OSD Critical Infrastructure Protection

Instructional Assessment and Gap Analysis

Critical Infrastructure Protection Education Survey (Phase II)

September 2002

OASD/C3I CIP Directorate

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Instructional Assessment and Gap Analysis
Critical Information Protection Education Survey (Phase II)

Executive Summary

Background. This report documents the results of the phase II Critical Infrastructure Protection Educational Survey conducted by the Education Technology and Training Division (ET&TD) of the Illinois Institute of Technology, Research Institute (IITRI) for the Director, Critical Infrastructure Protection, Office of the Assistant Secretary of Defense for C3I. Phase II of the survey is an assessment of the current instructional programs supporting Critical Infrastructure Protection (CIP) planning and coordination staffs. The survey sought to determine the common areas of emphasis among the staff personnel assigned to the CIP mission and whether there were suitable instructional programs available that addressed the common areas of staff emphasis. This study is not a needs assessment, which identifies and documents the gap between the desired and actual performance of staffs and individuals. Instead, this study documents common performance tasks among DoD CIP staffs and compares those tasks with the stated instructional objectives cited in CIP-oriented courses to determine if the common areas of interest are currently taught. The three-phased project plan is at Appendix A.

Methodology. Several different investigative procedures were used for this study. The survey team used document review, questionnaires, interviews and email inquiries to develop its findings and recommendations. Emphasis was placed on contacting the staff principal or designated action officers from each of the CIPIS member agencies to respond to questionnaires, interviews, and email inquiries. Based on the recommendation from the ASD/C3I CIP Directorate project officer, the survey team made site visits to Headquarters, Pacific Command, Joint Program Office for Special Technology Countermeasures, the National Defense University, and the Defense Security Service Academy to review current and planned CIP-oriented instruction and programs.

Findings

Project Objective One: Survey DoD CIP community for instructional needs and recommendations. Questionnaire and interview response rates were 38% and 60% respectively. However, the data received from the survey process provided important information from the respondents about what was valuable to them in terms of existing courses, informational sources, and preferences for the direction of additional instructional programs. Sixty-nine percent of the responses received indicated three possible categories of instructional interest: preparation of Defense Sector Assurance Plans (DISAP), "How to" conduct the Analysis and Assessment process, and CIP familiarization ("CIP 101"). The responses for other programs (1%) and the non-responses (22%) account for the other significant reply categories. Additional data received indicate that both DoDD 5160.54 and the DoD CIP Plan serve as the best current sources of task information, but responses indicated that both are in need of revision.

Project Objective Two: Define the DoD CIP-oriented instructional user community. The survey determined that the current CIPIS member agencies define the most important DoD user communities for CIP oriented instructional courses. Table 5 (page 14) shows where areas of common instructional interest exist between two or more communities. Beyond the DoD community, the membership of the National Structure for CIP would also be another possible user of CIP-oriented instructional courses. With the focus of this study on the DoD community, the survey team did not survey the National CIP membership. However, member organizations such as Departments of Energy, Justice, and Transportation plus FEMA, NCS, EPA, and FBI have developed 99 (28%) courses that have significant CIP content (see Appendix B).

Project Objective Three: Identify key performance tasks required by the different groups within the community. The primary sources for the development of the performance task list were the following documents:

- Department of Defense Directive 5160.54 - Critical Asset Assurance Program (January 1998)
- Department of Defense Critical Infrastructure Protection Plan (November 1998)
- Department of Defense Memorandum (OASD/C3I-CIP) - Planning Guidance to Assist in the Development of the Defense Infrastructure Sector Assurance Plan (Draft) (December 1998)
- Department of Defense Memorandum (OASD/C3I-CIP) - DoD Critical Infrastructure Protection Special Function (not dated)
- Chairman of the Joint Chiefs of Staff Instruction 3209.01 (June 2002)

From these documents, the survey team extracted 162 responsibility statements assigned to the various CIPIS member agencies. Using the task statement development process from DoD handbook MIL-HDBK-29612-4 (*Glossary for Training*), the team developed 269 performance tasks. Not all of the responsibility statements could be converted into one or more tasks. A total of eight did not meet one or more of the criteria to be converted into a task. The survey team was assisted in expanding the original responsibility statements into tasks by their analysis of the available DISAP documents. The Responsibilities and Tasks table at Appendix C associates groups of specified CIP responsibilities and performance tasks for each member of the DoD CIP community of instructional users. Two CIPIS groups, Lead Components for Defense Infrastructure Sector Assurance Coordination and the Heads of Components and DoD Critical Asset and Installation Owners, had the largest number of tasks in common, 121 (45%). Fifty-four tasks were nearly identical for both groups. That number represents 66% of the total Sector Lead group tasks and 69% of the Head of Component tasks. The 54 commonly shared tasks are divided between the tasks associated with one of the six phases of the CIP life cycle.

Project Objective Four: Analyze existing CIP-oriented instructional programs for reuse and availability. This phase of the project started with the information gathered during phase I, Critical Infrastructure Education Survey, dated 13 May 2002. The phase I report was placed on a CD and distributed at the May 2002 CIPIS meeting. In its Appendix B (Existing Courses), a total of 319 CIP-related courses were identified and listed. The first task for phase II was to determine if the courses on the list were relevant to one or more of the CIP Sectors. Next, the second task was to determine if the courses would accept

attendees from any member of the DoD CIP instructional user community. Finally, the task was to determine if there are other CIP-oriented courses that were not identified on the original list. At the completion of this review, 134 courses were deleted and 172 courses were added for an adjusted total of 357 courses. The 343 (96%) are functional courses aimed at agency practitioners performing duties in such fields as Anti-Terrorism/Force Protection and Information Assurance, or in response teams or response planning teams to mitigate and respond to incidents of terror. Four CIP Sectors are not represented by any Sector-specific courses: Financial Services, Personnel Services, Space, and Logistics. The remainder of the courses on the list addressed either CIP staff training or personnel assurance. The 357-course list in Appendix B is arranged by CIP Sector, beginning with the non-Sector specific courses (14/4%), then the DII & C3 (181/51%), Health Affairs (42/12%), ISR (6/2%), Public Works (91/25%), and Transportation (23/6%) Sectors. Name, sponsoring organization, course duration, and description of each course.

Project Objective Five: Conduct gap analysis between instructional task requirements, instructional needs, and available instructional programs. The methodology used to determine the findings for the gap analysis used a comparison between the tasks common between two or more of the major CIPIS member groups and the learning objectives of the eight CIP staff oriented courses. The survey team sought to find a match between task statement and one of the learning objectives. The team did not seek an exact text match. Instead, they conducted a key word search. Terms such as "identify assets," "infrastructure characterization," "risk assessment," and 16 others were used to find possible matches. Forty-two tasks were identified that matched the text comparisons of the course learning objectives. These tasks tended to be focused on the Analysis and Assessment phase, and some in the Remediation phase. Eighty-eight of the 130 common tasks were not identified during the comparison process. That means there is a 68% gap between the critical task list and the available instructional programs' learning objectives.

Project Objective Six: Develop an instructional program recommendation, report and brief. The findings suggested that there should be a more deliberate and comprehensive instructional strategy for Defense infrastructure assurance. The DoD CIP Plan calls for a "…CIAO Education Program, which may be modeled after or combined with the CIO Certificate Program." The survey team did not find evidence that that program was developed. While the concept of an executive education program remains valid, information gathered during this study indicates that a DoD educational concept should include two additional levels.

- Consideration should be given to instructional development that would incorporate the concepts of Defense Infrastructure Assurance as a part of Joint Professional Military Education (JPME). The future assignment of Military Department officers to Joint staffs in Commands or to DoD agencies, that are increasingly conducting physical and cyber assurance planning activities, can justify increased JPME instruction of DoD CIP requirements. The National Defense University should take the lead to determine JPME level that CIP concepts are taught, the tasks to be taught, and whether it should be added to the Joint Forces Staff College curriculum as a part of the deliberate and crisis action planning process.

- At the CIP action officer level, ASD/C3I CIP Directorate should begin the process of developing a comprehensive course of instruction that concentrates on the critical tasks that are common to the majority of the CIP instructional user community.

In summary, this study determined that there may be as many as 120 tasks that are common to two or more of the CIPIS member groups. Not all of the 120 critical common tasks may need to become course tasks because actual performance measures to accomplish shared tasks could be different for the Sector Lead agencies than for the Component asset/installation owners. The determination of the actual instructional tasks is performed during an instructional needs assessment, which was not a study objective.

The recommended concept is for an action officer-level program for both military and DoD civilians that has two components:

- The course should have as a foundation an overview of CIP as an integrated full spectrum assurance process, which emphasizes the goals, objectives, responsibilities, terminology, integrative processes, tools and end products. This portion of the course would be the "CIP 101" instruction identified by CIPIS survey participants.
- The course should emphasize the Analysis and Assessment portion of the CIP life cycle phases and the interdependency of this phase with the other life cycle phases. This second portion addresses the expressed interests of the respondents from the surveyed CIPIS community for "How to" instruction on preparing the DISAP and understanding the processes and tools for the Analysis and Assessment phase.

