TRAINING REQUIREMENTS DETERMINATION DURING EARLY PHASES OF WEAPON SYSTEM ACQUISITION

JAMES J. VAUGHAN JR., Ph.D.
Advanced Systems Department
Dynamics Research Corporation
Wilmington, Massachusettes

INTRODUCTION

The Weapon System Acquisition Process (WSAP) has generally been characterized by an inadequate consideration of the manpower, personnel, and training implications resulting from early design decisions. In response to this situation, the U.S. Navy has been involved in the design, development, and consistent improvement of a Military Manpower Versus Hardware Procurement (HARDMAN) methodology. The purpose of this methodology is to assess the implications of manpower, personnel, and training requirements early and continually throughout the WSAP.

As indicated in the reports describing the application of the methodology to the Shipboard Intermediate Range Combat System (Dynamics Research Corporation, 1978), the LSD-41 main propulsion plant (Dynamics Research Corporation, 1979a), and the Undergraduate Jet Flight Training System (Dynamics Research Corporation, 1979b), the methodology has been considered successful in generating manpower and personnel requirements for a proposed weapon system. However, due to a lack of contractual emphasis, the methodology has provided only a preliminary process for generating training requirements.

To satisfactorily close the loop of the HARDMAN methodology necessitates a Training Requirements Analysis (TRA) methodology step which will accurately determine the training implications associated with a proposed weapon system. This paper will propose a TRA step which provides the above determination and which is amenable to application early in the WSAP. The TRA has been designed in a manner which makes it compatible with the existing process of the HARDMAN methodology (see Figure 1) as described in Chapter 2 of <u>Development of A Prototype HARDMAN Application - LSD-41 Propulsion System: Final Draft</u> (Dynamics Research Corporation, 1979b).

OVERVIEW OF TRAINING REQUIREMENTS ANALYSIS

In order to determine training implications, the TRA step will provide the specification of an estimated training system design for a proposed weapon system. The design will include the following components:

*the objectives of instruction
*the sequencing of instruction
*the methods of instruction
*the media of instruction
*the methods of assessment
*the methods of remediation, and
*the overall training system management

This design will not be the same as that which results from Instructional System Development (ISD). While some portion of the TRA procedures and techniques are similar to those in ISD, TRA will not result in the detailed products normally generated by ISD (e.g., the actual design of instructional materials, the actual construction of assessment items).

Following its specification, the estimated training system design will then be

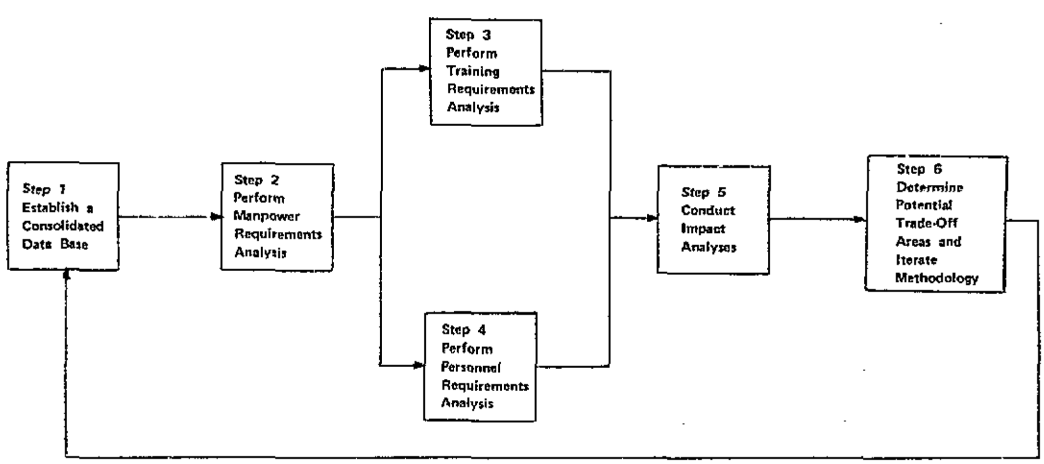

FIGURE 1- THE HARDMAN METHODOLOGY

evaluated in order to determine and quantify its associated implications. The evaluation will tentatively be conducted in respect to the following implication categories:

- *training system design consequences
  - operational manpower requirements
  - maintenance manpower requirements
  - system ownership cost
  - system design cost
  - student time to complete
  - real-time/simulator training time
  - faculty training requirements
  - support personnel training requirements
  - student outcome predictability
  - effects on career
- *training system design cost/benefit
- *training system design probability for success
- *training system design adequacy

Each of these categories has been selected, and is capable of quantification, within the obvious constraint of not physically posessing the instructional products associated with the training system design under evaluation.

