THE NAVY HARDMAN PROCESS: TRAINING THE ANALYST

Robert S. Bloom, Ph.D.
Principal Training Specialist
GP Taurio, Inc.
Alexandria, VA

ABSTRACT

This paper focuses on the training of Manpower, Personnel, and Training (MPT) analysts to perform the Navy HARDMAN Methodology. It describes analysts' performance requirements as a foundation for determining trainee educational outcomes and the knowledge and skill requirements for an experience-based training program. It describes the Navy HARDMAN Methodology as a logical planning and analytical process prior to and in concert with weapon system resource programming, budgeting, and life cycle decisions. It provides insights about HARDMAN as both a people and a data interaction process. It points out the necessity for training analysts to influence the weapon system acquisition documentation, decision, and interaction processes if HARDMAN is to be effective.

Introduction

In October 1985, the Chief of Naval Operations (CNO) mandated that all subsequent Navy weapon system acquisitions in major acquisition categories (ACATs) be subjected to a front-end Manpower, Personnel, and Training (MPT) Resource Requirements Analysis (OPNAVINST 5311.7, Determining MPT Requirements for Navy Acquisitions). The methodology, called HARDMAN, was developed to plan and identify early in the acquisition process the quality and quantity of manpower required to perform the operation, maintenance, and support tasks of a weapon system and the training resources necessary (e.g., billets, training devices and equipment, facilities, instructional materials, etc.) throughout the life cycle of the weapon system. HARDMAN emphasizes the use of a Baseline Comparison System (BCS) to provide a starting point for planning efforts, a process described in MIL-STD-1388-1A and 2A. HARDMAN produces qualitative and quantitative assessments of manpower and personnel based on delta or differences determinations of tasks and workload measures between existing and new equipment/systems and an identification of the training resources necessary to assure effective system performance. Proper application of HARDMAN provides a useful and powerful tool for providing manpower and personnel consideration into the equipment/system design through the Logistic Support Analysis process.

Purpose

A major problem exists in obtaining qualified analysts to perform the variety of tasks required to properly implement the HARDMAN methodology. This paper describes the five-step Navy HARDMAN analytic process and identifies the knowledge and skills an analyst must possess to perform MPT front-end resource requirements analyses. In addition, it describes what an analyst should do when collecting, analyzing, documenting, and distributing MPT data and the structure of a training program to enable him to learn how to perform a HARDMAN analysis. Above all, it points out the need for an effective training program to prepare analysts to participate in the weapon system acquisition process.

HARDMAN Methodology

The Navy HARDMAN methodology is a five-step process encompassing:

I - Data Collection
II- System Analysis
III-Comparability Analysis
IV- Requirements Documentation (MPT Concepts and Resources)
V - MPT data in Navy Logistic Documents and Planning, Programming and Budgeting System (PPBS) Documentation Requirements

In HARDMAN Step I, Data Collection, data on new weapon system (an equipment/subsystem/system (E/S/S), Aircraft, or Ship) requirements, concepts, functions, performance goals and standards, are collected and reviewed as the basis for resource determinations. The training needs for the analyst include knowledge and skill in:

- o data collection methods
- o sources of weapon system data (Navy management information systems and existing acquisition documents)
- o communication skills and application to/with acquisition personnel including engineers; program management personnel; logisticians; and others)
- o interpersonal relations.

In HARDMAN Step II, System Analysis, a Baseline Comparison System (BCS) is formulated that best matches the new system and provides a documentation source for existing billet and training requirements. A baseline is either a predecessor or a similar system for which mature performance and MPT data are available. Analyst knowledge or skills include:

- o system performance requirements and configurations
- o system analysis of the relationships within and between a new and existing weapon system
- o data sources for billet and training information on existing Navy equipment or systems
- o developing an audit trail of reference documentation
- o DoD and Navy Weapon System Acquisition Process (WSAP) (including DoD and Navy Directives, Instructions, Documentation Requirements, Acquisition Milestones, and Organizations involved).

In HARDMAN Step III, Comparability Analysis, procedures are employed to assess changes in required resources by comparing the known parameters of the new system, especially functional tasks, workload measures, and performance goals and standards, with those of the BCS. Based on this comparison, quantitative MPT estimates are established. The training needs for the analyst include knowledge and skills in:

- o job task analysis and workload assessment methodologies
- o data sources for Navy job performance descriptions or quantitative measures
- o computing manpower deltas from workload or watchstation performance.

