TECHNICAL REPORT 2003-003

Single Integrated Air Picture (SIAP) Data Management and Analysis for Analysis of In-Theater Data

APRIL 2003

SINGLE INTEGRATED AIR PICTURE (SIAP)
System Engineering
Task Force (SE TF)

1931 Jefferson Davis Highway
Crystal Mall 3, Suite 1188
Arlington, VA 22203

Report Documentation Page

Report Date	Report Type	Dates Covered (from... to)
00 Apr 2003	N/A	-

Title and Subtitle Single Integrated Air Picture (SIAP) Data Management and Analysis for Analysis of In-Theater Data	**Contract Number**
	Grant Number
	Program Element Number
Author(s)	**Project Number**
	Task Number
	Work Unit Number
Performing Organization Name(s) and Address(es) Single Integrated Air Picture (SIAP) System Engineerin Task Force (SE TF) 1931 Jefferson Davis Highway Crystall Mall 3, Suite 1188 Arlington, VA 22203	**Performing Organization Report Number**
Sponsoring/Monitoring Agency Name(s) and Address(es)	**Sponsor/Monitor's Acronym(s)**
	Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited	
Supplementary Notes	
Abstract	
Subject Terms	
Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU
Number of Pages 18	

UNCLASSIFIED

TECHNICAL REPORT 2003-003

SINGLE INTEGRATED AIR PICTURE (SIAP)
Data Management Analysis Plan (DMAP)
For Analysis or in-Theater Data

APRIL 2003

UNITED STATES JOINT FORCES COMMAND (USJFCOM)

and

SINGLE INTEGRATED AIR PICTURE ANALYSIS TEAM
System Engineering
Task Force (SE TF)

1931 Jefferson Davis Highway
Crystal Mall 3, Suite 1142
Arlington, VA 22203

CAPT Jeffery W. Wilson
SIAP

CAPT Joseph A. Horn
USJFCOM

(This Page Intentionally Blank)

GOVERNMENT RIGHTS IN DATA STATEMENT

Reproduction of this publication in whole
or in part is permitted for any purpose
of the United States Government

EXECUTIVE SUMMARY

PROBLEM

While operating in-theater with U.S. and coalition forces in a complex architecture of multiple data links, networks, systems and procedures, operators may encounter dual tracks, identification issues, and an uncommon tactical picture to a degree, and for causes not previously experienced. These operators could benefit from the experience and knowledge system and Subject Matter Experts (SMEs) have gained by conducting analysis in structured test and evaluation environments.

BACKGROUND

Following the 1990-1991 Gulf War, a number of organizations such as the All Service Combat Identification Evaluation Team (ASCIET), its successor the Joint Identification Evaluation Team (JCIET), and more recently the Single Integrated Air Picture (SIAP) System Engineering Task Force have addressed interoperability among Joint combat systems. Part of the process employed by these organizations has been a rapid turn-around analysis conducted by a collaborative team of SMEs. This rapid turn-around analysis is intended to provide near real time feedback to the operators to effect changes and improve performance. A similar process can be employed for in-theater operations.

APPROACH

Many of the systems deployed in-theater have some level of analysis support either on-site, in CONUS, or both. This plan leverages the existing capabilities and resources and provides the process to support collaborative analysis for multi-system fault analysis and recommended resolution.

(This Page Intentionally Blank)

1. Introduction

The following documents the processes and procedures to be followed by operators, support personnel, and Service analysts who will engage in the collection, reduction, transfer and analysis of Tactical Data Link (TDL) and Combat System (CS) data recordings of joint and coalition force operations conducted in-theater. The objective of the effort is to provide an environment for cross-Service/Agency investigation into Events of Interest (EOIs) identified from recordings of TDL and CS data, perform a limited level of analysis based on the data available, and inform the JICO, through USJFCOM of the results, in a manner sufficiently timely to assist operations.

1.1 Background

Various Program Offices/Organizations/Commands are currently supporting efforts, with people and tools, to collect, reduce and transfer data from systems that are in-theatre back to their respective home bases/facilities. However, no Joint organization has coordinated these collection efforts, nor has any organization coordinated for the collective analysis of this data. The existing tasking does not authorize any disclosure beyond the direct Chain of Command. The approach described in this document intends to leverage existing analysis resources and collaborate amongst the SIAP Analysis Team (SAT) members for resolution to joint/coalition force performance issues.

