

.....

The

.....

Army's

.....

Occupational

.....

Analysis

.....

Program

.....

*Integrating
Manpower,
Personnel and
Training
Requirements*

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

Progress Report
November 1996



REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) November 1996			2. REPORT TYPE Progress Report			3. DATES COVERED (from... to) May 1996 - October 1996		
4. TITLE AND SUBTITLE The Army's Occupational Analysis Program						5a. CONTRACT OR GRANT NUMBER		
						5b. PROGRAM ELEMENT NUMBER 433709		
6. AUTHOR(S) (in alphabetical order) U.S. Army Research Institute						5c. PROJECT NUMBER N/A		
						5d. TASK NUMBER 7002		
						5e. WORK UNIT NUMBER S04		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-OA 5001 Eisenhower Avenue Alexandria, VA 22333-5600						8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333-5600						10. MONITOR ACRONYM ARI		
						11. MONITOR REPORT NUMBER		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.								
13. SUPPLEMENTARY NOTES								
14. ABSTRACT (<i>Maximum 200 words</i>): The mission of the Occupational Analysis (OA) Program is to provide the Army's manpower, personnel, and training (MPT) communities with the individual task information critical to job design, analysis and training development. It is through the integration of the requirements of these three communities at the military occupational specialty (MOS) or job level that the OA Program supports the field commander, the ultimate customer for occupational analysis in the Army. The OA Program is to be the Army's center of excellence for job analysis and design. The program is in a transition period, adapting its procedures and methods to meet the needs of today's fast-paced Army. Through the adoption of contemporary technology, the OA Program is committed to providing its customers in the MPT communities rapid, clear information needed to help ensure that the right soldiers, with the appropriate skills, are available to meet Army-wide requirements. This progress report details the OA Program and provides examples of occupational analysis products. <div style="text-align: right; margin-top: 20px;">DTIC QUALITY INSPECTED 4</div>								
15. SUBJECT TERMS Occupational Analysis Program MOS ODARS								
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT Unlimited	20. NUMBER OF PAGES 29	21. RESPONSIBLE PERSON (Name and Telephone Number) Mr. Darrell Worstine 703-617-8857			
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified						

The Army's Occupational Analysis Program

Introduction

The mission of the Occupational Analysis (OA) Program is to provide the Army's manpower, personnel, and training (MPT) communities the individual task information critical to job design, analysis and training development. It is through the integration of the requirements of these three communities at the military occupational specialty (MOS) or job level that the OA Program supports the field commander, the ultimate customer for occupational analysis in the Army.

The OA Program vision is to be the Army's center of excellence for job analysis and design. The program is in a transition period — adapting its procedures and methods to meet the needs of today's fast paced Army. Through the adoption of contemporary technology, the OA Program is committed to providing its customers in the MPT communities with rapid, clear information needed to help ensure that the right soldiers, with the appropriate skills, are available to meet Army-wide requirements.

A Quick Example of an OA Project

Before describing the OA Program in detail, an example of how the OA Program's use of computer technology has improved job analysis will be presented. The OA Program, working with the U.S. Army Aviation Logistics School (USAALS), surveyed and analyzed the training curriculum for warrant officers in MOS 151A, Aviation Maintenance Technician. This project (Figure 3) was concerned with the division of MOS 151A Warrant Officer Basic Course (WOBC) into two separate courses — managers and technicians. Aviation Maintenance Technicians are responsible for managing the maintenance for all Army aircraft. Typically, new warrant officers taking 151A WOBC are former enlisted soldiers from MOSs within the aviation maintenance Career Management Field (CMF) 67.



OCCUPATIONAL ANALYSIS PROGRAM MISSION

To provide field commanders with the best possible soldier-job match by
integrating, at the MOS/job level, manpower, personnel
and training

Figure 1

The separation of the WOBC into two courses raised questions about the validity of the current training. The USAALS requested help from the OA Program to develop, administer, collect, and analyze training information using computer-based survey technology. As listed in Figure 4, the common steps involved in this process are: (1) initial planning and requirements, (2) task determination, (3) special concerns and questions, (4) survey development, (5) survey distribution and data collection, (6) survey analysis, and (7) report of analysis. Some examples of the types of items included in an OA Program survey are: (1) critical tasks performed in the MOS, (2) special items of concern to the customer, (3) demographics, and (4) general items of concern to the MPT communities.

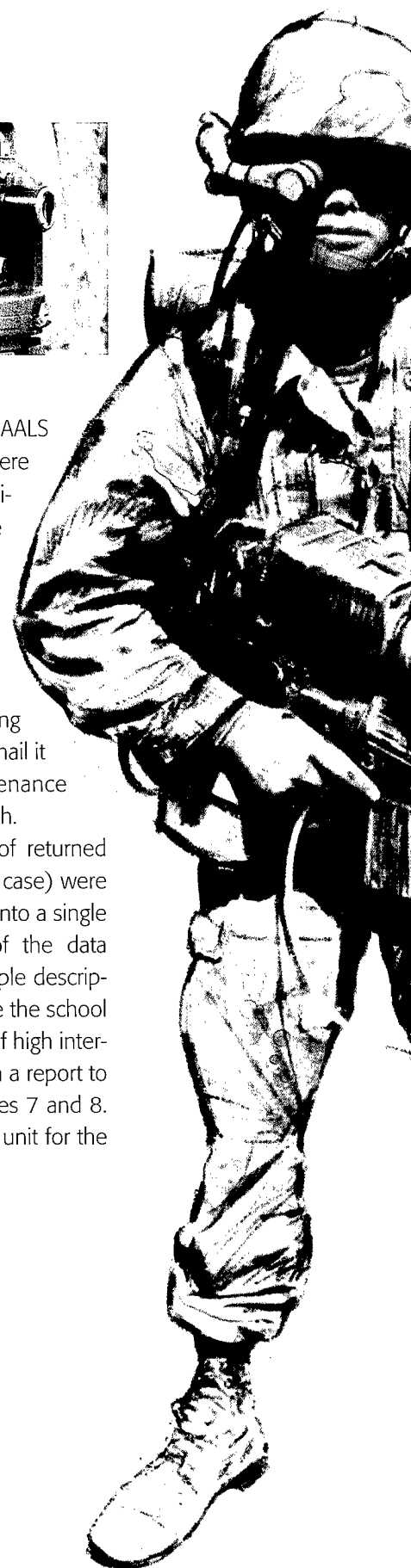
An initial planning meeting was held at the school. During this meeting, school and OA staff agreed on the approach to take for doing the survey work. It was decided that the effort would cover both the manager and technician WOBC courses. The school was well prepared and was able to furnish the total task list for the 151A MOS immediately, see Figure 5. This task list included all of the critical tasks for the MOS, plus additional tasks that are associated with the MOS.

Next, a rapid survey development and refinement effort was started. A draft survey was developed by the OA Program staff and



then presented, on-site, to the USAALS staff. Recommended changes were made immediately and the modified survey was presented the same day for approval. Sample questions from the MOS 151A survey for each of the four item types mentioned earlier are presented in Figure 6. The entire process from the initial planning meeting to finish the survey and mail it to all known Aviation Maintenance Technicians took about one month.

Once an acceptable number of returned surveys (about 70 percent in this case) were collected and the data organized into a single database, preliminary analysis of the data was performed. In this case, simple descriptive statistics were used to provide the school with immediate results on areas of high interest. Some sample graphs used in a report to the school are presented in Figures 7 and 8. The first graph shows the type of unit for the



.....

OCCUPATIONAL ANALYSIS PROGRAM VISION

THE ARMY'S CENTER OF EXCELLENCE FOR OCCUPATIONAL ANALYSIS

Expert Staff for Performing and Advising the Army on Job Analysis and Design

Innovator and Provider of Modern Technology for Army Occupational Analysis

.....

Figure 2



.....

TRAINING WARRANT OFFICERS

PROPOSER: Aviation Logistics School

MOS: 151A, Aviation Maintenance Technician (non-rated)

PURPOSE: Evaluation of Warrant Officer Basic Course (WOBC)

FINDINGS/OUTCOME: Data quickly collected; Customer doing analysis of data with advice from OA Program

.....

Figure 3

survey respondents. The second graph indicates where respondents thought more training was needed. Finally, Figure 9 shows two of the basic scales that were used to access job task information. This information helped the Aviation Logistics School begin initial plans for refining training in the WOBC. The time from the initial planning meeting to delivery of the first report to the school was about seven months (including Thanksgiving and Christmas holidays). At this time, school staff are doing a more in-depth analysis of the data to help improve the training curriculum.

