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ABSTRACT

This report discusses the amount and kinds of Department of Defense (DoD) interactive courseware (ICW) programs that are candidates for transfer to the private sector. Candidates for transfer were identified through an analysis of the Defense Instructional Technology Information System (DITIS). Out of 4,644 ICW programs that have been reported to the DITIS since its inception in May 1991, 2,718 were identified as having possible utility in the private sector. Of these 2,718 programs, 591 were computer-based instruction programs that run on the MS-DOS operating system, 1,997 were computer-based instruction programs that run on the NOS operating system and were prepared using the TUTOR authoring system, and 130 were interactive videodisc programs that run on the MS-DOS operating system. Final determination of the transferability of these programs will depend on more authoritative reviews of suitability, legality, and security; reviews that must be undertaken on a case-by-case basis. The DoD has taken several initiatives to assist the private sector in transferring DoD ICW programs to the civilian workforce for training. However, a number of issues, particularly those involving the availability of resources and the establishment of responsibilities, must be resolved before comprehensive procedures for transfer can be implemented successfully. Six tables and four figures provide details about the programs and the transfer process. (Contains 20 references.) (Author/SLD)

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DEFENSE WORKFORCE TRAINING PROGRAMS

J. D. Fletcher
Ruth Wienclaw
Gary Boycan
James Bosco
Harold F. O'Neil, Jr.

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J. D. Fletcher, Ruth Wienclaw, Gary Boycan, James Bosco,
Harold F. O'Neil, Jr.

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This report discusses the amount and kinds of DoD interactive courseware (ICW) programs that are candidates for transfer to the private sector. The Defense Instructional Technology Information System (DITIS) was analyzed to identify ICW programs that are candidates for transfer from the DoD to the private sector. Out of 4644 ICW programs that have been reported to DITIS since its inception in May 1991, 2718 were identified as having possible utility in meeting private sector training requirements. Of these 2718 programs, 591 were computer-based instruction programs that run on the MS-DOS operating system, 1997 were computer-based instruction programs that run on the NOS operating system and were prepared using the TUTOR authoring system, and 130 were interactive videodisc programs that run on the MS-DOS operating system. Final determination of the transferability of these programs will depend on more authoritative suitability, legal, and security reviews that must be undertaken on a case-by-case basis. The DoD has taken several initiatives to assist the private sector in transferring DoD ICW programs to the civilian workforce for training. However, a number of issues, particularly those involving the availability of resources and the establishment of responsibilities, must be resolved before a comprehensive set of procedures for transfer can be successfully implemented.

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J. D. Fletcher
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PREFACE

This work was jointly sponsored by the Office of the Assistant Secretary of Defense for Force Management and Personnel and the Office of the Assistant Secretary of Defense for Public Affairs, American Forces Information Service.

The paper was reviewed by James Ashcraft, Deputy Director, Defense Audiovisual Policy Office, American Forces Information Service, by Raye Newmen, a private consultant, and by Michael Fineberg of IDA. The authors express their sincere gratitude to these reviewers. Their efforts and comments have substantially improved the paper. Mark Stenger of the Defense Training and Performance Data Center spent many hours extracting data from the Defense Instructional Technology Information System, and for his efforts we are also most grateful.

ABSTRACT

This report discusses the amount and kinds of DoD interactive courseware (ICW) programs that are candidates for transfer to the private sector. The Defense Instructional Technology Information System (DITIS) was analyzed to identify ICW programs that are candidates for transfer from the DoD to the private sector. Out of 4644 ICW programs that have been reported to DITIS since its inception in May 1991, 2718 were identified as having possible utility in meeting private sector training requirements. Of these 2718 programs, 591 were computer-based instruction programs that run on the MS-DOS operating system, 1997 were computer-based instruction programs that run on the NOS operating system and were prepared using the TUTOR authoring system, and 130 were interactive videodisc programs that run on the MS-DOS operating system. Final determination of the transferability of these programs will depend on more authoritative suitability, legal, and security reviews that must be undertaken on a case-by-case basis. The DoD has taken several initiatives to assist the private sector in transferring DoD ICW programs to the civilian workforce for training. However, a number of issues, particularly those involving the availability of resources and the establishment of responsibilities, must be resolved before a comprehensive set of procedures for transfer can be successfully implemented.

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I. BACKGROUND

This report is the second prepared in response to Congressional interest in transferring DoD instructional materials to the private sector for workforce training. The first report suggested DoD policy and procedures for instructional materials transfer. This report discusses the amount and kinds of DoD interactive courseware programs that are candidates for transfer to the private sector. In accordance with the Training Technology Transfer Act of 1988, the emphasis in this report is on the transfer of interactive courseware (ICW).

II. PRIVATE SECTOR REQUIREMENTS

The private sector is emphasizing greater worker responsibility and participation at all levels of the workforce, thereby increasing requirements for improved worker skills, higher standards of performance, and more training. A number of studies have documented the need for American workforce training in five categories of competencies that private sector managers seek in entry-level personnel. These categories are: (1) Personal Characteristics and Attitudes, (2) Interpersonal and Teamwork Skills, (3) Higher Order Thinking Skills, (4) Basic Skills, and (5) Job-Specific Technical Skills. If DoD ICW programs that address these competencies can be transferred to the private sector, they may provide needed workforce training.

III. DoD INITIATIVES

In accord with the Training Technology Transfer Act of 1988, the DoD has taken a number of initiatives to increase the availability and transferability of its ICW programs. These initiatives include (1) issuance of MIL-STD-1379D to ensure the portability of ICW programs across many delivery platforms; (2) issuance of DoD Instruction 1322.20 and establishment of the Defense Instructional Technology Information System (DITIS) to improve the development, management, and reporting of ICW programs; and (3) development of procedures for transferring ICW programs to the private sector.

Procedures for transferring ICW programs that are audiovisual productions, such as interactive videodisc programs, are already specified, and similar procedures are being developed for transferring ICW programs that are not audiovisual productions, such as computer-based instruction programs.

IV. TRANSFERABLE DoD COURSEWARE

The DITIS database was analyzed to identify ICW programs that are candidates for transfer from the DoD to the private sector, although final determination of transferability will depend upon the results of more authoritative suitability, legal, and security reviews that must be undertaken on a case-by-case basis. Out of 4644 ICW programs that have been reported to DITIS since its inception in May 1991, 2718 were identified as having possible utility in meeting private sector training requirements. Of these 2718 programs, 591 were computer-based instruction programs that run on the MS-DOS operating system, 1997 were computer-based instruction programs that run on the NOS operating system and were prepared using the TUTOR authoring system, and 130 were interactive videodisc programs that run on the MS-DOS operating system.

V. CONCLUSIONS

The following conclusions may be drawn from this review:

- A number of DoD ICW programs appear to be candidates for transfer to the private sector, but final judgements on their transferability require more authoritative and comprehensive reviews that must be performed on a case-by-case basis. Many of these ICW programs have proved to be of significant value in DoD training and may be useful in meeting private sector workforce training requirements if they can be transferred.
- Workable procedures are already in place to aid in the transfer of DoD ICW programs that are audiovisual productions, such as interactive videodisc programs. These procedures serve as a model for effecting transfer of other ICW programs that are not audiovisual productions, such as computer-based instruction programs.
- The problems of resourcing and responsibilities remain. Through its policies and procedures, the DoD is prepared to assist the private sector in making DoD ICW programs available for transfer, but resources both within the DoD and outside the DoD remain to be identified and responsibilities for many necessary functions, especially those to be performed outside the DoD, remain to be assigned.

I. BACKGROUND

This report is the second prepared in response to Congressional interest in transferring DoD instructional materials to the private sector for workforce training. The first report suggested DoD policy and procedures for instructional materials transfer. This report discusses the amount and kinds of DoD interactive courseware programs that are candidates for transfer to the private sector. In accordance with the Training Technology Transfer Act of 1988, the emphasis in this report is on the transfer of interactive courseware (ICW).

The National Defense Authorization Act for Fiscal Years 1992 and 1993 directed the Department of Defense "to prepare an inventory on DoD training and education programs that relate to workforce training issues of concern to the private sector." This report was prepared in response to that direction. An earlier report (Fletcher, Bosco, Wienclaw, Ashcraft, and Boycan, 1991) was also produced in response to Congressional interest in this topic. It discussed policies and procedures that might be used to effect the transfer of DoD instructional materials to the private sector. In accordance with the Congressional direction, this second report discusses what and how many DoD interactive courseware (ICW) programs might be candidates for transfer to the private sector.

Interest in the DoD as a source of instructional materials for the private sector has been growing for several years. A number of Congressional actions have been taken to facilitate and govern transfer of DoD materials and technologies to non-DoD applications. Three of these initiatives are the following:

- *The Stevenson-Wydler Technology Innovation Act of 1980.* This act focuses on research and development. It authorizes the establishment of Centers for Industrial Technology and is intended to stimulate use of federally funded research and development products by state and local governments and the private sector. In the case of instruction, the act facilitates and encourages transfer of research and development products from the DoD personnel research laboratories to non-DoD applications.
- *The Federal Technology Transfer Act of 1986.* This act also focuses on research and development. It amends the Stevenson-Wydler Act by authorizing cooperative research and development agreements between Federal and non-Federal laboratories and by establishing a Federal Laboratory

Consortium for Technology Transfer within the National Institute for Standards and Technology.

- *The Training Technology Transfer Act of 1988.* This act, which is a chapter of the Omnibus Trade and Competitiveness Act of 1988, focuses on the transfer of federally-developed education and training software to non-Federal activities. The act is intended to facilitate transfer of education and training software from Federal agencies to applications that support the education, training, and retraining of industrial workers, especially workers in small business concerns. It specifically identifies the DoD as a potential source of instructional software. The act establishes an Office of Training Technology Transfer, which is to maintain a clearinghouse of information on federally developed education and training software.

Given the scope of this topic and the level of interest in it, other Congressional initiatives, some of which are now under discussion, are likely to affect requirements and responsibilities for transferring DoD instructional materials to the private sector.

The DoD has responded to these initiatives with several actions of its own. Many of these actions, including the development of the policies and procedures outlined earlier (Fletcher et al., 1991), were undertaken jointly and cooperatively by the OASD(FM&P) Readiness and Training Directorate and the OASD(PA) Defense Audiovisual Policy Office. These actions emphasize development, management, and transfer of the instructional software that is the primary concern of the Training Technology Transfer Act.

The DoD describes this software as "Interactive Courseware" (ICW), which is used as a general term for all varieties of interactive, instructional software. ICW is defined as computer-controlled instructional material, or courseware, that relies on student input to determine the pace, sequence, and content of instruction delivery. Courseware by itself refers to all training materials, including the curriculum database and all disks, tapes, books, charts, and computer programs, necessary to deliver an ICW program.

