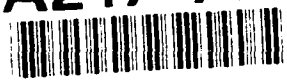

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AFTER-ACTION REPORT FOR THE OPERATIONS DESERT SHIELD/DESERT STORM TECHNICAL DATA DIRECTORY PROJECT

Thomas P. Christie, *Project Leader*
Richard A. Fejfar

January 1992

Prepared for
Office of Under Secretary of Defense for Acquisition

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(U) This document is an After-Action Report (AAR) for the Desert Shield and Desert Storm Technical Data Directory Project, a project undertaken at the direction of the Office of the Under Secretary of Defense for Acquisition (USD(A)) to compile a directory of data files as a result of the Gulf War. This AAR addresses the process by which technical data on materiel systems were collected during the preparation for, and conduct of, the Gulf Conflict. The objective of this effort was to assess how Department of Defense policies and organizations supported the collection of technical data; to identify strengths and weaknesses; and to recommend changes in policy, organizations, and responsibilities as they apply to technical data collection.

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AFTER-ACTION REPORT
FOR THE OPERATIONS DESERT SHIELD/DESERT STORM
TECHNICAL DATA DIRECTORY PROJECT

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PREFACE

This report was produced by the Institute for Defense Analyses (IDA) in response to contract MDA903-89-C-0003, task number T-G9-928, from the Under Secretary of Defense for Acquisition (USD(A)).

The IDA Technical Review Committee for this report was chaired by Mr. Andre R. Barbeau. The reviewers were Mr. William Barlow, Dr. William Buchanan, Dr. Gary Comfort, Mr. John Donis. Mr. Richard Miller, and Dr. Lowell Tonnessen.

INTRODUCTION AND SUMMARY

INTRODUCTION

This document is an After-Action Report (AAR) for the Desert Shield and Desert Storm Technical Data Directory Project, a project undertaken at the direction of the Office of the Under Secretary of Defense for Acquisition (USD(A)) to compile a directory of data files as a result of the Gulf War. This AAR addresses the process by which technical data on materiel systems were collected during the preparation for, and conduct of, the Gulf Conflict.

The objective of this effort is to assess how Department of Defense policies and organizations supported the collection of technical data; to identify strengths and weaknesses; and to recommend changes in policy, organizations, and responsibilities as they apply to technical data collection.

This AAR's implementation was planned in three phases:

- Gathering information from data collectors, data catalogers, potential data users, and policy makers by questionnaire or by interview.
- Completion of a preliminary report, followed by a by-invitation conference to discuss the findings and proposed recommendations.
- Publication of a final report.

A. BACKGROUND

Operations Desert Shield and Desert Storm provided a unique opportunity to collect technical data on the performance of materiel systems during a conflict. Most defense experts agree that such data are of value in the assessment of our force capability and in making decisions that affect materiel development and acquisition, combat development, and force structure. To the extent that such decisions are affected by the technical data collected during peacetime or in a conflict, it is important that these data be comprehensive, accurate, and timely.

There are, in general, three spheres of information collection in combat – historical chronologies, operational lessons learned, and technical data on materiel systems.[1] Particular groups or organizations tend to concentrate on collection within one sphere. There may be, however, some degree of overlap among the spheres. This study focuses on the collection of technical data, although the study occasionally discusses collection efforts aimed at historical or operational matters. The study also touches on a few instances where technical data were collected during these historical or operational collection efforts.

This study considers technical data to be pieces of information, both quantitative and qualitative, that provide some measure of the operational effectiveness and suitability of materiel systems. A system's operational effectiveness is determined by its ability to perform its required function while surviving. Operational suitability is the degree to which the system can be used in the field, including its operational availability and maintainability. The most prized of technical data are "hard numbers" that describe performance in objective quantifiable terms, e.g., the estimated probability of hitting a target under specified conditions, the estimated probability of killing a target given a hit, the estimated damage to a combat vehicle caused by a specific threat, the mean time or miles between failure, communications call completion rate. Most people have these data in mind when referring to technical data (this study calls such data quantitative technical data). Another form of technical data, which some refer to as technical information, is more subjective. These data generally relate to suitability and most often are gained through surveys or questionnaires (referred to as qualitative technical data). Quantitative data tend to be more difficult to collect and may be more perishable.

Desert Shield began in August 1990 with the initial deployment of United States military forces to the Persian Gulf area. As is well known, this United States commitment was expanded and was reinforced by other nations to form the Coalition against Iraq. The United Nations deadline for the Iraqi withdrawal from Kuwait was set at 15 January 1991. By late December 1990, the lack of meaningful diplomatic progress made it appear inevitable that an armed conflict would occur. Before this time, individual Services had made a variety of efforts to gather data on the buildup and to prepare for gathering combat data during the increasingly likely conflict. Concern arose within the Office of the Under Secretary of Defense for Acquisition (USD(A)) that some collection efforts appeared to be foundering because of lack of high-level support or denial of access to the theater.

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[1] These collection spheres cover friendly forces. The intelligence community performs a similar collection function, but it is focused on the opposing forces.

Beginning in January 1991, several action officer meetings were held at the Pentagon to discuss Service collection efforts and to assist in removing impediments to those efforts. On 31 January, the Deputy Secretary of Defense directed the Acting USD(A), in coordination with the Secretaries of the Military Departments, the Chairman of the Joint Chiefs of Staff, and other departmental officials to develop and carry out a plan for the compilation of a technical database on the performance of weapon systems in Operations Desert Shield and Desert Storm (Reference 1).

The Acting USD(A) tasked the Assistant Deputy Director for Tactical Warfare Programs (TWP) to coordinate the overall data collection effort (Reference 2). On 1 February, the Director for Live Fire Test and Evaluation (LFT&E) requested that the Institute for Defense Analyses (IDA) provide support to OSD in defining issues, determining data requirements, and establishing a data structure with documentation standards. On 7 February, IDA provided to OSD a list of candidate systems and a set of data prioritization rules. The following week the Services briefed OSD on their data collection efforts, both ongoing and planned. Mission Area Working Groups were established to refine the issues, specify the data needed to address them, and identify likely data sources.

The output of the Working Groups formed the basis of a draft data collection plan, which was reviewed by the Conventional Systems Committee (CSC) on 5 March. After modifying the draft somewhat, OSD published the final plan on 12 March as the Operations DESERT STORM and DESERT SHIELD Technical Data Collection Plan (Reference 3), with a transmittal memorandum from the Acting USD(A) (Reference 4). The plan was quite ambitious in its collection expectations, considering the late date at which it was published (although much of the content had been known before that date).

The memorandum transmitting the collection plan also directed that the end product of the effort be a data directory. The collection plan established the general procedures for Service submissions to OSD for the data directory, which was to be a compendium of databases and documents containing technical data from the Gulf War. The objective was to provide a research tool for analysts and staff members responsible for activities such as compiling lessons learned, writing combat histories, analyzing doctrinal issues, and assessing system performance. IDA was also tasked to support OSD in the preparation of the directory. There were two versions of the directory: the preliminary version published on 10 July 1991 (Reference 5) and the final version on 11 October 1991 (Reference 6). The data directory consists of two volumes. Volume I includes a set of classified summary sheets and a PC-based automated directory on diskette with a built-in retrieval system. Volume II is a hard copy version of the directory, with over 8,600 data sources.

The difficulties and delays met in establishing an effective data collection program indicated that there may be areas in which the process could be improved. This provided the impetus for an after-action report addressing the process by which technical data are collected and cataloged. Thus, this AAR was initiated by a 19 August 1991 memorandum from the Deputy Director for Tactical Warfare Programs (TWP) in OUSD(A) to various OSD offices, the Director J-7 of the Joint Staff, the Military Services, and the Defense Intelligence Agency (Appendix A). The memo established the study's objective, concept, and general schedule.

B. OBJECTIVES AND ISSUES OF THE AFTER ACTION REPORT

1. Objective

The objective of this AAR was to assess the technical data collection processes that the Defense Agencies and the Services used during Operations Desert Shield and Desert Storm. In particular, the study was intended to:

- Identify aspects of data collection that were particularly successful.
- Identify aspects where substantial improvements could have been made.
- Identify the root causes of the observed impediments to data collection both procedural and organizational.
- Recommend to OSD any changes in policy, organization, and responsibilities that would improve technical data collection in a future war or during crises.

2. Issues

To focus the AAR, the following issues were included in the OSD tasking memo:

- What data collection procedures, including organizations identified to implement them, had been established before Operation Desert Shield?
- To what degree were the established collection procedures successful during Operations Desert Shield and Desert Storm? In particular, what were the most notable successes and shortcomings?
- What *ad hoc* procedural or organizational changes were implemented during the collection effort, and to what degree were they successful?
- What were the root causes of shortcomings encountered? Were these shortcomings evident in procedures, organization, or both?
- What changes should be made to policy, organization and responsibilities, and at what levels should these changes be made?

C. CONCEPT AND SCOPE OF THE AFTER ACTION REPORT

As discussed earlier, this AAR was planned in three phases.[2] The first phase focused on gathering information about the collection of data and about perceptions of their value. Questionnaires were sent to individuals and agencies known to have been involved in the collection of technical data or in the cataloging of the data. In addition, a number of policy or decision makers in OSD, the Joint Staff, and the Services have been interviewed (see the appendices for more details about the questions asked, the respondents to the questionnaires, and the policy makers interviewed). Contact with potential data users has been limited to those users who were involved in the collection or cataloging of data. Most other potential users have not yet had enough access to the collected data to be able to address the issues authoritatively.

The second phase began with the publication of IDA's draft preliminary report on 21 November 1991 (Reference 7). The report consisted of early versions of Chapters I and II of this report, plus a set of suggested improvements that formed the basis for the remedies of this report's Chapter III. The report's findings and suggestions were discussed at a by-invitation conference held on 4 December 1991 at IDA in Alexandria, Virginia. The conference was attended by 29 people from the Services, OSD, the Joint Staff, and two Defense Agencies. All attendees had experience and interest in the collection, cataloging, or use of technical data collected during Operations Desert Shield and Desert Storm. The conference generally supported the preliminary report.

During the third and final phase of the AAR, the remaining policy maker interviews were conducted and this final report was written. Comments made during the conference and the interviews have been incorporated into this report. The submission of this final report to the USD(A) completed the AAR.

D. ASSUMPTIONS

To bound the scope of this study, some assumptions have been made. These assumptions define the starting point for the study and also limit, to some degree, its eventual recommendations. The assumptions are as follows:

1. Warfighting, including its preparation and its support, takes precedence over collection of data. Nonetheless, for most combat situations, there is some level of data collection that can be done without interfering with the warfighting.

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2 This AAR is being conducted in the three phases described here. The entire AAR is sometimes called Phase II of OSD's data collection effort, where Phase I included the collection plan and a data directory.

2. Technical data on the operational performance of materiel systems, including both effectiveness and suitability, is of value for several reasons:
    a. To discover materiel deficiencies that require near-immediate operational work-arounds, and to suggest what such work-arounds might be.
    b. To identify materiel inadequacies that necessitate
        - rapid product improvement,
        - quick-reaction procurement of workable substitute equipment, or
        - intermediate-term product improvements of existing systems.
    c. To determine valid estimates of the performance of our materiel systems, particularly weapons, sufficient to
        - allow accurate assessment of our force capability and
        - determine requirements for next generation systems.
3. In most cases it should be the responsibility of the Services and Defense Agencies to collect, catalog, and make available the technical data concerning materiel systems under their purview.

The second assumption suggests that there are three valid reasons to collect technical data on materiel systems. The first two are supported by the work of a wide variety of organizations, including materiel development commands, commodity commands, logistics representatives, program managers, and system contractors. Although the collection of technical data plays an important role in these endeavors, the primary objective is to find and fix problems as rapidly as possible. The third reason, however, requires a comprehensive data collection effort of broad scope and more distant horizon. This AAR focused on such broadly scoped data collection efforts.

Chapter I of this AAR describes the data collection procedures employed during Operations Desert Shield and Desert Storm. For each Service, Chapter I examines the procedures that had been established before Operation Desert Shield and how these procedures were implemented. It then describes what additional *ad hoc* measures each Service took to expand the collection of technical data, as well as what cataloging procedures the Services used. Chapter II examines the successes and shortcomings of the data collection efforts described in Chapter I.

Chapter III, the final chapter, proposes remedies for the shortcomings and recommends specific changes to policy, organizational structure, and responsibilities regarding data collection. These recommendations are intended to institute changes that capitalize on the successes of the Gulf War collection effort and remove some of the impediments that arose.

SUMMARY

Each Service had established procedures for data collection prior to Desert Shield and attempted to implement those procedures after commitment of U.S. forces. Elements within all Services recognized the importance of gathering technical data and made a variety of efforts to do so, some as part of established procedures and others on an *ad hoc* basis. Appropriate organizations within the Services took the initiative to determine data needs and to attempt to dispatch data collectors to the theater. Although such attempts sometimes were initially thwarted, persistent efforts often resulted in the deployment of collectors.

A. SERVICE AND DEFENSE AGENCY DATA COLLECTION EFFORTS

The Services and Defense Agencies deployed varying numbers of teams and individuals to collect data. This document describes most of these efforts in detail in Chapter I. Selected collection efforts are highlighted below.

1. Army Data Collection

In September 1990, the **Army Materiel Systems Analysis Activity** (AMSAA), a part of Army Materiel Command (AMC), attempted to activate a standby procedure for collecting data on equipment performance and damage, but the request for theater clearance was denied. AMSAA also tried to deploy trained collectors that were gathering data on failure rates during exercises in Germany. Again theater clearance could not be obtained.

Two teams were eventually deployed to assess combat damage and combat performance. The first team, the **Battle Damage Assessment Team (BDAT)**, was deployed to Southwest Asia (SWA) to assess battle damage incurred by Army ground combat vehicles. In December 1990, a specialized 12-man collection team was trained and placed on stand-by. The team deployed on 18 January 1991 and accompanied the 1st Infantry Division during the ground war. The BDAT was very successful in assessing combat damage to Army and Marine Corps vehicles, although it was often difficult to locate these vehicles. Furthermore, the damaged vehicles sometimes had been disturbed. The BDAT often assisted the operational units in their investigations and after-action studies. The team remained in SWA until early April.

The **Weapon System Combat Performance Assessment Team (WSCPAT)**, the second of the two materiel assessment teams, was formed in late

February 1991 and deployed in early March. The 53-man team was led by a colonel, and it began data collection in SWA on 18 March. As was true with the BDAT, the WSCPAT was not self-supporting and encountered support problems. The majority of the team stayed until early May, during which time 5,000 people were interviewed and over 4,000 questionnaires were completed. Data collection continued in CONUS for those units that redeployed from SWA before they could be surveyed. The largely qualitative data that were gathered probably address operational suitability better than operational effectiveness.

In August 1990, the **Center for Army Lessons Learned (CALL)** began efforts to deploy a team to SWA, but initial requests for access were denied. In December 1990, theater clearance was granted for a small group; in late January 1991, CALL deployed an in-country team chief to prepare for the arrival of a full contingent. Eventually 72 collectors reached the theater, mostly in late February or early March. The group generally conducted interviews with officers, non-commissioned officers (NCOs) and soldiers, mostly after hostilities had ceased. Although the team addressed mainly operational issues, it collected useful qualitative information on system performance.

As part of its **Logistics Assistance Program**, AMC fields peacetime teams that provide engineering and technical assistance directly to units. At the start of Desert Shield, each major Army unit had attached to it such a team. These teams deployed with their supported units and were later augmented in theater. Although their function was not to collect data, their method of operation is one that Army data collectors might emulate.

In mid-February 1991, HQDA sent a Ballistics Research Laboratory (BRL) analyst to Saudi Arabia to gather data on the **performance of Patriot against Scud missiles**. He spent about five weeks in theater visiting Scud impact points to assess the state of each missile when it struck the ground and whether its warhead functioned on impact.

The Army's Operational Test and Evaluation Command (OPTEC) deployed two system evaluators to theater to collect operational data on the **Joint Surveillance Target Acquisition Radar System (JSTARS)** and on **Global Positioning System (GPS)** receivers. The JSTARS evaluator arranged to be invited to the theater as a mission planner, with the primary mission of collecting data. The second OPTEC evaluator was able to gather useful operational data on the GPS receivers.

At the direction of the Army Vice Chief of Staff, a five-man team headed by the Deputy Chief of Military History visited the theater in April 1991 to investigate an engagement known as the **Battle of 73 Easting**. The team reconstructed the battle in detail for inclusion in the Army's Simulation Network (SIMNET) for training.

2. Navy Data Collection

About 40 analysts from the **Center for Naval Analyses** (CNA) are deployed with operational elements on a full-time rotational basis during peacetime. Although their primary duty is to provide analytical support to the commanders and staffs, they collect a variety of data. In late 1990, there were nine CNA analysts with ships and units deployed in support of Desert Shield, including 2 with USMC units. At the request of the naval component commander, CNA increased the number of analysts to 18 by early January 1991. The CNA analysts gathered extensive amounts of operational and technical data. Also, the analysts were able to witness and record the decisions of commanders and their staffs. Some difficulty was encountered in obtaining bomb damage assessment data.

3. Marine Corps Data Collection

The Commandant of the Marine Corps (CMC) placed a high priority on collection of data for lessons learned. The CMC tasked the Marine Corps Combat Development Command (MCCDC) to direct a Corps-wide effort to collect, analyze and disseminate operational experiences in SWA. MCCDC sent a three-person team to the Gulf in September 1990 to provide instruction on the preparation of after-action reports in **Marine Corps Lessons Learned System (MCLLS)** format. The team also briefed units on the preparation of the unit **command chronology**, which each battalion and squadron is required to submit in support of the Marine Corps historical program.

In early October 1990, the CMC tasked the **Marine Corps Research and Development Command (MCRDAC)** to send a team to SWA to identify materiel problems, correct them if possible, and document any problems not immediately resolvable. A 26-man team headed by a full colonel (the PM, Ground Weapons) was deployed to the theater on 19 October 1990 for 11 days. The team was functionally organized and visited users of all types of USMC equipment.

The CG, MCCDC established the **Marine Corps Operational Analysis Assessment Group (MCOAAG)** in October 1990 to determine the issues to be addressed, expand the data collection effort, and, finally, catalog and analyze the data from the Gulf War. The MCOAAG oversaw the fielding of an in-theater collection team.

In late 1990, MCCDC formed the **Battle Assessment Team (BAT)** (also called the Battle Assessment and Liaison Team, or BALT) and assigned a full colonel to head the team. The team consisted of about 25 people, organized into 14 functional areas. The team arrived in theater on 21 February 1991, just 2 days before the ground war began. The

backing of the Marine Corps component commander assured the team of support and cooperation. While in theater, the team expanded to almost 75 people. Survey forms and tape-recorded interviews were used to gather data, and some 15,000 survey forms were completed. The team was not yet ready to gather data when ground combat began, so almost all surveys and interviews were completed after-the-fact. The data tended to be subjective and qualitative. A majority of the team remained in theater until April.

4. Air Force Data Collection

The Air Force has a highly **automated peacetime data collection system** on which it also relies to collect technical (and other) data in wartime. These databases are generally distributed among the Air Force major commands (MAJCOMs), and they facilitate the gathering of much technical data from locations outside the theater.

The Air Force has a well-organized peacetime program for placing military **historians** at MAJCOMs and at various wing headquarters. Eventually, more than fifty historians were employed in support of the Gulf War, with focus more on historical and operational issues than on the collection of technical data.

The **Combat Operations Assessment and Reporting Program (COARP)** was developed by the Survivability/Vulnerability Information Analysis Center (SURVIAC), a government-sponsored repository for survivability data. Most of SURVIAC's existing data are from the Vietnam War, collected by teams whose sole mission was gathering damage and loss data. In October 1990, SURVIAC began to develop COARP, a program similar to that used in Vietnam, for collection of data on combat damage, losses, and repairs of aircraft in the Gulf. SURVIAC completed a draft collection plan in mid-December and a training syllabus in mid-January 1991. SURVIAC eventually trained 30 active duty Air Force engineers and technicians, but attempts to deploy a team to SWA foundered because of the lack of theater clearance. In early May 1991, Tactical Air Command (TAC) Headquarters tasked the Tactical Air Warfare Center (TAWC) to collect battle damage and repair data from TAC units after the units had redeployed to their home stations. The team visited all TAC units that reported any aircraft damage or losses. Some repair records had already been discarded, but generally SITREPS and aircraft damage reports were available. Photographs and video tapes of aircraft damage were helpful.

In late February 1991, HQ Air Force Systems Command (AFSC) directed the deployment of a **Munition Effectiveness Team** to document the performance of Air

Force air-delivered munitions against fixed and mobile targets. The seven-man team consisted of a lieutenant colonel team chief and six captains. The team was organized on 28 February and departed 2 March with a complete data collection kit but without a detailed collection plan. Theater clearance was arranged through Defense Intelligence Agency (DIA) channels. Clearance was granted for no more than 15 data collectors, roughly half for this Air Force effort (the other half of the authorization was for a combined team from the DIA and the Defense Nuclear Agency (DNA)). The team did not have written authorization to conduct its mission, which may have caused sponsorship problems. The team encountered some difficulty getting to targets before the ground troops destroyed them. Nonetheless, valuable data were gathered on munition effectiveness against fixed targets.

In early February 1991, HQ TAC tasked TAWC to deploy a team to theater to collect data on F-15 **air-to-air engagements**, particularly the causes of known failures. TAWC deployed a three-man team led by a lieutenant colonel. There was no significant predeployment training, and the team developed its own collection plan and kit. The team was in theater from 13-20 February, and one member visited units in Turkey in late February. The team joined an F-15 Fighter Weapons Instructor Center (FWIC) instructor already in theater . There were some initial sponsorship problems that did not hinder the collection mission. The most difficult data to obtain were the firing parameters of air-to-air engagements and the results of those engagements. Malfunctions of the videotape recorders (VTR) on the F-15 caused a significant loss of hard data.

There was no team dedicated to gather **HARM performance data**, but some valuable data were collected because the F-4G has a fully automated data recording capability on board the aircraft. The pilots viewed the output of the three recorders shortly after their missions and analyzed the recorded results to plan subsequent missions.

The role of the F-117A in the war and the high quality of its on-board recording capability are well known. It is not known if any specific data collection efforts were directed at **F-117A operations and performance**. The F-117A squadron itself has done an in-depth assessment of its operations, and a weapons data base is available.

The **Airborne Warning and Control System (AWACS)** recorded virtually all Desert Storm air operations on magnetic tape. The data tapes are of high quality, but they must be converted to a more usable format. Such conversion is feasible but slow.

5. Defense Agency Data Collection

The **DIA** and Defense Nuclear Agency (**DNA**) jointly deployed an 8-member **Munitions Effectiveness Assessment Exploitation Team** to gather data on the performance of precision-guided munitions against specific hardened targets. This team represented the other half of the CENTCOM clearance for 15 people. The team was deployed with 2 days notice on 1 March 1991. Led by a lieutenant colonel, the team included structural engineers, a weapons effects specialist, a targeteer, and a communications equipment specialist. It was well-equipped and well-qualified, but did not have a formal collection plan. The team gathered detailed structural engineering information on a variety of structures and collected data on the effects of weapons against those structures, including photographs and videotapes. The duration of the team's stay in theater was only 2 weeks. There were some difficulties with in-theater sponsorship.

The **Joint Electronic Warfare Center (JEWC)** dispatched teams to support deployed units and to collect data. The details of these efforts are not known, but they were intended to gather electronic warfare data on Iraqi systems.

6. Collection Efforts of Other Coalition Members

The **United Kingdom** (UK) deployed analysts with British forces, probably as operational analysis (OA) specialists. Also, there was an after-the-fact survey that resembles the combined work of the CALL team and the WSCPAT.

There may have been other collection efforts by Coalition members. In early March 1991, the **French** equivalent of the DNA visited several hardened targets to gather data on the effects of precision-guided munitions against such targets.

B. SUCCESSES IN DATA COLLECTION

There were many successes in the collection of data. The lessons to be drawn from these successes are summarized below. See Chapter II for more details.

1. Prior Relationships Generally Led to Success

Attachments of data collectors to deploying or deployed units generally were successful if some sort of relationship had been established in advance. CNA, the Air Force historians, and the Army's Logistics Assistance Program are examples.

2. Some Teams Dedicated to Data Collection Were Deployed, and They Gathered Data That Otherwise Would Have Been Lost

The collection efforts described in Chapter I indicate that all Services except the Navy deployed groups dedicated to data collection. They were all successful in varying degrees.

3. Specific Keys to Success Were Identified

These include theater clearance and logistical support in theater; the credibility of the collectors and their ability to provide a service; the collectors' ability to earn the backing of operational commanders; and the persistence and resourcefulness of the collectors.

4. Automated On-Board Recorders Collected Valuable Data

There were encouraging examples of the use of automated on-board recorders of video, audio, and digital data. Examples are the F-117A, the AH-64, Aegis, and AWACS.

C. SHORTCOMINGS IN DATA COLLECTION

Many early attempts to deploy collection teams were thwarted by the lack of theater clearance. Although appropriate collection teams were eventually deployed, they generally arrived late. Also, some teams were hurriedly assembled and had too little time in theater to perform their mission. Shortcomings were observed in several areas:

- There Was Too Little Organized Preparation for Data Collection
- The Theater Resisted "Outsiders" Collecting Data
- Coordination Problems Hindered Data Collection Efforts
- Some Support Problems Within Theater Hindered Collection
- There Was Too Little Organized Preparation for Data Cataloging

These shortcomings are summarized below. See Chapter II for more details.

1. There Was Too Little Organized Preparation for Data Collection

There was no early DoD-wide definition of the issues to be addressed by collected technical data. Before the Deputy Secretary of Defense's 31 January 1991 memorandum was signed, there was no written guidance or policy at the OSD level.

There were relatively few data collectors or analysts deployed with operational units at the start of Operation Desert Shield. Thus, there were not many existing relationships

between operational units and data collectors on which to build. This led to the formation of *ad hoc* collection teams that lacked organic support and were unfamiliar to commanders.

Although there were some established procedures for forming data collection teams, no such teams actually existed at the start of Operation Desert Shield. Also, there were no pre-Desert Shield support arrangements in piace. The situation did not markedly improve before the start of Operation Desert Storm. Although attempts were made to deploy collection teams, few collectors reached the theater before Desert Storm began. Most collection efforts occurred after cessation of hostilities. Automated on-board collection means were available for only a few systems, and some of these were not reliable.

2. The Theater Resisted "Outsiders" Collecting Data

The attempts to field data collection teams competed for in-theater resources with all other combat preparation efforts. The theater already had many non-combat people to support (including Service "fact finders"), and there were a number of separate collection groups vying for access. Nonetheless, a reasonable level of support could have been devoted to data collection if a higher priority been given to it. The theater may have been apprehensive about the importance and the purposes of such efforts. There was probably a wariness about possible misuse of the data. The low priority assigned to data collection by the theater was sustained by the DoD when no high-level efforts were made before late January 1991 to overcome the theater's reluctance to allow access to data collectors.

3. Coordination Problems Hindered Data Collection Efforts

The most fundamental coordination problem was the dichotomy between the operational and technical spheres of collection. The operational sphere was under the purview of the Services' uniformed operators, who also typically coordinated theater clearance through CENTCOM's component commands. The technical sphere, however, lay within the chain of the Service Acquisition Executive in the civilian side of the Service. Within the Pentagon, the uniformed Service operators typically interacted with the Joint Staff, while the Service Secretariats dealt with the OUSD(A). Closer coordination between the operators and the acquisition chain might have led to greater theater access.

The three separate spheres of collection – technical, operational, and historical – resulted in multiple attempts to gain theater access, which may have hindered the theater clearance process. A clearinghouse for requests for entry at the Joint Staff or OSD level, with Service counterparts, might have facilitated access to theater.

The intelligence community was involved in the collection of data similar to that discussed in this report, except that it was focused on the opposing forces. The two collection efforts must be linked for objective assessment of weapons performance. The full integration of the intelligence community with operational units and data collectors may not have occurred as frequently as it could have.

4. Some Support Problems Within Theater Hindered Collection

Most collection groups indicated that support problems hindered them in varying degrees. Some collectors arrived without firm written authority, and some lacked a written mission statement. No collection group was self-supporting, so each depended on in-theater sponsors. Intra-theater transportation, which was indispensable in data collection, was hardest to obtain. Other problems included poor communications and a lack of navigational equipment. Administrative, maintenance, and supply functions were distractions.

Most collection teams were sponsored by in-theater headquarters that had many other responsibilities. In most cases, the intended sponsorship arrangements did not work well. Also, collectors sometimes had difficulty in getting accurate information on unit and target locations. Even when locations were known, access was sometimes a problem.

5. There Was Too Little Organized Preparation for Data Cataloging

There were few advance preparations made for receiving, identifying, sorting, and archiving substantial amounts of raw data in many different formats. The first step in organizing cataloging should have been to structure the overall collection process. The OSD efforts in publishing a collection plan and compiling the Technical Data Directory were not begun early enough; there were late changes in the format for submission of data sources.

D. INDICATIONS OF THE EFFECTIVENESS OF DATA COLLECTION

Many of the analytic agencies and staffs that require technical data have not yet had access to the data collected during the Gulf War. Nonetheless, there are indications that shortcomings in the technical data collection process reduced the quality and, in some cases, quantity of useful data. In some cases, the vast amounts of data in incompatible formats have hindered the extraction of the information needed for analysis. There are, however, a number of potential remedies for the shortcomings in the present collection system.

E. SUGGESTED REMEDIES FOR SHORTCOMINGS IN DATA COLLECTION

Commanders and staffs will tend to resist externally organized data collection efforts. To minimize this resistance, DoD should establish a well-defined institutionalized program that provides some near-term benefits to commanders without imposing a burden. Data should be collected regularly during peacetime and crises. This paper proposes suggestions, arranged to satisfy four major goals, to remedy observed shortcomings by capitalizing on observed successes:

- Establish Data Collection Policy, and Institutionalize the Collection Process Based on That Policy
- Clearly Define Responsibilities With Respect To Collection
- Coordinate and Support the Needed Collection Efforts
- Exercise and Experiment During Peacetime, and Deploy During All Crises

These suggestions are summarized below. See Chapter III for more details.