In any given application of the TRA, it is likely that a user (e.g., the Navy) may specify certain parameters which the quantified implications of the training system design may not exceed. Any quantified implications which do exceed the parameters will necessitate one or more modifications to the training system design and/or to the proposed weapon system design. In such a situation, evaluation and modification of both the training system and/or the proposed weapon system design would be conducted iteratively until the quantified implications of the training system design no longer exceed the specified parameters. Once the quantified implications fit all given parameters, the TRA process would be considered complete.*

In addition to determining the implications of a training system design, the TRA will also serve a number of other useful functions. First, it will help to select among alternative competing weapon systems in respect to identifying that system(s) which optimize(s) training considerations. Second, for a given weapon system, TRA will help to identify a proposed training system(s) which optimize(s) one or more user considerations. Third, TRA will provide substantial inputs to the ISD process during later phases of the WSAP.

*Further weapon system and/or training system design changes /detailed design specifications would necessitate further iterations of TRA.

TRAINING REQUIREMENTS ANALYSIS: THE METHODOLOGY STEP

The performance of TRA during the WSAP will result in extimates. In the early phases of the WSAP, the quality of the estimates will be a product of the existing knowledge concerning the proposed weapon system. However, as the WSAP progresses, the quality of the estimates will consistently improve.

Due to the inherent potential for error embedded in estimates, the TRA must constantly remain subject to revision as the quality of the data improves. In order to facilitate and encourage revision, the proposed TRA step has been designed to reflect a system's approach. That is, TRA may be described as 'the HARDMAN methodology in miniature' as internally it contains the elements of impact analysis, trade-off analysis and iteration.

The four sub-steps involved in TRA are depicted in Figure 2 and briefly defined below:

Sub-step 3a - Establish A Baseline Training System Curriculum

(In the HARDMAN methodology, a proposed weapon system is termed the baseline system. Similarly, the training system related to the proposed weapon system will be termed the baseline training system.) In this sub-step, the skills, knowledges and related objectives to be associated with the baseline weapon system are stated.

Sub-step 3b - Generate the Baseline Training System Design and Data Base

Based upon the previously stated objectives, a baseline training system design is specified. In addition, data related to the baseline training design is gathered.

Sub-step 3c - Evaluate the Baseline Training System Design

In this sub-step the implications of the baseline training system are determined and quantified.

Sub-step 3d - Determine Baseline Training System Design Modifications

The above evaluations are analyzed in this sub-step. If the implications

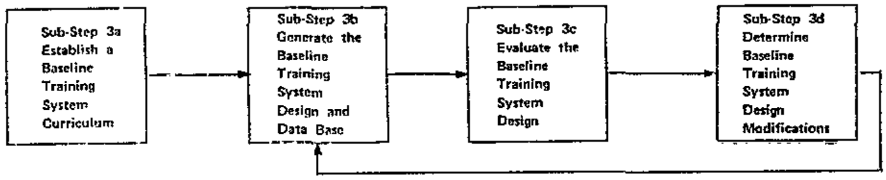

FIGURE 2- HARDMAN METHODOLOGY STEP 3: PERFORM TRAINING REQUIREMENTS ANALYSIS

of the baseline training system design exceed any user provided parameters, then changes in the baseline training system design are made and the changes iterated through the TRA. If the user provided parameters are not exceeded, then the TRA process is considered complete.

Each sub-step and its related activities are described as follows (see Figure 3 for the balance of this paper).

Sub-step 3a - Establish A Baseline Training System Curriculum

This sub-step involves a series of activities which will provide a foundation and focus for the succeeding sub-steps. The activities culminate in the statement of an estimated curriculum related to the job-skill areas demanded by the baseline weapon system under consideration. For purposes of this paper, a curriculum is defined as:

> the statement and sequencing of all the objectives to be mastered during a period of formal training related to a specific job-skill area.

As indicated previously, the job-skill area may be that of maintenance, operation, supervision, or some combination thereof.

The effort involved in curriculum development will vary depending upon the baseline weapon system. For those weapon systems which are similar (e.g., up-to-date replacements) for existing weapon systems, the establishment of an estimated curriculum may require little more than up-dating job-skills. However, for an entirely new weapon system, the generation of a complete listing of new job-skills and related curriculum efforts may be required. Of course, most baseline weapon systems will likely require an effort somewhere between these two extremes (e.g., the situation in which a baseline weapon system requires only the modification of a portion of an existing training system). A description of the three activites involved in the curriculum development sub-step is as follows.

