

MANPRINT

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1. Introduction. Manpower and Personnel Integration (MANPRINT) is the Army's program to ensure that the "human" is fully and continuously considered as part of the total system in the development and acquisition of all systems and that human performance is always considered as part of "total system performance."¹

2. Objectives. At the conclusion of this unit, you should be able to:

- a. Define MANPRINT and its seven domains.
- b. Discuss the objectives of MANPRINT and its role in achieving total system performance.
- c. Discuss MANPRINT's timely participation in the acquisition of a developmental system.
- d. List selected organizations involved in MANPRINT and describe their functions.

3. Seven MANPRINT Domains. MANPRINT integrates and facilitates trade-offs among the following domains but does not replace individual domain activities, responsibilities, or reporting channels:

a. **Manpower.** The personnel strength (military and civilian) available to the Army. Manpower refers to the consideration of the net effect of Army systems on overall human resource requirements and authorizations (spaces), to ensure that each system is affordable from the standpoint of manpower. It includes analysis of the number of people needed to operate, maintain, and support each new system being acquired, including maintenance and supply personnel, and personnel to support and conduct training. It requires a determination of the Army manpower changes generated by the system, comparing the new manpower needs with those of the old system(s) being replaced, and an assessment of the impact of the changes on the total manpower limits of the Army.

b. **Personnel Capabilities.** Military and civilians possessing the aptitudes and grades required to operate, maintain, and support a system in peacetime and war. Personnel refers to the ability of the Army to provide qualified people in terms of specific aptitudes, experiences, and other human characteristics needed to operate, maintain, and support Army systems. It requires a detailed assessment of the aptitudes which personnel must possess in order to complete training successfully and operate, maintain, and support the system to the required standard. Iterative analyses must be accomplished for the system being acquired, comparing projected quantities of qualified personnel with the requirements of the new system, any system(s) being replaced, and overall Army needs for similarly qualified people. Personnel analyses and

¹ AR 602-2, Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process.

projections are needed in time to allow orderly recruitment, training, and assignment of personnel in conjunction with system fielding.

c. Training. Considerations of the necessary time and resources required to impact the requisite knowledge, skills, and abilities to qualify army personnel for operation, maintenance, and support of army systems. It involves (1) formulating and selecting engineering design alternatives which are supportable from a training perspective (2) documenting training strategies, and (3) determining resource requirements to enable the Army training system to support system fielding. It includes analyses of the tasks which must be performed by the operator, maintainer, and supporter; the conditions under which the tasks must be performed; and the performance standards which must be met. Training is linked with personnel analyses and actions because availability of qualified personnel is a direct function of the training process.

d. Human Factors Engineering. “Human Factors Engineering is the technical effort to integrate design criteria, psychological principles, and human capabilities as they relate to the design, development, test, and evaluation of systems. The human factors engineering goals are:

(1) To maximize the ability of the soldier to perform at required levels by eliminating design-induced error.

(2) To ensure materiel maintenance, support, and transport are compatible with the capabilities and limitations of the range of fully equipped soldiers who would be using such materiel. Human factors engineering provides an interface between the MANPRINT domains and system engineers. Human factors engineering supports the MANPRINT goal of developing equipment that will permit effective soldier-machine interaction within the allowable, established limits of training time, soldier aptitudes and skill, physical endurance, physiological tolerance limits, and soldier physical standards. Human factors engineering provides this support by determining the soldier’s role in the materiel system, and by defining and developing soldier-materiel interface characteristics, workplace layout, and work environment.”²

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

f. Health hazards. The inherent conditions in the use, operation, maintenance, support 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.

g. Soldier survivability (SSv). (A soldier within the context of MANPRINT may refer to a military or a civilian.)

² AR 602-1, Human Factors Engineering Program.

(1) System. The characteristics of a system that can reduce fratricide, reduce detectability of the soldier, prevent attack if detected, prevent damage if attacked, minimize medical injury if wounded or otherwise injured, and reduce physical and mental fatigue.

(2) Soldier. Those characteristics of soldiers that enable them to withstand (or avoid) adverse military action or the effects of natural phenomena that would result in the loss of capability to continue effective performance of the prescribed mission.

4. MANPRINT Objectives and Concept.

a. MANPRINT is intended to influence the design of developmental systems and the selection of nondevelopmental systems with the primary goal (objective) of *achieving maximum total system effectiveness at a reasonable cost of ownership*. The implementation of MANPRINT impacts total system performance (both effectiveness and availability) by making explicit the role that soldier performance plays and is shaped by design factors. MANPRINT also addresses the manpower, personnel, and training resources needed to achieve the required performance and, where possible, indicates more affordable configuration of manpower, personnel, and training resources.

b. The engineering design philosophy of MANPRINT is focused on optimum system performance on the battlefield, which includes consideration of both soldier and equipment capabilities and survivability. MANPRINT is an option-oriented process as opposed to an objective-oriented process. The MANPRINT process will provide decision makers information upon which to make trade-offs in areas such as quality and numbers of people, training times, technology, conditions, standards, costs, survivability, safety, health hazard risks, design and interface features, and personnel assignment policy.

c. The body of MANPRINT expertise, formerly known as the MANPRINT Joint Working Group, will continue to function through the Integrated Concept Team (ICT) and the Integrated Product Team (IPT) process. The MANPRINT members of the ICT will transition to the MANPRINT Working IPT (WIPT) when applicable. The purpose of this body is to assist the combat developer (CBTDEV) (or functional proponent) and program manager to ensure MANPRINT principles are applied to the system, provide MANPRINT input to the Mission Needs Statement (MNS) and the Operational Requirements Document (ORD), and provide a tracking system and historical database of MANPRINT issues