1. Establish Data Collection Policy, and Institutionalize the Collection Process Based on That Policy

a. Publish DoD-wide data collection policy

Develop written DOD-wide policy that provides broad guidance on technical data collection, including objectives, scope, definitions, priorities, and responsibilities.

b. Define the issues

Define a clear set of issues to be addressed by the data to be collected. The definition process must include OSD, the Joint Staff, the Services, and appropriate Defense Agencies, and it must focus on major resolvable issues. Prioritize the issues, and require comparisons of system design requirements with how the systems were actually employed.

c. Determine the data required to address the issues

Determine the minimum data required to address the defined issues. Focus on technical data in an operational context, but consider all collection spheres.

d. Determine those data that can be collected by existing means and those that require dedicated collection teams

A substantial amount of automated data collection occurs regularly, especially in the area of logistics. However, certain issues will probably require extraordinary procedures to collect needed data. Two such issues concern the assessment of battle damage incurred by our own systems and the objective determination of weapons performance.

e. Determine the best combination of dedicated collection means

Different types of data generally will entail differing means of collection. There are four general approaches to dedicated collection:

- Assigning collectors to units or headquarters – in peacetime, if possible, to establish relationships and to allow deployment with the units.
- Deploying specially trained and equipped collection teams – but consider the need for theater access and the support burden on the theater.
- Assigning a collection mission as a secondary duty to staff members of deployed or deploying units – probably the last resort.
- Equipping military systems of all types with automated on-board data collection means to reduce the need for human collectors – but procedures for data recovery and retention must be established, and maintenance must be planned.

The individual Service or Agency will determine which combination of collection means is most appropriate. Coordinate internal technical collection efforts, and interact with collection efforts outside the Service (such as those of another Service or SURVIAC).

f. Place increased emphasis on automated on-board data recorders

Improve the automated recorders on aircraft, and expand their use on ground systems and ships. Address the imbedding of such recorders in materiel systems during the systems acquisition process. The devices must be nonintrusive, low-risk, and inexpensive. In designing recorders, consider the needs of both analysts and engineers; provide for extraction of the data elements needed for analysis.

g. Provide high-level interest in data collection

It would be easier to obtain support from the operational commanders if there were evidence that data collection has a hign priority among senior DoD military and civilian leaders. Expectations, however, must be reasonable.

2. Clearly Define Responsibilities With Respect To Collection

a. Services define collection efforts to satisfy OSD and own needs

The Services or Agencies that develop and field materiel systems should continue as principal collectors of technical data for those systems. Each Service should identify the collection means required to satisfy OSD needs and any additional needs of the Service. Services should clearly define all internal organizational responsibilities for data collection. Also, Services should control centrally requests for theater access and should establish priorities for access that consider data collection.

b. OSD and the Joint Staff jointly coordinate the DoD-wide collection efforts

OSD and the Joint Staff should jointly coordinate the effort to develop policy and to institutionalize technical data collection within DoD. OSD should assign an OUSD(A) element the responsibility to provide OSD oversight of the technical data collection process. The Joint Staff should participate to ensure that all joint issues will be addressed through established collection procedures. The Joint Staff should take the lead in all matters dealing with the CINCs, whose cooperation will be needed if collection efforts are to succeed. The Joint Staff should consider the value and feasibility of improved coordination of Service collection and analysis agencies during joint operations.

c. OSD and the Joint Staff address any special coordination needs

One area that may require exceptional coordination is the procedure for establishing the linkages between shooters and targets to assess weapons performance; another involves support for imbedding data recorders in military systems during the acquisition process.

d. CINCs support technical data collection

CINCs should be responsible to support technical data collection efforts, but fighting the war has top priority and the overall collection effort must not be a burden.

3. Coordinate and Support the Needed Collection Efforts

a. Coordinate historical, operational and technical collection efforts

Integrate efforts where possible; if not, coordinate them. All three spheres have legitimate needs for information. Strive for efficiency of coverage; minimize the number of separate groups to be supported. Stress the relationship between operational and technical.

b. Integrate intelligence

Intelligence assets must be integrated into the data collection process to identify the effects of specific engagements.

c. Assign collectors to units during peacetime whenever possible

Such assignments should build relationships that improve support, access, and deployability. Consider assigning Reserve Component members such missions.

d. If teams are to be deployed, verify their support arrangements

Ad hoc support arrangements generally did not work well during the Gulf War. If dedicated teams are planned for deployment, consider the degree to which they will be self-supporting, especially in transportation.

e. Field prepared collectors

Teams and individuals deployed to collect data should have clear mission statements and written authority. Consider how collectors might help operational commanders. Select people with the right skills, background and attitude. Train them, provide them a collection plan, and equip them to do the jobs defined in their mission statements. Blend military and civilian skills. Use augmentees, including Reservists, where possible.

f. Be prepared to deploy collectors early

In general, data collectors should deploy at the same time as committed forces. They should certainly be deployed before hostilities begin, if the situation allows.

4. Practice During Peacetime Exercises, and Deploy During All Crises

There are frequent joint, combined, and single-Service exercises in peacetime. Use these opportunities to train the collectors, provide lessons learned on data collecting, assist commanders in training, and acquaint commanders with data collection. Once data collection procedures have been institutionalized, they should be put into practice during any crisis. If Reserve Component collectors are used, allow them to train with their associated units. The ability to respond to a crisis will indicate DoD's level of preparation; the extent to which collection occurs will indicate how much value DoD places on data collection.

F. RECOMMENDATIONS

The remedies discussed in the preceding section provided the basis for the recommendations listed below. In particular, there is a decided need for definitive DoD-wide policy on data collection. See Chapter III for more details about all recommendations.

1. Recommendations on Policy

- Definitive DoD policy on technical data collection should be established at the Secretary of Defense level, with clear responsibilities, issues, and priorities. Policy should set procedures for data access and should define data directories.
- There should be continuing oversight of the data collection process, including periodic review of policy, preparation, and degree of success in collection.
- There should be an expectation within DoD that technical data will be collected during peacetime exercises and during crises and hostilities.
- There should be expanded use of automated data collection devices on military systems, with systematic review during the materiel acquisition process.

2. Recommendations on Responsibilities

- The Service or Defense Agency fielding an item of equipment should have the responsibility to collect, catalog, and analyze technical data on that item in accordance with DoD policy.
- The USD(A) should lead the development of DoD policy and should oversee the planning, preparation, and execution of measures supporting DoD collection policy, in coordination with the other OSD principals, the Joint Staff, the Services, and the appropriate Defense Agencies.
- The Joint Staff should participate in the development of DoD collection policy, interact with the CINCs, coordinate access of collectors, and consider expanding the coordination among Service collectors in joint matters.
- OSD and the Joint Staff should jointly identify and resolve multi-Service and multi-Agency issues.
- CINCs should support technical data collection to a degree consistent with warfighting responsibilities.

3. Recommendations on Organizational Structure

- No new organization or office should be established above Service level to collect or catalog data.
- The Services and appropriate Defense Agencies should be given maximum latitude in organizing their own collection efforts.

CHAPTER I

SERVICE AND AGENCY COLLECTION PROCEDURES -- ESTABLISHED AND *AD HOC*

I. SERVICE AND AGENCY COLLECTION PROCEDURES -- ESTABLISHED AND *AD HOC*

All the Services have established procedures for the development of lessons learned, including the collection of technical data on materiel systems performance. Some of these procedures are extensions of normal peacetime data gathering, while others require implementation of new approaches. This section discusses, on a Service-by-Service basis, established procedures, the degree to which they were implemented by the Services during the Gulf War, and what *ad hoc* measures were taken. Because this study looks more closely at the Services than at the Defense Agencies, only two Defense Agency *ad hoc* collection procedures are addressed. Also, the section briefly describes the manner in which each Service is cataloging its data.

A. ARMY DATA COLLECTION AND CATALOGING

1. Established Collection Procedures

The collection and analysis of system-level technical data within the Army is a function of the U.S. Army Materiel Command (AMC). Army Regulation (AR) 11-33, which defines the Army Lessons Learned Systems (ALLS), requires that the Commanding General (CG), AMC review data from the Equipment Performance and Damage System (EPADS) and the Field Exercise Data Collection (FEDC) reports for combat-relevant lessons. (Both EPADS, a standby collection program, and FEDC, an existing peacetime program, are discussed in more detail below.) AR 11-33 also requires that the CG, AMC "Provide observer team members, as required, to collect technical data for military equipment utilization and adaptations for combat." AMC controls a large number of people with a wide range of technical skills in such organizations as the Army Materiel Systems Analysis Activity (AMSAA), the Ballistics Research Laboratory (BRL), and a variety of commodity commands. The AR does not specifically require that AMC provide observers during combat, although the words "as required" certainly allow for this possibility.

AR 11-33 designates the Commanding General, U.S. Army Training and Doctrine Command (CG, TRADOC) the executive agent for the Army Lessons Learned System (ALLS). AR 11-33 also requires that the CG, TRADOC establish a Center for Army

Lessons Learned (CALL) at Fort Leavenworth, Kansas, to act as focal point in the collection, analysis, and dissemination of combat-relevant lessons Army-wide. Such lessons are sorted into five categories: doctrine, organization, training, materiel, and leadership (DOTML). Oversight of CALL at Headquarters, Department of the Army (HQDA) is the responsibility of the Assistant Deputy Chief of Staff for Operations and Plans, Force Development (ADCSOPS-FD).

Included in CALL's responsibilities is the implementation of the Wartime Army Lessons Learned Program (WALLP), which is to be a sustained effort to collect relevant wartime observations to provide immediate feedback to the observed unit and input to the ALLS. CALL is responsible for training the wartime observers if time permits. After their training, the observers will join the units they are assigned to observe, either as individuals or as part of a team. The WALLP appendix in AR 11-33 does not specifically refer to the collection of technical data on equipment.

The responsibilities of the Chief of the Center of Military History are outlined in a separate regulation, AR 870-5. Since these responsibilities do not relate to the collection of technical data on materiel systems, this study discusses the work of the historians only as it relates to lessons learned on technical data collection.

2. Implementation of Established Collection Procedures

a. Army Materiel Command

As noted above, AR 11-33 requires that AMC review data from the Equipment Performance and Damage System (EPADS) and Field Exercise Data Collection (FEDC) program for lessons learned and directs AMC to provide technical data collectors as required. The Army Materiel Systems Analysis Activity (AMSAA), a part of AMC, attempted to use both EPADS and FEDC to conduct technical data collection during the Gulf War.

EPADS was formulated by AMSAA in the early 1980s as a procedure for collecting data during wartime or crises. The intent was to structure a stand-by team capable of rapid deployment. The team was to have identified positions to be filled by technical experts from the various AMC commodity commands (e.g., Tank-Automotive Command, Communications-Electronics Command). There was to be a data collection plan, a set of procedures, and a number of data collector kits ready for deployment. This concept was partially exercised during Exercise Bright Star in the late 1980s, but has never been fully fielded. Nonetheless, the EPADS experience provided a core around which AMSAA could

have built a team for the collection of technical data on the performance and battle damage of ground systems. In September 1990, AMSAA attempted to activate a data collection team under EPADS, but the request for theater clearance was reportedly denied. Since EPADS would not have been totally self-supporting, the theater did not believe that resources could be spared to support the effort. Two teams were eventually dispatched to Southwest Asia (SWA) to perform the performance and damage assessment functions of EPADS. These teams are discussed below in the section on *ad hoc* procedures.

As a second attempt to get data collectors into theater, AMSAA tried to use existing trained collectors from the FEDC program. FEDC is a sample data collection program whose purpose is to gather data on component failure rates and spare parts usage of Army equipment that is subjected to operating tempos greater than those experienced during normal peacetime use. There are three contractor collector teams normally deployed in Germany, in Korea, and at the National Training Center (NTC). The team from Germany could have been redeployed to SWA, but once again theater clearance could not be obtained.

b. Center for Army Lessons Learned (CALL)

In August 1990 HQDA (DAMO-FDQ) directed CALL to execute the WALLP. CALL began the formation of a data collection structure to gather information for lessons learned both in CONUS and in SWA. The initial effort, which was conducted by 55 data collectors, began in August and focused on such issues as Reserve Component (RC) mobilization, training, unit deployment from CONUS to SWA, and in-theater reception of units. A few collectors reached the theater to observe unit reception. The second effort was to deploy a team to SWA functionally organized by battlefield operating system. The team would focus on DOTML issues in combat and support units at primarily the tactical level. At CALL's request, TRADOC schools provided the team members, and a training program began at Fort Leavenworth. CALL requested theater clearance and support for a proposed 60-70 person data gathering structure, but clearance was denied (apparently at ARCENT, the Army component headquarters). The stated reason for denial was the inability to support such an information gathering effort due to the demands of getting troop units into theater and preparing for combat.

From then on, HQDA continued to attempt to get data collection teams into theater, while simultaneously coordinating directly with deploying (or deployed) units to attach individuals to the unit staffs. Although about 50 people eventually reached the theater in

this manner, their ability to collect data was restricted because they were performing other tasks on the unit staffs.

In December 1990, theater clearance was granted for about five data collectors, three of whom were in country at the start of Desert Storm. After Desert Storm began, there were indications that additional collectors would be allowed in theater. On 20 January 1991, CALL deployed an in-country team chief (a lieutenant colonel) to begin preparation for the arrival of a full contingent. Eventually 72 information gatherers reached the theater, most of whom arrived in late February or mid-March. Unfortunately, the delay in deployment resulted in the nonavailability of about two-thirds of the people originally trained. Thus, many of the deployed collectors had very short notice and only a quick briefing before deployment. The team generally conducted interviews with officers, non-commissioned officers (NCOs), and soldiers to gather information. Almost all of these interviews were conducted after hostilities had ceased, often during the redeployment of their units back to home station. Although the CALL team addressed all DOTML issues rather than just those related to materiel, the team collected some useful information on system performance (generally at the battlefield operating system level). The interview technique of collection, however, typically yielded qualitative rather than quantitative information about system performance.

Because the team did not deploy as an equipped unit, it was totally dependent on in-theater units for support. While life support was generally easy to obtain, transportation and communications were not. The troops and junior officers were very cooperative and eager to talk, but higher level commanders were not always willing to allow interviewers free access to their soldiers. By all accounts, the in-country team chief did an exceptional job under difficult circumstances. It has been speculated that a team chief with the rank of full colonel might have had an easier time. Apparently, the Director of CALL, an O-6, could not get theater clearance.

c. Logistics Assistance Program

As part of its Logistics Assistance Program, AMC fields teams that provide engineering and technical assistance directly to units during peacetime. At the start of Desert Shield, each major Army unit (mainly the division) had attached to it a team headed by a Logistics Assistance Officer (LAO). Each team had a number of Logistics Assistance Representatives (LARs) from various commodity commands, who could provide assistance in troubleshooting problems and could expedite supply problems. These teams

deployed with the units that they supported and were augmented as necessary in theater. The Army deployed 13 such teams to SWA, each consisting of 20-25 LARs.

The function of the LAOs and LARs was not to collect data (their survey responses indicate that they did little data collection). Nonetheless, the manner in which they performed their mission is one that data collectors might consider emulating. The wartime organization of the team and its operational procedures mirrored those used in peacetime. The team was attached to its corresponding unit during peacetime, during which it provided much the same service to the unit that it did during war. The team was able to establish a working relationship with the unit, and when the unit went to war, the team went with it as a matter of course. Since the unit was used to having the team around, it did not present an unexpected burden. It has also been suggested that, if the Army ever implemented the widespread use of automatic data recorders on board combat systems, it might be feasible for the LARs to download the stored information periodically for archiving.

d. Army Historians

Forces Command (FORSCOM) provided most of the historians in support of Desert Shield and Desert Storm. Theater limits on numbers of people kept the number in SWA to about 30. This effort depended substantially on the call up of Army Reservist historians. This did not occur until late December 1990, limiting coverage of the initial force buildup, but allowing expanded observation during final buildup and the ensuing hostilities. There was apparently some Congressional pressure to release these Reservists as soon as possible, which could limit their utility in future conflicts.

3. Implementation of Ad Hoc Collection Procedures

The Army attempted to implement the WALLP as outlined in AR 11-33. However, the initial lack of success in deploying technical (and operational) data collectors led to a variety of other attempts to collect such data. Some, but not necessarily all, of these attempts are outlined in this section. All the efforts described below were surveyed by questionnaire except the in-theater contractors and those involved in reconstructing the Battle of 73 Easting.

a. Battle Damage Assessment Team (BDAT)

The BDAT, which was deployed to SWA to assess battle damage inflicted on Army ground combat vehicles, was essentially the damage assessment portion of the conceptual EPADS. After AMSAA was denied theater clearance to deploy a full EPADS team, the

Deputy Under Secretary of the Army for Operations Research (DUSA-OR) and the ADCSOPS (Force Development) tasked AMC on 6 December 1990 to establish and train a smaller team. The mission of this team was to assess battle damage sustained by U.S. ground combat vehicles.

Valid battle damage data are very difficult to obtain, requiring collectors with specialized training. The Army recognized that battle damage data, if collected correctly and assessed rapidly, might provide field commanders with near-immediate indications of possibly new or different threat mechanisms. Thus, the specialized collection team of 12 Army officers and NCOs was drawn from the Ballistics Research Laboratory (BRL), the Army Ordnance Center and School (USAOCS), the Combat Systems Test Activity (CSTA), and the Human Engineering Laboratory (HEL). Damage assessment checklists were developed from forms already used for the Live Fire Test program, formatted for ease of entry into an established data base structure. The team was trained and placed on stand-by until theater clearance was obtained, during which time in-theater support arrangements were to be coordinated. The team was not packaged as a self-supporting unit.

HQDA ordered the team to deploy within hours of the start of Desert Storm, and it deployed to SWA on 18 January 1991. It is not clear how (or if) final theater clearance was obtained. Once it was in theater, the team was attached to AMC (Forward), which was responsible for the team's support. Because of the demands on AMC (Forward) to prepare for what appeared to be imminent ground operations, the support available to the BDAT was minimal. AMC (Forward) eventually provided some vehicle support, but the team generally had to scrounge what it needed.

Because of the difficulty in getting theater clearance, the team did not have clear written authority to perform its mission. This inhibited the team's acceptance by units in theater. Fortunately, the importance of the team's mission and the potential value of its work enabled the team to sell itself to those in authority within one Army corps. During the ground war, the BDAT accompanied the 1st Infantry Division, and so followed close behind the fighting. The BDAT was very successful in assessing combat damage to Army and Marine Corps vehicles, although it was often difficult to locate these vehicles. Furthermore, the vehicles that were found sometimes had been disturbed, so the team's assessment of the damage mechanism(s) was made more difficult. Sensitivity of some units to the possibility that friendly fire had caused certain combat damage created a difficult environment for damage assessment. In these cases, however, the BDAT had the expertise needed to assist in the investigations that followed these incidents. The team remained in SWA until early April.

b. Weapon System Combat Performance Assessment Team (WSCPAT)

The Army deployed WSCPAT essentially in the role of the other half of the proposed EPADS – that intended to assess equipment performance. The deployment of this team appears to be a direct result of OSD interest in technical data collection, particularly the 31 January 1991 memorandum from the Deputy Secretary of Defense. That memo substantially improved the likelihood that data collectors would be allowed access to the Gulf. While OSD and the Services were meeting during early February 1991 to agree on a data collection plan, the DUSA-OR obtained AMC agreement that AMC was responsible for establishing a performance assessment team. AMC also agreed that AMSAA should lead the effort.

The DUSA-OR formalized AMC's responsibility in a message on 19 February. The message also requested that a number of Army organizations cooperate in completing a collection plan and in identifying appropriate team members. These tasks, and the development of survey questionnaires, were completed during the last week of February. During the same week, the Army selected an O-6 team leader with experience in materiel development, including operational test and evaluation. The initial design of the team called for about 100 people; however, the theater would not accept any more than 50. While the team chief deployed to theater on 4 March, the 50-55 team members underwent a very quick orientation program. This program included discussions about the questionnaires to be used and about appropriate interviewing techniques. The team had no time to practice survey techniques or to refine the questionnaires before deployment. The main body deployed on 16 March, and the first interview was conducted on 18 March, almost 3 weeks after cessation of hostilities. Again it is not clear exactly how theater clearance was obtained, although the consensus is that it required discussions at the three-star level between AMC and the support command in theater.

WSCPAT deployed 53 people to SWA, about 60 percent of whom were active duty military (including one USMC officer). Team members were drawn from AMSAA, operational test agencies, six commodity commands, the Concepts Analysis Agency, HEL, TRADOC, and the Vulnerability Assessment Laboratory (VAL). While in theater, the team was split into two collection teams (one per corps) of about 22 people, each led by a lieutenant colonel. There was also a data assessment team of seven people, also led by an O-5.

As was true with the BDAT, the WSCPAT was not self-supporting. Thus, it had to rely on AMC (Forward) for support. At this point, however, the hostilities were over,

reducing the uncertainty about the amount of support required for the war. Nonetheless, support was still bare bones, especially the transportation needed to get to the widely spread divisions.

The majority of the team stayed until early May, during which 5,000 people were interviewed and more than 4,000 questionnaires were completed. Data collection continued in CONUS for those units that redeployed from SWA before they could be surveyed. Again, the troops were the most eager to talk with data collectors, while reluctance was still occasionally evident at higher headquarters. There may have been some overlap between CALL and the WSCPAT, but the WSCPAT's interest in materiel system performance probably took it to the crew and operator level more often than CALL. Both teams, however, may have visited the same units, which might have led to a conclusion by some that the theater was overrun with data collectors.

Because of the team's short-notice deployment, there was no chance to practice using the data collection forms, with the result that most forms had to be reworked in theater. That, and the fact that the team deployed after hostilities ceased, placed some limitations on the collection effort. The information gathered by the WSCPAT is probably more appropriate for addressing issues of operational suitability rather than operational effectiveness; for both effectiveness and suitability, the data are largely qualitative.

c. Assessment of Patriot Performance Against Scud Missiles

In mid-February 1991, HQDA sent a representative from BRL to Saudi Arabia to gather data on the performance of Patriot against Scud missiles. A secondary mission was to determine whether Scud missiles fired at Saudi Arabia differed from those fired at Israel. The trip was sponsored by the OASA(RDA), and the analyst spent about 5 weeks in theater. Although official theater clearance was not obtained, a firm and workable support agreement was made with an in-theater sponsor.

The analyst visited many Scud impact points, both recent and old, to assess the state of the missile when it struck the ground and whether its warhead functioned on impact. This effort seems to have been the only scientific attempt to gather hard data on a highly visible battlefield issue. It appears that the analyst was reasonably successful, in spite of the significant transportation difficulties involved in trying to track down impact sites. The analyst noted that it was "hard for one person to cover all of Saudi Arabia." The analyst also indicated that it would have been helpful to have had a better working knowledge of how the entire Patriot system functions.

d. CALL

CALL generally went about its business as outlined in AR 11-33, although it encountered some impediments in performing its mission. The full discussion of CALL's activities is contained in Section A.2.b, which describes established procedures. In mid-April 1991, however, the Army gave the responsibility for writing the Army after-action report to a major general, who supervised a group known as the Desert Shield/Storm Special Study Project. This facilitated access of data gatherers to those units that redeployed before the collection effort had been completed.

e. Operational Test and Evaluation Command (OPTEC) Data Collection on the Joint Surveillance Target Acquisition Radar System (JSTARS) and the Global Positioning System (GPS)

The JSTARS, an airborne surveillance and targeting system in full-scale development, deployed to SWA at the request of an Army corps commander. The Army's operational evaluator of JSTARS at the Operational Test and Evaluation Command (OPTEC) realized that this deployment was a priceless opportunity to gather operational data in a combat environment. At some time after the air war started (JSTARS had been deployed in mid-January), the evaluator arranged for CENTCOM J-2 to send a by-name request for him to come to theater. Although requested by CENTCOM as a mission planner, he prepared himself before departure to collect data while in theater. He and another OPTEC analyst developed a comprehensive data collection plan, including data collection worksheets for operators, questionnaires for product users, and system log sheets. These were entered into a laptop computer, which was then made available to each JSTARS team chief for easy data entry. The OPTEC evaluator arrived in theater on 20 February and spent almost 6 weeks gathering data that otherwise would have been lost. The major problem encountered was that this one person was unable to do all that needed to be done. Support was obtained through the JSTARS detachment.

A second OPTEC evaluator was deployed to investigate the operational use of Global Positioning System (GPS) receivers. Although the endeavor was successful, complete details about it are not known.

f. Battle of 73 Easting Reconstruction

At the direction of the Army Vice Chief of Staff, a five-man team headed by the Deputy Chief of Military History visited the theater in April 1991 to investigate an engagement known as the Battle of 73 Easting. This battle was fought on 26 February

1991 by the Second Armored Cavalry Regiment of the VII Corps against armored elements of the Iraqi Republican Guard. The team reviewed all available documentation, interviewed participants and commanders, and reconstructed the battle on-site. The team collected some technical data to determine such parameters as engagement ranges. The focus of the effort was to reconstruct a battle in enough detail for it to be included in the Army's Simulation Network (SIMNET) for training.

g. HQDA Equipment Team

The Army's Vice Chief of Staff sent a team from HQDA to Saudi Arabia in April to provide disposition instructions for Army equipment. Because of the circumstances of the mission, the aviation specialist on the team had the opportunity to gather anecdotal data on the performance of Army aviation systems. Those data, mostly qualitative, were reported back to HQDA and were used in briefings within the Pentagon.

h. Program Executive Officer (PEO)/Program Manager (PM) Information Gathering Efforts

An unknown number of PEOs, PMs, or their representatives from all Services were able to reach the theater. The Services clearly benefited from visits by knowledgeable personnel who could assess system performance and identify flaws to be fixed. There are indications that specific PM representatives had some difficulty in obtaining hard data on system performance. However, it may not be the proper role of the PM to collect technical data on system operational performance.

i. Contractors

It appears to be common knowledge that some number of system contractors had representatives in theater for Army systems as well as those of other Services. Although the primary reason for such representation was clearly to provide logistical support to deployed systems, it is likely that technical data were collected. It is not known to what extent this data has been shared with the government. It is also not clear to what extent their presence in theater had been cleared, nor is the extent to which their presence taxed the support resources of the theater.

4. Cataloging Procedures

According to AR 11-33 it is the responsibility of CALL to gather available information and to develop the appropriate lessons learned. CALL was performing this role prior to Operation Desert Shield. As was noted above, the Army formed a Special

Study Project under a major general at Fort Leavenworth to prepare the Army's after-action report on all phases of the Gulf War. This project, a significant expansion of the CALL lessons learned effort, has published a comprehensive six-volume after-action report.

As part of the Army's overall lessons learned effort, it is AMSAA's responsibility to provide to CALL validated input data on the performance of materiel systems. AMSAA is reviewing technical data from all sources, including the WSCPAT, BDAT, and PEOs or PMs. When completed, AMSAA will provide the data to CALL to support materiel lessons learned. AMSAA has also established a data base at Aberdeen Proving Ground for Army materiel and combat developers.

B. NAVY DATA COLLECTION AND CATALOGING

1. Established Collection Procedures

The Navy's data collection procedures are unique among the Services. About 40 analysts from the Center for Naval Analyses (CNA) are deployed with operational elements, including those of the USMC, on a full-time rotational basis. These analysts report to the heads of staff of the ships or headquarters to which they are attached. Although their primary duty is to provide analytical support to the staffs, they are in a unique position to collect a variety of data during normal deployments and peacetime exercises. They address naval operational issues, as well as technical issues involving materiel system performance. Because of the nature of their ongoing relationship to the staffs, they are likely to have far greater access than analysts attached only during times of crises to gather data.

CNA not only collects the data but also catalogs the data and analyzes it. Often this work is done by the same analysts who gathered the data while deployed. After every major exercise, CNA performs an analytical reconstruction of all exercise activities. The results of each reconstruction are provided to the appropriate operational commanders.

Also, the Navy has several automated systems to track incident reports, munition expenditures, readiness reporting, maintenance documents, and intelligence debriefings. The output of the radar system on Aegis cruisers was recorded and retained. Each aircraft carrier has an established procedure to gather detailed data on battle damage incurred by their aircraft. These damage data are forwarded to the Navy Safety Center, which analyzes them and serves as a repository.

2. Implementation of Established Collection Procedures

Because of CNA's normal practice of having analysts deployed during peacetime, there were 9 analysts with ships and units deployed in support of Desert Shield, including 2 with USMC units. At the request of COMUSNAVCENT, CNA increased the number of analysts to 18 by early January. This included 3 with USMC headquarters in Saudi Arabia.

In August 1990, the Vice Chief of Naval Operations (CNO), through OP-07 and OP-08, designated CNA as the repository for all data and lessons learned from SWA operations. In January 1991, CNA provided specific guidance to its deployed analysts on what information to collect and retain. At the end of hostilities, COMUSNAVCENT instructed all elements of NAVCENT to send specific types of information to CNA for the reconstruction of the conflict. CNA provided assistance in the preparation of this directive.

The 18 analysts eventually deployed in theater were successful in gathering an extensive amount of operational and technical data. Also, the analysts were able to witness and record the decisions of commanders and their staffs. The area in which the greatest difficulty was encountered appears to be that of bomb damage assessment (BDA). The majority of cruise missile targets were in areas never relinquished by the Iraqis and were often attacked by other Coalition aircraft. Also, Navy strike aircraft were not equipped with sufficient on-board recording capability to provide detailed information about mission effectiveness.