Because the initial survey and analysis provided valuable information to the Aviation Logistics School, a second effort was conducted with the focus on the WOBC Aviation Maintenance Managers Course. The original survey was adapted for this effort. Since the job tasks were the same, only the background items needed to be changed to accommodate all personnel attending the manager's course (AOC 15D, MOSs 151A, 152, 153, and 154).

Survey Development Steps for Job Task Analysis

- Ascertain requirements
- Determine job tasks
- Specify special concerns items
- Develop computer-based survey
- Distribute survey and collect data
- Analyze data
- Deliver report

Figure 4

The re-use of survey items significantly reduced the time needed to develop the new survey and report the results back to the school. This time a total of three months were needed from initial planning of the project to first report of the data analysis to the school. This four month time savings is due, in part, to the capability to easily re-use survey items provided by automation.

A More In-Depth Look at the OA Program

From the first decisions made in the Continental Army about who would carry muskets, hold horses, or keep provisions, the Army has designed and re-designed MOSs. In the two centuries since these early decisions were reached, the need for effective MOS design and re-design has not diminished. To the contrary, the

complexity of creating jobs and developing training to support those jobs is as far removed from colonial times as are modern weapon systems from weapons used in the Revolutionary War.

Role of Occupational Analysis in the Army

Integrating MPT requirements. Today, occupational analysis serves to combine the Army's MPT requirements so that the individual soldier has the right training to perform successfully in a military occupational specialty (MOS), see Figures 10 and 11 for two

Example of Job Tasks (Ranked by Training Emphasis Rating)

1. Coordinate maintenance actions with maintenance/shop platoons
2. Manage work order flow using automated system
3. Manage production control functions within aviation maintenance unit
4. Coordinate aircraft scheduling/maintenance flow with maintenance officer to include status reports/bank time
5. Maintain aircraft availability per Army standards
- ...
201. Manage Aircraft Survivability Equipment (ASE) inspection/testing/repair
202. Utilize aviation unit's Sample Data Collection (SDC) program
203. Participate in aviation materiel life cycle management program
204. Monitor maintenance accountability of aircraft recovery kit
205. Manage ACE program within unit

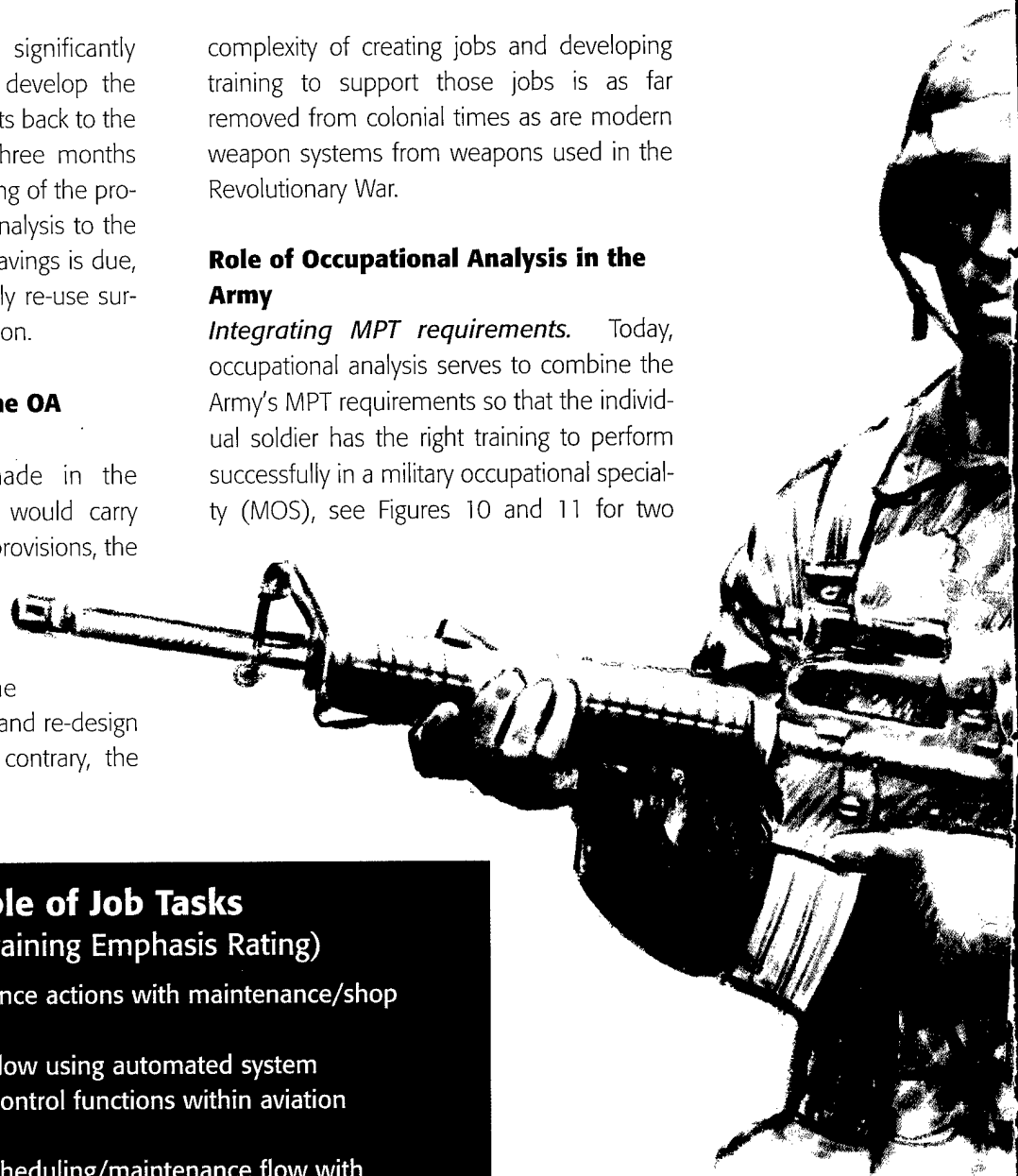


Figure 5



views of this role. To achieve this goal, a number of factors must be considered. The structure of the MOS or job must support the unit missions performed by the MOS. Job functions or duties are derived from unit mission requirements and are used to determine the individual job tasks. These tasks are then allocated to job (duty) positions that are grouped together based on the similarity of the performance requirements to form a MOS (see Figure 12 for diagram showing relationships among mission, function, task, etc.). This grouping of tasks and positions, and the determination of associated soldier knowledge and skills must be done skillfully to achieve an efficient force structure and a reasonable foundation for training. It is here that the requirements of the MPT communities converge — job analysis and design are needed to help understand and decide how to combine the individual soldier, unit, and the corresponding tasks and duties.

In addition to the concerns already mentioned, the OA Program is also working to standardize the procedures and terms used by the Army for



Sample Survey Items for 151A

- Critical Task
 - ✓ Perform aircraft vibration analysis
- Special Item
 - ✓ Was any portion of the WOBC unnecessary due to prior AVN maintenance experience?
- Demographic
 - ✓ What was your previous MOS?
- General Interest
 - ✓ How many hours a week do you use a PC?

Figure 6

Type of Current Unit

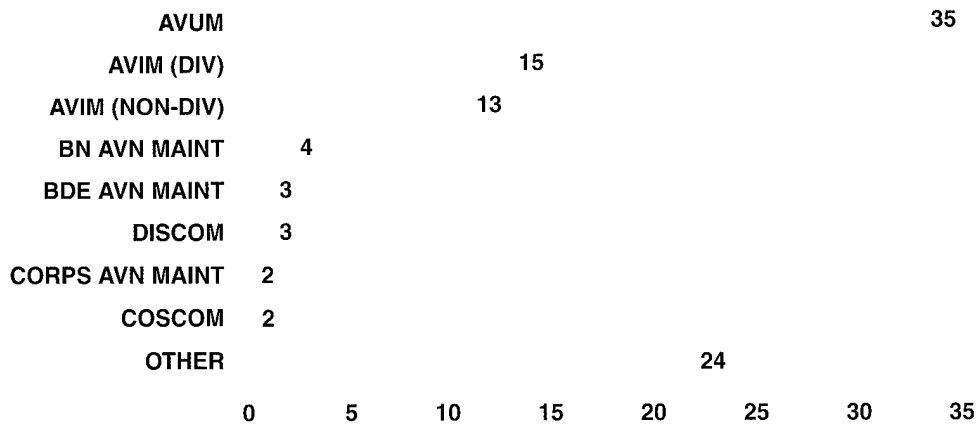


Figure 7

Additional Training Recommended

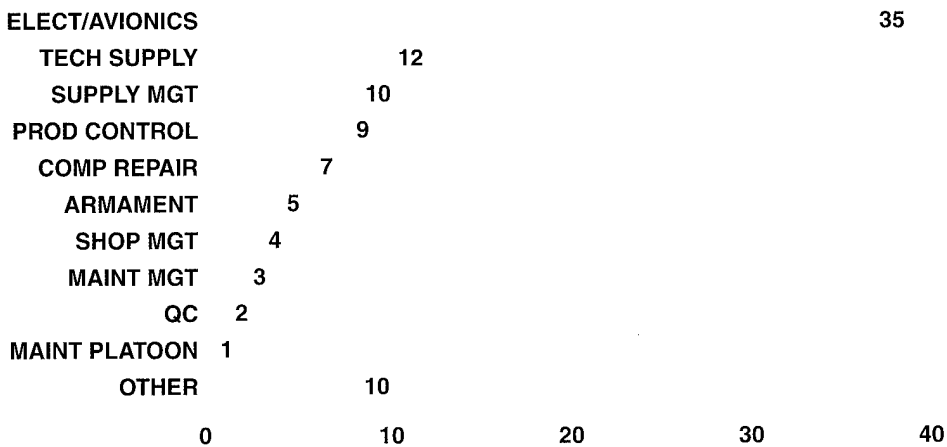


Figure 8

MOS or job analysis and job descriptions. This will result in less confusion in communicating job information among Army organizations and will allow for more efficient collection and interpretation of job data. Simultaneously, the OA program is actively

