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DEPARTMENT OF DEFENSE
HANDBOOK

DEVELOPMENT OF
INTERACTIVE MULTIMEDIA INSTRUCTION (IMI)
(PART 3 OF 4 PARTS)



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FOREWORD

1. This handbook is approved for use by all Departments and Agencies of the Department of Defense (DoD).
2. This handbook is intended for guidance only. This handbook cannot be cited as a requirement. If it is, the contractor does not have to comply.
3. MIL-HDBK-1379-3 is Part 3 of 4 Parts. The goal of Part 3 is to provide guidance that may be used by DoD (all Services) and industry for the planning, design, development, implementation, evaluation, and management of Interactive Multimedia Instruction (IMI) products. Use of this guidance is not mandatory.
4. Part 1, MIL-HDBK-1379-1, Department of Defense Handbook, Guidance for Acquisition of Training Data Products and Services, provides guidance for the preparation of solicitations and evaluation of solicitation responses for training. Part 2, MIL-HDBK-1379-2, Department of Defense Handbook, Instructional Systems Development/Systems Approach to Training and Education, provides guidance on the Instructional Systems Development (ISD)/Systems Approach to Training (SAT) process and the development of training materials. Part 4, MIL-HDBK-1379-4, Department of Defense Handbook, Glossary for Training, contains acronyms and definitions for commonly used training terms.
5. The guidance provided in this document is a conversion of process guidance previously provided in MIL-HDBK-284, Interactive Courseware (ICW) for Military Training. This handbook supersedes MIL-HDBK-284.
6. This handbook was developed within the DoD with the assistance of all Services as represented by the Interactive Courseware-Joint Services Action Group (ICW-JSAG) and the Defense Training Standards Working Group (DTSWG).
7. Guidance provided in this handbook is not intended to supplement or duplicate policies and procedures in existing Federal, Department of Defense, and Military Service regulations. Should a conflict arise between this handbook and any of the previously mentioned regulations, the regulations take precedence.
8. There are numerous ways to design, develop, implement, and manage the use of Interactive Multimedia Instruction products. The guidance contained herein may not be applicable to your specific organization.
9. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1. SCOPE

1.1 Scope. This handbook provides background information for the planning, design, development, implementation, evaluation, and management of Interactive Multimedia Instruction (IMI) products. Interactive Multimedia Instruction products include electronic products used in the delivery of instruction or supporting the delivery of instruction. See paragraph 4.2 for a further breakdown of Interactive Multimedia Instruction products. This handbook (Part 3 of 4 Parts) also provides acquisition guidance unique to Interactive Multimedia Instruction products and supplements general acquisition guidance provided in MIL-HDBK-1379-1 (Part 1 of 4 Parts).

1.2 Application guidance. This handbook is intended for guidance only. This handbook cannot be cited as a requirement. If it is, the contractor does not have to comply.

1.2.1 How to use this handbook. The guidance provided in this handbook applies to any Interactive Multimedia Instruction program development. It applies to Interactive Multimedia Instruction in weapons system or training system acquisitions. It also applies to Interactive Multimedia Instruction developed as a stand-alone training product. MIL-HDBK-1379-2 provides guidance for the selection of instructional media. When Interactive Multimedia Instruction is determined to be the best instructional media, the guidance in MIL-HDBK-1379-3 will assist in verifying whether or not Interactive Multimedia Instruction can be used and supported by the training activity. After verification, further guidance will aid in the design and development of an Interactive Multimedia Instruction program.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed below are not necessarily all of the documents referenced herein, but are the ones that are needed in order to fully understand the information provided by this handbook.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the latest issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto.

SPECIFICATIONS

MILITARY

MIL-PRF-29612	Performance Specification, Training Data Products
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HANDBOOKS

MILITARY

MIL-HDBK-9660	Department of Defense Handbook, DoD-Produced CD-ROM Products
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- MIL-HDBK-1379-1 Department of Defense Handbook, Guidance for Acquisition of Training Data Products and Services
- MIL-HDBK-1379-2 Department of Defense Handbook, Instructional Systems Development/Systems Approach to Training and Education
- MIL-HDBK-1379-4 Department of Defense Handbook, Glossary of Training Terms

(Unless otherwise indicated, copies of military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein.