3. Implementation of Ad Hoc Collection Procedures

The Navy appeared to follow its established and exercised procedures. The only extraordinary actions taken were the doubling of the number of deployed CNA analysts and the notification to save specific types of data. No analysts were dedicated to the collection of technical data on specific materiel systems.

In late November 1990, OP-O8 requested that CNA investigate whether it ought to establish a group analogous in function to the Vietnam era Combat Analysis Group (CAG). Located in Hawaii, the CAG provided centralized in-theater assessment of data collected by individual analysts located in the CINCPAC area of operations. Its goal was to analyze all available data and disseminate the analysis results to warfighters throughout CINCPAC. CNA decided not to form a CAG analog in the Gulf because the individual analysts were performing this service to the commanders without the need to centralize.

4. Cataloging Procedures

Immediately after the hostilities ceased, the deployed CNA analysts shipped their data back to CNA and then reported back to CNA themselves to begin the reconstruction of the war. Literally hundreds of boxes of data were collected and returned to CNA, not all of which were well-organized. The data were organized by ship or command, with individual folders for each broad category of data. The folder names were entered into a computer-based data retrieval program. The data were then used to reconstruct the conflict. The analysts who returned from theater took the lead in this effort, with augmentation by other CNA analysts and by officers from other Navy organizations and commands. The reconstruction took place during 15 April - 15 May 1991. Its final result was a 14-volume 2000-page report, the first such reconstruction by the Navy of an actual conflict. The reconstruction report is being staffed within the Navy.

The Navy plans to continue its analysis, including coordination with the Air Force to attempt to clarify whether Navy or Air Force weapons killed particular targets. CNA's continuing study program will address a wide variety of issues from the Gulf War, such as system effectiveness, tactics, Navy involvement in joint operations, a range of logistics issues, and many others.

C. MARINE CORPS DATA COLLECTION AND CATALOGING

1. Established Collection Procedures

The operating forces of the Marine Corps are responsible for conducting their own historical programs. Each battalion and squadron is required by Marine Corps Order (MCO) 5750.1 to prepare a command chronology of all combat actions in which it was involved. The chronology must also include other significant events related to the unit's combat activity. The unit must submit the chronology to the Historical Branch at HQ, USMC.

The USMC also has an established lessons learned program under the purview of the Marine Air Ground Task Force Warfighting Center (MAGTF WFC) of the Marine Corps Combat Development Command (MCCDC). Marine Corps units are required to submit after-action reports following all peacetime deployments and exercises, as well as after any conflict. Units submit the after-action reports to the Lessons Learned Section of the Studies and Analysis Branch at the WFC. In May 1990, the USMC published Marine Corps Order 5000.17, which outlined responsibilities and procedures for the lessons learned program. This order required that USMC units use the Marine Corps Lessons

Learned System (MCLLS) to prepare and submit after action reports. MCLLS is a computer-based applications program that is compatible with the Joint Uniform Lessons Learned System (JULLS). Each battalion-sized unit was trained in its proper use.

The Lessons Learned Section receives after-action reports and any other submissions of potential lessons learned. These submissions are screened for any problems or deficiencies that may warrant changes in doctrine, organization, training, or materiel. Candidates for such follow-up action are reviewed by the Remedial Action Program (RAP). The RAP is a review process, also outlined in MCO 5000.17, that assesses each possible problem, determines if it requires fixing, and assigns the responsibility for correcting the problem to an appropriate organization.

The MCLLS MCO does not provide for the fielding of a data collection team during time of crises or conflict. This would be handled by an expansion, as necessary, of the MCLLS and its associated processes.

2. Implementation of Established Collection Procedures

On 19 September 1990, the Commandant of the Marine Corps (CMC) made clear to the Marine Corps his position on collection of data from the deployment of forces to SWA:

> "...SWA will have a profound effect on the future of the Marine Corps. It will provide a base case for force structure in the next decade and beyond. Moreover, it provides a unique opportunity to collect and analyze information for immediate dissemination as lessons learned and to provide a repository for future historical purposes.
>
> ...Other than continuation of our unparalleled performance in SWA, I know of nothing more important to our future than the effectiveness of the collection, analysis, and lessons learned project. Make it happen."

The above message tasked the Commanding General (CG) of MCCDC to direct a corps-wide effort to collect, analyze, and disseminate operational experiences in SWA. MCCDC began an immediate effort to inform Marine units about the nature and importance of the MCLLS. At the request of the I Marine Expeditionary Force (I MEF), the WFC sent to the Gulf a three-person team that included the chiefs of the Historical Section and the Lessons Learned Section of Studies and Analysis Branch. The team was in theater from

late September to early November 1990 to provide instruction to USMC units on the proper submission of after-action reports in the MCLLS format. The team also briefed units on the information that ought to be included in the command chronology. A secondary mission of the team was to gather potential lessons learned. An added benefit of this visit was that it helped pave the way for later collection teams in theater.

3. Implementation of Ad Hoc Collection Procedures

The CMC had given the CG, MCCDC the responsibility to direct the overall effort to collect, analyze, and disseminate lessons learned, including the direct liaison with Department of Defense (DoD), Department of the Navy (DoN), the Joint Staff, and other staffs. Added emphasis had been given to the MCLLS, but the scope of MCCDC's responsibility, coupled with the increasing magnitude of the Desert Shield commitment, indicated that the lessons learned program had to be expanded. Thus, the Marine Corps Operational Analysis Assessment Group (MCOAAG) was established in October 1990 as a temporary part of the Studies and Analysis Branch. The MCOAAG was a task-organized group composed of dual-hatted members of the Studies and Analysis Branch augmented by other active duty and reserve component Marines. It determined the issues to be addressed, expanded the data collection effort, and, finally, cataloged and analyzed the data from the Gulf War.

The USMC deployed two major collection teams to the Gulf. The first of these was driven by the need to identify, assess, and correct possible deficiencies in equipment. The second was a broader collection effort organized under the MCOAAG. Both are discussed in detail below.

a. Marine Corps Research, Development and Acquisition Command (MCRDAC) Equipment Team

In early October 1990, the CMC tasked the CG of the Marine Corps Research, Development and Acquisition Command (MCRDAC) to send a team to SWA. The CG, MCRDAC directed the team to focus on materiel issues – to identify any materiel problems, assist in the correction of those problems if possible, and document any problems not immediately resolvable for later assessment back in CONUS. A secondary function was to gather any other lessons that might be learned along the way.

A 26-man team headed by a full colonel (the PM, Ground Weapons) was deployed to the theater on 19 October 1990 for 11 days. The team was functionally organized and visited users of all types of USMC equipment. Although the purpose of the visit was to

assist units in correcting equipment problems, the team collected some data in the process. Largely, these data were qualitative and dealt mainly with operational suitability issues since hostilities had not yet begun. The team did gather some effectiveness data on communications-electronics systems, a portion of which was quantitative.

The team recorded all its observations in the format required for submission to MCLLS (according to established Marine Corps procedures). The MCLLS submission included about 130 items related to equipment, plus more than 40 others not directly related to equipment. MCRDAC also prepared a summary of the findings for the CMC and HQ Marine Corps. The colonel who headed the team became MCRDAC's in-theater representative to MARCENT, and the officer who was the team's coordinator became the MCRDAC coordinator for MCLLS and the Remedial Action Program.

MCRDAC coordinated and sponsored a number of visits of smaller teams to the theater to analyze and correct specific problems as they arose. These two- to five-man teams collected some data, but that was not their primary mission.

b. Battle Assessment Team (BAT)

The 19 September 1990 CMC message specified that task-organized operations assessment teams would be formed when required. At the direction of its CG, the Warfighting Center at MCCDC began preparations to send a collection team to the theater. These preparations were begun under the MCOAAG in the Studies and Analysis Branch. In December, the WFC assigned a full colonel to head the team, called the Battle Assessment Team (BAT) (sometimes referred to as the Battle Assessment and Liaison Team, or BALT). In January 1991, a USMCR officer with an analytical background was called to active duty to develop the concept for such an effort. About 25 people were identified and trained before deployment. The team was organized into 14 functional areas, and a collection plan was developed. The function of the team was to gather lessons learned by functional area, not to collect technical data on systems performance.

The team arrived in theater on 21 February 1991, just 2 days before the ground war began. Even though the team had been cleared to enter the theater, some salesmanship regarding its mission had to be done. The potential of the team to provide near-term benefits to the field commanders (with the promise of not assessing unit or individual performance) was a major selling point. The support of the Marine Corps component commander assured the team of some measure of support and cooperation.

While in theater, the team expanded to almost 75 people by picking up unassigned in-theater augmentees. This greatly improved the coverage of Marine units. The primary means of gathering data was by survey form and taped interviews. Some 15,000 survey forms were completed. Although the team arrived before ground combat began, it was not in place to gather data at its start. Thus, the surveys and interviews were done after-the-fact for both the air and ground campaigns. Because the team was not intended to focus on technical data, the data collected tended to be subjective and qualitative. The BAT gathered some data on weapon systems, but not in the detail that some analysts might want. Nevertheless, the data were sufficient to identify, for example, all TOW missile shots taken by Marines, with some detail about engagement conditions and results.

In a 19 March 1991 message, the CG, MCCDC directed that all USMC units in theater pass "vital data" to the BAT before the units left the Gulf area (through in-theater CNA representatives, if required). The MCCDC message also specified what types of data were to be passed to the BAT. A majority of the BAT remained in theater until April, although some members stayed into May. About 20 team members returned to the WFC to participate in preparation of after-action reports on the issues addressed by the team.

4. Cataloging Procedures

Because the Studies and Analysis Branch of the Warfighting Center is responsible for the USMC lessons-learned program, it was given the responsibility to catalog all USMC Gulf War data. The MCOAAG (under the Studies and Analysis Branch) is organizing and cataloging all the data, after which it will be disestablished. The Studies and Analysis Branch will be the permanent repository for these data, and it will oversee the preparation of after-action reports on USMC participation in the Gulf War. These assessments will be organized by battlefield function and will cover all USMC activities during both Desert Shield and Desert Storm. All lessons learned during the conflict will be processed for entry into the MCLLS.

D. AIR FORCE DATA COLLECTION AND CATALOGING

1. Established Collection Procedures

The Air Force has a highly automated peacetime data collection system on which it also relies in wartime to collect technical (and other) data. These databases are generally distributed among the Air Force major commands (MAJCOMs). The structures of these automated systems facilitate the gathering of much technical data from locations outside the

theater of operations. The types of records to be retained and the periods of retention are determined by the Office of the Secretary of the Air Force as specified in Air Force Regulation 12-50.[1] There appear to be no organizations within the Air Force that have established responsibilities to field teams dedicated solely to collect information on such topics as battle damage to aircraft or air-delivered munitions effectiveness against particular targets. There are Air Force organizations that routinely evaluate operational units in the live-fire of air-to-air and air-to-ground ordnance, but they have no requirements for collection during combat operations.

The Air Force has a well-organized system for placing military historians at MAJCOMs and at wing headquarters throughout the Air Force. The Air Force assigns these historians to their positions in peacetime, and they deploy with the units to which they are attached. Air Force Regulation 210-7, revised in early 1990, includes a contingency plan for transition to wartime collection, including organization, equipment, and procedures.

The Air Force also has a lessons learned program that feeds the Joint Uniform Lessons Learned System (JULLS) at the Joint Staff. Oversight of the lessons learned program on the Air Staff lies with the Director of Plans within the Office of the Deputy Chief of Staff for Plans and Operations.

2. Implementation of Established Collection Procedures

The rules governing retention of all Air Force data are found in AFR 12-50, Volume II, Table 55-6, which addresses Operational Reports and Analysis. In October 1990, the Air Force Secretariat invoked Rule 3, which specifies what records must be permanently retained in support of Air Force analysis. Much of this information is operational rather than purely technical. Rule 1, which requires permanent retention of combat records, was automatically implemented at the start of Desert Storm.

Standardized peacetime procedures, including information management systems, only provided tools to collect and retain key data. The potential contribution of these procedures may not have been fully realized due to system reliability problems, insufficient operator training, or low emphasis on administrative reporting during combat operations.

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[1] These judgments are made by the Records Management Policy Branch, Directorate for Information Management, Administrative Assistant to the Secretary.

The Air Force executed the contingency plan for deployment of military historians, expanding the numbers to be deployed as needed. Eventually more than 50 historians were employed, with focus more on historical and operational issues than on the collection of technical data. The Air Force Historical Research Office was also active in theater, microfilming a large number of documents. It's not clear to what extent technical information was included in this effort.

3. Implementation of Ad Hoc Collection Procedures

The Air Force eventually implemented a number of data collection efforts. Several of these were aimed at the collection of technical data.

a. Combat Operations Assessment and Reporting Program (COARP)

The Combat Operations Assessment and Reporting Program (COARP) was developed during Operation Desert Shield by the Survivability/Vulnerability Information Analysis Center (SURVIAC). SURVIAC, located at Wright-Patterson Air Force Base, is a government-sponsored, contractor-operated repository for all non-nuclear combat and live-fire test data involving survivability. Most of the data maintained by SURVIAC were collected during the Vietnam War under the Battle Damage Assessment and Reporting Program (BDARP). Because these data have been useful to aircraft designers over the past two decades, SURVIAC began efforts soon after the start of Desert Shield to organize the COARP, a program similar in purpose and nature to BDARP. Because the COARP was developed by SURVIAC, it is not truly an Air Force program. Nonetheless, it is included in this discussion because the efforts made to implement it were associated with the eventual deployment of Air Force data collection teams.

SURVIAC operates under the auspices of the Joint Technical Coordinating Groups for Aircraft Survivability and Munitions Effectiveness (JTCG/AS and JTCG/ME). It is associated with the Wright Laboratory's Flight Dynamics Directorate, particularly its the Aircraft Battle Damage Repair (ABDR) Advance Development Technology Program (ADTP). Because of its association with the Wright Laboratory and its experience with data involving aircraft damage, SURVIAC was well-qualified to develop a Gulf War follow-on to the earlier BDARP. A key BDARP feature that SURVIAC sought to emulate was the deployment of BDAR Teams (BDARTs) to the theater of operations. These were groups of collectors, properly trained and equipped, given the sole mission of gathering combat damage and loss data in a systematic manner.

Beginning in early October 1990, SURVIAC met with the JTCG/AS, the JTCG/ME, the Services (mainly Air Force), and OSD to develop a program for collection of data on combat damage, losses, and repairs of aircraft. SURVIAC completed the early drafts of a collection plan by mid-December, and a data collection training syllabus was available by mid-January 1991. Although the plan also addressed gathering data on mission performance, its primary focus was on battle damage and repair.

SURVIAC established a training program for Air Force data collectors. The initial plan was to train and deploy two 8-10 member collection teams, but this was changed to a single 13-man team. Collection kits were obtained for the 13-member team, and SURVIAC began a training program in January 1991. Eventually, SURVIAC trained 30 active duty Air Force engineers and technicians (25 officers and 5 enlisted members) in three groups. SURVIAC conducted the first two sessions at Wright-Patterson in late January to mid-February and the third at Eglin in late-February. As was true for other collection efforts, this attempt to deploy a team to collect battle damage data foundered because of the lack of theater clearance. Since COARP was developed during Desert Shield, there had been no procedures established to obtain theater clearance. Also, few people on the operational side of the Air Force were aware of the program's existence.

Eventually the Air Force dispatched a team specifically to collect battle damage and repair data, but not until the war was over. After the Deputy Secretary of Defense memorandum to the Services on 31 January, the Air Force undertook a number of activities regarding data collection. In early May 1991, more than 2 months after cessation of hostilities, Tactical Air Command (TAC) Headquarters (through the TAC A Team) tasked the Tactical Air Warfare Center (TAWC) at Eglin AFB to collect BDAR data from TAC units. All data collection occurred after these units had redeployed from Gulf to home station.

In preparation for data collection, TAWC used the COARP data collection guide as a starting point for a questionnaire. Two collection subteams were formed, one for A-10 units and the other for F-15s and F-16s. SURVIAC participated in the visits to TAC units, as did the Air Force Electronic Warfare Center (AFEWC). The team visited all TAC units that reported any aircraft damage or losses. Some repair records had already been discarded, but generally SITREPS and aircraft damage reports (AF Form 97) were available. Photographs and video tapes of aircraft damage were helpful, especially if those who took them could be interviewed.

b. Munition Effectiveness Team

In late February 1991, HQ Air Force Systems Command (AFSC) tasked the Armament Directorate of Wright Laboratory at Eglin AFB to form and deploy a team to the Gulf. The team's mission was to observe and document the performance of air-delivered munitions against a variety of fixed and mobile targets. The seven-man team consisted of a lieutenant colonel team chief and six captains. Some team members had begun the SURVIAC training program then being conducted at Eglin, but their training was curtailed because of the team's short-notice deployment. Although the training program addressed collection of data on damage to U.S. aircraft, the SURVIAC techniques were also useful in the assessment of damage to Iraqi aircraft. The team was organized on 28 February and departed 2 March with a complete data collection kit but without a detailed collection plan.

Theater clearance was granted as part of an arrangement with the CENTCOM staff that was facilitated by the Defense Intelligence Agency (DIA) point of contact at CENTCOM, although the clearance may not have been approved before departure. The invitation from CENTCOM was extended for no more than 15 data collectors, roughly half from the Air Force to address the effectiveness of Air Force munitions against targets. The other half of the authorization was for a combined team from the DIA and the Defense Nuclear Agency (DNA). This team had the mission to investigate the ability of hardened shelters to withstand attack from precision guided munitions (see Section E of this chapter).

The team did not have written authorization to conduct its mission, which was unfortunate because the in-theater sponsorship arrangement for this team appeared to be more unworkable than most. The intended sponsor of the team was to have been the Joint Captured Materiel Exploitation Center (JCMEC). The JCMEC did not know the team was coming and seemed to resent its presence. Thus, the team was virtually unsupported, reduced on occasion to using fuel from abandoned Iraqi vehicles. The team encountered some difficulty getting to targets before the ground troops destroyed them. Nonetheless, some valuable data were gathered on fixed targets such as air base shelters.

c. Air-to-Air Warfare Assessment

In early February 1991, HQ TAC tasked TAWC to deploy a team to theater to collect data on F-15 air-to-air engagements, particularly the causes of known mission failures. A secondary mission was to assess the state of the data collection efforts regarding air-to-air performance.

TAWC deployed a three-man team with experience in the Weapon System Evaluation Program (WSEP), a live-fire program conducted at Tyndall AFB (air-to-air) and Eglin AFB (air-to-ground). The team included two pilots led by a lieutenant colonel. There was no significant predeployment training, and the team developed its own data collection plan and kit. The team was in theater from 13-20 February, and one member stayed to visit units in Turkey until 1 March 1991. The team joined an instructor from the F-15 Fighter Weapons Instructor Center (FWIC), who was already in theater to assess overall system performance of the F-15. The FWIC instructor collected the majority of the available data.

There were some initial problems with the sponsorship arrangement, but they were resolved and did not hinder the collection mission. Some perishable data were lost because the collectors did not have immediate access to the sources of the data. The most difficult data to obtain were the firing parameters of air-to-air engagements and the results of those engagements. Reliability problems with videotape recorder (VTR) on the F-15 caused significant loss of hard data on F-15 engagements.

d. Strategic Air Command (SAC)

Headquarters, SAC dispatched a four-member team to theater in mid-September 1990 to resolve reporting problems encountered by deployed units. The Core Automated Maintenance System (CAMS) was not initially available in theater, so the team developed modified procedures for reporting flying hour data, system mission capable status, component failure data and system performance of the B-52 and KC-135 aircraft. The team was in theater for about 7 weeks and gathered some technical data incidental to performance of its primary mission.

e. Proven Force (Composite Wing) Operations

In late February 1991, the Chief of Air Force Studies and Analysis visited Turkey for about a week to observe Proven Force (composite wing) operations. He was accompanied by an Air Force officer from Studies and Analysis and by an analyst from RAND Corporation. Operational and technical data were collected during this visit, some of which may have duplicated that collected by HQ, United States Air Forces, Europe (USAFE).

f. F-4G Operations and HARM Missile Performance

There was no team dedicated to gather HARM performance data. Nonetheless, there were some very valuable data gathered, and the reasons for this success are worth

discussing. The F-4G has a fully automated data recording capability on board the aircraft using three different recording devices. The pilots who flew the missions viewed the output of the recorders shortly after their missions and analyzed the recorded results to plan subsequent missions. Thus, the data were collected automatically and nonintrusively during the missions and were assessed almost immediately by the people most knowledgeable about their source. One unit in particular kept a careful record of its results, so its database grew over time.

g. 4487th Electronic Warfare Aggressor Squadron Activities

HQ TAC tasked elements of the 4487th EW aggressor squadron to deploy to SWA on two separate occasions – from early October through mid-December 1990 during Desert Shield and from the beginning of January through February 1991 for Desert Storm. The squadron was tasked to assess the mission capable rate of electronic combat systems carried on Air Force tactical aircraft. This mission was given to the EW Aggressor Squadron because of its unique ability to exercise these systems electronically and to assess the resulting output of the systems under test. Although gathering technical data was not the primary mission, significant amounts of maintenance-related data were collected and reported in detail.

h. F-117A Weapons Effectiveness and Survivability

The role of the F-117A in the war and the high quality of its on-board recording capability are well known to television viewers. It is not known, however, if any specific data collection efforts were directed at F-117A operations and performance. The F-117A squadron itself has done an in-depth assessment of its operations. Also, some analysis was done by an F-117A pilot on the Air Staff, but that may have been hampered by the lack of availability of such information as mission reports. It is also not known to what extent recordings of F-117A mission results were retained.

i. Airborne Warning and Control System (AWACS)

The Airborne Warning and Control System (AWACS) has the capability to record radar data on the air operations in which it participates. Virtually all Desert Storm air operations were recorded on magnetic tape and archived for future reference. The data are of high quality, but there are only limited facilities for reviewing the tapes in their recorded form. In order to realize the full potential of the data, the recorded data must be converted to a more usable format. Such conversion is feasible but very slow.

4. Cataloging Procedures

The Air Force collected data in a decentralized fashion wherein each MAJCOM had the responsibility to collect all data related to its role in the Gulf War. This included both technical and operational data. This decentralization extended to the cataloging and storage of the data. Each MAJCOM is collecting and cataloging all the data that it can locate. The most extensive of these efforts probably are at Headquarters, Tactical Air Command (TAC), and at Headquarters, Strategic Air Command (SAC). TAC established a large team (the TAC A Team) to oversee TAC's data collection and cataloging effort. SAC provided dedicated analytical support to its Battle Staff, established its own data directory, and developed automated databases of bomber operations.

The various data sources thus identified by the MAJCOMs are being reported to the Gulf War Studies Office (GWSO) of the Air Force Center for Studies and Analysis (AFCSA) on the Air Staff. The GWSO has identified all known data sources within the Air Force and has added them to its directory of data sources. The GWSO also maintains the USAF Analysis Question Bank, which identifies potential analysis topics and assists in matching data requirements with data sources. The GWSO will maintain a catalog of completed Air Force studies on all aspects of the war as they are completed.

The GWSO shares the Gulf War after-action responsibilities with the Plans Directorate of the Deputy Chief of Staff for Plans and Operations (AF/XOX). AF/XOX determines policy, controls taskings, oversees studies underway, and prepares lessons learned for dissemination within the Air Force and for submission to JULLS.

SURVIAC is the designated DoD repository for survivability and effectiveness data. As such, it already had in place a computerized infrastructure for data storage. As Desert Storm data are received from the Services, SURVIAC will add them to its existing database. Because SURVIAC was involved in the collection of Air Force damage and loss data, those data are readily available. Some data from the other Services have been received, and other data are expected to be available after Service release.

E. DEFENSE AGENCY DATA COLLECTION AND CATALOGING

1. Established Collection Procedures and Their Implementation

This study did not include an in-depth assessment of what established data collection procedures there might be in the many Defense agencies. If such procedures exist, they have not been brought to light during the research for this report.

2. Implementation of Ad Hoc Collection Procedures

There were a number of Defense Agencies that participated directly in data collection efforts. The ones identified during this study are discussed below.

a. Munitions Effectiveness Assessment Exploitation Team

This eight-person team represented the other half of the CENTCOM authorization of theater clearance for a total of 15 people to gather data on munitions performance (see Air Force section) and on how well specific structures withstood attack. Although the authorization was simultaneous for the two teams and they arrived in theater at the same time on or about 3 March 1991, they were different entities and traveled separately in theater. Like the Air Force team, this team was deployed on very short notice, although some preparatory work had been done in anticipation of eventual theater clearance.

The team was composed of two structural engineers, a weapons effects specialist, and a targeteer from the Defense Intelligence Agency (DIA), plus three structural engineers and a communications equipment specialist from the Defense Nuclear Agency (DNA). One of the structural engineers, who had experience with the test equipment being used, was detailed from the Army Corps of Engineers Waterways Experiment Station. The highest ranking member of the team was a lieutenant colonel. The team was well equipped, but did not have a formal collection plan. The team members were well qualified for the job due to their backgrounds and extensive work on related activities during both Desert Shield and Desert Storm.

As was the case with the Air Force munitions effectiveness team, there were difficulties with the in-theater sponsorship arrangements. A personal visit to Lt Gen Horner, the CG of CENTAF, by a team member who had previously worked for him was very helpful in reducing transportation difficulties within theater.

The data collection mission in theater was two-fold: to gather detailed structural engineering information on a variety of structures and to collect data on the effects of weapons against those structures. The team visited at least seven targeted installations during its 2-week stay in theater. Following its return to CONUS, the team made extensive efforts to gather targeting data from the operational units who attacked the targets, and the team has had some notable, although incomplete, success in this regard.

This team encountered the same problem that the Air Force contingent did in getting cooperation from the Joint Captured Materiel Exploitation Center (JCMEC), particularly JCMEC (Forward) in Kuwait.

b. Joint Electronic Warfare Center (JEWC)

The Joint Electronic Warfare Center (JEWC) sent a number of teams to the Gulf to support deployed units and to collect data. The details of these JEWC deployments are not known, but their collection efforts were intended to gather electronic warfare data from each Service's perspective. This includes data on Iraqi systems such as weapons, radar and communications, and their potential effectiveness against United States and Coalition systems.

3. Cataloging Procedures

The efforts of the teams discussed above are being analyzed by the agencies involved. DIA, DNA, and JEWC have extensive lessons learned activities underway, including organizing these lessons for future use by their own agencies and by the Services.

F. COLLECTION EFFORTS OF OTHER COALITION MEMBERS

No direct efforts were made to survey other Coalition nations to determine the extent and success of any collection that they may have undertaken. Nonetheless, some information about such efforts was encountered during the research for this report.

1. United Kingdom Collection Efforts

Information about United Kingdom (UK) efforts has been gleaned second hand from U.S. participants in discussions with, or briefings by, UK representatives. There were two ways in which UK analysts provided scientific support to land operations (apparently called Operation Granby within UK scientific circles). First, there were analysts deployed with British forces, probably as operational analysis (OA) specialists because they brought with them a computer-based modeling and simulation capability. This group performed "what if" exercises for the commander of British forces in the Gulf, which apparently amounted to a piece-by-piece feasibility analysis of the commander's campaign plan. Although the analysts had the support (and the ear) of the commander, their efforts in validating the commander's plan may have reduced their ability to address other OA problems or to collect data.

Second, there was an after-the-fact survey by a Land Scientific Evaluation Team (LANDSET). At least on paper, this effort closely resembles that of the CALL team with perhaps WSCPAT level of detail on equipment. The successes of this team (and the problems that they encountered) closely parallel the experience of the U.S. Army efforts.

According to information from CNA, British naval vessels in the Gulf were equipped with recording devices. The data recorded by the devices include navigational information, radar output, and voice traffic over the command channel.

2. Others

There may have been other collection efforts by Coalition members. The only reference mentioned in returned surveys about other countries dealt with French forces, who were quoted by one U.S. collection team as saying that those particular French forces had encountered no other data collection efforts in their area. That may or may not be true, but any statements about the overwhelming success of data collection by other countries should be viewed with some skepticism.

CHAPTER II

SUCCESSES AND SHORTCOMINGS IN DATA COLLECTION

II. SUCCESSES AND SHORTCOMINGS IN DATA COLLECTION

This chapter assesses the overall technical data collection effort described in the preceding chapter. In particular, it discusses those aspects of the collection effort that were successful and those that showed shortcomings. These judgments are based on the information gathered from questionnaires, interviews, and the after-action conference. The shortcomings section is longer than the section describing the successes. There are two reasons for this. First, the shortcomings section is intended to form the basis of a checklist for assessing the collection process and its components, a purpose for which a complete list of potential pitfalls is useful. Second, although there were some significant successes in data collection, it is likely that useful data from the Gulf War were lost due to difficulties encountered in the technical data collection and cataloging effort. This chapter's final section discusses some indications that support this contention.

A. SUCCESSES IN COLLECTION AND CATALOGING

Each Service had established procedures for data collection prior to Desert Shield and attempted to implement those procedures after commitment of U.S. forces. Elements within all Services recognized the importance of gathering technical data and made a variety of efforts to do so, some as part of established procedures and others on an *ad hoc* basis. The Services differed substantially in their approaches to data collection. However, appropriate organizations within each Service took the initiative to determine data needs and then attempted to dispatch data collectors to the theater in cases where existing data collection means were not sufficient. Although many such attempts were thwarted initially by lack of theater clearance, persistent efforts often resulted in the deployment of data collectors.

This AAR has identified a number of successes in the collection effort, which are categorized as follows:

- Prior Relationships Generally Led to Success
- Some Teams Dedicated to Data Collection Were Deployed, and They Gathered Data That Otherwise Would Have Been Lost

- Specific Keys to Success Were Identified, Including:
  - the granting of clearance to enter theater, and the provision of logistical support, mainly transportation, once in theater;
  - the credibility of the collector(s) and the degree to which they could provide a service to commanders;
  - the collectors' ability to earn the backing of operational commanders; and
  - the persistence and resourcefulness of the collectors.
- Automated On-Board Recorders Collected Valuable Data.