The key distinction between an ICW program and other training programs is the provision, through use of computer technology, of interactions that tailor the instruction to the needs of individual students. With individually tailored instruction, each student receives the level of detail, pace, remediation, sequence of topics, and interactions needed to learn the material efficiently within the limits imposed by time and access to other instructional resources. ICW programs can individualize instruction within currently established, group-oriented instructional institutions. This advantage, combined with the fact that ICW programs tend to be developed as transportable, or autonomous, modules of

instruction, makes them promising candidates for smooth transfer to training in the private sector.

Transfer of DoD education and training materials and technologies is motivated by the workforce requirements of the private sector. These requirements are briefly reviewed in Section II. Section III describes initiatives taken by the DoD to improve its own management of ICW programs. These initiatives also facilitate access and transfer of DoD ICW programs to outside agencies and the private sector. Section IV provides an assessment of the amount and kinds of DoD ICW programs that might be made available to meet workforce training requirements in the private sector. Section V presents a few conclusions that might be drawn based on these findings.

II. PRIVATE SECTOR REQUIREMENTS

The private sector is emphasizing greater worker responsibility and participation at all levels of the workforce, thereby increasing requirements for improved worker skills, higher standards of performance, and more training. A number of studies have documented the need for American workforce training in five categories of competencies that private sector managers seek in entry-level personnel. These categories are: (1) Personal Characteristics and Attitudes, (2) Interpersonal and Teamwork Skills, (3) Higher Order Thinking Skills, (4) Basic Skills, and (5) Job-Specific Technical Skills. If DoD ICW programs that address these competencies can be transferred to the private sector, they may provide needed workforce training.

What instructional programs are of interest to the private sector? This question is best addressed by considering the workforce competencies that are of most concern to managers in the private sector. Several studies have been completed recently that address this issue. Seven of them are listed and briefly described in Table 1.

These studies all note that the challenge of competing in the world market necessitates re-examination of our use of people in organizations. The early part of this century witnessed a burgeoning concern about how to organize the efforts of individuals in the large organizations that grew out of the industrial revolution. Increasingly, the human factor was recognized as critical to productivity. Frederick Taylor, who is considered the father of American management, recognized that limitations in the skills of workers limited the productivity of their organizations (Taylor, 1916). His answer to perceived deficiencies in worker skills was an extensive managerial structure to organize and supervise the workers, leaving them with as little individual responsibility and discretion as possible. This approach has been subjected to increasingly critical scrutiny in recent years.

Today, managers recognize that workers must assume more responsibility at points of production, sales, or service rendered, if their organizations are to compete successfully in today's world markets (e.g., Johnston and Packer, 1987; Senge, 1990; U.S. Congress, Office of Technology Assessment, 1990; and others). To introduce new products and services quickly with high quality, managers are emphasizing greater worker participation, flatter organizational structures, just-in-time management approaches, job rotation, and

Table 1. Reports Documenting the Need for Job Skills

Report	Trends	Needs
America's Choice: High Skills or Low Wages! (National Center on Education and the Economy, 1990)	Higher worker skill requirements U.S. embarking on a "third industrial revolution"	Public/private sharing or responsibility for training and education Comprehensive employment/ training policy
High Schools and the Changing Workplace (National Academy of Sciences, 1984)	American economy in a period of drastic change Workplace requirements will continue to change	Need for education in both core competencies and specific skills
Michigan Employability Skills Employer Survey (Mehrens, 1989)	Training and education needs are constantly changing Formal education will never meet all the needs of the marketplace	Need for training and education in both generic and specific skills Perceived and actual needs may not be the same
What Work Requires of Schools (Secretary's Commission on Achieving Necessary Skills, 1991)	Globalization and technology contain both threat and promise High performance workplaces are the model for a successful future	Need for broader skills and training for everyone Requirement for both foundation and specialty skills training and education
Worker Training: Competing in the New International Economy (Office of Technology Assessment, U.S. Congress, 1990)	Broader use of computer-based training "Learning on demand" Increased emphasis on training technology	Need greater investment in transferable skills training Need more Federal assistance Encourage use of training consortia
Workforce 2000: Work and Workers for the 21st Century (Johnston and Packer, 1987)	More training and education for skills required by today's workforce People are the primary asset of today's organizations	Training to meet changing occupational structure Need to address education and training needs of workforce *now*
Workplace Basics: The Essential Skills Employers Want (Carnevale, Gainer, and Meltzer, 1990)	Increasing number of entry-level workers come from groups that are educationally deficient Employees must be able to quickly understand and acquire new and different skills	Need sound basic skills training to increase U.S. competitive edge and individual's quality of life Functional context approach to job skills training

team work. This decentralization requires more competency from all members of the workforce, and managers pursuing these goals back them up with substantial, ongoing training. The report issued by the Congressional Office of Technology Assessment (*Worker Training*, 1990) concludes that "American companies that have adopted this model have found that their workers can achieve levels of productivity and quality equal to the best in the world" (p. 3).

The possibility that the U.S. workforce may not be prepared to meet current challenges has been raised by many studies. *Worker Training* summarizes the discussion in a way that is characteristic of many reports on this topic:

> The quality of the U.S. workforce matters now more than ever. Well-trained, motivated workers who can produce high-quality goods and services at low cost help enhance industrial productivity and competitiveness and keep American living standards high. In today's international economy, workers must be prepared to change the way they do their jobs in order to capture the benefits from rapidly evolving technology. Training goes hand-in-hand with productivity, quality, flexibility, and automation in the best performing firms.
>
> Good training pays off for the individual worker whose skills are upgraded, for the company seeking a competitive edge, and for the Nation in overall productivity and competitiveness. Conversely, inadequate training costs firms and workers in down-time, defective parts or equipment, wasted material, health and safety risks, late deliveries, and poor customer service. Poor training also can delay the implementation of new technology or work reorganization.
>
> When measured by international standards, most American workers are *not* well trained. Many in smaller firms receive no formal training. Larger firms provide more formal training, but most of it is for professionals, technicians, managers, and executives. Our major foreign competitors place much greater emphasis on developing workforce skills at <u>all</u> levels. Experienced production workers at Japanese auto assembly plants, for example, get three times as much training each year as their American counterparts. (*Worker Training*, p. 1)

In another analysis, Carnevale and Gainer (1989) discussed the declining percentage of U.S. Gross National Product (GNP) that is accounted for by resources from the earth such as minerals, energy, and food. In 1890, these resources accounted for 50 percent of the GNP. Today these resources account for 10 percent of the GNP. Their place has been taken by human resources which now account for more than four-fifths of the nation's economic output. Bishop (1989) analyzed the impact of training on the productivity of human resources and found that workers who receive formal job training

have a 30 percent higher productivity level than workers who are not formally trained. Investments in training may therefore substantially improve economic productivity.

The requirement for workers with greater skills and capacities for responsibility has spawned many commissions, task forces, and studies, including those listed in Table 1. These studies have contributed to the growing evidence that high levels of workforce performance are essential for successful competition in today's markets and that workforce training is needed to achieve them.

O'Neil, Allred, and Baker (1992), who reviewed most of the studies in Table 1, point out that these studies have begun in the same way. Educators, business leaders, scholars, and policy makers were assembled to identify skills necessary for the workforce. These authorities generated a list of necessary skills based on their own knowledge and experience and on independent investigations of the workforce and its requirements. Nearly all the studies included a validation phase in which employers and/or employees were asked to rate the relative necessity, desirability, or importance of each identified skill. Although different labels were used in the studies, there is consistent agreement across all the studies on five major categories of competencies that are sought and needed by workers if their organizations are to compete successfully in the modern world. These categories of competencies are:

- *Personal Characteristics and Attitudes.* Important themes in this category of competencies are dependability, honesty, motivation, and responsibility. Many of the private-sector authorities rated workforce qualities in this category as the most important of all.
- *Interpersonal and Teamwork Skills.* Many of the studies noted that as responsibility is pushed further down the management hierarchy, responsibility for communication and cooperation is increasingly shared by all members of an organization. Increasingly, workers must communicate, negotiate, tolerate and perhaps capitalize on diversity, share leadership, and interact with others in a professionally and socially appropriate manner.
- *Higher Order Thinking Skills.* Each of the studies identified the need for skills in this category of competencies. These skills were judged necessary because of the rapidity of change in the workforce and its high mobility. The higher order thinking skills most commonly identified were skills in adapting to changes. These skills include reasoning, problem-solving, creativity, decision making, and learning how to learn. The latter skill was identified in one study as *the* fundamental skill.

- *Basic Academic Skills.* Each study identified the need for basic academic skills. These include speaking and listening skills as well as the three R's. *Worker Training* concluded that "many American workers--20 percent or more in some firms--are deficient in basic skills" (p. 10) and that very few companies now make much effort to upgrade their employees' basic education; they are more likely to test job applicants for basic skills competencies and not hire applicants who fail.
- *Job-Specific Technical Skills.* Many studies noted the need for job-specific technical skills in the workforce. These are the many, diverse skills needed to operate and maintain equipment, control complex systems, and follow technical procedures. These skills do not require academic preparation so much as workplace experience and training tailored to the needs of specific jobs.

ICW programs have been shown to contribute significantly to developing competencies in the last four of these categories. ICW contributions to the last three of these catagories (Higher Order Thinking Skills, Basic Academic Skills, and Job-Specific Technical Skills) are generally acknowledged and documented, but it should be noted that computer-based instruction and interactive multimedia technologies such as interactive videodisc have also been found to contribute significantly to the development of interpersonal and teamwork competencies in ways that are both less labor intensive and more effective than standard approaches using classroom instruction and role playing (see Blaiwes and Weller, 1978; Schroeder, Dyer, Czerny, Youngling, and Gillotti, 1986, for examples). Whether or not ICW programs can contribute to the development of competencies in the first category (Personal Characteristics and Attitudes) has yet to be assessed.

Worker Training (1990) also emphasized the plight of small firms, those with 100 employees or less. These firms provide about 35 percent of total U.S. employment, but they lack the expertise to provide in-house training, the resources to pay for outside training, and sufficient numbers of people who need training at any one time to justify a focused training effort. Further, they are more likely to employ workers who have less education and are older or younger than the average. They usually try to provide training through unstructured, informal approaches that vary widely in quality. Transportable, quality-controlled training, such as that available from many ICW programs, may help solve the training problems of small firms.

Larger firms are more likely to provide formal training than smaller ones, but the training they provide is largely limited to managers and technicians. The lower the level of

skill a worker brings to a firm, the less likely it is that he/she will receive training from the firm. Still, the amount that firms invest in training their workers is sizable. Estimates of these investments range from $33-44 billion a year, with about $9 billion provided by outside sources. However, this investment, which is 0.6-0.9 percent of GNP, may be far short of what is needed. The American Society for Training and Development (undated) estimated that in 1989 the total cost to retrain those parts of the American workforce that required skill updates and enhancements would have been $64 billion of which $45.4 billion would have been the employer share. The number (over 45 million) and percent (about 42 percent) of workers who needed but did not receive retraining, and the cost (over $45 billion) of that retraining are shown in Table 2. ICW programs may lessen this shortfall through their accessibility and relative cost-effectiveness. A supply of already prepared, available ICW programs could increase this possibility.

