



US ARMY

Automated Document Conversion System

(ADCS)

FY2000 Project Road Map and

Project Submittal Guide

14 May 1999

(Data Call Update Letter Enclosure)

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**AUTOMATED DOCUMENT CONVERSION SYSTEM (ADCS)
FY 2000 ROADMAP**

FY 2000 Project Planning Kick-Off.....30 March 1999

Submittal of PDM/FCG Comments on Project Submit Criteria.....2 April 1999

Submittal of Data Call Letter to AMC for Coordination.....5 April 1999

Ms. Price Approval/Sign out of Data Call Letter.....9 April 1999

Develop/Submit Draft Project Evaluation Guide.....17 May 1999

PDM/FCG Concurrence With Proj Eval Guide.....1 June 1999

PDM/FCG Eval Guide Presentation To AIB.....3 June 1999

AIB Approval Of Project Evaluation Guide.....15 June 1999

Data Call Project Submittal Due Date.....15 June 1999

Submittal of Packaged Projects To The PDM/FCG.....1 July 1999

PDM/FCG Evaluation Comments Due.....15 July 1999

PDM/FCG Project Prioritization.....19-22 July 1999

Provide PDM/FCG Recommendations To The AIB.....30 July 1999

AIB Formal Approval/Submission Of Projects31 August 1999

DCS/RDA Project Submittal To OSD.....3 September 1999

Services Meeting To Coordinate/Prioritize Projects.....Early October 1999

Services Prepare/Submit Projects & Contracting Plan.....Early November 1999

OSD Approve Projects/Contracting Plans.....Mid November 1999

OSD Send Funding To Services.....Mid December 1999

Automated Document Conversion System (ADCS)

Project Synopsis – Section I

1. Introduction and Overview:

This document defines the requirements for submission of ADCS Projects in support of converting Army engineering data to a more intelligent form. Section one includes a program overview that provides a description the program, its objectives, history, and identification of program authority and key points of contact. Section two provides a draft set of criteria, which will be used to evaluate projects being submitted for funding by the ADCS program. Section three provides the project submittal format. Section four provides samples of project submissions based on the FY99 program. These projects are provided as FY99 samples only and should not be construed to contain all the requirements necessary for acceptability as the FY00 through FY05 submit. Section five provides a set of baseline cost metrics for data conversion based on costs experienced on FY98 and earlier ADCS projects. Section six provides the project evaluation guidelines as well as weighting factors for the FY 2000 projects and criteria.

2. FY00 – 05 Program Description:

The Automated Document Conversion System (ADCS) is a legacy document conversion effort within the Department of Defense with the express intent of converting paper and digital engineering drawings to a more intelligent form. The purpose of this conversion is the development of intelligent engineering data and other program documents that will facilitate the acquisition and/or production of weapons systems' components. The goal of ADCS is to make digital information available thereby reducing process time and ultimately reducing the ownership costs and increasing the availability of our weapons systems. To this end, the Army ADCS program consists of executing and managing five major tasks established to fully meet the DoD goals for data conversion; namely:

- ❑ Conducting functional analysis in support of determining and optimizing business processes involving the use of intelligent data;
- ❑ Acquisitions of software, hardware, communications and services to facilitate ADCS data conversion operations;
- ❑ Development of the repository interfaces to assure adequate distribution of ADCS converted intelligent data;
- ❑ Integrating ADCS converted data within Army operations including providing training for the use of the converted data;
- ❑ Establishing and managing ADCS bulk conversion daily operations within the Army.

3. Background:

The Department of Defense (DOD) initiated a long-term effort, Automated Document Conversion System (ADCS), that aims to convert all legacy product data to digital form. Of particular interest is the establishment of a Smart Enterprise Model where multiple activities can access product data for various purposes and intended uses. There are many uses of product data. Many of these uses require the data in different forms/ formats. Multiple file formats are appropriate because of the different intended uses. There are often many formats, some partially

covered by standards, but still many formats are proprietary. To support the Smart Enterprise Model, the Army has a need to at least view this data enterprise wide. However, in the Computer Aided Design arena, proprietary formats for data delivery is the norm. At this point in time no one set of standards exists that can be used for digital data without the potential loss of data.