JIEO REPORT -- 8300 Department of Defense Minimum Desktop Personal Computer Configuration

(Copies of this JIEO Report may be obtained by written request to the Commander, Joint Interoperability Engineering Organization (JIEO), Attn: Code TP, Fort Monmouth, NJ 07703-5613)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 General. Definitions and acronyms are provided in MIL-HDBK-1379-4.

4. INTERACTIVE MULTIMEDIA INSTRUCTION PLANNING

4.1 Introduction. Managers achieve successful Interactive Multimedia Instruction (IMI) design, development, acquisition, and management when they become involved with the using activities as soon as Interactive Multimedia Instruction requirements are identified. Deciding whether to use Interactive Multimedia Instruction requires careful planning and consideration. This section provides information and decision aids to help determine whether Interactive Multimedia Instruction can be used and supported by the training activity.

4.2 What is Interactive Multimedia Instruction? Interactive Multimedia Instruction is a term applied to a group of predominantly interactive, electronically-delivered training and training support products. IMI products include instructional software and software management tools used in support of instructional programs.

4.2.1.1 Interactive Multimedia Instruction products. Interactive Multimedia Instruction products are teaching tools and may be used in combination or individually. Used individually not all Interactive Multimedia Instruction products can be considered interactive, multimedia, or instructional. However, Interactive Multimedia Instruction products when used in combination

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with one another are interactive, multimedia, and instructional. A hierarchical representation of IMI products is provided in Figure 1. Interactive Multimedia Instruction products include:

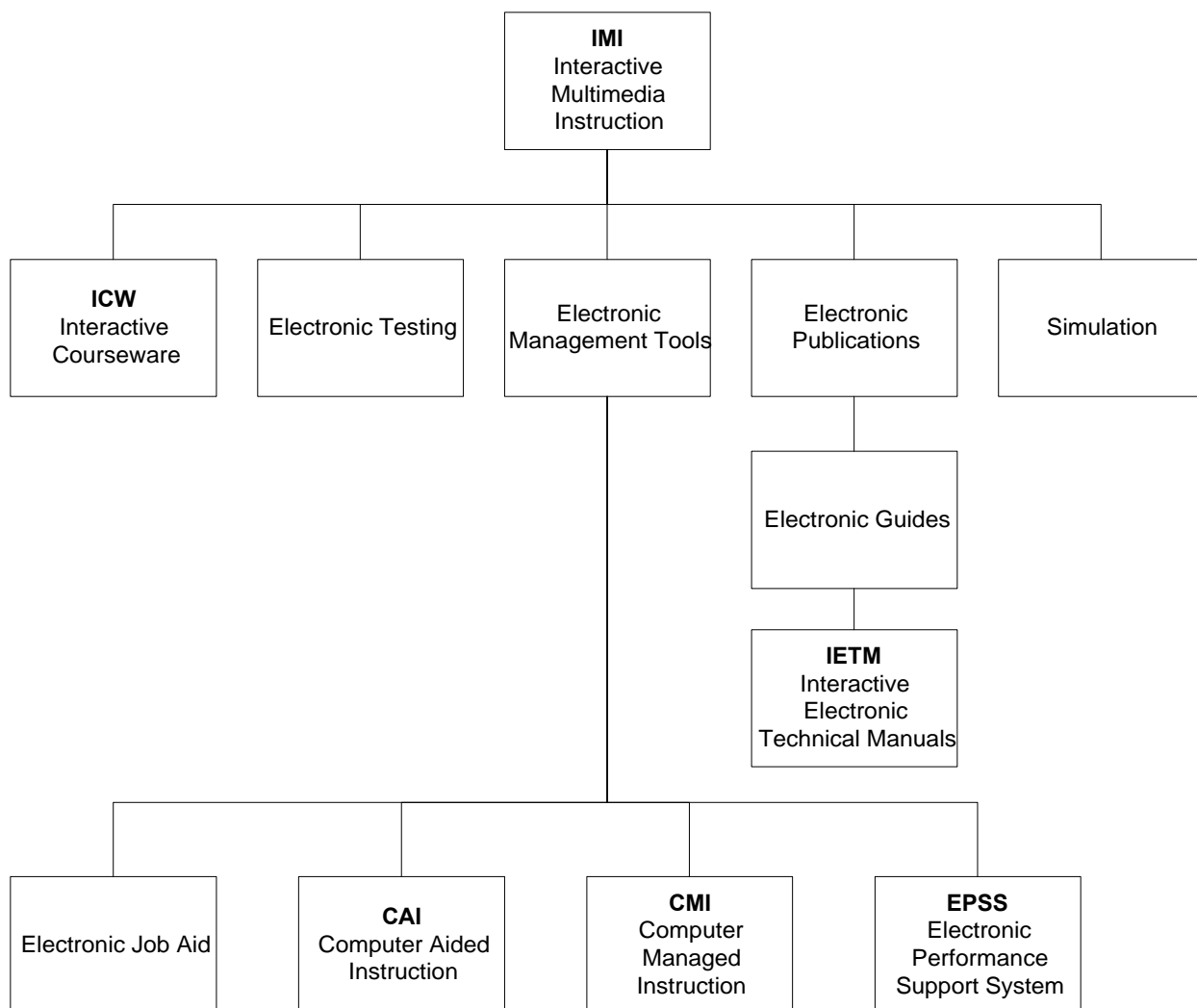
- a. Interactive Courseware (ICW).
- b. Electronic publications.
 - (1) Electronic guides.
 - (2) Interactive Electronic Technical Manuals (IETMs).
- c. Electronic testing.
- d. Simulation.
- e. Electronic management tools.
 - (1) Electronic Performance Support System (EPSS).
 - (2) Computer Aided Instruction (CAI).
 - (3) Computer Managed Instruction (CMI).
 - (4) Electronic job aids (e.g., templates, macros, etc.).