Activity 3a.1 - Specify On-Job Skills

The primary input to this activity is the baseline task networks developed during the manpower requirements determination step of the HARDMAN methodology. These networks reflect a sequential listing of major job events as they occur in any maintenance/operational scenario. Thus the networks provide an initial conception of the maintenance, operation and supervision job-skills which will be associated with the baseline weapon system and which will require training.

Using the input from the baseline task networks, two general alternative methods for specifying actual on-job skills are available. The first is to conduct a hypothetical task analysis. This alternative would be followed in those situations where the baseline weapon system is an entirely new system or contains a significant number of new job-skill components. The procedures for conducting a hypothetical task analysis are described in Learning for Performance: Systematic Course Design Applied to Career Oriented Education (Vaughan, 1977).

The second general alternative for specifying on-job skills would be via the validation of an existing task analysis. This alternative would be employed in situations where the baseline weapon system is replacing an existing system and in which the job skills of both systems are relatively similar. In employing this alternative, the following general procedure would be followed:

1. the existing task analysis would be validated in respect to existing fleet operational requirements,
2. new job skills would be added to the task analysis to reflect new fleet operational requirements or new hardware/software additions,
3. existing job skills would be revised to reflect revised fleet operational requirements,
4. job skills within the existing task analysis which are no longer required by existing fleet operational requirements would be removed,
5. the existing task analysis would be reformatted (or restated) in a manner useful for further curriculum development activities.

Activity 3a. 2 - Convert Job Skills to Performance Objectives

In this activity each of the job skills would be converted into performance objective format. This conversion would result in a statement of required behavior, the mastery learning criteria associated with that behavior, and the conditions under which the behavior would be assessed. The performance objectives become the specific, measurable estimated learning outcomes of the baseline training system.

Activity 3a. 3 - Conduct Learning Analyses

Each performance objective would be subject to a learning analysis. Essentially, a learning analysis involves the statement and sequencing of enabling objectives (pre-requisite learning) required in order to achieve a specific performance objective (Gagne, 1975). The statement and sequencing of enabling objectives is accomplished employing an established hierarchy of learning (e.g., Bloom's Taxonomy of Educational Objectives, Gagne's Varieties of Learning, Ellis, et.al. Instructional Quality Inventory).

The major outcome of the curriculum establishment sub-step would be a baseline training system curriculum. In addition to providing a job skills and related objectives