Table 2. Unmet Need for Retraining American Workers in 1989

Type of Retraining	Number (and Percent) of Workers Who Needed but Did Not Receive Training (CY 1989)		Money Needed for Retraining ($B) (Employer Share)
New Technology Training			
• Technical Workers	9,255,270	(8%)	$8.7
• Skilled Workers	6,815,680	(6%)	$6.5
Executive, Management, and Supervisory Training	5,490,374	(5%)	$9.7
Customer Service Training	11,394,240	(9%)	$5.4
Basic Skills Training	16,559,243	(14%)	$15.1
Total	49,514,807	(42%)	$45.4

Over the past two decades the states have expanded their investment in training as a way to attract new firms, to encourage resident employers to create new jobs, and to help other resident employers to improve their business performance. *Worker Training* showed that in 1989, 44 states supported one or more customized training programs. These programs served a variety of goals, but the states reported an increasing demand for

training to upgrade already employed workers--for in-service training. Many of these programs relied on community colleges or vocational-technical institutes to deliver the training. There are numerous examples of community colleges providing customized training for business, and it is likely that the states and their community colleges could benefit from the availability of DoD ICW oriented toward specific skills.

The U.S. economy will continue to support large numbers of low-skilled jobs in the future, but, according to the Bureau of Labor Statistics (BLS), nearly all the new jobs that will be created over the next 10 years will be in service industries. These new jobs will be split fairly evenly between knowledge-based, high-skilled services (mainly involving health, business services, and education) and traditional, low-skilled services (mainly involving retail trade and personal services). Despite the rapid growth of knowledge-based jobs, of the 10 occupations with the greatest number of new jobs that the BLS expects to see created by the year 2000, only two require post-secondary school credentials for entry. However, all these jobs require training--especially upgrade training, which is infrequently provided and is more likely to be given to workers with more rather than less previous training and education.

The problem of making substantial improvements in the skill levels of the American workforce is complex and unlikely to be solved by any one action. However, it does appear that transportable, quality-controlled training packages (such as those provided by ICW programs) could help by making training both more efficient and more accessible.

III. DoD INITIATIVES

In accord with the Training Technology Transfer Act of 1988, the DoD has taken a number of initiatives to increase the availability and transferability of its ICW programs. These initiatives include: (1) issuance of MIL-STD-1379D to ensure the portability of ICW programs across many delivery platforms, (2) issuance of DoD Instruction 1322.20 and establishment of the Defense Instructional Technology Information System (DITIS) to improve the development, management, and reporting of ICW programs, and (3) development of procedures for transferring ICW programs to the private sector. Procedures for transferring ICW programs that are audiovisual productions, such as interactive videodisc programs, are already specified, and similar procedures are being developed for transferring ICW programs that are not audiovisual productions, such as computer-based instruction programs.

The courses presented by the DoD range in length from less than a day to more than a year. The format of this instruction ranges from traditional platform lecture using textbooks to correspondence courses to field exercises involving actual equipment and live ammunition. The instructional technology used also spans a wide range and includes lesson plans, study guides, workbooks, instructor guides, overhead transparencies, textbooks, workbooks, programmed textbooks, audio cassettes, films, videotapes, computer-assisted instruction, computer-managed instruction, interactive videodisc instruction, CD-ROM instruction, part-task simulators, two-dimension simulators, high-fidelity simulators, laser-simulated weapons fire, networks of simulators, and actual equipment.

Increasingly, the DoD relies on interactive courseware (ICW) to support its instructional needs. There are several reasons for this:

(1) *Stability*. The development of movable type and books provided a capability to capture the content of high-quality instruction and deliver it inexpensively to many people. However, the effectiveness and efficiency of instruction varies if content is presented using different rules and procedures. In addition to content, computer technology captures the interactions of high-quality instruction and makes them widely, inexpensively, and reliably available to many people. ICW programs cannot yet supply all the interactions of an individual tutor working with an individual student, but they can capture a significant portion of it. What interactions they do provide--along with the

instructional content--can then be delivered in a stable, autonomous fashion to learners, with a minimum of the variability that is characteristic of human instructors.

(2) *Effectiveness*. There have been enough reviews of the effectiveness of computer-based instruction that a review of the reviews (Niemiec and Walberg, 1987) has been published. It indicates an improvement of about 14 percentile points in student achievement through the substitution of computer-based instruction for more conventional approaches. A suggestion of the improvements to be expected in the wider world of ICW using interactive multimedia approaches were provided by Fletcher (1990), who found improvements of about 19 percentile points through the use of interactive videodisc instruction.

(3) *Cost-Effectiveness*. One significant measure of cost when students are being paid by the organization that trains them is time spent in training. A very stable finding for ICW has been that it reduces training time by about 30 percent over more conventional means (Orlansky and String, 1979; Fletcher, 1990). A second source of cost reductions through the use of ICW involves its ability to substitute simulation for actual equipment without adversely affecting student achievement. Use of simulations that may cost a tenth or even a hundredth of the actual equipment used in military systems has provided a powerful cost incentive for using ICW programs to train operators and maintainers of military systems.

Several actions to improve the management and use of ICW programs within the DoD have been initiated. These actions include the development of policies, technical standards, and a new automated reporting system and data base that will improve the sharing of materials both within the DoD and between the DoD and non-DoD activities. Many of these initiatives were undertaken jointly and cooperatively by the OASD(FM&P) Readiness and Training Directorate and the OASD(PA) Defense Audiovisual Policy Office. They center on three areas: (a) ICW portability; (b) development and management of ICW; and (c) procedures for transferring ICW.

A. ICW PORTABILITY

Interactive courseware (ICW) portability refers to the ability to operate the same software across many different hardware platforms. Portability (1) reduces the costs and increases the usability of both computers and their software, (2) strengthens the market for both, and (3) helps institutionalize their use in many diverse applications.

Without portability for ICW programs, routine and widespread use of this promising technology is seriously handicapped. These handicaps include excessive cost, difficulty of use, technological inertia, and unnecessary complexity in courseware design, development, delivery, and implementation. These handicaps are removed by designing interactive courseware to be portable.

Interactive courseware can be portable if developers use standard practices to create it. Consequently, the topic of portability is also a topic of standards--military standards, federal information processing standards, national standards, and international standards. Implementation of these standards represents a significant opportunity and requirement for cooperation at all levels of technical development and across all communities concerned with the use of ICW programs.

Portability means different things to different people. Transportability, transferability, convertibility, and related terms are used to discuss the same concept. A restricted, but straightforward definition has been articulated as "the ability to move an application from one computer to another unchanged and get the same results" (Dahlstrand, 1984, p. 17). The DoD definition is not much different. DoD Instruction 1322.20 defines portability as "the capability to run courseware and associated application programs without modification on a delivery system other than the one for which they were originally designed."

Courseware portability will increase the sharing of ICW within each Military Service by providing ICW programs that can be used with little, if any, reprogramming across a full range of within-Service instructional settings including initial skill training, advanced skill training, garrison training, job-site training, officer education, and Reserve Component training.

Courseware portability will also increase the sharing of ICW across the different Military Services. All the Services teach basic courses such as electricity, electronics, hydraulics, and motor vehicle repair. It is not unreasonable to suggest that materials for these courses, or some portion of them, be usable by all the Services. This sharing is neither an administrative nor political impossibility. Joint training is now offered in 62 inter-Service courses or skill areas (U.S. Dept. of Defense, *Military Manpower Training Report,* 1991), and the need for it will increase as training budgets decrease.

Finally, portability makes the transfer of ICW from the DoD to the private sector technically feasible and practical. It provides a foundation for the DoD to meet the

requirements of the Training Technology Transfer Act of 1988 with minimum impact on its resources and maximum opportunities for transfer.

The objectives of the DoD portability effort are illustrated in the progression shown in Figure 1a-c. Figure 1a illustrates the situation without portability. In this case, application software must be uniquely developed for different operating systems and hardware platforms. The interface between the authoring software and the operating system is unique and usually proprietary for each combination of authoring software, operating system, and hardware platform.

The current status of DoD portability is illustrated by Figure 1b. It may be described as system level portability. Its goal is to allow application software to run on different operating systems and hardware platforms with minimal modifications to the application. This goal is rarely reached to the point of requiring no modifications, but the current scheme of portability minimizes these modifications and facilitates their implementation. The goal has largely been reached by the effort described here through specification of a virtual device interface.

A more ambitious objective for portability is illustrated by Figure 1c. This objective may be called device level, or plug-and-play portability. Its goal is not only for application software to run on different operating systems and hardware platforms with no modifications to the application (system level portability), but also to permit substitution of hardware devices, perhaps supplied by different manufacturers, in hardware platforms with no modifications required in either the application or the operating system software. This goal has been achieved for high fidelity audio, and it can similarly be accomplished in the ICW world through specification of a virtual device interface.

Work on the systems level portability illustrated in Figure 1b has been completed for ICW programs using the MS-DOS operating system through a combination of DoD and industry efforts and has been incorporated in Appendix D of MIL-STD-1379D, "Military Training Programs," issued 5 December 1990.