These successes are discussed in detail in the remainder of this section.

1. Prior Relationships Generally Led to Success

Assignments or attachments of data collectors to deploying or deployed units generally were successful if some sort of relationship had been established in advance. In particular, CNA's peacetime assignment of its analysts to operational ships and units extended well to the wartime environment. The operational commanders were familiar with the CNA analysts assigned to them, so the commanders allowed them access that probably would not have been given to a new arrival. The CNA analysts were assigned to support the operational commander, but nonetheless were able to gather voluminous amounts of data because of their familiarity with the operational environment. Also, because some analysts were assigned to operational units deployed at the start of Desert Shield, they were able to participate in all phases of the buildup and the war.

Although they were not technical data collectors, the attachment of Air Force historians at wing-level also worked well. As was the case with CNA, attachment during peacetime established a relationship between the historian and the unit to which he was assigned. Deploying with the unit allowed the historian access during all phases of the unit's participation in the war.

The success of the Army's Logistics Assistance Program, which places logistics representatives within its divisions during peacetime, indicates that a system of attachment can function effectively in the Army as well as in the Navy and Air Force. As in those Services, this program establishes a continuing relationship that allows expansion during crisis or conflict. The logistics representatives were not data collectors, but an analogous system for data collection may be feasible. As a cautionary note, however, some of the data collectors that the Army's CALL attached to unit staffs were diverted from data collection to full-time staff work. The likelihood of this occurring might be diminished if

the Army assigned analysts to certain units (like CNA assigns analysts to ships) to perform analytical tasks in support of the commanders as well as to collect data.

2. Some Teams Dedicated to Data Collection Were Deployed, and They Gathered Data That Otherwise Would Have Been Lost

As described in Chapter I, several collection efforts achieved some degrees of success. During the ground phase of Desert Storm, the Army team that deployed to collect battle damage data followed close behind ground units. The Army's CALL team and WSCPAT, and the USMC's BAT, were successful in collecting a substantial amount of qualitative data over a broad range of issues. Also, the Air Force munitions effectiveness team and the DIA/DNA exploitation team both gathered useful data on the effectiveness of air-delivered munitions. In fact, there was eventually in theater most of the capability to gather the data required for an objective assessment of air-to-ground munitions performance. Aside from these teams, Chapter I describes a number of other efforts that gained access to the theater and were successful in gathering data. It is notable that all Services decided that some dedicated collection efforts were required (except the Navy, which doubled the number of CNA analysts deployed to SWA).

3. Specific Keys to Success Were Identified

A necessary, but not sufficient, condition for success was access to the theater, also called theater clearance. This required the permission of the theater, which was obtained far easier for small groups than for larger ones like the full EPADS team that the Army tried to deploy initially. Theater clearance was more readily granted after cessation of hostilities. A particularly effective way to obtain clearance was to negotiate an invitation from a staff section of the unified command or a component command. Such an invitation, however, did not lead automatically to firm support in theater – the provision of in-theater logistical support, especially transportation, was a key to success distinct from theater access.

Most deployed teams, including the USMC team with its supportive CMC message, had to use some salesmanship once they arrived. Commanders and their chiefs of staff were not eager to have visitors from CONUS in their areas, especially just prior to Desert Storm and its ground campaign. Whatever the mission of the collection team, it first had to establish its own credibility, which was done with relative ease if the team had been properly staffed and prepared. The data collectors typically had to explain who sent them, exactly what they intended to do, and how they could be of service to the operational commander. The ability of the Army's battle damage assessment team to identify potentially

new threat damage mechanisms – a clear near-term benefit to the commander – probably played a major role in the team being allowed to perform its mission.

While some might hold that the importance of data collection is self-evident, the ability to provide near-term benefits to a commander may be the key that opens the door to his command. Given the general lack of eagerness to receive data collectors, the commander's support was a necessity. Consensus among data collectors at the conference was that the commander was more likely to support collection efforts that provided a near-term service, were cheap in terms of needed resource support, and entailed no new reporting requirements. Also, commanders preferred that collection teams be under the control of a military officer.

As in any other form of salesmanship, success in gaining access or support went to the persistent and the resourceful. This often meant locating someone influential (the more highly placed the better) with whom a professional relationship had been previously established. For one team, such a highly placed individual was the CENTAF commander. Similarly, the BAT obtained the MARCENT commander's personal support.

4. Automated On-Board Recorders Collected Valuable Data

There were some encouraging examples of the value of automated on-board devices that recorded video, audio, and digital data from system data buses. Compared to human data collectors, these devices are more accurate, can record much more data, and can go where humans frequently cannot. Some of the best technical data collected during the war were obtained in this manner. Examples include the recorders on board the F-4G, the F-117A, AWACS, the AH-64, and the Aegis cruiser. Although the Patriot system does not have an imbedded data recording capability, portable recorders were used during three early engagements. The data gathered during these engagements led to the quick fielding of two major software changes that were successful in later engagements.

B. SHORTCOMINGS IN COLLECTION AND CATALOGING

Although appropriate collection teams were eventually deployed, they usually arrived too late, in some instances even after hostilities had ceased. Also, some teams were hurriedly assembled and had too little time in theater to perform their mission. This section describes some of the shortcomings that were reported on completed questionnaires, at the after-action conference, or during interviews. These shortcomings are categorized as follows:

- There Was Too Little Organized Preparation for Data Collection
- The Theater Resisted "Outsiders" Collecting Data
- Coordination Problems Hindered Data Collection Efforts
- Some Support Problems Within Theater Hindered Collection
- There Was Too Little Organized Preparation for Data Cataloging

1. There Was Too Little Organized Preparation for Data Collection

Prior to Operation Desert Storm, there were specific gaps in the institutionalization of data collection within DoD. The roles and responsibilities of OSD, the Joint Staff, the Unified Command (CENTCOM), and the Services were not clearly defined. Also, there was no early DoD-wide definition of the issues or questions to be addressed by the technical data collected. This lack of definition of the issues resulted in little understanding of the expected uses of the data. The OSD data collection plan eventually contained a list of issues categorized into mission areas, with specific data requirements for each issue. However, the collection plan was not published until March 1991, and its data requirements were too detailed to allow collection during the time available. Because there was no advance provision for an OSD directory of technical data sources, the structure of a database to support this directory (e.g., definition of fields, list of key words) was not defined until after the collection plan had been published. Before the Deputy Secretary of Defense's 31 January 1991 memorandum was signed, there was no written guidance or policy at the OSD level.

Relatively few data collectors or analysts were deployed with operational units at the start of Operation Desert Shield. Thus, there were not many existing relationships between operational units and data collectors on which to build more extensive collection efforts (CNA was the rare exception). This necessitated the formation of special teams dedicated to collect data, teams that were not familiar to the commanders in theater.

Although there were some established procedures for forming data collection teams (e.g., the Wartime Army Lessons Learned Program), no such teams actually existed at the start of Operation Desert Shield. Any teams that were to be deployed first had to be identified, trained, and equipped for collection. Also, there were no pre-Desert Shield support arrangements in place, so these had to be negotiated with in-theater headquarters that were very busy with other matters. The lack of a well-established support structure in theater greatly complicated support arrangements.

Unfortunately, the situation did not markedly improve before the start of Operation Desert Storm. Although several attempts were made to form and deploy a variety of collection teams, very few technical data collectors reached the theater before Desert Storm began. The Army's battle damage assessment team was a notable exception, but most other collection efforts were not organized and deployed until late February or early March 1991. Few collectors were able to gather data on events as they occurred; most of the major collection efforts were conducted after cessation of hostilities. As a result, the most perishable data were lost. Substantial amounts of subjective qualitative data, some of which were technical, were gathered by after-the-fact surveys and interviews. Less success was achieved in gathering objective quantitative technical data.

Because of the early difficulty in getting access for collection teams, individuals were sometimes attached to deploying units to gather data while performing other functions on the unit staffs, such as operations or logistics staff work. Initial assessments indicate that this technique was not particularly effective. Most of these collectors did much more staff work than collection of data, reducing the overall amount of data collected. More importantly, data collectors assigned to unit staffs suffered from divided loyalty and, perhaps, reduced objectivity.

The lack of data collectors in theater was offset somewhat by use of automated collection means on board some systems. Such collection means, however, were available for only a few systems, mostly aircraft. Few ground systems were so equipped. Data on Patriot engagements could be obtained only by attaching portable recorders to the system. (Some people believe that, in the past, imbedded collection capabilities have been specified in requirements documents for weapons systems but were "traded away" during the development process.) Some of the current recording devices, particularly the F-15's VTR, were not always reliable during the Gulf War. Collection efforts may have been hindered by a shortage of videotapes for some systems. Also, it is still not clear to what extent such automated records were retained for later use. The relative paucity of automated collection devices led to reliance on human data collectors, who generally encountered difficulty in reaching the theater.

2. The Theater Resisted "Outsiders" Collecting Data

An assumption of this after-action review was that preparing for and conducting the war takes precedence over other activities. This reflects the attitude of those during Desert Shield who were readying for a war whose start date, scope, and likely length were unknown. The attempts to field data collection teams competed for in-theater resources

with all other combat preparation efforts, and data collection lost that competition. The theater already had many non-combat people to support, including a fair number of civilians. Many of these non-combatants were "fact finders" sent by various elements of the Services to augment the flow of information from the theater, which was judged to be insufficient by some. The significant numbers of these visitors, who brought along no organic support, led CINCCENT to impose more stringent controls on theater access. The CINCCENT restrictions severely limited the access of technical data collectors, who had a legitimate reason for entry. It is possible that greater control of visitors by individual Services would have eased the access problems encountered by data collectors.

A higher priority was not given to data collection, in some measure, because of theater apprehension about the importance and the purposes of such efforts. A number of collectors indicated that certain headquarters treated them much like representatives of the Inspector General (IG) or the General Accounting Office (GAO), who might be there to grade, audit, or second-guess performance. There may also have been some concern about potential micromanagement by Washington. The greatest impediment to the collection of technical data might have been concerns about how the data might eventually be used.

It is understandable that in-theater headquarters, given the difficulties inherent in preparing for war in a logistically immature theater, would not place a high priority on the collection of data. Nonetheless, some reasonable collection effort probably could have been supported without adverse effects. In retrospect, it appears that the low priority assigned to data collection by the theater was sustained by the DoD when no high-level efforts were made before late January 1991 to overcome the theater's reluctance to allow access to data collectors.

3. Coordination Problems Hindered Data Collection Efforts

As discussed in a previous section, the collection of data encompassed technical, operational, and historical spheres. There was some overlap among the three, and they were only loosely related, thus causing some coordination problems. The most fundamental such problem was the dichotomy between the operational and technical spheres of collection. The collection of operational information for lessons learned (including materiel issues) was a function of the Services' uniformed operators. Also, the uniformed side of each Service typically coordinated theater clearances through the component commands of CENTCOM. The collection of quantitative technical data, however, tended to lie within the chain of the Service Acquisition Executive, who is on the civilian side of the Service headquarters. Within the Pentagon, the uniformed Service

operators typically interacted with the the Joint Staff, while the Service Secretariats dealt with the OUSD(A). Close coordination between the operators and the acquisition community is required for two reasons. First, both spheres are interested in the performance of materiel systems, but they differ in the degree to which technical detail is required. Thus, any efforts to gather materiel data for either purpose need close coordination to allow full coverage without overlap. Second, the collection of technical data will probably always require deployment of some number of data collectors who will be dependent on the operational side of the Service to secure theater access and support. Without close coordination between operational and acquisition elements of the Services, there is little hope of collecting the detailed technical data that requires the presence of human collectors. Cooperation in this area could have been better during the Gulf War.

The three separate spheres of collection resulted in multiple attempts to gain theater access, which may have hindered the theater clearance process. Once collection teams were deployed, some operational units were visited by more than one collection group. Both of these occurrences might have been reduced by more coordination among the groups. More extensive coordination also might have reduced the potential for overlapping coverage of some areas or units while missing others entirely.

The problems with coordination extended to a lack of an effective filter in CONUS for requests to enter theater. Each Service generally worked through its respective component command in theater, but there were no single points of contact within the individual Services to control entry requests. Had a clearinghouse for requests for entry been established in the Joint Staff or OSD with a counterpart in each Service, the total number of requests for theater clearance might have been reduced and collectors might have been granted more access. A theater clearance POC at unified command headquarters might also have helped.

The intelligence community is involved in the collection of data similar to that discussed in this report, except that it is focused on the opposing forces. Some linkage between the two collection efforts must occur to assemble the data that will allow objective assessment of weapons performance. Such assessment requires data that identify, for each engagement, the type of platform, the munitions employed, the engagement conditions, the target attacked, and munition effects on target. The intelligence community must provide the data on the targets and on the effects of specific attacks on specific targets. There are indications that the full integration of the intelligence community with the operational units and the data collectors did not occur as frequently as it could have.

4. Some Support Problems Within Theater Hindered Collection

A number of collection teams did deploy to theater, many hurriedly organized in February 1991 after Operation Desert Storm had begun. The in-theater support arrangements made for these groups differed in their nature and extent. Most collection groups, however, indicated that support problems hindered them to some degree or other. Some collectors arrived without firm written authority to conduct their collection mission, and some lacked a written mission statement. Some groups indicated that this lack of authority hindered their performance, although others felt that it did not.

No collection group was deployed as a self-supporting entity, so each depended on in-theater sponsors for most, or all, of its support. Food, water, and shelter were obtained relatively easily (at least in rear areas), but other items of support were not. Intra-theater transportation, which was indispensable in data collection, was hardest to obtain. Many collection efforts were hindered by the lack of helicopter and wheeled vehicle transportation. Some teams became especially adept at cannibalizing worn-out vehicles to keep a few operational. Other frequently mentioned support problems involved the lack of communications or navigational equipment. GPS receivers were especially helpful in navigating about Saudi Arabia and occupied areas, but some teams had difficulty getting something as simple as satisfactory maps. Almost all teams reported that performance of administrative, maintenance, and supply functions detracted from data collection.

Most collection teams were told before they deployed who their in-theater sponsors would be. Generally, the sponsoring headquarters had many other responsibilities, so they were not enthusiastic about the sometimes unexpected arrival of data collection teams without visible means of support. In most cases, the intended sponsorship arrangements did not work well. Although deploying collectors in larger groups may have been more efficient, the arrival of such groups did present support problems for the sponsoring units. In addition, inter- and intra-Service turf issues may have occasionally made life more difficult for collection teams. For example, there were a few reports that teams were refused support by other Services, often for needs as simple as vehicle fuel.

Collectors, particularly those who used the interview technique to gather data, sometimes had difficulty in getting accurate information on unit locations. Even when those locations were known, access was sometimes a problem. For teams investigating damage to particular targets, the lack of accurate target location and the inability to gain access to certain areas also caused problems even when transportation was available. Access was sometimes denied because of the danger of mines and unexploded ordnance.

5. There Was Too Little Organized Preparation for Data Cataloging

The responses to the cataloger questionnaire were fewer in number and less detailed than the responses from collectors. Nonetheless, there were recurrent themes in the questionnaire responses and in discussions with potential users of the data.

The Services made few advance preparations for receiving, identifying, sorting, and archiving substantial amounts of raw data in many different formats. Likewise, there were few pre-determined procedures for extracting useful data elements and storing them in a format suitable for use by analysts. The data catalogers within the Services had little control over the manner in which data were submitted, so they accepted everything that was offered and then addressed how to catalog the various materials. Because the Gulf War collection effort was ill-defined at the start, it was difficult for the catalogers to develop satisfactory procedures. Several respondents to the cataloger questionnaire stated that the first step in improving cataloging should be to provide more structure and organization to the overall collection process.

The interest shown by OSD in publishing a data collection plan and the Technical Data Directory provided impetus to the cataloging effort. Unfortunately, the DoD effort was not organized early enough to allow advance preparation for the required submission of data sources for the data directory. The database structure for the directory had not been defined before the Services began their individual collection and cataloging efforts. The structure was not defined until after the data collection plan had been published, and later mid-course corrections made to the structure caused some confusion and revisions within the Services. For example, changes to the list of standard key words for the data directory apparently caused some problems among the catalogers of certain Services.

Many contractor representatives were in theater to support various materiel systems. At least some are known to have gathered technical performance data on their respective systems. The quantity and quality of such data are unknown. More importantly, it is not clear to what extent these data have been shared with the government, nor is it clear to what degree contractors are obligated to provide their data to the government. For example, the JSTARS mission tapes are considered proprietary information by the prime contractor (Reference 8).

Some requests for access to data have not been satisfied to the degree desired by the requestor. In these instances, it may be that the requested data either had not been collected or had not yet been extracted by the cataloging process. This would indicate that improvements are needed in the collection and cataloging process. On the other hand, if

available data were being withheld, that would indicate a need to clarify the policy regarding access to data.

C. INDICATIONS OF THE EFFECTIVENESS OF DATA COLLECTION

At this point, one might question the degree to which the shortcomings summarized above affected the quality or quantity of technical data collected during Desert Shield and Desert Storm. Many of the analytic agencies and staffs that require technical data have not yet had access to the data collected during the Gulf War. Nonetheless, some indications about data adequacy are emerging from some ongoing endeavors.

One such endeavor is OSD's report to Congress on the conduct of the war, as required by Title V. A concern often voiced by those familiar with the preparation of the report involves the problem of objectively assessing system performance, especially of weapons systems. Such assessment requires the matching of data on weapons platform, munitions, delivery conditions, targets, and effects on target on an engagement-by-engagement basis. This has proven to be difficult to accomplish.

Elements within the Army made extensive efforts, perhaps more than any other Service, to gather technical data during the Gulf War. As Chapter I showed, some of these efforts were either stymied or delayed. During the interviews and discussions conducted in conjunction with the preparation of this report, Army representatives were exceptionally candid about the degree of success achieved, the reasons for shortcomings in collection, and possible procedures for improving data collection (Reference 9). There was general agreement that technical data collection should be institutionalized within the Army and that the proper starting point would be the establishment of a clear DoD-wide policy.

The work by CNA analysts, especially in documenting the commanders' decision-making processes, facilitated the Navy's detailed reconstruction of the War, which was the most extensive one ever done by the Navy. A view of a senior CNA analyst was that, although the overall quality of the data was the "best ever," some improvements could have been made in technical data collection. The Navy did not deploy dedicated data collectors, so much of its technical data came from automated recorders. Some aircraft, however, lacked recording devices, which limited the availability of BDA for assessment of strike system effectiveness. Aegis radars, on the other hand, generated so much data that extraction of the most useful elements was difficult. These examples, and the lack of devices on board ships to record such things as navigational data and communications, indicate that data collection by automated means could have been improved. Discussions

with CNA also raised the point that analysis within the Services could be improved by enhanced coordination within the DoD. Coordination could be improved by better defining the procedures for sharing data among Services (such as Aegis and AWACS radar output in usable form), and by developing DoD-wide standards that specify the data to be collected and the format(s) to be used.

The after-action conference confirmed that, other than the MCRDAC team deployed to identify and solve materiel problems, the Marine Corps did not make any dedicated efforts to gather detailed technical data. The BAT collected relatively little quantitative data on system performance, although some members were more successful than others in collecting such data (on TOW, for instance). In the view of a knowledgeable CNA analyst, the Marine Corps could have improved the quality and quantity of the technical data collected if it had made an earlier determination of what technical data to collect and how to collect them. Furthermore, the Marine Corps, as does the Navy, needs better automation of the collection process to reduce reliance on manual collection methods such as surveys and interviews. The overall Marine Corps collection effort, however, provided much better information than was collected during the Vietnam War.

The Air Force representatives interviewed for this review were generally satisfied with the Air Force's policy of centralized control and decentralized execution of collection and cataloging. This process generated significant amounts of data within the Air Force, including the Tactical Air Forces (Reference 8). Nonetheless, there are indications that, at least for the Tactical Air Forces, "most of the data cannot be easily tied together to support analysis and some data has perished." (Reference 10). In particular, current BDA is not adequate for weapon systems evaluation because there is not enough BDA to evaluate each tasked mission, and the quality of the assessments is lacking (Reference 10). Reference 10 also provides an excellent set of recommendations for improving data collection, beginning with plans that assign responsibilities to the individual commands. Also, at least one source has indicated that valuable data on battle damage assessment and repair of aircraft were lost because collection teams did not deploy during the war (Reference 11).

In summary, there are clear indications that there were shortcomings in the technical data collection process that reduced the quality and, in some cases, quantity of useful data. In specific situations, the vast amounts of material in incompatible formats have hindered the extraction of the data needed for analysis. There are, however, a number of potential remedies for the shortcomings of the present collection system – remedies that are discussed in more detail in the next chapter.

CHAPTER III

REMEDIES AND RECOMMENDATIONS

III. REMEDIES AND RECOMMENDATIONS

This chapter contains four sections, the first of which provides remedies for the observed shortcomings in the process for collecting technical data on materiel systems. These remedies reflect the comments and suggestions made on the returned questionnaires, at the after-action review conference, and during interviews with policy makers. Sections B through D list specific recommendations on policy, responsibilities, and organizational structure, respectively, as applicable to the Office of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff and Joint Staff, the CINCs of the Unified and Specified Commands, the Military Services, and the Defense Agencies.

A. SUGGESTED REMEDIES FOR SHORTCOMINGS IN DATA COLLECTION

Commanders and their staffs will tend to resist data collection efforts, particularly those generated from outside their organizations. DoD should minimize this resistance by establishing a well-defined institutionalized program that provides some near-term benefit to the operational commander without imposing an unacceptable burden. The DoD collection program should include regular collection of data during peacetime exercises, force deployments, crises, and hostilities, with a clear expectation that data will be collected and reported in each of these situations. Table III-1 summarizes the suggested remedies.

1. Establish Data Collection Policy, and Institutionalize the Collection Process Based on That Policy

a. Publish DoD-wide data collection policy

The only known written policy on DoD-wide collection of technical data consists of the Deputy Secretary of Defense memorandum of 31 January 1991 and the Operations Desert Storm and Desert Shield Technical Data Collection Plan, 12 March 1991. The after-action review of Gulf War data collection should establish a policy framework that institutionalizes data collection within DoD. There should be written policy at the Secretary of Defense level that provides broad guidance on technical data collection, including objectives, scope, definitions, and responsibilities. The DoD policy should define ground

rules for access to data, including procedures for data request and release. Consideration should be given to publication of interim policy guidance, followed by a formal directive.

b. Define the issues

After the overall policy has been determined, the next step in the process should be to specify the materiel systems of interest and to define a clear set of issues to be addressed with regard to those systems. Priorities for addressing the issues should be established for several circumstances. There may be differences in priorities between single-Service and unified command deployments, and for probable short-term commitments versus those likely to be longer term. The issue definition and prioritization process must include OSD, the Joint Staff, the Services, and the appropriate Defense Agencies. The set of issues, however, must be limited to major issues that have a realistic chance of being addressed by the data likely to be available. The issues should require comparisons of system design requirements with how these systems were actually used in an operational environment and how they performed. The policy should allow changes in the number, statement, or priority of the issues in response to unforeseen circumstances.

c. Determine the data required to address the issues

After the issues have been defined, there should be a determination of the minimum data required to address each issue. The focus should be on technical data in an operational context, but consideration should be given to all aspects of collection, including operational, technical, historical, and intelligence. The policy formulation process should determine whether centralized directories of data sources such as the Technical Data Directory will be required; if so, their structure should be well-defined.

d. Determine those data that can be collected by existing means and those that require dedicated collection teams

A substantial amount of automated data collection occurs regularly, especially in the area of logistics. Some issues may be addressable using these data, as long as provisions are made for retention and disposition of the data. There may be certain issues, however, that require extraordinary procedures to collect needed data. Two such issues involve the assessment of battle damage (incurred by our own systems) and the objective determination of our weapons performance (which requires linkage between shooters and targets). The resolution of such issues may entail the deployment of individuals or teams dedicated to collecting specific data.

e. Determine the best combination of dedicated collection means

Different types of data generally will entail differing means of collection. Thus, a combination of collection methods may be required to gather the needed data in the most efficient manner. There are four general approaches to dedicated collection:

- Assigning collectors to units or headquarters – in peacetime, if possible, to establish relationships and to allow deployment with the units.
- Deploying specially trained and equipped collection teams – but consider the procedure for obtaining theater access and minimize the support burden on the theater.
- Assigning a collection mission as a secondary duty to staff members of deployed or deploying units – probably the last resort.
- Equipping military systems with automated on-board data collection means to reduce (but not eliminate) the need for human collectors – but procedures for recovery and retention of data must be established, and the maintenance of such recorders must be anticipated.

It will be up to the individual Service or Agency to determine which combination of dedicated collection approaches is most appropriate in situations where dedicated collection is required. Each Service and Agency should coordinate its technical collection efforts and, to the degree possible, interact with collection efforts outside the Service (such as those of another Service or SURVIAC).

f. Place increased emphasis on automated on-board data recorders

The value of automated recording devices, now used principally in aircraft, has been demonstrated clearly. Their use in aircraft should be continued, with improvements as warranted. The appropriate Services should investigate the feasibility of using of similar devices in ground combat systems such as tanks, infantry fighting vehicles, and field and air defense artillery. Also, expanded use of recorders on ships should also be considered.

The inclusion of automated recorders in military hardware depends on actions taken throughout the materiel system acquisition process. The imbedding of these recorders should be addressed at each acquisition milestone for systems under development. For currently fielded systems, the responsible Service should determine those into which recorders should be retrofit. The recording devices chosen for inclusion must be non-intrusive to the crew and easily serviced. The design of the devices should be low-risk and relatively inexpensive. In designing the devices, keep expectations reasonable and attempt to balance the data needs of the analysts with those of the development engineers. In

particular, consider how data elements needed to assess system effectiveness in an operational environment can be extracted from the large amounts of data generated by computer-intensive systems (such as AWACS and Aegis).

g. Provide high-level interest in data collection

A clear prerequisite for success in collection is the support of the operational commanders from the CINC down through all levels where collection occurs. It would be easier to obtain such support if there were clear evidence that data collection has a high priority among senior DoD military and civilian leaders. The leadership, however, should have reasonable expectations about the extent to which data can be collected during combat operations. When making a case for the value of data collection to operational commanders, stress both the long-term value to the Service and, more importantly, any near-term benefits for the commanders in fighting the war (or in peacetime training). The leadership's continued awareness of, and interest in, the data collection effort can be achieved only through regular exposure to the collection process and its products.

2. Clearly Define Responsibilities With Regard to Collection

In order for the data collection process to function, the roles of the Services, OSD, the Joint Staff, and the CINCs must be delineated clearly.

a. Services define collection efforts to satisfy OSD and own needs

The Services (and Agencies that have proponency) should continue as the principal collectors of technical data on systems that they field. Each Service should identify and organize the collection means required to satisfy OSD needs as well as any additional demands of the Service. Each Service should define clearly all organizational responsibilities for data collection, with a goal of integrating its technical, operational, historical, and intelligence collection efforts. Also, the Services should control the numbers and types of visitors attempting to gain access to the theater, while ensuring that data collectors have appropriate priorities for entry.

b. OSD and the Joint Staff jointly coordinate the DoD-wide collection efforts

With Service and Defense Agency participation, OSD and the Joint Staff should jointly coordinate the effort to develop policy and to institutionalize technical data collection within DoD as discussed in Section III.A.1. An OUSD(A) element should lead an effort to publish a DoD Directive on data collection policy, with an appropriate implementation

instruction or manual. Some consideration should be given to the role played by organizations such as SURVIAC and the JTCGs, including the extent to which the Services must provide data for archiving.

An OUSD(A) element (not necessarily the office leading policy development) should be tasked with providing continuing OSD oversight over the technical data collection process. The responsible office should be cognizant of peacetime preparations for data collection and of the degree of success being achieved in data collection during exercises, crises, or hostilities. The oversight process should include a mechanism for reporting the status of collection preparation and for periodic reviews of policy and preparedness.

The Joint Staff should ensure that all issues of a joint nature are addressed during policy development and during the process of institutionalizing collection. The Joint Staff should take the lead in all matters dealing with the CINCs, whose cooperation will be needed for any data collection efforts to succeed. This includes informing the CINCs about DoD policy on technical data collection and about Service planning to execute the policy. Also, the Joint Staff should determine whether there is a requirement for policies to coordinate collectors' access to theater when such access is not pre-planned. If there is such a need, these policies should become part of the jointly developed collection procedures.

A point made during the policy maker interviews was that DoD should place more emphasis on the joint aspects of data collection and analysis, because joint operations are likely to be the norm for future employments of U.S. forces. This could be done by better coordination of deployed Service collectors and analysts, not by establishing a new joint organization. A potential operational benefit of such coordination might be the near-term identification and resolution of problems encountered during joint operations. It was suggested that the Joint Staff (perhaps J-8), in coordination with OSD and the Services, take the lead in addressing this matter.

c. OSD and the Joint Staff should address any special coordination needs

One area that requires exceptional coordination among the Services and Defense Agencies is the problem of establishing the linkages between shooters and targets that are needed to assess weapons effectiveness. OSD and the Joint Staff should specifically address what special coordination procedures may be required to resolve this multi-Service and multi-Agency issue (and any other issues that are joint in nature). Also, OSD and the Joint Staff should ensure that the Defense Acquisition Board (DAB) and Joint

Requirements Oversight Council (JROC) consider the requirement to imbed appropriate data collection means into materiel systems during the acquisition process.

d. CINCs support technical data collection

The responsibilities of the CINCs and their Component Commanders should include supporting the data collection efforts of the DoD, subject to two provisos. First, fighting the war always has top priority, including its preparation, support, and conduct. Second, the overall DoD collection effort (technical, operational, and historical) must be organized and coordinated so that an undue support burden is not imposed on the theater.