Table 7 (p.23) shows a possible list of 40 instructional tasks that could be used in the recommended program. The intent of this program is the establishment of DoD-wide instructional task standards for both CIP staff action officer instruction and job performance.

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Instructional Assessment and Gap Analysis -- Critical Infrastructure Protection Education Survey

This report documents the results of the phase II Critical Infrastructure Educational Survey conducted by the Education Technology and Training Division (ET&TD) of the Illinois Institute of Technology, Research Institute (IITRI) for the Director, Critical Infrastructure Protection, Office of the Assistant Secretary of Defense for C3I. Phase II of the survey is an assessment of the current instructional programs supporting Critical Infrastructure Protection (CIP) planning and coordination staffs. The survey sought to determine the common areas of staff emphasis among the staffs assigned to the CIP mission and whether there were suitable instructional programs available that addressed the common areas of staff emphasis. This study is not a needs assessment, which identifies and documents the gap between the desired and actual performance of staffs and individuals. Instead, this study attempted to document common performance tasks among DoD CIP staffs and compares those tasks with the stated instructional objectives cited in CIP-oriented courses to determine if the common areas of interest are currently taught. The three-phased project plan is at Appendix A.

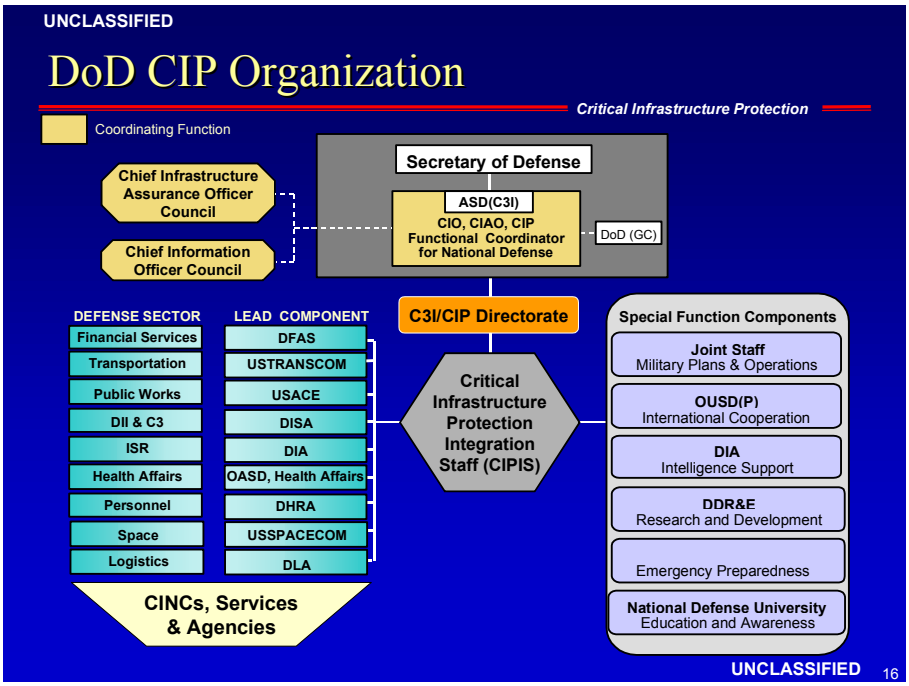
Background

CIP Program Description. The ASD/C3I CIP program developed from requirements established in Presidential Decision Directive 63 (PDD-63), which was issued in May 1998. PDD-63 was in response to the findings and recommendations of the President's Commission on Critical Infrastructure Protection (PCCIP). PDD-63 directed DoD to protect its portion of the Federal Government Critical Infrastructure. The DoD infrastructure was defined in the DoD plan as the defense-wide sectors that provide infrastructure services within DoD. There were eleven designated in 1998: Defense Financial Services; the Defense Information Infrastructure (DII); Defense Command, Control, and Communications (C3); Defense Logistics; Defense Transportation; Defense Space; Defense Personnel; Defense Health Affairs; Defense Public Works; Defense Intelligence, Surveillance and Reconnaissance; and Defense Emergency Preparedness. When appropriate the DoD CIP program would continue the work occurring under the DoD Antiterrorism Force Protection (AT/FP) Program and the Critical Asset Assurance Program (CAAP). The latter program was established under DoDD 5160.54, in January 1998.

The DoD Critical Infrastructure Protection Plan was published in November 1998. The Assistant Secretary of Defense (ASD/C3I) was appointed the DoD Chief Infrastructure Assurance Officer (CIAO) and the CIP Functional Coordinator for National Defense. Additionally, Lead Components for Defense Infrastructure Assurance were selected for each of the nine sectors (see Figure 1). Each Sector Lead Component appointed a Sector Chief Infrastructure Assurance Officer (CIAO), who, together with the DoD CIAO, the CIP Special Function Coordinators (i.e., Military Plans and Operations, Intelligence Support, International Cooperation, Research and Development, and Education and Awareness), and the Military Departments, formed the DoD CIAO Council. The DoD CIAO also established a CIP Integration Staff (CIPIS) to support coordination among DoD CIP agencies with

functions that contribute to CIP programs such as the Critical Asset Assurance Program (CAAP), Defense-wide Information Assurance Program (DIAP) and Infrastructure Assurance Program (IAP). The DoD CIP organizational structure is shown in Figure 1.

Figure 1 - DoD Critical Infrastructure Protection Organization
Source - OASD/C3I CIP Directorate briefing, dated 10 June 2002



CIP activities are those actions that identify, assess, and assure the critical cyber and physical assets essential to the mobilization, deployment, and sustainment of US military operations. DoD's CIP activities support the warfighting Joint Commands by:

- Providing operators with real-time situational awareness of critical infrastructure assets.
- Conducting modeling and simulation to reliably depict/predict the operational environment in sufficient time to change near-term events.
- Determining sources of and reduction of single points of failure.
- Ensuring that networks are fundamentally more dependable and trustworthy.
- Denying the potential enemy of any real operational advantage.
- Providing information that allows adjustments to operations in anticipation of infrastructure events.

The DoD CIP program requires planning for each of the six phases of the full life cycle of protection—Infrastructure Analysis and Assessment, Remediation, Indications and Warning, Mitigation, Response, and Reconstitution. From a program organization, DoD agencies with CIP responsibilities have different responsibilities within the CIP life cycle phases:

- ASD/CIP—overall policy oversight and program management

- CIP Integration Staff (CIPIS) -- coordinates policy and program implementation
- JPO-STC—technical lead agency for CIP-related tools, devices and procedures
- Combatant Commands—identification of critical infrastructure assets
- CIP Sector Lead Agencies—mapping of critical infrastructure assets and services
- Military Departments—planning/implementing remediation, mitigation, response and reconstitution requirements

Problem and Impact. Information obtained from members of the ASD/CIP staff and from the CIPIS membership indicates that the lack of any systematic instructional program for CIP staff planners continues to cause problems with:

- Shared understanding of CIP-related terminology.
- Shared knowledge of the availability and use of CIP-oriented tools and procedures.
- Shared understanding of the CIP planning process and outputs.

The stated lack of a shared basis about the inputs and outputs of the CIP planning and coordination process may have contributed to areas of uneven completion rates and thoroughness of CIP program planning and coordination. For example, after more than two years of planning and coordination, the ASD/CIP Directorate only has five of nine approved DISAPs from the Sector Lead agencies. High staff turnover rates particularly among the CIP military planners, who often leave the staff after one or two years, can complicate efforts to develop effective multi-agency coordination between CIP planning staffs. At this time, these identified problems are the perception expressed by current CIP staff members interviewed for this project. A more complete needs assessment should be conducted to document actual performance problems in both staff and individual performance of CIP-specific tasks, and to identify the exact causes for any detected.

Purpose. The assessment and gap analysis of the survey of existing programs, policies and directives will focus on determining common areas of task emphasis and available instruction that address the common emphasis. Six study objectives were established to analyze this mission:

1. Survey the DoD CIP community for available instructional programs and recommendations
2. Define the DoD CIP-oriented instructional user community.
3. Identify essential performance tasks required by the different groups within the community.
4. Analyze existing CIP-oriented instructional programs for re-use and availability.
5. Conduct a gap analysis between performance task requirements, instructional needs, and available instructional programs.
6. Develop an instructional program recommendation, report, and brief.

Scope. The analysis first sought to verify the course descriptions and data identified in the phase I inventory of relevant CIP information. Initial emphasis was needed to identify available course/lesson objectives relevant to one or more CIP sectors, document CIP - specific performance tasks, and determine gaps between CIP-specific performance tasks and course/lesson objectives associated with CIP-specified performance tasks. Emphasis was placed on those courses/lessons open to both DoD and other Federal Government employees.

Civilian commercial and institutional educational programs were included where information could be obtained. The CIPIS community was the primary resource for information gathering.

Limitations/Constraints. Low response rates to surveys, requests for interviews, and requests for information by the CIPIS community limited the number and variety of responses in determining problem definition, understanding the range of common interests, and developing a range of possible solutions. While most CIP sector-related course managers or points of contact readily provided general course descriptions and student requirements, most did not provide detailed course objective lists, lesson plans or other detailed course data. The time limit of ten weeks limited the number of contacts that could be made because obtaining satisfactory data from any given contact required multiple attempts.