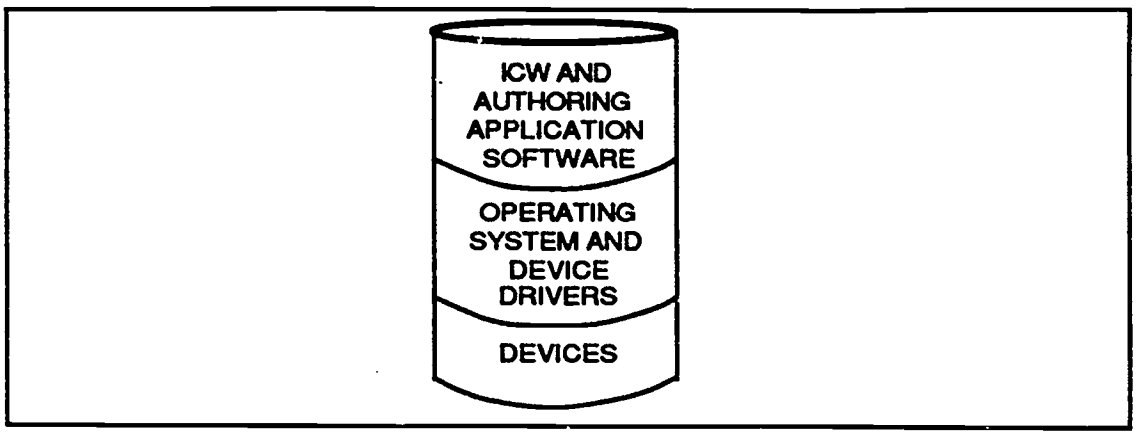

Figure 1a. Standard Architecture Without Portability

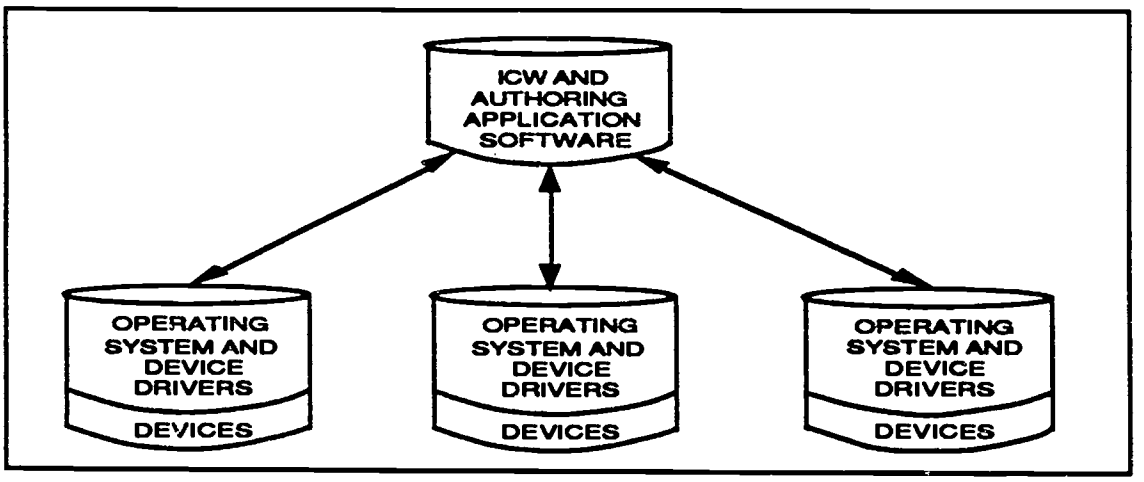

Figure 1b. Standard Architecture With System-Level Portability

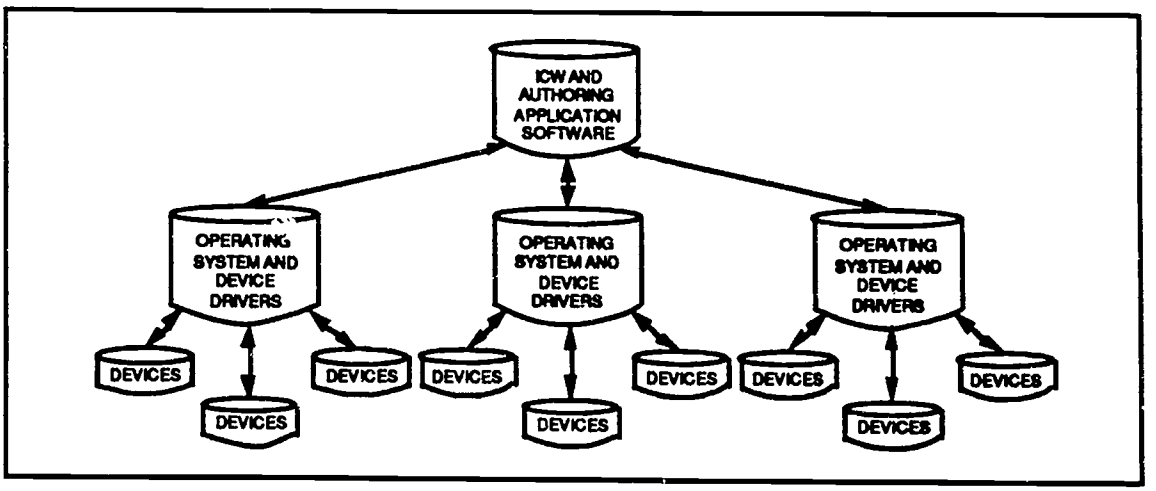

Figure 1c. Standard Architecture With Device-Level Portability

B. DEVELOPMENT AND MANAGEMENT OF ICW

MIL-STD-1379D, which includes the ICW portability standard, is the principal DoD standard for training. It establishes: (1) procedures to follow when developing training programs, including guidelines for writing contracts and delivery orders for training; (2) requirements for using DoD Computer-aided Acquisition and Logistic Support (CALS) for training documents; and (3) requirements for using the virtual device interface described here.

Additionally, DoD Instruction 1322.20, "Development and Management of Interactive Courseware (ICW) for Military Training" was developed and issued on 14 March 1991. The objective of this instruction is increased cost-effective use of ICW for military training, and it applies to all interactive courseware developed by or for the DoD.

The instruction sets five policies for the development of new and substantially modified ICW programs and the management of both new and existing ICW programs in the DoD. These policies are the following:

(1) ICW programs are to be designed to promote portability, following the standard DoD programming protocols developed under the DoD portability initiative and other technical requirements prescribed in MIL-STD-1379D.

(2) Payment of royalties, recurring license or run-time fees, use taxes, or similar additional expenses for ICW and associated materials developed for or by the DoD are to be eliminated.

(3) The Defense Instructional Technology Information System (DITIS) is established to provide and maintain an inventory of DoD ICW programs for use by all DoD components. DITIS is also significant for non-DoD workforce issues because it provides essential information for determining the potential of DoD ICW programs for transfer to the private sector.

(4) Reproduction master materials must be archived for the life cycle of each ICW program.

(5) DoD Components must ensure the availability of all materials necessary to modify ICW programs throughout their life cycles.

C. PROCEDURES FOR TRANSFERRING ICW

The DoD (as well as other Federal agencies) has provided many training and education audiovisual materials to the private sector through an existing structure within the National Audiovisual Center, which is an operating division with the National Archives and Records Administration, as outlined in the Office of Management and Budget Circular

A-114, "Management of Federal Audiovisual Activities." Since A-114 is already in place, the DoD intends to use it as much as possible in transferring ICW programs to the private sector. However, ICW programs that are not audiovisual productions are not covered by these provisions, and procedures are being established so that ICW management, including that concerned with transferring programs to the private sector, is consistent across all ICW programs.

General procedures for transferring all DoD ICW programs are shown in Figure 2. First, the programs must be screened for potential relevance to the new target audience on a well-defined set of criteria. Those ICW programs that successfully meet these criteria must then be reviewed by legal counsel to ensure that no legal encumbrances preclude their sale to the public and then be subjected to a security review to determine if they can be cleared for public release. ICW programs that pass these reviews will then be available for transfer to the private sector. These programs will be offered directly as they were produced for the DoD. The DoD cannot take responsibility for any costs associated with secondary user desired content changes, editing, duplication, updates, shipping, technical conversion, licensing, patents, or royalties associated with these cleared ICW programs.

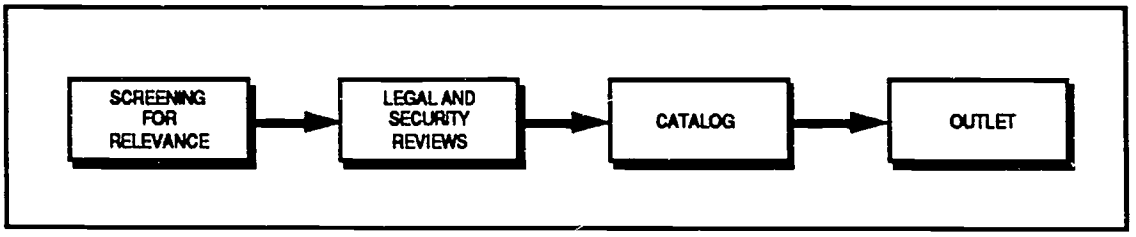

Figure 2. Materials Transfer Process

This process then involves three "filters" or reviews through which ICW programs must pass:

(1) *Suitability Review.* The first question that arises about a DoD ICW programs is: Would anyone else want it? A substantial amount of DoD instructional material is specifically focused on the main business of the DoD, which is warfighting. Much DoD instructional material concerns combat, the operation, maintenance, and deployment of materiel required for combat, and procedures for managing large military organizations. ICW programs directly concerned with combat or with systems and procedures that are only used for combat are excluded from further consideration. Some ICW programs may pass this suitability review and still be too martial in tone for the taste of many civilian users, but at this point the issue is left to these users to resolve for themselves.

(2) *Legal Review.* The most restrictive review for DoD ICW programs to pass may be the legal review. Here the question is: Does the DoD have the legal right to provide a particular ICW program for copying and distribution by others? In short, does the DoD own it? Many DoD ICW programs have restrictions on their distribution outside the DoD. These restrictions are the result of several factors: the software used in ICW programs may be copyrighted; imagery, music, and sound effects used in audiovisual productions may be copyrighted; and distribution rights may be restricted to DoD users only. Clearly, the DoD does not have the right to copy and distribute these materials outside the DoD.

In other cases, the distribution rights for the materials themselves are unlimited, but the means to present them may be limited. This is especially likely to be true of ICW programs in which instructional content the curriculum data base of items, scenarios, graphics, photographics, audiovisual productions, and the like is only part of the instructional package. The rules and procedures for presenting and individualizing the instructional content are a separate matter. The content may be wholly owned by the DoD with free and unrestricted rights for its distribution within the DoD, but the rules and procedures for presenting it may involve proprietary algorithms, licensing, royalties, or other limitations to the rights of the DoD to transfer it to non-DoD users.

(3) *Security Review.* Classified material or material that reveals business proprietary information or trade or technology secrets cannot be transferred to the private sector. Instructional material that could be transferred by the DoD to the private sector would have to be reviewed to determine if it could be made available for public release and unlimited distribution outside the DoD.

DoDI 1322.20 is intended to minimize restrictions on the transfer of new ICW programs and of those undergoing major revisions. However, this instruction does not cover already existing ICW programs, and it will not sweep away all barriers to ICW transfer. Problems of resourcing transfer procedures, establishing responsibilities, and adapting to inevitable and rapid technological changes in ICW remain to be solved.

The general process for transferring DoD ICW programs to non-DoD users, then, centers on the three reviews discussed above. All three reviews will certainly result in new, non-mission-related costs that the DoD will have to bear and that will require additional resources.

Distribution rights to ICW programs remain to some extent uncharted territory. An adequate body of decisions for establishing legal precedents for the distribution of ICW programs to outside users has yet to be accumulated. Clear criteria for developing ICW

programs with well-understood distribution rights and clear criteria for determining distribution rights for existing ICW programs have yet to be developed.

It is also uncertain what legal liability issues may be associated with transferring certain ICW materials to non-DoD and private users. Potentially transferable materials may have to be legally reviewed in this context as well.