1.2 Approach

Normally system's data for an entire event is available to the SAT for analysis, however this approach is not practical in this situation. Operational constraints on the collection and transfer of the data dictates that a much more limited amount of data be specified. The approach is to have the Joint Interface Control Officer (JICO) coordinate the data collection effort among the systems for short periods of time (approximately 4 hours on three separate occasions), on-site system personnel reduce and transfer the data, and the SMEs conduct the analysis and provide feedback to the appropriate Program Office(s) and USJFCOM for forwarding to the JICO and operators. Once the SMEs have had the opportunity to conduct their analysis it may be necessary to conduct additional collection/reduction and transfer of amplifying data or data from additional systems. If this need arises the in-theater personnel, along with the JICO, will be contacted to arrange for the additional data.

The Program Offices of the systems involved are currently supporting this effort with existing resources and no additional funding is required for the collection, reduction and transfer of the data. If it becomes necessary for the SAT to meet in a central location to conduct collaborative analysis the associated costs would be negotiated between the affected Program Offices and the SIAP SE TF.

The SAT resources responsible for planning, analysis, and reporting of this effort are listed in Table 1-1.

Table 1-1. SAT for In-theater Data.

Member	Function	Phone	E-mail
CDR Paul Votruba	SIAP/ Reporting Oversight	(703) 602-6441	VotrubaPA@navsea.navy.mil
Darrell Schultz	SIAP SE TF/ Joint CONUS Coordination	(703) 602-6441	SchultzDP@navsea.navy.mil
Kevin Nurre	LTPO Lead Engineer	(256) 955-1220	Kevin.Nurre@amd.army.mil
Danny Ellenburg	LTPO/PATRIOT Analysis	(256) 694-2481	dgellenb@intergraph.com
John Jordan	LTPO/PATRIOT Analysis	(256) 217-8421	john.jordan@cas-inc.com
Dan Bergstrom	NSWC Corona/ Navy CONUS Coordination	(909) 273-5084	BergstromDJ@corona.navy.mil
Claude Klapp	NSWC Corona/ Analysis	(909) 273-5280	KlappCD@corona.navy.mil
Tam Vo	NSWC Corona/ Analysis	(909) 273-4809	Vott@corona.navy.mil
Alex Brofos	MARCOR/TAOM Analysis	(781) 271-7921	ambrofos@mitre.org
Tom Hart	MARCOR/TAOM Analysis	(781) 271-7503	thart@mitre.org
Laura Johnson	552nd/AWACS CONUS Coordination	(405) 739-2464	Laura.johnson@tinker.af.mil
Les Davis	AWACS SPO/AWACS Analysis	(781) 271-3397	lidavis@mitre.org
Larry Lewis	CNA/Navy and CAOC CONUS Coordination	(703) 824-2020	lewisl@cna.org

2. Goals, Products and Schedules

2.1 Goals

The goals of this effort are to:

1. Provide rapid analysis and feedback to support development/evaluation of Tactics, Techniques, and Procedures (TTP).
2. Provide rapid analysis and feedback to support Tactical Data Link management.
3. Provide rapid analysis and feedback to assess Common Operational Picture (COP) differences.

TTP, TDL and COP analysis will address EOIs identified by either operational personnel in-theater (JICO or system operators) or the SAT if upon review of the data an issue is observed that was not apparent to the operator.

There are secondary objectives of this analysis that are not driven by the need to provide a timely response to support in-theater performance.

1. Assess system performance in the context of real-world operations.
2. Develop, and exercise a Joint process for extracting, reducing and transferring data from in-theatre.
3. Provide data for validation of models/simulations/scenarios.

2.2 Products

The primary product the SAT will produce is rapid feedback to in-theater personnel. This feedback will be distributed via SIPRNET and will be in a MS Office format (e.g., MS PowerPoint or MS Word) and will address each issue separately. The report will provide:

1. Issue Identification number and title.
2. Description of the EOI.
3. Summary of analysis and results
4. Recommendation for short-term resolution or work around.
5. Recommendation for long-term resolution.

At the completion of operations in-theater, a report will be compiled and submitted to JFCOM and SIAP SE TF and include the following content and format guide.

