WHAT'S HAPPENING AT ASD REGARDING MPT

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ABSTRACT

More emphasis needs to be placed on *manpower, personnel, and training (MPT) factors* earlier in weapon system acquisition. To accomplish this, a new directorate was created at the Air Force Systems Command's largest product division, Aeronautical Systems Division (ASD). The MPT Directorate was chartered as a model organization to study and recommend ways in which the Air Force's most expensive asset, people, can more fully affect weapon system design, particularly in the early phases of the acquisition process when design adjustments are made most economically. This paper discusses the MPT Directorate's implementation plan and the progress made to date. Included are (I) a brief summary of why the Directorate was established, (II) MPT integration problems to be solved, (III) MPT process objectives, (IV) the Directorate's mission and functions, (V) its proposed concept of operation, and (VI) time-phased actions that must be taken to meet program objectives. The procedures and analytic tools which may be used by the MPT Directorate to consider MPT issues in the design process are highlighted in the concept of operations section. These procedures and analytic tools could be applied by other Air Force organizations in pursuit of similar objectives.

SECTION I

REASONS FOR ESTABLISHING THE MPT DIRECTORATE WITHIN ASD

While the United States Air Force (AF) led development of advanced analytic tools and data systems valuable for assisting MPT integration, it has not consistently applied available tools and data systems within a coherent framework. These tools, data systems, and techniques include the Advanced Personnel Data System (APDS), Comprehensive Occupational Data Analysis Programs (CODAP), Qualitative and Quantitative Personnel Requirements Information (QQPRI), and the Logistics Composite Model (LCOM), together with a host of logistical, safety and engineering data systems with MPT potential. The following section describes some of the missed opportunities which resulted in HQ USAF, HQ ATC, and HQ AFSC signing a memorandum of agreement in March 1986 to create the MPT Directorate within ASD as a model organization.

Growing concern in Congress, the Department of Defense and elsewhere in the weapon system acquisition communities has focused attention on MPT factors in the WSAP. Although many attempts have been made to emphasize the importance of MPT considerations, MPT integration into the WSAP has been a "sometimes thing". The insufficient attention being given to MPT factors while weapons systems were being developed resulted in MPT nightmares such as inefficient utilization of personnel, unnecessary expenditures for interim contractor support, late-to-need training development, and career ladder structures which affected Air Force readiness. Beginning in the early 1980s, a number of studies and reports served to bring MPT problems into clearer focus. Prominent sources included:

- Defense Science Board Study in 1982
- Air Force contract studies
- GAO reports
- Air Force Functional Management Inspections (Jun 1986)
- Congressional action
- Secretary of Defense action

Findings from these sources and the realization that the Services were manpower-constrained intensified the sense of urgency to improve integration of MPT factors into the Air Force WSAP. Meanwhile the Army and Navy established MPT-oriented programs, MANPRINT and HARDMAN, respectively. Significant high-level attention was directed at the timely acquisition and effective use of training devices for aircrew and maintenance personnel for new or modified weapon systems. This attention resulted in numerous conferences, reports, and studies to help improve training system acquisition, support and use.

The Defense Science Board Report, Dec 1982, *stressed* the need for more emphasis on effective training for operation and maintenance of future weapon systems. This report also addressed the problem of late delivery of training devices to operational units and the need to identify training requirements much earlier in the weapon system development process.

Starting in 1982, HQ AF/Director of Personnel contracted with Akman Associates, Inc., to study MPT in the WSAP. This study reported that the sizable increase in MPT support costs had amplified the need for earlier WSAP attention to identifying the manpower requirements and the associated MPT support costs of the new weapons system. Air Force planners needed to improve their capability to adequately anticipate the MPT needs associated with new

systems, react to those needs, and influence design decisions during the conceptual or design phase. In April 1983, the final report titled, "Enhancing Manpower, Personnel and Training Planning in the USAF Acquisition Process," was presented to the Deputy Chief of Staff, Manpower and Personnel. The study examined current MPT policies and practices, and recommended improvements to the WSAP. The report also included a plan to implement those recommendations.

In an ensuing contract, Akman Associates developed a basic concept for a manpower, personnel, and training information system. A draft report entitled, "System Concept Document for Manpower, Personnel, and Training Integration System" (MPTIS) documents Akman's efforts to date, illustrating the need to make MPT information available to key MPT players and acquisition personnel early in the WSAP.

Increased Air Force Inspector General's interest resulted in a Functional Management Inspection (FMI) during the period 13 May 1985 - 25 Jun 1986. The inspection examined the Air Force Simulator Certification (SIMCERT) Program. To assess the effective use of aircrew training devices, trainers supporting the F-15, C-5, F-16, F-111, EF-111A, C-141, and B-52 systems were evaluated. Training equipment for the ground launched cruise missile (GLCM) and maintenance training devices supporting these aircraft were also evaluated. This extensive FMI included maintenance training equipment covering visits to 11 ATC Field Training Detachments (FTDs) and the 3306th Training Evaluation Squadron (TES) at Edwards AFB (Flight Test Center), California.