Once these reviews are completed, the instructional materials that are determined to be transferable will be released for publication in a catalog. There are additional tasks that must be performed by non-DoD organizations to complete the transfer of these materials to civilian users. Among these are the following:

- *Catalog Publication and Dissemination.* The catalog must be published and disseminated to potential users. This task includes maintaining mailing lists and developing a capability for marketing the DoD materials. The catalog must include materials newly entered, previous materials that have been updated, and materials whose distribution status has changed. The catalog should be maintained in a digitally accessible format as well as in a paper format.
- *Material Location and Retrieval.* Transferable materials must be located and retrieved. ICW programs are scattered widely across DoD commands. Locating and securing complete, fully workable sets of ICW programs may consume substantial resources.
- *Material Storage.* Transferred materials must be physically stored with all necessary environmental safeguards. These materials must be maintained in good working order, and updated and modified promptly by the organization responsible for marketing them. Software, hardware, and an in-house technical capability must be available in order to provide this quality assurance.
- *Technical Assistance.* Non-DoD users will require technical assistance in installing the DoD materials for their own applications, and this assistance will have to be provided via telephone hot lines, technical documentation, technical bulletins, user group seminars, and the like.

Other tasks may well develop with experience. What is needed is an adequately resourced materials transfer organization that is outside the DoD but that has clear responsibility to market, technically support, and transfer DoD ICW programs to non-DoD users. If the DoD materials and other government-developed ICW programs are of sufficient value, such an organization should become self-supporting through sales of ICW programs after receiving start up support, but adequate seed funding will have to be provided and an organizational "home" for the center will have to be established.

IV. TRANSFERABLE DoD COURSEWARE

The DITIS database was analyzed to identify ICW programs that are candidates for transfer from the DoD to the private sector, although final determination of transferability will depend upon the results of more authoritative suitability, legal, and security reviews that must be undertaken on a case-by-case basis. Out of 4644 ICW programs that have been reported to DITIS since its inception in May 1991, 2718 were identified as having possible utility in meeting private sector training requirements. Of these 2718 programs, 591 were computer-based instruction programs that run on the MS-DOS operating system, 1997 were computer-based instruction programs that run on the NOS operating system and were prepared using the TUTOR authoring system, and 130 were interactive videodisc programs that run on the MS-DOS operating system.

The DITIS database is the only DoD database that will satisfy the information reporting requirements of the Training Technology Transfer Act of 1988. DoDI 1322.20 requires DoD training developers to determine if an ICW program exists that meets their needs before embarking on the development of any new training program, and DITIS was established by the instruction as a resource for making this determination. ICW programs must be entered into DITIS when they are proposed, put under development, completed, modified, taken out of service, or terminated. Full-scale development of the database was begun in May 1991 when the Services were formally notified of the requirement to register their ICW programs in DITIS.

At present, 4644 records have been entered into DITIS and are available for analysis. These records are now being reviewed, validated, and checked for completeness. Also, more DITIS records are being added all the time. These activities are continuing and should substantially increase both the completeness of DITIS coverage and the quality of its records. However, the 4644 ICW programs now in DITIS provided an initial, credible basis for determining the amount and kinds of DoD ICW programs that may be transferable to private sector use.

The Service developers of the ICW programs reported in DITIS are listed in Table 3. As the table shows, most of the ICW programs reported came from the Army (2134 programs), but there are significant numbers of programs reported by the Navy (331 programs), Air Force (655 programs), and DoD (555 programs). Most of the DoD

programs came from joint commands, and most of the programs for which no Service was reported as the developer were acquired jointly, by two or more Services. Most of the programs were developed by active components (2908 programs). Only 14 programs were developed by reserve forces, none by National Guard forces, but the developing component of many (1722) programs was not reported.

Table 3. Sources of ICW Programs Reported in DITIS

Service (Component)	No. of Records
Army - (Active)	1380
Army - (No Response)	754
Total	2134
Navy - (Active)	320
Navy - (Reserve)	11
Total	331
Air Force - (Active)	638
Air Force - (Reserve)	3
Air Force - (Other)	14
Total	655
Marine Corps - (Active)	5
Coast Guard - (Active)	10
DoD - (Active)	555
No Response	954
Total	4644

Only computer-based instruction and interactive videodisc were reported in DITIS as delivery media for these ICW programs. A total of 3499 programs were reported as computer-based instruction, 965 were reported as interactive videodisc programs, and there were 180 non-responses in which the delivery media data element was left blank.

The information held in DITIS is determined by its data elements, which are defined by DoDI 1322.20. These data elements and their definitions are listed in Appendix A. Some characteristics of DoD ICW programs that may be determined from these data elements as they have been reported to DITIS are shown in Table 4. It should be emphasized that many DITIS records are in their early developmental phases and may not be authoritative. Further review must be made on a case-by-case basis to determine conclusively what the actual status of an ICW program listed in DITIS is with regard to any of its data elements.

Table 4. Reported Characteristics of ICW Programs in DITIS

Distribution Restrictions		Security Classification		DoD Rights		Program Status	
Response	No. of Programs	Response	No. of Programs	Response	No. of Programs	Response	No. of Programs
None	3095	Unclassified	4625	Unlimited	239	Proposed	
Legal	53	Confidential	4	Limited	3900	Development	480
Government Only	121	Secret	11	Government Use	321	Completed	3983
DoD Only	962	No Response	4	Other	4	Revision	20
Other	99			No Response	180	Out of Service	1
No Response	314					Terminated	2
						Other	2
						No Response	1

Data elements that are particularly important in determining transferability are the following:

- *Restrictions to Distribution.* If there are any legal restrictions on public distribution of an ICW program, then clearly, and in accord with the procedures outlined earlier, the DoD cannot transfer the program to the private sector. As Table 4 suggests, 3095 of the 4644 ICW programs now listed in DITIS have no reported legal restrictions on their distribution. Again, authoritative determination of these restrictions must be made, and many ICW programs that are reported to be unrestricted may turn out, after further scrutiny, to be restricted.
- *Security Clearance Required.* If a security clearance is required to view an ICW program, then its transferability is clearly limited. In accord with the procedures outlined earlier, only unclassified ICW programs will be released by the DoD for use in the private sector. Security classification does not appear to be a major issue in the transferability of DoD ICW. As Table 4

shows, 4625 of the 4644 ICW programs now in DITIS are reported to be unclassified.

- *DoD Rights to ICW Programs.* A specific stipulation in the Federal Acquisition Regulations determines the type of rights to a product held by the government after acquiring it. DoD rights may turn out to be a major issue since, as Table 4 shows, unlimited rights were reported to have been purchased for only 239 of the 4644 ICW programs in DITIS as part of their acquisition. In one sense, the 4405 programs for which the DoD does not own unlimited rights may not be transferable to the private sector, since the DoD does not strictly own them. On the other hand, there are no legal restrictions to the distribution of 3095 of the DoD ICW programs in DITIS, and perhaps these programs are transferable or the rights to these programs may be purchased from the original supplier. This issue remains unresolved in general and will have to be treated on a case-by-case basis in determining the transferability of any ICW program. This problem should be alleviated in new ICW programs that follow the guidelines established by DoDI 1322.20. In this report, ICW programs whose rights have not been purchased by the government are nonetheless included in the inventory of programs that are considered candidates for transfer to the private sector.

- *ICW Program Status.* One factor that might be considered in the transfer of an ICW program is whether or not it is operational. Proposed ICW programs must be entered into DITIS, but until they are actually completed, they cannot very well be transferred. At present, 3983 of the 4644 ICW programs now listed in DITIS have been completed. An additional 480 programs are under active development, which means they are likely to be completed, and 20 programs are being revised, giving 4483 ICW programs that are either genuinely operational or are likely to be. The ICW programs that are inventoried here, however, are all reported in DITIS as being "completed."

- *Authoring System Product Name.* An authoring system is a specialized software package designed to help developers prepare instructional material for presentation as ICW. ICW prepared with some authoring systems require a runtime version of the system to be used in presenting the instruction to students. In some of these cases, the DoD may have full rights to distribute the instructional materials, but the necessary runtime version of the authoring system must be obtained separately if transfer of the ICW is to be fully effected. The information in DITIS does not identify these cases, and they are expected to be minimized in the future as DoDI 1322.20 takes hold. The number of ICW programs prepared for DoD use with each authoring system is shown in Table 5. As the table shows, TUTOR was used to prepare 2474 of the 4644 ICW programs in DITIS, and MicroTUTOR was used to prepare 584 others. TUTOR programs require a proprietary computer operating system (NOS) and architecture for their presentation. MicroTUTOR programs can be presented by most MS-DOS systems. It is likely that many of the TUTOR

Table 5. Authoring Systems Used to Prepare ICW Programs in DITIS

Authoring System or Higher Order Language Used	Number of ICW Programs
ADAPT	95
AIS-II/PC	5
ASET	17
Authology	2
C	27
C++	1
CAMS	1
CBESS	5
CDS	57
CDTS	17
DXTER	15
EIDS-Assist	518
GW Basic	2
ICON Author	1
IVDL	3
Lunaria	8
MERLIN	31
MicroTUTOR	586
OASYS	22
OASYS/PILOT	169
Pascal	2
PILOT	3
PMS	1
QUEST	128
SABER	12
SAM	1
Teacher	1
TENCORE	33
TUTOR	2474
VISION	21
WISE	23
WYSE	53
No Response	310
Total	4644

programs could be successfully translated to MicroTUTOR, and many of the DoD TUTOR-based ICW programs may be of interest to the private sector, but this translation is not a fully automated process and would have to be resourced.

- *Operating System.* An operating system is a computer program that schedules access to a computer system's resources, increases the efficiency with which application programs run, and makes using the computer system easier and more convenient for programmers and other users, including students. The operating system on which an ICW program runs affects the ease with which ICW can be transferred. If the operating system is widely used, "open," and generally available, cost-effective transfer is more likely to be achieved than if it is not. Two operating systems dominated the DITIS reports: MS-DOS supporting 1792 ICW programs and NOS supporting 2474. NOS runs on mainframe computers manufactured by one supplier; MS-DOS runs on a variety of computer systems. NOS supports the TUTOR authoring system; MS-DOS supports a variety of authoring systems, including MicroTUTOR.
- *Delivery Medium.* Although DoDI 1322.20 lists eight possibilities for this data element, only two delivery media were reported in the current DITIS records. These are computer-based instruction, which was reported for 3499 ICW programs, and interactive videodisc instruction, which was reported for 965 ICW programs; 180 DITIS records did not report this data element. With time, the number of records reporting CD-ROM as a delivery medium should increase, but none has been reported yet.

Potentially transferable programs are reported in three categories: (1) MS-DOS programs using computer-based instruction for their instructional presentations, (2) NOS programs using computer-based instruction for their instructional presentations (developed using TUTOR), and (3) MS-DOS programs using interactive videodisc (IVD) for their instructional presentations.

MS-DOS computer-based instruction is the most easily transferable of DoD ICW programs because of the provisions of DoD 1322.20, the requirements of MIL-STD-1379D, and the widespread availability of MS-DOS computer systems.

