of mission performance, potential for causing life threatening heat stroke, loss of consciousness, coma and death. The XXXXX workspace temperature is often elevated to dangerous and debilitating levels (100 to 125 degrees F). The air exchange from inside the XXXXX to the outside ambient air is small. Therefore, humidity climbs rapidly to life threatening levels (inside the XXXXX) due to soldier sweat and other moisture that may have entered. Potential solutions are to mechanically cool the workspace air, or limit (XXXXX) vehicle use to cool areas. Although AMC has accepted the risk to safety and health by operating the XXXXX under hot climatic conditions (provided users are informed of the potential for heat stress injuries and exercise administrative controls to mitigate the hazard), human performance degradation and Manpower, Personnel and Training (MPT) issues E-mail (i.e., when administrative controls are used to relieve an operator to avoid heat stress, some other trained operator must be provided).

(2) Two major issues identified during Initial Operational Testing and

Evaluation (IOTE), were clock synchronization and frequent (system) rebooting. SMEs state that both will be corrected by software changes to XXX. Clock synchronization problems, if not corrected, could cause mission failure. ATEC analysis described frequent rebooting as a major indicator of the need for more specified troubleshooting training, especially for common problems. The report also noted that operators need more training on the meaning of alerts and warnings. The software revision should make the need for increased training less likely.

f. Health Hazards - AMBER. There are no health hazards directly associated with XXXXXX, apart from heat stress, but there are health hazards associated with different configurations of vehicles housing the XXXXXX and associated equipment. These are exposure to chemical substances (i.e., diesel exhaust), acoustic energy and temperature extremes. Recommendations are to prohibit operation of the XXXXX diesel engine when the XXXX is occupied. Diesel generator engine exhaust can be controlled by positioning generators downwind and as far away from personnel as possible. New noise data is needed on the XXXXX. Crew are required to wear the XX helmet with chin strap fastened at all times when the vehicle is operating, but from 30 to 59% of these helmets checked in the field are totally unserviceable for protection of hearing. Pending new noise data, double hearing protection must be worn for missions involving more than 30 minutes of stationary or 13 minutes of vehicle movement in a 24 hour period. Personnel noise exposure time must be limited to 12 hours per 24 hours with double hearing protection when operating in the stationary mode. Heat stress in the XXXXX is discussed under HFE. Rigid Wall Shelters (RWS) mounted on the XXXXX should be equipped with an Environmental Control Unit (ECU) capable of meeting heating requirements of MIL-STD-1472D. The XXXX should be equipped with a heater capable of meeting requirements of MIL-STD-1472D. DAPE-MR strongly recommends that these health hazards be considered during future XXXX and generator variant upgrades/new developments.

g. Survivability - AMBER. The Soldier Survivability (SSv) Domain Report found no critical problems for XXXXXX. A major problem is the unknown ability of the system to detect malicious codes. SLAD reports that the impact of the results of malicious codes on system performance is also unknown. SLAD concludes that there are no adverse effects that would delay the fielding of XXXXXX.

3. Direct telephonic inquiries regarding this assessment to XXXXXXXX, DSN 225-XXXX, or COMM 703-695-XXXX.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

ROBERT F. HOLZ
Acting Director for Personnel
Technologies

APPENDIX I

DEFINITIONS

This appendix contains definitions for MANPRINT-related terms.

— A —

Acquisition Strategy: The method utilized to design, develop, and deploy a system through its life cycle.

Army Systems Acquisition Review Council (ASARC): Top level DA corporate body for systems acquisition that provides advice and assistance to the Secretary of the Army and AAE. Reviews major defense acquisition programs and Army designated acquisition programs.

Automated Information System (AIS): A combination of information, computer, and telecommunications resources and other information technology and personnel resources that collects, records, processes, stores, communicates, retrieves, and displays information.

— C —

Combat Developer (CD): Command or agency that formulates doctrine, concepts, organization, materiel requirements, and objectives. May be used generically to represent the user community role in the materiel acquisition process (counterpart to generic use of MATDEV).

Concern: An issue identified within one or more of the MANPRINT domains, which is expected to result in one or more of the following problems: bodily injury to friendly personnel; reduced mission performance or effectiveness; system damage; or a negative impact on the ability of the MPT community to support fielding with trained and available personnel. Concerns should be resolved if time an resource permit. A concern may become a major issue over time. (See "critical issue" and "major issue.")

