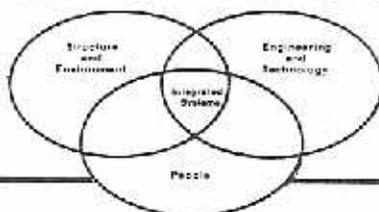




MANPRINT BULLETIN



NO. 1

JULY 1986

MANPRINT WHAT? WHY? WHO?

MANPRINT (MANPOWER AND PERSONNEL INTEGRATION)

The term "MANPRINT" was coined by General Richard H. Thompson, Commanding General, Army Materiel Command, in 1984 during a briefing on human factors, manpower, personnel and training in the materiel development and acquisition process. Since that initial briefing, major initiatives by the Army staff, the Army Materiel Command, the Training and Doctrine Command and the Operational Test and Evaluation Agency have expanded the scope of the MANPRINT concept. MANPRINT is now defined as:

A comprehensive management and technical program to improve total system (soldier and equipment) performance by the continuous integration of human factors engineering, manpower, personnel, training, system safety and health hazard considerations throughout the materiel development and acquisition process.

Although, MANPRINT is a recently instituted Army initiative, interest in such a concept began to grow in the early 1980's as the result of a series of reports such as the Kerwin and Blanchard Study and the Army Science Board Summer Studies. These studies were generated by a wave of high technology weapon systems combined with contemporary conflict experiences. These reports concluded that

(continued on page 2)

MESSAGE FROM: DCSPER

I would like to take this opportunity to welcome each and every recipient of this Bulletin to the family of individuals and organizations dedicated to making the MANPRINT Program as effective as its potential allows. While concerns for the individual soldier have always been a major component of the philosophy of the Army, MANPRINT promises to take these concerns to a new level of achievement both to the good of the individual as well as the effectiveness of the complete fighting unit.

ROBERT M. ELTON
Lieutenant General, GS
Deputy Chief of Staff for Personnel

LHX MANPRINT Implementation

According to a recent statement by Lieutenant Colonel J.E. Clay, U.S. Aviation Systems Command, the Light Helicopter Experimental (LHX) is writing history! Among the many reasons this system enjoys such prominence is that it is the first major Army program to implement MANPRINT considerations into the Front End Analysis (FEA) phase of the materiel acquisition process. More importantly, the LHX is the first program to include MANPRINT in the source selection document. Because

(continued on page 2)

(MANPRINT cont)

while our units might possess the most sophisticated and theoretically superior equipment, total performance potential might not be realized unless human performance was taken into account also. Hence, there is a new level of awareness concerning man-machine interface. This awareness has been the beginning of coordinated and integrated initiatives to improve the integration of the modern tools of battle with the individual soldier.

In addition, MANPRINT also addresses the Congressional concern that the Armed Forces get what they pay for in total weapons system performance, and that critical resources are not wasted to acquire high capability technology that exceeds the bounds of human performance. In the past, increased capability achieved with advanced technology, has often been accompanied by increases in soldier task complexity. System design was not impacted by MANPRINT design constraints or by a disciplined process that insisted on putting "the soldier-in-the-loop". Instead the system design process was built on the unstated premise that sufficient numbers of skilled soldiers would always be available to operate, support, and maintain the system.

The goal of the MANPRINT Program is to enhance total system performance by assisting the Army and industry in taking the necessary actions to answer the question: Can this soldier, with this training, perform these tasks, to these standards, under these conditions using this equipment.

(LHX...cont)

MANPRINT related considerations were equally weighted with technology and cost factors, contractors included comprehensive MANPRINT plans in their submissions to the Source Selection Evaluation Board--another first!

Moreover, key LHX program goals will be achieved through the use of a "road map" known as the System MANPRINT Management Plan - a document created during pre-concept exploration by a MANPRINT Joint Working Group. The SMMP will facilitate achievement of the LHX MANPRINT goals which include diminishing manpower/personnel quotas by forty-three percent, a thirty-seven percent decrease in the training requirements and a reduction in maintenance workload equal to forty-seven percent. In addition, the total requirements including logistic support, and fully trained personnel will be documented prior to production. Many of these goals are achievable because of the application of innovating technology and MANPRINT considerations in the initial design of this system.

The LHX is indeed writing history. Not only is the program using leading edge technology, it is also pioneering institution of the Army's philosophy of equipping the soldier rather than manning the equipment.