3. Coordinate and Support the Needed Collection Efforts

The after-action review has identified certain guidelines that, if followed, should improve the collection of technical data.

a. Coordinate historical, operational, and technical collection efforts

Integrate the three separate spheres where possible, and coordinate their efforts where integration is not possible. Recognize that all three constituencies have legitimate but differing (not conflicting) needs for information. Also recognize that the value of the technical data depends on knowledge of the operational environment in which such data were gathered. Strive for efficiency of coverage, while minimizing the number of separate groups with which the theater must deal.

Of special interest is the relationship between operational and technical – more specifically, the relationship between the Service operators and the Service acquisition chain. Both the operational and acquisition communities within the Services have important roles to play in the determination of needed data and in the collection of those data. Close cooperation of both sides, as well as OSD and the Joint Staff, is needed for successful collection. The expectations of all parties, however, must be reasonable.

b. Integrate intelligence

Adequate objective assessment of weapons system performance cannot be done without data on target effects on an engagement-by-engagement basis. Intelligence assets must be integrated into the data collection process to assist in matching target effects with specific weapons engagements. The intelligence community should address the extent to which it requires specialists in bomb damage assessment.

c. Assign collectors to units during peacetime whenever possible

There are strong indications that the assignment of collectors to operational units during peacetime would be the best method of dedicated collection when automated collection is not possible. The assigned collectors could develop a relationship with the unit that leads to better support, provides easier access to data, and establishes a base that could expand as needed. Also, such collectors would be more likely to deploy with the unit than would outsiders. If Active Component members cannot be spared for such assignments, serious consideration should be given to assigning collection missions to members of the Reserve Component. Reservists could train regularly with their associated units, thus practicing their collection skills while establishing continuing relationships with the units.

d. If teams are to be deployed, verify their support arrangements

Ad hoc support arrangements generally did not work well during the Gulf War, although there was a certain amount of situational dependence in this regard. If dedicated teams are planned for deployment, consider the degree to which they will be self-supporting, especially in transportation. The need to scrounge for support may significantly degrade data collection performance. By minimizing added support needs and by forgoing new reporting requirements, the data collection process can be made less burdensome to the operational commanders

e. Field prepared collectors

Teams and individuals that are deployed to collect data should be provided with clear mission statements and the written authority to accomplish the mission (the higher the level of authority the better). Consider ways in which the collectors can provide a near-term service to the operational commanders. Provide collectors with credibility by selecting people with the right skills, background, physical condition, and attitude. Train them, provide them a collection plan, and equip them to do the job defined in their mission statements. Blend military and civilian skills, including the use of augmentees from the Active and Reserve Components (consider Geneva Convention implications when deploying civilians). Consider those people with backgrounds in either operational or technical test and evaluation. Use existing resources efficiently and avoid plans requiring increases in people. If teams are deployed, consider placing them under the command of at least an O-6.

f. Be prepared to deploy collectors early

The failure to deploy collectors soon enough during Operation Desert Shield was a recurrent theme both in the responses to the questionnaires and during the interviews. In general, data collectors should deploy at the same time as committed forces. They should certainly be deployed before the start of hostilities whenever the situation allows. Whatever procedures are institutionalized, they should include immediate response elements. The assignment of collectors to operational units during peacetime would facilitate this.

4. Exercise and Experiment During Peacetime Exercises, and Deploy During Crises

Combat forces exercise during peacetime to train for war and to evaluate the tactics and doctrine to be employed in war. Data collectors should prepare in a similar manner.

a. Normal peacetime exercises

There are a number of peacetime opportunities for the exercise of data collection, including joint and combined exercises as well as exercises that are Service-unique. The exercise of data collectors during these opportunities would train the collectors, provide lessons learned on data collecting, assist commanders in unit training, and acquaint commanders with the presence and services of data collectors. If members of the Reserve Component have been given collection missions, they should be given continuing opportunities to train and practice with their associated Active Component units.

b. Crises and hostilities

In short-notice, short-duration operations such as those in Panama and Grenada, data collection was virtually nonexistent. Even during a conflict like the Gulf War with its lengthy buildup, the data collection effort could have been improved. Once data collection procedures have been institutionalized, they should be put into practice during any crisis. The ability of the established collection procedures to respond will indicate DoD's level of preparation to collect data; the extent to which data collectors are allowed access will indicate how much value DoD places on data collection.

Table III-1. Suggested Remedies for Shortcomings in Data Collection

Establish Data Collection Policy, and Institutionalize the Collection Process Based on That Policy.
Publish DoD-wide data collection policy.
Define the issues.
Determine the data required to address the issues.
Determine those data that can be collected by existing means and those that require dedicated collection teams.
Determine the best combination of dedicated collection means.
Place increased emphasis on automated on-board data recorders.
Provide high-level interest in data collection.
Clearly Define Responsibilities With Regard to Collection.
Services define collection efforts to satisfy OSD and own needs.
OSD and the Joint Staff jointly coordinate the DoD-wide collection efforts.
OSD and the Joint Staff should consider any special coordination needs.
CINCs support technical data collection.
Coordinate and Support the Needed Collection Efforts.
Coordinate historical, operational, and technical collection efforts.
Integrate intelligence.
Assign collectors to units during peacetime whenever possible.
If teams are to be deployed, verify their support arrangements.
Field prepared collectors.
Be prepared to deploy collectors early.
Exercise and Experiment During Peacetime Exercises, and Deploy During Crises.
Exercise and experiment during normal peacetime exercises.
Deploy during all crises and hostilities.

B. RECOMMENDATIONS ON POLICY

The lack of published DoD-wide guidance is a fault that virtually all policy makers felt should be corrected. Although the interviewed policy makers expressed varying opinions about the specific content of such policy, there was general agreement that collection policy should be published by the Secretary of Defense and that OSD should have the lead in coordinating its development. This section lists specific recommendations on policy regarding technical data collection, which are summarized in Table III-2.

1. Definitive DoD policy on technical data collection should be established.

a. Consider the findings of this report in developing such policy.

b. Publish policy on technical data collection at the Secretary of Defense level, preferably via a DoD Directive and an accompanying instruction or manual.

c. Clearly define the scope, objective, and responsibilities for data collection.

d. Identify the materiel systems of interest, the issues to be addressed, and the minimum data required to address the issues.

e. Tailor the issues for likely situations, which will vary in the number of participating Services (or nations), the amount of warning, the duration of pre-war buildup, and the length of hostilities. Establish priorities for addressing the issues in each situation.

f. Determine the extent to which centralized directories of data sources are required, define the structures of any such databases, and define the reporting procedures.

g. Determine the extent to which listings of Service-sponsored analyses are required, and define the format of any such submissions.

h. Allow the Services maximum latitude in achieving the objectives of the data collection program, but define clearly the policy regarding access to data and the procedures for requesting release of data.

2. There should be continuing oversight of the data collection process.

a. Assign an OSD element the responsibility for being cognizant of:

- the status of peacetime preparation for data collection via a formal reporting mechanism; and
- the degree of success of data collection efforts during crisis or wartime.

b. Conduct periodic OSD-level reviews, with Service participation, of:

- the degree to which existing DoD policy has been implemented;
- the need to modify existing policy; and
- the state of preparedness within DoD to collect technical data.

3. There should be an expectation within DoD that technical data will be collected.

a. Collect technical data during peacetime exercises and deployments.

b. Collect technical data during crises and hostilities, with the degree of detail contingent on the situation.

c. Recognize that there are limits on the ability to collect data.

4. There should be expanded use of automated data collection devices on military systems.

a. Develop devices nonintrusive to operator or crew procedures.

b. Address the inclusion of such devices in materiel systems as part of the systems acquisition process, including appropriate cost benefit analysis.

C. RECOMMENDATIONS ON RESPONSIBILITIES

Those who were surveyed and interviewed during this review were unanimous in their belief that the responsibility for the actual collection of technical data on the performance of a materiel system ought to lie with the Service or Agency that developed and fielded it. This section expands on this responsibility in the context of findings discussed in prior chapters. This section also lists recommendations on the responsibilities of OSD, the Joint Staff, and the CINCs. The recommendations are summarized in Table III-3.

1. The Service or Defense Agency fielding an item of equipment should have the responsibility to collect, catalog, and analyze technical data on that item in accordance with DoD policy. Specifically, Services and Agencies should:

a. Participate with OSD and the Joint Staff in developing DoD policy, particularly the issues and the data required to address those issues.

b. Plan a total Service technical data collection and cataloging effort that addresses the issues stated in DoD policy, as well as Service-specific issues; integrate technical data

collection with historical, operational, and intelligence collection efforts; coordinate the collection and cataloging so that the overall process yields data to address the defined issues.

c. Determine the best combination of collection approaches to satisfy all data needs; establish a structure and a set of procedures that are adequate to execute the collection plan, giving due consideration to the peacetime assignment of collection cells to operational units.

d. Follow certain principles in developing collection procedures and structure:

- Provide a service to operational commanders at all levels.
- Encourage command support for the collection effort at all levels.
- Minimize the burden of collection on commanders.
- Impose no new reporting requirements on commanders.
- Maximize the use of existing collection means.

e. To the extent possible, imbed automated nonintrusive collection devices in materiel systems during their development; implement procedures for recovering and retaining data collected in this manner.

f. Establish controls on requests for access to theaters of operations; address priorities for access that consider data collection needs.

g. Report the nature and extent of planning for technical data collection to the office within OUSD(A) charged with oversight of the collection process.

h. Practice data collection regularly in peacetime and be prepared to collect during crises or hostilities; execute the plan for technical data collection during crises and hostilities.

i. After any execution of the collection plan, provide a listing of technical data sources to the OSD oversight office in the format specified for such submissions.

j. After any execution of the collection plan, provide a listing of Service-sponsored analyses to the OSD oversight office in the format specified for such submissions.

2. The USD(A) should lead the development of DoD policy and should oversee the planning, preparation, and execution of measures supporting such policy. Specifically, in coordination with the other OSD principals, the Joint Staff, the Services, and the appropriate Defense Agencies, the USD(A) should:

a. Develop DoD policy on technical data collection in accordance with the recommendations of Section III.B.

b. Publish a DoD Directive and an implementing instruction.

c. Determine the role in the technical data collection process of such organizations as SURVIAC and the JTCGs.

d. Establish a formal program for continuing oversight of the DoD-wide planning for technical data collection, including a reporting mechanism.

e. Conduct periodic reviews of published policy and of DoD's progress in implementing that policy.

3. The Joint Staff should participate in the development of DoD collection policy, interact with the CINCs, and coordinate access of collectors. Specifically, the appropriate Joint Staff Directorates should:

a. Coordinate with the USD(A) on development of collection policy with regard to joint issues and CINC matters.

b. Inform the CINCs about data collection policy and planning; work with the CINCs to facilitate the technical data collection process.

c. Review procedures for coordinating reasonable access of data collectors to theaters of operation.

d. Determine the value and feasibility of systematically improving the coordination among Service data collectors and analysts on matters of joint interest during peacetime, crises, and hostilities; if such coordination is judged to be sufficiently valuable and feasible, determine a mechanism for establishing such coordination.

4. OSD and the Joint Staff should jointly identify and resolve multi-Service and multi-Agency issues.

a. In close coordination with the Services and appropriate Defense Agencies, the USD(A) and the J-2 should develop procedures that better link data about weapons

engagements with the effects of those engagements on their intended targets to allow objective assessment of performance.

b. The USD(A) and the J-7 should ensure that the systems acquisition process, through the Defense Acquisition Board (DAB) and Joint Requirements Oversight Council (JROC), considers the requirement to imbed appropriate data collection means into materiel systems.

c. The USD(A) and the appropriate Joint Staff Directorate should coordinate the resolution of any technical data collection issue that has joint ramifications.

5. CINCs should support technical data collection to a degree consistent with warfighting responsibilities.

a. The CINCs should be provided with a clear description of both the DoD collection policy and the Service collection plans in support of that policy.

b. The CINCs should support well-defined collection and analysis efforts as long as they do not interfere with the preparation for, or conduct of, combat operations.

c. It should be each CINC's prerogative to establish an element on his own staff either to collect and analyze technical data or to facilitate data collection by specialized teams provided by the Services.

D. RECOMMENDATIONS ON ORGANIZATIONAL STRUCTURE

No justification has been found for the establishment of organizational elements to collect data independent of the Services. In fact, there appears to be no need for the establishment of any additional structure above the Service-level. Thus, this section, which lists organizational responsibilities, is quite short. The recommendations are summarized in Table III-4.

1. No new organization or office should be established above Service level to collect or catalog data.

a. Responsibility for coordinating development of DoD collection policy should be given to an existing office in OUSD(A).

b. Responsibility for continuing oversight should be given to an existing office in OUSD(A).

2. The Services and appropriate Defense Agencies should be given maximum latitude in organizing their own collection efforts. Services and Agencies should:

a. Organize so that published DoD policy can be implemented and so that individual Service or Agency needs can be met.

b. Where feasible and appropriate, assign to operational units a collection capability that can be expanded during wartime. If declining Active Component end-strengths make this approach infeasible, assign to specific elements of the Reserve Component the continuing mission of collecting technical data within associated operational units.

Table III-2. Recommendations on Policy

Definitive DoD policy on technical data collection should be established.
Consider the findings of this report in developing such policy.
Publish policy on technical data collection at the Secretary of Defense level.
Clearly define the scope, objective, and responsibilities for data collection.
Identify the materiel systems of interest, the issues, and the minimum data required.
Tailor the issues for likely situations, the warning time, the duration of pre-war buildup, and the length of hostilities. Establish priorities for addressing the issues.
Determine the extent to which centralized directories of data sources are required, define the structures of any such databases, and define the reporting procedures.
Determine the extent to which listings of Service-sponsored analyses are required, and define the format of any such submissions.
Allow the Services maximum latitude in data collection, but define clearly the policy regarding access to, and request of, data.
There should be continuing oversight of the data collection process.
Assign an OSD element the responsibility to be cognizant of (1) the status of peacetime preparations for data collection and (2) the degree of success of data collection efforts during crisis or wartime.
Conduct periodic OSD-level reviews of the degree of policy implementation, the need to modify policy, and the preparedness to collect technical data.
There should be an expectation that technical data will be collected.
Collect data during peacetime exercises and deployments.
Collect data during crises and hostilities, with detail contingent on the situation.
Recognize that there are limits on the ability to collect data.
There should be expanded use of automated data collection devices.
Develop devices nonintrusive to operator or crew procedures.
Address the inclusion of such devices in materiel systems as part of the systems acquisition process, including appropriate cost benefit analysis.

Table III-3. Recommendations on Responsibilities

The Service or Agency fielding equipment should have the responsibility to collect, catalog, and analyze technical data on that item in accordance with DoD policy. Services and Agencies should:

Participate with OSD and the Joint Staff in developing DoD policy.

Plan a total collection and cataloging effort; integrate technical collection with historical, operational, and intelligence collection; coordinate collection and cataloging.

Determine the best combination of collection approaches; establish the structure and procedures to execute the collection plan, including possible peacetime assignment of collection cells to operational units.

Follow certain principles: Provide a service to commanders; encourage command support; minimize the burden on commanders; impose no new reporting requirements on commanders; and maximize the use of existing collection means.

Imbed automated nonintrusive collection devices in materiel systems during their development; implement procedures for recovering and retaining the data.

Establish controls on requests for access to theaters of operations; address priorities for access that consider data collection needs.

Report the nature and extent of planning for technical data collection to OSD.

Practice in peacetime, and be prepared to collect during crises or hostilities; execute the collection plan during crises and hostilities.

After any plan execution, provide to OSD listings of technical data sources and Service-sponsored analyses.

The USD(A) should lead the development of policy and should oversee the planning, preparation, and execution of such policy. Specifically, in coordination with the other interested parties, the USD(A) should:

Develop DoD policy on technical data collection in accordance with the recommendations on policy.

Publish a DoD Directive and an implementing instruction.

Determine the role in the technical data collection process of such organizations as SURVIAC and the JTCGs.

Table III-3. Recommendations on Responsibilities (Continued)

Establish a formal program for continuing oversight of the DoD-wide planning for technical data collection, including a reporting mechanism. Conduct periodic reviews of published policy and of DoD's progress in implementing that policy.
The Joint Staff should participate in the development of DoD collection policy, interact with the CINCs, and coordinate access of collectors. Specifically, the appropriate Joint Staff Directorates should: Coordinate with the USD(A) on development of collection policy with regard to joint issues and CINC matters. Inform the CINCs about data collection policy and planning; work with the CINCs to facilitate the technical data collection process. Review procedures for coordinating reasonable access of data collectors to theaters of operation. Determine the value and feasibility of systematically improving the coordination among Service data collectors and analysts on joint matters during peacetime, crises, and hostilities; if valuable and feasible, determine a mechanism for accomplishing it.
OSD and the Joint Staff should jointly identify and resolve multi-Service and multi-Agency issues. In close coordination with the Services and appropriate Defense Agencies, the USD(A) and the J-2 should develop procedures that better link data about weapons engagements with the effects of those engagements on their intended targets. The USD(A) and the J-7 should ensure that the systems acquisition process, through the DAB and JROC, considers the requirement to imbed appropriate data collection means into materiel systems. The USD(A) and the appropriate Joint Staff Directorate should coordinate the resolution of any technical data collection issue with joint ramifications.

Table III-3. Recommendations on Responsibilities (Continued)

CINCs should support data collection consistent with their warfighting responsibilities. CINCs should be provided with a clear description of both the DoD collection policy and the Service collection plans in support of that policy. CINCs should support well-defined collection and analysis efforts as long as they do not interfere with the preparation for, or conduct of, combat operations. It should be each CINC's prerogative to establish a staff element either to collect and analyze technical data or to facilitate collection by specialized Service teams.

Table III-4. Recommendations on Organizational Structure

No new organization or office should be established above Service level to collect or catalog data. Responsibility for coordinating development of DoD collection policy should be given to an existing office in OUSD(A). Responsibility for continuing oversight should be given to an existing office within OUSD(A).
The Services and appropriate Defense Agencies should be given maximum latitude in organizing their own collection efforts. Services and Agencies should: Organize so that published DoD policy can be implemented and so that individual Service or Agency needs can be met. Where feasible and appropriate, assign to operational units a collection capability that can be expanded during wartime. If declining Active Component end-strengths make this approach infeasible, assign to specific elements of the Reserve Component the continuing mission of collecting technical data within associated operational units.

REFERENCES

1. Memorandum from the Deputy Secretary of Defense, "Operations DESERT STORM and DESERT SHIELD Technical Performance Assessments," 31 January 1991.
2. Memorandum from the Under Secretary of Defense (Acquisition), "Operations DESERT STORM and DESERT SHIELD Technical Performance Assessments," 12 February 1991.
3. Office of the Under Secretary of Defense (Acquisition), "Operations Desert Storm and Desert Shield Technical Data Collection Plan," 12 March 1991.
4. Memorandum from the Under Secretary of Defense (Acquisition), "Operations DESERT STORM and DESERT SHIELD Technical Data Collection Plan," 11 March 1991.
5. Office of the Under Secretary of Defense (Acquisition), "Operations Desert Storm and Desert Shield Preliminary Technical Data Directory," 10 July 1991.
6. Office of the Under Secretary of Defense (Acquisition), "Operations Desert Storm and Desert Shield Technical Data Directory," 11 October 1991.
7. Institute for Defense Analyses Document D-1077, "Preliminary After-Action Report for the Operations Desert Shield/Desert Storm Technical Data Directory Project," 21 November 1991.
8. HQ Tactical Air Command Joint Studies Group Memorandum 91-02-01A/91-06-01A, "Desert Storm Data Assessment Report," 6 December 1991.
9. Memorandum from the Deputy Under Secretary of the Army (Operations Research), "Technical Performance Data Collection in a Theater of Operations," 31 May 1991.
10. HQ Tactical Air Command, "Planning for Combat Data Collection," 31 December 1991.
11. Briefing by Survivability/Vulnerability Information Analysis Center (SURVIAC), "Desert Storm Data Collection Status Report," 31 October 1991.

APPENDIX A

TASKING DIRECTIVE

OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000

19 AUG 1991

ACQUISITION

MEMORANDUM FOR DISTRIBUTION

SUBJECT: After Action Report for the Desert Shield/Desert Storm Technical Data Directory Project

As an adjunct to the Operations Desert Shield/Desert Storm Technical Data Directory project, OSD intends to write an After Action Report (AAR) on the data collection process; assessing how DoD policies and organizations support the collection of technical data in times of peace, crises, and war. Attached you will find the concept for the AAR and sample questionnaires to be mailed to selected data collectors and catalogers. Interviews of data users and decision makers will cover the same areas.

The AAR concept and questionnaires have been informally coordinated with the Service technical data collection project Action Officers. Their comments have been incorporated where appropriate.

You are invited to submit a list of recommended data collectors and catalogers to be surveyed not later than COB 21 August 1991. A necessary prerequisite for being included is that they be involved in the Desert Shield/Desert Storm data collection/cataloging effort.

Preliminary findings will be reviewed at a by-invitation-only seminar presently scheduled for November. You will be given an opportunity to review and provide comments on any findings before the seminar. The final report should be available by late December.

Mr. Dick Fejfar, IDA, has been selected to complete the AAR project. He is highly experienced in process assessments. Please give him your full cooperation. The OUSD(A) Action Officer for this effort is CAPT Steve Wood, USN, (703) 614-3274, Room 3E1065.

Frank Kendall
Deputy Director
(Tactical Warfare Programs)

Attachments

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OSD HISTORIAN

AFTER ACTION REPORT ON THE COLLECTION OF TECHNICAL DATA FROM OPERATIONS DESERT SHIELD & DESERT STORM

Objective

To assess the technical data collection processes of the Defense Agencies and the Services used during Operations Desert Shield and Desert Storm.

- Identify aspects of data collection that were particularly successful.
- Identify aspects where substantial improvements could have been made.
- Identify the root causes of the observed impediments to data collection, both procedural and organizational.
- Recommend to OSD any changes in policy, organization, and roles and missions that would improve technical data collection in a future war or during crises.

Issues

- What data collection procedures, including organizations identified to implement them, had been established before Operation Desert Shield?
- To what degree were the established collection procedures successful during Operations Desert Shield and Desert Storm? In particular, what were the most notable successes and shortcomings?
- What *ad hoc* procedural or organizational changes were implemented during the collection effort, and to what degree were they successful?
- What were the root causes of shortcomings encountered? Were these shortcomings evident in procedures, organization, or both?
- What changes should be made to policy, organization, and roles and missions, and at what levels should these changes be made?

Study Plan

The study will be conducted in three phases. The first phase will focus on gathering information from data collectors, data catalogers, potential data users, policy makers, and other selected personnel. Questionnaires and interviews (telephonic or in person) will be used to obtain this information. This effort will be done as unobtrusively as possible and on a non-interference basis.

Questionnaires will be sent to organizations whose members participated in the collection of technical data. It is desired that the questionnaires be completed by personnel who were directly involved in the data collection effort. Questionnaires will also be sent to those who have participated in the cataloging of the data. Information from data users will be gathered by interview. Gathering of information from data catalogers and data users will be done with full consideration to those who are already heavily tasked with other after-action responsibilities. No Service reports or briefings will be required, nor will any travel to the Washington, D.C., area.

The Phase II will consist of the writing of a preliminary report based on the information gathered during Phase I, followed by a by-invitation-only seminar. Suggestions concerning desired attendees are welcome. The Services will be given the opportunity to review the preliminary report before the seminar. The seminar will include an opportunity for presentations.

During Phase III, IDA will complete the final draft report, coordinate for comment the final draft with the Services if so directed by the study sponsor, and submit the final report to OSD. At the discretion of the sponsor, the publication of the final report may be delayed until the Services have completed their own internal reviews of the collection effort. The final report will document the information gathered during Phases I and II, and will provide rationale for recommendations on any changes to policy, organization, and roles and missions.

Study Schedule

Pre-Study Phase:

Review of study plan	Mid August

Phase I:

Questionnaires (sent NLT/due NLT)

Data collectors	Late August / Early September
Selected PMs/SPOs	Late August / Early September
Data catalogers	Early September/Late September

Interviews with:

Data users	Early through late September
Policy Makers	Early through late September

Phase II:

Preliminary Report	Late September or early October
Seminar (by invitation)	Late October or early November

Phase III:

Final Report to OSD	December

APPENDIX B

ABBREVIATIONS AND ACRONYMS

APPENDIX B
ABBREVIATIONS AND ACRONYMS

AAR	After-Action Report
ABDR	Aircraft Battle Damage Repair (USAF)
ADCSOPS	Assistant Deputy Chief of Staff for Plans and Operations (USA)
ADTP	Advanced Development Technology Program
AFCENT	Air Force Component of U.S. Central Command
AFCSA	Air Force Center for Studies and Analysis
AFEWC	Air Force Electronic Warfare Center
AFR	Air Force Regulation
AFSAA	Air Force Studies and Analysis Agency (formerly AFCSA)
AFSC	Air Force Systems Command
ALLS	Army Lessons Learned Systems
AMC	Army Materiel Command (USA)
AMSAA	Army Materiel Systems Analysis Activity (USA)
AR	Army Regulation
ARCENT	Army Component of U.S. Central Command
ASD	Aeronautical Systems Division (USAF)
AWACS	Airborne Warning and Control System (USAF)
BALT	Battle Assessment and Liaison Team (USMC)
BAT	Battle Assessment Team (USMC)
BDAT	Battle Damage Assessment Team (USA)
BDARP	Battle Damage Assessment and Reporting Program
BDART	Battle Damage Assessment and Reporting Team
BRL	Ballistics Research Laboratory (USA)
CAA	Concepts Analysis Agency (USA)
CAG	Combat Analysis Group (Navy)
CALL	Center for Army Lessons Learned (USA)
CAMS	Core Automated Maintenance System (USAF)
CENTCOM	U.S. Central Command
CG	Commanding General
CINC	Commander in Chief
CINCPAC	Commander in Chief, U.S. Forces, Pacific
CMC	Commandant of the Marine Corps
CNA	Center for Naval Analyses
COARP	Combat Operations Assessment and Reporting Program
COMUSNAVCENT	Commander, NAVCENT
CONUS	Continental United States
CSC	Conventional Systems Committee (OSD)

CSTA	Combat Systems Test Activity (USA)
DAB	Defense Acquisition Board
DCSOPS	Deputy Chief of Staff for Plans and Operations (USA)
DIA	Defense Intelligence Agency
DNA	Defense Nuclear Agency
DoD	Department of Defense
DoN	Department of the Navy
DOTML	Doctrine, organization, training, materiel, and leadership (USA)
DUSA-OR	Deputy Under Secretary of the Army for Operations Research
EPADS	Equipment Performance and Damage System (USA)
EW	Electronic Warfare
FEDC	Field Exercise Data Collection (USA)
FORSCOM	U.S. Army Forces Command
FWIC	Fighter Weapons Instructor Center (USAF)
GPS	Global Positioning System
GWSO	Gulf War Studies Office (USAF)
HARM	Homing anti-radiation missile
HEL	Human Engineering Laboratory (USA)
HQDA	Headquarters, Department of the Army
IDA	Institute for Defense Analyses
I MEF	I Marine Expeditionary Force
JCMEC	Joint Captured Materiel Exploitation Center
JEWC	Joint Electronic Warfare Center
JROC	Joint Requirements Oversight Council
JTCG/AS	Joint Technical Coordinating Groups for Aircraft Survivability
JTCG/ME	Joint Technical Coordinating Groups for Munitions Effectiveness
JSTARS	Joint Surveillance Target Acquisition Radar System
JULLS	Joint Uniform Lessons Learned System
LANDSET	Land Scientific Evaluation Team (UK)
LAO	Logistics Assistance Officer (USA)
LAR	Logistics Assistance Representative (USA)
MAGTF	Marine Air Ground Task Force
MAJCOM	Major Command (USAF)
MARCENT	Marine Corps Component of U.S. Central Command
MCCDC	Marine Corps Combat Development Command
MCLLS	Marine Corps Lessons Learned System
MCO	Marine Corps Order
MCOAAG	Marine Corps Operational Analysis Assessment Group

MCRDAC	Marine Corps Research, Development and Acquisition Command
NAVCENT	Navy Component of U.S. Central Command
NCO	Non-commissioned officer
NTC	National Training Center (USA)
OA	Operational analysis
OASA(RDA)	Office of the Assistant Secretary of the Army for Research, Acquisition and Development
OPTEC	Operational Test and Evaluation Command (USA)
OSD	Office of the Secretary of Defense
PEO	Program Executive Officer
PM	Program Manager
RAP	Remedial Action Program (USMC)
RC	Reserve Component
SAC	Strategic Air Command (USAF)
SIMNET	Simulation Network (USA)
SITREPS	Situation Reports
SPO	System Program Office (USAF)
STF	Special Task Force
SURVIAC	Survivability/Vulnerability Information Analysis Center
SWA	Southwest Asia
TAC	Tactical Air Command (USAF)
TAWC	Tactical Air Warfare Center (USAF)
TOW	Tube-launched, Optically-Tracked, Wire-Guided
TRADOC	U.S. Army Training and Doctrine Command
TWP	Tactical Warfare Programs (TWP)
UK	United Kingdom
USAF	United States Air Force
USAFE	U.S. Air Forces, Europe
USAOCS	U.S. Army Ordnance Center and School
USMC	United States Marine Corps
USMCR	United States Marine Corps Reserve
VAL	Vulnerability Assessment Laboratory (USA)
VTR	Videotape recorder
WALLP	Wartime Army Lessons Learned Program (USA)
WFC	Warfighting Center (USMC)
WSCPAT	Weapon System Combat Performance Assessment Team (USA)
WSEP	Weapon System Evaluation Program (USAF)

APPENDIX C

COPY OF QUESTIONNAIRE TO COLLECTORS

Date questionnaire completed _____

QUESTIONS FOR COLLECTORS OF DATA FROM OPERATIONS DESERT SHIELD & DESERT STORM

(Please answer each question as it applies to you. Write your response below the question. You may use the back of the form to continue your response. Return the completed form to IDA, ATTN: OED (Dick Fejfar), 1801 N. Beauregard St, Alexandria, VA 22311-1772.)