Critical Issue: An issue identified within one or more of the MANPRINT domains, which if uncorrected is expected to result in one or more of the following problems: system cannot be started or uncontrollably fails (e.g., engine quits); catastrophic injury or death to the crew or other friendly personnel; seriously degraded mission performance or effectiveness; requires major unprogrammed MPT resources; or jeopardizes the ability of the MPT community (TRADOC, PERSCOM, etc.) to support fielding with trained and available personnel. Critical issues which E-mail unresolved through the IPT process will be included in the IPT's report to the MDA, or in a separate MANPRINT report to the MDA. Critical issues must be resolved before proceeding to the next acquisition phase.

—E—

Early Comparability Analysis (ECA): ECA is an analytical process used to identify manpower, personnel, and training high-driver tasks in current predecessor or systems similar to that being developed. The objective is to design the new system such that these negative characteristics are avoided or minimized. A secondary benefit of the ECA is that insights may be gained into how to mitigate these impacts with the current system, either through changes in manning, personnel considerations, or training fixes.

—F—

Functional Expert: An individual who is an expert in a MANPRINT-related functional area (e.g., logistics, testing).

Functional Proponent (FP): The representative of the Army agency responsible for the subject area in which Information Mission Area (IMA) resources are utilized or to be utilized for Major Automated Information Systems (MAIS).

—H—

HARDMAN (Hardware vs. Manpower) Comparability Methodology (HCM): The HCM is an analytical tool, developed first by the Navy and adapted for use by the Army, used to estimate the quantitative manpower, personnel, and training requirements associated with the new system. The methodology is expensive, time-consuming, and requires a mainframe computer. However, selected portions of the methodology can be modified and used effectively.

Health Hazards (MANPRINT Domain): The inherent conditions in the use, operation, maintenance, repair, support, storage, and disposal of a system (e.g., acoustical energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes, trauma, and vibration) that can cause death, injury, illness, disability, or reduce job performance of personnel.

Health Hazard Assessment: A report, which identifies potential health hazards assigns risks, and provides recommended solutions that may be associated with the development, acquisition, operation, and maintenance of Army systems. The purpose is to preserve and protect the humans who will operate, maintain and support the equipment; enhance total system effectiveness, reduce system retrofit needed to eliminate health hazards; reduce readiness deficiencies attributable to health hazards; and reduce personnel compensation. The Army HHA Program at CHPPM prepares the Health Hazards Assessment Report (HHAR).

Human Factors Engineering: The comprehensive integration of human characteristics (including limitations or constraints) into system definition, design, development, and evaluation to optimize total system performance (the human-machine system) under operational conditions.

Human Factors Engineering Domain Assessment: A report prepared by ARL-HRED that reviews the status of human factors engineering as the system approaches the end of a life cycle phase. A major purpose of the report is to identify any design flaws which, taken singularly or collectively, may be so objectionable that, if not remedied, might warrant a decision not to transition to the next phase. It will also identify issues and concerns that, while not critical, should be resolved to enhance total system operational effectiveness.

— I

Improved Performance Research Integration Tool (IMPRINT): A MANPRINT tool consisting of multiple software components which can be used either singly or in a combination for a determination of the number, attributes, availability, and training needs of soldiers required to operate and maintain Army systems. It can be used to develop constraints and subsequently, to evaluate requirements.

Integrated Concept Team: A integrated team made up of people from multiple disciplines formed for the purposes of developing warfighting concepts, determining DTLOMS solutions to FOCs, developing materiel requirements documents, and developing other DTLOMS requirements documents, when desired.

Integrated Product Team (IPT): An team of representatives from all appropriate functional disciplines working together to build successful programs, identify and resolve issues, provide recommendations to facilitate sound and timely decisions.

Integrating Integrated Product Team (IIPT): An IIPT is a form of Working-Level IPT. It is headed up by the PM; its purpose is to coordinate WIPT efforts and cover all topics not otherwise assigned to another IPT.

— L

Life Cycle Management Model (LCM): A management process, applied throughout the life of a system, that bases all programmatic decisions on the anticipated mission-related and economic benefits derived over the life of the system.