TUTOR computer-based ICW programs were examined as a group because of their large number and general applicability to private sector concerns. However, they require an operating system and a computer system architecture that is not widely available to either military or private education and training communities. TUTOR programs can be and have been prepared to operate on MS-DOS systems, usually by translating them to MicroTUTOR. This translation can be 80-90 percent automated, and it is available from a number of suppliers, making this investment attractive from a cost-benefit standpoint for many TUTOR programs

Finally, interactive videodisc (IVD) programs were separated from the others because they can be treated as audiovisual materials, and there already exists a DoD procedure for releasing audiovisual materials including interactive videodisc ICW programs for sale to the public through the National Audiovisual Center. Also, IVD materials were separated out because they require a different suite of presentation hardware (they require a computer system connected to a videodisc player), and the status of many of these programs with regard to distribution rights and copyright is less certain than it is for most computer-based instruction.

An assessment was made of the ICW programs in each of these three categories to determine their potential for transfer. More specifically, the screenings suggested earlier were applied to the 4644 ICW programs now reported in DITIS. ICW programs that dealt only with military-specific equipment or procedures, course management tools without accompanying training packages, and non-training computer programs and applications software were omitted. Following this initial screening, the remaining ICW programs were screened to select those that provide instruction in a competency, job, or vocational area that may be needed in the private sector.

In order to characterize and better describe the final set of ICW programs, they were classified into four general categories based on their content:

- *Basic Literacy and General Education* covers topics in general education, including all basic verbal and mathematical literacy skills, preparation for education in specific subject areas, preparation for educational certification tests, learning skills (especially learning to learn), and personal development skills necessary to function as an adult in modern society.
- *Specific Technical Training* covers ICW programs concerning instruction in the knowledge and skills needed to perform non-professional jobs, i.e., jobs that do not require education in the general liberal arts or sciences or advanced study in a specialized field. Most of these programs are intended to prepare students to perform a specific, identifiable job.
- *Workplace Knowledge and Skills* covers ICW programs providing instruction in knowledge and skills necessary to direct and administer groups of people or organizational procedures.
- *Professional and Para-Professional Knowledge and Skills* covers ICW programs providing instruction to maintain, update, and improve vocation-specific knowledge and skills related to specialized fields requiring advanced education and training.

The categories used to classify DoD ICW programs do not map exactly onto the five categories of competencies sought by managers in the private sector. This is not surprising since the DoD ICW programs were developed for specific DoD needs. However, there are areas of overlap between the DoD categories and the workforce competencies sought by the private sector. Specifically, the five private sector competency areas can be mapped onto the DITIS inventory in the following ways:

- *Personal Characteristics and Attitudes*. This competency is addressed by the DITIS Basic Skills Training and General Education category of "Personal Development," which covers the practical skills needed for daily living. In addition, the General Workplace Knowledge and Skills category contains the subcategory "Personal Job Skills," which presents non-task-related knowledge and skills that generally enhance workers' effectiveness on the job and within an organization.
- *Interpersonal and Teamwork Skills*. These competencies relate to two DITIS subcategories. The General Workplace Knowledge and Skills subcategory "Leadership" presents principles for supervising others in the workplace in order to increase task efficiency and performance, and the subcategory "Teamwork" covers procedures for enhancing cooperative efforts to complete a task or job.
- *Higher Order Thinking Skills*. These skills are covered in the Basic Skills Training and General Education subcategory of "Academic Skills," which includes learning strategies (e.g., listening, memorizing, note taking, studying, test taking, reading strategies) and reference skills (e.g., finding information in the library, finding information in books, skimming for relevant information, organizing information from multiple sources). Also the DITIS inventory includes the subcategory "Higher Order Skills," which includes problem solving (especially the application of knowledge and skills to novel situations) and spatial relations (mental manipulation of two- and three-dimension objects).
- *Basic Academic Skills*. This competency is directly addressed by the DITIS category Basic Skills Training and General Education. It includes language skills (e.g., general language skills, applied language skills, general vocabulary, job-related terminology, English as a second language) and mathematics skills (general mathematics skills, applied mathematics skills, and advanced mathematics skills). This general category also covers topics related to physical sciences, social sciences, and foreign language and culture.
- *Job-Specific Technical Skills*. These competencies are directly addressed by almost every subcategory in the DITIS Specific Technical Training category as well as by many subcategories in the Workplace Knowledge and Skills and in the Professional and Para-Professional Knowledge and Skills categories.

A. MS-DOS COMPUTER-BASED INSTRUCTION

Of the 4644 ICW programs now in DITIS, 1800 were reported as being prepared for operation on the MS-DOS operating system. Of these, 854 were reported as computer-based instruction and the remaining 946 were reported as interactive videodisc instruction. The final set of MS-DOS computer-based instruction entries was selected based on the following criteria:

- As suggested, the program is reported to be MS-DOS computer-based instruction.
- No restrictions are reported on its distribution to the public.
- The development or acquisition of the program has been completed.
- Its security classification is reported as "Unclassified."
- There may be a need in the private sector for the competency, job, or vocational area for which it provides instruction.

There were 591 of the 854 MS-DOS computer-based instruction programs that met these criteria. An inventory that shows into which subject categories these programs may be categorized is provided in Table 6. It should be emphasized that the counts shown in Table 6 are based solely on data currently contained in DITIS and would probably change upon closer review of the programs themselves. Still, this inventory gives a sense of the variety and number of DoD MS-DOS computer-based instruction programs that may be applicable outside the DoD. With the exception of a large cluster (263 programs) of MS-DOS computer-based instruction programs for air traffic control and the general absence of these programs from the General Education subcategory, they appear to be fairly evenly distributed across all the subject categories.

B. NOS (TUTOR) COMPUTER-BASED INSTRUCTION

Of the 4644 ICW programs now in DITIS, 2472 were reported as being prepared using the TUTOR authoring language for operation on the NOS operating system. The final set of TUTOR computer-based instruction entries was selected based on the following criteria:

- As suggested, the program is reported to be computer-based instruction prepared using the TUTOR authoring language for the NOS operating system.
- No restrictions are reported on its distribution to the public.
- The development or acquisition of the program has been completed.

Table 6. Counts of Candidate ICW Programs

I. BASIC SKILLS TRAINING AND GENERAL EDUCATION

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
A. Basic Skills				
1. Academic Skills				
a. Learning Strategies	36	4		32
b. Reference Skills	36			36
2. General Job Skills				
a. Charts, Diagrams, and Schematics	13			13
b. Tool and Equipment Use	56	3	8	45
c. Miscellaneous	15			15
3. Higher Order Skills				
a. Problem Solving	34			34
b. Spatial Relations	30			30
4. Language Skills				
a. General Language Skills	15			15
b. Applied Language Skills	30	2		28
c. General Vocabulary	23			23
d. Job-Related Terminology	79	18		61
e. English as a Second Language	1		1	
5. Mathematics Skills				
a. General Mathematics Skills	86	1	3	82
b. Applied Mathematics Skills	76	10		66
c. Advanced Mathematics Skills	58	1		57
6. Personal Development	20			20
B. General Education				
1. Test Preparation				
a. AFCT	6			6
b. CLEP	6			6
c. GED				
d. GRE	5			5
2. Physical Sciences				
a. Basic Science	3			3
b. Biochemistry				
c. Biology				
d. Chemistry	4			4
e. Geology	4	2		2
f. Physics	2			2
3. Social Sciences				
a. Behavioral Sciences				
b. Economics				
c. Geography				
d. Political Science				

(continued)

Table 6. Counts of Candidate ICW Programs (continued)

I. BASIC SKILLS TRAINING AND GENERAL EDUCATION (continued)

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
B. General Education (continued)				
3. Social Sciences				
a. Behavioral Sciences				
b. Economics				
c. Geography				
d. Political Science				
4. Foreign Language and Culture				
a. Arabic	11			11
b. Chinese	4			4
c. Czech	9			9
d. Egyptian	1			1
e. French	4			4
f. German	32		1	31
g. Greek	1			1
h. Hebrew				
i. Italian	6			6
j. Japanese	21			21
k. Korean	2		1	1
l. Latin	4			4
m. Norwegian				
n. Polish	5			5
o. Portuguese	39			39
p. Russian				
q. Serbo-Croatian	1			1
r. Spanish	47		1	46
s. Swedish				
t. Syrian/Iraqi	1			1
u. Tagalog				
v. Thai				
w. Turkish	3		1	2
x. Vietnamese	1			1
y. Miscellaneous	5			5
Total Basic Skills Training and General Education ICW Programs	835	41	16	778

(continued)

Table 6. Counts of Candidate ICW Programs (Continued)

II. SPECIFIC TECHNICAL TRAINING

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
A. Automotive Mechanics	48		1	47
B. Aviation				
1. Aerodynamics	5	5		
2. Aeronautics and Astronautics				
3. Air Traffic Control	270	263		7
4. Aircraft Familiarization	6	5	1	
5. Aircraft Maintenance	36	1	1	34
6. Emergency Procedures	5	5		
7. Flight Crew Training				
8. Flight Inspection	37			37
9. Flight Planning				
10. Flying Fundamentals	11	1		10
11. Ground Training	2		2	
12. Helicopter Repair	3		3	
13. Instrument Landing Systems (ILS)	46			46
14. Pilot Training	32	4	1	27
C. Communications and Communications Equipment	22	2	2	18
D. Computers				
1. Data Communications	2			2
2. Data Processing	9			9
3. Fundamentals	20	4		16
4. Hardware	12	3		9
5. Military Computer Systems				
6. Operating Systems	1			1
7. Operations				
8. Programming Languages				
a. Ada	5			5
b. BASIC	2			2
c. C	19			19
d. COBOL	44	12		32
e. ECL				
f. FORTRAN	5			5
g. GMAP				
h. JCL				
i. MASM				
j. PASCAL	1			1
k. PROLOG				
l. RPG	1			1
m. SQL				
n. STORM				
9. Security	6	5		1
10. Software and Applications Programs	6	1		5
11. Word Processing	2			2
12. Miscellaneous	1	1		

(continued)

Table 6. Counts of Candidate ICW Programs (Continued)

II. SPECIFIC TECHNICAL TRAINING (continued)

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
E. Electronics				
1. Fundamentals	77		31	46
2. Generic Electronic Equipment Operation and Maintenance				
3. Safety	3		1	2
4. Tool and Equipment Use	39		14	25
F. Hydraulics and Pneumatics	15	1	2	12
G. Journalism				
1. Broadcast	3			3
2. Photo	7			7
3. Print	5			5
H. Maintenance (Miscellaneous)	4	2	1	1
I. Map Reading	33	1	1	31
J. Materials Handling and Storage	5	1	1	3
K. Navigation				
1. Air	32	12		20
2. Celestial	1	1		
3. Nautical	1	1		
4. Rules of the Nautical Road	2		2	
L. Postal Procedures	7	3		4
M. Radar and Sonar	106	43	3	60
N. Safety	30	1		29
O. Security, Law Enforcement, and Criminology	2		1	1
P. Soldering and Welding				
Q. Typing	23	12		11
R. Miscellaneous	6	1	1	4
Total Specific Technical Training ICW Programs	1060	391	69	600