4.2.1.1 Source materials for development of Interactive Multimedia Instruction products.

Types of source materials for development of Interactive Multimedia Instruction products include:

- a. Imagery (e.g., animations, graphics, still photograph, 3-D, etc.).
- b. Video.
- c. Audio.
- d. Text.

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FIGURE 1. **IMI products.**

4.3 Interactive Multimedia Instruction and the Instructional Systems Development/ Systems Approach to Training (ISD/SAT) process. The ISD/SAT process provides the framework for developing training (see MIL-HDBK-1379-2). Within the framework of the ISD/SAT process, training requirements are established and translated into appropriate instructional objectives. In the design phase, one of the most important tasks is that of selecting appropriate instructional delivery methods and media. After the methods and media are selected, the guidance provided in this Part of the handbook is applicable for the planning, design, and development of Interactive Multimedia Instruction.

4.3.1 Interactive Multimedia Instruction applications. Interactive Multimedia Instruction uses may include 1) a stand-alone program that is suitable for use in supplementing a formal course of instruction or distributing to operational activities for use, 2) a program that supports presentation by an instructor, 3) a program that supports formal on-the-job training, 4) a program that supports personnel performance, or 5) a program that supports the management of courseware.

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4.3.2 Advantages of Interactive Multimedia Instruction. Interactive Multimedia Instruction may be a suitable instructional media delivery system for many training objectives. Thanks to the rapid development of computer technology, it is now possible to create, at a reasonable price, new ways of designing and developing educational and training materials. Today, computers can be used to deliver interactive, competency-based, individualized, multimedia instruction. Interactive Multimedia Instruction can tailor instruction to the individual student's needs, be deployable, and provide "just-in-time" instruction.

4.4 General rules for selecting Interactive Multimedia Instruction as an instructional media delivery system. General rules that apply to using almost any form of Interactive Multimedia Instruction are shown in Table 1.

TABLE 1. General rules for using IMI as an instructional media delivery system.

