Army Regulation 602–1

Soldier–Materiel Systems

Human Factors Engineering Program

Headquarters
Department of the Army
Washington, DC
08 February 91

Unclassified

SUMMARY of CHANGE

AR 602–1
Human Factors Engineering Program

This revision-

- Implements policies and procedures contained in the revision of AR 602-2.
- Clarifies the relationship between the human factors engineering program and the MANPRINT program (para 1-5).
- Assigns responsibilities to program executive officers and project or product managers (chap 2).
- Redefines HQDA responsibilities to reflect the reorganization of the DA Staff (chap 2).
- Replaces product improvement section with materiel change management (para 3-9).
- Redefines the Human Factors Engineering Assessment (app B).

Headquarters
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Effective 08 March 91

Soldier–Materiel Systems

Human Factors Engineering Program

By Order of the Secretary of the Army:
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General, United States Army
Chief of Staff
Official:
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History. This UPDATE printing publishes a revision of this publication. Because the publication has been extensively revised, the changed portions have not been highlighted.

Summary. This regulation, which covers policies and procedures for human factors engineering (HFE) in the Department of the Army (DA), has been revised. The revisions are responsive to:

a. Changes in materiel acquisition policies and procedures that influence the process of integrating the soldier and the materiel being acquired into a cost–effective system.

b. Policies and procedures specified in AR 602–2, Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process (MAP).

c. DA emphasis on front–end planning, nondevelopmental item (NDI) acquisition, and materiel change management.

Applicability. This regulation applies to the Active Army, the Army National Guard, and the U.S. Army Reserve.

Proponent and exception authority. Not applicable.

Army management control process. This regulation is subject to the requirements of AR 11–2. It contains internal control provisions but does not contain checklists for conducting internal control reviews. These checklists are being developed and will be published at a later date.

Supplementation. Supplementation of this regulation and establishment of command and local forms are prohibited without prior approval of HQDA, (DAPE–MRP), WASH DC 20310–0300.

Interim changes. Interim changes to this regulation are not official unless they are authenticated by the Administrative Assistant to the Secretary of the Army. Users will destroy interim changes on their expiration dates unless sooner superseded or rescinded.

Suggested Improvements. The proponent agency of this regulation is the Office of the Deputy Chief of Staff for Personnel (ODCSPER). Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to HQDA (DAPE–MRP), WASH DC 20310–0300.

Distribution. Distribution of this publication is made in accordance with the requirements on DA Form 124E, block number 3628, intended for command level D for Active Army, Army National Guard, and U . S Army Reserve.

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* This regulation supersedes AR 602–1, 15 February 1983.

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Chapter 1
Introduction

1–1. Purpose

This regulation–

a. Establishes policies, procedures, requirements, and assigns responsibilities for human factors engineering (HFE) in the Department of the Army (DA).

b. Emphasizes front–end planning and soldier performance database development to facilitate integrating human factors engineering into the Army materiel system acquisition process, thereby reducing the impact on manpower, personnel, and training resources, while reflecting system safety and health hazard constraints.

1–2. References

Required and related publications are listed in appendix A.

1–3. Explanation of abbreviations and terms

Abbreviations and special terms used in this regulation are explained in the glossary.

1–4. The HFE Program

This program–

a. Is a comprehensive management and technical effort to generate and apply human factors engineering data and principles to the materiel development and acquisition process for the purpose of enhancing soldier–materiel system performance.

b. Is applied early in the process for the Concept Based Requirements System (CBRS).

c. Provides inputs to special studies (see AR 5–5), Manpower and Personnel Integration (MANPRINT) reviews, assessments, plans, and requirements.

d. Identifies potential issues, concerns, and voids in the HFE database.

e. Provides a mechanism in the materiel acquisition process for u the following:

(1) Addressing human performance requirements, human engineering design criteria and program requirements during system definition, design, development, and evaluation.

(2) Feeding field evaluation data back into the soldier performance database for the design of next generation equipment.

f. Includes, but is not limited to, the following activities:

(1) Determining and evaluating requirements for overall system performance based upon capabilities and limitations of soldier performance.

(2) Developing and applying HFE methodologies to analyze human factors engineering, human performance, and workload requirements in an effective, integrated, and coordinated manner.

(3) Developing, maintaining, and using human factors databases.

(4) Developing design guidelines and standards that will enhance soldier–materiel interaction within the established performance limits, training time, soldier aptitudes and skills; and cognitive, physical, and physiological tolerance limits.

(5) Defining, developing, or selecting those soldier–materiel interface characteristics that enhance human performance, reduce or eliminate safety and health hazards, and reduce demands and costs for personnel, skills, and training.

(6) Developing and evaluating operator and maintainer task procedures; for example, interaction of crew members to ensure effective and efficient work patterns and workload, to support design tradeoff and decision efforts, and to provide such information for technical publications, manuals, and training media preparation.

(7) Determining human performance and workload requirements for new systems and materiel–changed systems.

(8) Evaluating system performance as a function of soldier materiel interface and human performance.

(9) Applying, as appropriate, HFE methodologies to developmental items, nondevelopmental items (NDI), and materiel–changed systems.

(10) Conducting research required to resolve HFE problems encountered in materiel development programs.