The FMI concluded with the following findings and recommendations:

Management of training equipment issues requires continued emphasis. Early acquisition documents, such as, Statement of Need (SON), Program Management Directives (PMD), and Training Development Plans (TDP) should contain specific training needs information. Newly assigned training device acquisition and management personnel should attend a formal acquisition training course within the first six months of assignment.

Insufficient Manpower, Personnel, and Training (MPT) planning in the acquisition process degraded the quality and effectiveness of aircrew and maintenance training. The AF should improve MPT analysis concurrent with weapon system conceptual planning and include this requirement in initial PMD. A revision to AFR 50-11 should require early and accurate validation of aircrew and maintenance training device needs through a thorough MPT analysis.

Inadequate logistic support planning for training devices diminished availability for aircrew and maintenance personnel use. Another problem involved the lack of adequate coordination of engineering change proposals (ECPs) and training device managers, which often resulted in delays in delivery of trainers. Improved provisioning of training device spare parts based on their utilization frequency. Also, more effective coordination of modifications between Air Logistics Center system program managers and training device managers was necessary. In addition, AF should establish procedures to evaluate MPT issues resulting from weapon system modifications. Finally, proper interface with parent aircrew or maintenance training devices should be ensured by requiring software program validation for training systems before software is returned to training use.

The FMI concluded that early training planning in weapon system acquisition was essential. Further, to be successful, this planning must be developed in concert with weapon system manpower and personnel considerations. M, P and T are totally interrelated and dependent upon each other. MPT integration is needed to better ensure that quality training is provided to those who operate and maintain new and modified weapon systems. If this planning is inadequate, MPT needs associated with the weapon system will be ill-defined--increasing MPT costs, which are estimated to be some two-thirds the life-cycle costs of a weapon system.

The FMI also concluded that Air Force MPT direction was highly decentralized with no organization responsible for integrating and monitoring system-related MPT requirements. Further, early and more complete MPT analysis of system needs could have better assured procurement of more cost-effective and worthwhile training systems. This integration could be achieved, in the words of the FMI, through more effective program advocacy at Air Staff and MAJCOM level.

As a result of these and other reports, investigations, and studies, the March 1986 MPT Memorandum of Agreement (MOA) was signed and the process of staffing the MPT Directorate was begun. By September 1986, 12 personnel had arrived at Wright-Patterson AFB, OH and the MPT Directorate opened its doors. The MPT Colonel-level Steering Committee, consisting of representatives of the MOA's signatories, met to provide initial guidance. Since that time the assigned manpower, personnel, training and analyst personnel have engaged in learning the WSAP and the many acquisition tools and techniques already available at ASD. In addition, they developed, coordinated, and published the ASD/ALH implementation plan.

Meanwhile, interest in improving MPT integration has mounted. Congressional interest has been growing. This interest was typified by the action initiated by the Senate Armed Services Committee during deliberations on the FY 87 DoD Budget Request. The Committee expressed concern over an inability to properly consider the manpower requirements associated with major defense acquisition programs during the development and procurement decision stages of these programs. This lack of accurate information has resulted in Congress being confronted with unexpected requests for Service end strength increases to permit the sufficient operation, maintenance, and support of new weapons systems after the systems have been deployed.

The Committee suggested that in order to permit Congress to make more knowledgeable decisions concerning development and acquisition of such systems, the Secretary of Defense (SECDEF) should submit a report to Congress at least 90 days in advance of decisions regarding full-scale engineering development (Milestone II) and production of weapon systems (Milestone III). This report includes the complete manpower requirements associated with such systems, along with a plan for full operational deployment of such systems if no increase in personnel were authorized for the periods when deployment would occur. Language mandating this requirement was included in the National Defense Authorization Act for Fiscal Year 1987 (pp 165-166, HR 99-1001).

By Memorandum dated 14 Oct 1986, the Deputy Secretary of Defense (DEPSECDEF) advised the Secretaries of the Military Departments that DoD needed to improve the consideration given to Manpower, Personnel, Training, and Safety (MPTS) during all stages of the defense weapon system acquisition process. More emphasis was needed on MPTS factors in designing new systems, and better analysis of the impact new systems will have on total force MPTS requirements.

The Assistant Secretary of Defense, Force Management and Personnel [ASD(FM&P)], was assigned responsibility for coordinating efforts to improve MPTS planning for new defense weapon systems. FM&P was tasked to provide guidelines for submission on MPTS information to the Joint Requirements and Management Board (JRMB) at its milestone reviews. Also, FM&P will chair an OSD-Service staff-level working group charged with developing a general approach to MPTS planning that could be applied to all systems subject to JRMB review. The Undersecretary of Defense for Acquisition (OUSD/AQ) will be represented on this group in addition to the Services and the OASD(FM&P).

In a 31 Oct 1986 Memorandum entitled "Analysis of the MPTS Aspects of Proposed Defense Systems", the ASD (FM&P) expanded the working group's charter to consider what information the JRMB needs on the MPTS aspects of proposed systems at each stage of the planning process. The working group's overall objective will be to develop a general approach to MPTS planning and reporting that can be applied to all systems subject to JRMB review.