1. What was your data collection assignment and how did you receive it?

a) Were you tasked to collect technical data on the performance of weapons or support systems? If so, what specific type(s) of data were you to collect?

b) If you were tasked to collect other than technical data, what specific type(s) of data were you tasked to collect?

If so, was the collection of technical data somehow involved in your collection efforts? How?

c) From whom did you receive your data collection assignment? When? In what form?

2. How were you organized for data collection?

a) To whom were you responsible for your data collection assignment?

b) Were you part of a team specifically tasked to collect data?

If so, when was that team organized for data collection? To whom did it report?

Were any analysts on the team?

Were you detailed from another organization ? If so, from what organization and for how long ?

3. How were you prepared for your data collection work?

a) Did you receive any special training for your data collection effort?

b) If you were specially trained, what kind of training did you receive?

From whom? How far in advance of deployment?

Did it help? How?

c) If you were not specially trained, what training would have helped?

d) Did you receive advice from analysts or subject matter experts about what types of data were of particular value?

e) Were you given a data collection plan that described your collection objectives and procedures? Was it satisfactory?

f) Did you receive a collection "kit" of any sort? What did it contain? What did it lack?

g) Were you provided with written authority to conduct data collection? If not, would it have helped?

4. How did you get to the theater?

a) What mode(s) of transportation did you use to get to theater?

b) What problems did you have getting transportation to the theater? Who resolved them?

c) How was theater clearance requested for you? Did you encounter problems in getting clearance to enter the theater?

If so, at what level(s) was resistance to your entry encountered? Who solved your clearance problems and how did they do it?

d) Did you have a clearly identified in-theater sponsor before you were deployed?

If so, did the sponsorship arrangement work well? If not, why not?

If you had no sponsor, were you able to find an in-theater organization to "adopt" you?

5. How were you supported in theater?

a) During what period(s) were you in theater?

b) What organizations in theater provided your support?

c) What types of support did you receive in theater (logistics, transportation, communication, etc., with specifics)?

d) What type of support was most helpful?

e) What specific support was lacking that would have been helpful?

f) Did you have a clear chain of command?

g) What were the reactions of commanders in theater to your work? What were the reactions of the troops, airmen, sailors and marines?

i) Did these reactions change after the fighting stopped?

j) Were you able to stay with one or more operational units while you gathered data?

6. How effective were your data collection efforts?

a) Was data collection your primary assignment in theater? If not, what other tasks were you required to perform and what proportion of your time was spent on them?

b) What specific problems did you encounter in the collection of data?

c) What types of data were easiest to get?

d) What types were hardest to get? What circumstances made them so?

e) What types of data did you try to get, but were unable to do so? Why not?

f) To whom did you provide your data? Were the people to whom you provided data satisfied with it?

g) Were you able to send your data to the required recipients while you were in theater?

h) Did you receive requests for specific types of data while you were deployed? If so, were you able to satisfy those requests?

i) Were you told about the likely uses of your data?

j) Do you believe that your work duplicated that of others? If so, in what regard and to what extent?

k) Did you continue your collection of data from units after they had redeployed from theater to their home stations?

If so, what type of units, where, and what types of data?

If not, did you try, but were unable to do so? Why did the effort not succeed?

l) Do you believe that you were successful in data collection? To what extent? If not, why not?

7. How would you improve the methods for collection of data in situations such as Desert Storm and Desert Shield?

a) What one thing would you change to make a job such as your data collection assignment easier or more productive?

b) What advice would you give to someone else who were to get a data collection assignment similar to the one that you received for Operations Desert Shield and Desert Storm?

c) Do you know of any other data collection efforts that we should contact for this study?

d) What additional comments or observations would you like to make?

Administrative information about the person who completed this questionnaire:

What is your Service or Agency? _____

To what organization do you belong? _____

What is your name and phone number? _____

(Optional)

APPENDIX D

COPY OF QUESTIONNAIRE TO CATALOGERS

QUESTIONS FOR CATALOGERS OF DATA FROM OPERATIONS DESERT SHIELD & DESERT STORM

General: The intent of this questionnaire is to assess the data cataloging process, not procedures. It is expected that the Defense Agencies and Services will have different procedures as they reflect specific needs and/or anticipated use of the data.

(Please answer each question as it applies to you. Write your response below the question. You may use the back of the form to continue your response. Return the completed form to IDA, ATTN: OED (Dick Fejfar), 1801 N. Beauregard St, Alexandria, VA 22311-1772.)

1. What was your data cataloging assignment and how did you receive it?

a) What specific type(s) of data were you tasked to catalog?

b) From whom did you receive your data cataloging assignment ? When? In what form?

c) Was cataloging technical data your primary assignment ? If not, what other tasks were you required to perform?

d) What proportion of your time was spent on cataloging data from Operations Desert Shield and Desert Storm?

2. How were you organized for data cataloging?

a) To whom were you responsible for your data cataloging assignment ?

b) Were you part of a team specifically tasked to catalog data?

If so, when was that team organized and to whom did it report?

Were you detailed from another organization? If so, from what organization and for how long?

c) Were you given the opportunity to specify in advance the type and format of the data that you received?

d) Who established the type and format of the data that you received?

f) Were you able to modify the type or format of the data after submission had begun?

3. How were you supported in your data cataloging work?

a) Did you receive the support needed to accomplish your cataloging assignment ?

b) What type of support was most helpful?

c) What specific support was lacking that would have been most helpful?

d) Did you coordinate your cataloging efforts with any other organizations also doing data cataloging?

If so, was coordination effective?

4. How effective were your data cataloging efforts?

a) What types of data did you receive?

From whom and in what format?

b) What influence did you have over the manner in which data was submitted to you?

c) Are you satisfied with the type and format of the data that you received? If not, what would you have changed?

d) What other duties did you have in addition to cataloging Operations Desert Shield and Desert Storm data?

To what extent did they interfere with your cataloging assignment ?

e) Do you believe that your work duplicated that of others? If so, in what regard and to what extent?

f) Do you believe that you were successful in data cataloging? To what extent? If not, why not?

g) Who do you believe will be the principal users of the data that you have cataloged?

5. How would you improve the methods for cataloging data in situations such as Desert Shield and Desert Storm?

a) What one thing would you change to make a job such as your data cataloging assignment easier or more productive?

b) What advice would you give to someone else who were to get a similar data cataloging assignment to the one that you received for Operations Desert Shield and Desert Storm?

c) Do you know of any other data cataloging efforts that we should contact for this study?

d) What additional comments or observations would you like to make?

Administrative information about the person who completed this questionnaire:

What is your Service or Agency? _____

To what organization do you belong? _____

What is your name and phone number? _____

(Optional)

APPENDIX E

LIST OF RESPONDENTS TO QUESTIONNAIRES

APPENDIX E
LISTS OF RESPONDENTS TO QUESTIONNAIRES

Listed below are the organizations whose members completed and returned either collector or cataloger questionnaires. The numbers in parenthises represent the numbers of responses from each organization. Some of the completed collector questionnaires have been counted as cataloger responses, generally because they described CONUS-based compilation of data collected or generated elsewhere.

A. DATA COLLECTORS

Army

Center for Army Lessons Learned (37)
Logistics Assistance Officers/Logistics Assistance Representatives (4)
Battle Damage Assessment Team (3)
Weapons System Combat Performance Assessment Team (28)
Patriot Performance (1)
Operational Test and Evaluation Command (1)
HQ, Department of the Army (5)
Program Managers (35)

Navy

Center for Naval Analyses (2)

USMC

Marine Corps Lessons Learned System (1)
Battle Assessment and Liaison Team (8)
Research, Development and Acquisition Command (1)

Air Force

Battle Damage Assessment (3)
Munition Effectiveness (3)
Air-to-Air Effectiveness (3)

Strategic Air Command (1)
Proven Force Visit (1)
F-4G Operations (1)
EW Aggressor Activities (1)
F-117A (2)
SURVIAC (1)

Defense Agencies

Munitions Effectiveness Assessment Exploitation Team (3)
Joint Electronic Warfare Center (1 summary response)

B. DATA CATALOGERS

Army

Center for Army Lessons Learned (1)
Army Materiel Systems Analysis Activity (1)

Navy

Center for Naval Analyses (6)

USMC

Marine Corps Operational Analysis Assessment Group (10)

Air Force

Gulf War Studies Office (Center for Studies and Analysis) (1)
Tactical Air Command A Team (6)
Strategic Air Command (3)
Pacific Air Forces (PACAF) (2)
Air Force Historical Research Office (1)
Air Force Special Operations Command (2)
Air Force Electronic Systems Command (1)
Military Airlift Command (2)
Air Force Reserve (1)
Air Force Logistics Management Center (1)
SURVIAC (1)

Defense Agencies

Joint Electronic Warfare Center (1)

APPENDIX F

DISCUSSION OF RESPONSES TO COLLECTOR QUESTIONNAIRE

APPENDIX F
DISCUSSION OF RESPONSES TO COLLECTOR QUESTIONNAIRE

This appendix summarizes the responses to the questionnaire that was sent to people directly involved in the collection of data in the Gulf (Appendix C). This summary generally follows the format of the questionnaire, but not all questions are summarized. The summary focuses on five specific areas:

- Preparation (training, collection plan, collection kit, written authority)
- Getting to theater (theater clearance, transportation)
- Support in theater (sponsorship, specific items of support, access)
- Effectiveness (problems, ability to gather data, duplication of effort, degree of success)
- Suggestions for improvement (what to change, advice for future collection)

This appendix is organized by Service and, within each Service, by collection effort. Phrases or sentences in quotation marks indicate comments made on one or more responses to the questionnaire.

1. ARMY

a. Battle Damage Assessment Team (BDAT)

The BDAT was a 12-man team composed of specialists in various aspects of the assessment of battle damage to U.S. ground combat vehicles. The team was deployed to theater at the start of Desert Storm, and it accompanied an Army division during the ground campaign. See Section I.A.3.a for more details.

1) Preparation (training, collection plan, collection kit, authority)

All team members (except one from the 24th Infantry Division) were from Aberdeen Proving Ground (APG), Maryland. Most members had past experience in assessment of combat damage through their participation in the Army's Live Fire Test and Evaluation (LFT&E) Program conducted at APG. The team received predeployment

training that covered various damage mechanisms, damage assessment procedures, shotline analysis, and combat vehicle familiarization.

Before it deployed, the team received a collection plan that was generally satisfactory, but "could have been a little more detailed," according to one respondent. The team developed its own collection kit, which included checklists (developed from those used in LFT&E) and photography equipment. The kit lacked materiels to make identification signs to be used in photographs of damaged vehicles.

The team did not have written authority to conduct its mission. In the words of one respondent, "damn right it would have helped" to have such authority.

2) Getting to theater (theater clearance, transportation)

Theater clearance and transportation via Military Airlift Command were arranged through Army Materiel Command (AMC). No major problems were encountered getting to theater.

3) Support in theater (sponsorship, specific support items, access)

Because the team had no organic support, it was totally dependent on in-theater units for vehicles, radios, uniforms, other equipment, and food. AMC (Forward), the in-theater sponsor, was not prepared initially to equip and support the team. Although some support was provided by the sponsor, the team relied on scrounging to get most of its support. The most valuable support items were vehicles (eventually four HMMWVs), navigational equipment, operational intelligence, and general logistical support.

The team was allowed access to damaged vehicles after the team leader convinced commanders and staff in VII Corps that his team could provide a useful service by identifying any new or unexpected damage mechanisms. "Old boy" network contacts helped the team to get access to vehicles that suffered combat damage. Although the team had eventual access to all damaged vehicles, some of these vehicles had been moved or otherwise disturbed before the team was able to reach them. Occasionally combat units were sensitive about the possibility that some combat damage had been caused by friendly fire. In such instances, the team was able to provide valuable expertise in the ensuing investigations. There was good cooperation from soldiers and both junior and senior leadership.

4) Effectiveness (problems, ability to gather, duplication, success)

The size of the theater caused difficulty in reaching damaged vehicles before they had been disturbed. Movement was made even more difficult by the hazards of mines and unexploded ordnance. The BDAT was closer to the fighting than any other Army collection effort, so its members were subject to hostile fire. A more mundane problem occurred in requisitioning specific items of equipment, such as radios, whose stock numbers were not known by the team.

5) Suggestions (what to change, advice for collection)

The respondents provided a number of suggestions. First, deploy any such team with all required equipment on pre-loaded vehicles. Airlift these loaded vehicles directly from CONUS to the theater. Coordinate with in-theater operational headquarters and units before deploying from CONUS. Provide better training on photography, especially close-up and under low-light conditions, and equip the team to support videotaping of the overall vehicle assessment process. If possible, obtain intra-theater airlift to transport collection teams to the sites of damaged vehicles before they are disturbed.

b. Weapon System Combat Performance Assessment Team (WSCPAT)

The WSCPAT was a 53-man team composed of volunteers on temporary duty from a variety of Army organizations. It was hurriedly formed in late February 1991 and deployed in early March. Its mission was to gather data on materiel system performance by means of surveys and interviews of users. The first interviews in theater began in mid-March, about three weeks after cessation of hostilities. See Section I.A.3.b for more details. Over half of the team responded to the questionnaire, so this summary concentrates on the major points raised in the responses.

1) Preparation (training, collection plan, collection kit, authority)

Team members were selected from various Army organizations because of their knowledge about particular materiel systems, so no system-specific training was given to them. There was some predeployment training in chemical defense and small arms. Also, there was an orientation on the theater and a brief explanation of the collection methodology. Once in theater, the team was given some instruction on interviewing techniques by its leaders. Respondents suggested that the predeployment training should have included a walk-through of the questionnaire in a classroom environment; instruction

on correct interviewing techniques; some fresher training on the systems to be surveyed; and a pilot test at the National Training Center or some other appropriate location.

There was no predeployment plan for collection of data (other than determination that questionnaires would be used to survey users). Questionnaires were developed at Aberdeen Proving Ground before deployment, apparently with the assistance of some of the data collectors. Most collectors did not see the questionnaire before they arrived in SWA. Respondents expressed several complaints about the questionnaires: they were developed too late to allow practice interviews, they did not ask all the right questions, they were not well organized, and they were not coordinated with PMs and users.

Some team members were well-equipped with cameras, tape recorders, and measuring devices. Others indicated that they were equipped only with the questionnaire, so they had to develop their own kits. Some organizations may have been better than others at equipping collectors for their mission.

Aside from the Deputy Secretary of Defense memorandum, it is not clear that the team had written authority to perform its mission. Once he was in theater, the O-6 team chief signed an order designating himself as a commander so that he could obtain support.

2) Getting to theater (theater clearance, transportation)

Back-channel communication at the three-star level between AMC and ARCENT gained theater clearance for a team of about 50 people. Team members were transported to theater by MAC, and travel was "as easy as any TDY trip."

3) Support in theater (sponsorship, specific support items, access)

AMC (Forward) was supposed to have been the sponsor of this relatively large team, which was totally dependent on theater for all support. Unfortunately, the sponsorship arrangement did not work well ("We were the bastard children of AMC."), and the team became self-supporting through "scrounging (or stealing)." A variety of informal support arrangements were made, often through friends and acquaintances made during previous assignments.

As was the case for other collection efforts, transportation became the key item of support (after basic life support). After the sponsoring organization did not provide wheeled vehicles, the team drew some well-used vehicles from the theater reserve ("the boneyard"). The worst of these vehicles were then cannibalized to obtain enough parts to keep a few of the better vehicles operational. At least one team member bought vehicle

repair parts on the local economy. Eventually, the team received four HMMWVs, which were more reliable and better suited for the environment.

A number of respondents commented on the team's lack of organic capabilities to provide maintenance, supply, and administration. As a result, much of the team members' time was devoted to those functions. Also, one respondent mentioned that video cameras would have been a valuable support item.

The team chief and his key subordinates obtained the support of senior Army leadership in theater, thus allowing the team access to operational units. A key factor was their ability to convince commanders that the team could provide a valuable product and that the team's mission was to gather data on equipment, not to grade unit performance. Once the commander's support had been secured, the team had reasonably good access to operational units, with the possible exception of the 82nd Airborne Division. The troops were eager to talk, and they were happy that AMC was asking them about what worked and what did not. Commanders were supportive of the collection effort, but it may have been a low priority for some. Very few commanders were hostile to the effort. Some troops were told not to discuss instances of combat damage because of the possibility that the damage had been caused by friendly fire.

4) Effectiveness (problems, ability to gather, duplication, success)

The questionnaires, which had been so hurriedly developed in CONUS just before the team's deployment, required substantial revision in theater. Also, because the team was deployed so late, it did not begin its surveys of operational units until mid-March 1991. Although the team did not have to compete with efforts to prepare for the war, its work was hampered by the redeployment of units to home station. This caused scheduling problems, limited the availability of some units, and distracted the soldiers. Some units were not interviewed until after they had redeployed to CONUS. The size of the theater and the separation among operational units made data collection time consuming and difficult to coordinate.

Because of the team's late arrival, no data were collected during the build-up or during combat. Thus, very little "hard data" (also called "tape measure data") were gathered on issues such as system performance, reliability, and spare parts usage. For Hellfire, for example, it proved difficult to learn the serial or lot numbers of expended rounds or to obtain video recordings of errant rounds. Also, it was hard to reach units with low-density equipment, especially special operations forces and certain aircraft units. In

general, it was not possible to obtain accurate BDA data and to match such data with specific engagements to assess weapons system performance.

Some respondents acknowledged the possibility that their collection duplicated the work of others, such as the CALL team, PMs, and contractors (only one respondent stated that WSCPAT duplicated unit after-action reports and thus was of little value). One member pointed out that the WSCPAT asked not only "How did it perform?", but also "Why?" and "How can we improve it?".

Almost all respondents stated that the team was successful within the situational limitations. That is, the team succeeded in gathering qualitative and anecdotal data from a large number of users via structured questionnaires administered well after the occurrence of combat events. The completed questionnaires provided direct input from the soldiers who actually used Army equipment in combat, but this input is from memory and there is no way to judge its quality. The data so obtained should be useful to materiel developers to identify trends, but the data are not suitable for deducing quantitative performance estimates such as mean time between failure and probability of hit. Some respondents wondered about how the data base will be used; some questioned whether the data will be used at all because they sensed defensiveness among some unspecified system proponents.

5) Suggestions (what to change, advice for collection)

Virtually all respondents had suggestions about how to improve the collection process. Be prepared by having a detailed plan prior to deployment; do not send collectors "as an after-thought." Maintain a skeleton team of subject-matter experts on standby with a collection plan, forms, and structured data base. Define the collection mission. Establish permanent collection cells within division and corps staffs. Practice during peacetime exercises. Get collectors into theater early during the build-up phase, deploying with operational units when possible (if collectors do not get there early, they are "treated like the GAO"). Give data collection the high priority that it deserves. Get PEOs and PMs involved in the design of the collection process, especially the development of surveys or questionnaires. Plan for a data entry element. Design collection teams to be self-sufficient, including supply specialists and vehicle mechanics who are "first-class scroungers ... perhaps even descended from a long line of thieves." Make firm support arrangements in advance of deployment. Continue to use a mix of military and civilian collectors; for civilians, consider their uniform, physical condition, and background. (One respondent alleged that military collectors often tend to report only good news to more senior officers.) Use people with a test and evaluation background. Coordinate all collection efforts, and

deploy collection teams that provide a service to the commanders and their troops. Finally, make the resulting data bases more widely available.

Future data collectors should travel light and be prepared for a Spartan environment. They should be patient and flexible; they should attempt to establish rapport with troops from whom they are collecting data. They must understand the collection mission and know the system on which they are collecting data. They should bring their own laptop computers, especially if they plan to use questionnaires. Collectors of data on ammunition should accompany the collectors for the corresponding weapon.

c. Center for Army Lessons Learned (CALL)

CALL deployed a group of data collectors to address issues concerning doctrine, organization, training, materiel, and leadership (DOTML). Some technical data was gathered, but CALL's focus was on the battlefield operating system rather than individual hardware. Most collection was done after hostilities ceased.

About three dozen of the CALL-sponsored collectors responded to the questionnaire. Some responses were *pro forma*, but most were detailed and quite perceptive. One response included the completed questionnaire plus five additional pages of handwritten observations. The experiences of data collectors varied *substantially – some* observed training, mobilization, and deployment from CONUS; others were attached to units being deploying or already deployed; most most were part of the 72-person collection team that finally reached theater in February and March 1991. Nonetheless, there are trends evident in their comments, especially indications of their frustration at having had their collection efforts hampered by lack of early access to theater and, later, by resistance within theater. The following section summarizes these trends. See Section I.A.2.b for more details about CALL's efforts to deploy collectors to the Gulf.

1) Preparation (training, collection plan, collection kit, authority)

Generally, the responses about training reflect the experiences of the 72-person team that deployed in February and March. Some members of that had been alerted for deployment in August 1990, but they were put on hold after theater clearance had been denied (only one third of those alerted in August eventually deployed). Others had been alerted in early- to mid-January 1991 when there was a perceived increase in the likelihood that a team might finally be deployed. Expectations were strong enough for CALL to conduct a short training course at Fort Leavenworth, Kansas, in mid-January. Of the team members that eventually deployed, most attended this 2-day course to receive instruction on

the collection mission, the methodology to be used, and the proper method of conducting interviews. Also, they were given a theater orientation. Most respondents indicated that the training was helpful, although it was very broad and somewhat rushed. The only suggested training improvement was to add more information about the theater of operations.

CALL published a data collection plan, but many team members indicated that it was too detailed to be of practical value. The collection kit consisted of data collection forms developed by CALL. Some collectors apparently developed a more extensive collection kit on their own.

It is not clear to what degree the collectors had written authority (the questionnaire sent to collectors was not specific enough on this point). There was disagreement among respondents about the existence and the value of written authority. Many respondents seemed to believe that written authority was irrelevant. If they could not sell their effort to the field commanders and their staffs, it would not matter who signed the letter of authority.

2) Getting to theater (theater clearance, transportation)

Section I.A.2.b in the main report details the difficulties encountered in obtaining access to theater. The prevalent opinion among respondents was that the ARCENT Commander and, perhaps, the corps commanders did not want CALL collectors in the ater and that HQDA did little to reverse that position.

Once the theater clearance issue had been resolved, CALL coordinated CONUS-to-theater transportation to the satisfaction of virtually all team members.

3) Support in theater (sponsorship, specific support items, access)

An O-5 from CALL deployed to theater on 20 January 1991 to prepare for the expected initiation of a significant collection effort. He worked in coordination with the ARCENT G-3, the theoretical sponsor of the collection effort. As was true for almost all such collection efforts, it was relatively easy to obtain life support but extremely difficult to get vehicles for intra-theater transportation. Scrounging vehicle support became a principal task, and a number of informal support arrangements were made. As the WSCPAT did, the CALL team obtained a number of vehicles in very poor condition and cannibalized them to keep a few of them functional. (Thirteen field grade officers attempted to draw vehicles at Dhahran, had to get three-star approval for the issue, were offered two dozen near-dead vehicles, spent eight hours without adequate tools getting six vehicles to run, and resorted

to the local economy to get enough duplicate keys made.) The team eventually obtained new four-wheel drive civilian vehicles from ARCENT and some HMMWVs through scrounging. Communications equipment and navigational devices were hard to obtain, but they proved to be very valuable if they could be found.

The in-country team chief had worked with some of the Army general officers during warfighter exercises, and this experience helped him sell his collection product to senior Army leadership within theater. There were very few collectors in theater during the ground campaign. After the cessation of hostilities, however, it became much easier to get collectors into country and to collect data after they got there. According to their responses, most collectors were able to get access to commanders, officers, NCOs, and troops to conduct surveys. Commanders and staffs below corps level were very cooperative in allowing access (although a small minority of respondents alleged that some division and corps staffs carried on internal turf battles that hampered the collection effort). Collectors, however, were not free to go were they wished – they were well supervised.

4) Effectiveness (problems, ability to gather, duplication, success)

The many respondents to the questionnaire had substantially different experiences in data collection. This diversity makes it difficult to summarize the effectiveness of the overall effort. Nonetheless, some respondent observations stood out – these are summarized here.

The CALL collection effort in theater was headed by an O-5 because CALL could not obtain theater clearance for its Director, an O-6. This put the team chief in a bad situation for two major reasons. First, he did not outrank all members of his own team. Second, he had limited clout to function in a staff bureaucracy rife with general officers and O-6s. Several respondents offered their admiration (and sympathy) for his ability to operate as effectively as he did in such an environment.

A number of other problems were encountered. The CALL team in theater was organized by functional area into sub-teams. Unfortunately, the members of these sub-teams did not deploy together from CONUS, so the collection effort was piecemeal and team composition was subject to change. The members of the CALL team were typically provided by TRADOC's proponent schools. One respondent stated that the schools were allowed too much leeway in determining the size of their representation (leading to over-representation in Army aviation). Also, some school representatives were alleged to have had parochial agendas that led them to ask leading questions to validate their own expectations. A small minority of respondents mentioned possible hidden agendas of

commanders and staffs that made them unwilling to tell the whole story. Most respondents, however, indicated that almost all commanders were open and candid, even division commanders. The data collector assigned to observe Reserve Component mobilization training at the National Training Center was denied access for three weeks pending resolution of a general officer-level disagreement between TRADOC and FORSCOM. The civil affairs collectors did not deploy until mid-March 1991 and were not granted access to all areas of the theater.

The CALL collectors were allowed access to units to gather data, but there were significant strings attached. VII Corps required that data collectors work through an assigned point of contact on the corps staff to "facilitate" visits to units. The interest and attitude of these POCs affected the ability of the collectors to perform their mission. Collectors had to have clearance from corps to move from unit to unit. Some respondents stated that collection sub-teams functioned more efficiently if they by-passed the corps POC (risking the wrath of the corps commander) and contacted units directly. However, this might have made life more difficult for the units. One respondent indicated that "ARCENT-corps HQ" were so sensitive about his sub-team's presence that the staff wanted to know not only the sub-team's findings but also the names and units of their sources of information, a violation of CALL's non-attribution policy. It is not clear if this was a common occurrence or limited only to a particular functional area. The ultimate hindrance to gathering data was that the CALL team did not deploy until after the war, so it was not able to observe unit activities as they happened.

A few questionnaire responses were received from collectors who had been attached to the staffs of operational units after early efforts to deploy a collection team foundered. One such collector was able to devote 90% of his time to collection by arranging to accompany the division's IG on his travels. In contrast, another collector spent 90% of his time on staff work and encountered a "get a job" mentality regarding his collection assignment.

Most respondents believed that their work was important and that they achieved some success in gathering after-the-fact impressions and anecdotal data. Virtually all respondents stated that the survey and interviews collected substantial amounts of data. Some collectors cited unit after-action reports as particularly valuable sources of data, while other collectors were denied access to AARs because they did not have a need to know. While it was easy to conduct extensive interviews with a broad cross-section of military members, it was difficult or impossible for at least some collectors to get access to battle plans, orders, and information that could explain why operational decisions were made. It

was clear from the responses that most members felt that their collection could have been much more successful if better preparations been made and if they been involved earlier. Also, their "IG" image hurt them, and "higher headquarters" were unwilling to dispel that image by providing "cover" for the collection effort.

Many respondents indicated that there was duplication of effort, although a few felt that this was beneficial as a cross-check. The duplication occurred because of individual collection efforts by schools and AMC commands. According to one respondent, "...too many people were allowed to run around the theater purporting to be performing the lessons learned function that should be DA-directed and synchronized."

5) Suggestions (what to change, advice for collection)

As an introduction to the suggestions provided by the respondents, consider the following observation from one collector:

> "With all the attention now being given to...Desert Storm lessons learned, it is frustrating that...gaining theater access and visiting the right units and headquarters was so difficult...."

The suggestions about what changes should be made can be summarized as follows: the Army should improve its capability to organize, prepare, coordinate, deploy, and support worthwhile data collection efforts in peacetime and during crises. The Army should put all collection efforts under a single proponent, with one commander who will determine collection instruments and procedures. ("SWA commanders had to deal with too many outside agencies.") The Army should have a TOE or TDA collection unit with the right people and equipment able to deploy on short notice as needed. Collection should begin during unit preparation for deployment. Deploy the collection effort early and attach it to the Army component headquarters in theater. The deployed team should be headed by at least an O-6 with an adequate staff ("a 'big daddy' with a big enough stick"). The collection effort should have clear prioritized objectives. Obtain CINC support through the JCS and provide written authority for collection. HQDA should provide vigorous support. Give the team enough resources to be transparent to the theater. If the deployed team does not have sufficient organic support to operate independently, ensure that a firm support agreement is in place and that dedicated transportation is available before deployment. Collectors should be field grade officers and senior NCOs with experience at several echelons. Integrate the NCOs into functional area teams. Coordinate all visits so that units do not receive multiple visits by the separate functional area sub-teams. Ask the right questions to address the defined objectives and issues. Use the same people to gather data

across multiple corps for better perspective. If possible, observe units in operation, whether they be involved in combat, combat support, or combat service support.

Respondents provided many suggestions for those involved in future collections. The majority of them are listed here. Know the mission and have a plan. Establish credibility by being technically and tactically proficient in the subject area. Come prepared to be as self-sufficient as possible, including adequate military equipment and weapon. Find an influential sponsor and use the "good-old-boy" network. Collect from top down and then back up. Be flexible, open-minded, receptive, and diplomatic. Don't give advice and don't get in the way. Observe events as they occur. Take detailed notes and record all observations as soon as possible. Operate in small teams to minimize logistics problems. Retain objectivity – don't allow branch or school to influence job performance. Resist the efforts of some people to get their own recommendations recorded as observer findings. Call it like you see it. Prepare for the worst – get personal affairs in order before deploying. Don't handle unexploded ordnance. Expect the field not to trust you initially; ask a lot of questions and build their trust. Take a broad perspective.

d. Patriot

An analyst from the Army's Ballistics Research Laboratory (BRL) was deployed to SWA in mid-February 1991 to gather data on the effectiveness of the Patriot missile system against Scud missiles. The impetus for the deployment appears to have come from HQDA, which required better data on Patriot performance.