MANPRINT Training

As the primary source for implementing MANPRINT policy, ODCSPER is sponsoring three levels of courses for personnel involved in the materiel acquisition process. These courses are:

A four week course designed for entry level Combat Developers (CBTDEV), Materiel Developers (MATDEV), Training Developers (TD), Tester/Evaluator (TE), and selected DA Staff Officers.

A one week course designed for those CBTDEVs, MATDEVs, TDs, TEs and selected DA Staff Officers who are experienced with the materiel acquisition process.

A one day course for General Officers, Senior Executive Service (SES) personnel, Commandants, and Program Managers (PM) involved with the materiel acquisition process.

Beginning in FY 87 all four week courses will be condensed and presented in a 3 week format. Additionally, during FY 87 TRADOC will assume responsibility for all MANPRINT training courses. Commissioned officers will be awarded skill identifier 6S for successful completion of this course.

Personnel interested in attending any of these courses should contact the MANPRINT Policy Office, ODCSPER. The General Officer Management Office will schedule participants for the one day General Officer Course. A tentative listing of future course dates follows:

Four-Week Courses

Locations	Dates
Xerox Trng Ctr Leesburg, VA	22 JUL-15 AUG 86
Ft. Belvoir, VA	9 SEP-3 OCT 86
TBD	15 OCT-7 NOV 86

One-Week Courses

Locations	Dates
TBD	AUG 86 (Pilot)
TBD	22-26 SEP 86

One-Day Courses

Locations	Dates
TBD	Mid July 86

ARI MANPRINT Research and Support Program

The Army Research Institute for the Behavioral and Social Sciences (ARI), has initiated a wide-ranging program of research and support for MANPRINT. As an element of ODCSPER, ARI is responsible for providing R&D on MANPRINT-related analytical techniques. To accomplish these research efforts, ARI works intensively in selected weapons development programs to identify, test, and revise MANPRINT support technologies. At present, support is being provided to the LHX Helicopter, Advanced Field Artillery System, Forward Area Air Defense System, and Anti-Armor Weapons Systems offices.

The levels of support that ARI can provide to program offices within the context of its research mission can be characterized as extensive, medium, and light. Extensive support involves a long term resource commitment and includes the conduct of some of the required MANPRINT analyses. This level of support is reserved for programs that (a) have a significant potential manpower impact on the Army (b) are sufficiently early in the development process for MANPRINT to be fully effective, and (c) offer the opportunity to serve as a MANPRINT technology test bed. When mutual agreement exists to establish support, a Letter of Agreement is executed and a full program management plan is established. This support typically includes drafting the System MANPRINT Management Plan (SMMP), serving on working groups, and conducting selected analyses for the program. A medium level of support involves activities such as assisting with the SMMP, serving on working groups, contributing to the preparation of requirements documents, reviewing analyses, and, perhaps, serving on source selection boards. A light level of support is limited to a periodic review of system documen-

(continued on page 4)

(ARI MANPRINT...cont)

ation, serving on the MANPRINT Joint Working Group (MJWG), and providing consultation on specific issues as they arise.

The delivery mechanism for ARI support services is a combination of the Manned Systems Group in Alexandria, VA, and the ARI Field Units located at various posts around the country. The POC for more information on ARI support is Mr. John F. Hayes, Chief, Manned Systems Group, COM (202) 274-8883, AV (284).

METHODOLOGY FOR DEVELOPING HUMAN PERFORMANCE SPECIFICATIONS

U.S. Army Human Engineering Laboratory's Technical Memorandum 7-80 "A Concept for Developing Human Performance Specifications" by Johnathan D. Kaplan and William H. Crooks, dated April 1980, describes a conceptual model for human performance requirements in systems acquisition. The memorandum is a guideline for persons responsible for developing human performance specifications.

The methodology begins with the application of a series of functional profiles or templates taken from the Human Resources Test and Evaluation System (HRTES). The HRTES was developed by the Army Research Institute, as guidance for performing Operational Test and Evaluation.

Using these templates, the mission of the specific piece of equipment can be defined in terms of what it is supposed to do rather than in terms of its appearance. From this perspective, people are viewed as an extension of equipment and, therefore, human performance can be calculated into the total system performance.

For purposes of illustration, an example is presented that describes the development of mission specifications for a selected system.