Mounting Congressional, DoD, and AF Secretariat interest coupled with a clear definition of MPT integration problems, should help provide the resources necessary to solve these problems.

SECTION II

MPT INTEGRATION PROBLEMS TO BE SOLVED

The MPT integration problems needing solution are listed below. This summary is extracted from the MPT MOA and ASD/ALH implementation plan, and has been endorsed by the Colonel-level MPT Steering Committee, which oversees the Directorate's operation.

o The Air Force WSAP needs a systematic approach to properly manage the integration of MPT factors.

o MPT planning has generally been fragmented and ill-timed. One result is that actions to integrate MPT factors have not occurred early enough in the WSAP to influence the design. Usually, the major effort to analyze MPT impacts on weapon systems has taken place in the Full Scale Development phase after most life cycle costs are fixed.

o The MPT planning effort often was not comprehensive enough to ensure that all pertinent factors were included or accurately applied. The Air Force did not clearly define weapon systems MPT goals for contractors designing and developing weapon systems. The initial estimates of manpower requirements needed to be identified as accurately as possible at the outset, with full consideration given to the specialties that will be involved in the new system.

o Data for MPT analysis was not available in a usable format to analyze weapon system design and suggest trade-offs. On-line data transfer networks were not readily available to expedite data transfer.

o Existing MPT requirements analysis tools were segmented and lacked the capability to do complete analyses to support complete MPT management decision process.

o Training and training equipment were not being adequately or consistently funded, developed, and procured throughout the acquisition cycle concurrently with their weapon system.

o MPT management was highly decentralized with no organization responsible for integrating and monitoring system related MPT requirements. Little effective direction and guidance was given to system program managers on MPT issues by Air Staff and the implementing commands (FMI finding).

o Lack of controls over the MPT process resulted in duplication of effort, higher cost for weapon systems, and ill-defined and late-to-need aircrew and maintenance training equipment.

SECTION III

MPT PROCESS OBJECTIVES

To help the Air Force solve these problems and disconnects, the MPT directorate was chartered as a model organization with a mission to address these MPT process objectives contained in the MPT MOA and MPT Directorate Plan:

o The primary objective of the MPT process is to improve analysis and integration of MPT issues in the acquisition cycle. MPT efforts must fully reflect the concerns and planning efforts of the using and supporting commands as well as the implementing command. To attain this objective the following sub-objectives must be met.

- Ensure that MPT factors and constraints are developed for use during early acquisition phases, where the potential to provide an optimally supported weapons system is greatest.

- Formulate a plan to bridge the gaps so MPT is factored into the acquisition process along with cost, schedule, performance, reliability, and maintainability; thus providing a more realistic, economical life-cycle cost for any given system in procurement or modification. MPT is a factor of weapon system supportability and needs to be highlighted as such.

- Ensure that training planning, requirements analysis, and training equipment development and production are planned, coordinated, and funded.

- Establish data sources, analytical tools, and procedures which support MPT trade-off analyses in the design of weapon systems.

- Make MPT analyses available in a format which emphasizes life-cycle cost-effective use of critical manpower, personnel and training resources.

SECTION IV

MISSION AND FUNCTIONS OF THE MPT DIRECTORATE

The MPT Directorate's mission is to provide centralized planning, direction and control for all MPT elements in the ASD weapon systems acquisition process. Major functions include:

o Directs the development and implementation of plans, policies, and analytical tools to quantify MPT impacts on and of developing weapon systems. In this regard, the Directorate places special emphasis on front-end analysis to bring MPT into the forefront during initial design processes of Preconcept and Concept Phases of the WSAP.

- Reviews regulations, military standards (MIL STDs), and acquisition documents to ensure MPT integration is encouraged.

- Develops a detailed MPT management network plan for the ASD WSAP to identify the time-phasing and method of implementing critical MPT elements.

- Assists in defining MPT roles and functions of key ASD organizations to ensure full MPT integration in ASD's everyday conduct of business.

o Employs analysis techniques and applicable policies and procedures to ensure consideration of alternative MPT utilization concepts and systems designs, and encourages necessary trade-offs to optimize cost and force effectiveness.

o Maintains contact with Systems Program Offices, Deputates for Development Planning, Training Systems, Engineering and similar organizations to assure the Directorate's participation in their studies and analyses, ensuring MPT integration is included early and throughout the systems concept and design stages.

o Maintains liaison with research organizations within and outside the military to optimize use of existing MPT resources; to promote research into areas beneficial to MPT; and thereby minimize costs for developing new models and systems to meet the organization's needs.

o Functions as the ASD focal point in directing the activities of MPT analysts who are assigned to SPOs to advise, assist and provide technical information, appropriate analytical models, methodologies and information systems to support the MPT planning process on the selected weapon systems.

o Provides the direction and leadership to obtain information systems equipment, software and related resources needed to support the Directorate's operations and MPT analyses.

o Advises the ASD Commander and HQ AFSC through the Deputy for Acquisition Logistics (ASD/AL) on MPT matters.

o Advises the MPT Steering Committee on the Directorate's progress in meeting the organization's objectives and obtains appropriate feedback for follow-on actions.

o Maintains liaison with key AF MPT organizations, such as AFMPC, AF Manpower Engineering Agency, ATC, USAFOMC, and other Steering Committee offices to exchange MPT information, data and concepts.

o Serves as the "model" Air Force MPT integration organization. Ensures that a comprehensive management plan is developed and updated with steps to achieve the organization's mission. The plan will provide detailed management information to similar organizations which may be established at the other AF product divisions. Further, ensures that MPT integration efforts are tracked by audit trails and evaluated to determine most effective methods and tools.

o Publicizes MPT integration issues and successes using available publication media including news releases, news letters, briefings, etc.