engaged in evolving the old paper-based occupational analysis system into a faster, computer-based system. This effort will significantly improve the responsiveness of OA projects to the needs of the Army.

Optimizing Operational and Research and Development Efforts. As part of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), the OA Program works closely with research elements within the organization to optimize current job design practices and to inform the direction of research in areas related to occupational analysis. This close working relationship between ARI's operational and research elements allows for: (1) early and extensive interaction in identifying and meeting opportunities for improving Army occupational analysis systems; (2) cooperative and dynamic interplay in determining research directions; and (3) quick and effective transfer of technology into the operational community. The MPT communities benefit by having an efficient mechanism for implementing contemporary technology in the field and by having a direct means for providing feedback to the research community. Also, the OA Program coordinates with other government and private agencies involved in occupational analysis to ensure that the inno-

vations in job analysis, design methodologies and procedures are tested and incorporated into the Army's OA Program as needed. These valued-added activities are listed in Figure 13.

Historical Background. The OA Program was initially created in 1965 to help with the MPT issues associated with the Army's role in Vietnam. Today it consists of a small group of statisticians, occupational analysts, and information system analysts that bring a wide range of experience to their jobs. Additionally, the OA Program contracts with computer scientists and other professionals as needed. There are equivalent elements in each of the other U.S. armed forces with similar missions. However, the Army's OA program is the first to adapt modern technology to meet the demands of today's armed forces. Using recent computer software developments, the Army's OA Program has demonstrated that quality occupational and job analysis can be done quickly and inexpensively.

Answer Scales Used to Access Job Task Information

Scale Used to Determine Incumbent Opinions on Task Significance to MOS

1. Do not perform task
2. Insignificant part of position (POP)
3. Slightly significant POP
4. Somewhat significant POP
5. Moderately significant POP
6. Quite significant POP
7. Highly significant POP
8. Extremely significant POP

Scale Used to Determine Training Emphasis (TE) That Should be Given to Critical Tasks

1. Can't evaluate/no experience
2. Train in unit
3. Train in WOBC, low TE
4. Train in WOBC, below average TE
5. Train in WOBC, average TE
6. Train in WOBC, above average TE
7. Train in WOBC, high TE

Figure 9

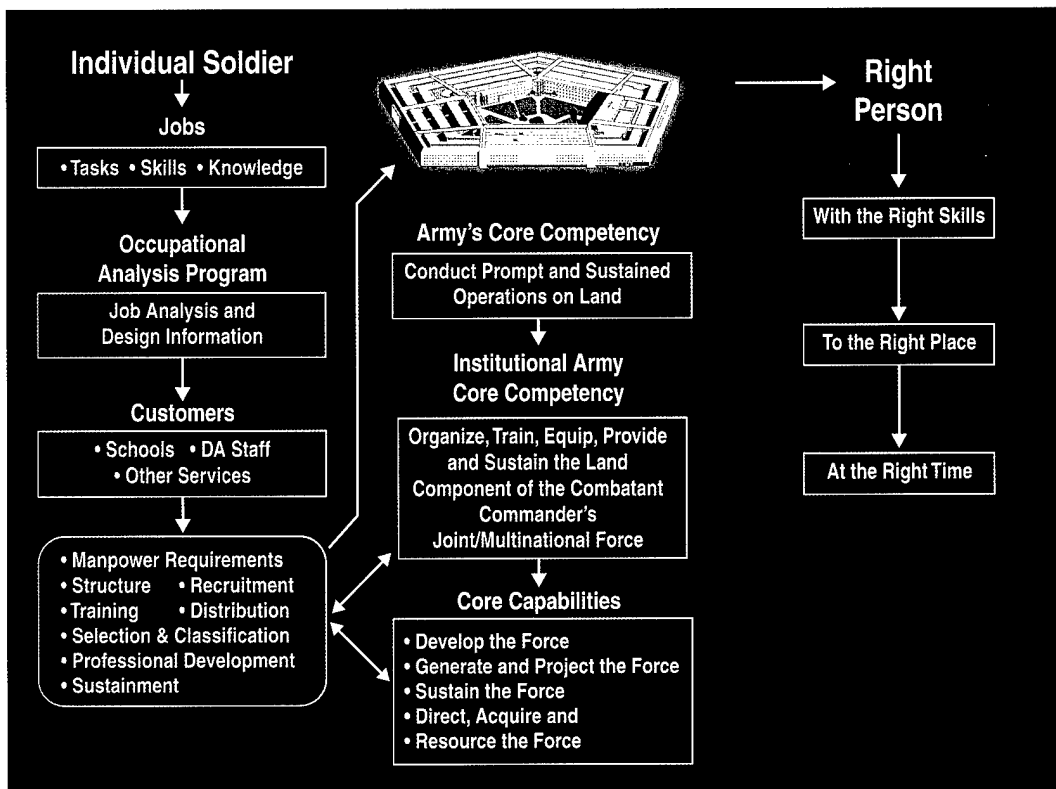


Figure 10

Job Design and Analysis in Army Force Development and Training

Occupational Analysis Background.

Occupational analysis can be thought of as the process of understanding all aspects of how work is organized, performed, and trained in an organization. Some examples of occupational analysis concerns include: individual jobs, duties, and tasks; social and cultural environment of the work place; and characteristics of individuals and teams performing the work activity. At a more manageable level, job analysis and design can be viewed as a major subset of occupational analysis, and can be seen as consisting of the functions associated with understanding the nature of jobs, duties and tasks and the related knowledge and skills needed to perform

those activities. Job analysis is still quite broad, and its application is important to a variety of military concerns. A listing of these