#	GENERAL RULE	RATIONALE
1	Use IMI to gather a large collection of multimedia material, such as slide collections or still photographs or a mixture of still-frame and motion sequences on film or video.	When the volume of slides and the demand for reproduction reach a certain point, the use of IMI may prove to be the most cost-effective means of distribution. Motion sequences, film and video reproduction, are in the long run much more expensive than IMI reproduction. Also, film and video tapes tend to deteriorate over time, where IMI will maintain the images at the same resolution for extensive periods.
2	IMI training should be considered when there are a large number of students distributed over time and place.	In this instance, a cost trade-off exists between self-paced, individualized training and lecture-based training. The break-point is achieved when the number of students is so large and/or widely distributed that it becomes more economical to use individualized training methods.
3	Consider using IMI applications when it is necessary to allow students to practice a skill, and a simulator or real equipment is impractical or unavailable for this training.	If designed correctly, an IMI simulation can often greatly reduce the amount of time required in hands-on training on real equipment or a simulator. Real equipment or a simulator might not be available to provide every student with an opportunity to practice. Real equipment may be undesirable for hands-on training because it is too delicate for constant training use.
4	IMI can provide a safe, yet realistic, simulation of dangerous activities and situations.	When potentially hazardous procedures must be demonstrated or practiced, simulation often becomes a necessity. A case in point involves teaching maintenance personnel how to repair high voltage equipment. Simulation would allow maintenance personnel to practice proper procedures without exposure to actual dangers. An IMI simulation can show the effects of improperly performed procedures without damaging equipment or injuring personnel.
5	IMI is a particularly suitable instructional media delivery system when training requires continuous practice and/or retraining.	One of the most desirable features of IMI is the ease with which any portion of a course or lesson can be retrieved and reviewed. This characteristic is best illustrated by pilot training. Continuous practice is required because pilots must maintain near-perfect proficiency.
6	IMI can be a very useful delivery method in training problem-solving and decision-making skills.	Since advanced or higher-order skills are usually learned "on-the-job," experienced workers are often forced to spend valuable time training unskilled workers, at the expense of their own jobs. IMI training could be substituted, thereby freeing skilled employees from the task of training others.

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TABLE 1. **General rules for using IMI as an instructional media delivery system - Continued.**

#	GENERAL RULE	RATIONALE
7	When a training situation is such that students vary in experience, learning style, and skill level, IMI instruction can provide different types and levels of instruction to different students.	Specific features can be designed into an IMI program to allow users to advance based on their skill levels. IMI programs can be designed to facilitate individual differences in students' learning styles. For example, if the students are visually oriented rather than spatially oriented, the IMI might contain motion video and animation.

4.5 When to use Interactive Multimedia Instruction. Deciding when to use Interactive Multimedia Instruction requires a step-by-step examination process. Interactive Multimedia Instruction should not be selected simply for its technological appeal. This handbook provides additional information and decision aids to assist in identifying constraints that could influence the design of Interactive Multimedia Instruction products.

4.6 Quality improvement. Quality Improvement (QI) is the continuous, organized implementation of beneficial change to the process of designing and developing Interactive Multimedia Instruction. The goal of QI is to promote continuous improvement in the Interactive Multimedia Instruction process and products.

4.6.1 Continuous improvement. Continuous QI of instructional programs is an ongoing initiative. The Interactive Multimedia Instruction development process is designed to lead managers and designers to ask the right questions and help focus on the customer's needs in terms of requirements, schedules, and budgets. Focusing on the needs of the customer is a key element of continuous QI. Customer satisfaction is the number one goal; customer satisfaction translates into meeting instructional requirements in the most effective and efficient manner possible.

4.6.2 Keep customer involved. Once the requirements for the Interactive Multimedia Instruction program have been established and agreed upon, it is important to keep the customer involved in the process. There are several points in the development of an Interactive Multimedia Instruction program where the customer should be involved in the development and review of products that make up the Interactive Multimedia Instruction material.

4.6.3 Get "buy-in". It is essential that the user organization "buy in" to the Interactive Multimedia Instruction design and development process. If the user organization disagrees with the proposed solutions or ideas, it is better to find out and make adjustments early in the process. If the user is kept involved throughout the process, there should be no "surprises" when the final product is delivered.

4.7 The Interactive Multimedia Instruction project team. Depending on the scope of the project and resources available, many different people can be involved in the Interactive Multimedia Instruction process.

4.7.1 Interactive Multimedia Instruction development team responsibilities. Each member of the Interactive Multimedia Instruction development team must know what is expected of them. The Interactive Multimedia Instruction development team needs to know what products

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are required and when, and how Interactive Multimedia Instruction products in the user organization look and function. Interactive Multimedia Instruction development requires team members with a variety of experience. Table 2 lists the Interactive Multimedia Instruction team functions, and describes the specific responsibilities assigned. Depending upon the scope and size of the specific Interactive Multimedia Instruction project and organization management, some of the responsibilities listed below may be combined.