In HARDMAN Step IV, an MPT Concept Document (MPTCD) and an MPT Resource Requirements Document (MPTRRD) are produced detailing weapon system/training device development or construction schedules, equipment installation schedules, quantitative and qualitative manpower requirements for each system individually and for the multiple platforms/squadrons on which they are installed, training concepts (including types of training, prerequisites/ training paths, and training support materials), and specific training resources (including billets; training planning factors; training devices and equipment; training facility construction (MILCON) and facility logistics requirements; and life cycle costs). The training needs for the analyst include knowledge and skills in:

- o organizational structures of Navy ship, shore, and headquarters activities
- o WSAP decision-points and required level of documentation detail
- o training program objectives
- o HARDMAN documentation organization and format
- o Navy training planning factors for classroom, laboratory, and training device loading
- o calculating course annual training input requirements (ATIR).

In HARDMAN Step V, Logistic and PPBS Documentation, MPT issues that are part of the WSAP trade-off and supportability decisions, i.e., logistic support and equipment design impact, and the Navy Training Plan (NTP) process, are identified and distributed to the documentation requirements and Planning, Programming, and Budgeting (PPB) activities inherent in all phases of the WSAP. The training needs of the analyst include knowledge and skills in:

- o early WSAP documentation needs (Required Operational Capability and Projected Operational Environment (ROC/POE) Plans, Operational Requirements (OR), Justification for Major System New Starts (JMSNS), Integrated Program Summary (IPS), Decision Coordinating Paper (DCP), Systems Concept Paper (SCP), Statement of Work (SOW), and others)
- o Logistic Support Plans and Documents including Integrated Logistic Support Plans (ILSP); Ship, Squadron, or Shore Manning Documents (PSMD/SMD); Logistic Support Analysis (LSA) and Logistic Support Analysis Record (LSAR) based on MIL-STD-1388 and other Life Cycle Planning requirements
- o relation of HARDMAN to the NTP process
- o problem-solving and decision processes
- o front-end analysis concepts
- o role of a HARDMAN Advisory Board in the MPT planning and development process.

HARDMAN Analyst Job Performance

A military or contractor MPT analyst performs a variety of duties and tasks for a HARDMAN MPT analysis utilizing the above knowledge and skill requirements. The following describes what an analyst does and provides a basis for determining what an analyst needs to learn in a training program if he is to be effective in producing quality MPT resource requirements determinations:

Duties and Tasks

An MPT Analyst should perform the following in a HARDMAN Resource Requirements analysis:

I. Data Collection
   - A. Collect data from official Navy documents (JMSNS, SCP, OR, SOW, DCP, ROC, POE, NTP, and others) concerning concepts, scenarios, constraints, standards, and other contextual data.
     1. Identify official Navy sources and Points of Contact for access to appropriate data sources;
     2. Establish schedules and procedures for when and how to collect data;
     3. Use suggested HARDMAN Procedures and Worksheets to record data and data sources.

II. System Analysis
   - A. Analyze data from a comparable and/or predecessor system and from the new weapon system to provide the basis for system comparability.
     1. Identify and document: mission scenarios; operator, maintenance, manning, support and training concepts; equipment(s); equipment interfaces and configuration; manpower constraints; performance goals and standards.

III. Comparability Analysis and Use of Task Data
   - A. Perform comparability analysis between the new system and a predecessor or comparable system in order to calculate functional and performance differences.
     1. Identify functions, manpower quality (rate, rating, Navy Enlisted Classification (NEC), officer designator, Naval Officer Billet Code (NOBC)) and other required data for a baseline and a new system;
     2. Collect data from NAVPERS 18038 (series) (NEC Manual) and NAVPERS 15839 (series) (NOBC Manual), the Navy Occupational Task Analysis Program (NOTAP), Maintenance and Material Management (3M) System (including Maintenance Index Pages (MIPs) and Maintenance Record Cards (MRCs)), and other similar sources to document personnel quality;

3. Analyze operator and maintainer functions relative to their performance within the context of identified operator and maintenance concepts and mission scenarios for both the BCS and new system;
4. Compute operator and maintainer manpower deltas (frequency and duration) between BCS and new system functions and establish other non-training support requirements;
5. Develop recommendations for manning and personnel levels (quality and quantity of required billets) of the new system.

IV. Requirements Documentation

A. MPT Concept Document and Training Analysis

Prepare an MPT Concept Document (MPTCD) including the justification for the information developed.