Methodology

Approach. Several different investigative procedures were used for this study. The survey team reviewed documents, and used questionnaires, interviews, and email inquiries to develop its findings and recommendations. Emphasis was placed on contacting the staff principal or designated action officer from each of the CIPIS member agencies to respond to questionnaires, interviews, and emails inquiries. Based on the recommendation from the ASD/C3I CIP Directorate project officer, the survey team made site visits to Headquarters, Pacific Command, Joint Program Office for Special Technology Countermeasures, the National Defense University, and the Defense Security Service Academy to review current and planned CIP-oriented instruction and programs.

Document Review. The survey team reviewed all unclassified Government Furnished Information (GFI) related to the national and DoD CIP programs to determine program purpose, goals, objectives, organizational structure and agency roles and responsibilities. The team also reviewed available DISAPs on record at the ASD/C3I CIP Directorate's office. Finally, the team conducted a literature review to determine whether there are any published results of previous CIP instructional analyses or reviews of available CIP instruction.

The following GFI was either provided or recommended for the team to review:

- Presidential Decision Directive 56 - Managing Complex Contingency Operations (May 1997)
- Presidential Decision Directive 62 - Combating Terrorism (Fact Sheet) (May 1998)
- Presidential Decision Directive 63 - Critical Infrastructure Protection (May 1998)
- USC Title 10, Chapter 131, Section 2224 - Defense Information Assurance Program
- Department of Defense Directive 2000.12 - DoD Antiterrorism/Force Protection (April 1999)
- Department of Defense Directive 2000.14 - DoD Combating Terrorism Program Procedures (June 1994)
- Department of Defense Directive 2000.16 - DoD Antiterrorism Standards (June 2001)

- Department of Defense Directive 3020.26 - Continuity of Operations (COOP) Policy and Planning (May 1995)
- Department of Defense Directive 5200.1 - DoD Information Security Program (December 1996)
- Department of Defense Directive 5160.54 - Critical Asset Assurance Program (CAAP)
- Department of Defense Critical Infrastructure Protection Plan (November 1998)
- Department of Defense Directive 3020 (Draft) - Critical Infrastructure Protection Program (June 2002)
- Department of Defense Instruction 3020 (Draft) - Implementation of the Critical Infrastructure Protection Program (May 2002)
- Department of Defense Memorandum (OASD/C3I-CIP) - Planning Guidance to Assist in the Development of the Defense Infrastructure Sector Assurance Plan (Draft) (December 1998)
- Department of Defense Memorandum (OASD/C3I-CIP) - DoD Critical Infrastructure Protection Special Function (not dated)
- Department of Defense Memorandum (OASD/C3I-CIP) - A CINC Mission Assurance Critical Infrastructure Protection Demonstration Project: Work Plan (Draft) (January 2002)
- Department of Defense Memorandum (OASD/C3I-CIP) - Establishment of a Vulnerability Assessment Technical Working Group (June 2002)
- Chairman of the Joint Chiefs of Staff Instruction 3209.01 (June 2002)

These documents were reviewed to give the team an understanding of the CIP mission, responsibilities, and range of tasks of the various agencies responsible for the OSD CIP mission. The DoD CIP Plan, DoDD 5160.54, and the OSD memos regarding the planning guidance for the DISAP and the CIP special functions were the primary sources to determine the list of CIP staff performance tasks.

The next set of documents reviewed were the available CIP Sector DISAP documents on file at the ASD/C3I CIP Directorate office. These plans were reviewed for the purpose of determining Sector implementation of specific CIP performance tasks and the identification of Sector-specific performance tasks. Only the Sector Leads are required to develop DISAP documents. However, the coordination process between the Sector Leads with the Military Departments, Combatant Commands, Support organizations and Special Function agencies should be recorded in each DISAP and can indicate the extent and subject of coordination and common emphasis.

The last portion of the document review was a search of CIP-related literature from previous CIP educational or training investigations for information on methodologies, contradictory findings, and new information. Three principle sources were used. The first was the 83-item list of educational courses, Government documents, and CIP Web links contained in the phase I CD-ROM released as part of this project in May 2002. The second source was the ERIC (Educational Resources Information Center) Resources and Services system for access to primary and secondary literature and studies. The third source was the *Education Abstracts Information Encyclopedia* for author and subject information. These three data collection sources were intended to be used for identification of key terms (for electronic

search) and the identification of journal indexes to search for primary sources of CIP-related educational studies and research.

Questionnaires. The self-completed questionnaire is normally an excellent means for obtaining information regarding a wide range of study questions. In this case, the survey team desired to obtain information from the CIP Sector, Military Department, Combatant Command, Support, and Special Function CIPIS points of contact for these inquiry items:

- Identify and provide information on the educational programs that address CIP requirements and responsibilities.
- Identify and provide information on educational products (presentations, manuals, syllabi, class outlines, etc.) that address CIP requirements and responsibilities.
- Identify and provide information on Internet Web sites that are applicable to specific or general areas of CIP.
- Identify and provide information on studies, regulations, instructions and guidelines that have applicability to specific or general areas of CIP.
- Recommend educational programs and materials that are not available but are needed to fulfill your agency's need for CIP education or training.

All of these inquiries were open-ended and electronically sent to the participants to allow the respondents to "cut-and-paste" their response from internal documents or to provide sufficient descriptive detail to address the question. The use of open questioning normally requires more administrative activities to combine the multiple responses for comparison and analysis. In this case, that effort was necessary to obtain the details of the information tabulated to use in subsequent charts and tables describing instructional capabilities and needs. A total of twenty-six questionnaires were sent to the targeted CIPIS agencies in April-May 2002. Responses returned by the end of May were incorporated into the phase I report on educational programs, materials, documents, and CIP web links (published on CD-ROM). Responses received after May, as well as the earlier responses, were all used in this study.

Interviews. The intent of the interview process was to obtain facts, beliefs, or attitudes about the need for CIP-related instruction and the availability of appropriate instruction to meet CIP-related instructional requirements. The target audience consisted of CIPIS Sector Leads, CIPIS Military Department leads, and a sampling of the CIPIS Combatant Command, Support and Special Function Leads. The eighteen desired respondents were: JPO-STC, DSS, USA, USNIUSMC, USAF, USCG, DII&C3, Financial Services, Health Affairs, ISR, Logistics, Personnel, Public Works, Space, Transportation, PACOM, TRANSCOM, and NDU. Because of the time-consuming nature of interviews, both face-to-face and telephone interviews were conducted. Specific, open questions were used to obtain similar information from each respondent, while allowing the respondent to freely develop a response. The questions used were:

- What DoD directives, documents and memoranda best describe the roles, responsibilities and tasks for your CIP mission?
- What are the most critical tasks your agency must perform to accomplish your CIP mission?
- Did you review the CIP Education and Training Program CD-ROM provided to you at the May 2002 CIPIS meeting?

- What information should we add to the CD that you think is missing?
- Have you or any of your staff attended any of the CIP Staff instructional programs listed on the CD?
- What education or training programs do you think should be developed that would meet the mission requirements for your organization?

The timing of the interviews was during June-July 2002, after the release of the CIP Education and Training Program CD-ROM in May. In this way the survey team could obtain feedback on materials contained in its CD. Additionally, the survey team wanted to use interview questions to follow-up on selected questionnaire items, which were not consistently answered by respondents.

Email Inquiries. This method was use to obtain specific items of information to support the study. Specific questions of one or two items were asked of a particular respondent to obtain a direct response. This method was also used to verify the contents, instructional objectives (course or lesson terminal learning objectives), and administrative information about the course. One aim of the phase II portion of this project was to verify the course content of the courses listed in the phase I, Appendix B survey of educational programs, which were listed on the CD disk released in May 2002. Each POC on the May list of courses was contacted, and from those who responded specific course information was verified: course title, overall course program, sponsoring agency, course CIP Sector applicability, course duration, acceptable course attendee, course location, type of instruction, registration information, and actual course or program POC. This information was sorted and used to revise the original CIP Education and Training Program list. That revised list is found in Appendix B of this study.

Findings

Project Objective One: Survey DoD CIP community for instructional needs and recommendations. Questionnaires and interviews used by the survey team obtained facts, opinions and attitudes regarding the needs for CIP-oriented instruction, and recommendations regarding effective, available instruction that address some or all CIP instructional needs. The survey team also used a non-attribution policy in an effort to achieve a survey response rate of 50% or greater, i.e., no CIPIS agency was specifically identified with any response.

Questionnaire. In April, the survey team conducted an initial electronic mailing of a questionnaire to twenty-six CIPIS agencies. By mid-May seven agencies responded. In June, the team made another request to the non-responding agencies and received three more responses by mid-July for a total of ten of twenty-six responses (38%). Responses were more numerous from the support organizations (60%) and least so from the Combatant Commands. Surprisingly small were the responses from the Sector Lead agencies with only a 33% return even after several email and telephone requests. The response summary is in Table 1. The Special Function Agencies were not selected to participate by ASD/C3I CIP Directorate.