1) Preparation (training, collection plan, collection kit, authority)

The analyst received a one-week orientation course at Aberdeen Proving Ground, Maryland. The course lacked specific training on the operational aspects of the system and its using units.

The analyst was not given a collection plan prior to deployment. He developed his own collection kit – camera, film, calculator, ruler, calipers, tape measure, and markers. HQDA provided written authority for the collection mission.

2) Getting to theater (theater clearance, transportation)

Although a sponsorship arrangement was made prior to deployment, it does not appear that official theater clearance was received. The analyst was transported to theater on a MAC C-5, possibly with a load of Patriot missiles or other equipment.

3) Support in theater (sponsorship, specific support items, access)

Sponsorship, including all life support and intra-theater transportation, was provided by an Army air defense brigade. Transportation was the most valuable item of support. The major lack of support was additional manpower to collect data. The analyst was given access to the units and was transported to impact sites. Commanders were supportive of the effort, but were "curious" about a civilian in a war zone. The troops were helpful and cooperative.

4) Effectiveness (problems, ability to gather, duplication, success)

Because of the large size of the theater, arranging transportation to impact sites was somewhat of a problem. It was difficult for one person to cover all of Saudi Arabia. The analyst was able to visit impact sites of missiles launched before and during his stay in theater. Unfortunately, many of the older impact points had been cleaned up, although much of the Scud debris was retained.

To some degree, the analyst duplicated the collection efforts of some Patriot batteries that were performing their own data collection. The interest in data collection varied among units, however, and most batteries did not know what data ought to be collected. The BRL effort was successful, within the constraints of the situation, and was the only scientific collection of data on Patriot performance.

5) Suggestions (what to change, advice for collection)

Collection should be done by a group of trained data collectors that is independent and self-sufficient. Collectors should have some operational experience with the weapon system and should understand all operational aspects of its performance. The team should not be limited to active duty military. The demand for immediate availability of collected data should be minimized.

e. Joint Surveillance Target Acquisition Radar System (JSTARS)

JSTARS, a system still in development, was deployed to SWA in late January 1991. On his own initiative, the JSTARS operational evaluator from the Army's Operational Test and Evaluation Command (OPTEC) arranged to be invited to theater to gather data on JSTARS support of Army operations. He arrived in theater on 20 February for a 6-week stay.

1) Preparation (training, collection plan, collection kit, authority)

As the Army's operational test evaluator for the system, he did not require system-specific training. As an active duty officer, neither did he need military training. With the help of an OPTEC analyst, he developed his own collection plan and kit before he deployed. The kit included data collection sheets for system operators, questionnaires for users, and system log sheets. These were entered into laptop computers, which were provided to JSTARS team chiefs for use during missions.

Initial authority was verbal, followed by a formal tasking message from CENTCOM J-2. Based on the tasker, Army Personnel Command provided written orders to deploy.

2) Getting to theater (theater clearance, transportation)

Theater clearance was provided by CENTCOM J-2, with the assistance of ARCENT J-2 and the commander of the 4411th JSTARS Squadron (Provisional) (the Air Force JSTARS detachment). The official reason for deploying was to coordinate JSTARS tasking and employment, although all parties understood that the real reason was to collect data. Transportation to theater was via a MAC contract carrier, which was easily arranged after orders to theater were published.

3) Support in theater (sponsorship, specific support items, access)

The in-theater sponsor was the CENTCOM J-2, but ARCENT and the 4411th Squadron provided most support items. ARCENT provided general life support, the coordination of visits to Army units with ground stations, and the helicopter transportation to those units. The 4411th furnished wheeled-vehicle transportation. Also, video support was provided by the Joint Combat Camera unit. Telephone and fax services were the hardest to obtain.

The OPTEC evaluator had exceptional access to those involved with JSTARS, including the team on the aircraft and the Army recipients of JSTARS information. He was "warmly received" everywhere he went because the contribution made by JSTARS was appreciated. Almost all involved with JSTARS were eager to share their experiences.

4) Effectiveness (problems, ability to gather, duplication, success)

Data collection was somewhat impeded because busy system operators and contract maintainers did not always record operational and maintenance information on the sheets provided to them. Operator logs were spotty in quality, but they generally provided useful

data. The collection effort garnered valuable user comments on system performance, but there were data gaps in mission logs, mission summaries, target lists, maintenance records, BDA data, and detection and dissemination timelines.

The only potential duplication was of contractor records and of (perhaps) HQ, TAC collection efforts. The collection effort was very successful and will form the basis for an extensive data base at OPTEC.

5) Suggestions (what to change, advice for collection)

It should be mandatory that data collection teams be integral to using units. Develop better means of automated data collection to minimize interference with the users. Ensure that the development of these collection means keep pace with overall system development. Convince both the materiel developers and the users that collecting data is important to the success of the program. Build confidence among developers and users by not misusing the data. If surveys are used to collect data, consider using tape recorders.

e. Representatives of Program Executive Officers (PEOs) and Program Managers (PMs)

Almost three dozen responses were received from PEO/PM representatives. The responses are so diverse that they are difficult to summarize in the manner used elsewhere in this appendix. Thus, this subsection will be limited to a brief discussion of the respondents' experiences, followed by a summary of their suggestions.

Although not all PM representatives that sought access to theater were granted clearance, most who tried to deploy were successful (sometimes with difficulty or after cessation of hostilities). Those PM representatives who had a clear in-country mission related to fielding or modernization were the ones most likely to gain entry and to receive adequate support. Many respondents mentioned that they encountered support problems similar to those experienced by other collectors. Some were dissatisfied with the collection of hard data on the performance of their systems. Many respondents, therefore, had suggestions about changes needed in the overall process for collecting quantitative data. These suggestions are summarized in the following paragraph.

It is "extremely important" to collect data on system performance, especially when a system is being deployed in an unusual environment, such as the desert in the Gulf area. Data gathering should be "part of the overall operation." Better prior planning is needed – do not wait until deployment to plan collection. Establish and document collection priorities in peacetime. Each PM should "identify <u>now</u> what data he requires and would

like to collect during tactical operations." Pre-coordination with commanders that use the system is needed. PMs should develop firm relationships with the readiness and maintenance directorates of the appropriate commodity commands, as well as with the inventory control points. Identify collection teams in peacetime so that they can be deployed quickly during force commitment. Deploy PM representatives to theater to provide logistical support, identify and solve problems, and gather data as they are generated. Only the PEO and the Army Acquisition Executive should be in the approval chain for PM requests to deploy; the commanders of the commodity commands should not be. If the PM cannot deploy representatives to theater, he should establish a relationship with deployed Logistics Assistance Representatives (LARs), who could collect and report such data as numbers of missiles fired, numbers of attempted firings, reasons for failure, serial numbers, and disposition of malfunctioning missiles. Equip more Army systems with an on-board recording capability, including "gun cameras" on infantry fighting vehicles and permanent data recorders on Patriot. Improve the process for recovering threat systems and [illegible]ions for exploitation to enable the appropriate PMs to improve our systems in su[illegible]reas as armor protection, structural hardening, and electronic countermeasures.

2. NAVY

a. Center for Naval Analyses (CNA)

The CNA deploys analysts with operational units on a full-time rotational basis. Although their primary duty is to provide analytical support to the commander and his staff, the analysts are in a unique position to gather a variety of data normally generated during deployments, exercises, and hostilities. Eighteen analysts were involved in Operations Desert Shield and Desert Storm. Some were in the Gulf area at the start of Desert Shield, some accompanied ships or headquarters that deployed to theater, and others were sent to theater in January 1991 to provide additional support to selected commanders. See Section I.B for more details.

1) Preparation (training, collection plan, collection kit, authority)

All the CNA analysts that supported the Gulf War had prior experience as deployed analysts, so they received no additional training. One respondent stated that there was a collection plan based on exercise collection plans, but that was too detailed. There was no collection kit for the analysts. No authority was needed for the analysts assigned to ships or headquarters in theater at the start of Desert Shield or deployed during Desert Shield.

The nine additional analysts dispatched to theater in January 1991 had a message from NAVCENT as their authority.

2) Getting to theater (theater clearance, transportation)

Only the nine additional analysts needed theater clearance, which was straightforward because the analytical reinforcement had been coordinated with NAVCENT. It is not clear that the clearance had been received before the additional analysts departed for theater. Transportation was not a problem.

3) Support in theater (sponsorship, specific support items, access)

Analyst were sponsored and supported by the ships or headquarters to which they were assigned. Because the assignment of analysts to operational units is regularly done by the Navy, the entire procedure was routine. Commanders and staffs knew what to expect of the analysts; they also knew what would be needed to support the analysts. The analysts contributed to the accomplishment of the mission and were able to observe much of the decision-making process within the commands. They had access to messages, routine reports, debriefs, and data tapes from automated systems such as those on Aegis cruisers.

4) Effectiveness (problems, ability to gather, duplication, success)

Only two problems were reported on questionnaire responses. First, access to "Personal For" messages (PFORs) was denied, apparently for those messages involving the commanders. It is not known if this was true for all commands. Second, there was so much data being generated that it became impractical to collect, maintain, and deliver it all to CNA at war's end.

There was no duplication of CNA's efforts. The respondents regarded their efforts as successful.

5) Suggestions (what to change, advice for collection)

Only a few suggestions were made: "Get rid of PFORs," get analysts into theater early, and keep analysts in place until the finish.

3. MARINE CORPS

a. Battle Assessment Team (BAT)

The Marine Corps Combat Development Command (MCCDC) deployed about 25 people from Quantico to theater in late February 1991 to gather lessons learned by functional area, not to collect technical data. The BAT expanded to almost 75 people by picking up theater augmentees. See Section I.C.3.b for more details. The respondents to the questionnaire were from MCCDC's Warfighting Center. Most of the responses were tersely written; the two responses with the most detail were written on the cataloger questionnaire, so not all of the appropriate collector questions were addressed.

1) Preparation (training, collection plan, collection kit, authority)

Training consisted of a briefing of unspecified length. Several respondents suggested appropriate topics for additional training: interviewing techniques, collection methods other than interviewing, analytical writing techniques, technical aspects of weapons systems, and procedures for handling enemy prisoners of war.

The BAT was organized into sub-teams by functional area, and it appears from the responses that the senior members in each area (subject matter experts) developed his own collection plan. These plans underwent changes in theater.

Team members were provided with survey forms and questionnaires for interviewing. Each functional area sub-team received tape recorders, a still camera, a vehicle, and access to a word processor. Respondents indicated the some questionnaires were awkwardly written and that portions of some questionnaires were not pertinent.

One respondent stated that he had written authority and that it was "essential." The other respondents stated that they did not have authority and that such authority would not have been helpful.

2) Getting to theater (theater clearance, transportation)

Theater clearance was coordinated by MCCDC. Given the Commandant's well-publicized interest, it is not clear why it took so long to get a team into country. An exchange of messages at the three-star level was required to secure entry. Respondents reported no problems getting transportation to theater.

3) Support in theater (sponsorship, specific support items, access)

The respondents provided little detail about sponsorship and support. There was not so much a sponsor as a point of contact, so the BAT operated independently under attachment to the MEF G-3. Apparently support arrangements were reasonably satisfactory, although informal support arrangements were required. Intra-theater transportation was identified as the most valuable support item, and the BAT received nine of the commercial vehicles provided by the government of Japan. The BAT brought with it most of its own administrative equipment, such as word processors, copier, field desks, tape recorders, cameras, and office supplies. Two respondents mentioned the lack of a dedicated administrative capability, probably manpower.

When the BAT's advance party arrived in theater, its movement was restricted by MARCENT headquarters. The BAT briefed the MARCENT commander that it would focus on organization, doctrine, and equipment, not on individuals or units. After the briefing, the MARCENT commander became a supporter of the collection effort, and he sent a message to all Marine units in theater directing that they cooperate with the BAT. Thereafter, the BAT had complete access to Marine Corps units in theater. The Marines that the BAT visited were very supportive of the collection effort and cooperated fully.

4) Effectiveness (problems, ability to gather, duplication, success)

The lack of dedicated administrative support and transportation hindered collection to some degree. There was some indication that the BAT was burdened with internal administrative requirements such as briefings and status reports. Lack of time and manpower in selected areas were mentioned as problems. Also, the collection effort competed with redeployment back to home stations.

Interviews were easily arranged, conducted, and recorded on audio tape. It was easy to gather general comments on weapon system performance, but it was much more difficult to get technical performance data because detailed records were not kept at unit level. Little data could be gathered on the performance of distributed systems (for example, communications) or on damage done to enemy vehicles. From aviation units, the team gathered flight schedules, ordnance expenditures, details about flight operations, video-tapes, and still photographs.

One respondent stated that his work duplicated that of others, apparently regarding aspects of the air war. Another respondent stated that there may have been some duplication of the data collected by the CNA analysts assigned to Marine Corps

commanders. There was also some overlap with reports submitted by units to the Marine Corps Lessons Learned System (MCLLS), but the BAT's work was much more systematic.

Half the respondents believed that they were successful within limits; the other half felt that they did not have the time, resources, or manpower to complete the job. One respondent stated that the BAT leadership violated the non-attribution guidelines for the collection procedure.

5) Suggestions (what to change, advice for collection)

The changes suggested by the respondents parallel those from other collection efforts. Establish a collection structure before a crisis, perhaps by having an active duty nucleus that can be expanded. Pre-select and pre-train team members. Select the right people for the job, including military members (active and reserve) and civilian analysts. For each functional area, provide administrative support, a collection team, and an analyst to assess the data and write any required report. Recruit enough collectors to complete the collection mission. Ensure that the team leader is adaptable and capable. Deploy the collection team early. Properly staff the team for administrative and logistical support. Provide dedicated transportation. Ensure that a point of contact is identified at the headquarters to which the team(s) will be assigned. Publish a clear detailed collection plan and then follow it. Design surveys and questionnaires to be user friendly for both interviewers and interviewees. Provide the team with a letter of introduction and authority from the Commandant. Conduct collection during all Marine Corps employments, not just the occasional war. Publish a list of standard keywords for cataloging the data.

Respondents provided a number of suggestions for future data collectors. Prepare for collection by getting advice from all possible sources, and review existing assessments or analyses. Be aggressive, take charge, and don't take "No" for an answer. Respect the people being interviewed; listen, don't talk. Know the subject matter. Use these battlefield assessments as "unsanitized" after-action reports that tap information while it is still fresh.

b. Marine Corps Research, Development and Acquisition Command (MCRDAC) Equipment Team

In early October 1990, the Commandant directed that the Marine Corps Research, Development and Acquisition Command (MCRDAC) deploy a team to the Gulf to identify materiel problems, fix what problems it could, and document the remaining problems for later resolution in CONUS. Its purpose was not to collect technical data, but it did collect a

substantial amount of qualitative data on materiel system operational suitability and a lesser amount on operational effectiveness. A 26-man team headed by an O-6 deployed on 19 October and spent 11 days in theater. See Section I.C.3.a for more details. Only one response was received from this team. Because it was in the format of the cataloger questionnaire, most of the collector issues were not addressed.

1) Preparation (training, collection plan, collection kit, authority)

The team received a briefing of unspecified content and length before deployment. The team was prepared to submit its data in the format specified for input into the Marine Corps Lessons Learned System (MCLLS).

2) Getting to theater (theater clearance, transportation)

Details about theater clearance are not known, but MARCENT did not put up strong resistance.

3) Support in theater (sponsorship, specific support items, access)

Details about the support arrangements are not known. The team included one administrative clerk and a laptop computer. There was no problem getting access to Marine units.

4) Effectiveness (problems, ability to gather, duplication, success)

No significant problems were reported; the team's work did not duplicate any other effort. The respondent indicated that the team was successful – it documented about 130 equipment-related MCLLS submissions and more than 40 others not related to equipment. Its findings were summarized and reported to the Commandant. Significant progress was made in correcting the identified materiel shortcomings before the ground campaign began.

5) Suggestions (what to change, advice for collection)

The respondent made a number of suggestions about future deployments of such teams. Deploy a team as early as possible to identify and correct materiel problems. Maintain a smaller team with the deployed forces for the duration of the deployment. Provide sufficient administrative support and take along more than a single laptop computer.

4. AIR FORCE

a. Battle Damage Assessment Team

SURVIAC made a number of attempts to train and deploy battle damage assessment teams to the Gulf before and during combat, but all such efforts foundered. Eventually, HQ TAC directed that a damage assessment team visit all TAC units that sustained any combat damage to their aircraft. This was not done until early May 1991, so well-structured damage assessments were not made until after deployment from the Gulf. One team visited A-10 units and another visited F-15 and F-16 units. See Section I.D.3.a for more details.

1) Preparation (training, collection plan, collection kit, authority)

The military members of the team, who provided the operational perspective, did not receive any additional training. The damage assessment was performed mainly by civilians on temporary duty from a variety of organizations (including SURVIAC) based on needs for specific expertise. These individuals received the training program that evolved during SURVIAC's efforts to develop the Combat Operations Assessment and Reporting Program (COARP) during Operation Desert Shield. The 3-day training program included an orientation; a description of the needed data and their uses; a discussion of data sources; an outline of the collection mission and concept; an explanation of collection forms; instruction on threat effects; familiarization with types of technical data; instruction in camera operation; and a practical exercise.

SURVIAC's COARP Data Collection Guide (February 1991) provided the basis for the collection plan, which also included a questionnaire developed by the Air-to-Surface Division of the Tactical Air Warfare Center (TAWC).

Each team received an extensive kit (developed by SURVIAC as it refined the COARP) that included: a 35mm camera with zoom lens and data back, a video camera with tapes, microcassette audio recorders, measuring devices, recording forms, questionnaires, several types of tools, and blank videotapes for recording Heads-up Display (HUD) output.

The team had written authority to collect data, which one respondent deemed "essential."

2) Getting to theater (theater clearance, transportation)

The collection of data was done after the units had redeployed from theater to home stations in CONUS and overseas. Clearance for entry to the Gulf area was not needed.

3) Support in theater (sponsorship, specific support items, access)

Due to the after-the-fact nature of the collection effort, support was not an issue. The teams had access to aircraft, damage records, reports, and some photos and videotapes of damage that had been repaired in theater.

4) Effectiveness (problems, ability to gather, duplication, success)

The most severe problem was that collection took place so long after the combat damage occurred. The team did not have immediate access to damaged aircraft before they had been repaired. Thus, all collection was historical. Memories had faded, some videos had been lost, and some reports had been destroyed. Also, there may have been Special Access Required (SAR) restrictions that prevented some data from being collected. The easiest data to obtain were aircrew interviews and questionnaires, aircraft damage reports (AF Form 97), SITREPS, and personal photographs and videotapes. Hardest to obtain were correlated intelligence reports and cockpit video recordings.

One respondent stated that this effort duplicated some aspects of other efforts. At one CONUS base, the respondent was told that his was the 19th data collection team to come through. There was no central authority, and teams were constantly overlapping in time and areas of interest.

The team was successful only in collecting what data were available several months after the damage occurred. There was no real-time data collection.

5) Suggestions (what to change, advice for collection)

The unanimous suggestion was that battle damage data be collected in real-time. Have trained teams ready to deploy during hostilities. Set up DoD-wide procedures for collection of aircraft battle damage or loss data; exercise the procedures during unit evaluations. Provide a checklist of data to be obtained after any damage or loss, and assign responsibility to ensure that the data are collected. Organize teams composed of knowledgeable people from operations, intelligence, and maintenance to analyze collected data in real-time to identify lessons learned for immediate dissemination. The Desert Storm collection effort was "haphazard, duplicated many times over, intrusive, and in many cases

too late to be of value...DoD should...direct establishment of a central data collection agency and program."

b. Munition Effectiveness Team

In late February 1991, HQ AFSC directed that a team be deployed to observe and document the performance of air-delivered munitions against fixed and mobile targets. The 7-man team was formed on 28 February, deployed two days later, and spent about 2-weeks in theater. See Section I.D.3.b for more details.

1) Preparation (training, collection plan, collection kit, authority)

The short-notice deployment allowed no time for training, only a quick briefing on what types of data were to be collected. All team members, however, had experience in weapons development and testing. Also, some team members had received training being given by SURVIAC (see Section I.D.3.a). Although the SURVIAC training was directed toward assessment of damage to U.S. aircraft, it was "very helpful" in providing techniques for analysis and documentation of damage done to Iraqi aircraft. Respondents made several suggestions about what the training program should have included: recognition of non-U.S. munitions; procedures on how to determine what samples to collect and how to collect them; chemical defense training; weapons qualification; medical self-aid and buddy care; and an intelligence update on target locations.

The team had no collection plan, only a broad mission statement. The team was provided with an excellent collection kit: 35mm camera with flash and film, a video camera, audio tape recorders, measuring devices, a selection of tools, and administrative supplies.

The team did not receive written authority to conduct its mission. One respondent indicated that CENTCOM approval and support would have helped.

2) Getting to theater (theater clearance, transportation)

Theater clearance was obtained through discussions between DIA in CONUS and its representative at CENTCOM in Saudi Arabia. The total authorization was for 15 people, roughly half for this Air Force effort and the other half for a joint DIA/DNA team. AFSC coordinated the Air Force's participation. The team did not receive formal clearance until after it had arrived in theater.

Transportation was via MAC charter. Some members may have had to fly on a space available basis, but that caused no delay.

3) Support in theater (sponsorship, specific support items, access)

Of all the teams that responded to this questionnaire, this team seems to have had the most difficult time finding satisfactory support. The in-theater sponsor was supposed to have been ARCENT's Joint Captured Materiel Exploitation Center (JCMEC), which was not informed of the arrangement and did not furnish much support. JCMEC provided some life support, but little else. One Army O-5 associated with JCMEC was particularly difficult, and he sometimes prevented his subordinates from providing support that they were able and willing to give (including equipping the team with weapons for self-defense). The team scrounged most of its support through informal agreements. For example, the team obtained three HMMWVs from the Air Force at King Fahd Air Base, which allowed them to perform its mission in Iraq and Kuwait. Finding fuel became a severe problem, because many Army units in Kuwait would not provide fuel to an Air Force element (there were exceptions). The Marines in Kuwait were helpful, and the team was able to take fuel cans from abandoned Iraqi vehicles to keep running. No helicopter support was available, so it was not possible to reach armor targets in western Kuwait and southeastern Iraq.

The team had better access to fixed targets like airfield shelters than to mobile targets like tanks. Because the team did not have good intelligence data about target location, the search for destroyed targets was "seat of the pants." Ground troops, the NCOs, and officer below the grade of O-5 were supportive of the team's effort.

4) Effectiveness (problems, ability to gather, duplication, success)

As mentioned above, finding targets was difficult because of poor intelligence and weak transportation support. It was relatively easy to find aircraft shelters in Kuwait, but not nearly so easy to find mobile targets. Once a target was found (especially a mobile target), it was hard to determine what munition(s) hit it and how much of the damage was caused by secondary explosions after impact. Also, some targets had been mined or boobytrapped, which made examination dangerous or impossible. The shifting sands had covered many craters and target fragments. The team could not secure access to all areas where targets might have been found. In particular, it could not gather data on damage to bridges or air-defense sites.

The respondents stated that its work did not duplicate Army and Marine Corps data gathering. The team was aware that the DIA/DNA team was in theater at the same time, but the responses indicated that the two efforts were seeking different data. The Air Force and DIA/DNA teams shared their data after their return.

The respondents believed that the effort was successful regarding static targets, but less so for mobile targets. Much more could have been done if the team had had better transportation.

5) Suggestions (what to change, advice for collection)

One respondent suggested that the Air Force had "no organized pre-planned data collection effort" and that this led to "serious missed opportunities," including possible recovery of operational MIG-29 aircraft. Respondents suggested that a collection team be deployed early (before hostilities, if possible) and be logistically supported, especially with transportation. To accomplish this, form a standby team under AFSC that is trained and ready for deployment. The team(s) should include military engineers or analysts with experience in air-delivered munitions, including their development and employment. Keep team size small to minimize the logistics burden. Deploy the teams under the J-2 so they can track potential targets. In theater place the teams with logistics support elements just rear of the front line so they can follow the battle.

Respondents made provided some advice for future collectors. Be flexible and innovative. Don't take "No" for an answer. Bring along weapons. Ensure that logistics support is in place. Carry everything expected to be needed; carry enough to be independent. Get to targeted vehicles and installations "as quickly as you safely can."

c. Air-to-Air Assessment Team

In early February 1991, HQ TAC directed that a team be deployed to the Gulf to collect data on F-15 air-to-air engagements. A three-man team with experience in the Weapon System Evaluation Program (WSEP) deployed in mid-February. The team joined an instructor from the Fighter Weapons Instructor Center (FWIC), who was already in theater assessing the overall performance of the F-15. See Section I.D.3.c for more details.

1) Preparation (training, collection plan, collection kit, authority)

The team members were subject matter experts, so did not participate in a training program before deployment. One respondent indicated that it would have been helpful to have been given a better understanding of what they were being sent to analyze.

The team developed its own collection plan and kit. No comments were made about their adequacy.

The team did not have formal written authority, and there was disagreement among respondents as to whether or not such authority would have helped.

2) Getting to theater (theater clearance, transportation)

It was not clear from the responses whether clearance had been received. Although HQ TAC directed that the team be deployed, it arrived in theater "unannounced and unexpected," according to one respondent. Transportation to theater was via the TAC rotator; no problems were reported.

3) Support in theater (sponsorship, specific support items, access)

It is not clear from the respondents just who the sponsor was, although CENTAF, through CENTAF/DO, provided in-country support. Transportation between F-15 bases was via C-130. Individual F-15 units provided support at the bases the team visited. No support problems were reported.

The team had access to all F-15 units, including the opportunity to interview pilots and weapons officers and to view available videotape recordings of engagements. Units were generally very cooperative. Commanders tended to be "apprehensive and cool" about the team's presence, but the team was able to moderate these responses by explaining how it could help solve any problems.

4) Effectiveness (problems, ability to gather, duplication, success)

The team did not arrive until almost a month after Desert Storm had begun, so the most perishable data were lost. Because the F-15 videotape recorder (VTR) was so unreliable, only about 30% of the air-to-air kills were documented on tape. Thus, it was difficult to determine with any certainty the missile engagement parameters and the corresponding results of each air-to-air engagement. Much of the data obtained was from pilot reports, which could not be corroborated.

The team partially duplicated the work of the FWIC instructor (before the two efforts were combined), but there was some value to the cross-check that such duplication provided.

The respondents rated the team's success from "somewhat" to "extremely" successful. One response suggested that the team's effort would have been more successful if the team had arrived before hostilities, the F-15 VTR had been more reliable, and the Air Force had deployed more people with experience in the live-fire of air-to-air munitions.

5) Suggestions (what to change, advice for collection)

The respondents were in agreement that the Air Force needs a plan for evaluating air-to-air systems during conflicts and that a collection effort be in place at the start of such conflicts. The operators are busy fighting the war and should not be expected to collect data – there should be collectors on-site "solely responsible" for data collection. Establish procedures, forms, and reports to be used in collection. Consider using the WSEP program as a model or basis for a "Combat WSEP" program to be activated for hostilities.

The respondents had a number of suggestions for those who might be tasked with data collection. Determine the specific data needs and the expected uses of the data. Once in theater, immediately establish contact with organizations that can provide intra-theater airlift. Do the job right, because the data will be used to identify needed system improvements and to defend system performance.

5.DEFENSE AGENCIES

a. DIA/DNA Munitions Effectiveness Assessment Exploitation Team

A joint 8-man team of specialists from DIA and DNA (including one detailed from the Army's Waterways Experiment Station) was formed on 28 February 1991, deployed on or about 3 March, and spent 2 weeks in theater. The team's mission was twofold: to gather detailed structural information on targeted installations and to collect data on the effects of munitions against those targets.

1) Preparation (training, collection plan, collection kit, authority)

The team included structural engineers, a weapons effects specialist, a targeteer, and a communications equipment specialist. Most had participated in various aspects of CONUS-based support for Operations Desert Shield and Desert Storm, including vulnerability analysis of potential targets and bomb damage assessment after attack. Some team members participated in the analysis, targeting, or BDA of installations that they later visited. There was no time for additional training before deployment, although some team members reviewed selected imagery. One respondent stated that some photography training, both still and video, would have been helpful.

The team had no collection plan, only their mission statement. Their sophisticated collection gear consisted of three identical kits that contained: a battery-powered concrete core sampler; a concrete rebound hammer; a soil penetrometer; a reinforcement locator; tape measures, hammers, chisels, screwdrivers, and wrenches; a laser distance-measuring

device; a 35mm camera with a flash, four lenses, and 200 rolls of film; an 8mm video camera with a light source and 20 blank videotapes; a micro-cassette audio tape recorder; and administrative materials. The battery powered core sampler turned out to be inadequate. A simple point-and-shoot 35mm camera might have been more suitable than the sophisticated camera equipment that the team was given.

The team had only their temporary duty orders for written authority. No respondent identified this as a problem.

2) Getting to theater (theater clearance, transportation)

Theater clearance was obtained through discussions between the Target Intelligence Division of DIA and DIA's representative at CENTCOM in Saudi Arabia. The authorization was for 15 people, roughly half for the DIA/DNA team and the other half for the Air Force Munitions Effectiveness Team. Clearance came initially via secure phone, followed by a message.

The team flew to theater on board a military chartered aircraft. No problems were reported.