SECTION V

MPT DIRECTORATE PROPOSED CONCEPT OF OPERATION

INTRODUCTION TO CONCEPT OF OPERATIONS

Since its inception in September 1986, the MPT Directorate has been conducting studies and interacting with ASD organizations to establish roles and develop its concept of operation. In its 6-8 April 1987 meeting the MPT Steering Committee approved the MPT Directorate's draft plan, including the above mission and functions. In addition, the Committee endorsed briefings on ASD/ALH's preliminary concept of operation. Many aspects of this concept of operation will have to be fully staffed before they become codified.

The remainder of this paper is intended to present a glimpse of the proposed ASD/ALH concept of operation. We believe that open discussion of the proposed concept of operation will stimulate the feedback necessary to construct the most effective MPT organization. The concept of operation described below also includes the analysis tools and procedures which the MPT Directorate is strongly considering incorporating into ASD WSAP procedures.

To describe the MPT Directorate's concept of operations, it is necessary to examine many facets of ALH's given and planned activities. First, we'll look at the organizational placement and structures which govern and allow the Directorate to accomplish its mission. Second, since ALH must integrate its functions into the existing WSAP, we'll look at some of the critical existing and proposed documents which can allow MPT to influence design. Third, the Air Force already has a number of analytic tools and data bases which can be used in the WSAP. We'll examine a sample of these and the existing management tools which will give MPT visibility and help institutionalize MPT within the WSAP. Finally, since necessary actions differ during the various phases of the WSAP, we'll look at ALH's major proposed functions during the process.

FUNCTIONAL ALIGNMENT AND ORGANIZATIONAL STRUCTURE

Functional Alignment of ASD/ALH. The MPT Director is responsible to the Deputy for Acquisition Logistics (ASD/AL) for the proper functioning of the MPT Directorate (ALH) and oversight of activities of personnel matrixed to the program offices. Matrixed personnel are responsible to the Director for Manpower, Personnel, and Training, ASD/ALH, for MPT functions within ASD Acquisition Deputy organizations. This structure provides a central group of MPT personnel with visibility across program lines to ensure support and organizational objectives are attained; provides expertise for specific programs and/or issues during high demand periods (preparation and review of RFPs, SOWs, ITOs, etc.); and provides collocated expertise to work the program-specific issues as the weapons system progresses through the acquisition process.

General Concepts. The MPT Directorate will develop suitable data bases and analytical techniques to establish MPT constraints for the design process in much the same manner as performance and cost parameters are currently utilized. As a specific system transitions through the acquisition process, MPT Directorate personnel will aid the Systems Program Office (SPO) in establishing an MPT baseline, and will ensure all affected agencies are aware of the impacts upon that baseline as design, operational, or maintenance concept changes are proposed. The Directorate will address MPT supportability in both new and present acquisitions by providing both management guidance and technical support.

In a management role, the MPT Directorate will provide a means to formalize the MPT activities within SPOs. It will review existing policy and develop further guidance where appropriate. An essential management goal is to consolidate existing MPT direction and to provide a focal point for coordinating this direction.

In a technical support role, the MPT Directorate will be responsible for providing program managers with MPT expertise. MPT analysts will advise, assist, and provide technical information, appropriate analytical models, methodologies, and information systems to support the MPT planning process. These tools will be used to compare, project, and assess different design options and operational and maintenance scenarios for their relative MPT impacts and life-cycle costs. Maximum use will be made of currently available methodologies and tools such as Logistics Support Analyses (LSA), LSA Records (LSAR), appropriate LSA output reports, LCOM and Cost Oriented Resources Estimating (CORE) model outputs, and other life-cycle costs and MPT models. The MPT Directorate will develop contractual document statements which ensure that contractors are responsive to MPT concerns, and standards for evaluating MPT proposals during source selection.

Plan/Roadmap. The MPT Directorate educated its staff of manpower, personnel, training, and analyst personnel in the WSAP methods, procedures, tools, strengths, and weaknesses. As this study of MPT in the acquisition process progressed, the Directorate developed an implementation plan which describes its approach to MPT integration. In essence, this plan shows how the Directorate will develop its concept of operation. The plan received Air Force-wide feedback from offices concerned with MPT integration and was approved by the MPT Steering Committee on 8 April 1987.