The questionnaire response did not achieve the desired 50% return. Reasons most cited for the low participation rate were grouped around preoccupation with other staff requirements and with the perception that an educational survey of CIP instructional requirements was premature. The low return rate based on "preoccupation" reasons is possibly due to the nature of the CIPIS organization, which is organized by directive from the DSD, cited as a requirement in the DPG and JV2020, but still requires agency cooperation to fulfill tasks.

Table 1 - Summary of CIP Educational Survey Questionnaire Participation

Recipient Groups	Questionnaires Sent	Questionnaire Responses
Support Organizations (JPO-STC, DIAP, NCS, DSS, DTRA)	4	3 (75%)
Military Departments (Army, Navy/USMC, USAF, USCG)	4	2 (50%)
Defense Sectors (NCR/DISA, DFAS, OASD/HS, DLA, DIA, DHRA, USACE, SPACECOM, TRANSCOM)	9	3 (33%)
Combatant Commands (CENTCOM, JFCOM, PACOM, EUCOM, SOUTHCOM, SOCOM, SPACECOM, STRATCOM, TRANSCOM)	9	2 (22%)
Special Function Agencies (Joint Staff, OUSD/P, DIA, DDR&R, NDU)	0	0
Total	26	10 (38%)

While the survey project was approved, funded, and announced by the ASD/C3I CIP Directorate in March, there was no letter or other document to the CIPIS membership specifically citing the requirement to support the project. Therefore, CIPIS membership participation was voluntary. Another often-stated reason for low participation is that the full understanding of the width and depth of the CIP mission analysis may not be fully known to all participating CIPIS members. Therefore, some responses indicate that the determination of CIP-specific instructional requirements may be premature. In a similar rationale, three responses of the ten received said that current emphasis on instruction for AT/FP, IA, and emergency response to WMD incidents meets most near-term CIP instructional requirements for remediation, I&W, mitigation, response, and reconstitution phases.

The summary of information received from the questionnaires is in Table 2. As an open question instrument, the survey team copied all of the responses to each question, then categorized the responses by the themes presented to minimize the loss of relevant information. The table lists the response categories in the middle column and the frequency of each response category in the right column. There are more responses for each category than the number of questionnaires completed (n=10) because respondents provided more

than one category of response to each question. Additionally, some respondents did not complete all of the questionnaires, which resulted in one to three "No response" replies to each question. Responses to questions #4 and #5 were combined in Table 4 because the two questions requested similar types of information. The responses to question #1 provided information regarding 28 courses appropriate for one or more CIP staff and sector or Military Department instruction. The information about these courses required some follow-up calls to confirm the data, but all of them were suitable for inclusion in both the project phase I informational CD-ROM and the phase II course list. Most of the information provided in response to questions #2 through #5 was used in both the phases I and II course information lists. The responses to question #6 indicated two areas of common instructional interest for the respondents. The first common interest is in gaining knowledge of the fundamental definitions, terminology, and functions of the CIP process ("CIP 101"). The second common interest is in the detailed and multifaceted requirements necessary to conduct a Defense Infrastructure Analysis and Assessment. During the remainder of the study, the survey team sought to determine if these latter two indications of common interest could be substantiated with other data.

Table 2 - Summary of CIP Educational Survey Questionnaire Response Data

Questions	Response Categories	Category Frequency
#1 - Identify and provide information on the educational programs that address CIP requirements and responsibilities	Sector oriented programs MilDep oriented programs CIP staff oriented programs Non-CIP oriented programs (e.g., AT/FP) No response	5 2 4 2 1
#2 - Identify and provide information on educational products (presentations, manuals, syllabi, class outlines, etc.) that address CIP requirements and responsibilities	Sector oriented products MilDep oriented products CIP staff oriented products Non-CIP oriented products (e.g., AT/FP) No response	4 1 4 2 3
#3 - Identify and provide information on Internet websites that have applicability to specific or general areas of CIP	Sector oriented websites MilDep oriented websites CIP staff oriented websites Non-CIP oriented websites (e.g., AT/FP) No response	3 1 4 1 3
#4 & 5 - Identify and provide information on studies, regulations, instructions and guidelines that have applicability to specific or general areas of CIP	Sector oriented info MilDep oriented info CIP staff oriented info Non-CIP oriented info (e.g., AT/FP) No response	3 1 2 2 3
# 6 - Recommend educational programs and materials that are not available but are needed to fulfill your agency's need for CIP education or training	"How to" do the DISAP process "How to" do A&A phase process "CIP 101" (a general CIP knowledge) Add CIP awareness to MilDep Schools No response	2 5 5 1 3

The survey team's use of the questionnaire may not be a strong predictor of the instrument's reliability because the actual responding sample size is only 27%. This small returned sample of the requested CIPIS members may be questionable for predicting the response of the

larger CIPIS membership. Further, the survey team noted that seven of the ten respondents to the questionnaire also were consistently present and active at those CIPIS meetings attended by various survey team members from April to June. Thus, the relative self-selectiveness of the participant sample may be a threat to external validity of the results for this instrument. This indicates that more testing must be done with a more random sample to attain greater reliability before any cost decision is made in developing new instructional programs.

Interviews. The second survey instrument used was a set of interviews in which the focus of the interview effort was on the CIPIS POCs belonging to the Sector Lead, Military Department, and a selection of support and Special Function agencies. These interviews were conducted in June and July. To accommodate each participant's schedule, the survey team used face-to-face, email or telephone interviews. The three forms of interviews all used the same five questions listed in the Methodology section to obtained the information regarding authenticating documents, knowledge of critical CIP staff tasks and opinions regarding the value of current CIP staff instruction. By this time in the survey process, the survey team desired opinions identifying critical agency tasks to perform specific CIP responsibilities. The survey team also desired to know the participant's opinions regarding the applicability of the available CIP staff courses. Tables 3 and 4 provide both the participation response data and the question response data.

Table 3 - Summary of CIP Educational Survey Interview Participation

Recipient Groups	Interviews Attempted	Interviews Attained
Support Organizations (JPO-STC, DIAP, NCS, DSS, DTRA)	4	3 (75%)
Military Departments (Army, Navy/USMC, USAF, USCG)	4	2 (50%)
Defense Sectors (NCR/DISA, DFAS, OASD/HS, DLA, DIA, DHRA, USACE, SPACECOM, TRANSCOM)	9	5 (55%)
Combatant Commands (CENTCOM, JFCOM, PACOM, EUCOM, SOUTHCOM, SOCOM, SPACECOM, STRATCOM, TRANSCOM)	2	1 (50%)
Special Function Agencies (Joint Staff, OUSD/P, DIA, DDR&R, NDU)	1	1 (100%)
Total	20	12 (60%)

The response to the interview questions did not achieve a desired 75% response rate. The response rate was set higher than for the questionnaires based on the assumption that the receipt of the project's phase I educational information CD-ROM would increase CIPIS membership interest in the project. Regardless, the process to obtain the interview still required the cooperation of the participants in order to obtain a reliable response. If after three contacts by email or voicemail, the participant still did not agree to be interviewed, no further effort was made. Consequently, 12 of 20 (60%) participants agreed to be interviewed - four in person, five by email and three by telephone. The rationale for low participation was assumed to be similar as those given for the questionnaire. In all but two cases, the respondents to the questionnaire also agreed to respond to the interviews.

At the time that the questions for the interviews were developed, the survey team desired to have feedback comments from the CIPIS membership regarding the information contained in the phase I CD-ROM. All of the agencies present at the May 2002 CIPIS meeting received a copy. Twenty copies were distributed. There was no requirement to distribute copies to those members not present because the phase I information CD-ROM is an interim measure until the completion of the phase III educational CD-ROM. Therefore, the selection of interview participants was limited to those CIPIS members receiving the phase I CD-ROM. Other interview objectives were to obtain information regarding the identification of authoritative CIP document lists of critical CIP performance tasks, and to conduct a reliability test of the same question #6 used in the questionnaire. The responses to the interview are summarized in Table 4.

The response to question #1 indicates that DoD 5160.54 and the DoD CIP Plan are the most cited authoritative source for CIP staff requirements. However, not all respondents considered the DoD CIP plan with the same authority as the DoD directive. Several participants questioned the delay that ASD/C3I CIP Directorate has taken to update the CIP plan or convert it into a DoDD or DoDI. Two agency respondents stated that DoD 5160.54 and the DoD CIP Plan are too outdated to be effectively used. Four Sector respondents stated that they considered their own DISAP as the most authoritative document for determining responsibilities and tasks. Only one respondent cited the various drafts of Directives, Instructions, memoranda, and presentations done by ASD/C3I CIP Directorate as authoritative sources for responsibilities and tasks. While the respondents thought the CIP Directorate's documents to be of value, they did not state that the documents attained the authority of an approved DoDD or DoDI. The same response pattern was exhibited for question #2. Most respondents selected DoD 5160.54 and the DoD CIP Plan as the authoritative sources for Sector missions and responsibilities. Military Department respondents were less accepting of the DoD CIP Plan because of perceived confusion of assurance responsibilities between the Sectors and the Military Departments in the CIP Plan. Questions #3 through #5 indicate that few respondents have spent time reviewing the phase I CD-ROM. The reasons stated ranged from "too busy" to "not needing it." A more positive reaction came from several DoD and other Federal education and training departments who were sent copies and stated their appreciation for the information and data on the disk as reference materials and possible school enrollment information for their agency staff members. Finally, the intent of question #6 was to test the reliability of the responses to the same question on the questionnaire. Approximately the same percentage of responses stated

the need for more "How to" CIP process courses. The "no response" replies came from respondents that did not see CIP instruction as either a cause for or against performance improvement.