—M—

Major Automated Information System Review Council (MAISRC): The MAISRC is the senior advisory body to the Milestone Decision Authority (MDA), providing advice on program readiness to proceed into the subsequent LCM phases and as to whether proposed plans for the subsequent LCM phases are consistent with sound management practices. It has been replaced by the IT OIPT (Information Technology Overarching Integrating Product Team).

Major Issue: An issue identified within one or more of the MANPRINT domains, which is expected to result in one or more of the following problems: extensive system damage; injury to friendly personnel; a major reduction in mission performance or effectiveness; or a major negative impact on the ability of the MPT community to support fielding with trained and available personnel. A major issue may become critical over time, and should be resolved as soon as possible in the next acquisition phase.

Manpower (MANPRINT Domain): The number of men and women, military and civilian, required, authorized and potentially available to train, operate, maintain, repair, supply, transport and provide base support for a system.

MANPRINT (Manpower and Personnel Integration): The comprehensive technical effort to identify and integrate all relevant information and considerations regarding the full range of manpower, personnel, training, human factors engineering, system safety, health hazards, and soldier survivability into the system development and acquisition process to improve individual performance, total system performance, and reduce the cost of ownership throughout the entire life cycle of a system.

MANPRINT Action Officer (AO): An individual held accountable by the Program Manager or (Branch, Specified or Functional) Proponent for assisting the implementing and managing of MANPRINT inputs and activities.

MANPRINT Assessment: An integrated assessment across each domain of the MANPRINT status of the system. The objective is to identify any unresolved MANPRINT issues or concerns. Issues still unresolved after coordination with the PM are presented to the ODCSPER for presentation at the ASARC/IT OIPT or similar milestone decision review. The assessment is drafted by ARL-HRED and finalized by the Director, PERTEC and signed for the DCSPER, DA.

MANPRINT Working-Level Integrated Product Team (MANPRINT WIPT): A body of experts in the MANPRINT domains and other functional areas who are responsible for assisting the PM in applying MANPRINT principles and practices to the system. *Materiel Developer:* The RDA command, agency, or office assigned responsibility for the system under development or being acquired. The term may be used generically to refer to the RDA community in the materiel acquisition process (counterpart to the generic use of CD).

MPT Assessments: Assesses the manpower, personnel and training risks of the system. It identifies any/all risks/issues prior to the milestone review. PERSCOM, DCSOPS, MPT Domain Branch will conduct the assessments on new and improved Major Automated Information Systems, Major Defense Acquisition Programs and Major Systems. ARL-HRED will the conduct the assessments on non-major systems when required.

Milestone Decision Review (MDR): The decision point, separating life cycle phases, at which the system's status is assessed for fitness to proceed to the next phase. The activities that have been performed in the preceding LCM phase, the status of program execution and program management's plans for the E-mailer of the program, are assessed and exit criteria for the next LCM phase are established during the milestone review and decision process.

— N —

NDI/COTS: A broad, generic term that covers materiel available from a wide variety of sources with little or no development effort required by the government. NDI/COTS items include items: available in the commercial marketplace; already developed and in use by other U.S. military services or government agencies or by a foreign government with which the United States has a mutual defense cooperation agreement; already being produced, but not yet available in the commercial marketplace.

— O —

Overarching Integrated Product Team (OIPT): OIPTs are formed to provide assistance, oversight and review as a program proceeds through its acquisition life cycle. They are composed of the PM, PEO, Component Staff, Joint Staff (if applicable), Under Secretary of Defense for Acquisition & Technology (USD(A&T)), and the OSD staff principals or their representatives.

— P —

Personnel (MANPRINT Domain): The cognitive and physical capabilities required to be able to train for, operate, maintain and sustain materiel and information systems. Included are the human aptitudes, skills, knowledge, and experiences required to perform job tasks included in the total system design compared to these characteristics possessed by the target audience.

Program/Project/Product Manager (PM): A HQDA board-selected manager for a system or program. A PM may be subordinate to either the AAE, PEO, or a materiel command commander. The title refers to the level of intensity the Army assigns to particular weapon or information systems. As a rule, a Program Manager is a General Officer or SES; a Project Manager is a Colonel or GS-15; and a Product Manager is a Lieutenant Colonel or GS-14.