Essentially, the model program will be conducted in two distinct, yet interdependent stages: (1) MPT Development, and (2) MPT Implementation. The MPT Development stage encompasses the effort required to research, design, plan, and test an MPT strategy within the existing WSAP; this is the stage in which the Directorate is now operating. The MPT Implementation stage takes the MPT strategy and implements it in the major weapon system acquisition process.

MPT Steering Committee. In consonance with the MPT objectives established in the MPT MOA, the Colonel-level Steering Committee provides a working forum for development of the model MPT program. It provides guidance, feedback, planning assistance, visibility, helps work issues, and assesses progress. It conducts semi-annual reviews of all aspects of the model program and provides assessments to the MOA signatories.

ALH SPO-Matrixed Personnel. ASD/ALH will matrix an MPT analyst to selected major weapon system SPOs. The matrixed MPT analyst will work for the Director of Logistics (DOL) to ensure MPT issues are fully addressed. Assisting the DOLs with manpower, personnel, and training expertise in working the Integrated Logistics Support (ILS) plan, they will support the Chief Systems Engineer in identifying the full MPT ramifications of the various design issues faced by the SPO. They will work interactively on all design issues having MPT implications, closely with SPO-matrixed engineering and logistics personnel. They will be trained in manpower, personnel, training, WSAP, and basic MPT analysis techniques. When ALH is fully operational, approximately half of its 36 personnel will be matrixed to SPOs.

MPT Directorate Home Office Support. ASD/ALH's home office will select, train and matrix the MPT analysts to selected SPOs. ALH will also provide continuing training, advice and counsel. The home office will be responsible for career enhancement, and supporting them on the more complex MPT analyses. For those SPOs not having matrixed personnel, ALH will provide staff assistance and MPT analysis on a space available basis.

Coordinating and Assisting ASD Organizations. Several key ASD organizations will have a special relationship with ASD/ALH. These include ASD's Deputy for Engineering, Safety Office, Deputy for Training Systems, the Deputy for Development Planning, and the ATC Operating Location (OL) at ASD.

Deputy for Engineering (EN). Like ALH, EN also has matrixed engineers in the SPOs who are supported by the home office. Close coordination between ASD/ALH and EN needs to be maintained to ensure that MIL STDs and procedures are developed which encourage MPT influence on design. Interaction will be especially close with EN human factors, training, and LCOM personnel.

Safety Office (SE). SE also has matrixed system safety engineers and managers in the SPOs who are supported by their home office. Close coordination between ASD/ALH and SE will be maintained to ensure that safety programs and analyses are developed which encourage MPT influence on design. Interaction will be especially close with safety training and design hazard analyses to identify high drivers.

Deputy for Training Systems (YW) and the ATC Operating Location (ASD/TTGT). ALH will also coordinate closely with YW (formerly SIMSPO) and with

ASD/TTGT (ATC OL) to ensure training systems developed to support aircraft systems LSA and engineering data are available in sufficient time to develop training systems that will be fielded with the weapon system.

Deputy for Development Planning (XR). ALH will be active during the WSAP phases in which design can be most influenced. Therefore, ALH will participate with the Development Planning Deputate on Long-Term Planning Projects that have potential MPT implications. Examples of these projects include the High Reliability Fighter, Embedded Trainer Concept, Recce-Attack Fighter Training System, etc. Matrixing an MPT analyst to this Deputate can help ensure that MPT factors are considered early in the acquisition process.

Collocate MAJCOM OLs. The MPT Steering Committee accepted ALH's recommendation that using MAJCOMs establish operating locations (OLs) at Wright-Patterson AFB for system-manpower analysis for staffing. These OLs, if implemented, will work as a team with ASD/EN, ALH and their SPO-matrixed personnel to conduct LCOM and other MPT analyses, and provide using MAJCOM inputs, guidance and coordination to determine the manpower assessment. Under this concept the SPO would be responsible for consolidation of all manpower assessments, including AFLC and ATC inputs, and will provide them to the using MAJCOM. The using MAJCOM will be responsible for forwarding a consolidated statement of manpower requirements to HQ USAF prior to Milestones II and III to satisfy the 1987 Defense Authorization Bill's reporting requirements. The joint ASD/EN, ALH, and using MAJCOM team will have the best chance of achieving an optimum balance between manpower and equipment costs and of influencing design. Also, developing the figures jointly offers the best opportunity for deriving an unbiased estimate. Strategic Air Command (SAC) has already established an OL at Wright-Patterson AFB, OH for this purpose. HQ USAF is staffing this concept with other MAJCOMs.

WEAPON SYSTEM ACQUISITION DOCUMENTS

The Weapon System Acquisition Process (WSAP) is a complex set of procedures controlled by several key documents. ASD/ALH plans to integrate MPT by reviewing, recommending changes, and ensuring the MPT aspects of these documents are prepared in sufficient time to affect design. These reviews will be conducted in conjunction with ASD/EN/YW/SE/XR counterparts.

Early Acquisition Requirement Documents. ALH will review early acquisition documents to ensure MPT requirements and issues are appropriately addressed. The goal is to be proactive in setting specifications for design which require MPT trade-off analyses to construct systems which comply with MPT constraints. ALH will work with Air Staff, using MAJCOMs, the ASD staff, ATC, AFMPC, and ASD/EN (as appropriate) to ensure MPT constraints and goals are clearly communicated in early acquisition documents.