The Army's goal is to procure and use product data based on industry and international standards. However, since that is not possible today, the Army will need to deal with proprietary data formats. The Army needs to develop policy and guidelines that can be used by program managers in their efforts to convert their product data to a digital form that will meet current and future needs and will minimize future legacy conversion problems. The Army needs to use commercial products, processes, and practices to reduce development, production, and operation support costs.

The Army needs to establish the ability to access, receive and transfer digital files with minimum human intervention and maximum flexibility for the intended uses of the data. The Army also needs to establish the ability to view, move, and review files received for use in the Joint Engineering Data Management Information and Control System (JEDMICS) and for use in a configuration management system, which is capable of managing multiple digital data formats, sometime in the future.

4. Authority:

ADCS Project is Congressionally mandated and funded. The DoD, Logistics Reinvention Office, ADCS POC is Gary Jones, gjones@darpa.mil, (703) 681-1484, and <http://www.acq.osd.mil/log/lro/index.html>. Critical ADCS project roles include:

- Raster to vector conversion to reduce Administrative Lead Time (ALT) and Production Lead Time (PLT);
- Tech manual foldouts conversion to support interactive electronic technical manuals;
- Focused conversion of product data to support smart product models and simulation based acquisition;
- Focused product data conversion to support total ownership cost reduction and pilot programs.

The challenge is to get the best value for the Army.

5. FY00 ARMY SERVICE CHAMPION/POINT OF CONTACT:

Mr. Paul W. Behrens, U.S. ARMY Aviation & Missile Command Engineering Data Management Systems Program Management Office (EDMS PMO) is the Army ADCS Service Champion. Mr. Behrens is the Army's primary ADCS point of contact and is responsible for implementation of individual initiatives funded through the ADCS Project to include contract award and project execution management.

The Acquisition/ Engineering Information Board (AIB) is an AMC committee of senior management officials that determines the final overall Army priorities for the Army ADCS submissions. Mr. Gary Tull, Principal Deputy for Acquisition is the Chair of the AIB.

Mr. Jim Knowles, HQ Army Materiel Command (AMC), AMCRDA-TE, is the Army ADCS sponsor and acts as the primary interface between the ADCS project team and the AIB.

The Logistics Integration Agency (LIA) working in concert via memorandum of agreement with the DoD Logistics, Logistics Reinvention Office, coordinates funding for ADCS projects within the services. The LIA primary point of contact is Ms. Karen Halloran.

The Product Data Management (PDM) Functional Coordinating Group (FCG) is the AMC subcommittee of functional Army representatives including COE representatives. The role of the PDM/FCG is to assist in gathering conversion requirements and providing recommendations to the AIB on the Army ADCS priorities, based on a review of project submissions. Mr. Gordon Ney, AMSAA (RI) is the chair of the PDM FCG.

6. FY98 PROJECT EFFORTS:

During FY98 the ADCS program funded several Army projects to establish a comprehensive conversion capability within the Army logistics and engineering communities to provide conversion operations supporting conversion of legacy data to formats usable in today's and future business processes by. Efforts initiated/supported in FY98 include the following:

- The M113 Tracked Vehicle and High Mobility Vehicle (HMMWV) programs - two conversion vendors, using separate conversion technologies, but converting to the same conversion specification, are converting high priority (based on procurement needs) engineering drawings into a level 6 CAD Perfect format. Additionally, funding for the M113 program initiated an analytical effort to:
 - Identify and assess the internal government and prime contractor engineering, configuration management, and logistics support processes involving the use of Raster based and/or CAD based engineering drawings/associated documentation, and
 - Identify the metrics for evaluating the efficacy of using ADCS converted data in these processes;
- The 1790 Engine engineering drawing conversion program – a single conversion vendor is converting the high priority engine component engineering drawings to level 6 CAD Perfect format slated for use in the Pro/E native CAD solid modeling tool;
- The H60 Helicopter data conversion effort – this program is a pilot project converting raster engineering drawing into level 4 intelligent text format to establish a text searchable database for acquisition and logistics support. It will facilitate use of intelligent data in program management operations through improved access to individual files and digital information on engineering drawings or engineering data on specific weapon systems for support of acquisition and logistics tasks; and
- The Panama Canal Facility and Infrastructure Data Capture Program – a short fuse program to raster scan over 700,000 facility engineering and infrastructure documents prior to final ownership transfer of the Panama Canal to the Republic of Panama by December 1999.

These projects serve a combined purpose of providing intelligent data for use in program management, re-procurement and logistics processes while also establishing a proving ground for assessing and developing conversion vendor base in the more technical areas of ADCS data conversion.