1. Executive Summary addressing Issue, Background, Approach, Scope, Findings, Summary and Recommendations.
2. Introduction section containing system and test descriptions.
3. Analysis Process and Results section containing descriptions and root cause analysis of EOIs (including impact to operational forces), a brief description of SIAP Attribute measurement, and Attribute measurements.

4. Lessons Learned for tactical data collection and engineering support to in-theater operations. Summary and Recommendations section containing high-level results of the analysis, the impact to operational forces and recommendations.
5. References
6. Appendix containing detailed analysis results (e.g., vignettes, Attribute tables by object, … etc.).

2.3 Schedule

The schedule for in-theater analysis cannot be predetermined. The primary objective of this analysis is to provide rapid feedback. The goal is to provide a response to in theater representatives within a time period of 5-7 days upon receipt of data by the SAT members.

3. Data Collection, Reduction, Transfer Guidelines

The following provides specific tasks and a description of the process for the collection, reduction, transfer and analysis of in theater data.

3.1 Roles and Responsibilities

3.1.1 SIAP Analysis Team

The SAT, as listed in Table 1-1, will be responsible for planning, executing and reporting the results of the data collection/analysis effort. The team members supporting the various systems that are in-theater and participating in this effort will communicate the system-specific procedures for collecting, reducing and transferring data with their on-site representatives. Upon receipt of the prescribed data from in-theater the individual team members will conduct preliminary analysis at their designated analysis facility to identify issues and assess individual system performance. The SAT will then work collectively, at a central location if deemed necessary, to understand any issues presented, provide root-cause analysis, and develop recommendations on how to alleviate/mitigate the impact to the operational forces. Any recommendations will be coordinated through the appropriate Program Offices and USJFCOM, and will be forwarded through the proper process to in-theater personnel for implementation.

3.1.2 JICO

The JICO assigned as the Primary, co-located with the CAOC, will coordinate the data collection effort. The JICO will identify specific time periods for data collection and the specific units, those listed below that will collect data. We propose 3 separate 4 hour time periods for the collection effort. The specific days/times will be at the discretion of the JICO, but for this analysis effort to be most effective, the collection should include time periods when a robust data link architecture is active and significant activity is ongoing within the AOR. (i.e. a significant number of aircraft are airborne). Upon selection of the collection periods the JICO will communicate the specific days/times (ZULU) to the units within the architecture and inform the units to collect the prescribed data during those times.

3.1.3 Program Offices

The affected Program Offices or responsible organizations will establish communications with on-site personnel and identify the specific data to be collected and the process for reducing and transferring the data from in-theater to CONUS.

3.1.3.1 US Army PATRIOT

All PATRIOT BNs in-theater will collect data as follows:
Collect ICC Embedded Data Recorder (EDR) tapes (8 mm exabyte) for the Master ICC, subordinate Patriot ICCs and associated Fire Units for the specified time windows. The PATRIOT operators should then provide the EDR tapes to the on site Raytheon Major Item Repairman (MIRs). ICC tapes should be transmitted via the PATRIOT IDSS satellite link to the Lower Tier Project Office Data Analysis Center at Huntsville, AL. The MIRs should indicate in the header/readme files that the data files are the Interoperability data collect along with other standard labeling standard operating procedures. The Fire Unit EDR tapes should be held and transmitted only upon request.

3.1.3.2 US Naval Units

Specific Aegis ships will be selected for data recording due to capabilities, their place in the link architecture, and their current operational focus (performing AAW and/or RICO functions). For these ships, the crew will record and collect 9-track tapes and/or Optical media as applicable to capture C&D War Diary data (a specific extraction point list will be delivered to affected ships prior to recording). The media will then be forwarded to the on-site personnel. If NSWC Corona personnel are on-site, they will reduce the data and transmit it electronically to CONUS, otherwise the CNA on-site personnel will ship the media to NSWC Corona for reduction and subsequent analysis.

3.1.3.3 CAOC

Link 16 link data will be captured through the use of the recording feature of ADSI terminals. These data obtained from ADSI terminals in the CAOC are particularly valuable for assessing what information was available to the JICO for managing the link, and what was available to the RADC for situational awareness. Following the data collection period, an on-site technical rep will transfer the ADSI recording from the ADSI terminal, reduce it to WAM format, and transmit the data electronically to CONUS (CNA and CORONA). This collection/reduction will include the entire set of link messages.