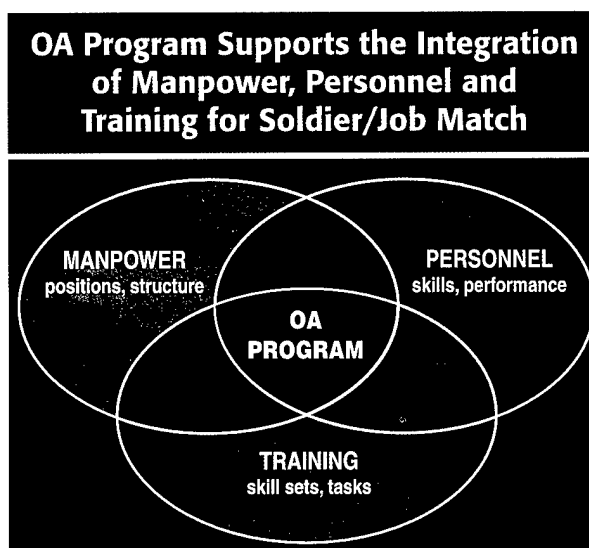


Figure 11

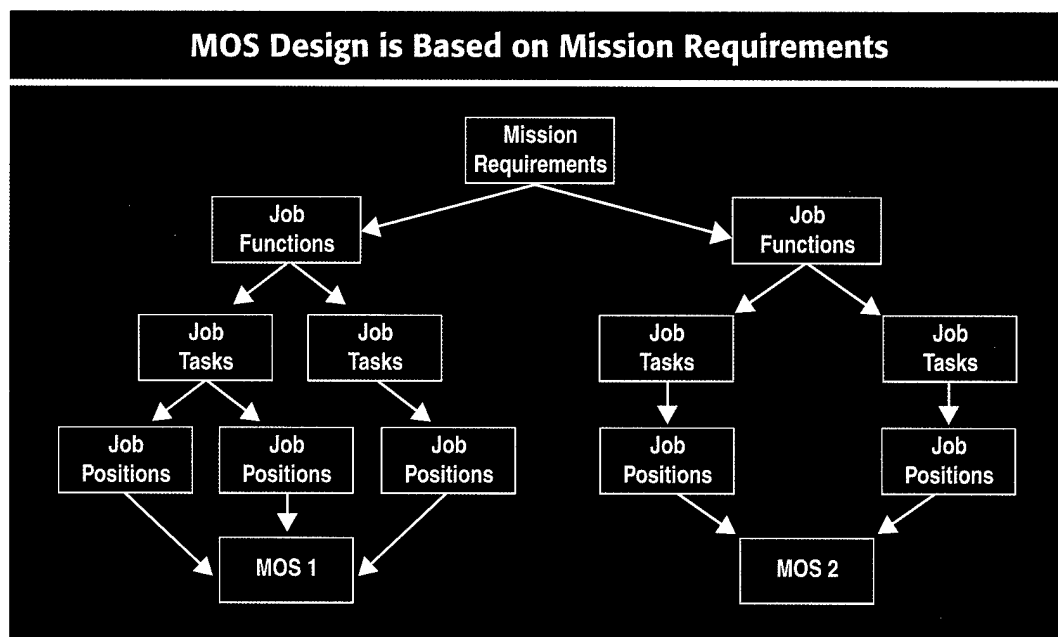


Figure 12

is given in Figure 14. The OA Program is focused on job analysis and design, especially as it relates to determining the knowledge and skills needed to perform tasks within an Army enlisted MOS or Officer Branch.

Job Design Background. Job or MOS design is essential to creating an effective fighting force and should occur early in the force development process. As shown in Figure 15, in designing a MOS, the content (duties and tasks), qualifications, costs, and working relationships of the positions that will constitute the MOS need to be considered. The MOS design based on these factors is reported in Army Regulations (AR) 611-101 (commissioned officer), 611-112 (warrant officer) and 611-201 (enlisted). Historically, the number of MOSs and other identifiers (additional skill identifiers, ASI) have fluctuated over the last thirty years — reaching a peak

during the Vietnam war, declining afterwards, and again increasing during the build-up and modernization of the 1980's. With the political reorganization of the former Soviet Union, the subsequent downsizing of the Army, and the remarkable increase in the

VALUE-ADDED BY ARI'S OA PROGRAM

Improved individual and unit performance through better soldier/job match

Standardization of procedures and terms for job analysis and description across the Army

Systematic improvement of OA technology for the Army

Link with OA programs in other services

Link with OA research community

Figure 13

Uses of Occupational Analysis Information

- MOS/Job Description
- MOS/Job Requirements (e.g., knowledge and skills)
- MOS/Job Classification
- MOS/Job Commonality
- MOS/Job Design, Re-Design
- Grade Evaluation
- Manpower/Workforce Requirements
- Recruitment
- Soldier Training
- Mobilization Planning
- Safety
- Transition to Civilian Workforce

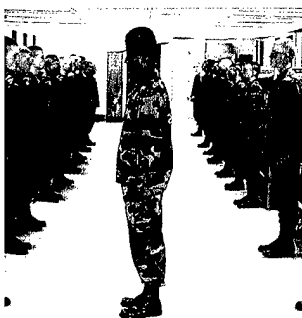
Figure 14

quality of recruits, the number of enlisted MOSs has decreased in the 1990s. Consequently, most recent job analysis and design activities concern the merger of MOSs in the Army. However, job design methods can also be used to determine if a MOS should be divided or should be expanded to serve a larger role.

MOS or job design is critical to individual and unit performance. It serves as a bridge between force development and personnel manning, as shown in Figure 10. On the force development side, effective job design is crucial in determining the personnel

requirements for unit models. Job design is also important in ascertaining the knowledge and skills needed by personnel to fill authorized positions.

Job design has a central role in creating effective and efficient work units and is of increasing importance to the Army as MPT resources become more constrained. Conversely, the lack of job design, or inappropriate design, can negatively affect the mission readiness of work units and result in poor use of resources. Reasons for doing MOS analysis and design for the Army include: adjusting MOS structure and tasks in



MOS/Job Design Directly Affects Occupational Structure

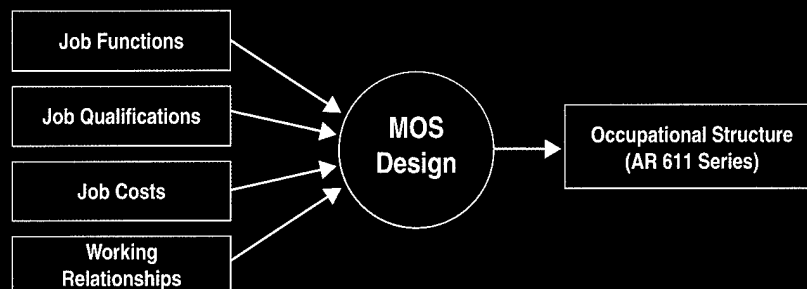


Figure 15

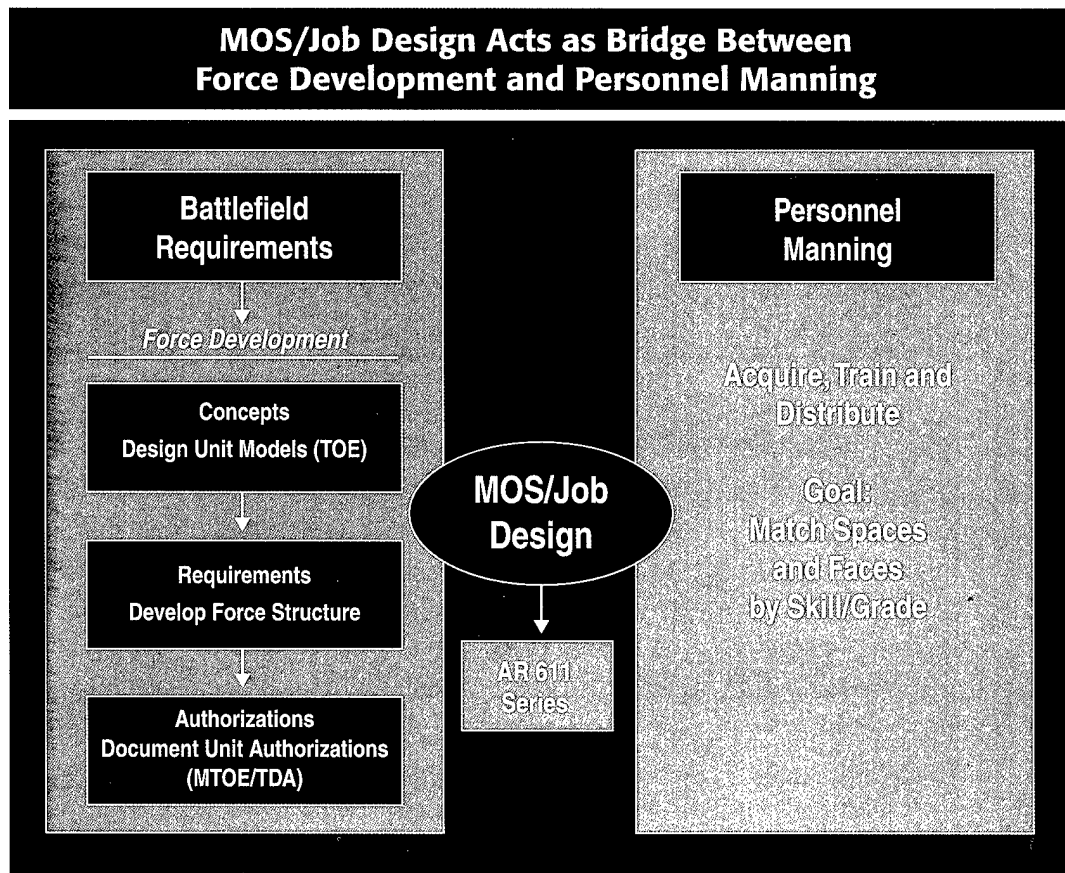


Figure 16

response to new equipment or procedures; merging two or more MOSs; and creating a new MOS or skill identifier. For instance, three MOSs related to material analysis, technical drafting, and construction surveying (51G, 81B, 82B) were merged into one broader based MOS for technical engineering (51T). This action required job design to create a reasonable structure for the 51T MOS and a job analysis to determine the duties and tasks that should be trained for the MOS. The OA Program has recently completed a study validating the effectiveness of this consolidation, providing a quantitative basis for realigning the training done in the new MOS.