1–5. Policies

a. HFE is a management and technical effort to integrate the human element into the design of systems. HFE is concerned with mission effectiveness workload, human performance, skills, number of personnel, safety and health hazards, training, and other related people–type implications, as they apply to the design of the soldier materiel interface, safety, training, selection, manning, and related efforts.

b. HFE will be used to integrate materiel development with personnel capabilities and limitations during all phases of the life cycle of materiel systems (to include developmental and nondevelopmental acquisitions, as well as materiel change) and nonstandard commercial equipment procurement by major Army commands (MACOMs) and Field Operating Agencies (FOAs). HFE principles, methods, and techniques will be applied to systems, equipment, and facilities, including support equipment, software, training equipment and devices, and skill performance aids.

c. HFE will be accorded an equal priority with other system engineering activities during the materiel acquisition process to ensure effective soldier–materiel operational interface.

d. HFE, biomedical, and behavioral research will be conducted to address gaps that may develop in the HFE database or when novel human factors problems are identified in Army development programs (see AR 70–8).

e. Human factors engineering assessments (HFEAs) will be initiated 6 months prior to major milestones for all materiel acquisitions (developmental, nondevelopmental, and materiel change). No waivers will be granted. Assessment scope will depend on the system under study.

f. HFE is one of six MANPRINT domains (see AR 602–2) and will interface with the MANPRINT Joint Working Group (MJWG) and other MANPRINT domains to produce tradeoffs and MANPRINT positions for acquisition process decision making.

1–6. Objectives

The objectives of the HFE program are to–

a. Influence soldier–materiel system design to achieve total system performance requirements.

b. Ensure that Army materiel systems, and concepts for their employment, are consistent with the capabilities and limitations of the fully equipped soldier to safely operate, maintain, supply, and transport the materiel in its operational environment consistent with tactical requirements and logistic capabilities.

c. Influence total life cycle costs of personnel resources and training resources–

(1) During the conceptual phases for each alternative system considered.

(2) During subsequent acquisition phases for the selected system.

d. Ensure that equipment designs and operational concepts are compatible with the capabilities and limitations of the operators, maintainers, and supporters as defined by the target audience description (TAD) in the System MANPRINT Management Plan (SMMP). (See AR 602–2.)

e. Develop an HFE database of performance–indexed soldier characteristics; for example, target audience descriptors indexed to soldier performance capabilities. The database will provide a method for translating TADs to performance capabilities that are usable as design inputs.

f. Define and develop soldier–unit performance matrices and measures of effectiveness (MOE) (based on the performance–indexed soldier characteristics database) for application to establishing and determining total system performance.

1–7. Scope

This regulation applies to Headquarters, Department of the Army (HQDA), all Army agencies, and major field commands with responsibilities for—

a. Mission area analysis.

b. Organization and doctrine.
c. Tactics and concept.
d. Materiel requirements.
e. Research, development, test, and evaluation of materiel.
f. Production and procurement of materiel systems.
g. Management of personnel resources.
h. Development of personnel resources.
i. System safety engineering.
j. Health hazard assessment.
k. Integrated logistic support.
l. System reliability, availability, and maintainability engineering.
m. Development of training devices.
n. Human factors engineering.

Chapter 2
Responsibilities

Section I
HQDA Elements

2–1. Assistant Secretary of the Army for Research, Development, and Acquisition (ASARDA)

The ASARDA will—

a. Include research, development, test, and evaluation (RDTE) funds for HFE in the annual submission of the Program 6 budget.

b. Establish Army policy and guidance to ensure proper and systematic application of HFE throughout the materiel development and acquisition process.

c. Verify. in coordination with HQDA, Office of the Deputy Chief of Staff for Personnel (ODCSPER), the application of HFE requirements before production of materiel.

d. Ensure, in coordination with HQDA, ODCSPER, application of HFE requirements in system modification or materiel change actions.

2–2. Director of Information Systems for Command, Control, Communications, and Computers (DISC4)

The DISC4 will—

a. Establish policy and guidance to integrate HFE considerations into the preparation of requirements documents and the development and acquisition of information management systems.

b. Ensure the application of HFE methodologies, design, and performance requirements to hardware and software development, modification, and acquisition programs under the Information Mission Area of responsibility.

c. Verify, in coordination with HQDA, ODCSPER, the application of HFE requirements before production of materiel or information systems.

d. Ensure, in coordination with HQDA, ODCSPER, application of HFE requirements in system modification or materiel change actions (hardware and software).

e. Ensure the inclusion of HFE issues in operational testing, technical testing, and user testing and evaluations.

2–3. Deputy Chief of Staff for Personnel (DCSPER)

The DCSPER will—

a. Exercise primary Army Staff responsibility for the HFE Program.

b. Coordinate HFE policy with the Army Staff.

c. Provide behavioral sciences and HFE research support to ensure the scientific basis for HFE. The DCSPER HFE research and development program is executed through the U.S. Army Human Engineering Laboratory (HEL), the Army's lead laboratory for HFE, an agency of the U.S. Army Laboratory Command (LABCOM).

d. Review and monitor materiel objectives, requirements documents, SMMPs, acquisition plans, and other activities for major and Level I nonmajor programs for which DA has oversight to assure the proper application of HFE during system development. Ensure that HFE is addressed during front–end analysis activities and continuously throughout the materiel or software acquisition process.