Table 4 - Summary of CIP Educational Survey Interview Response Data

Questions	Response Categories	Category Frequency
#1 - What DoD directives, documents and memorandums best describe the roles, responsibilities and tasks for your CIP mission?	DoDD 5160.54 DoD CIP Plan ASD/C3I CIP policies, memos, briefings Sector DISAP Other	5 4 1 4 1
#2 - What are your most critical tasks your agency must perform to accomplish your CIP mission?	Tasks derived from DoDD 5160.54 Tasks derived from DoDD 5160.54 & DoD CIP Plan Sector DISAP No response	3 6 4 2
#3 - Did you review the CIP Education and Training Program CD-ROM provided to you at the May 2002 CIPIS meeting?	No Yes	8 4
#4 - What information should we add to the CD that you think is missing?	Do not need to add anything Need to add CIP staff training course Need to add omitted documents Need to correct selected information No opinion - did not review	1 1 1 1 8
#5 - Have you or any of your staff attended any of the CIP Staff instruction programs listed on the CD?	No Yes, JPO-STC programs Yes - MilDep equivalent programs Yes - AT/FP, IA, emergency response programs	6 3 1 3
#6 - What education or training programs do you think should be developed that would meet the mission requirements for your organization?	“How to” do the DISAP process “How to” do A&A phase process “CIP 101” (a general CIP knowledge) Risk Assessment, COOP, or other management No response	3 3 4 2 4

In summary, low participation rates and the receipt of uneven data regarding participants' interest in specifically identifying instructional objectives weakens the validity of a strong recommendation for any specific program of instruction. However, the data received from the survey process provided important information from the respondents about what was valuable to them in terms of existing courses, informational sources, and preferences for the direction of additional instructional programs. Sixty-nine percent of the responses received indicated three possible categories of instructional interest: preparation of Sector DISAPs, "How to..." conduct the Analysis and Assessment process, and CIP familiarization ("CIP 101"). Responses for other programs (1%) and the non-responses (22%) account for the other significant reply categories. Those majority categories of interest will be tested using the task analysis method in the Project Objective Four portion of this study. Additional data received also indicates that both DoDD 5160.54 and the DoD CIP Plan serve as the current best source of task information, but responses indicated that both are in need of revision.

Project Objective Two: Define the DoD CIP-oriented instructional user community. Table 5 provides information regarding possible DoD user communities for CIP-oriented courses. Areas of common instructional interest between two or more communities are italicized. Beyond the DoD community, the membership of the National Structure for CIP would also be another user of CIP-oriented courses. With the focus of this study on the DoD community, the survey team did not survey the National CIP membership. However, member organizations such as Departments of Energy, Justice, and Transportation, plus FEMA, NCS, EPA, and FBI have developed several courses that have significant CIP content (see Appendix B). Other significant non-DoD components are the civilian universities associated with the National INFOSEC Education and Training program. At the time of the survey, the participating university curricula numbered 36 "Centers of Academic Excellence in Information Assurance Education" including four DoD institutions: the Air Force Institute of Technology, Naval Postgraduate School, IRM College of NDU, and the US Military Academy. Courses from 19 participating universities are included in Appendix B.

The survey team developed the information in Table 5 based on their analysis of the DoD CIP Plan, DoDD 5160.54, CJCS 3209.01, and from participants' replies to the questionnaire and interview. The information statements within the "Areas of Instructional Interest" column are paraphrased statements from the DoD CIP Plan and DoDD 2000.12, 2000.16, and 5160.54. They indicate possible areas for instructional activity or for instructional development if no current instruction is available. Instructional interest for the OSD CIP Directorate would be in the development of courses that further the knowledge and skills for both CIP executive management and the staff personnel of the multiple DoD CIP agencies and organizations. Additionally, the CIP Directorate would be interested in CIP awareness activities that educate both the DoD and larger Federal community regarding DoD CIP goals and objectives to foster support and participation, as applicable. The table also shows the shared interests of the Sector Leads and the Heads of Components for range of activities associated with the CIP life cycle phases. Another area of indicated shared interest is the sponsorship and coordination of training by the CIPIS support and Special Function groups of agencies. These observations are only general indications of possible areas of instructional commonality between groups of CIPIS members. A more thorough task analysis will give more detail about the actual commonly shared tasks.

There are also specific assurance requirements that may seem to differentiate CIP interests. As significant asset and installation owners, the Military Departments has instructional requirements for their staffs to plan for the remediation, mitigation, response, and reconstitution portions of the CIP life cycle. These requirements may seem more acute than for the Sector Lead staffs because of the issues of direct ownership responsibility. Therefore, the Military Departments and the other Components Heads have developed within their own resources instructional programs to support their asset and installation requirements for Anti-Terrorism/Force Protection (AT/FP), physical security, personnel security, emergency crisis response, and Information Assurance (IA). Separate DoD Directives and Military Department regulations guide these latter instructional requirements. As noted earlier, more than 300 courses listed in Appendix B address the AT/FP, emergency crisis response, and IA instructional requirements, 47 of which are provided by the Military Departments. This apparent separate Component area of interest may itself be an important aspect of CIP

Table 5 - DoD CIP-Oriented Instructional User Community

DoD Instructional User Community	Primary CIP Responsibilities (DoD CIP Plan, Nov 98)	Areas of Instructional Interest
ASD(C3I) CIP Directorate	Responsible for CIP policy and executive direction, ensure all DoD CIP needs are identified and satisfied, advocate and support CIP funding and ensure DoD General Counsel review of CIP matters	- Development and implementation of a CIP education and awareness program - Development of education and/or training for CIP crisis management personnel - *CIP executive leadership development*
Lead Components for Defense Infrastructure Sector Assurance Coordination (DFAS, TRANSCOM, USACE, DISA, DIA, OASD(HA), DLA, DHRA,SPACECOM)	Identify sector's critical assets (both NDI and INDI), identify sector infrastructure characterization, coordinate with DoD Components to implement Sector Assurance Plans, and cooperate with JTF-CND and CIPIS for infrastructure protection and integration activities	- *Train for Sector infrastructure characterization, vulnerability assessment and asset identification* - *Develop, train for and exercise Sector level remediation, indications & warning, mitigation and emergency response activities* - *CIP executive leadership development*
Heads of Components and DoD critical asset and installation owners (Military Departments, DoD Field and Defense Agencies)	Assure the availability, integrity, survivability and adequacy of critical assets IAW DoDD 5160.54 and the DIAP, and cooperate with DoD Sector CIAO, Combatant Commanders, and Special Function Coordinators in planning, coordination and execution of assurance activities	- *Train for asset infrastructure characterization, vulnerability assessment and asset identification* - *Develop, train for and exercise asset/installation level CIP mitigation and emergency response activities* - *Train AT/FP staff and individuals in field and staff training to exercise plans, measures, and management* - Develop and implement initial and sustaining Information Security Program education and training activities
Joint Staff and Combatant Commanders	Establish CIP program to meet NMS and DoD CIP policy requirements; coordinate with supporting/supported commanders, Military Departments, and DoD Agencies; and, ensure CIP efforts support command warfighting capabilities to execute war plans	- *Train for asset infrastructure characterization, vulnerability assessment and asset identification* - *Develop, train for and exercise asset/installation level CIP mitigation and emergency response activities* - *Train AT/FP staff and individuals in field and staff training to exercise plans, measures, and management*
Lead Components for Coordination of DoD Special Functions (Joint Staff, OUSD/P, DIA, ODDR&E, NDU)	Coordinate with Military Departments, Combatant Commands, and DoD CIP agencies to identify operational requirements and interdependencies, improve infrastructure assurance and emergency planning	- Sponsor joint planning, training and exercise of the coordination and interface of CIP mitigation and emergency response activities at all levels - asset, installation and infrastructure sector - Sponsor and coordinate training programs for deliberate and crisis action planning process, use of CIP related tools and models for analysis and assessment - Sponsor training programs for Defense infrastructure intelligence monitoring and reporting activities (intelligence & warning)
Lead Components for support to DoD CIP Integration Staff - CIPIS (DSS, JPO-STC, DIAP, NCS, DTRA)	(as a CIPIS member) Assist the Sector Leads and Components in the development of Sector Assurance Plans and the Special Function Coordinators in the development of annual CIP support plans	- Sponsor and coordinate training programs for deliberate and crisis action planning process, use of CIP related tools and models for analysis and assessment - Sponsor training for asset infrastructure characterization, vulnerability assessment and asset identification

instructional interest to aid in the understanding of the interrelationship between Sector assurance planning and the requirements for Combatant Command and Military Department

asset/installation owner assurance planning.