MISSION: Destroy Enemy Armored Vehicles

FUNCTION: Acquire Target(s)

TASK: Identify Target(s)

CONDITIONS: General environment-system crew, buttoned up, using NBC gear, rain, moonless night. Target presentation - 10° positive ground slope; dense brush; T72 tank, 3000 meters, crossing at 30 KPH; azimuth-left 60°, 0°, right 30°, right 60°. If humans perform this task they are to be personnel who: have Army average experience and aptitudes, have had a maximum of 3 weeks on-the-job training prior to the task, have had 2 continuous weeks without training or practice prior to this task, and have engaged in 20 hours of simulated, continuous combat immediately prior to this task.

The specifications for successful system performance may be defined as follows:

1. Task completed within 20 seconds of target presentation at given range.
2. No errors allowed in differentiating between enemy and friendly targets.
3. Within friendly/enemy categories, incorrect model identification accepted if target type is correct (e.g., medium tank).
4. No errors allowed in identification of target type for one or two simultaneous targets.
5. A maximum target type error rate of 25% is allowed for more than three simultaneous presentations.
6. No significant accidents or near accidents involving system personnel or other major system components is acceptable if potential damage to those personnel or components might result.

Given these criteria for acceptable performance, the probability of task success can be projected at 80%.

(continued on page 5)

READERS RESPOND

This Bulletin is for the MANPRINT community. It is intended to inform, educate, stimulate, communicate, and in all ways support the MANPRINT initiative and all those involved with it. You have received this first issue of the MANPRINT BULLETIN by virtue of your association with the program, your expressed interest in MANPRINT activities or your position or function in the materiel acquisition process. In an effort to better organize the distribution of the Bulletin and simultaneously improve its value to the MANPRINT community, we would like to ask you, the reader, to take a moment to provide us with information which will help us achieve this goal. If your address is not correct, please fill in the address box below to ensure that you receive future issues of the Bulletin. The additional information requested will help us in understanding your needs and addressing them.

NAME (Last) (Rank-First) (MI) _____

ORGANIZATION-FUNCTION _____

MAILING ADDRESS _____

PHONE _____ AV _____ COMM _____

The MANPRINT focus extends from initial system conceptualization through fielding, operation and total support of military systems and their crews. Describe briefly your place or point of interest in this continuum.

- Combat Developer _____
- Materiel Developer _____
- Training Developer _____
- Test & Evaluation _____
- ILS Support _____
- TSM _____
- Industry _____
- Senior Management _____
- Other _____

In future issues of this Bulletin, we will include regular column subjects. This will aid both the reader and contributor in the communications process. Listed below are several of the column topics. Please indicate with a circle whether you Support (S), Reject (R), or have a Wait and See (W/S) attitude toward the columns.

RESEARCH ARENA
 (i.e., Articles on what activities laboratories and research facilities are currently engaged in).
 S R W/S

INDUSTRY ACTIVITIES
 (i.e., Date and attendance information for joint meetings and conferences of interest to the military and Industry).
 S R W/S

EDUCATION - TRAINING
 (i.e., Dates, attendance information and synopsis of MANPRINT related training activities).
 S R W/S

IDEA SHARING
 (i.e., Brief description of new concepts for satisfying various MANPRINT requirements).
 S R W/S

THE LIBRARY

(i.e., Publications lists and bibliographies of new documents with interest to the MANPRINT community).

S R W/S

HOW TO

(i.e., Articles suggesting new approaches to carrying out program activities).

S R W/S

UPCOMING EVENTS

(i.e., Contact and attendance information on upcoming events of general interest).

S R W/S

NEWS FROM OTHER SERVICES

(i.e., Articles on man-machine interface topics from other services).

S R W/S

WHAT'S COMING UP

(i.e., Articles and features which will appear in forth coming issues of the MANPRINT Bulletin).

**OTHER SUGGESTED TOPICS
OR FUNCTIONS**

Your nickels's worth:

Thank you for your time and effort.

.....

FROM:

**TO: MANPRINT Policy Office
HQDA (DAPE-ZAM)
Washington, D.C. 20310-0300**

(METHODOLOGY...cont)

Once these system performance standards and a probable success rate have been identified, the Human Factors Engineering specialist can now begin to design a system which will effectively accomplish the mission of destroying enemy armored vehicles. This approach to system development enables early definition of the total requirements, both human and equipment, needed to ensure successful system performance.