(continued)

Table 6. Counts of Candidate ICW Programs (Continued)

III. WORKPLACE KNOWLEDGE AND SKILLS

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
A. Finance and Accounting	34	2		32
B. Instruction and Training	39	3		36
C. Management				
1. Teamwork	18	1		17
2. Leadership	6	2		4
3. Performance Appraisal	9		1	8
D. Office Management				
1. Document Control	2	2		
2. Administration	10	9		1
3. Secretarial Skills				
a. Correspondence	16	5		11
b. Filing	31			31
c. Other Forms and Procedures	8	7		1
E. Personal Job Skills	10			10
F. Personnel Policies and Employee Relations				
1. General	18	3		15
2. Government-specific	35	7		28
3. Equal Employment Opportunity and Affirmative Action	29			29
G. Miscellaneous	5	1		4
Total Workplace Knowledge and Skills ICW Programs	270	42	1	227

(continued)

Table 6. Counts of Candidate ICW Programs (Continued)

IV. PROFESSIONAL AND PARA-PROFESSIONAL KNOWLEDGE AND SKILLS

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
A. Engineering				
1. Civil Engineering (General)	4	2		2
a. Bridge Design	32	11		21
b. Concrete	6	3		3
c. Construction Management	3	1		2
d. Drainage Facilities	16	6		10
e. Materials Quality	11	5		6
f. Road and Airfield Construction	31	12		19
2. Combat Engineering				
3. Electrical Engineering	1	1		
4. Mechanical Engineering	2			2
5. Production Control Management	14			14
B. Medicine				
1. Anatomy and Physiology (General)	55	16	8	31
2. Basic Medical Skills	18		13	5
3. Combat Medicine	4		4	
4. Dental Science	27	5	3	19
5. First Aid, Emergency Treatment, and Medical Readiness	28	1	11	16
6. Health Care Administration	29	9		20
7. Infectious Diseases	8			8
8. Laboratory Technology	10			10
9. Medical Technology	36		2	34
10. Nursing	12			12
11. Nutrition and Wellness	21	3		18
12. Pharmacology	19	9		10
13. Public Health	4			4
14. Medical Specialties				
a. Allergies	9			9
b. Behavior/Psychiatry	4	1		3
c. Cardiology	20	5	1	14
d. Clinical Medicine	5	1		4
e. Dermatology	2			2
f. Ear, Nose and Throat				
g. Endocrinology	5	2	1	2
h. Neurology	5	2		3
i. Obstetrics/Gynecology	2			2
j. Oncology	2			2
k. Optometry/Ophthalmology	32	12		20
l. Orthopedics	2			2
m. Pulmonary Medicine	39	2	1	36
n. Radiology	8			8
o. Surgery	14	5		9
p. Urology	3	1		2

(continued)

Table 6. Counts of Candidate ICW Programs (Continued)

IV. PROFESSIONAL AND PARA-PROFESSIONAL KNOWLEDGE AND SKILLS (continued)

Subject Category	Number of Programs			
	Total	MS-DOS	IVD	TUTOR
B. Medicine (continued)				
15. Veterinary Medicine	5			5
16. Miscellaneous	5	2		3
Total Professional and Para-Professional Knowledge and Skills ICW Programs	553	117	44	392
Overall Totals	**2718**	**591**	**130**	**1997**

- Its security classification is reported as "Unclassified."
- There may be a need in the private sector for the competency, job, or vocational area for which it provides instruction.

There were 1997 of the 2472 TUTOR computer-based instruction programs that met these criteria. An inventory that shows into which subject categories these TUTOR programs may be categorized is provided in Table 6. As above, the counts shown in Table 6 are based solely on DITIS entries and would probably change given closer examination of the programs. Still, this inventory gives a sense of the variety and number of TUTOR computer-based programs that may be applicable outside the DoD. There is a TUTOR program in almost every subject category listed. As discussed earlier, commercial programs available from several suppliers will automate the translation of 80-90 percent of these TUTOR programs to MicroTUTOR and thereby to a form that can be presented on most MS-DOS computer systems. Roughly, 1-3 person-weeks are required to translate a TUTOR program to MicroTUTOR.

C. MS-DOS INTERACTIVE VIDEODISC INSTRUCTION

Of the 1800 ICW programs in DITIS reported to operate on the MS-DOS operating system, 946 use interactive videodisc (IVD) instruction. The final set of MS-DOS IVD instruction programs was selected based on the following criteria:

- As suggested, the program was reported to be interactive videodisc instruction prepared for the MS-DOS operating system.
- The development or acquisition of the program has been completed.
- Its security classification is reported as "Unclassified."

- There may be a need in the private sector for the competency, job, or vocational area for which it provides instruction.

Lack of reported restrictions for distribution to the public was not among the criteria for selecting ICW programs in the category of MS-DOS IVD instruction. Many of these programs are new, and review of their distribution rights is currently underway. It seems fair to identify these ICW programs as candidates for transfer as long as it is recognized that their distribution rights are still being determined and may turn out to be restricted.

There were 130 IVD instruction programs that met the criteria for inclusion in the Table 6 inventory of ICW programs that are candidates for transfer. The percentage (14 percent) of IVD programs, then, that met these criteria is much lower than the corresponding percentages for MS-DOS computer-based instruction (69 percent) and TUTOR computer-based instruction (81 percent). This relatively low percentage appears to be due to the large number of IVD programs the DoD has developed to train operators and maintainers of specialized military systems and are therefore not candidates for transfer to the private sector. Table 6 shows into which subject categories the IVD programs that are candidates for transfer may be categorized. As before, the counts shown in Table 6 are based solely on DITIS entries and would probably change given closer examination of these ICW programs. Still, this inventory gives a sense of the variety and number of DoD IVD programs that might be applicable in private sector training.

V. CONCLUSIONS

Based on the above considerations and the resulting inventories of DoD ICW programs that appear to be transferable to the private sector, the following conclusions may be drawn:

- A number of DoD ICW programs appear to be candidates for transfer to the private sector, but final judgements on their transferability require more authoritative and comprehensive reviews that must be performed on a case-by-case basis. Many of these ICW programs have proven to be of significant value in DoD training and may be useful in meeting private sector workforce training requirements if they can be transferred.
- Workable procedures are already in place to aid in the transfer of DoD ICW programs that are audiovisual productions, such as interactive videodisc programs. These procedures serve as a model for effecting transfer of other ICW programs that are not audiovisual productions, such as computer-based instruction programs.
- The problems of resourcing and responsibilities remain. Through its policies and procedures, the DoD is prepared to assist the private sector in making DoD ICW programs available for transfer, but resources both within the DoD and outside the DoD remain to be identified and responsibilities for many necessary functions, especially those to be performed outside the DoD, remain to be assigned.

In brief, transfer of ICW programs from the DoD to the private sector appears to be a potentially useful approach for meeting some non-DoD workforce training requirements. Actual transferability of specific ICW programs must be determined authoritatively on a case-by-case basis, and a number of issues, particularly those involving the availability of resources and the establishment of responsibilities, must be resolved before a comprehensive set of procedures for transfer can be developed and successfully implemented.

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APPENDIX A

DITIS DATA ELEMENTS

APPENDIX A
DITIS DATA ELEMENTS

SECTION A: ADMINISTRATIVE INFORMATION

This section is to be completed for a proposed development, or any time a DITIS database query is initiated. The section consists of eight data elements organized into the following four blocks:

1. Date. The date this record is forwarded to DITIS. Entry format is complete year, month, and day (e.g., 22 August 1995 is entered as 19950822).

2. DITIS Record Number. The alphanumeric tracking number, developed by the originating activity, that is used to identify the ICW program record within the DITIS database. The number consists of five parts, separated by hyphens, as follows:

C = One character code to denote the service of the lead Component for the ICW program.

A = Army
F = Air Force
N = Navy
M = Marine Corps
P = Coast Guard
D = Department of Defense
O = Other

S = One character code to denote the unit status of the activity responsible for the development of the ICW program

R = Active
G = Guard
V = Reserve
O = Other

NAME = First four letters of the last name of the Service program manager, point-of-contact, or similar individual in the originating activity.

YYYYMMDD = The date on which data regarding this program are first entered into the DITIS. Entry format is complete year, month, and day. (e.g., 19950822).

= A unique six digit number

3. ICW Program Status. Code to denote the current phase of the program for which data are being submitted to DITIS:

Q - Query only
P - Proposed development
U - Under development
C - Development or acquisition completed
R - Program revision
S - Out of service
T - Program terminated
O - Other (specify)

4a. Originating Activity Organization Name. The full name of the Government activity responsible for the development of the ICW program (e.g., Chief of Naval Education and Training; USA Training and Doctrine Command; USAF Air Training Command). If the current data entry is part of a query, the full name of the Government activity requesting the data search.

4b. Originating Activity Office Symbol. The full office symbol of the Government activity responsible for the development of the ICW program (e.g., CNET, Program Management Support Activity, Code 0474; HQ TRADOC Attn: ATTG-C1; HQ ATC/TTOR). If the current data entry is part of a query, the full office symbol of the Government activity requesting the data search.

4c. Originating Activity Point-of-Contact (POC) Name. The name and title of the person at the originating activity who is most knowledgeable about the program content and features.

(1) Commercial. The commercial telephone number, including area code, of the originating activity (e.g., (407) 555-1234).

(2) AUTOVON. The AUTOVON telephone number of the originating activity.

SECTION B: ICW PROGRAM INFORMATION

This section is to be completed for a proposed development, or any time a DITIS database query is initiated. The section consists of eight data elements organized into four blocks, and is used as the basis of the DITIS database search for comparable products. The data elements are the following:

5. ICW Program Key Words/Concepts. A list of up to 10 key words or concepts separated by commas that describes the general training area supported by the ICW program (e.g., aircraft, radar, maintenance, troubleshooting, fault isolation, repair). These terms are the key concepts used to search the database for comparable products.

6a. Target Audience. A general description of the intended trainee population who will use the ICW program (e.g., all aircraft maintenance personnel; advanced sonar technicians; E-9 load masters).

6b. Specialty Code(s). The specific specialty codes (i.e., Navy = NEC, Army/Marine Corps = MOS, Air Force = AFSC) of the target audience for which the ICW program was designed (e.g., 305X4). If the ICW program is not targeted at a specific occupational specialty or group, enter N/A for "not applicable." This item will be included in the Key concepts used to search the database for comparable products.

6c. Specialty Code Title(s). The corresponding titles of the occupational specialty code(s) listed in Item 6b (e.g., Electronic Computer & Switching Systems Specialist). These terms will be included in the key concepts used to search the database for comparable products.