e. Encourage professional coordination and collaboration among human factors engineers, behavioral scientists, system safety engineers, logistics engineers, and biomedical scientists.

f. Review HFEAs for Major and Level I nonmajor systems for which DA has oversight.

g. Develop, coordinate, and disseminate HFE program policy and guidance to all Army commands and agencies

2–4. Deputy Chief of Staff for Logistics (DCSLOG)

The DCSLOG will—

a. Ensure HFE considerations and design criteria are integrated into the development of logistics systems (such as packaging, handling, storage, maintenance, transportation, and disposal).

b. Ensure HFE program results are considered in the implementation of Integrated Logistic Support Policy for developmental, nondevelopmental, and materiel–changed systems.

c. Ensure Integrated Logistic Support Plan (ILSP) development considers relevant HFE guidance and concerns in the SMMP.

2–5. Deputy Chief of Staff for Operations and Plans (DCSOPS)

The DCSOPS will—

a. Ensure application of HFE in combat developments during the preparation of initial and subsequent requirements documents and in the review of the acquisition objectives for total system feasibility.

b. Ensure inclusion of relevant HFE data in establishing requirements for training devices for new equipment training, institutional training, and unit and joint–Service training.

c. Ensure inclusion of HFE issues in operational testing, technical testing, and user testing and evaluations.

d. Ensure HFE is addressed by all special task forces (STFs) according to AR 71–9.

e. Coordinate with DCSLOG HFE requirements and changes affecting—

(1) Logistical support policies.
(2) Logistics systems development requirements.

2–6. Deputy Chief of Staff for Intelligence (DCSINT)

The DCSINT will—

a. Establish policy and guidance to integrate HFE considerations into the preparation of requirements documents and the development and acquisition of intelligence and security materiel systems.

b. Ensure the application of HFE methodologies, design, and performance requirements to intelligence and security materiel systems' development, modification, and acquisition.

c. Ensure the inclusion of HFE in operational testing, technical testing, and user testing and evaluations.

2–7. The Surgeon General (TSG)

TSG will—

a. Provide consultation and advice to the Army Staff and system developing agencies on the medical aspects of HFE.

b. Monitor throughout the materiel development and acquisition cycle the HFE application of biomedical and health standards.

c. Develop medical databases and needed health standards to support HFE application to Army systems.

d. Perform appropriate medical RDTE tasks for nonmedical development and acquisition programs.

e. Interface with the HFE Program by managing and instituting the policies and procedures specified for the Health Hazard Assessment Program in support of the materiel acquisition decision process (see AR 40–10).

Section II
Commanders of Major Army Commands

2–8. Commanding General, U.S. Army Materiel Command (CG, AMC)

The CG, AMC, will—

a. Integrate HFE (including inputs from Army personnel, training, testing, medical, safety, and research activities) into the materiel research, developmental, nondevelopmental, materiel change, and acquisition programs.

b. Include HFE human performance, work, design, and data requirements in solicitation packages.

c. Develop, coordinate, and implement an HFE program, to include the preparation of design and performance specifications, standards, and procedures.

d. Provide HFE orientation for Program executive officers (PEOs) and program, project, or product managers (PMs).

e. Ensure inclusion of HFE in technical testing, and technical evaluations and assessments.

f. Ensure HFE–qualified specialists are assigned to materiel developmental, nondevelopmental, and materiel change programs.

g. Improve the Army's capability for HFE management by sup porting studies to improve HFE methodologies.

h. Perform appropriate basic and applied HFE RDTE.

i. Ensure coordination with Commanding General, U.S. Army Training and Doctrine Command (CG, TRADOC); and Commanding General, U.S. Army Operational Test and Evaluation Agency (CG, OTEA), to integrate HFE test and evaluation requirements, objectives, issues, and criteria into the Test and Evaluation Master Plan (TEMP).

j. Support TRADOC in developing HF input to the SMMP and use it as a foundation for the formulation of operational and organizational (O&O) plans, required operational capabilities (ROCs), HFEAs, TEMPs, Requests for Proposal (RFP), and ILSP.

k. Establish and maintain an HFE database in coordination with ODCSPER, DISC4, OTSG, and CG, TRADOC. This database should provide the capability for automated search and retrieval of existing HFE standards, guidelines, and collected soldier performance data as well as the generation of tailored performance specifications and verification checklists for system designers.

l. Ensure qualified HFE specialists participate in MJWGs, Test Integration Working Groups (TlWGs), and STF or special study groups (SSGs) to investigate HFE issues (see AR 71–9).

m. Ensure HFE is an evaluation factor in the source selection evaluation plan.

n. Ensure HFE specialists participate on Source Selection and Evaluation Boards (SSEBs).

o. Initiate and fund, through the PEO or PM and program sponsors, requests for HFE and HFEA preparation for all nonmajor systems for which AMC has oversight.

p. Provide to the PEOs or PMs the required HFE specialist sup port to carry out HFE responsibilities.

q. Ensure that HFE issues, concerns, and lessons learned are considered during the development and updating of SMMP.

r. Provide HFE data to the U.S. Army Materiel Readiness Sup port Activity (MRSA) MANPRINT database.

s. Provide HFE support to the combat and the training developer during development of concepts, studies, analyses, system requirements, and user tests and evaluations.

t. Develop HFE approaches, methodologies, and models to be used to incorporate HFE into the acquisition process.

u. Ensure command program sponsors execute the HFE program responsibilities of a PM.

v. Ensure trade–off analyses include human performance, work load, reliability, and maintainability considerations.