—S—

Soldier Survivability (MANPRINT Domain): The design characteristics or operational requirements of a system that: reduce detectability by the enemy; reduce fratricide; facilitate cover and concealment; minimize likelihood and extent of injuries if engaged; and minimize physical and mental fatigue (a design concern shared with human factors engineering).

Soldier Survivability Domain Assessment: A report which addresses the system's ability to reduce fratricide, detectability, and probability of being attacked, as well as minimize system damage, soldier injury, and cognitive and physical fatigue. ARL-SLAD prepares this report.

System MANPRINT Management Plan (SMMP): The SMMP is the Army's Human Systems Integration Plan. It serves as a planning and management guide and as an audit trail to identify tasks, analyses, tradeoffs, and decisions that must be made to address MANPRINT issues during the system development and acquisition process. The SMMP may be updated as needed throughout the acquisition process and prior to each MDR. It is no longer mandatory but is an excellent managerial control tool.

System Safety (MANPRINT Domain): The design characteristics and operational characteristics (including operating procedure requirements) of a system that minimize possiblities of machine, personnel, or total system accidents or failures and create an acceptable level of risk.

System Safety Domain Assessment: A report which assesses the overall safety of the emerging or changing system and ensures that system safety issues and concerns, and recommended solutions, are integrated into the acquisition program. For major materiel systems, the U.S. Army Safety Center prepares this report; for AIS, U.S. Army Materiel Command prepares the report; for non-major systems, USAMC prepares the report.

—T

Target Audience Description (TAD): The TAD lists occupational identifiers for personnel who are projected to operate, maintain, repair, train, and support a specific future Army system. Further, for each identifier, the TAD provides an information source which will describe the characteristics of the personnel identified. Describing projected system personnel early in the acquisition process increases the Army's flexibility to achieve the best system solution in terms of design, affordability, supportability and performance. While a TAD is no longer mandatory, early identification of the target audience remains essential.

Total System: A total system includes not just the prime mission equipment, but the people who operate and maintain the system; how system security procedures and practices are implemented; how the system operates in its intended operational environment and how the system will be able to respond to any effect unique to that

environment (such as Nuclear, Biological and Chemical (NBC) or information warfare); how the system will be deployed to this environment; the system's compatibility, interoperability, and integration with other systems; the operational and support infrastructure (including Command, Control, Communications, Computers and Intelligence (C4I); training and training devices; any data required by the system in order for it to operate; and the system's potential impact on the environment and environmental compliance.

Total System Performance: Total system performance is customarily measured in two areas: effectiveness and suitability. Operational effectiveness is defined as the overall degree of mission accomplishment of a system when used by representative personnel in the environment planned or expected (for example, natural, electronic, threat, and so forth) for operational employment of the system considering organization, doctrine, tactics, survivability, vulnerability, and threat (including countermeasures; initial nuclear weapons effects; nuclear, biological, and chemical contamination threats). Operational suitability is defined as the degree to which a system can be satisfactorily placed in field use with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistic supportability, and training requirements.

Tradeoff Analyses: The system acquisition process consists of a continuous series of tradeoffs both at the macro and micro level. The critical factor is the "trade space". This is the range between objective and threshold that can be traded-off by the PM. The best time to reduce life-cycle costs is early in the acquisition process. Cost reductions should be accomplished through cost/performance tradeoff analyses conducted before an acquisition approach is finalized. MANPRINT should significantly impact the operating and support costs as part of the life-cycle costs. Every MANPRINT domain has its own cost implications and potential cost savings/avoidance.

Training (MANPRINT Domain): Consideration of the necessary time and resources required to impart the requisite knowledge, skills, and abilities to qualify Army personnel for operation, maintenance, repair, and support of Army systems. 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. It includes analyses of the tasks performed by the operator, maintainer, repairer, and supporter; 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.

—W—

Working-Level Integrated Product Team (WIPT): WIPTs are a form of IPT. They are made

up of representatives from the PM office, CD organization, Department of the Army (DA) staff, contractors, and other cognizant functional experts. They are headed up the PM or the PM's designated representative. Their purpose is to assist the PM to efficiently develop/acquire the new system by addressing all facets of the life cycle on as much of a real-time basis as is possible.