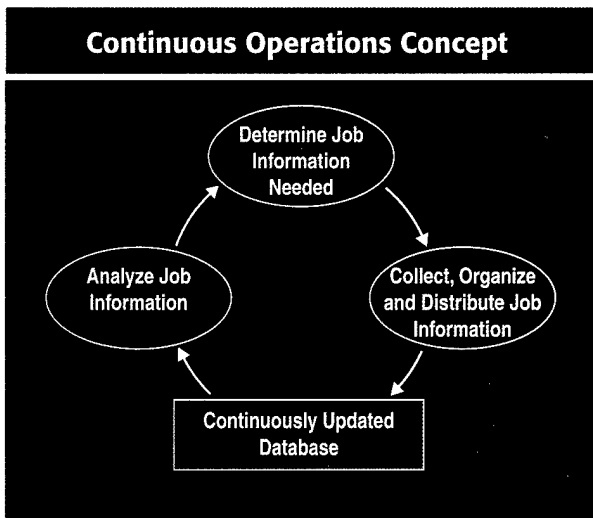


Figure 17

Currently, the OA Program is focused on the training aspects of job analysis and design. Knowing what knowledge and skills should be explicitly trained, and where the knowledge and skills should be initially

trained (e.g., AIT, unit) is important for creating and maintaining mission readiness proficiency. The OA Program plans to provide continual feedback between the field operating units and schools to inform and adapt all levels and types of training in the Army (see Figure 17). By including job design and analysis in this process, possible inefficiencies and incongruous training elements can be avoided or quickly corrected. More detailed information on this topic is presented later in this paper.

Customers

Potentially the Occupational Analysis Program has three types of customers: (1) manpower, (2) personnel, and (3) training. At this time, OA staff are primarily working with the training community, reflecting the focus on job skills and tasks. This approach also recognizes the responsibilities of the

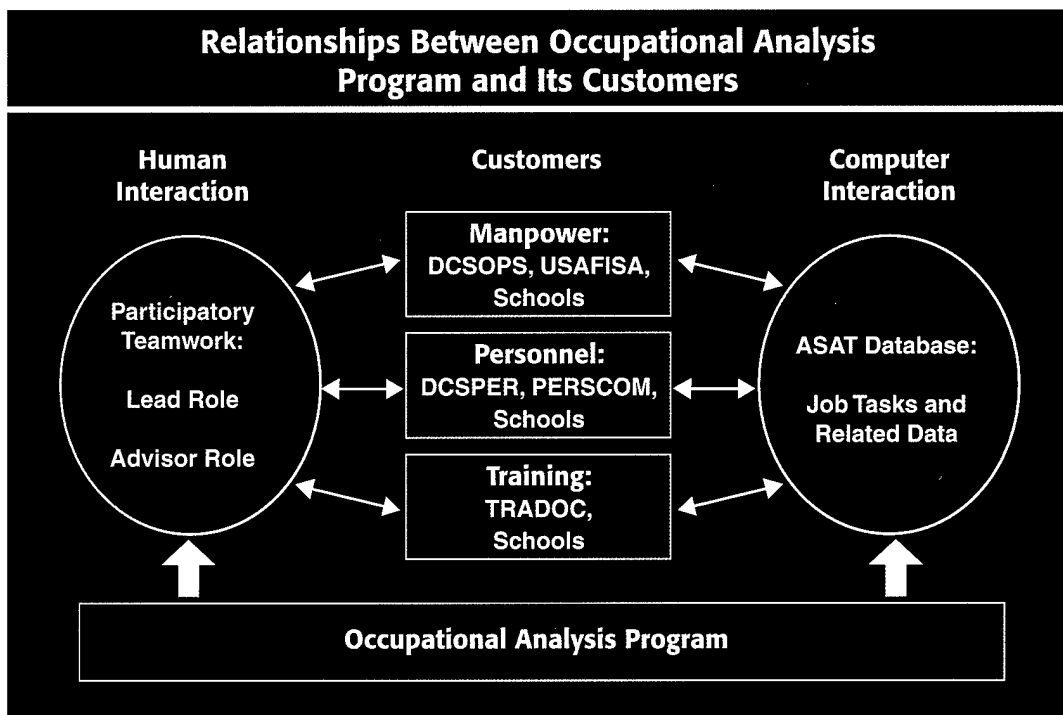


Figure 18



OCCUPATIONAL ANALYSIS PROGRAM FUNCTIONS

Determine kind and scope of information to be collected to meet specific job design and analysis objectives

Collect, organize and distribute job information

Analyze job information

Develop, acquire and maintain OA tools

Serve as technical advisor for OA to other Army organizations

Figure 19

proponent schools in determining the MPT requirements at the MOS/job level. The aim, in all cases, is to provide two direct avenues for customers to do job analysis or design or to acquire data on job tasks. First, as is currently the case, OA staff will work with customers in a participatory fashion. Integrated teams of OA staff and customers work together to produce the pertinent data and analysis. In some cases this will necessitate that OA staff function in the lead role, doing the majority of data collection, analysis, and reporting. In other cases, OA staff will serve as advisors. One goal is to offer customers a flexible working relationship so that the OA process can be adapted to fit their particular needs.

Additionally, in the near future, OA project data will be organized and stored in the U.S. Army Training and Doctrine Command's Automated Systems Approach to Training (ASAT) database for use by OA customers. It is envisioned that the most recent information on job tasks, as well as other related data such as free form comments, will be available to the Army in electronic format. In subsequent sections of this paper more will be said regarding the use of computer technology to improve the process and communications of OA related activities.

Description of the Occupational Analysis Program

OA Program Functions. The OA Program performs the five major functions listed in Figure 19. First, since each OA project may have unique requirements based on the purpose



and objectives of the customer, the scope and kind of job information needed for the project must be determined.

Second, the mechanism for collecting the job information must be developed, typically a survey of one or more MOSs. This information must be organized in a coherent fashion and distributed back to the original customer, and sometimes to other interested Army organizations. It is common to initially organize the data into a standard database format since this is a portable and ubiquitous way to transfer data. Distribution of project information may only consist of the database for the project, but more often will include reports that summarize the data using statistics and graphics.

Third, depending on the project, descriptive statistics or more sophisticated methods such as cluster analysis, multiple regression, and so on, may be used to analyze the data. This information is usually reported in tables and graphs that are appropriate to the needs

of the customer. Additionally, qualitative data are frequently collected. Specific qualitative analysis varies with the need of the project. Typically, this information is classified into meaningful categories and a summary of this data is given to the customer.

In addition to the above functions, the OA Program's fourth role is to maintain, improve, and acquire new tools for survey development, statistical analysis, and data distribution. New tools and methods in these areas are often evaluated by the OA Program, and when deemed useful for applied Army occupational analysis, are incorporated into the OA program. The information concerning these tools and methods is distributed to OA customers. Having the OA Program provide instruction on new tools and methods to its customers as multimedia, computer-based software is being considered, as well.

A fifth role, compatible with its function to explore and provide the Army with the best job analysis tools, is the OA Program's service



as a source for technical expertise in the areas of job analysis and design, and related survey, statistics and automation methods.

An example of where the OA Program's last two functions have benefited the Army is presented here. The OA Program identified the computer-assisted survey development tool, RaoSoft®Survey, as a candidate for automating parts of the survey process for the Army. OA staff obtained copies of this software and evaluated it. RaoSoft®Survey proved to meet most of the needs for practical occupational survey development, administration, analysis, and distribution in the Army. The OA Program adopted the software for internal development, completing a number of job analysis projects using the tool (some of these projects are reported later in this paper). Working with the developer of the software, OA staff suggested and sup-

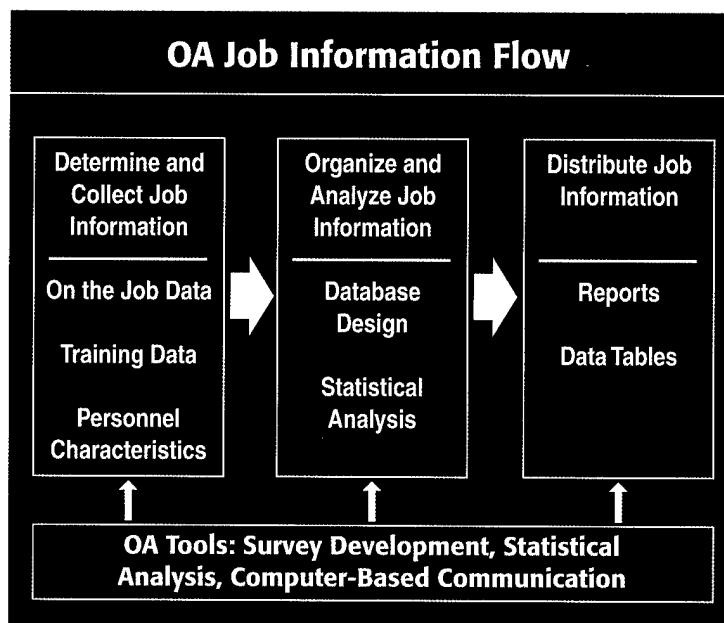


Figure 20

ported numerous changes in the software to make it more useful to the Army. Once satisfied that RaoSoft®Survey could be of significant benefit to the Army, and that it could be used directly by OA customers, the OA Program began to export this tool to its customers. At this time, numerous demonstrations of the software have taken place and evaluation copies of the software have been loaned to some customers. The response from customers has generally been positive and RaoSoft®Survey is being adopted by a number of Army schools. Further, ARI has

TOOLS OF THE OA PROGRAM

The OA Program is engaged in an extensive effort to modernize the MOS/Job

Analysis and Design process by moving to state-of-the-art computer survey and analytical tools

Figure 21

TYPES OF TOOLS USED BY THE OA PROGRAM

- **Survey Development Software**
- **Computer-Assisted Data Collection**
- **Computer-Based Data Distribution**
- **Statistical Analysis**

Figure 22



contracted with RaoSoft Incorporated to enhance the survey software to better meet the specific needs of Army occupational analysis.