TABLE 2. **IMI development team.**

FUNCTION	RESPONSIBILITIES
Courseware Developer	Authors lesson designs, flowcharts, and storyboards. Designs and/or creates static and animated graphics, performance exercises, simulations, and interactive sequences. Programs lessons with authoring systems.
Instructional Designer	Develops standards and instructional strategies for IMI lessons. Assists with lesson authoring when required. Reviews completed lesson designs, flowcharts, and storyboards for instructional integrity and conformance with standards and strategies.
Subject Matter Expert (SME)	Provides information on project subject matter. Reviews lesson designs, flowcharts, storyboards, and programmed lessons for technical accuracy and currency. Authors lessons as required.
Courseware Programmer	Programs lessons with authoring languages. Develops static and animated graphics with authoring languages. Assists in converting American Standard Code for Information Interchange (ASCII) code when automatic conversion is unavailable. Develops subroutines.
Graphic Artist	Develops graphics and is the advisor for visual conventions.
Media Production Specialist	Films motion and still-frame sequences. Coordinates audio narration. Assists in planning premaster media layout.

4.7.2 **Interactive Multimedia Instruction implementation team responsibilities.** After Interactive Multimedia Instruction is developed, a team of personnel with specific responsibilities is needed to implement the program. Table 3 lists the functions and responsibilities of the team members. Due to the type and use of a specific Interactive Multimedia Instruction program, some of the below listed responsibilities may need to be distributed to a different labor category.

TABLE 3. **IMI implementation team.**

FUNCTION	RESPONSIBILITIES
Configuration Manager	Catalogs, stores, and distributes courseware materials including student guides, workbooks, flowcharts, storyboard hard copy, lesson design hard copy, flowcharts, lesson disks, backup disks or tapes, and version updates.
Courseware Administrator *	Enrolls students. Tracks student progress through CMI reports. Maintains records on student progression. Provides student progression records to instructors.
System Administrator	Sets up and runs computer laboratories. Contacts technicians for unscheduled maintenance. Trains staff to use the hardware system.

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TABLE 3. **IMI implementation team - Continued.**

Class Monitor *	Assists students using IMI. Responds to operational questions and monitors performance using CMI. Updates instructors on student performance.
Instructor *	Provides individual remedial instruction and counseling. Tracks student performance through CMI. Schedules students for remediation. May also participate in IMI development as courseware developer, instructional design, or SME.
* This function may not be required in an exportable environment, but the responsibilities identified in this Table may be required. It may be necessary to redistribute responsibilities to another function on the exportable courseware implementation team.	

4.7.3 Interactive Multimedia Instruction team training. A successful Interactive Multimedia Instruction design and development effort requires team members with skills in initial selection decisions, design, development, and implementation of Interactive Multimedia Instruction. The team should receive training in Interactive Multimedia Instruction design, development, and implementation.

4.8 Management and organizational support decisions. This section provides information on how to determine if organizational support for Interactive Multimedia Instruction exists. Successful implementation of Interactive Multimedia Instruction depends on sufficient management support and proper facilities.

4.8.1 Management support. There are three general types of management support required 1) commitment of resources, 2) enthusiasm for the project, and 3) the ability to meet staffing demands. Table 4 provides general descriptions of the three types of management support.

TABLE 4. **General types of management support.**

TYPE OF SUPPORT	DESCRIPTION
Commitment of resources	Upper level management support is needed for successful IMI development and implementation. Management controls the resources. On IMI projects, resources may be needed for 1) purchasing hardware, software, and IMI, 2) training the IMI team, 3) facilities, and 4) support personnel.
Enthusiasm for project	Enthusiastic managers can serve as project advocates and promote an atmosphere of cooperation throughout the training organization. By their enthusiasm for a project, managers can reduce negative attitudes of others associated with the project.
Meeting staffing demands	Management support is essential in meeting staffing demands. The selection, assignment, and training of personnel should be a major concern. Ideally, management should assign personnel to the project from start to finish. Although assignment longevity is hard to achieve in a military environment, it is a critical factor to the success of an IMI project. Personnel rotation can slow the IMI process because of learning curves for new employees, and different perceptions of what is needed.

4.8.2 Evaluation of organizational support for Interactive Multimedia Instruction. This section provides decision aids to help evaluate the level of organizational support. The decision

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aids also help to identify an action and develop a plan for altering the level of organizational support, re-evaluate organizational support, and identify potential solutions for support issues.

- a. Lack of support in any of the categories listed in Table 5 can lead to serious consequences, but a support deficit does not necessarily eliminate the option of Interactive Multimedia Instruction.