2–9. Commanding General, U.S. Army Training and Doctrine Command (CG, TRADOC)

The CG, TRADOC, will–

a. Ensure HFE is considered and reported in the development of doctrinal, training, leader development, and materiel solutions provided for consideration during the CBRS process.

b. Develop target audience descriptions for use by materiel developers and contractors as inputs to the HFE effort.

c. Ensure HFE issues, concerns, and lessons learned are considered during the development and updating of the SMMP.

d. Coordinate and provide information to the materiel developer for use in HFE programs during the materiel acquisition.

e. Ensure requirements documents produced under AR 71–9, as well as specialized requirements documents used for computers or individual clothing and equipment, include adequate specification of human performance requirements (including minimum standards of soldier performance for critical operations, maintenance, and training tasks as well as the maximum tolerable training burden).

f. Ensure Critical Operational Issues and Criteria (COIC), including those for HFE, are provided to the materiel developer during the concept exploration phase.

g. Ensure human performance issues and criteria are provided to operational testers and evaluators, that test results are collected and disseminated, and that post–fielding analysis is performed. (See AR 71–3.)

h. Ensure human factors test and evaluation (HFTE) data are collected during user testing for which TRADOC is responsible and are made available for use by other activities for continuous evaluation.

i. Ensure employment and doctrinal decisions that influence engineering design are analyzed for resource and human performance implications.

j. Identify needs for HFE improvements in fielded systems from post–training effectiveness analyses.

k. Ensure trade–off analyses include human performance workload, reliability, and maintainability considerations.

Section III
Heads of Other Army Elements

2–10. Commanding General, U.S. Army Operational Test and Evaluation Agency (CG, OTEA)

The CG, OTEA, will—

a. Analyze and evaluate the human factors of system performance in user testing to include, but not limited to, simulated combat, or the operational setting, during initial operational test and evaluation (IOT&E) and follow–on operational test and evaluation (FOT&E).

b. Determine how human performance contributed to a system failing to meet a critical operational criterion.

c. Determine whether soldier performance measurements are sensitive to hardware and software design features, operating characteristics, or operational procedures.

d. Identify soldier performance and other human factors problems that can be corrected by design changes to hardware and software.

2–11. Director of Army Safety (DASAF)

The DASAF will—

a. Ensure HFE is considered in—

(1) Establishing an overall system safety policy for developing, acquiring, or changing materiel systems.

(2) Accident investigation and prevention programs.

b. Integrate the consideration of relevant HFE outputs into system safety programs (see AR 385–16).

2–12. Heads of other Army agencies and major commands assigned responsibilities for development of materiel items

The CG, U.S. Army Information Systems Command; CG, U.S. Army Medical Research and Development Command; CG, U.S. Army Strategic Defense Command; and Chief of Engineers will establish and fund HFE programs that incorporate the provisions of this regulation in their materiel acquisition and testing responsibilities .

Section IV
Program Executive Officers, Separate Program Managers, and Project or Product Managers

2–13. Program executive officers and separate program managers The PEO and separate program manager (SPM) will—

a. Include in PM charters the responsibility for defining and executing the HFE program.

b. Monitor PM and contractor executions of HFE program requirements.

c. Develop policy and procedures to ensure PMs obtain HFE and HFE assessments and make them available to requesting headquarters.

2–14. Project or product managers

The PM will—

a. Ensure HFE program implementation on all systems including NDI and separately managed materiel change efforts from project inception to completion.

b. Provide adequate support for effective HFE program implementation and maintenance. Include HFE program requirements in the Long–Range Research, Development, and Acquisition Plan (LRRDAP) process.

c. Ensure HFE is identified as an integrating function for MANPRINT in the design process.

d. Include HFE human performance, work, design, and data requirements in solicitation packages.

e. Brief HFE status and issues during each review of a system.

f. Monitor materiel system prime and subcontractors' accomplishment of HFE objectives and requirements as specified in the statement of work (SOW). Use information gathered in the development of system specifications and applicable military standards.

g. Ensure assignment of qualified HFE specialists to materiel development and nondevelopmental programs.

h. Ensure HFE specialists participate in MJWGs, TlWGs, and STFs or SSGs to ensure the investigation of HFE issues. (See AR 71–9)

i. Ensure technical trade–off analyses include human performance, workload, reliability, and maintainability considerations.

j. Ensure HFE is an evaluation factor in the source selection evaluation plan. Ensure qualified HFE specialists participate in SSEBs.

k. Include HFE issues in the TEMP (not limited to technical testing (TT), first article testing (FAT), initial production testing (IPT), and production acceptance test and evaluation (PAT&E)).

l. Initiate, in coordination with other commands, and fund, the conduct of HFE and HFEAs on all Major Defense Acquisition Programs (MDAPs), Army Designated Acquisition Programs (ADAPs), and nonmajor programs. Permit no waiver of the HFEA requirement.

m. Provide HFE data to the MANPRINT database at the Materiel Readiness Support Activity (MRSA), ATTN: AMXMD–EL, Lexington, KY 40511–5101.