1. Develop an organizational structure including the officers, enlisted, support, and civilian personnel who will be involved in any way with the system; develop an organizational chart detailing the above structure by function (operation, maintenance, and support; ship, shore, headquarters);
2. Identify, document, or establish installation schedules; determine decision-points in the WSAP and level of detail for which MPT documentation for system deployment is necessary;
3. Develop training concept, objectives, and requirements including: team, initial, follow-on, replacement, and factory training; skill progression; training paths; integration of courses; and other planning factors;
4. Prepare an MPTCD in accordance with instructions of the HARDMAN Methodology.

B. Training Resources and Costs and the MPT Resource Requirements Document

Document and justify training resources and estimated costs necessary to plan for training requirements and determine training billet and MILCON requirements.

1. Develop training objectives in concert with operation and maintenance concepts; document system training planning factors and costs including those that impact on Training Aids, Training Devices, Training Equipment/Repair Parts, and Technical Manuals, relative to manpower development needs and system installation schedules;
2. Using HARDMAN algorithms, calculate student, instructor, and training support billets; calculate military construction needs and costs;
3. Determine total Navy-wide manpower requirements for operation, maintenance, and support of the new system by fiscal year for each ship, squadron, or shore activity;
4. Prepare an MPTRRD in accordance with instructions of HARDMAN Methodology.

V. HARDMAN Process and Documentation

A. Provide plans, documentation, and decision alternatives to relevant decision-makers at all assigned phases within the weapon system acquisition process (WSAP).

1. Identify an organizational role for an MPT Analyst as a part of a weapon system management team;
2. Develop a personal strategy for implementing HARDMAN MPT Analysis;
3. Document and distribute MPT requirements in accordance with logistic specification requirements of an ILSP, LSAR, or similar acquisition and life cycle documents.

Training the Analyst

A training program to provide the knowledge, skills, and experiences to enable an MPT analyst to exercise HARDMAN relates to educational objectives grounded in what an analyst does. The objectives are statements of learning outcomes which are measureable and which facilitate the development of appropriate instructional strategies and trainee evaluation procedures. A training program developed for the Navy to teach MPT analysts how to apply the HARDMAN methodology has been developed for CNO (OP-111C). It uses four teaching strategies - lectures, discussions, simulations and demonstrations which emphasize trainee active participation in his own learning. These strategies will be briefly described below and generalizations will be presented about how to apply HARDMAN training to a variety of weapons system/manpower analysis contexts.

Lecture

A lecture method presents information so that basic definitions and concepts are presented to trainees in an efficient manner. The HARDMAN Training Program contains six lectures outlined in both an Instructor and Student Guide which present information about: what is HARDMAN, Data Collection Methods, Systems Analysis, Comparability Analysis, Training Analysis, and Training Resource Costs. The lectures are designed for 25-30 minute presentations and are supported by documented definitions of all terms used. Trainees are provided the definitions and explanations which are then utilized in later instructional activities.

Discussion

A strategy in which trainees read prepared discussion papers and respond either orally or in writing to open-ended questions is utilized in the HARDMAN Training Program. Two discussion topics, HARDMAN in the Weapon System Acquisition Process (WSAP), and the Relationship

of HARDMAN to Integrated Logistic Support (ILS) Documentation, are presented in point papers which also include questions designed to elicit trainee knowledge and experience as they (or perceive they will) work as MPT analysts. It is presumed that persons learning about HARDMAN have had prior experience in military MPT analysis or at least are trained in the planning of MPT resources for military weapon system application. The discussion strategy relies on trainees being able to relate their prior skills and knowledge to the HARDMAN context.

Simulation

A strategy which combines trainee knowledge, prior experience, and new learning is a guided simulation. The HARDMAN Training Program contains six simulated exercises in which trainees use HARDMAN worksheets to collect, record, analyze, and document simulated MPT resource requirements data. Specific skills such as the following are exercised: constructing a baseline comparison system (BCS), computing manpower deltas, developing training objectives/concepts/requirements, developing a Training Path, and performing a Training Resource and Cost Analysis. Simulated sources of information, points of contact, and completed HARDMAN worksheets provide the context where data applicable to exercised performances are documented. In this way, trainees are not only involved in a HARDMAN analysis activity, they are also directed to useful sources where data might be found. Simulations are focused on those performances which trainees do most frequently in a HARDMAN analysis. Simulation experiences are subjects of a debriefing exercise where trainees talk about what they did, what conclusions they drew, and what feelings were engendered. The total simulation enables trainees to perform specific HARDMAN skills, utilize HARDMAN worksheets, locate and utilize data and contact sources where HARDMAN information can be found, and discuss their learning and personal feelings.