Occupational Analysis Job Flow. The typical progress of an OA project can be viewed as the flow of job information among the first three OA Program functions mentioned in the preceding section (see Figure 20). First, a determination is made of the scope and type of job information required to meet the purpose of a particular project. For instance, a project involving MOS re-structuring may need different information from a project concerned with updating the training curriculum for a MOS.

In general, the types of information needed fall into one of three categories: on the job data, training data, and descriptive personnel data. On the job data includes: (1) frequency of task performance, and (2) the importance of knowledge and skills to job performance. Training data consists, in part, of judgments from subject matter experts concerning what tasks require training, the emphasis that should be placed on training, and the difficulty associated with learning to perform a task to standard. Duty position title, rank, and component are typical person-

nel data elements.

Next, the data need to be collected. The typical method used by the OA Program is to develop a computer-assisted survey consisting of items and questions related to the specific project and some generic information common across most projects such as demographics. Most often, the survey development and collection are done using RaoSoft@Survey software.

Once the data has been collected, it is then organized in a database (PC based), and analyzed. Finally, the data is distributed as a database, and in some cases, as a report summarizing the data and analysis done on that data. All of these steps are increasingly becoming automated as the use of computers and computer-based communications are integrated into the process. A major goal of the OA Program is to create a "continuous" operation, whereby occupational information is updated frequently and made available to OA customers electronically. Ideally, the action officer in a training development or proponent office will have on-line access to the data coupled with easy to use software requiring minimal training to operate.

The OA Program has consolidated this effort and is calling it Occupational Data,



Analysis, Requirements, and Structure (ODARS). This is a new and dynamic approach to Army occupational analysis and will provide the Army with a world class job analysis and design system that is capable of rapid, tailored data collection, analysis, and reporting. ODARS is intended to combine the latest in psychological and computer methodologies to produce a job analysis system that is based on a firm scientific foundation and uses current automation capabilities to make the system user oriented. Critical elements of the ODARS program include: (a) automated surveys, (b) continuous data collection, (c) a centralized and accessible OA database, and (d) flexible, easy analysis and report generation.

The ODARS system will help training proponents, and other Army elements, do systematic occupational analysis based on job content, qualifications, costs, and working relationships. Systematic, integrated and

COMPUTER-ASSISTED SURVEY DEVELOPMENT

- **Developed and delivered on MS-DOS and Windows PCs**
- **Easy re-use of survey items and styles**
- **Decreased development, delivery time and costs**

Figure 23

quick job analysis and design will lead to increased force readiness and enhance the Army's ability to respond rapidly to mission and resource changes. Additionally, ODARS will decrease the costs and time needed to perform occupational analysis. Data supporting this statement is presented in the next section of this paper regarding OA tools and the automation of survey development and distribution.

Computer-Assisted Data Collection

- Automatic data capture in database format
- Versatile Access
 - ✓ Stand-alone PCs
 - ✓ Local Area Networks
 - ✓ Bulletin Board
 - ✓ Internet

Figure 24

Tools of the Occupational Analysis Program

The OA program is engaged in an extensive effort to modernize the MOS/job analysis process, Figure 21. As mentioned above, this endeavor to modernize the Army's OA efforts is called ODARS. As seen in Figure 22, four types of tools have been the focus of the ODARS program: (1) survey development software, (2) computer-assisted data collection, (3) computer-based data distribution and sharing, and (4) statistical analysis software. The aim of ODARS is to increase the efficiency and speed that job related surveys can be developed and processed. Testing has shown this can be accomplished with a cost savings to the Army. Automation is expected to increase the usability of occupational information to customers by making it easier to obtain, manipulate, interpret, and present.

Survey Development Software. As previously mentioned, the OA Program has progressed from paper-based to computer-based survey development. Currently, electronic surveys are developed and delivered

Computer-Assisted Data Distribution

- Establish OA Bulletin Board for delivering surveys and collecting data
 - ✓ Telephone Dial-in
 - ✓ Internet Entry
- Integrate with the Automated Systems Approach to Training (ASAT) database to provide wide access to OA Program data

Figure 25



on MS-DOS/Windows based machines. Moving to electronic surveys has made it easy to re-use survey items and styles. As will be described later in the project overview section, this has already resulted in increased survey development speed when one project is a follow-on to another. Also, it has allowed for the relatively effortless use of standardized questions across surveys (e.g., demographics), and has been a significant factor in reducing the cost of survey development (see Figure 23).

Data Collection. Closely connected with computer-based survey development is computer-assisted data collection (Figure 24).

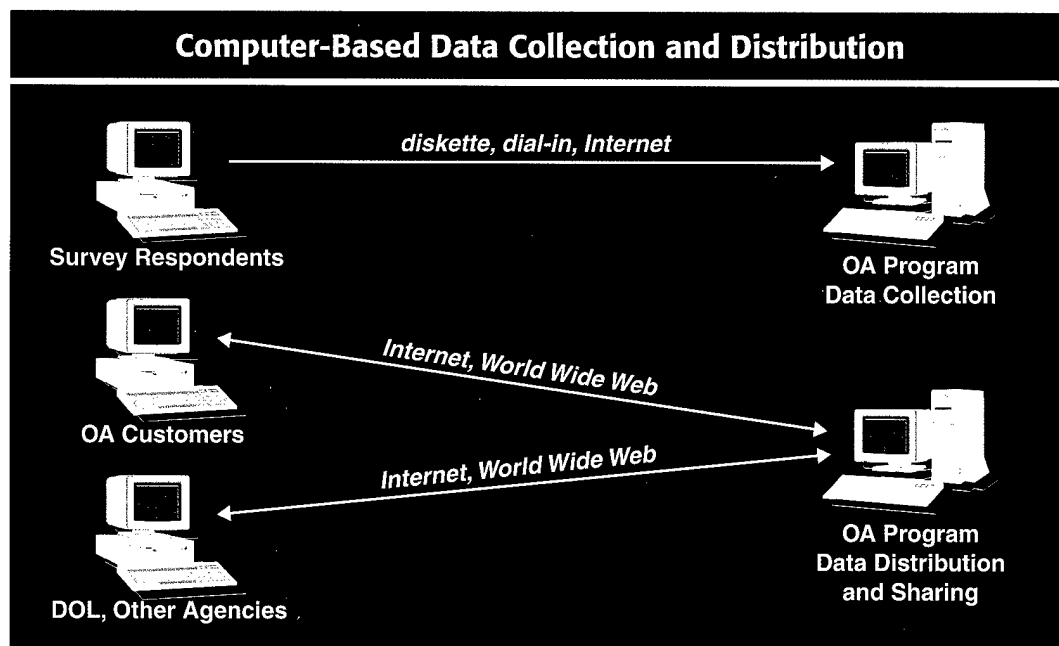


Figure 26

Typically, when a user takes an electronic survey, the responses are stored immediately into a database. The location of this response database varies according to how the survey was installed on the computer and on how, and if, the computer is connected to other computers. If the survey is installed on a stand alone personal computer (PC), the response database is local to that computer. The database will have to be sent back to the survey analyst on a diskette for further processing. If the PC is part of a local area network, then the database may optionally be located on a central server machine that collects survey responses from multiple PCs. This data will still need to be sent back to the survey analyst. Finally, if the survey is located on a bulletin board or a World Wide Web page, then the data may be stored directly back at the survey analyst's site.