Based on the available survey responses from the DoD CIPIS Special Functions and Support agencies, combined with statements of responsibility, their areas of instructional interest seem to be in the sponsorship of instructional programs. As functional agencies that develop data, information, tools, methodologies, models, and procedures in support of CIP and multiple other DoD programs, they do offer some of the most relevant instructional courses and products. Together, they sponsor 80 courses in Appendix B. Some of these agencies (DSSA, JPO-TPC, NDU, DTRA and DISA) should be considered as sponsors in the possible development of additional CIP-specific instruction because of their expertise.

Project Objective Three: Identify key performance tasks required by the different groups within the community. The primary sources for the development of the performance task list were the following four documents:

- Department of Defense Directive 5160.54 - Critical Asset Assurance Program (January 1998)
- Department of Defense Critical Infrastructure Protection Plan (November 1998)
- Department of Defense Memorandum (OASD/C3I-CIP) - Planning Guidance to Assist in the Development of the Defense Infrastructure Sector Assurance Plan (Draft) (December 1998)
- Department of Defense Memorandum (OASD/C3I-CIP) - DoD Critical Infrastructure Protection Special Function (not dated)
- Chairman of the Joint Chiefs of Staff Instruction 3209.01 (June 2002)

Another source of information were the CIP Sector DISAP documents made available to the survey team from the Defense Information Infrastructure & Command, Control and Communications (DII & C3), Financial Service, Public Works, and Transportation sectors. The Intelligence/Surveillance/Reconnaissance (ISR) DISAP was classified and not provided to the team. No other Defense Sector DISAP was available for review from the ASD/C3I CIP Directorate. A review of these documents found a total of 152 statements of the DoD CIP responsibilities assigned among the twelve agencies or group of agencies identified in either the DoD CIP Plan or DoDD 5160.54:

- ASD/C3I CIP Directorate
- Lead Components for Defense Infrastructure Sector Assurance Coordination
- Heads of Components and DoD Critical Asset and Installation Owners
- Director, Defense Security Service
- Director, Defense Information Systems Agency
- Joint Staff for Military Operations and Plans
- OUSD (P) for International Cooperation
- DIA for Intelligence Support
- Director, DR&E
- National Defense University

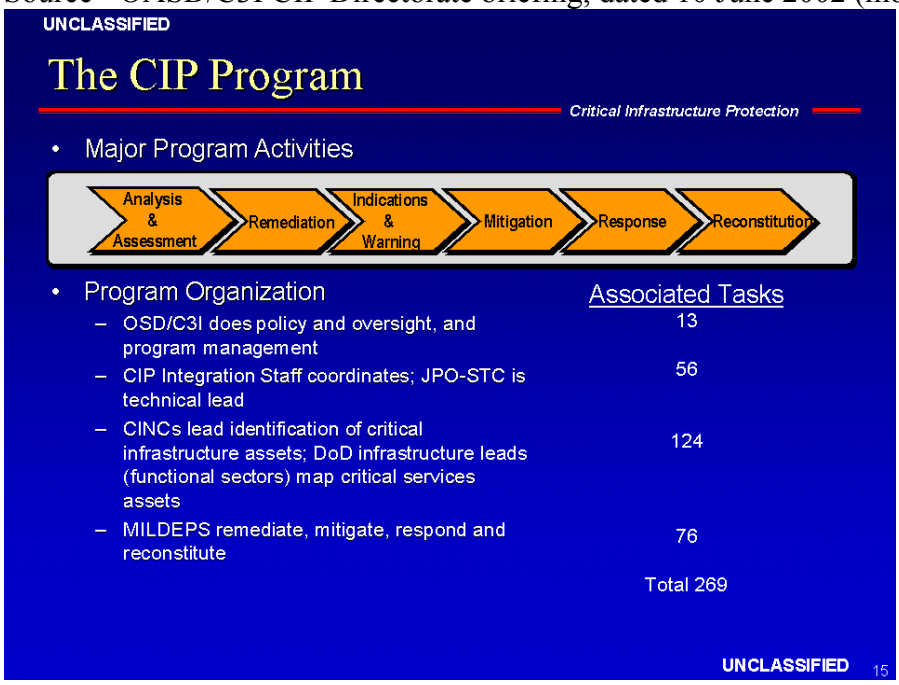
The DoD directives and plans provided the majority of the statements of responsibilities. These statements, often written in compound sentences, with two or more action verbs, could not be used as performance tasks for an instructional analysis. Therefore, the statements of responsibility had to be converted to task statements as defined in DoD handbook MIL-HDBK-29612-4, Glossary for Training. This is the fourth volume of a five-volume set of DoD handbooks that provide guidance in the acquisition and preparation of instructional materials. This source defines a task as "...a single unit of specific work behavior with a clear beginning and ending points that are directly observable or otherwise measurable. A task is performed for its own sake, that is, it is not dependent upon other tasks, although it may fall in a sequence with other tasks." Using this definition, the survey team analyzed the 162 responsibility statements and developed 269 tasks in accordance with guidance from the DoD training handbook. Not all of the statements of responsibility could be converted into one or more tasks. A total of eight did not meet one or more of the criteria to be converted into a task without requiring the survey team to develop assumptions about the missing task criteria. The survey team was helped in its expansion of the original statements of responsibility into tasks by their analysis of the available Defense Sector DISAP documents. In these documents, the Sector Lead agencies developed task lists for each of the CIP life cycle phases. While the lists were often specific to the particular sector, similarities could be determined in all the lists that allowed for the development of more generic task statements associated with each of the statements of responsibility. The team also converted most of the compound sentence structure of the statements of responsibility into two or more tasks, led by an action verb from the Standard Verb List of the DoD handbook.

As explained in the introduction of this survey, this task analysis process is not the same as the task analysis process that is a part of an instructional needs assessment. A task analysis based on instructional needs assessment is derived from a survey of all the tasks performed at the job site and a series of organizational, team or individual performance measurements. This requires actual data collection of all CIP staff work sites to determine both the collective and individual tasks performed and measurement of performance outcomes. That process was not specified in this project task and is beyond the scope of this survey. Instead, the survey team was tasked to determine if current CIP staff-related instruction is directed to the organizational responsibilities of the various agencies responsible for the CIP assurance process and where there may be some commonalties. This requires a less detailed approach in task determination and analysis.

The responsibilities and tasks table at Appendix C associates groups of specified CIP responsibilities and performance tasks for each member of the DoD CIP community of instructional users. The user community is defined at the head of the columns of the Appendix C table. As listed above, these users are primarily from the CIPIS member agencies and identified in the listed documents above. Many of the tasks (73%) are associated with the agencies that are the Lead Components for Defense Infrastructure Sector Assurance Coordination, the Heads of Components and DoD Critical Asset and Installation Owners, or the Joint Staff and the Combatant Commands. These three groups comprise the majority of the CIPIS membership and consist mainly of the Sector Lead agencies, the Military Departments, and the Combatant Commands. Two of these Joint commands, SPACECOM and TRANSCOM, are also sector leads. Most of the tasks for these groups are

associated with their responsibilities to coordinate or perform the processes of the six CIP life cycle phases. The other agencies listed in the appendix generally support this process with program funding, products, tools, data, and staff information/coordination support. Figure 2 illustrates the relationships among the various DoD CIP Instructional user communities and the number of CIP tasks associated with each group.

Figure 2 - CIP Program Organization
Source - OASD/C3I CIP Directorate briefing, dated 10 June 2002 (modified by author)



The findings of the questionnaire and interview process indicated that the primary interest for CIP staff training came from the same two groups with the greatest number of task requirements. These groups are the Lead Components for Defense Infrastructure Sector Assurance Coordination, Combatant Commanders and the Heads of Components and DoD Critical Asset and Installation Owners. The tasks associated with these three groups totaled 200 of the 269 identified tasks (74%). The Survey team also did an analysis of all of the tasks to determine which tasks appeared common to two or more CIPIS groups. Those tasks, totaling 130 (48%), are identified by an "X" in the third column of the table in Appendix C. Because the individual groups represent five or more different agencies, the italicized tasks represents highly critical tasks for DoD- supported instructional emphasis. This list becomes the main primary list of tasks considered in the gap analysis between what should be trained and what instructional programs address these tasks. This analysis will be made in a later section.

Project Objective Four: Analyze existing CIP-oriented instructional programs for reuse and availability. This phase of the project started with the information gathered during phase I, Critical Infrastructure Education Survey, dated 13 May 2002. The phase I report was

placed on a CD and distributed at the May 2002 CIPIS meeting. In Appendix B (Existing Courses), a total of 319 CIP-related courses were identified and listed. This course list categorized the courses in the same category as identified by the course sponsor. A total of seven categories were used: Anti-Terrorism (AT), Crisis Management (CM), Information Assurance (IA), Physical Security (PS), Utilities (UT), Weapons of Mass Destruction (WMD), and CIP Overview (CO). The latter category included courses that appeared to contain programs that taught the CIP process and guide staff actions.

The first task for phase II was to determine if the courses on the list were relevant to one or more of the CIP Sectors. The second task was to determine if the courses would accept attendees from any member of the DoD CIP instructional used community. Finally, the task was to determine if there are other CIP-oriented courses that were not identified on the original list.