5. MANPRINT in System Design and Development.

a. MANPRINT technology base activities are concerned with increasing the body of knowledge relevant to actual or potential military human performance requirements. MANPRINT research and development produces information relevant to the design of systems and facilities. MANPRINT focuses on defining the human-centered issues identified for any given developmental approach. In addition, MANPRINT research focuses on emerging technologies to identify soldier performance enhancements and limitations and to indicate the most effective use of technology to replace or supplement human activity.

b. MANPRINT supports determination and definition of system or materiel needs by providing total system performance forecasts for various concepts and by estimating the manpower, personnel, and training costs of alternatives. Human performance reliability data should be collected and evaluated to determine whether the proposed system concept delivers the expected performance using personnel with no greater aptitudes and no more training than planned.

c. MANPRINT supports the concept and studies activities through analyses focused on the human element impact on operational effectiveness and manpower resources.

d. MANPRINT front-end analyses are performed early in the development process and should focus on predecessor systems and lessons learned.

e. MANPRINT products, requirements, and activities should be integrated into the system procurement documents (contracts) and processes to include being a major area for source selection consideration.

f. MANPRINT data should be developed to support cost and other trade-off analyses, the Basis of Issue Plan *Feeder Data*(BOIPFD) and the Qualitative and Quantitative Personnel Requirements Information (QQPRI) document. Additionally, MANPRINT issues should be incorporated into the system's test and evaluation program. A MANPRINT assessment should be prepared or updated for each milestone decision review.

g. In preparing for system fielding, MANPRINT actions should ensure new equipment training and institutional training are ready to prepare personnel to operate, maintain, and support the emerging materiel, and manpower spaces are documented with sufficient lead time to ensure that personnel with the requisite skills and abilities are available to fill these spaces.

i. MANPRINT contributions to nondevelopmental acquisition programs are similar to those made for developmental programs. MANPRINT should be an evaluation factor in the market survey.

j. When a system is being modified, MANPRINT activities are an integral part of the modification. MANPRINT activities should be tailored to meet the needs of the system modification program.

6. Organizations and Key Personnel Involved in MANPRINT.

a. The Deputy Chief of Staff for Personnel (DCSPER) exercises primary Army staff responsibility for the MANPRINT Program. The DCSPER establishes MANPRINT policy and finalizes MANPRINT assessments for major programs.

b. The ICT group leader will ensure MANPRINT is incorporated in the ORD and track MANPRINT issues via System MANPRINT Management Plan (SMMP) and Common Data Elements(CDEs). The CDE format is: Issue, Impact, What has been done, What has not been attempted and Who the proponent agency is. These issues will be passed to the TSM and PM.

Additionally, the ICT group leader will have a MANPRINT representative at all materiel solution ICTS.

c. Once appointed, the program manager is responsible for executing the MANPRINT Program. This includes providing funding, resolving issues and concerns, and incorporating MANPRINT into program planning documents (e.g., contracts, Test and Evaluation Master Plan, Acquisition Logistics Plan, and equipment publications.) The program manager should brief the status of MANPRINT efforts at milestone decision reviews.

d. The US Army Research Laboratory-Human Research Engineering Directorate (ARL-HRED) is the MANPRINT focal point. In addition they are the human factors engineering experts, The US ARL Research Laboratory -Survivability Lethality Analysis Directorate (ARL-SLAD) is the soldier survivability expert. Participates in the ICTs and MANPRINT WIPT as necessary. ARL-SLAD produces Survivability Assessments.

g. Commanding General, U.S. Total Army Personnel Command (PERSCOM) Deputy Chief of Staff for Operations (DCSOPS) Force Integration Division (FID) MPT Domain Branch Participates in the ICTs and MANPRINT WIPT as necessary.

h. Office of the Surgeon General (OTSG) U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), HHA Program Executive Agent performs Health Hazard Assessments. Participates in the ICTs and MANPRINT WIPT as necessary.

i. U.S. Army Safety Center, Independent Safety Assessors perform Safety Assessments. Participates in the ICTs and MANPRINT WIPT as necessary.

7. Review Questions.

- a. Define MANPRINT. (Paragraph 1.)
- b. What are the seven MANPRINT domains? (Paragraph 3.)
- c. What is the objective of the MANPRINT program? (Paragraph 4.a.)
- d. Describe how MANPRINT helps achieve total system performance? (Paragraphs 4. a. and b.)
- e. Describe the influence of MANPRINT analyses and other products on the development process. (Paragraph 5.)
- f. Who is overall responsible for the Army MANPRINT Program? (Paragraph 6.a.)
- g. Who is responsible for ensuring MANPRINT is incorporated into the ORD? (Paragraph 6.b.)

- h. What MANPRINT responsibilities are discharged by the program manager? (Paragraph 6.c.)
- i. What agency is the focal point for MANPRINT efforts for ICTs and IPTs (Paragraph 6.d.)
- j. Who is responsible for providing technical advisory assistance to program managers on human factors engineering?(Paragraph 6.d.)
- k. Who is responsible for Soldier Survivability Assessments? (Paragraph 6.e.)
- l. Who is responsible for Health Hazard assessments? (Paragraph 6.g.)
- m. Who is responsible for Safety Assessments? (Paragraph 6.h.)