7. FY99 PROJECT APPROVALS:

To support ADCS Project sustainment several efforts were approved to support establishing an infrastructure to efficiently manage conversion activities. These included:

- ◆ Development of a Program Manager's Implementation Guide
- ◆ Development and Implementation of a Conversion Toolkit Designed to Ensure the Maintenance of the Converted Data
- ◆ Development of World Wide Web accessible repository of software tools and viewers
- ◆ Providing a center of technical expertise for the Navy ADCS Management Office, in conjunction with the Army's, to assist ADCS programs (and conversion contractors) in proper use of standard formats and assure that the selected formats and data structures will support program objectives

Several existing bulk conversion efforts approved were follow-on efforts from FY98 initiatives. These included

- ◆ M113 FOV Follow-on – Converting the second increment of re-procurement significant stock numbered drawings that could not be completed in FY98 and the conversion of M113 FOV peculiar Computervision CADD5 Files to a Neutral CAD Format
- ◆ Bulk Conversion Projects - HMMWV Follow-on
 - ◆ Convert/validate 3 to 5 Thousand Drawing Sheets
 - ◆ Validate Metrics for Time and Cost of Conversion Process
 - ◆ Document Benefits of Conversion Activity
 - ◆ Establish Business Rules for Application of Neutral CAD Data Into Business Processes
 - ◆ Implement Lessons Learned From the Introduction of Neutral CAD Data

And finally, a new start bulk conversion initiative was approved to begin the process of converting the Army's large quantity of stable base engineering data. This initiative is:

- ◆ Bulk Conversion Project - H60 Mylar Conversion
 - ◆ Convert First Increment of AMCOM Stable Base Engineering Data Converted to CAD Perfect 2D Vector Formats
 - ◆ Develop An Integration Plan With Supporting Coordination to Store the Resulting Files in JEDMICS
 - ◆ Update Procurement Operations And Training Guides

8. FY00 - 05 PROJECT FOCUS:

For FY00 - 05, the Army will array a series of projects that build on FY99 project initiatives and pave the way for successfully executing the Army's unfunded POM line established for FY00 through 05. The FY00 overall project focus is fourfold:

- ❑ Performing Bulk Conversion on High Priority Army Programs;
- ❑ Introduction Of Processes For Managing and Using ADCS Converted Data;
- ❑ Establishment of an infrastructure to accommodate management of converted data throughout the Army Using The DoD Repository System; and
- ❑ Establishment of a means for controlling the evolution of ADCS converted engineering data through management of conversion specifications. This measure is to assure data converted will be able to serve re-procurement and engineering needs well into the future.

9. ADCS Project Requirements Survey:

The purpose of the ADCS Survey is to gather and analyze data needed for defining the business case for continued outyear funding of the ADCS project. In support of this effort, a survey of Army activities creating, managing, or using engineering data must be conducted to analyze the current costs of doing business associated with engineering drawings and identify specific benefits from the engineering drawing conversion process. To ease the data capture process, the survey is web based. The survey can be accessed at www.adcs-survey.com. The survey is structured to permit analysis of all the significant processes that represent 80% of the work load required to develop/modify TDPs and resulting products to determine their contribution to administrative and production lead times (ALT/PLT). From this analysis it will be determined whether use of intelligent data within the engineering data processes evaluated will yield reductions of ALT/PLT. As used herein, engineering data are engineering drawings and associated lists defined by DoD-STD-00100D (AR) which addresses engineering drawings and data such as parts lists, notes and specifications that form a part of the engineering drawing. The survey is broken into two major sections designed to separate general respondents, versus respondents using this survey to submit requirements for future ADCS funding for data conversion.

The first series of questions in the survey are germane to all respondents. The second series of questions in the survey are for respondents submitting future ADCS requirements. In order to eliminate the potential for duplication, respondents are requested to supply answers based on civil engineering (CE) project(s) and weapon system specific requirements. Consequently, each addressee must identify a specific individual by CE project or weapon program(s) to respond with the data requirements/uses for the efforts under their cognizance. This individual will also be the Major Subordinate Command (MSC), Program Executive Officer (PEO), or the Corps of Engineers (COE) point of contact for the CE project or weapon system(s) project they represent and will coordinate any project submittals for the those efforts.