The original list of 319 courses was initially divided into ten CIP Sector categories by matching the course description with the initial ten Sector descriptions found in the DoD CIP Plan (dated 18 Nov1998). Subsequent to this first categorization, the list had to be adjusted when courses identified as Personnel Security were removed from the Personnel Services category and courses identified as Emergency Preparedness were recategorized. Most of the Personnel Security courses were deleted because of limited admissions policies. Four were retained within the Cross Sector category. OSD (CIP) Directorate did not retain the Emergency Preparedness Sector and most of the courses attributed to that deleted Sector were found to be applicable to the Public Works, Health Affairs or Transportation Sectors. Each POC on the original list was contacted to verify the course description, course learning objectives, and course administrative information (location, admissions, instruction methods/media, duration and admissions). A total of 86 course contacts were made to obtain the desired information. Based on these contacts, a total of 38 courses were deleted because of restricted admissions or lack of CIP Sector relevance. Courses determined to have restricted admissions were those that restricted enrollment to only agency members. If the course was open to all Military, DoD and other Federal service employees and could address one or more of the CIP life cycle phases, the course was added to the list. A summary of the course data information is at Table 6 and in Appendix B of this report.

Table 6 - Summary of CIP Sector-Oriented Course Identification Changes

CIP Sector	Phase I List	Adjusted	Deleted (Not Avail)	Added	Phase II List
Financial Services	0				0
Transportation	13		4	14	23
Public Works	44		II	58	91
DII & C3	124		16	73	181
ISR	9		3		6
Health Affairs	31		4	15	42
Personnel Services	38	-38			0
Space	0				0
Logistics	0				0
Emergency Preparedness	58	-58		0	0
Cross Sector	2			12	14
Total	319	-96	38	172	357

Additional courses were added to the list from several sources. First, course managers identified other courses within their organization or in other organizations. Second, several CIPIS points of contact made recommendations regarding relevant CIP courses to their Sector or military Service. Finally, further research by the survey team identified additional courses from higher educational institutions primarily within the DII & C3 Sector. In all cases, the search for course information and applicability was limited to unclassified instructional programs. This was a limitation of the project search and the DoD program manager, to ensure that the information developed from the project is available to the widest possible audience.

The information obtained about the course data leads to several observations:

- The majority of the identified courses (approximately 340 of 357) were functional courses aimed at agency practitioners performing duties in such fields as Anti-Terrorism/Force Protection, Information Assurance, or in response teams or response planning teams to mitigate and respond to incidents of terror (physical or cyber). These are courses that would be offered in support of other programs but can be dual-used for CIP staff members in agencies responsible for plans and operations in one or more of the CIP life cycle phases. Fourteen courses could be identified as focusing on the entire DoD CIP-oriented community, particularly those staff members of the CIPIS community responsible for staff planning and operations across the entire range of CIP life cycle phases. This conclusion will be discussed further during the gap analysis.
- Four CIP Sectors were not represented by any Sector-specific courses - Financial Services, Personnel Services, Space, and Logistics. The survey team found that while there are numerous courses regarding Sector-specific skills, knowledge, and abilities to perform the functions within the Sector, there were no courses found that addressed unique CIP tasks or responsibilities. Feedback from those Sector representatives, who responded to the questionnaire and requests for interviews, stated in their opinion that threats to their Sector were common to all Sectors, that is threats to physical and cyber infrastructure. Therefore, instructional programs related to physical security, information assurance, and performance of their CIP tasks and responsibilities are in common interest to all of the Sector Lead agencies.
- No identified instructional program or set of programs attempted to address the full spectrum of CIP staff tasks, responsibilities, and operations. The programs found so far provide familiarization with the CIP concept or focus on one or more activities within one or two of the CIP life cycle phases. The JPO-STC programs (current and projected) address the Analysis and Assessment phase in some depth, but it is the only program that could be found to do so. The findings in gap analysis address this conclusion with more detail.

The 357-course list in Appendix B is arranged by CIP Sector, beginning with the non-Sector specific courses (14/4%), then the DII & C3 (181/51%), Health Affairs (42/12%), ISR (6/2%), Public Works (91/25%), and Transportation (23/6%) Sectors. Name, sponsoring organization, and course duration and description identify each course. Courses that are part of a specific program of instruction are grouped together in the same table row. Course or program administrative information, such as course location, attendee description,

instructional methods/media, registration information, and course POC was deleted from Appendix B. This information will be included in a separate release of a comprehensive CIP informational CD-ROM at the August CIPIS meeting for CIPIS member review and comment. The courses identified as "CIP Staff Training" in Appendix B were further reviewed to determine their direct applicability to the CIP staff training purpose. The survey team contacted each of the course managers to request the course learning objectives and information regarding course goal and desired participant. Of the ten courses identified as "CIP Staff Training" only eight were fully developed. The survey team obtained the learning objectives for these eight courses and summarized the objectives and course descriptions in Appendix D. One of the courses, Consequence Management Exercises and Gaming (NDU's National Strategic Gaming Center) is not a course at all. Rather, it is a staff exercise that facilitates staff and leader course of action analysis and the simulated execution of remediation, mitigation and response plans. All of the other courses on the list address a range of methods, procedures and tools for asset identification, risk and vulnerability analysis, asset characterization, remediation, mitigation or response strategies, and other CIP-related planning activities.

Project Objective Five: Conduct gap analysis between instructional task requirements, instructional needs, and available instructional programs. The methodology used to determine the findings for the gap analysis used a comparison of the tasks common between two or more of the major CIPIS member groups with the learning objectives of the eight CIP-staff oriented courses. The 130 tasks common to several agencies are those marked by an "X" in the third column in Appendix C. There are 3 ASD/C3I CIP Directorate tasks common to other groups, 58 Sector Lead tasks common to other groups, 58 Heads of Component tasks common to other groups, 5 Combatant Command tasks common to other groups, and only one Special Function agency (Joint Staff) task common to other groups. The greatest commonality was between the Sector Lead and the Heads of Components. Fifty-four tasks were directly common to both groups. That number represents 66% of the total Sector Lead group tasks and 69% of the Head of Component tasks. The 54 commonly shared tasks are divided between the tasks associated with one of the six phases of the CIP life cycle. Therefore, what the two predominate groups share in common is their planning, coordination, monitoring, reporting and activities to implement the CIP process. The tasks that are unique to the two groups are the sector-specific DISAP preparation and coordination tasks and the installation-specific assurance tasks.

The next step in the gap analysis process was to compare the identified common tasks with the lists of learning objectives for the eight identified CIP staff courses. The survey team sought to find a match between task statement and one of the learning objectives. The team did not seek an exact text match. Instead, they conducted a key word search. Terms such as "identify assets," "infrastructure characterization," "risk assessment," and 16 others were use to find possible matches. Forty-two tasks were identified that matched the text comparisons of the course learning objectives. These tasks tended to be focused on the Analysis and Assessment phase, and some in the Remediation phase. Eighty-eight of the 130 common tasks were not identified during the comparison process. That means there is a 68% gap between the critical task list and the available instructional programs' learning objectives. The significant gaps are in the tasks associated with the Indications & Warning, Mitigation,

Response and Reconstitution phases of the CIP staff process. The exception is the National Strategic Gaming Center's objectives, which seem to address the activities in coordination of the Remediation CIP phase. The two courses that address the most tasks are those offered by the Joint Programs Office (JPO-STC), which cover most of the Analysis and Assessment phase.

These findings do not mean that there are no other courses that also may address the 130 common tasks. It just means that they were not identified to the survey team. Additionally, several agencies such as JPO-STC, NDU, DSSA, and Booz, Allen & Hamilton have indicated that they have programs in development that will address additional aspects of the CIP life cycle process. Two are listed in Appendix B but were not included in the Appendix D analysis because their learning objectives were not ready for release. There are several sources of error that can challenge the validity of the findings. First, the task list is not an established list recommended by OSD CIP Directorate or any of the CIPIS members. It was an analysis tool based on the survey team's review of the DoD documents citing agency and component roles and responsibilities. CIPIS member review and comments on this task list from 24 August to 9 September 2002 helped to refine the task and learning objective comparison process. Next, the course learning objective lists are primarily course objectives and not the lesson terminal learning objectives, which provide the details of the lesson-level of instruction. Only NDU, JPO-STC, and DSSA provided lesson-level learning objectives. That means the other course objectives may be too general to determine exact task match. The survey team recommends that the identified CIP staff training course designers review these findings and the other documents of this study and refine the task/learning objective comparison and send their comments to the OSD CIP Directorate's project officer. Their knowledge of their course contents can better determine appropriate task comparisons.