6d. Skill Level(s). For each of the specialty codes listed in Item 6b, the target skill level(s) to which the ICW program was written. If the program is targeted at more than one skill level, this element lists the appropriate ones, separated by commas (e.g., 3,5,7). If the program is appropriate for all skill levels within a specialty code, the word "all" is entered. This item will be included in the key concepts used to search the database for comparable products.

7a. Operational Equipment Designator. The short title of the DoD designator of the operational equipment supported by the ICW program (e.g., F-14A; AN/ANQ-64) and/or the primary associated support equipment (e.g., oscilloscope) covered by the

program. If the ICW program does not deal with a piece of equipment, N/A is entered. These terms will be included in the key concepts used to search the database for comparable products.

7b. Operational Equipment Nomenclature. The complete nomenclature of the DoD designator of the operational equipment supported by the ICW program (e.g., F-14 Fighter Aircraft; AN/ANQ-64 Radar Fire-Fighter Close Support), and/or the primary associated non-generic support equipment covered by the program. If the ICW program does not deal with a piece of equipment, N/A is entered. These terms will be included in the key concepts used to search the database for comparable products.

8a. Associated Course Title(s). The Service/agency-assigned title(s) of the training course(s) that the ICW program supports (e.g., AT&T 3B15 Computer Maintenance). If the ICW program does not support a specific course, N/A is entered.

8b. Associated Course Identification Number(s). The Service/agency-assigned course identification number of the training course(s) that the ICW program supports (e.g., ES-370). If the ICW program is used to support on-the-job, OJT is entered.

SECTION C: ICW PROGRAM DESCRIPTION

This section is to be completed within 30 days following Component-approval to develop or fund the ICW program procurement. The section consists of 12 data elements organized into the following five blocks:

9a. ICW Program Title. The Service/agency-approved name of the ICW program.

9b. ICW Program Identification Number. The Service/agency-approved identification number of the ICW program.

9c. ICW Program Version. The version number and/or date of the latest update of the ICW program.

9d. ICW Program Summary. A brief narrative description (maximum 100 words) of the instructional contents of the ICW program.

10. Estimated Total Hours of Instruction. The projected average contact hours necessary for a trainee to complete the ICW program. Entry format is hours:minutes (e.g., a course that averages four hours and 15 minutes to complete is entered as 04:15).

11a. Number of Courseware Units. The total number of discrete units of courseware (i.e., lessons or modules) contained in the ICW program that can be taught, measured, and evaluated as a single unit.

11b. Courseware Unit Numbers. The corresponding identification number for each courseware unit in the ICW program. If the ICW program contains only one unit, N/A is entered.

11c. Courseware Unit Titles. The full title for each courseware unit contained within the ICW program. If the courseware units do not have descriptive titles, a short description of the contents of the unit is entered (e.g., Rules of the Road; Oscilloscope Use.) If the ICW program contains only one unit, N/A is entered.

12a. Development of Acquisition Method. Code to denote the method by which the ICW program has been acquired or developed:

J - Joint development or acquisition with another Service/agency

E - Development or acquisition based on an existing program.

I - In-house design and development (with or without contractor support)

C - Commercially available off-the-shelf program

O - Other (specify)

12b. DITIS Record Number of Shared Program. The DITIS record number of the ICW program of the other Service/agency if the current program is shared with another Service or agency, or if it is based on ICW program materials received from another Service or agency (i.e., if the answer to Item 12a is "J" or "E"). If this item is not applicable to the current ICW program, N/A is entered.

12c. Use of Shared Program. Code to denote the extent to which the materials of the shared program are used in the current ICW program. (If this item is not applicable to the current program, N/A is entered).

W - Shared program used without modification

M - Minor changes made to shared program (e.g., title change, additional credits)

C - Content changes made to shared program (e.g., video reshot, additions or deletions made to instructional content)

F - Format changes only made to shared program (e.g., different presentation medium used)

I - Shared program materials only used as inputs to the development of the current program.

13a. ICW Program Materials. A list of all training materials used to support the objectives of the ICW program. Include all plans; control documents; discs, tapes, books, job performance aids, and other support materials; and instructor guides and other user documentation (e.g., 1 compact disc, 2 floppy discs, instructor guide, trainee workbook).

13b. Deliver medium. Code to denote the primary type of technology used by the OCW program to present information.

IVD - Interactive Videodisc
IDD - Interactive Digital Disc
DVI - Digital Video Interactive
CBI - Computer-Based Instruction (stand-alone computer)
CDI - Compact Disc - Interactive
IVT - Interactive Videotape
PTT - Part Task Trainer
OTH - Other (specify)

13c. DoD Rights to ICW Program. Code that denotes the type of rights (per the Federal Acquisition Regulation) that are owned by the Department of Defense for the ICW program:

U - Unlimited
L - Limited
O - Other (specify)

SECTION D: SOFTWARE DESCRIPTION

This section is to be completed within 30 days following the completion of ICW program development or acquisition. The section consists of seven data elements organized into the following two blocks:

14a. Authoring System Product Name: The official product name or trademark of the authoring system, assembly language, or higher order language (HOL) used to develop the ICW program courseware (e.g., Instructional Support System (ISS)).

14b. Authoring System Version: The version number and/or date of the authoring system assembly language, or higher order language (HOL) compiler used to develop the ICW program courseware (e.g., Version 2.1, December 1989). If the courseware was developed using a HOL, the compiler version number is given.

14c. Authoring System Vendor: The full name and acronym (if appropriate) of the commercial, academic, or Government developer of the ICW authoring system, assembly language, or higher order language used to develop the ICW program courseware.

14d. DoD Rights to Developmental Authoring System: Code that denotes the type of rights (per the Federal Acquisition Regulation) that are owned by the Department of Defense to the developmental portion of the authoring system used to develop the ICW program.

U - Unlimited
L - Limited
N - None
O - Other (specify)

15a. Operating System Product Name/Version: The official product name or trademark, including vendor and version, of the computer operating system software used by the ICW program (e.g., Microsoft DOS 4.0).

15b. Operating System Software Drivers Required: A list of any special software drivers that are required to run the ICW program but are not included as part of the training materials (e.g., mouse driver, ANSI.SYS, CD-ROM extensions). If no additional software drivers are required, N/A is entered.

16. DoD Portability Standards Version: The version number of the portability standards in MIL-H-1379D used in the development of the ICW courseware. If the courseware was developed before the initial issuance of MIL-H-1379D, N/A is entered

SECTION E: HARDWARE DESCRIPTION

This section is to be completed within 30 days following completion of ICW program development or acquisition. The section consists of eight data elements organized into the following five blocks:

17. Hardware Required: A list of the official product names or trademarks that uniquely identify each of the hardware components and peripherals required to run the ICW program (e.g., XY Model 201 videodisc player; RPQ Model 6012 CD-ROM interface card).

18a. Minimum Free System Memory (RAM) Required: The minimum amount of unused memory (RAM) that must be available on the system to run the ICW program (e.g., 425K).

18b. CPU Type: Type of CPU for which the ICW program was designed (e.g., 8086, 8286, 68000).

18c. Minimum Hard Disk Space Required: If the ICW program requires the use of a hard disk drive, the minimum storage space that must be available on the hard disk drive to run the ICW program (e.g., 2.8 MB).

19a. Floppy Disk Type: If the ICW program requires the use of floppy disks, the physical size and capacity of the floppy disks for which the ICW program was designed (e.g., 3.5 inch, 720K; 5.25 inch, 360K). If the ICW program does not require the use of floppy disks, N/A is entered.

19b. Number of Floppy Disk Drives Required: If the ICW program requires the use of floppy disks, the number of floppy disk drives necessary to run the program (e.g., 2). If the ICW program does not require the use of floppy disks, N/A is entered.

20. Graphics Adapter Type Required: The type of graphics adapter board that must be installed in the system to run the ICW program (e.g., VGA).

21. Input Device(s): A list of all input devices that the ICW program was designed to use (e.g., keyboard, mouse).

SECTION F: MANAGEMENT INFORMATION

This section is to be completed within 30 days following completion of ICW program development or acquisition. The section consists of ten data elements organized into the following four blocks:

22a. Life Cycle Management Organization Name. The full name of the activity responsible for the life cycle management of the ICW program, as designated by the Component (e.g., Chief of Naval Education and Training; USA Training and Doctrine Command; USAF Air Training Command).

22b. Life Cycle Management Office Symbol. The full office symbol of the activity responsible for the life cycle management of the ICW program, as designated by the Component (e.g., CNET, Program Management Support Activity, Code 0474; HQ TRADOC Attn: ATTG-C1; HQ ATC/TTOR).

22c. Life Cycle Management Point-of-Contact (POC) Name. The name and title of the person designated by the Component to be the life cycle manager for the ICW program.

22d. Life Cycle Management Telephone.

(1) Commercial. The commercial telephone number, including area code, of the life cycle manager for the ICW program (e.g., (407) 555-1234).

(2) AUTOVON. The AUTOVON telephone number of the life cycle manager for the ICW program.

23a. Security Clearance Required. Code that denotes the clearance level required for an individual to view or discuss the ICW program.

U - Unclassified

C - Confidential

S - Secret

O - Other (specify)

23b. Restrictions to Distribution. Code that denotes the release status of the ICW program, based on the content of the program materials.

LR - Legal restrictions to public distribution

NR - No legal restriction to public distribution

CP - Cleared for public exhibition but not distribution

CG - Cleared for Government distribution only

CD - Cleared for DoD distribution only

RD - Restrictions to DoD distribution

RF - NOFORN (i.e., not available to foreign nationals)

OT - Other (specify)

23c. Adaptability to Civilian Training. Code to denote the ease with which the ICW program can be adapted for use in training in the civilian sector.

W - Usable without modification

M - Requires minor changes (e.g., title change, additional credits)

C - Requires content changes (e.g., video reshot, additions or deletions to instructional content)

I - Requires major changes or can only be used as inputs to development of civilian training

N - Not applicable to civilian training

O - Other (specify)

23d. Military Articles and Services Listing (MASL) Number. If the ICW program is available for the Military Assistance Program, enter the Military Articles and Services

Listing (MASL) number assigned by the Component. If the ICW program is not available for the Military Assistance Program, N/A is entered.

24a. Courseware Developer Name. The full name and acronym (if appropriate) of the contractor or Government agency responsible for developing the ICW program courseware (e.g., Chief of Naval Education and Training (CNET); USA Training and Doctrine Command (TRADOC); USAF Air Training Command (ATC)). If the ICW program is a joint in-house/contractor development effort, the name of the contractor is entered.

24b. Year Developed or Last Updated. The full calendar year that the ICW program was developed or, if the program has since been updated, the full calendar of the latest revision. This data element applies only if this is the record of a currently fielded program that has not previously been entered into the DITIS database; otherwise, N/A is entered.

25. Defense Automated Visual Information System (DAVIS) Production Identification Number(s) (PINs): The PIN(s) assigned to the ICW program by DAVIS, if the ICW program contains video. If the ICW program does not contain video, N/A is entered.