Data Distribution. Once the data has been

collected, it needs to be organized, analyzed (for most projects), and distributed (Figure 25). Aside from traditional paper reports presenting summary analyses, the collected data will be organized into a standard database format for wide compatibility with other Army data and analysis software. The primary customer for this organized data will be the Army's Automated Systems Approach to Training (ASAT) database. From ASAT, the data will be available to the Army community. Further, the OA Program has established an electronic bulletin board and is exploring sharing databases with its customers using the standard File Transfer Protocol (FTP). Consideration is also being given to exporting appropriate parts of a project's data to other Army data sources as well. The objective is to make occupational data accessible to all Army components that will have a use for it, and to increase data and information sharing with other Army and government organiza-

Advantages of Automating the Survey Process

- Increased Efficiency
 - ✓ Saves time
 - ✓ Saves money
- Empowers Army Schools
 - ✓ Increased usability of information
 - ✓ Increased flexibility for obtaining and presenting information



Figure 27

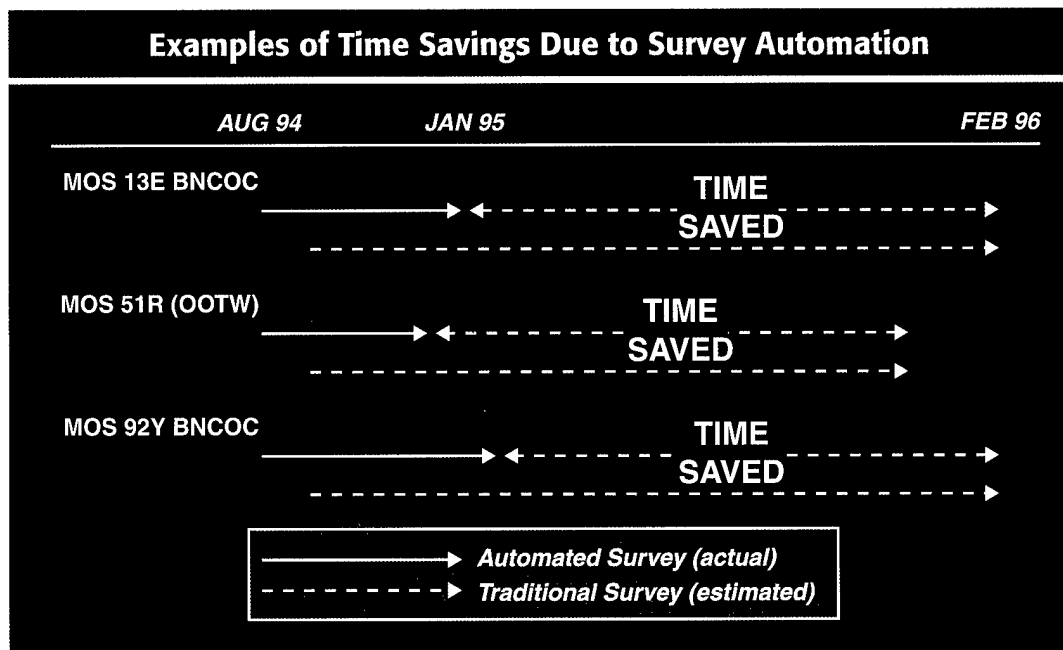


Figure 28

tions. A simple schema of the OA Program's computer-based data collection and distribution is presented in Figure 26.

Advantages of Automation. Moving to computer-assisted survey development and delivery has had a number of benefits, see Figure 27. Early results of the ODARS pro-

gram have been positive and have shown a significant reduction in the time needed to develop and process technical surveys. Using an automated approach to estimating the knowledge and skills of soldiers, the typical time needed to produce a survey and collect data has been reduced by about fifty percent, and a substantial saving in cost has also

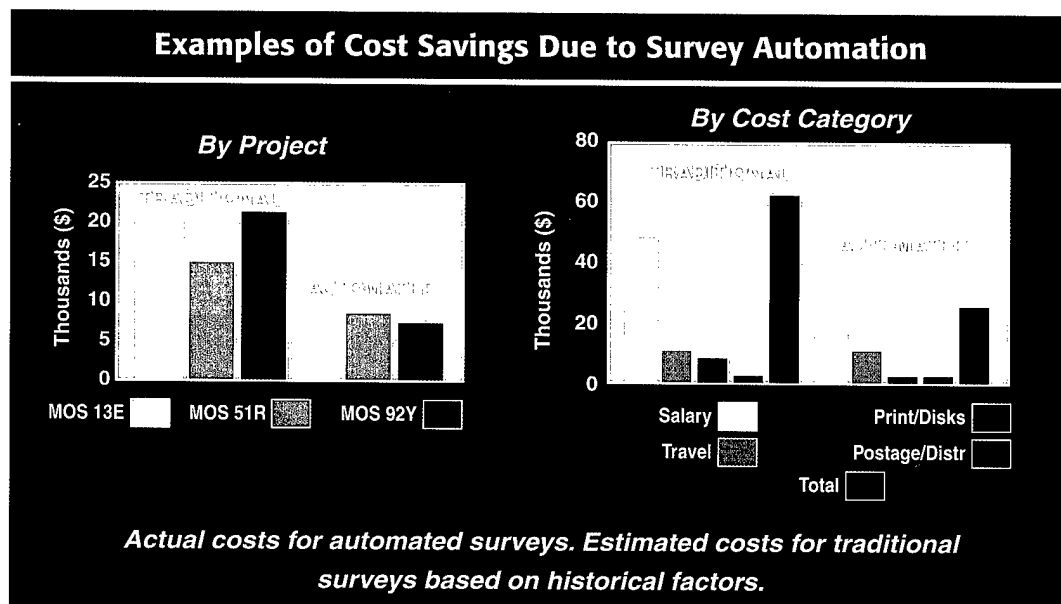


Figure 29

been realized. For example, the cost of a professionally printed paper survey typically ranges from \$2 to \$10 per copy. On the other hand, floppy diskettes normally cost about 25¢, are reusable, and can be used by multiple respondents. Other cost savings are gained by substantially reduced postage requirements. Also, since the time needed to complete a computer-assisted survey is approximately one third to one half of the time needed for a paper and pencil survey, time lost from operational work is reduced. Figures 28 and 29 compare the time and costs for producing and analyzing surveys for three projects using the computer and paper based approaches.

Statistical Analysis. The OA Program performs and suggests the use of a variety of statistical analyses (Figure 30). The aim is to provide customers with meaningful information in a succinct format. For the majority of customers, a summary of the data analysis

would consist of simple descriptive statistics arranged according to the purpose of a project, and would frequently be accompanied by graphics. When appropriate, other statistical techniques are used such as cluster, factor, discriminant, regression and other multivariate analysis. The OA Program is also actively involved in the investigation and development of statistical tools. Currently, an OA Program funded effort is underway to adapt and port the Air Force's CODAP (Comprehensive Occupational Data Analysis Programs) job clustering methods to MS Windows. This effort will not only move the job clustering procedure to MS Windows, but will modernize the human-computer interface so that it is more flexible compared to the old, mainframe style interface.

New Directions of the Occupational Analysis Program

The Occupational Analysis Program is moving forward in a number of areas in its efforts to

.....

STATISTICAL ANALYSIS

Variety of methods and tools based on project needs

Focus on descriptive statistics and graphics that convey immediate meaning to customers

Developing PC versions of some specific job analysis techniques such as Air Force's CODAP job clustering analysis

.....

Figure 30

improve and modernize Army job analysis and design, see Figure 31. Three of these areas are briefly discussed here. First, the OA Program's active investigation of the MOS design process is presented. Second, efforts to facilitate the comparison of military and civilian jobs is discussed. Third, efforts to expand and improve communications between the OA Program and its customers using World Wide Web technology is noted.

MOS Design. Currently, the Army has an excellent system (see AR 611-1) for proposing and changing the occupational structure. Factors such as grade structure (e.g., NCO content), aptitude area scores, and physical

.....

FUTURE DIRECTIONS OF THE OA PROGRAM

New Approaches to MOS/Job Design

Crosswalking Military and Industrial Jobs

World Wide Web Presence

.....

Figure 31

New Approaches to MOS/Job Design

In an effort to improve Army MOS design, the OA Program is investigating the use of the Task Knowledge Commonality Analysis Method

- Standardized method for determining the structure of MOSs
- Relies on subject matter experts
- Can be automated to a significant extent

Figure 32

requirements have been quantified and are routinely used to design and modify MOS structure. However, there is not an established and standardized approach to designing MOSs. Methods for the quantification of factors such as commonality of task performance, skills, and knowledge have not been developed and provided to MOS proponents. Consequently, the design of new Army jobs or the re-design of existing jobs is left to the proponents for each MOS. Although this system can and does produce quality job designs, it can also produce job design that does not adequately meet the needs of MOS proponents or the Army. Even in the case of

Exploring New Ways to Crosswalk Military and Industrial jobs

- Standardized Occupational Classification (SOC)
 - ✓ New system for grouping jobs for Federal Statistical analysis
 - ✓ Military occupations included for first time
- Department of Labor's O*Net
 - ✓ Replaces the Dictionary of Occupational Titles
 - ✓ Accessible via the World Wide Web

Figure 33

well-done job design, it may be that the procedures and types of analysis performed in producing the design are not documented so that lessons learned from those efforts are not communicated across the Army.