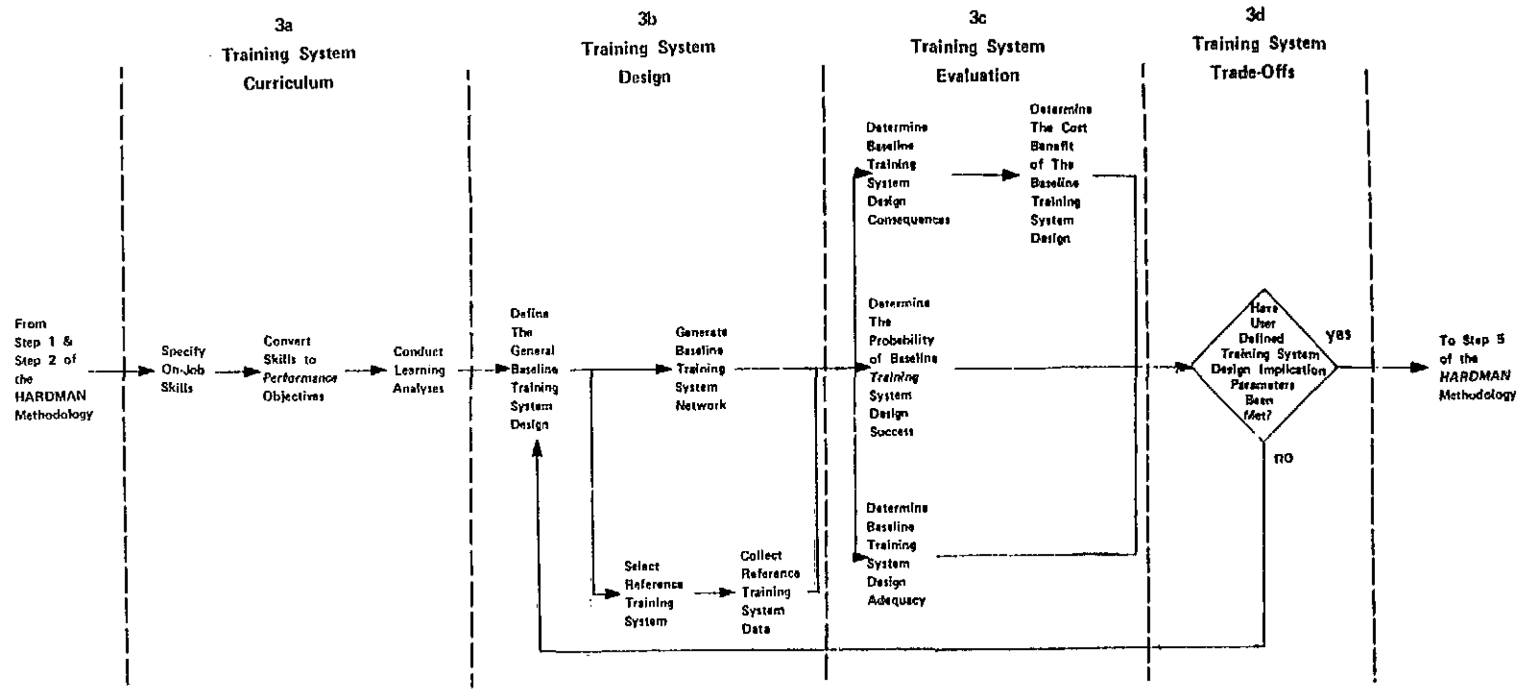

FIGURE 3-- PERFORM TRAINING REQUIREMENTS ANALYSIS (EXPANDED VERSION)

foundation upon which a baseline training system design may be generated, the sub-step would also:

*assure that present and future job skill requirements are incorporated into the baseline system design,
*focus future learner and instructional designer attention via the statement of performance and enabling objectives,
*assure that the content of the baseline curriculum is appropriately sequenced via the learning analyses, and
*assure that alternative baseline training system designs (as required) are developed from the same basis and are thus amenable to comparisons.

Sub-step 3b - Generate the Baseline Training System Design and Related Data Base

The baseline training system design describes a training system which will satisfy those maintenance/operation/supervision skill needs specified in Activity 3a (note: a given baseline weapon system could require a number of different baseline training systems; each designed to satisfy a specific job area). In this sub-step both general and detailed designs of the baseline training system are generated. Further, a data base related to the baseline training system is also generated. This data base is used in later steps for evaluating the baseline training system design.

Activity 3b. 1 - Define the General Baseline Training System Design

There are two parts to this activity. In the first part the baseline training system is generally defined. This general definition reflects judgmental decisions made in terms of the following training system components:

*Training Sequencing Component - this refers to the sequencing of units of instruction (a unit is defined as a single performance objective and its related enabling objectives), e.g., may be characterized as sequencing by perceived complexity, sequencing by perceived transfer of learning value, sequencing by equipment system.
*Training Method Component - this refers to the general format to be used for training, e.g., may be characterized by individualized instruction, self-paced instruction, computer managed instruction, instructor led instruction.
*Training Media Component - this refers to the general kinds of media to be employed, e.g., may be characterized by motion pictures, simulator, textbook, programmed instruction, computer assisted instruction.
*Training Assessment Component - this refers to the general ways in which students will be tested during training; e.g., may be characterized by paper and pencil, on-job performance, simulated performance, oral interview.
*Remedial Assistance Component - this refers to the general ways in which student learning problems will be corrected; e.g., may be characterized by peer tutoring, motivational intervention, automatic feedback.
*Training System Management Component - this refers to the way in which overall management of the training will be conducted; e.g., may be characterized by computer managed instruction, personalized management system, instructor management.

For example, a hypothetical baseline training system may be generally defined as follows:

*Training Sequencing Component - instruction will be sequenced according to the equipment system being learned and for the piece of equipment according to complexity.
*Training Method Component - the methods of instruction will be primarily instructor led for complex skills and self-instruction for non-complex skills.
*Training Media Component - instructor led segments of instruction will use a lecture/textbook media while self-instructional segments will employ linear programmed instruction.
*Training Assessment Component - all assessment will be conducted via on-job performance, non-job related assessments will not be conducted.
*Remedial Assistance Components - the instructor will recognize learning problems and verbally provide remediation.
*Training System Management Component - all management tasks will be completed by the instructor.