Project Objective Six: Develop an instructional program recommendation, report and brief. Based on the findings, the current instructional emphasis for critical infrastructure assurance appears to be concentrated in the functional programs that have a heavy emphasis in information assurance and protection of public works, including facilities and personnel. Other programs address health affairs, transportation, and intelligence functions. The smaller numbers of intelligence courses are due to the classified nature of the course materials, which were not released for this study. While there appear to be instructional gaps within the Space, Personnel, Finance, and Logistic Sectors, responding survey participants from these CIPIS Sectors stated that courses for physical and cyber assurance apply equally to them, therefore, requiring no additional specialized course. For those courses that apply to CIP staff training, the number of courses are limited in number and in scope. The eight identified courses are primarily focused on the processes and tools for asset identification, characterization, interdependency, and vulnerability assessment. Some of the courses provide broad overviews of the entire CIP staff process, but the available learning objectives do not indicate much depth of instruction toward those tasks concerned with most of the CIP life cycle process. With the exception of the course offered by the Naval Postgraduate School, most of the courses are two to three days long. The large number of tasks identified as essential, because of their importance to the entire CIP process and their commonality between many members of the CIP instructional user community, would indicate the need for a more substantial instructional effort.

Findings suggested that there should be a more deliberate and comprehensive instructional strategy for Defense infrastructure assurance. The DoD CIP Plan calls for a "…CIAO Education Program, which may be modeled after or combined with the CIO Certificate Program." The survey team did not find evidence that that program was developed. While the concept of an executive education program remains valid, information gathered during this study indicates that a DoD educational concept should include additional levels.

Next level after an executive level program should be instructional development that would incorporate the concepts of Defense infrastructure assurance as a part of Joint Professional Military Education (JPME) at both the Military Department's professional development schools and within NDU's Joint professional education schools. The future assignment of Military Department officers to Joint staffs in Combatant Commands or to DoD agencies, which are increasingly conducting physical and cyber assurance planning activities as part of Theater Sector Assurance Plans (TSAP) or Defense Sector Assurance Plans (DISAP) can justify increased JPME instruction. The National Defense University would take the lead to determine the JPME level where CIP concepts should be taught, the tasks to be taught, and whether it should be added to the Joint Forces Staff College curriculum as a part of the deliberate and crisis action planning process. The multiple requests from the Joint Commands to JPO-STC for their *CIP Support for Appendix 16 Development* course signals a new and likely sustained interest for Joint staff officers trained and knowledgeable in National and DoD CIP strategy, organization, roles and responsibilities.

At the CIP action officer level, ASD/C3I CIP Directorate should begin the process of developing a comprehensive course of instruction that concentrates on the critical tasks that are common to the majority of the CIP instructional user community. This study determined that there may be as many as 130 tasks that are common to two or more of the CIPIS member groups. The majority of the common tasks are the 108 tasks that are identically shared (54 each) by Sector lead agencies and the Component asset/installation owners. Most of these 108 tasks are those that specify staff activities across the six phases of the CIP life cycle. That suggests that any comprehensive CIP instructional program should consider incorporating these shared tasks. While there currently are instructional programs that do address some of these critical tasks, these courses only appear to address about 32% of them. Additionally, only the JPO-STC courses were designed to accomplish specific CIP tasks. The remainder appears to be locally initiated for internal requirements and are not a part of a DoD coordinated activity. Should the DoD CIP program address all 108 critical common tasks? This may not be necessary because the actual performance measures to accomplish the respective shared tasks could be different for the staffs of the Sector Lead agencies, the Component asset/installation owners or the Combatant Commands. Additionally, this study did not determine the performance measures for each task because that is an activity more accurately performed during an instructional needs assessment. As stated before, this study was not a needs assessment. Instead, this recommendation is only a concept for an instructional program based on the information developed by the study. The concept is for an action officer-level program for both military and DoD civilians that has two components:

- First, the course should have as a foundation an overview of CIP as an integrated full-spectrum assurance process, which emphasizes the goals, objectives, responsibilities,

terminology, integrative processes, tools, and end products. This portion of the course would be the "CIP 101" instruction identified by CIPIS survey participants.

- Second, the course should emphasize the Analysis and Assessment portion of the six CIP life cycle phases and the interdependency of this phase with the other life cycle phases. This second portion would address the expressed interests of the respondents from the surveyed CIPIS community for "How to" instruction on preparing the DISAP and understanding the processes and tools for the Analysis and Assessment phase and how that process is linked to the other five phases. Table 7 shows a possible list of 40 instructional tasks that could be used in the recommended program.

Table 7 - Possible Learning Tasks for a DoD-Sponsored CIP Course of Instruction

CIP Program Overview
Describe the recommendation of the President's Commission on Critical Infrastructure Protection panel and the resulting PDD-63 and DoD CIP Plan.
Describe the role of critical infrastructure as a component of national and economic security.
Determine the nature of Defense infrastructure, their vulnerabilities, and assess on-going activities to improve the assurance of the information infrastructure.
Contrast the similarities and differences between the National and DoD CIP organizational structure and responsibilities.
Summarize the roles and responsibilities of the offices established to support Defense infrastructure assurance planning, implementation, and protection.
Identify each of the DoD Sector Lead agencies and their responsibilities.
State the primary CIP activities in each of the six CIP life-cycle phases.
Evaluate the roles and responsibilities of the various sectors in implementing Defense infrastructure assurance policy.
Identify methodologies to link CINC mission requirements to CIP Sector, installation, and commercial assets.
Discuss the concepts of risk management as an integral component of the Defense infrastructure assurance planning process.
CIP Analysis & Assessment Process
Describe the process of identifying critical assets and infrastructure.
Describe the process of identifying commercial or public assets and infrastructure.
Identify vulnerabilities of infrastructure assets and installations.
Describe the collaboration process between Sector CIAOs, Joint Staff Military Plans & Operations, and the DoD CIP Directorate of ensuring appropriate vulnerability assessments tools are identified.
Analyze the operational impact to DoD operations (military and support) that could result from the loss or compromise of assets and installations.
Explain the coordination process between DoD CIP support agencies to assist in Component Analysis and Assessment activities.
Determine appropriate Analysis and Assessment tools for use by asset and installation owners in their vulnerabilities and remediation recommendations.
Conduct an interdependency analysis of critical infrastructure to identify dependencies between Component cyber systems/assets, and between physical and cyber systems/assets.
Identify methodologies to link CINC mission requirements to CIP Sector, installation, and commercial assets.
Identify methodologies and techniques for assessment of vulnerabilities of commercial infrastructure assets.
Identify methodologies and techniques for assessment of vulnerabilities of installation infrastructure assets.
Prepare a Sector characterization matrix.
Conduct high level functional risk assessments (RA).
Conduct high level Business Impact Analysis (BIA).
Describe the business case for resources required that address identified vulnerabilities to infrastructure assets and installations.
Describe how to incorporate CIP analysis and assessment results into DoD's approved recurring analysis process.

Other CIP Process
Determine vulnerabilities deemed most critical for resourcing remediation efforts.
Assess and develop mechanisms for reporting vulnerabilities.
Develop preplanned remediation actions that identify resource requirements and acceptable levels of risk.
Integrate and reconcile sector asset and installation remediation plans with all affected agencies, to include Federal, State and Local, for the asset or site.
Integrate and reconcile sector asset and installation Indications and Warning plans aimed at improving the fusion and application of reporting in the protection of physical and cyber assets.
Determine available technologies that will enhance indications and warning goals.
Determine ways to expedite the dissemination of warning information from Law Enforcement and Intelligence communities to the appropriate sector asset and installation owners responsible for protecting the threatened DoD and civilian support infrastructure.
Integrate and reconcile sector asset level mitigation planning and activities.
Coordinate sector level mitigation activities in response to warning, emergency, or infrastructure incident
Establish Continuity of Operations Plans (COOP) to mitigate disruption or degradation of key sector operational and command and control systems.
Monitor response activities and coordinate appropriate sector mitigation activities.
Implement procedures to coordinate sector asset and installation reconstitution activities.
Implement procedures to monitor sector asset and installation reconstitution activities.

All of these tasks were extracted from Appendix C. The instructional tasks listed are a combination of the instructional tasks used in the JPO, DSSA, and NDU programs and from the task list that the survey team derived from DoDD 5160.54, DoD CIP Plan, CJCSI 3209.01 and from the Sector DISAPs. The list is a concept, not a validated course list. Its intent is to help guide the instructional analysis during follow-on needs assessment, which if properly done, will be able to measure job performance and recommend specific instructional objectives to increase performance. Further, the needs assessment should recommend optimal choices in the integration of existing programs - such as those offered by JPO-STC, the uses of various instructional media, and substantiated cost estimates. This feature will be necessary to justify the Program Objective Memorandum funding requirements to initiate and sustain a new instructional program. One possible model of this instructional concept is the certification program entitled *Information Assurance Certification Program*, offered by NDU's Information Resources Management College. This four-course program starts with an overview of the CIP concept at the national level, then covers assurance strategies, guidelines, policies, and technologies for the information infrastructure. Details of this course can be found at http://www.ndu.edu/irmc/nstissi.html. The intent of this type of program is the establishment of DoD-wide instructional task standards for both instruction and job performance.

By whatever means, current and future CIP staff officers assigned to CIPIS member agencies are learning about their requirements for their jobs and the expected job standards. Whether that process is by trial-and-error, from a colleague, or from some course, learning is taking place everyday. Whichever means is used, that process should be directed and focused to ensure that the learning is based on approved performance task standards with the aim to gain accuracy and economy of effort for both individuals and their organizations.