In an attempt to improve this situation, the OA Program is conducting an investigation on the effectiveness of using a previously developed methodology, funded by ARI, called the Task Knowledge Commonality Analysis Method (TKCAM). As noted in Figure 32, what TKCAM offers is a standardized and detailed set of procedures for producing a job design especially developed for the Army. Unfortunately, these procedures have not been fully evaluated, and the possible increased efficiency of automating some of its components has not been addressed. The OA Program and ARI research staff are working together to evaluate and adapt TKCAM to current Army requirements for rapid and robust MOS design. If this investigation indicates that TKCAM could be a valuable tool for the Army, then the OA Program will promote its use by Army proponents. OA Program staff are also looking at job design tools developed by the Navy. Should these

WORLD WIDE WEB PRESENCE

MOS data and job analysis tools

Data collection

Expert advice and lessons learned

Occupational analysis resources

Tutorials on OA techniques and tools

News concerning the Army's OA Program

Figure 34



tools prove useful for the Army, then they will be adapted by the OA Program and their use encouraged.

Crosswalking Military and Civilian Jobs. In coordination with other parts of ARI, the OA Program is working to have the Army take advantage of current developments in the federal civilian sector (Figure 33). The first of these is the replacement of six federal systems for classifying jobs (e.g., the Census Bureau's) into one revised Standard Occupational Classification (SOC). For the first time, military occupations will be included in the SOC. ARI and the OA Program are



interested in developing a system that will allow for the crosswalking of military and civilian jobs. If a good comparative method can be developed, then this will be of benefit to the Army in recruiting from the civilian sector. It will also be advantageous to Army personnel who are leaving military service and need to find employment in the private or government sectors.

A second development is the Department of Labor's modernization of the Dictionary of Occupational Titles (DOT). The next edition will be an electronic database called O*NET that describes jobs in terms of the workers' characteristics, the work done, and the job settings. Keyed to the revised SOC, O*NET will readily be accessible to a wide number of military and civilian organizations. Currently, ARI is evaluating the power and limits of O*NET to meet the Army's needs in MPT. The new SOC/O*NET complex promises to give the Army powerful new tools to efficiently manage the never-ending flow of personnel between the civilian and military sectors.

World Wide Web Presence. The OA Program is exploring the potential of establishing a World Wide Web presence, see

Figure 34. Due to recent advances in information technology, it is now feasible to provide a wide range of services over the Internet. Testing is being done to evaluate simple data collection using Internet connections. In the future, because of platform independence and distributed processing capabilities, more sophisticated forms of data collection and analyses will be possible using the Web. For example, embedded artificial intelligence techniques could be used to make computer-assisted surveys more adaptable and more like a structured interview. Artificial experts could potentially be built to help design surveys and analyze data. It will also be possible to conduct live computer-based conferences with audio and video, so that expert advice and lessons learned can be exchanged effectively and inexpensively over the Internet. A Web presence will also allow the OA Program to make available occupational analysis resources such as articles, project summaries, and other net resources at little cost. The use of the Web will give the OA Program the ability to economically distribute multimedia tutoring programs or new tools and procedures to its customers. Finally, a Web page would be an ideal way to notify customers of occupational analysis news that affects the Army.

Humanitarian Relief	
• Proponent:	Engineer School
• MOS:	51R, Interior Electrician
• Purpose:	Evaluate training effectiveness after Hurricane Andrew Relief Effort
• Findings/Outcome:	New tasks needed to be added to training: Engineer School changed training curriculum to increase mission readiness

Figure 35

Two Brief Examples of OA Projects

In this last section, descriptions of two other projects will be presented to convey the variety of work performed by the OA Program. The first project described here deals with changing the training for interior electricians so that they can more effectively operate humanitarian relief efforts. The second project description focuses on collecting critical training information from the reserves.

Humanitarian Relief. Based on observation of MOS 51R (Interior Electrician) participation in the Hurricane Andrew Relief Effort, the U.S. Army's Engineer School decided that its training curriculum for this MOS could be improved (Figure 35). The OA Program was asked to develop and analyze a survey regarding the performance and training of tasks related to what were then categorized as operations other than war (OOTW). Working with school staff in a dynamic and participatory fashion, a computer-based survey was developed, delivered, and analyzed in a short period of time. The results of this survey indicated that a number of changes should be made to the MOS 51R training program. These changes were congruent

Looking at the Reserves	
• Proponent:	JFK Special Warfare Center and School
• MOS:	37F, Psychological Operations Specialists
• Purpose:	MOS converted to Special Operations, needed to examine job requirements (e.g. knowledge and skills)
• Findings/Outcome:	Data being analyzed

Figure 36

with the school staff's estimation of needed improvements. With the aid of solid empirical data collected by OA staff, the school was able to improve their training curriculum to meet the evolving activities of the Army.

Looking at the Reserves. Finally, the last project described here (Figure 36) examined the Psychological Operations Specialist (37F) MOS training taught at the JFK Special Warfare Center and School. This MOS has a high percentage of reservists and was recently placed under Special Operations. The school, therefore, needed to evaluate the training requirements for the specialty in order to update and improve the instructional curriculum. This is a current OA Program project and data collection is still ongoing. Consequently, only initial data analysis has been completed. This effort is one of the first computer-assisted survey projects to obtain data from the Army reserves. The analysis of this data should greatly help the school refine its training for this MOS. This project has been a good test case for surveying reservist soldiers, and will serve as a model for future endeavors where survey collection has traditionally been difficult.

Summary

To conclude, the Occupational Analysis Program has started an endeavor to modernize and improve Army job analysis and design. This process has been implemented as the ODARS system, and is based on two critical assumptions: (1) good occupational analysis is crucial to developing and maintaining an effective fighting force; and (2) with the rapid changes occurring in the Army and the world, it is essential to acquire new methods and technologies to perform occupational analysis in a timely manner. At this time the OA Program has demonstrated that by using computer-assisted survey technology it can give the Army high quality and rapid responses to job analysis needs at a substantial cost savings. Computer-based communication and database technologies will enable the OA Program to further increase the speed, flexibility, and accessibility of occupational analysis products for its Army customers.

Looking to the immediate future, the OA Program intends to expand on its success by enhancing the job design process with conceptual tools like TKCAM. Leveraging recent developments by the Department of Labor to update its job database technology (O*NET), ARI will be able to better exploit the commonalities between military and civilian jobs, especially for recruitment and transition back to the civilian workforce. Encouraging the advance of computer-assisted survey technology, OA will pursue the development of platform independent surveys using the World Wide Web, and the possibility of incorporating artificial intelligence methods in survey software to increase their flexibility and adaptability. To close, ARI and the OA Program will continue to explore and utilize advances in survey, statistical, and computer technology in order to provide the Army with world class occupational analysis for the benefit of all its customers from field commanders to training developers to the individual soldier.

Glossary

Duty. A set of tasks that represent a major portion of the work associated with a position.

Job. A group of positions that are similar with respect to major or significant tasks.

Job Analysis. The process of obtaining, organizing and presenting job information in a meaningful fashion for a specific or general purpose.

Job Content. The set of duties and tasks required to perform a job.

Job Description. A brief, detailed accounting of the work activities, environment, tools, etc. associated with a job.

Job Design. The process of determining what combination of duties and tasks should be grouped together to form a position or job to meet the needs of an organization.

Job Performance. The actions of an individual related to completing a set of duties or tasks that can be measured quantitatively or qualitatively.

MOS Structure. The set of work unit descriptions that designate all positions for a MOS, including single positions where an individual is the only representative of an MOS.

Occupation. A general class of jobs that is independent of organization structure.

Occupational Structure. See MOS structure.

Position. A collection of tasks and duties designed to be performed by one person.

Task. A discrete unit of work performed by an individual for a specific purpose. Composed of a set of task elements. A task is usually described by a statement that consists of an action and an object that is the recipient of the action. It may also include qualifying information to distinguish similar tasks from each other.

Task Element. The smallest unit of analysis that is meaningful for describing a work activity. The next lower level of detail would concern physical motions.

Work Unit. A set of positions, for a MOS, that are designed to work together to accomplish a specific job. Work units are described in the AR 611 series using grade, number of positions, MOS, and other identifiers.