Any single training system component characteristic or combination of characteristics may be selected in developing the general definition of the baseline training system. These characteristics may emanate from an array of sources.*

In any discussion of training, training

*e.g., the content of the baseline curriculum, the Mission Element Needs Statement, perceived learning problems, research on teaching/learning, experimental considerations, a desire to simply update an existing training system, the requirement to modify only a portion of the existing training system, potential student capabilities as measured by standardized test scores.

component characteristics are presented as though there is a general understanding of their meaning. However, such is not the case. For example, to some individuals the characteristic 'written self-instruction' implies pages containing 350 (more or less) typed words. Yet, to other individuals it may imply pages containing enough words to present a stimuli for learning, provide a model of expected student performance, provide prompts for learning, and guide student thinking. Obviously, in the case of 'written self-instruction,' the difference between these perceptions has a significant effect on (for examples):

*the skills required of the person developing the written self-instruction
*the time involved to develop the written self-instruction
*the time required for a student to master the contents of the written self-instruction

Thus, the second part of this activity requires that the training component characteristics within the general baseline training system description be thoroughly defined. Essentially, each component characteristic which may become a part of the baseline training system design requires careful definition. Without this definition, the evaluation of a single (or competing) baseline training system design(s) will be inadequate.

Activity 3b.2 - Select the Reference Training System

The function of the reference training system is to serve as a data source from which baseline training system design data may be generated through extrapolation. Thus, the reference training system selected should contain features which make it directly comparable to the general baseline training system design (e.g., similar type of curriculum, similar training component characteristics). For example, if the baseline curriculum contains sophisticated technological job skills and the general baseline training system design incorporates the component characteristics of self-paced, computer assisted instruction, then a similar reference training system should be selected. In certain cases the reference system may be the existing training system which is being replaced. However, assuming that the general baseline training system design incorporates unique component characteristics or is designed for an entirely new weapon system, the reference training system may be composed of:

*a similar existing training system
*portions of similar existing training systems
*related training system data gleaned from the literature on training.

Activity 3b.3 - Collect Reference Training System Data

Data to be acquired on the reference training system is specific. Data should be collected on each training component characteristic which is to be a part of the baseline training system design. The accuracy of the data collected will be a function of how closely the component characteristics of the reference training system match the component characteristic definitions generated in activity 3b. 1. Thus, the data collected may require modification based upon any differences in characteristic definition.

The data collected for each component characteristic should include:

*time to design/develop
*cost
*expected student performance
*faculty training requirements
*support personnel training requirements
*career impacts
*expected design problems

Each data item should be sufficiently detailed to permit accurate extrapolation to the baseline training system (e.g., the cost factors obtained for the design and development of a single page of 'written self-instruction' in the reference training system should be of sufficient detail to permit the generation of similar costs for the baseline training system).

Activity 3b. 4 - Generate the Baseline Training System Network

A training system network is a pictorial display of the terminal and enabling objectives within a given training system (see Figure 4). The network indicates the sequence in which the performance objectives and enabling objectives will be learned (which will reflect the learning analysis except in those cases where the sequencing of objectives is arbitrary). Further, the network indicates, for each objective, the specific methods and media to be used, the specific methods of assessment and remediation to be used, and the specific training management technique to be used. Each of these decisions is made based upon the general definition of the baseline training system design (Activity 3b. 1) massaged by convenience, research findings, expected benefits, task difficulties, requirements for practice, and kind of learning involved.

Essentially, the construction of the baseline training system network provides the specific design for the baseline training system. In the HARDMAN methodology, it is this specific design which is used (along with manpower and personnel determinations) in the conduct of impact analyses and tradeoff studies related to the baseline weapon system. However, due to the relatively soft nature of training, the baseline training