Demonstration

A final strategy used in the HARDMAN Training Program is a demonstration of how to calculate a) Annual Training Input Requirements (ATIR) for training course loading estimates and b) how to construct and write the two HARDMAN products - the MPT Concept Document and the MPT Resource Requirements Document. This demonstration leads trainees through the procedures and requirements of the products. In this way, trainees are guided by example with the instructor able to present insights and lessons learned. Demonstrations utilize simulated information and are coordinated with the above simulations so that trainees can see an example of a product developed by the HARDMAN methodology.

Conclusion

The HARDMAN Training Program utilizes the Equipment/Subsystem/System (E/S/S) application of the HARDMAN Methodology and is appropriate for training all MPT analysts who work on weapon systems as well as on total ship and aviation MPT problems. The HARDMAN Training Program emphasizes the analytical process and data sources where appropriate information on any weapon system is located, so it is applicable for training an MPT analyst who is experienced but unfamiliar with the structured HARDMAN approach. The training itself is a combination of four different strategies but the emphasis is on the simulation and discussion strategies so that trainees can be participants rather than just receivers of information. The HARDMAN Training Program fulfills its purpose of providing knowledge, skills, and simulated experience to enable analyst trainees to correctly perform an MPT Analysis and produce MPT Concept and Resource Requirement Documents.

Summary and Conclusion

In sum, this paper has discussed HARDMAN as a Navy MPT Resource Requirements planning and documentation process mandated for front-end and iterative analysis of equipment/subsystem/system, aviation, or total ship acquisitions. The logic and validity of HARDMAN makes it a useful tool for Navy and other acquisition decision-makers in the WSAP (e.g. Program Managers, Logisticians, Management Review Boards and others) to judge decision alternatives early in the acquisition process. HARDMAN enables attention to the design and training system impacts of weapon system changes as acquisition proceeds from concept development to full scale engineering and beyond. This paper provided a description of what an MPT analyst does and what knowledge and skill outcomes he should gain in a training program. It suggests that an experiential learning strategy is most appropriate for a training program focus as HARDMAN is an interactive and iterative process. It also points out that a properly trained analyst who has both knowledge and process skills will be able to implement an effective HARDMAN analysis. Other military MPT analysis procedures such as the Army MANPRINT and Air Force Front-end Analysis (FEA) for Training Simulators must also have properly trained analysts who are able to integrate all of the interactive and planning procedures of a complex resource determination process.

REFERENCES

- Navy Program Manager's HARDMAN Guides to Early MPT Planning, Chief of Naval Operations (OP-11), HARDMAN Publication No. 84-00, July 1985
- HARDMAN Methodology: Equipment/System/Subsystem, Chief of Naval Operations (OP-11), HARDMAN Publication No. 84-01, May 1985
- HARDMAN Methodology: Aviation, Chief of Naval Operations (OP-11) HARDMAN Publication No. 84-02, May 1985
- HARDMAN Methodology: Total Ship, Chief of Naval Operations (OP-11), HARDMAN Publication No. 84-03, January, 1984
- HARDMAN Training Workshop Instructor's Manual, Chief of Naval Operations (OP-11), HARDMAN Publication No. 84-08, February, 1985

ABOUT THE AUTHOR

Dr. Robert S. Bloom is a Principal Training Specialist at GP Taurio of Alexandria, VA, a major defense training systems support contractor. He is currently responsible for performing MPT studies in Navy weapon system and its training equipment acquisitions. Dr. Bloom developed a training program for the preparation of Navy HARDMAN analysts which included a number of simulated exercises, guided discussions, demonstrations, and lectures. Dr. Bloom also prepared a HARDMAN Data Sources Directory as part of the HARDMAN training program. Dr. Bloom received a Ph.D. from Ohio State University in Curriculum and Instruction and has been developing professional and military training programs using the Instructional Systems Development process (ISD) since 1972. He has published several articles on writing educational objectives and education as a management tool in the health professions and nuclear utility context. Dr. Bloom has held a variety of research, administrative, and teaching positions in the academic, military, and manpower preparation arenas.