TABLE 5. **Decision aid - evaluation of organizational support for IMI.**

SUPPORT CATEGORY	EVALUATION PROCEDURE	SUPPORT IS	
		Available	Unavailable
Management support	Talk to managers to determine their support for IMI.		
Staff support	Talk to staff to determine support for IMI.		
Staff availability	Review future commitments for staff. Determine whether staff can be added.		
Staff skills	Review staff resumes. Interview staff about prior IMI experience.		
Staff dedication	Determine whether staff can be dedicated for the duration of the project.		

- b. Use Table 6 to identify an action and develop a plan for altering the level of organizational support. Table 6 lists the critical support categories, the potential results of a support deficit, and suggested actions to reduce the deficit or increase the level of support.

TABLE 6. **Modification of support level.**

SUPPORT CATEGORY	RESULTS OF SUPPORT DEFICIT	ACTION TO ALTER DEFICIT
Management support	May have resource availability problems. Lack of support may flow down through organization.	Inform management of IMI benefits and advantages. Involve managers in the decision process or planning phase.
Staff support	Instructors may resist the change and be uncooperative during implementation.	Provide training on IMI to reduce resistance. Convince staff that changing roles does not mean less responsibility. Involve staff in decision process.
Staff availability	May not have the force to develop IMI.	Add staff to current force. Defer current commitments. Contract out IMI development.
Staff skills	Learning curve may be high. Development may proceed slowly.	Train staff to perform IMI development. Contract out development. Add experienced staff to current force.
Staff dedication	Lesson revisions increase with IMI staff changes.	Develop and enforce lesson standards to reduce potential for format changes.

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- c. Organizational support re-evaluation. Use Table 7 to re-evaluate organizational support based on the data collected on Tables 5 and 6. If support is now available in three of five categories (one must be management), Interactive Multimedia Instruction may be pursued. If the re-evaluation still reflects a substantial support deficit and the decision is made to pursue Interactive Multimedia Instruction, be prepared for additional problems in meeting schedules.

TABLE 7. **Decision aid - organizational support re-evaluation.**

SUPPORT CATEGORY	SUPPORT IS	
	Available	Unavailable
Management support		
Staff support		
Staff availability		
Staff skills		
Staff dedication		

- d. Support deficit solutions. One potential solution to a support deficit in the area of staffing requirements is contracting Interactive Multimedia Instruction to a commercial training development company. Use Table 8 to determine if contractor support is a potential solution.

TABLE 8. **Decision aid - contractor support determination.**

ITEM	DECISION FACTOR	YES	NO
1	Scope and schedule exceed in-house capability. (see Note.)		
2	Inadequate staffing support for IMI (see Note).		
3	Adequate staff available but inexperienced with IMI.		
4	Staff dedication to IMI lacking.		
5	Contract funding available.		

NOTE: If the answer is "yes", this may be adequate reason for pursuing contractor assistance.

4.8.3 Facility support requirements. A number of facility requirements affect implementation of certain Interactive Multimedia Instruction products. Three of the major factors are delivery system facility requirements, development system facility requirements, and special facility requirements. See applicable sections for further guidance on facility requirements.

4.9 Media selection. MIL-HDBK-1379-2, Section 7, provides guidance for the selection of media. The output of media selection identifies the appropriate media for supporting the specific learning objectives (LOs). The following paragraphs provide guidance on determining whether the use of Interactive Multimedia Instruction is feasible in the target environment. (For example, during media selection Interactive Multimedia Instruction was found to be the most effective media to support the learning objectives. However, during the Interactive Multimedia Instruction feasibility analysis, it was found that the course content was expected to be unstable

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for the next three years due to immaturity of the supported system. In this case, immediate development of Interactive Multimedia Instruction may not be the most cost effective solution, and the media selection should be conducted again with course content stability being used as a constraint.)

4.9.1 Media selection process. Media selection is a four step process and is conducted as follows:

- a. Identify sensory stimulus requirements for each learning objective.
- b. Identify sensory stimulus features for all available media.
- c. Match the sensory stimulus requirements with the sensory stimulus features to identify a candidate list of media.
- d. Select the delivery media (i.e., transparencies, printed materials, audio tape, video, film, ICW, CD-ROM, web server, etc.) based on resource constraints, classroom logistics, and all other relevant considerations.