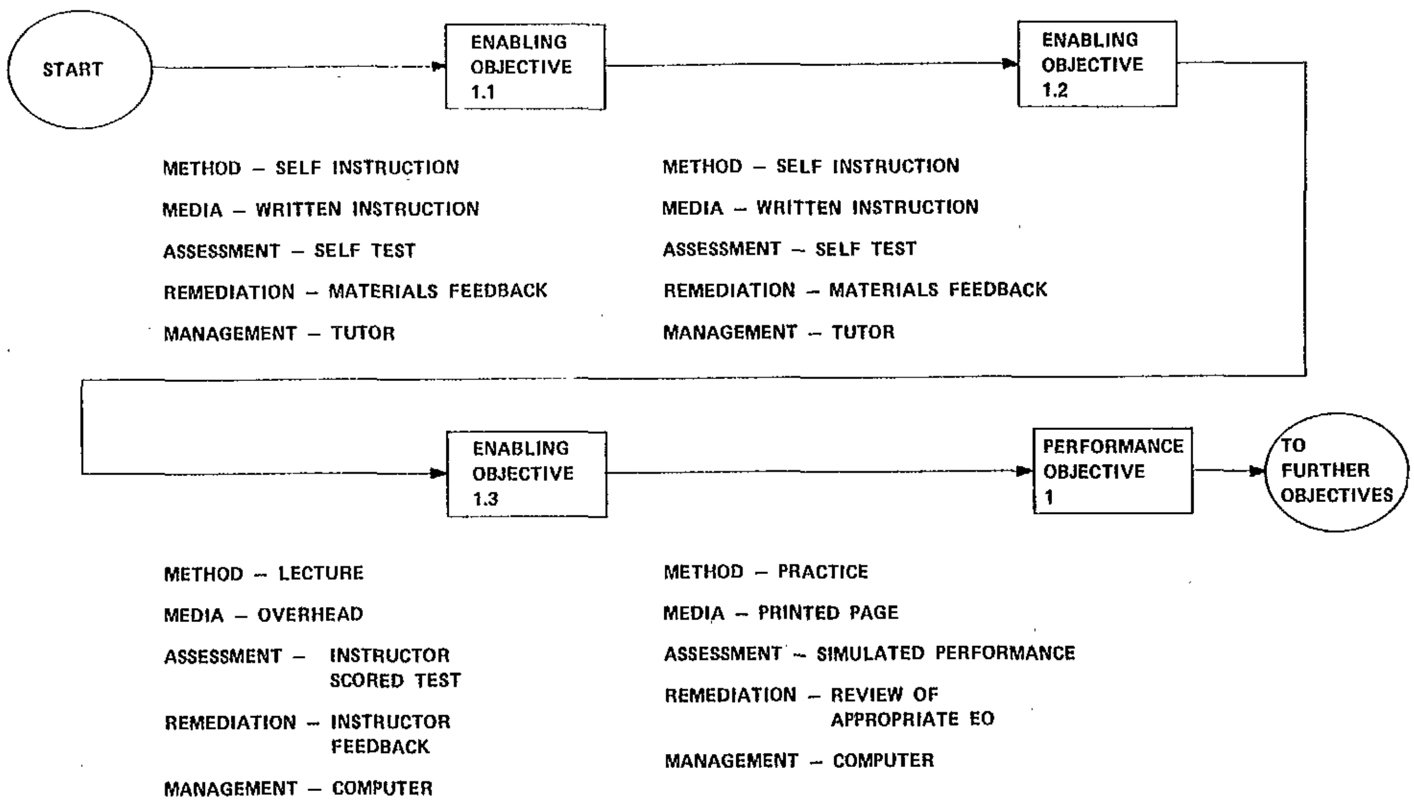

FIGURE 4. PORTION OF A BASELINE TRAINING SYSTEM LEARNING NETWORK

system design is iteratively subjected to evaluation and tradeoffs within the TRA. The need for evaluation and tradeoffs within the TRA provides the rationale for the next two sub-steps.

Sub-step 3c. Evaluate the Baseline Training System Design

This sub-step consists of evaluations of the specific baseline training system design (as presented in the baseline training system network and associated data) in order to determine and quantify the implications of the design. The evaluations are conducted in respect to the following implication categories:

*estimated consequences of the baseline training system design
*estimated cost-benefit of the baseline training system design
*estimated probability of baseline training system design success
*estimated adequacy of the baseline training system design

Based upon the evaluations, training tradeoffs may be conducted (in the next sub-step). In addition, the evaluations permit a comparison of alternative baseline training system designs (as appropriate) in preparation for the selection of a final design. Following that selection, training tradeoff studies may then be conducted. This sub-step is composed of four activities, each of which consists of one or more evaluations within a given implication category:

Activity 3c. 1 - Determine Baseline Training System Design Consequences

In this activity, the consequences of the baseline training system design are determined. This determination stems from the baseline training system network and related quantifiable data from activity 3b. 3. There are presently ten consequences which may readily be quantified (estimated) for any given baseline training system design:

1. Operational Manpower Requirements - This consequence refers to the estimated number and types of personnel required to maintain the operational capability of a training system on a day to day basis. Specifically, this would include faculty and related support personnel (e.g., secretaries, media support, assessment experts, facility upkeep personnel).
2. Maintenance Manpower Requirements - Maintenance manpower requirements is an estimate of the number and kinds of personnel whose task it is to update, revise or repair any aspect of the training system. Thus, these personnel would run the gamut from instructional technologists to media equipment repair personnel to technical writers.
3. System Ownership Cost - System ownership cost is an estimate of a training system's operational costs (e.g., materials, faculty and student maintenance, revision of instruction, repair of media equipment, facilities maintenance of learning laboratories, supplies and materials, overhead costs) for the life of the training system. In this context, system ownership costs refers only to those costs accruing following deployment of the training system.
4. System Design Cost - System design costs are an estimate of all those cost factors (e.g., materials production, equipment purchases, initial faculty training, construction and/or renovation of facilities, training system field testing, initial equipment installation, design overhead costs) necessary in order to result in an operational training system. System design cost has been separated from system ownership costs as system design costs may vary dramatically dependent on the overall format of training.
5. Student Time to Complete - This consequence is an estimated measure of the average expected amount of time required for a student to master the entire training system curriculum.
6. Real-Time/Simulator Training Time - This consequence is an estimated measure of the expected amount of student time devoted to simulator training as opposed to real-time training. In light of the costs of real-time training (both financial and otherwise), the importance of this consequence will likely increase overtime.
7. Faculty Training Requirements - Regardless of the format of a training system, faculty will require some degree of training. The time and complexity of estimated faculty training will be a product of the overall format of the baseline training system. For example, faculty skills may range from the conduct of a lecture (for a more traditional training system to the development of a supportive interpersonnel environment for a more innovative training system).
8. Support Personnel Training Requirements - As with faculty training, the format of the baseline training system will permit an estimate of the kinds and complexity of support training required. For examples, the use of new hardware may require the training of technicians, while

certain kinds of media may require the training of educational technologists.

9. Student Outcome Predictability - This consequence does not refer to what is learned, but rather to the *estimated consistency of learning.* Some training system formats may allow (even encourage) a diversity of achievement while others may result in highly consistent achievements.

10. Effects on Career - This consequence is an estimate of the effect of the training system on a student's future career. The inclusion of this consequence stems from studies related to the Navy's Integrated Personnel System (IPS). The IPS studies indicated that dramatic changes in training can have significant effects (both negative and positive) on careers.

As indicated previously, data related to each of the consequences is developed from the training data base (Activity 3b. 3). However, certain of the training program consequences may require data which is not readily available. For example, the training data base may not have sufficient data on faculty training vis-a-vis the more complex faculty skills which may be required by a given baseline training system design. Thus, reference training system data may require reinforcement with data from other existing training systems or from related literature (Note: any further data collected would be added to the training data base).

The following comments on training design consequences should be noted:

*Each of the training system design consequences is an estimate based on existing data, thus, the consequences are subject to revision as the quality of data improves.

*The ten training system design consequences are not intended to become a finite list. Other consequences may be selected for measurement depending upon the baseline weapon system under consideration.

*The quantification of certain design consequences helps in stimulating data of value in quantifying other consequences. For example, the complexity of faculty training requirements will lead to questions of assignment flexibility (due to faculty illness, leave, etc.). the results of the assignment flexibility analysis will help to further quantify the student time to learn consequence and thus the system ownership cost consequence.

Activity 3c. 2 - Determine the Cost-Benefit of the Baseline Training System Design

All training system designs are intended to produce desirable outcomes. However, in order to judge desirability, decision makers are concerned with the benefits and costs of a given design. Cost-benefit analysis includes estimates of both cost-analysis and benefit-analysis. Each of these terms is defined as follows (Human Resources Research Organization, 1973):

*cost analysis - a process for determining or estimating the dollar cost of training (both system ownership costs and system design costs) per student or groups of students.

*benefit-analysis - a process for determining or estimating the dollar value of specific benefits gained from training. Essentially, benefits analysis requires the identification of those benefits or portions thereof that can be directly attributed to training.

*cost-benefit analysis - a process for determining or estimating the dollar cost of those benefits directly attributable to a training system design. Further, cost-benefit analysis permits the comparison of alternative training system designs or of variations of the same design.

Activity 3c. 3 - Determine the Probability of Baseline Training System Design Success

Failing an analysis of success, any baseline training system design has the same general probability of success as any other design. As baseline training system designs cannot be empirically tested prior to their actual development and implementation, a method for accurately estimating the probability of their success is desirable. In order to satisfy this probability of success requirement, the TRA will employ a variation of a technique know as 'fault tree analysis' (Wood *et al*, 1979).