These documents include the Statement of Operational Need (SON), System Operational Requirements Documents (SORD), Requests for Proposal (RFPs), and Statements of Work (SOWs). MPT constraints, goals, issues, analyses and concerns need to be included in these documents if design is to be affected. Ultimately, the prime contractors must see the benefit of applying good MPT techniques in design. For this reason, ASD/ALH plans to furnish representatives for source selection, and ultimately develop generic MPT criteria which can be used as a guide for source selection of individual systems.

Existing Acquisition Plans. In addition to acquisition documents and source selection, these acquisition plans include MPT information: the Human Factors Engineering (HFE) plan, the Integrated Logistics Support Plan (ILSP), the Training Development Plan (TDP) and the Test Plan. ALH intends to improve the accuracy and completeness of MPT information in these documents. Also, ALH will attempt to ensure that MPT information is entered sufficiently early to allow design changes.

Proposed System MPT Plan. One way to ensure integration of MPT goals and constraints is to develop a weapon system MPT plan prior to Milestone 0. This kind of document could be developed by a team of MPT players to focus attention on MPT issues. The Systems MPT Plan could be a living document produced/revised (as a minimum) before each milestone, examining MPT issues which come to light as more is learned about the system. It would be designed to coordinate M, P, and T issues and goals for the system into an integrated approach. Further, this proposed plan would address ways in which MPT will be integrated into system design considerations.

Establishes MPT Constraints & Provides Visibility. In the initial phases of acquisition, the System MPT Plan could document the MPT constraints and goals for the system. Later, the plan could document trade-off decisions between M, P, and T, and between MPT and system performance/cost/schedule and other considerations, giving visibility to MPT issues. The MPT plan could be coordinated among major MPT and system players, and be coordinated with the Human Factors, System Safety, Integrated Logistics Support (ILS) and Training Development Plans (TDP).

Add M & P to TDP. Because there are so many acquisition plans, often presenting the same or similar information, it would be best to avoid proliferation of plans. It is possible to expand an already existing plan, the TDP, for MPT purposes. The System MPT Plan could be composed of M and P issues added to the Training Development Plan. The Systems MPT Plan would start before Milestone 0, much earlier than the Training Development Plan (TDP) currently is begun. Expanding the TDP appears to make sense, since many critical MPT issues are already required in the TDP, yet are not developed soon enough to affect design.

Character Changes with Phases of WSAP. The character of the Systems MPT Plan would change as the weapon system matures. Initial editions would focus on MPT goals and constraints, with later versions focusing on system trades and a full-fledged Training Development Plan.

System MPT Planning Team. A System MPT Planning Team would be established for selected programs before Milestone 0. The team could be chaired by ALH until the SPO is staffed. Since the SPO Director is chair of the Training Planning Team (AFR 50-8), this Director should probably chair the System MPT Team. He/she will likely use the ALH SPO-matrixed person to work MPT plan issues and to document the System MPT Planning Team recommendations.

Team Composition Changes with WSAP. Before Milestone 0, proposed members of the System MPT Planning Team include the ASD MPT Directorate, Developmental Plans Deputate, ATC, AFMPC, the Using MAJCOM, and Air Staff Manpower and Personnel Plans. After staffing of the SPO (around Milestone 0), ASD Engineering and MPT Directorate SPO-matrixed personnel, the Deputy Program Manager for Logistics (DPML), and eventually the Prime Contractor(s) join, as ASD Developmental Plans and Air Staff agencies reduce their involvement. Later in the acquisition process, the team may also include the Air Force Operational Test and Evaluation Center (AFOTEC) to ensure appropriate test planning of MPT issues. The initial Systems MPT Plan can furnish needed input for the TDP and the MPT parts of the ILS plan. As the Training Planning Team is formed, meetings could be held in conjunction with the System MPT Planning Team meetings.

Regulatory Guidance. Finally, ALH plans to review the host of acquisition, manpower, personnel and training regulations to determine consistency and their impact on MPT integration. In addition, the Military Standards (MIL STDs) or Military Primes (MIL PRIMES) and Data Item Descriptors (DIDs) furnish guidance to contractors and writers of contracts. A thorough review and necessary revision will greatly facilitate MPT integration.

Automated Design Tools as MIL STDs. In place of MIL STDs, the new Computer Aided Design (CAD) system human factor design tools like Crew Chief and COMBI/MAN can impact on prime contractor engineers while they are in the design process. These human factor automated design aids use a three dimensional manikin on the CAD screen, allowing engineers to "see" accessibility problems. By making these systems available to all prime contractors and requiring their use, many of the access problems experienced in the past can be overcome during the design process. ALH will encourage their use and standardization into the design process.