Ultimately completion of this survey will facilitate development of budgeting recommendations for data conversion, in support of the Headquarters (HQ) AMC mission as the Army's Business Process Manager for Technical Data.

10. Project Submittal Procedures:

After completion of the survey discussed above, projects shall be developed based on the criteria identified herein in section II, following the format defined in section III. The projects will be created in Microsoft Office application for ease of consolidation. Projects should be attached to an email and submitted to the following email address ADCS@ADCS-Survey.com. Projects should be submitted by the individual assigned by the MSC /PEO/COE as the weapon system(s) or civil engineering project(s) specific point of contact after coordination through the MSC, PEO, or COE for assignment of priority. Project submittal planning should incorporate sufficient timeframes for internal priority assignment coordination through the appropriate executive and still meet the 15 June 1999 submittal deadline.

11. Other Points of Contact:

For further information please contact -

Steve McGlone	AMSAA	(309) 782-6521	e-mail: mcglones2@ria.army.mil
Gordon Ney	AMSAA	(309) 782-6586	e-mail: nevg@ria.army.mil
Larry Simmons	Systems & Solutions, Inc	(301) 883-9632	e-mail: lsimmons@sasi000.com

Automated Document Conversion System (ADCS) Project Synopsis – Section II

Project Evaluation Criteria (Not listed in order of priority)

Listed below are the evaluation criteria that will be used to judge and compare Army ADCS projects. The rating factors for criteria are based on DoD investment priorities as defined by the OSD, Army Digitization objectives, Weapon System and Civil Engineering Project Priorities and critical needs. Although projects may be submitted that do not meet the criteria below in all areas, and there is no minimally acceptable criteria, those submittals that meet or exceed the criteria below will be judged more favorably than those that do not.

Evaluation Criteria and Rationale

1. Executability: How executable is the requirement based on the following:

- ◆ contracting strategy,
- ◆ conversion schedule,
- ◆ conversion validation plan,
- ◆ validation resources.

Ideal project submission candidates will possess the following characteristics:

- a) Contracting strategy is identified.
- b) **Contract strategy relies on use of existing competitive vehicle.**
- c) Timeframes for contracting are **adequate** given the strategy selected and includes slack time for unforeseen challenges.
- d) Validation Schedule is **Achievable/Viable**: Sufficient personnel resources are identified to support the validation schedule. Additionally, as a general guide, if a conversion project uses in-house resources for validation, approximately 20% of the total project-funding request should be identified for validation. If outsourcing the validation is planned, 30% or greater of the project resources should be identified for validation.
- e) Funding requirement requested is **reasonable** for the level of effort required. For bulk conversion projects, unless specific rationale is provided for deviation, historical values should be used for conversion estimation.

2. Business Case/ROI/TOC/ALT-PLT Reduction: Does the planned use of ADCS conversion resources result in a decrease in weapon system ownership costs due to:

- ◆ reductions in engineering change processing costs,
- ◆ reductions in to costs to create follow-on technical data products developed or modified based on the use of engineering data
- ◆ reductions in engineering data storage costs

- ◆ reductions in re-procurement costs (Administrative Lead Time)
- ◆ reductions in component or end item manufacturing costs (Production Lead Time or Product Unit Costs)

Must quantify based on lower technical data development/modification in-house or prime contractor man-hours required, lower unit costs, or lower data storage costs (in terms of fewer square feet of storage space required or data management man-hours). Reduced costs should be projected over the projected remaining program life or 20 years (which ever is less) term to determine ROI impacts. Includes considerations for:

- a. **"Business Process Fit" - Will the owner of the data reconfigure his CM processes to take advantage of the new data files by performing CM at the data source level e.g. assuring ECPs are not being applied to the old data. Instead converting the impacted data prior to/in concert with ECP processing. Should address whether or not business process changes will be accomplished to take advantage of the improved data.**
- b. **"Maximum Army Conversion Value" - the Army submission/prioritization will take into account a grouping of projects which maximize the value of the conversions for the funded program. For example, if 15 "modest proposals" buy the Army 1 million conversions, it may be a better "ownership" value than 2 high ROI projects that convert only 10,000 drawings. It is a total ownership cost issue that is factored into the criteria, as opposed to an MSC sub-optimum.**
- c. **Number of Procurement Actions/Sustainment Activity: Projected number of procurement actions on the data to be converted over a five-year period of time. Includes considerations for the amount of competition/ breakout experienced on the components to be converted. Also to be considered is the current storage medium for the data (paper vs. digital). A preference may be given for projects converting paper to CAD on components with moderate to high re-procurement actions over a five-year period. This factor may be estimated using the formula "number of spares and major item procurements" X "number of drawings per procurement" / "number of drawings converted" where Each spare/major item counts as one procurement (proc.) For example: 500 proc. *15 drawings per proc. =7500/10000 sheets=.75,**
- d. **Number of Changes Expected (Major Mods, Retrofits, ECP History, ETC): Projected number of component modification/change actions requiring updates to configuration and product data over a five year period of time as evidenced by 5 year history or other supportable projection rationale such as product improvements planned and funded. This factor may be estimated using the formula "number of ECPs" X "number of drawings per ECP" / "number of drawings converted" example: Number of Class I ECPs example: 50 ECPs * 15 drawings per ECP = 750/10000=.075**

Although not required with the submission, backup data substantiating the reduced costs should be available.

Ideal project submission candidates will possess the following characteristics:

- a) Project includes a discussion of the business case that confirms the requirement and **quantifies** the value to the Army in real, project/weapon system specific terms.
- b) Project **includes** a cost/benefits analysis supported by backup spreadsheets available for review.
- c) Project shows a return on investment greater than **5 to 1 over a 20** year timeframe and reflects a Total Ownership Cost reduction for the weapons platform the project supports

3. Follow-on Efforts: Previously ADCS funded programs with past performance/execution metrics.

Ideal project submission candidates will possess the following characteristics:

- a) Project was fully successful and **exceeded** previous year conversion goals in terms of quantity of drawings converted and cost of conversion.
- b) Project supports ADCS business case and impacted program **has** provided specific metrics based on their experience with the use of the converted data.

4. Out Of Production/Service Life Extension System with > 10Yr Remaining Life: Weapons Programs or Civil Engineering Projects that have an estimated remaining service life of ten years or greater. Considerations include "Remaining Life of the Design", and whether or not the product going to be PIP'd.

Ideal project submission candidates will possess the following characteristics:

- a) Project supports out of production weapon system/fully completed CE development with greater than **20 years** estimated remaining life.

5. Data Support for Smart Enterprise Model SBA Concept: Project includes requirement for Conversion of hardcopy, raster or 2D CAD to 3D CAD data using STEP or other industry accepted (defacto) standards. Project submission may be a pilot effort but must include plans for incorporation of resulting data into organizational business processes.

Ideal project submission candidates will possess the following characteristics:

- a) Project **requires** conversion of data into a 2D vector orthogonal view, as well as a native CAD 3D model, and STEP Compliant or other industry accepted (defacto) standard for 3D model.
- b) Project includes **requirements** for business process changes to fully utilize 3D model for design analysis, CM, production procurement and logistics.
- c) Project is a **production** (i.e. routine Business Operations) implementation.

6. Multi-Service Project: Project that meets the needs of more than one service, is more desirable, and may be infrastructure oriented or a joint use weapon with each of the services/components requiring the data in CAD format.

Ideal project submission candidates will possess the following characteristics:

- a) Joint infrastructure project with **4** or more services/components participating (Army, Navy, Air Force, Marines, or DLA), or
- b) Joint use platform with **4** or more services/components requiring data in CAD format.

7. Army DA Authenticated Prioritization List: The DA's list of weapon systems prioritized based on importance to the Army mission.

Ideal project submission candidates will possess the following characteristics:

- a) Projects for weapons platforms with a priority **10** or lower on the Army DA Authenticated Prioritization List.

8. MSC Commander's Priority: Major system command identification of project priority.

Ideal project submission candidates will possess the following characteristics:

- a) Projects CE projects or weapons platforms with a priority **1** assigned by the MSC, PEO, or COE Commander.

**Automated Document Conversion System (ADCS)
Project Synopsis – Section III
ADCS 00 Project Submittal Format**

Project Name:

Military Service: Army

MSC, PEO, COE Priority:

Project Sponsor: Name of Command:

Project POC Name:

Commercial Phone No.