The fault tree analysis technique provides an indication of the most likely points of failure which could occur within any given baseline training system. The technique requires a concise and logical step by step description of the various combinations of potential or possible occurences within a baseline training system design which could result in failure of the system. Further the technique will graphically portray and *systematically depict the probable failure event* sequences which can lead to failure of a key learning outcome.

When a fault tree analysis is completed, mathematical formulas are applied to determine the strategic paths leading to undesired events. Thus, through a summation process, a probability of success of a given baseline training system design may be determined. The overall value of the fault tree analysis technique is that it will provide both a clear indication as to the weakest link within a given baseline training system design as well as indicating the comparative success probabilities for alternative designs.

Activity 3c. 4 - Determine the Adequacy of the Baseline Training System Design

The adequacy of a baseline training system design may be defined as "the ability of the training system network components to move a student from an entering capability level to a terminal capability level." For purposes of this evaluation, the estimated adequacy of the training network will be measured as follows (Mulligan & Funaro, 1979):

*Training System Ability to Satisfy Recall Learning Requirements - Recall learning requirements are defined as the amount and complexity of recall required by a terminal performance objective. Adequacy will thus be a function of the training system network's ability to satisfy these recall requirements. The adequacy of the baseline training system network will normally be measured via the estimated amount of student rehearsals necessary in order to meet the recall requirements.

*Training System Ability to Satisfy Skill Performance REquirements - Skill performance requirements are defined as the complexity of performance required by a terminal performance objective. Adequacy will thus be a function of the training system network's ability to satisfy these requirements. The adequacy of the training network will normally be measured by its estimated ability to satisfy specific psychomotor, conceptual learning, and perceptual discrimination requirements.

Sub-Step 3d - Determine Baseline Training System Design Modifications

This final sub-step employs the results of sub-step 3c in generating an answer to the following:

HAVE USER DEFINED TRAINING SYSTEM DESIGN IMPLICATIONS PARAMETERS BEEN MET?

By user defined it is meant that the user may provide parameters for one or more of the implication categories within sub-step 3c. The comparison of these parameters against each of the implication categories will permit the identification of any undesireable outcomes of the baseline training system design; i.e., quantified baseline training system design implications which exceed user parameters.

If there are no undesireable outcomes, then the results of the TRA (quantified implications of the baseline training system design) will proceed to Step 5 of the HARDMAN methodology where the impacts of manpower, personnel and training implications, both individually and collectively, will be identified. If, on the other hand, there are undesireable outcomes, then changes will be made to the baseline training system design (activity 3b. 1) or the baseline training system network (activity 3b. 4). These changes will be iterated through sub-step 4c in order to generate modified baseline training system design implications. This iteration process will continue until an acceptable array of quantified training system design implications (via user stated parameters) are obtained.

CONCLUSION

The TRA described in this paper enhances the overall applicability of the HARDMAN methodology. It does this by estimating/quantifying the training implications associated with a proposed weapon system design both early and continually in the WSAP. Unfavorable implications may then be alleviated. This may be accomplished either through the modification/replacement of the baseline training system of through a modification in the design of the baseline weapon system.

The TRA is characterized by, and owes its potential accuracy to, the following:

1. The tendency towards objectivity in all TRA sub-steps and related activities.
2. The specification of the baseline training system design as a result of a detailed baseline weapon system curriculum matched to job skills.
3. The specification of the baseline training system design in sufficient detail to allow quantification.
4. The evaluation of the baseline training system design via the estimates of training system consequences, training system cost-benefit, training system probability for success, and training system adequacy.
5. The provision for TRA internal trade-off and iteration based upon evaluations of the baseline training system design.
6. The provision for revision of the baseline training system design (and related evaluations) as more accurate data becomes available.

In addition to the identification of the training implications associated with a baseline weapon system design, the TRA will also serve a number of other useful functions.

Among these are to select among alternative competing weapon system designs, to help identify optimum training systems, and to provide substantial inputs to the ISD process during later phases of the WSAP. In the future, the TRA can easily be adapted for computer operation.

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ABOUT THE AUTHOR

DR. JAMES J. VAUGHAN, JR. is a Staff Scientist at Dynamics Research Corporation. He is presently involved in the formulation and refinement of techniques which will accurately predict the training requirements related to emerging weapon systems. In previous associations, he has been a private consultant to the Free University of Iran and a curriculum specialist at Harvard University. Dr. Vaughan holds an M.S. degree and a Ph.D. from Florida State University in instructional systems.