Chapter 3
HFE Program in Life Cycle System Management of Army Materiel

3–1. Introduction

a. The HFE Program begins prior to Milestone 0 by providing HFE information and analyses to TRADOC. HFE support continues throughout all phases of the life cycle regardless of the acquisition strategy selected.

b. The focus of the HFE Program is to ensure operational effectiveness of soldier–materiel systems by integrating into materiel development and materiel acquisition all relevant information concerning—

(1) Human characteristics.
(2) Skill capabilities.
(3) Human performance.
(4) Anthropometric data.
(5) System interface requirements.
(6) Biomedical factors.
(7) Safety factors.

c. Human factors engineering assessments, conducted to determine compliance with operator, maintainer, and supporter capability requirements, are used as inputs to milestone decision reviews.

d. Adequacy of system HFE is evaluated during both technical, operational, and user testing.

3–2. HFE in the preconcept exploration phase

a. HFE information and analyses will be incorporated into the following:

(1) HFE input to the Branch Planning Process for inclusion in CBRS products (that is, Battlefield development plan (BDP) and Army Modernization Memorandum).
(2) Special studies under AR 5–5.
(3) Early comparability analysis (ECA) support.
(4) Safety mishap assessments.
(5) STF and SSG. (See AR 71–9.)
(6) HFE input to concepts and doctrine studies.
(7) HFE support for Force Development Test.
(8) Concept Evaluation Programs (CEPs).
(9) HFE input to preliminary requirements documents.

b. HFE input to the SMMP will include the following:

(1) HFE information and data from predecessor systems.

(2) Identification of HFE issues, objectives, areas of concern, and questions to be resolved during system development.

(3) HFE significant tasks to be accomplished from research and exploratory development through the first unit equipped.

c. HFE inputs to the system requirements documents; for example, O&O Plan or Mission Need Statement (MNS) will include—

(1) Description of key soldier–materiel interface (SMI) requirements that may limit solutions to meet the need.

(2) Description of key SMI characteristics that must be achieved to satisfy the need. These inputs become part of the 'System Constraints' paragraph of both documents.

d. HFE and human performance requirements and constraints identified in the O&O Plan will be included in the TEMP and described in terms of human performance standards and design requirements when developing test issues and criteria.

e. HFE and human performance test issues and criteria will be coordinated among members of the TIWG.

f. HFE investigations will be conducted to establish human performance SMI information needed in the preconcept exploration phase.

3–3. HFE in the concept exploration phase

a. HFE data development and HFE application are critical to provide the basis for establishing system design and evaluation requirements.

b. HFE data will be developed and applied during the concept exploration phase to—

(1) Determine human performance and critical operator, maintainer, or supporter mission tasks.

(2) Provide requisite HFE input to the requirements documents.

(3) Provide requisite HFE input to the four Concept Formulation Package (CFP) analyses; for example, Cost and Operational Effectiveness Analysis (COEA). HFE input use should include—

(a) Identifying inconsistencies between system performance requirements and human performance capabilities.

(b) Recommending soldier–materiel interface characteristics necessary to correct inconsistencies identified in (a) above.

(c) Providing results of HFE technical analyses and trade–offs.

(4) Provide HFE input to solicitation packages, which will include—

(a) Developing RFP requirements for hardware or software prototypes, testbeds, conducting demonstrations, and experimentation.

(b) Tailoring HFE human performance and detail design requirements to the concepts being explored.

(c) Defining the human performance and detail design requirements for the SOW.

(d) Defining the human performance and detail design requirements for the system specifications.

(e) Identifying the required data items for the contract data requirements list (CDRL).

(f) Providing contractor responsiveness to the HFE human performance RFP requirements criteria for the source selection (SS) process.

c. HFE input to Market Analysis or Market Investigation will be used to—

(1) Define HFE human performance and detail design issues and criteria that must be addressed during these activities.

(2) Identify specific features required in the candidate system or item to correct known HFE human performance problems in its predecessor (that is, lessons learned).

(3) Provide HFE human performance and detail design test issues and evaluation criteria to the TEMP and coordinate with the TIWG.

d. HFE data will be integrated into technical and management plans to

(1) Provide requisite HFE input to the Acquisition strategy (AS) of the system concept paper (SCP), to include–(a) Discussing HFE human performance and detail design lessons learned from predecessor systems.

(a) Discussing HFE human performance and detail design lessons learned from predecessor systems.

(b) Summarizing plans to ensure that HFE human performance capabilities, limitations, and detail design criteria are considered throughout the design process.

(2) Provide requisite HFE Technical Data Package (TDP) input to 9 tailor military specifications, standards, and contract data items.

(3) Provide requisite HFE input to the ILSP.

e. HFE SMMP inputs will be updated.

f. An HFEA will be conducted in support of the Milestone I Decision Review.

3–4. HFE In the concept demonstration and validation phase

a. During this phase, HFE focuses on optimizing the SMI aspects of equipment or design.

b. HFE equipment or design process inputs are—

(1) Conducting trade–offs among those system characteristics that impact operator or maintainer performance parameters.

(2) Including human performance, work, design, and data requirements in solicitation packages.

(3) Participating in the SSEB.

(4) Participating in post–contract award meetings to resolve any ambiguities remaining from the SSEB.