3.1.3.4 US Marine Corps TAOM

USMC analysts have already established a successful process for the collection and transmission to CONUS of the data necessary to support the analysis effort. Future collections designated by the JICO shall be coordinated through CO, MACS 24. The files collected shall be reduced to ASCII Merged Reply Data files (in the case of the AN/TPS-59) and ASCII DERG files (in the case of Link-16 data) on-site according to the existing procedures. Transmission of the data to CONUS will be done using the existing method (File Transfer Protocol) via SIPRNET to the USMC analysts identified in Table 1-1 at the MITRE Corporation.

3.1.3.5 US Air Force AWACS

The collection of AWACS recorded mission data will be accomplished by the 552d Computer Systems Squadron (CSS) and coordinated through the 552d Computer Systems Group. The means of data collection will come from AWACS mission data. The 552 CSS will reduce the data to a product for manipulation/use by the Task Force Enduring Look (TFEL).

All organizations (except 8th AF) requesting data reduction must send their requests to ACC/DOYA with courtesy copies sent to 552 CSS/CC, 552 CSS/SCZD and 552 CSG/SCXX. Requests must include justification and an address (either SIPRNET or standard postal address) sufficient for delivery of classified material in addition to the 552 ACW Form 29.

3.2 Data Management Process Description

NSWC Corona will manage the collection and dissemination of any available Link-16, Central Track File, and/or sensor files for each system by setting up a secure FTP site upon which all data will be deposited. This FTP site shall be accessible to only those parties listed in this Data Analysis and Management Plan.

4. Data Analysis

The analysis of the in theater data will be divided into a rapid response analysis and post-event data analysis. Emphasis is to be made on timely dissemination of data and analysis of EOIs. Both will be performed by the SAT as listed in Table 1-1.

4.1 Rapid Response Analysis

Observation reports reflecting EOI analysis will be used to inform specific Service or System offices of EOIs emanating from Link traffic from their JUs so that they can pursue root-cause with whatever organic data they may have access to, or if deemed of sufficient high priority, inform JFCOM so that the JICO can direct on-site investigations into causes and/or suggested fixes. These fixes may include, as an example, changes in TTP or network management. Approximate SIAP Attribute calculations can prove to be useful supplementary information in this regard to provide the JICO or Service/System offices with a general context of the severity of SIAP problems.

4.2 Post Event IADS Performance Assessment and Root Cause Analysis

The SAT will also meet in person as required to compare and review findings and develop a coordinated report for JFCOM. These meetings will typically involve 2-3 days at a common location where analysis of classified data is supported. Such arrangements have been made successfully for the similar group analysis sessions in Huntsville, Corona, and at MITRE/Bedford. The agenda at such meetings will concentrate on review of Observation Reports and analysis of those Observation Reports to the degree of analysis the Team can support. The product of such sessions will be a Team report and/or briefing of the status of the Observation Reports as directed by the leadership.

Each System representative will provide a matrix identifying all data collected for the event and will perform the initial reconstruction at their home location.

4-1

4.3 Analysis Results

Analysis results will be documented in the context that the issue is either understood and recommendation is provided, the issue is not understood and needs additional time and resources to isolate, or that the issue is not problematic and is dropped. For issues requiring additional time, the SAT will determine who has responsibility for resolution.

The SAT will review potential issues and consider further onsite analysis as required. Potential issues will be derived from test observer notes, engineering discussions, TORs, and analysis results. SAT analysts will review their issues and make recommendations during scheduled meetings on whether the initial draft of the issues is valid and on the recommended agency for resolution. The SAT will make analysis assignments and set analysis priorities.

4.4 Data Reporting and Storage

The SAT will report results of the post-event data analysis to USJFCOM and SIAP SE. This report will include a description of subject event description, a table of SIAP attributes and other relevant metrics for each raid, discussion of the results including root cause, if available, and recommendations for SIAP improvement.

Each System reporting party will be responsible for maintaining the raw data collected at the event for a period of five (5) years. This data should be held at the System program office with point(s) of contact for accessing the data. The SAT will be responsible for maintaining the post-processed data.