DEVELOPING A TARGET AUDIENCE DESCRIPTION

A Target Audience Description (TAD)¹ describes the quantity and qualifications of those who will operate, maintain and support a weapons system. Individual qualifications on all relevant dimensions: physical, mental, physiological, biographical, and motivational should be addressed, particularly as they relate to the ability to accomplish operational, maintenance and support tasks. Selected aspects of the TAD, including the contents and responsibilities for development and communication of the requirements, are discussed below.

The contents of the TAD depend on the range of specific system performance requirements and tasks that are required to operate, maintain and support the system. The description should contain: current or projected force structure, designated Military Occupational Specialties (MOS) and civilian job categories; anthropometric, physical and aptitude descriptions of the target populations; biographical information; skills and knowledge profile; and task performance information.

¹This discussion is a synopsis of the information presented in the MANPRINT Primer, Appendix E, 22 May 1986. MANPRINT Planning and Policy Office, HQ DA DAPE-PSR, Washington, D.C.

The description of the force structure should include the numbers of persons by skill level and experience who will operate, maintain and support the system. The force structure, established at a constant end strength, can be obtained from the Military Personnel Center (MILPERCEN)-Force Management Book (MILPERCEN-COM (703) 325-7500/AV 221).

Generic MOS descriptions are available in Army Regulation (AR) 611-201. Generic officer descriptions are in AR 611-101/AR-611-112. Civilian classification descriptions are in the Office of Personnel Management (OPM) "Handbook of Occupational Groups and Series of Classes."

A starting point for obtaining information for anthropometric descriptions is the U.S. Army Human Engineering Laboratory. Anthropometric data should address the range of physical dimensions and not be limited to the average of the target population.

Physical qualifications are provided in the PUHLES or Physical capacity, Upper extremities, Hearing, Lower extremities, Eyes and Psychiatric profile, as well as the Military Entrance Physical Strength Capacity Test (MEPSCAT). The PUHLES defines both the broad physical demands of an MOS and the physical ability required to perform the tasks within an MOS. The MEPSCAT assesses physical strength capacity to determine the match between a person's capacity and the specific job for which he or she is enlisting.

The aptitude description includes the aptitude requirements for each MOS and an explanation of the meaning of the test scores. Biographical information should contain data such as the percentage of high school graduates in the target population. Data relating to special abilities such as familiarity with the metric system or computers might also be included.

(continued on page 6)

(DEVELOPING A TARGET...cont)

The skills and knowledge profile will list individual training received in formal settings and on the job. Task Performance data for operator, maintainer and support tasks should be included to show how task performance relates to key characteristics of the target population.

The information in the TAD is used to communicate MANPRINT requirements to potential government contractors. The Training and Doctrine Command or the combat developer prepares the Target Audience Description and provides it to the materiel developer or the Army Materiel Command. The information is incorporated in the Request for Proposal provided to contractors. Subsequently, these contractors use the TAD to make design decisions to meet government performance requirements for the system under consideration. The TAD is, therefore, a key element in the success of the MANPRINT initiative.

**MANPRINT
INFORMATION SERVICE**

In the near future, a general inquiry response facility will be established to support the MANPRINT Program effort. The information service is now in the concept stage of development. The service will be designed to provide feedback, within 24 hours, to those asking questions.

Present alternatives suggest the use of either a MANPRINT information terminal on the ARPA/MIL Net or a telephone "800" information and inquiry service. Your preference or alternative suggestions are invited since you will be the potential user of this service. The point of contact for suggestions is: MANPRINT Policy Office, HQDA (DAPE-ZAM), Washington, D.C. 20310-0300. (AV 225-9213)

MANPRINT BULLETIN PUBLICATION

This Bulletin is edited and published monthly by Automation Research Systems, Limited (ARS) after review and approval by the ODCSPER. For information concerning this publication contact the MANPRINT Policy Office (Patricia Colliver - Autovon 225-9213) or ARS (703) 820-9000. Readers are invited to submit articles for publication or suggestions for articles/features you would like to see published. Submit to: MANPRINT Policy Office, HQDA (DAPE-ZAM), Washington, D.C. 20310-0300, (formerly MANPRINT Policy, Research, and Planning, DAPE-PSR).