(5) Reviewing engineering change proposals (ECPs) for HFE human performance implications.

(6) Participating in contractor or Government design and program in–process reviews (IPRs) to ensure that HFE human performance requirements are addressed.

(7) Reviewing contractor's HFE data item deliverables to identify unresolved HFE human performance or SMI issues and concerns requiring management attention.

c. HFE input to TT includes providing input to TT planning to update the HFE human performance and detail design issues and criteria, and monitoring TT.

d. HFE UT input updates HFE human performance issues.

e. HFE inputs to the AS, ROC, TDP, ILSP, TEMP, and SMMP a will be updated.

f. An HFEA addressing each alternative proposed for full scale development (FSD) will be the HFE input to the Milestone 11 Decision Review.

g. Monitoring contractor HFE activities will ensure that mission requirements are met with the soldier in the loop.

h. Monitoring and reviewing contractor–design activities and HFE deliverables will ensure compliance to human performance and design criteria.

i. HFE representatives will participate in MJWG and SMMP update activities.

j. HFE representatives will conduct investigations to collect performance data.

3–5. HFE in the full scale development phase

a. During the full scale development phase, the system is fully developed, engineered, fabricated, tested, and documented. HFE emphasis focuses on optimizing the SMI aspects of equipment or system design.

b. HFE equipment or system design process inputs are—

(1) Including human performance, work, design, and data requirements in the solicitation package.

(2) Participating in the SSEB.

(3) Participating in the post–contract award meeting to resolve any ambiguities remaining from the SSEB.

(4) Monitoring the contractor's HFE activities to ensure performance of contract–specified tasks.

(5) Participating in technical interchanges between Government and contractor HFE specialists.

(6) Reviewing ECPs for HFE human performance implications.

(7) Participating in contractor or Government design and program IPRs to ensure that HFE human performance requirements are v addressed.

(8) Reviewing contractor's HFE data item deliverables to identify unresolved HFE human performance or SMI issues and concerns requiring management attention.

c. HFE input to TT includes providing input to TT planning to update the HFE human performance and detail design issues and criteria and monitoring TT.

d. HFE UT input updates HFE human performance issues and criteria for UT planning and UT monitoring.

e. HFE inputs to the As, TDP, ILSP, TEMP, and SMMP will be updated.

f. A system HFEA will be prepared for input to the Milestone 111 Decision Review.

g. HFE representatives will participate in MJWG and SMMP update activities.

h. HFE representatives will conduct investigations to collect performance data.

3–6. HFE in the full–rate production and initial deployment phase

a. HFE program inputs will include–

(1) Human performance, detail design requirements, and quality assurance provisions in the systems specification of the RFP.

(2) Participating in the SSEB.

b. FOT&E will assess HFE implications of any implemented materiel change proposals.

c. HFE representatives will conduct HFE reviews of fielded systems to identify any HFE shortfalls or problems that impact effective system operation, maintenance, safety, or soldiers' health and resolve.

d. HFE representatives will review engineering change proposals to ensure operational and HFE criteria are incorporated in design changes.

3–7. HFE in NDIs acquisition

a. HFE human performance and detail design considerations influence NDI prior to program initiation. Market surveillance activities will gather HFE–relevant data for determining strategy and preparing solicitation documentation. HFE information will be a critical factor in the decision whether or not to pursue an NDI strategy.

b. HFE inputs to the NDI acquisition strategy include—

(1) Defining HFE human performance and detail design issues and criteria.

(2) Summarizing plans to ensure that HFE is considered throughout the NDI acquisition process.

c. Given an approved NDI strategy, HFE issues are inserted into the independent evaluation plan (IEP) for the Market Investigation. Critical HFE issues, questions, and concerns must be answered in the Independent Evaluation Report (See AR 70–10, para 3–4b for guidance on completing this report.) before a decision to continue an NDI program can be made.

d. HFE will be a primary factor in selecting a specific NDI acquisition candidate.

3–8. HFE in materiel change management

a. HFE is critical to all system materiel changes (both production and retrofit). Changes implemented through the life cycle management process will include HFE program activities outlined in paragraphs 3–4, 5–5, and 3–6. Changes implemented in other ways will ensure HFE is a primary factor.

b. HFE field data will be collected during the sample data collection (SDC) effort.

c. Discovered HFE human performance and detail design problems will be documented in a materiel change proposal (MCP). All MCPs affecting the SMI will be evaluated to determine if the proposed configuration change (hardware or software) adversely impacts existing operator or maintainer performance.

d. HFE human performance data and HFE guidelines and criteria will be developed to support materiel change programs. Contractor's HFE activities will be monitored, HFE deliverables will be reviewed, and in–process design reviews will be attended. HFE human performance issues and areas of concern will be assessed during the FOT&E.

e. HFE issues are inserted into the IEP for the evaluation of the operational effectiveness and suitability of the materiel change. Critical HFE issues, questions, and concerns must be answered in the Independent Evaluation Report before a decision to continue a materiel change can be made.

f. The System Improvement Plan (SIP) supporting documentation will include HFE considerations.

g. Materiel change proposals will be evaluated for resulting HFE impact.

h. An HFEA will be prepared to support milestone decision reviews.