USE EXISTING MPT ANALYSIS TOOLS AND DATA SOURCES/SYSTEMS

The Air Force has many valuable MPT analysis tools and data bases/systems which, if integrated and applied, could pay big dividends. For example, LCOM (the AF-approved manpower modeling) has been thoroughly validated to produce aircraft maintenance manpower assessments through simulation. For aircraft maintenance, this method is far superior to and more accurate than the Army and Navy HARDMAN procedures of adding task times. LCOM uses the Maintenance Data Collection (MDC) system to furnish the crew size, frequency and maintenance tasks times for each aircraft system. Before inputting these data into LCOM, the MDC data are operationally audited by manpower personnel for consistency and accuracy. MDC data offers hard maintenance data on predecessor systems, which can be used in LCOM simulations of future systems. The Advanced Personnel Data System (APDS) and Occupational Survey Program furnish comprehensive data on which tasks are performed by Air Force personnel. These data are available "on line" through the Occupational Research Data Bank. Logistics Support Analysis (LSA) and LSA Record (LSAR) are available from prime contractors, and could be requested sufficiently early to provide training developers with needed information in time to field training systems with the aircraft. Validated human factor tools, which have been applied for years to cockpit design, could be applied more fully to maintenance. And both safety and human factor data bases could be used to focus attention on MPT high drivers in time to affect design. Let's examine a few of these tools/data bases to obtain an image of how ALH envisages employing them.

LCOM as an Iterative Process and Source of Maintenance Manpower Estimates. LCOM is used as a tool to identify MPT high drivers and aircraft maintenance manpower assessments throughout the WSAP. LCOM will be conducted at increasing levels of specificity from Preconcept sensitivity analyses on the predecessor system, to baseline system comparisons during Concept Development, to LCOM models based on HFE/LSA comparability input data during the Demonstration/Validation Phase and more final HFE/LSA/engineering data during Full Scale Engineering Development. It will be the recommended source of aircraft maintenance manpower estimates. ALH will be responsible for conducting or contracting the LCOM sensitivity analyses using predecessor system or generic data prior to the SPO being formed. Once the SPO has been formed, EN may conduct/contract for LCOM analyses on selected major weapon system as requested by the SPO. The LCOM model produced by the ASD/EN, ALH, SPO and MAJCOM OL personnel could be used for both manpower assessments and engineering analyses.

APDS and CODAP Available through the ORDB. The Air Force has one of the most sophisticated personnel data systems available in any Service. It can describe AF military personnel in great detail by career ladder and has great flexibility for data manipulation to answer MPT questions. Comprehensive Occupational Data Analysis Programs (CODAP) enables the USAF Occupational Measurement Center to describe the tasks and related task data about each AF career ladder. Again, these data are stored in a very flexible format. Both APDS and CODAP data bases feed the Occupational Research Data Bank (ORDB) which makes computer "runs" available through "on-line" modem access. The one drawback to these data is that they are presented by Air Force Specialty Code (AFSC), which may or may not be directly related to an aircraft system. Research is under way to alleviate this disconnect. Once this is accomplished, the rich AF personnel data resources can be made available for the personnel/AFSC analysis needed to input to the LCOM manpower analysis. Until that time, ALH hopes to use this data as best possible in a manual mode.

LSA/LSAR and HFE Task Data Ordered Iteratively, and Source for Training Development. LSA/LSAR and HFE task data will be ordered iteratively throughout the WSAP beginning with milestone 0 to provide data for addressing MPT issues. It is critical that the users tailor what they need, specify when each delivery is to take place, and that the medium specified is the most efficient/effective for immediate use. Later in the WSAP, complete and accurate LSA/LSAR is needed to address training development issues. If it is late, the training development system cannot ensure adequately trained personnel for the Initial Operational Capability (IOC). In the past, LSA/LSAR has received low priority. ALH will attempt to give higher visibility to HFE and LSA through the System MPT Plan so that the Air Force buys a total weapon system, including everything necessary for trained personnel to operate, maintain, and support it when fielded.

Human Factoring Maintenance Tasks. In the past, most human factors efforts centered around the cockpit

and crew positions. Because of the expense and lessened availability of maintenance manpower, it is critical that we start assigning the same human factor priority to maintenance as we have crew positions. The result will be maintenance tasks and equipment which reduce manhour requirements per unit, and increase the efficiency of maintenance turn-around and wartime readiness of new systems.

Coordination with Safety and Human Factors Initiatives. Because some safety and human factors issues can have large MPT implications, close coordination with the ASD Human Factors Engineering (HFE) Branch and Safety Office is appropriate. Both human factors and safety data sources could help identify high driver MPT issues. ALH will work closely with these offices to develop data-based ways of identifying MPT issues of consequence. By supporting issues of common interest, the three offices have a better chance of obtaining SPO funding for necessary analyses and of gaining implementation of HFE, Safety, and MPT positions.

MPT MANAGEMENT ACTION

In addition to the above methods, which may have management implications, ALH plans to conduct the intensive search and development to develop a CSNAS (see below) Network for MPT. In addition when fully staffed, ALH will take on the mission of developing a three-tiered Systems MPT course, and will work with Air Force Institute of Technology (AFIT) and ASD acquisition courses for full inclusion of MPT principles.