4.10 Interactive Multimedia Instruction application considerations. Interactive Multimedia Instruction can be applied across several levels of instruction, from entry-level to advanced refresher training. This Interactive Multimedia Instruction characteristic should be considered during the trade-off analysis. Design and development to support several training levels can significantly reduce overall life cycle costs because a greater number of training requirements can be satisfied with a single product. A single Interactive Multimedia Instruction product covering several training levels may cost more to develop.

4.10.1 Interactive Multimedia Instruction feasibility. The results of the media selection process should be analyzed to determine if the media selected is feasible for the intended instruction. A job aid for media feasibility is provided in MIL-HDBK-1379-2, Appendix D.

4.10.2 Interactive Multimedia Instruction exportability. Exportable Interactive Multimedia Instruction consists of products that are developed and/or managed at a centralized location, but delivered at more than one remote user facility. Use Table 9 to determine if exporting Interactive Multimedia Instruction to remote locations is feasible. The exportability decision aid has three parts. Guidance on the use of the three parts follows:

- a. If you obtain a "yes" response to all three questions in Part I, go directly to Part III. If you obtain a "no" response to any of the questions in Part I, you need to complete Part II.
- b. A "no" response to either question in Part II indicates that exportable Interactive Multimedia Instruction cannot be supported and should not be attempted until funds are allocated. "Yes" responses to Part II indicate that exportable Interactive Multimedia Instruction is feasible, and you should complete Part III.
- c. "Yes" responses to the questions in Part III indicate that Interactive Multimedia Instruction is feasible.

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TABLE 9. **Decision aid - exportable IMI feasibility checklist.**

EXPORTABILITY QUESTIONS	YES	NO
PART I		
Is there existing hardware at the field unit that can support IMI training?		
Is the number of hardware stations sufficient to train the number of students?		
Is the existing hardware available for IMI training?		
PART II		
Are funds available for hardware procurement?		
Are funds available for operating IMI?		
PART III		
Is IMI an appropriate media for presenting this content?		
Do the target audience demographics justify IMI use?		

4.10.3 Authoring software selection. Authoring software includes prepackaged prompted aids, courseware templates, or menu driven editors designed to help authors create Interactive Multimedia Instruction without elaborate programming. This section describes authoring software and how the characteristics of authoring software affect selection of an authoring software package. When selecting authoring software it is necessary to have Interactive Multimedia Instruction team members who are experienced with programming, courseware development, and instructional design. The Interactive Multimedia Instruction authoring software decision is based on a number of selection factors, military acquisition restrictions, command regulations, and local directives and policies. Before examining various software systems, become familiar with the acquisition process and review appropriate regulations such as DODI 1322.20, Development and Management of Interactive Courseware for Military Training; and MIL-PRF-29612, Performance Specification, Training Data Products. There are three types of Interactive Multimedia Instruction authoring software; 1) authoring language, 2) authoring system, and 3) ancillary software. Descriptions are as follows:

4.10.3.1 Authoring languages. An authoring language is a set of words, notation, syntax, and semantics used by an author to specify the logic and content of instruction to be delivered by a computer.

4.10.3.2 Authoring system. An authoring system (often referred to as an authoring package) is a prepackaged, prompted authoring aid, courseware template, or menu-driven editor designed to help authors (without formal computer programming skills) create Interactive Multimedia Instruction without elaborate programming.

4.10.3.3 Ancillary software. Ancillary software refers to commercial off-the-shelf packages or tools used with authoring software. Examples of ancillary software are:

- a. Word processing software.
- b. Graphics software.
- c. Flowcharting software.
- d. Storyboarding tools.

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- e. CMI software.

4.10.3.4 Restrictions for using ancillary software. There are two restrictions for using ancillary software, descriptions are as follows:

- a. The authoring software must have the capability to import the code generated by the ancillary software.
- b. The authoring software must be able to use the imported code.

4.10.3.5 Authoring software decisions. Typically, a decision will not need to be made as to whether to use an authoring language or an authoring system to develop courseware. Because of the ease of implementation and the flexibility and power now available with most authoring systems, the decision most likely to be faced is which authoring system should be used. The information presented below will help make this decision.