3–9. HFE In the ILS process

a. HFE implications are considered in ILS management plans and procedures to integrate and acquire ILS elements.

b. Logistics support analysis (LSA) documentation that supports ILS should provide data to HFE analyses and use results from them.

c. DA Integrated Logistics Support Reviews (ILSR) will review and assess the status of each ILS elements' HFE implications.

The director for MANPRINT will represent ODCSPER at major system and Designated Acquisition Program (DAP) system ILSRs. The appropriate Personnel Systems Staff Officer (PERSSO) will substitute for the director for IPR systems.

Appendix A
References

Section I
Required Publications

AR 5–5
Army Studies and Analyses (Cited in paras 1–4, 3–2.)

AR 40–10
Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process. (Cited in para 2–7).

AR 70–8
Personnel Performance and Training Program (PPTP) (Cited in para 1–5 .)

AR 71–3
User Testing (Cited in para 2–9.)

AR 71–9
Materiel Objectives and Requirements (Cited in paras 2–14, 2–5, 2–8, 2–9, and 3–2.)

AR 385–16
Systems Safety Engineering and Management (Cited in para 2–11.)

AR 602–2
Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process (Cited in paras 1–5, 1–6.)

AR 700–127
Integrated Logistic Support (ILS). (Cited in para 3–9.)

Section II
Related Publications

A related publication is merely a source of additional information The user does not have to read it to understand this regulation.

AR 70–1
Systems Acquisition Policy and Procedures

AR 70–6
Management of the Army Research, Development, Test and Evaluation, Army Appropriation).

AR 70–10
Test and Evaluation During Development and Acquisition of Materiel

AR 70–15
Product Improvement of Materiel

AR 70–37
Configuration Management

AR 702–3
Army Materiel Systems Reliability, Availability, and Maintainability

MIL–HDBK–759
Human Factors Engineering Design for Army Materiel

MIL–STD–882B
System Safety Program Requirements

MIL–STD–1388–1A
Logistics Support Analysis

MIL–STD–1388–2A
Logistics Support Analysis Record

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

MIL–STD–1473
Standard General Requirements for Color and Marking of Army Materiel

MIL–STD–1474
Noise Limits for Army Materiel

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

DOD–HDBK–761
Human Engineering Guidelines for Management Information Systems

DOD–HDBK–763
Human Engineering Procedures Guide

DOD–STD–1477
Symbols for Army Air Defense Systems Displays
(Military Specifications, Standards, and Handbooks are available from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.)

Section III
Prescribed Forms

This section contains no entries.

Glossary

Section I
Abbreviations

ADAP
Army–Designated Acquisition Program

ADEA
Army Development and Employment Agency)

AMC
U.S. Army Materiel Command

AP
Acquisition plan

AR
Army Regulation

ARI
U.S. Army Research Institute

ARNG
Army National Guard

AS
Acquisition strategy

ASARDA
Assistant Secretary of the Army for Research, Development, and Acquisition Development, and Acquisition

BDP
Battlefield development plan

BTA
best technical approach

CBRS
Concept Based Requirements System

CDRL
Contract data requirements list

CEP
Concept Evaluation Program

CFP
Concept formulation package

CG
commanding general

COEA
cost and operational effectiveness analysis

COIC
Critical Operational Issues and Criteria

DA
Department of the Army

DAP
Designated Acquisition Program

DASAF
Director of Army Safety

DCSINT
Deputy Chief of Staff for Intelligence

DCSLOG
Deputy Chief of Staff for Logistics

DCSOPS
Deputy Chief of Staff for Operations and Plans

DCSPER
Deputy Chief of Staff for Personnel

DISC4
Director of Information Systems for Command, Control, Communications, and Computers