E-mail address:

Categories of service supported by the project (check all that apply):

Conversion:

Low-end conversion (raster / pdf): R2V conversion: SGML / ETMs with illustrations:

Simulation Based Acquisition:

IDE integration to DoD Std Sys: Product Data Model: Data repositories:

Software Tools:

Standards:

Project Description:

Description of the actual work to be done including how work is to be accomplished (contractor, in-house, etc.), justification for meeting specified criteria, primary benefit to DoD, and estimate of and justification for return on investment (ROI): The number of drawings to be converted, the number of procurement actions, the number of ECPs, the number of drawings per procurement action and the number of drawings per ECP should be part of the data provided as part of the project submission and also used to calculate the ROI and business case.

Projected Process Improvements/Benefits:

- ◆ Process improvements planned or underway resulting from use of ADCS converted digital/intelligent data and quantifiable benefits expected.

Level Of Conversion Required To Support Mission:

- ◆ Example: Paper to raster, or raster to vector, or raster to CAD, etc.

Deliverables:

- ◆ Example: Number of sheets to be converted with the requested funding for each impacted FY.

Schedule:

- ◆ Task elements and time frames allotted for conversion activity, including up-front contracting tasks.

Project Cost Estimate:

- ◆ Estimated cost of project including in-house conversion validation costs for 00 - 05 FY years. Segregate bulk conversion from other management costs.

	Prior					OUT			
	Years	FY 00	FY01	FY02	FY03	FY04	FY05	YEARS	TOTAL
Bulk conv.	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM
Other costs	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM
Subtotal	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM

**Automated Document Conversion System (ADCS)
Project Synopsis – Section IVa**

Submittal Example Infrastructure Support:

Program Name: Cooperative Army/Navy Initiative for Implementation Guidance

Military Service: U.S. Army **Service Priority:** 1

Program Sponsor: Name of Command: AMC **PM’s Name:** Paul Behrens

Commercial Phone No. 256-313-2255 **E-mail address:** behrenspw@redstone.army.mil

Categories of service supported by the program (check all that apply):

Conversion:

Low-end conversion (raster / pdf): R2V conversion: SGML / ETMs with illustrations:

Simulation Based Acquisition:

IDE integration to DoD Std Sys: Product Data Model: Data repositories:

Software Tools:

Standards:

Description of the actual work to done including how work is to be accomplished (contractor, in-house, etc.), justification for checking and scoring the above criteria, primary benefit to DoD, and estimate of and justification for return on investment:

This is a cooperative effort between the U. S. Army and the U.S Navy. Overall project lead will be the Army with specific sub-elements identified for specific Navy responsibility. This will institutionalize the ADCS program for future projects in preparation of the POM funding required for submittal in FY 00, as required by Congress. It will cover:

Element 1. Development and implementation of a Program Manager’s Implementation Guide to provide Weapon System Program Managers specific templates to assist them in management and use of ADCS to support their programs. The development and implementation of a process to deploy the ADCS Data Validation/ Performance Specification to assure the support of the Government and Industry as requirements evolve. A Guide/Performance Spec will be prepared to provide standardization of the data coming out of the conversion processes. This spec will be implemented with all ADCS projects and defines the “WHAT” regarding requirements for the resulting data. The FY99 project will generate a companion “HOW” document for execution of the program. It will facilitate the standardization of the data coming out of the conversion processes.

Element 2. Development and implementation of a Conversion toolkit designed to ensure the maintenance of the converted data. The core toolkit established in FY 98 provides a filtering utility to maintain the currency of the converted data, to enhancement of existing conversion effort to support native CAD systems and to sustain help desk operations for user support. This effort will provide more and better filers of existing CAD formats to move converted data to "neutral" formats, allowing full interchangeability of the data and maintenance in a state (version) compatible with state-of-the-art technologies.

Element 3. Will build a World Wide Web accessible repository of software tools and viewers that can be easily accessed by all users of DoD digital data to view, read, and interpret 2-D digital graphics data formats, raster formats and text data. This will support and supplement Elements 1 and 2, serving as a multiplier of those efforts. Naval Surface Warfare Center Carderock Division will perform Work. Justifications: Guarantees user ability to use ADCS developed data; avoids all users having to purchase all viewer software. It is easy mechanism to provide benefits of digital data to all users and minimizes DoD investment in seldom-used software.

Element 4. Provide a center of technical expertise for the Navy ADCS Management Office, in conjunction with the Army's, to assist ADCS programs (and conversion contractors) in proper use of standard formats and assure that the selected formats and data structures will support program objectives. Work will be performed in-house by NSWC Carderock Division. The technical agent will assist all ADCS programs to achieve goals of conversion by providing expert knowledge of digital vector and text formats and applications to both program offices and contractors. As the technical agent supports, strengthens, and improves all ADCS efforts, it contributes in all selection criteria areas. . This will support and supplement Elements 1, 2 and 3, serving as a multiplier of those efforts.