Development of CSNAS Network. ALH will conduct a thorough review of regulations, MIL STDs, MIL PRIMES, operating instructions, and MPT requirements working cooperatively with appropriate ASD, AFSC, AFALC and Air Staff organizations. Based on the findings of this review ALH will construct a Computer Supported Network Analysis System (CSNAS) model network. This computerized "PERT diagram" provides SPOs with a government owned project management tool which meets regulatory requirements for each major program to have a networking system. The computer network identifies critical actions over the development of each system, and allows the SPO to show impacts of program changes on the schedule using the critical path method. The MPT model that ALH will develop will provide SPO personnel with a prototype of what they should accomplish regarding MPT in their program. They can tailor the prototype model to meet the unique facets of their program so that MPT becomes an integral part of their program's management. Thus the MPT CSNAS model will provide guidance on the timing and procedures for implementing MPT within each program.

Systems MPT Course. While attempts have been made, it is clear that a course which fully covers manpower, personnel and maintenance training (as well as operator training) needs to be developed. As funds and manpower become available, ALH plans to monitor the contract for a three-tiered MPT course. A short version would be tailored for senior AF and Industry. A more detailed and functionally-oriented course would address the needs of MPT managers, logistics, human factors, and other Air Force and Industry personnel. Finally, a detailed MPT analyst course is needed for the ALH, SPO-matrixed, and other personnel who are expected to conduct weapon systems MPT analysis.

Update AFIT and ASD Acquisition Courses. Working with AFIT and ASD training personnel, ALH hopes to update the courses used to educate and train ASD personnel on the acquisition process. As regulatory guidance is published, these courses are normally updated. Therefore, as progress is made in updating regulations and MIL STDs, they will be incorporated into the AFIT courses. In addition, the Directorate will furnish assistance in updating MPT integration aspects of AFIT WSAP courses.

WSAP TIMELINE ACTIONS

Another way to describe ALH's concept of operations is to look at the major functions ALH will perform, or ensure are performed by acquisition phase. These are the MPT Directorate's goals:

Preconcept: Develop MPT constraints and goals, define problems to be solved with new system, identify MPT analyses and trades to be examined, examine new technologies, participate in planning projects, and develop source selection criteria.

Concept: Explore MPT alternatives, examine implications of design trades, develop alternate MPT concepts, influence design, and develop defined source selection criteria.

Demonstration/Validation: Evaluate MPT implications of alternative systems, recommend changes, refine MPT concept, refine manpower assessments, order data for training development, plan MPT tests, and develop source selection criteria.

Full Scale Development: Evaluate System for MPT issues, finalize and publicize MPT concept, ensure training system developed, finalize manpower estimate, and conduct/evaluate MPT tests.

Production/Deployment: Review test results for MPT implications, develop MPT lessons learned, and validate MPT concept.

SECTION VI

DIRECTORATE PROGRAM OBJECTIVE TIME-PHASED ACTIONS

The following time-phased actions being undertaken by the MPT Directorate illustrate some of the activities initiated by ASD/ALH. They are being undertaken in support of the ALH mission and to implement the concept of operations, explained in Section V.

-Determine MPT roles and responsibilities

- Establish Safety Program interface

- Include MPT factors in regulations, LSA, DIDs, MIL STD/MIL Primes, procurement documentation formats, etc.

- Develop standard paragraphs and checklists for procurement documents

- Develop prototype Systems MPT Plan

- Develop procedures for MPT integration into source selection

- Develop MPT CSNAS network

- Develop MPT education and training course(s)

- Update MPT information in AFIT and ASD acquisition courses

- Develop MPT analysis capabilities using existing analysis tools and data bases

- Promote research and development to correct MPT analysis tool/data base deficiencies

- Establish information systems support for MPT Directorate

- Develop procedure to monitor force structure performance indicators (e.g., aptitude, education, retention, skill projections) for potential impact on developing weapon systems

- Develop/manage MPT program decision package

- Assess and procure contractual MPT support

- Develop matrix personnel plan

- Develop MPT information and publicity plan

SUMMARY

The Manpower Personnel and Training Directorate was established to test whether a long-standing need to fully integrate MPT considerations into the acquisition process could be institutionalized by a model organization at the AFSC product division level. The initial cadre of 12 military personnel developed an MPT Implementation Plan which is summarized above. The goal of the organization's concept of operation is to determine how existing MPT analysis tools, data sources and procedures can more fully improve consideration of MPT factors in the WSAP. The MPT Directorate is giving favorable consideration to using or ensuring use of LCOM, CODAP, HFE task analyses and CAD tools, and LSA/LSAR. In addition, it plans to review acquisition documents for inclusion of MPT requirements, and use CSNAS as a management prototype to encourage timely requesting of MPT analyses and data. Regulation and MIL STD changes coupled with a three-tiered Systems MPT course will help encourage acquisition mangers to consider MPT. And finally, a Systems MPT Plan is proposed to integrate M, P, and T and give MPT the appropriate planning and visibility. With this tool, the SPO-matrixed MPT analysts will be able to obtain MPT goals and constraints to influence system design, and can highlight the important MPT issues within and outside the SPO.

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