ECA
early comparability analysis

ECP
engineering change proposal

FAT
first article test

FDTE
force development test and experimentation

FOA
Field operating Agency

FOT&E
follow–on operational test and evaluation

FSD
full scale development

HEL
U.S. Army Human Engineering Laboratory

HFE
human factors engineering

HFEA
human factors engineering assessment

HFTE
human factors test and evaluation

HHA
health hazard assessment

HQDA
Headquarters, Department of the Army

IEP
independent evaluation plan

ILS
integrated logistics support

ILSP
Integrated Logistic Support Plan

ILSR
Integrated Logistic Support Reviews

IOT&E
initial operational test and evaluation

IPR
in–process review

IPT
initial production test/testing

LABCOM
U.S. Army Laboratory Command

LCSMM
life cycle system management model

LRRDAP
long–rang research, development, and acquisition plan

LSA
logistics support analysis

MAA
mission area analysis

MACOM
major Army command

MANPRINT
Manpower and Personnel Integration

MCP
materiel change proposal

MDAP
Major Defense Acquisition Program

MJWG
MANPRINT Joint Working Group

MNS
mission need statement

MOE
measures of effectiveness

MPT
manpower, personnel and training

MRSA
U.S. Army Materiel Readiness Support Activity

NDI
nondevelopmental item

ODCSPER
Office of the Deputy Chief of Staff for Personnel

O&O
operational and organizational

OSUT
onsite user test/testing

OTEA
U.S. Army Operational Test and Evaluation Agency

OTSG
Office of The Surgeon General

PAT&E
Production Acceptance Test and Evaluation

PEO
program executive officer

PERSSO
personnel systems staff officer

PM
program, project, or product manager

PM TRADE
program manager training devices

P31
preplanned product improvement

RDTE
research, development, test, and evaluation

RFP
request for proposal

ROC
required operational capability

SCP
system concept paper

SDC
sample data collection

SIP
System Improvement Plan

SMMP
System MANPRINT Management Plan

SMI
soldier–materiel interface

SOW
statement of work

SPM
separate program manager

SS
source selection

SSA
system safety analysis

SSEB
source selection and evaluation board

SSG
special study group

STF
special task force

TAD
target audience description

TDP
technical data package

TDR
training device requirement

TEMP
Test and Evaluation Master Plan

TIWG
Test Integration Working Group

TOA
trade–off analysis

TOD
trade–off determination

TRADOC
U.S. Army Training and Doctrine Command

TSG
The Surgeon General

TSM
TRADOC system manager

TT
technical test/testing

USAR
U.S. Army Reserve

USASC
U.S. Army Safety Center

UT
user test/testing

Section II
Terms

Concept Based Requirements System (CBRS)
The analytical process used by TRADOC to identify and prioritize Army warfighting requirements for doctrine, training, leader development, organizations, and materiel. TRADOC continuously works to consider historical perspective, to project threat, to understand technology, to describe our current projected capabilities by unit and time period, and to develop concepts. Assessment of our ability to fight as described in concepts leads to the identification of warfighting needs consisting of deficiencies, opportunities for improvement, and preplanned modernization needs. TRADOC also continuously identifies potential solutions to warfighting needs, assesses the solutions value–added to the force, and analyzes the cost–benefits of alternative solutions. The Army Modernization Memorandum (AMM) contains the prioritized listing of the Army's warfighting requirements (solutions).

Early comparability analysis (ECA)
A "lessons learned" approach to identify manpower, personnel, and training resource intensive tasks (high drivers) on current materiel that must be resolved in new or materiel changed systems. Byproducts of the methodology are initial MPT constraints and input to the target audience description.

Human factors engineering (HFE)
The technical effort to integrate design criteria, psychological principles, and human capabilities as they relate to the design, development, test, and evaluation of systems. The HFE goals are (I) 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. HFE provides an interface between the MANPRINT domains and system engineers. HFE 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. HFE 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.

Human factors engineering assessment (HFEA)
An HFEA is a review of the status of HFE in an acquisition program. The HFEA's purpose is to influence and support the milestone decision review process by identifying (1) design flaws which, taken singularly or collectively, would warrant a decision not to transition to the next phase, or (2) HFE issues or concerns, not serious enough to preclude transitioning, which should be resolved to enhance system effectiveness. The HFEA scope addresses human performance and soldier equipment interfaces, as they apply to the design of equipment, facilities, and procedures. An HFEA also includes an analysis of the impact of soldier performance on system reliability, effectiveness, operational suitability, and maintainability, providing supporting data exist. Further, the HFEA will address, as appropriate, the HFE issues identified in the current SMMP.

Manpower and Personnel Integration (MANPRINT)
A comprehensive management and technical program to enhance human performance and reliability in the operation, maintenance, and support of weapon systems and equipment. MANPRINT achieves this objective by integrating the full range of human factors engineering, manpower, personnel, training, health hazard assessment, and system safety considerations into the entire materiel development, acquisition, and change processes.

MANPRINT assessment
A MANPRINT assessment for a system integrates the results of all six domain (functional) assessments into a source document for input to the decision review process. Assessments will be conducted prior to milestone decision reviews on acquisition programs, including materiel change and nondevelopmental items. The MANPRINT assessment objective is to determine the status and adequacy of MANPRINT efforts in the materiel acquisition program and to present any unresolved MANPRINT issues or concerns to

decision makers. The HFEA and other pertinent information will be used to formulate the overall MANPRINT assessment. ODCSPER will be responsible for MANPRINT assessment preparation on all major defense as well as Army–managed acquisition programs. HQ, AMC; HQ, TRADOC; and applicable MACOMs will be responsible for preparing the MANPRINT assessment on all nonmajor acquisition programs.

MANPRINT Joint Working Group (MJWG)
The TRADOC proponent combat developer establishes the MJWG 3 to 6 months prior to O&O Plan submission. MJWG representation depends on available assets and the type of acquisition. As a minimum, MJWG includes representatives from HFE and the other MANPRINT domains plus the AMC MSC MANPRINT manager. The group manages all MANPRINT issues and provides oversight to ensure that MANPRINT plans are executed and objectives are met. HFE participates in the development and acquisition through the MJWG.

System MANPRINT Management Plan (SMMP)
The SMMP, a planning and management guide, is initiated by the combat or training developer when the MAA identifies battlefield deficiency requiring development of new or improved materiel. The SMMP identifies tasks, analysis, trade–offs, and decisions that must be made to address MANPRINT issues during the materiel development and acquisition process. The SMMP will be updated as needed throughout the materiel acquisition process, providing a audit trail.

Target audience description (TAD)
The TAD is a description of the quantity, quality, and performance capabilities of the soldiers and civilians who are projected to operate, maintain, and support a specific future Army system. The TAD should describe the desired range of individual qualifications on all relevant physical, mental, physiological, biographical, and motivational dimensions, and link these characteristics to the performance of the system's operation, maintenance, and support tasks.

Section III
Special Abbreviations and Terms
This section contains no entries.

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