3) Support in theater (sponsorship, specific support items, access)

CENTCOM J-2 sponsored the visit; the Joint Captured Materiel Exploitation Center (JCMEC) (apparently under ARCENT) was to have provided support in theater. The support arrangement, however, was particularly rocky. Primary life support at the team's Riyadh home base was provided by the Air Force. In order to reach targets in Iraq, the team scrounged transportation (through the Chief of Targets at CENTAF) via first a C-130 and then a CH-47 helicopter. The team did not have a vehicle at any of the sites visited in Iraq. After JCMEC would not support the team's request for transportation to targets in Kuwait, a team member visited LtGen Horner, the Commander of CENTAF, who interceded with the CENTCOM J-2. JCMEC grudingly provided 2 HMMWVs, which were used for transportation to installations in Kuwait.

Regardless of location, the team appeared to have had little trouble finding rations and water. Communications was non-existent, but that did not pose a significant problem. Army units in Iraq and Kuwait were very helpful.

Once transportation was arranged, the team had access to targeted installations. Wherever they went, they encountered a positive response to their work. The U.S. Army, the U.S. Marines, and the British Army were all quite helpful to the team. The team's

worst treatment came from an Army O-6 at ARCENT (Forward) and from an Army O-5 at JCMEC (Forward), both in Kuwait.

4) Effectiveness (problems, ability to gather, duplication, success)

The team was able to spend only 2 days in Iraq, and it wasted a lot of that time walking around the visited installations. Likewise, time was wasted in Kuwait driving to targets because of a lack of helicopter support. While it was relatively easy to photograph and videotape a target site, it was much more difficult to record detailed bomb damage data and structural descriptions. Even more time consuming was the collection of material samples.

The team visited a total of seven targeted installations. It is not clear to what extent these same installations were visited by the Air Force Munitions Effectiveness Team, which deployed to theater at the same time but for a different reason. None of the DIA/DNA responses addressed potential duplication of the Air Force effort.

The team amassed a substantial collection of photographs and videotapes of bomb-damaged targets. The responses indicated that the team felt it was extremely successful in its "visit to the largest weapons laboratory in the world." The results are being briefed throughout the DoD.

5) Suggestions (what to change, advice for collection)

As was true for responses from other collection efforts, the respondents stressed the importance of data collection and the need for prior planning of the collection efforts. Munitions effectiveness assessment should be in place early to gather information to assist the war effort and to help get ready for the future. Exploitation must be a multi-Service effort with Joint leadership. Exploitation must include facilities, aircraft, and documents in command facilities.

Future data collectors were advised to bring along their own weapons. Be flexible and resourceful; use initiative. Ensure that there is an effective point of contact in theater. Arrange for dedicated helicopter support if possible.

APPENDIX G

DISCUSSION OF RESPONSES TO CATALOGER QUESTIONNAIRE

APPENDIX G
DISCUSSION OF RESPONSES TO CATALOGER QUESTIONNAIRE

This appendix summarizes the responses to the questionnaire that was sent to people directly involved in the cataloging of data in the Gulf (Appendix D). This summary generally follows the format of the questionnaire, but not all questions are summarized. The summary focuses on five specific areas:

- Cataloging assignment (types of data, degree of involvement in cataloging)
- Organization (how and when organized, influence over type and format of data)
- Support (support most helpful, support lacking, coordination with other cataloging efforts)
- Effectiveness (influence over data submission, satisfaction with manner in which data was submitted, duplication of effort, degree of success, expected users of the data)
- Suggestions for improvement (what to change, advice for future cataloging)

This appendix is organized by Service and, within each Service, by collection effort. Phrases or sentences in quotation marks indicate comments made on one or more responses to the questionnaire.

1. ARMY

a. Center for Army Lessons Learned (CALL)

The Center for Army Lessons Learned at Fort Leavenworth, Kansas, is the Army's focal point for the collection, analysis, and dissemination of combat-relevant lessons Army-wide. Thus, CALL is the natural recipient and cataloger of all data from the Gulf War. In mid-April 1991, the Army expanded CALL's after-action efforts by forming a Special Study Project under a major general at Fort Leavenworth. The questionnaire response

from CALL came from the division regularly involved with internal processing of lessons learned.

1) Assignment (data types, degree of involvement)

The cataloging assignment, which was a normal outgrowth of the duties within CALL, was to catalog all materials collected by CALL data collectors, the Weapon System Combat Performance Assessment Team (WSCPAT), major commands, and others. Submissions included data in digital format as well as materials that had to be transcribed or optically scanned. CALL received narratives, JULLS-formatted reports, maps, messages, briefing slides, photographs, videotapes, and other materials. The division also continued to perform far- and near-term automation planning for CALL.

2) Organization (how and when organized, influence over type and format)

CALL existed at the start of Operation Desert Shield. The general concepts for cataloging digital data, which had been derived from Operation Just Cause experience, were in the process of being implemented when Kuwait was invaded. CALL had little influence over the type and format of the data that it received for cataloging.

3) Support (support most helpful, support lacking, coordination)

Because of the eventual size of the cataloging mission, additional manpower was provided and contract support was obtained. Additional expertise in archival or library science would have been helpful. CALL coordinated with the Combined Arms Research Library at Fort Leavenworth and with the Center for Military History (CMH)-Fort Leavenworth field team.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

There was no influence over the manner in which data was submitted. As a result, most submissions did not lend themselves to cataloging within a standardized structure. The respondent was uncertain about the degree to which CALL efforts would duplicate or complement the efforts of the CMH. The respondent was not ready to characterize the degree of success achieved in cataloging. The users of the data are expected to be the TRADOC schools and centers; students at the Command and General Staff College (CGSC); CALL analysts for lessons learned; TRADOC Research Command (TRAC); and

contractors doing relevant work. The respondent suggested that the users might not have known exactly what data they needed.

5) Suggestions (what to change, advice for cataloging)

Develop a standardized cataloging system that takes full advantage of computer technology to store and retrieve digitally formatted data. Also, address the classification or numbering standards of the librarians and archivists – these standards do not support the filename convention used by the Microsoft Disk Operating System (MS-DOS), which allows a filename of only eight characters plus a three-character extension.

Borland International's software application REFLEX is highly recommended for data entry. Its unrestricted field size and ease of field modification give it great flexibility.

2. NAVY

a. Center for Naval Analyses (CNA)

Section I.b of the basic report describes how CNA analysts gathered data while they provided analytical support to operational commanders during the Gulf War. CNA also led the effort to organize the collected data and to prepare a reconstruction of the conflict, drawing heavily from its deep base of experience from earlier reconstructions. The cataloging effort included identifying and cataloging the contents of several hundred boxes of data sent back from deployed units by the CNA analysts. Although the procedures used to catalog the data were similar to those used in earlier reconstructions, the Gulf War reconstruction's large size and short time frame combined to make it much more formidable than its peacetime counterpart. Questionnaire responses were received from those who established cataloging procedures and who participated in the cataloging.

1) Assignment (data types, degree of involvement)

Data were received from over 80 ships and commands, including six carriers and airwings, twelve major staffs, and twelve cruisers, eight of which were Aegis. The data to be cataloged included a variety of command logs, arriving debriefs, message traffic, imagery, computer output, magnetic media, and administrative materials. Almost all the data were routinely generated by the commands from which they came. The CNA respondents to the questionnaire all stated that they were heavily involved in the cataloging effort, working full-time for the two or three weeks just before the reconstruction began.

2) Organization (how and when organized, influence over type and format)

In the past, CNA has cataloged such data routinely after peacetime exercises, but the large volume of data made this task more difficult. A group of analysts was temporarily dedicated to organizing the data, which was grouped by ship or command. For each ship and command there was an individual folder for each broad category of data. After the data were sorted into the folders, the names of the folders and their contents were entered into a data retrieval system (FileMaker data base).

CNA did not specify the format of the data, which were generated routinely by operational units and gathered by the deployed analysts. At the close of the war, the Commander of NAVCENT sent a message to his command that specified what data were to be recovered and shipped to CNA.

3) Support (support most helpful, support lacking, coordination)

Several members of the CNA research staff had extensive experience in directing or participating in previous reconstruction efforts. Their expertise helped get the endeavor organized quickly. The primary shortage was time, because of the early due-date for the first draft. CNA coordinated with the Navy Historical Center, which will eventually take charge of the data. Information from the effort was also provided to to the Deputy CNO for Program Planning (OP-08).

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

The data were shipped to CNA after the war, generally by the CNA analysts themselves. Commands without a CNA analyst were responsible for shipping their own data to CNA. Given the circumstances, the submission was satisfactory. In some cases, however, there was little time to organize the data before shipping it to CNA. The boxes of data ranged in size from one-foot square to a size so large that they could not be moved without a dolly. Special administrative arrangements had to be made for control of the large amounts of classified information that were included with the data.

Because CNA organized the Navy's overall reconstruction effort, there was no duplication. CNA was successful in cataloging an extensive collection of various types of data in a very short time. The initial work has been refined so that data can be retrieved at a much finer level of detail to assist the analysts.

5) Suggestions (what to change, advice for cataloging)

Respondents made a number of comments about lessons learned during the cataloging process. It was noted that the quality of the data was dependent on individuals, presumably those who generated the data or collected them. There was little automatic data collection. All data arrived after the war, so CNA was not able to view the data as it was collected (except for individual CNA analysts who collected a substantial amount of the data). It would be better if units in the field were told at the start of the conflict exactly what data should be recovered for shipment to CNA. The Gulf War was a Joint-Service operation, but CNA received little data on the War's joint aspects. This has led to CNA's after-the-fact coordination with other Services to resolve data issues such as bomb damage assessment. CNA deployed representatives who had experience with fleet operations and exercise reconstructions – they knew what types of data were needed, how the data would be used, and where to find the data. The organization of the data at the operational sites and its shipment back to CNA, however, could stand some improvement. Also, the Navy should devise better ways to collect data from those ships and commands that do not have CNA representatives on their staffs. Some standardization of the data submissions would be helpful.

Some general advice was also provided by the respondents. Know the users of the data and learn their jargon. Work closely with the users – be a part of the team before you start. Look at the data as it is received. Draw on the experience of those who have been deployed with operational units or have participated in earlier reconstructions.

3. MARINE CORPS

a. Marine Corps Operational Analysis Assessment Group (MCOAAG)

The MCOAAG was formed as a temporary group under the Studies and Analysis Branch of the Warfighting Center at MCCDC. Its role was to identify the issues to be addressed, to expand the collection effort beyond MCLLS, and, eventually, to catalog and analyze the data from the Gulf War. Generally, MCOAAG was a functionally organized group of active and reserve military members, many of whom were from other elements of the Warfighting Center. Its members had differing experiences in data cataloging. Some were returning members of the Battle Assessment Team who cataloged the data that they had collected themselves. Others cataloged data gathered by someone else. The responses to the cataloger questionnaire reflected this diversity of experience.

1) Assignment (data types, degree of involvement)

The cataloged data included the audiotapes, videotapes, and completed survey forms gathered by the BAT in theater. Also cataloged were situation reports, after-action reports, messages, orders, logbooks, magnetic media, and other documents that were either collected by the BAT or received from other sources.

Generally, respondents worked about half time on cataloging data, although a number of them (including Marine Reservists) worked full time for some periods. Some BAT members assisted in cataloging data while they were writing their after-action reports.

2) Organization (how and when organized, influence over type and format)

The MCOAAG was organized in October 1990, but its composition varied over time. Some respondents came aboard early, while others joined during the first three months of 1991. The respondents indicated that, unless they had participated personally in the BAT effort, they had no influence over the types and format of the submitted data.

3) Support (support most helpful, support lacking, coordination)

The shortage of manpower and time were problems mentioned by several respondents. The activation of Marine Reservists was very helpful in this regard. Another apparent problem was continuity among the people involved in cataloging (the Reservists were eventually lost). One respondent stated that the "facilities" could have been improved.

There was some coordination between this effort and that of the Center for Army Lessons Learned (CALL). Also, coordination was made with the OSD Technical Data Directory project.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

Unless the cataloger was part of the BAT, he had no influence over the manner of data submission. Generally, catalogers cataloged whatever they received, but some comments were made about data submission. One respondent suggested that, although audiotapes were easily made in theater, catalogers found it hard to extract data from the tapes. There should have been better preparation of data collectors and more reliance on digitized data.

One respondent indicated that there was duplication with "other agencies" that were not named; another mentioned possible duplication with CNA. Also, it was pointed out that "everybody" was interested in "BDA."

Most respondents indicated that they achieved some degree of success. One respondent believed that he was more successful with historical data than with technical data, which were more difficult to extract. Another respondent stated that he would have been less successful if he had been required to answer questions immediately. The return of Marine Reservists to civilian life may have lowered the degree of success. Changes in the set of terminology (keywords) for the OSD Technical Data Directory project caused some disruption of the Marine Corps cataloging effort.

The expected users of the data include analysts, historians, operators, and those doing studies. Some respondents specified Marines as the appropriate users of the data.

5) Suggestions (what to change, advice for cataloging)

Several respondents suggested that the major needed change was the organization of a total collection effort – specify what to collect, from whom, in what format, and how. Standardize the collection formats and the military terminology used by collectors. Establish collection teams with the operational units early, and ensure that they know all data requirements "up front." Replace paper with digitized data, and automate collection to a greater extent. If surveys are used, enter the data into computers as they are gathered, so the data is saved automatically in digital format on magnetic media. Provide equipment to microfiche paper documents. Eliminate redundant sources and "streamline the cataloging process." Ensure that military libraries receive the cataloged data or lists of data sources.

Respondents provided some advice for future catalogers. If possible, avoid the use audiotapes. Plan ahead, gather the needed assets, and ensure that there is a set of standard terminology. Accept any data that is offered.

4. AIR FORCE

Questionnaires received from Air Force catalogers covered a broad range of activities The majority of the responses, however, discussed the Air Staff-led efforts to identify data sources throughout the Air Force. Generally, the Major Command (MAJCOM) respondents described their coordination with the Air Staff in the identification of sources for the OSD Technical Data Directory. Relatively few responses were received from those who organized and cataloged the collected data. Some responses were so

sketchy that it was difficult to determine the nature and extent of the cataloging activities to which those questionnaires pertained.

a. Gulf War Studies Office (GWSO)

The Gulf War Studies Office was established within the Air Force Studies and Analyses Agency (AFSAA) to manage a portion of the Air Staff's Gulf War after-action activities. The GWSO's responsibilities include maintaining the catalog of Air Force data sources and providing that information to OSD for the Technical Data Directory. GWSO also maintains a USAF Question Bank and a (completed) Studies Catalog. The Air Force's method of cataloging data sources has been one of centralized control and decentralized execution. That is, the Air Staff has established, coordinated, and enforced reporting standards. The MAJCOMs and Field Operating Agencies (FOAs) have been responsible for determining what data are important, locating the "best" data, and reporting the sources of data to the Air Staff.

1) Assignment (data types, degree of involvement)

The GWSO requested, received, cataloged, and reported to OSD all known sources of Gulf War-related data. The "data" received by the GWSO were descriptions of data collections throughout the Air Force. The GWSO deals with Gulf War study activities on a full-time basis; identifying Gulf War data sources was the primary mission of the respondent to the questionnaire.

2) Organization (how and when organized, influence over type and format)

The GWSO was organized within AFSAA on 25 February 1991 using members already assigned to AFSAA. The office organized the compilation of the data source catalog and, in doing so, provided the format in which entires were to be submitted to the Air Staff. The data base format used by the Air Force was that used by OSD for the Technical Data Directory.

3) Support (support most helpful, support lacking, coordination)

The most helpful support was enough funding for travel to Air Force commands and agencies to coordinate the compilation of data sources. The only noted lack of support was of an administrative specialist dedicated to the effort. The office coordinated with all potential sources of Air Force data.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

Because the GWSO coordinated the submission of data sources, it had substantial influence over the method of submission. Generally, the commands and agencies provided the input in the proper format, although the format had been modified by OSD just before the OSD submission was due. Also, a few agencies submitted input in hard-copy format rather than on magnetic media, but this was not a major problem. There was no duplication of this effort.

This cataloging effort succeeded in identifying over one thousand collections of data throughout the Air Force. Expected users include analysts from the Air Staff, the Air Force Secretariat, MAJCOMs, and DoD agencies.

5) Suggestions (what to change, advice for cataloging)

The Air Force's basic plan of centralized direction with decentralized execution was sound. For future cataloging efforts, organize early, communicate widely and clearly, make face-to-face visits with the key players, and use decentralized collection and cataloging efforts that feed a central cataloging office.

b. Tactical Air Command (TAC) A Team

The A Team was a small, functionally organized group of individuals on temporary assignment from other offices in HQ TAC. Its mission was to identify sources of data within TAC and to assist in cataloging data received at HQ TAC. It provided TAC's input to the Air Staff submission of data sources for the OSD Technical Data Directory.

1) Assignment (data types, degree of involvement)

The types of data included reports, summary statistics, narratives, logbooks, message traffic, interviews, imagery, computerized data bases, special team lessons learned, and equipment inventories. The data were from four functional areas within the tactical air forces: operations/intelligence/requirements (OIR); Command, Control, and Communications (C3); Logistics; and Combat Support.

Most A Team members worked at cataloging on less than a full-time basis, and the proportions of time spent by members varied by month and by individual. At least one was virtually full-time for two months. The team members who still had other duties reported that there was no interference with their cataloging work.

2) Organization (how and when organized, influence over type and format)

The team was organized at HQ TAC in February 1991. Most team members began work in March.

The team identified data sources within TAC and also assisted in cataloging data that had been received at HQ TAC. The team had no influence over the types or formats of data that had been generated during the conflict, although much of the data (especially logistics information) was in a format used normally during peacetime. The team influenced the manner in which TAC units identified existing data sources by specifying the format to be used for submission. The specified format was compatible with the OSD Technical Data Directory.

3) Support (support most helpful, support lacking, coordination)

Each functional area had one or two experts to assist in collection and cataloging. They were able to provide good advice on what data were available and where to look. Administrative support, a reduction in outside taskings, and the use of peoples' time were cited as being valuable support items. On the other hand, some respondents stated that there was not enough administrative support. One respondent believed that HQ TAC should have sent a message to the operational units that tasked them to "save/store/send" specific data and that also directed the units to cooperate with the A Team's effort. The A Team coordinated with the TAC Historian.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

In order to identify the existing data sources, the A Team provided to TAC units pre-printed forms in the OSD Data Directory format. Thus, the process of submission was one of filling in the blanks. There was dissatisfaction among several respondents about mid-stream changes in the OSD format (such as fields to be completed and field length).

Respondents acknowledged the possibility of duplication, although one respondent stated a preference for redundancy over omission. In at least one functional area, duplication of effort was resolved as it was discovered. All respondents believed that the A Team's efforts were successful. One reason given for success was that the team's functional area experts were aware of significant amounts of available data, which were then identified, archived, and cataloged. One respondent stated that the effort had been

more thorough at HQ TAC than in the field – not all operational units documented their activities and, of those that did, not necessarily all submitted input.

The expected users include historians, military students, Service analyses organizations, OSD, GAO, "single-issue activists (Greenpeace, etc.)," "Defense think tanks," and industry.

5) Suggestions (what to change, advice for cataloging)

Most of the suggested changes addressed ways in which an overall collection and cataloging process could be established before the next contingency. Define a "generic data gathering system with appropriate procedures and networks" based on Gulf War experience. There should be a "top-level frame-work" that organizes both collection and cataloging, including the identification of specific collection and cataloging teams. A comprehensive data plan should be developed in advance of the next contingency. Establish a complete data structure; do not change it after cataloging has begun. Automate the collection process where possible. Coordinate the efforts of the MAJCOMs, the Air Staff, and the DoD Agencies to ensure a "unified vector on data collection." Ensure that the field knows early what data to keep. Ask the field for the data as soon as it is feasible for them to comply. Ensure that appropriate HQ secure the cooperation of field units.

Future catalogers were offered some advice. Find people who worked data collection and cataloging during Operations Desert Shield and Desert Storm – ask questions and listen to their advice. Read the A Team files; be aware of DoD efforts like this after-action review. Start early, be organized from the start, and find good points of contact in field units. Keep looking for data; accept anything. Determine the data structure early and then stick with it.

c. Strategic Air Command (SAC)

SAC established a structured after-action process consisting of a number of tasks that included lessons learned, data collection, and a "Hot Wash and After-Action." The data collection task, which identified key data elements available within HQ SAC and operational units, provided input for the Air Force submission to the OSD Technical Data Directory. The Hot Wash and After-Action effort was more than cataloging. It identified issues in four categories, determined sources of data needed to address each issue (including existing data, plus surveys and interviews with crews, commanders, and other key people), and outlined specific review processes to be used. The questionnaire respondents either compiled data as part of Battle Staff efforts during the war, gathered the

data from units as they returned from the Gulf, or compiled SAC data sources for submission to the Air Staff. Except for subsection 4.C.5), the following discussion of questionnaire responses is applicable only to the compilation of data sources within SAC.

1) Assignment (data types, degree of involvement)

The submission to the Air Staff included sources of data pertaining to SAC bomber, tanker, and reconnaissance operations. The sources were submitted in both paper and computerized data base format. Generally, respondents performed the compilation in addition to their normal duties.

2) Organization (how and when organized, influence over type and format)

The data source compilation was begun in April 1991. The group that compiled the SAC data sources required that all input be submitted in the format of the OSD Technical Data Directory.

3) Support (support most helpful, support lacking, coordination)

The only questionnaire comment made about support shortcomings was that there was a need for more timely notification of taskings, format, and deadlines. Coordination was made with TAC.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

The data sources were submitted in the format specified by the Air Staff, but not all submissions were received in computerized format. The compilers who responded were satisfied with the submission, and they believed that it did not duplicate the efforts of anyone else. The compilation of sources was considered a success. Data users are expected to be SAC, other Air Force agencies, OSD, and RAND.

5) Suggestions (what to change, advice for cataloging)

With regard to the compilation of data sources, it was suggested that data formats be determined and that clear guidance be given at the start, with enough lead time to accomplish the task by the deadline. Enlist someone who is familiar with computer data bases. Establish procedures for accommodating requests for data from outside the command, including requests under the Freedom of Information Act (FOIA).

A few comments were received about the overall process of collecting and cataloging the actual data (as opposed to only compiling data sources). Before a war, develop "clear, concise, and understandable formats and directives" so that units know what data must be gathered during wartime. Design the procedures to be very similar to, or exactly the same as, those used in peacetime. If there are special types of data to be collected in wartime, exercise the collection in peacetime. In particular, minimum wartime data requirements for analysis should be established and incorporated into peacetime training exercises. One respondent offered an interesting observation: "We would have liked to collect a lot more data, but the constraints of not interfering with wartime operations and the fact that no data collectors would have been trained in peacetime prevented us from making requests."

d. Military Airlift Command (MAC)

The response from MAC addressed its compilation of data sources for submission to the OSD Technical Data Directory via the Air Staff. MAC also had access to data retrieved from the Mobility Air Integrated Reporting System (MAIRS) data base. Data of interest included numbers of missions and sorties, the numbers of passengers and amount of payload delivered, mission and station reliabilities, delays, and ground times. Presumably, some subsets of these data were retrieved, compiled, and cataloged for use by operators , logisticians, and analysts; no information is known about any such cataloging efforts.

1) Assignment (data types, degree of involvement)

The cataloged data included information about known data sources within MAC. MAC received its tasking to submit such a list from the Air Staff. The compilation of data sources was done in conjunction with normal duties.

2) Organization (how and when organized, influence over type and format)

The compilation of data sources began in April 1991. The format for submission was that specified by the Air Staff (which followed the format required for submission to OSD). The format, however, was changed after submissions to HQ MAC had begun.

3) Support (support most helpful, support lacking, coordination)

Not much support was required, other than the cooperation of the offices submitting the input. No coordination was made with organizations outside of MAC.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

The submissions, which were organized as specified by the Air Staff, were satisfactory. The effort was not duplicative, and it was successful. The expected users are those who are allowed access by "POCs involved in the cataloging process."

5) Suggestions (what to change, advice for cataloging)

The change suggested by the respondent is the standard one: agree on the final format before the process begins so that mid-stream changes are not needed.

e. Pacific Air Forces (PACAF)

Two consolidated responses were received from PACAF, one to the cataloger questionnaire and the other to the collector questionnaire. In the main, the cataloger response addressed the compilation of data sources for submission to the Air Staff and, ultimately, to the OSD Technical Data Directory. The response to the collector questionnaire did not address technical data collection. Instead, it discussed PACAF's work on lessons learned and on assessments of the impacts of the deploying PACAF resources to support the Gulf War. The discussion below summarizes the cataloger response. Some of the collector comments are included in subsection 4.e.5).

1) Assignment (data types, degree of involvement)

The cataloging effort consisted of compiling data sources within PACAF for submission to the Air Staff.

2) Organization (how and when organized, influence over type and format)

Some cataloging effort began in January 1991, with later taskings from the Air Staff. HQ PACAF had no influence over the formats of the data bases within the command (but presumably used the format provided by the Air Staff to identify existing data sources).

3) Support (support most helpful, support lacking, coordination)

The response indicated dissatisfaction with the discarding of unspecified records. Internal coordination was made with the MAJCOM History Office.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

The response questioned the choice of a decentralized approach to data reporting ("we were told ...that we need not collect the data, only report its nature and existence."). A better approach might have been to require that the data be sent to HQ PACAF for more consistent and accurate cataloging. There may have been duplication of the work done by historians or in support of JULLS. The respondent questioned whether anyone would use the data sources that he had identified.

5) Suggestions (what to change, advice for cataloging)

The respondent suggested the need to "Demand format, field descriptions of cataloged items from OSD before the effort begins." It was inefficient to go back to data suppliers for "a couple more data fields for each record."

On the collector questionnaire, the respondent (apparently an analyst) noted that the "Analytic community should have taken initiative early in this conflict to organize data collection effort using professional people to perform this task with some specific objectives." He went on to say that "The analytic community has missed the boat. Desert Storm was a unique opportunity to obtain quantitative data on effectiveness of various weapon systems, tactics, and C2 in a combat environment. Lessons learned and recollection of events after the conflict is over are better than nothing but are no substitute for hard data. Lessons learned are colored by personal experiences and possibly biases.... This experience has only strengthened the need for analyst involvement not only in peacetime but even more so in time of conflict."

f. Air Force Historical Research Agency

The response submitted by this agency in response to the cataloger questionnaire was from its Accessions Division. The division had the mission to microfilm and catalog all documents received from Air Force historians, which included some technical data.

1) Assignment (data types, degree of involvement)

The agency cataloged a variety of data, including CENTAF's files on 16mm microfilm, the Air Tasking Orders, computer printouts, CENTCOM files, Historical Contingency Reports, videotapes, and audiotaped interviews. The cataloging was part of the normal mission of the division.

2) Organization (how and when organized, influence over type and format)

The agency is required to accept all Air Force historical reports, monographs, and special collections. MAJCOM history offices are required to screen and evaluate materials provided by the deployed historians.

3) Support (support most helpful, support lacking, coordination)

Provision of Air Force Reservists was most helpful. Manpower and budget cuts hurt the effort.

4) Effectiveness (influence over submission, satisfaction with submission, duplication, success, expected users)

The agency accepted what was submitted by deployed historians, and the submissions were very good considering the circumstances. There was the possibility of duplication because multiple data bases and duplicate records. Expected users include Air University students, researchers, and, possibly, the Gulf War Air Power Survey Team.

5) Suggestions (what to change, advice for cataloging)

A suggested change was that there be more awareness of the field historians' primary duties and of the records repositories that are available. The respondent advised that copies of computer printout carbons be handled carefully (the ink rubs off).

APPENDIX H

QUESTIONS ASKED OF POLICY MAKERS

QUESTIONS FOR POLICY MAKERS/DECISION MAKERS

1. How important is the collection of technical data?

a) Most people agree that it is important that technical data on the performance of materiel systems be gathered and cataloged in situations such as Operations Desert Shield and Storm. Do you believe that technical data of this type is required by DoD decision makers?

b) Do you believe that the DoD placed a sufficiently high priority on the gathering of such data during Desert Shield and Desert Storm? If not, what steps could have been taken to raise its priority?

c) Do you believe that the DoD placed too high a priority on the collection of such data?

2. How should technical data collection be organized?

a) What role in technical data collection and cataloging should be played by OJCS?

By OSD?

By the Services?

By the Defense agencies?

By others?

b) Should specific organizations within the Services and Defense agencies have the peacetime mission of being prepared to dispatch teams of data gatherers to future theaters of operations? If so, at what levels?

c) Should certain CINCs have cells within their HQs to gather technical data during deployment ? If so, which CINCs?

d) Should the Secretary of Defense (through the USD(A)) have a means of collecting data that is independent of the Services? If so, to what extent?

e) Should data collection organizations be exercised during peacetime so that they will be prepared to gather data during war or crisis?

f) At what level should oversight be exercised to minimize duplication of data collection efforts?

g) At what level should entrance into theater be controlled? Should JCS act as a clearinghouse for such requests to reduce duplication?

3. With regard to data collection, are there organizational or procedural issues that arose from Operations Desert Shield and Desert Storm?

a) Do you believe that there are jurisdictional differences that need to be settled with regard to data collection efforts of the type that took place during Desert Shield and Desert Storm?

b) Do you believe that changes in existing procedures are required with regard to the collection, cataloging and distribution of technical data of the type gathered during future situations like Desert Shield and Desert Storm?

If so, should those changes address policy?

Organizational structure?

Organizational responsibilities?

c) Do you have any other comments on how the data collection and cataloging process might be improved?

APPENDIX I

LIST OF POLICY MAKERS INTERVIEWED

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LIST OF POLICY MAKERS INTERVIEWED

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AFTER-ACTION REPORT
FOR THE OPERATIONS DESERT SHIELD/DESERT STORM
TECHNICAL DATA DIRECTORY PROJECT

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