4.10.3.5.1 Key capabilities of authoring systems. For authoring systems to facilitate development of Interactive Multimedia Instruction, a variety of key capabilities are required. Authoring system capabilities are divided into two major categories: authoring and presentation capabilities, and CMI capabilities. Authoring systems vary with regard to the authoring and presentation capabilities and specific CMI capabilities as follows:

- a. Authoring/presentation capabilities assist in performing such authoring tasks as:
 - (1) Developing or editing text displays.
 - (2) Creating or editing graphics.
 - (3) Animating graphics.
 - (4) Developing written test items and response analysis.
 - (5) Creating performance test items.
 - (6) Programming video sequences.
 - (7) Sequencing lesson material.
 - (8) Using utilities.
- b. CMI capabilities are available to manage instruction. Categories for CMI capabilities are:
 - (1) Administration.
 - (2) Record keeping.
 - (3) Schedule generation.
 - (4) Answer judging.
 - (5) Report generation.
 - (6) Random test generation.

4.10.3.5.2 Authoring software selection. Selecting authoring systems is generally the outcome of a tradeoff analysis. There are two phases to the selection process. Phase 1 is selecting the authoring capabilities that are required or desired. Phase 2 is conducting a tradeoff analysis comparing two or more authoring software packages. The following data should be collected to aid in the authoring software selection process:

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- a. General information:
 - (1) Name of software package and version number.
 - (2) Reviewer's name and phone number.
 - (3) Review date.
- b. Software characteristics:
 - (1) Description of text entry and editing procedures.
 - (2) Description of color selection procedures.
 - (3) Description of graphics creating and editing procedures.
 - (4) Description of animation procedures.
 - (5) Description of video editing procedures.
 - (6) Description of procedures for sequencing displays (indicating branching strategies).
 - (7) Description of procedures for specifying CMI functions.
 - (8) Performance test item generation.
 - (9) Record keeping.
 - (10) Schedule generation.
 - (11) Report generation.
 - (12) Central Processing Unit (CPU) type and speed required to run the software.
 - (13) Operating system needed to run the software.
 - (14) Random Access Memory (RAM) needed to run the software (does the selected hardware have it?).
 - (15) Ability to use legacy data.
- c. Costing information:
 - (1) Cost of individually purchased software package.
 - (2) Number of software packages needed for Interactive Multimedia Instruction development.
 - (3) Cost of site license.
 - (4) Comparison of cost of site license to the cost of purchasing individual software packages.
 - (5) Run time costs.
 - (6) Cost of Interactive Multimedia Instruction team training on use of authoring software.
- d. Software support:
 - (1) Description of technical support available to users.
 - (2) Support for peripheral equipment such as audio, printer, pointing device, joystick, network capability, touch screen, optical scanner, etc.

4.10.4 Interactive Multimedia Instruction hardware configuration decisions. This section addresses hardware selection and describes the impact that hardware decisions have on Interactive Multimedia Instruction. The goal is to choose a configuration that supports a variety of parameters, including the previously selected Interactive Multimedia Instruction instructional features and the authoring system. Personnel with a hardware background are desired for this phase of the Interactive Multimedia Instruction decision-making process.

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4.10.4.1 Review policies and regulations. The Interactive Multimedia Instruction hardware decision is based on a number of selection factors including, military acquisition restrictions, command regulations, and local directives and policies. Before examining various hardware systems, become familiar with the acquisition process and review appropriate regulations. Some sources for review would be Department of Defense (DoD) instructions on Interactive Multimedia Instruction and computers, Defense Information Systems Agency (DISA) publications, commercial publications, and guidance provided in applicable Service documents.

4.10.4.2 Factors influencing hardware selection. After reviewing regulations and determining how restrictions affect the selection process, examine specific hardware systems for the following:

- a. Interface with authoring software.
- b. Processing speed.
- c. Capability to support multimedia.
- d. Transportability.
- e. Existing hardware.
- f. Cost.
- g. Vendor support and past performance.
- h. RAM.
- i. Standards.
- j. Security.

4.10.4.3 Hardware data collection. Determining the hardware requirements is a two step process. The first step is to determine existing hardware capability. This data may be used to constrain the design of courseware. After determining what media the existing hardware will support, a determination needs to be made as to whether or not that design will satisfy the training need. If the media design will not satisfy the training need then the hardware will need to be upgraded or new systems procured. Selecting hardware is generally done by conducting a tradeoff analysis. Table 10 is an aid to be used in recording data on both existing systems and prospective systems.