These efforts are necessary to avoid loss of sunk costs of data conversions when the converted data is not maintained in a current version. Without these efforts, the initial benefits realized in Admin Lead Time / Production Lead-Time Reduction, Process Change, and Total Ownership Cost Reduction will be lost. The Return on Investment from initial efforts will be negated and the investment a loss that will have to be repeated in the future.

Estimated Costs:

Prior							OUT	
Years	FY 00	FY01	FY02	FY03	FY04	FY05	YEARS	TOTAL
X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM	X.XM

**Automated Document Conversion System (ADCS)
Project Synopsis – Section IVb**

Submittal Example Bulk Conversion Support:

Program Name: Bulk Conversion of Data for M113 Family of Vehicles

Military Service: U.S. Army **Service Priority:** 2

Program Sponsor: U.S. Army Materiel Command

Name of Command: AMCOM/TACOM **PM's/POCs Name:** Paul Behrens

Commercial Phone No. 256-313-2255 **E-mail address:** behrenspw@redstone.army.mil

Categories of service supported by the program (check all that apply):

Conversion:

Low-end conversion (raster / pdf): R2V conversion: SGML / ETMs with illustrations:

Simulation Based Acquisition:

IDE integration to DoD Std Sys: Product Data Model: Data repositories:

Software Tools:

Standards:

TITLE: M113 FOV

OBJECTIVE:

The primary objective for digitizing M113 FOV drawings is to develop an information set that will enable cost reductions in the manufacture of M114 FOV spare and repair parts.

PROJECTED PROCESS IMPROVEMENTS/BENEFITS:

Converting the raster and Native CAD files to a Neutral Exchange format will facilitate re-procurement of M113 FOV spare and repair parts and equipment with little or no recourse to the original design agent. This will engender increased competition and lower re-procurement spare and repair part prices. Another major benefit will be the reduction of administrative and production lead-times. It is estimated that use of neutral CAD files will lead the reduction of Administrative Lead-Time (ALT) by:

- Facilitating lower costs in future re-design efforts, afforded through the use of automated tools for integration support, failure analysis, Finite Element Analysis, etc.
- Improving the ability to distribute/transmit the Technical Data Package to various program management offices that use the M113 FOV as a platform for their system, as well as to potential spare part manufacturers.
- Improving drawing legibility, resulting in fewer instances of drawing misinterpretation during redesign and manufacturing.

- ❑ Eliminating the dimensional inaccuracies caused by the age/condition of the original physical media.
- ❑ Reducing missing and/or outdated data.

Production Lead Times (PLT) will equally be reduced by:

- ❑ Providing the digital information to drive Numerical Control and Laser Cutting Machines for manufacture of predominately metallic/sheet metal components.
- ❑ Improving the ability to distribute/transmit the Technical Data Package to various potential spare part manufacturers.
- ❑ Improving drawing legibility, resulting in fewer instances of drawing misinterpretation during redesign and manufacturing.
- ❑ Eliminating the dimensional inaccuracies caused by the age/condition of the original physical media.
- ❑ Reducing missing and/or outdated data.

It is anticipated that a 4 to 7 day reduction in administrative lead time and 6 to 10 day reduction in Production Lead Time will be experienced as result of the benefits derived from the fully converting to an intelligent format via the ADCS program. Reductions of this magnitude will contribute to improved readiness by reducing the frequency of spare parts procurement delays/errors caused by problems with the old drawings and allowing new technology to be implemented into the TDP. Moreover, reductions in overall operation and support costs for the M113 FOV should be experienced due to:

- ❑ Improved availability due to the shorter turn-around times in spare and repair parts procurements;
- ❑ Reductions in inventory levels as a direct result of shorter turnaround time;
- ❑ Reductions in overall labor hours consumed in the re-procurement process.

Although the above benefits are qualitative in nature, a business case analysis effort is proposed herein to provide the funding to substantiate the potential improvements and cost reductions stated.

BACKGROUND:

The M113 FOV is the highest density tracked vehicle system with a large number of derivative vehicles and numerous kits bought on a continuing basis. Many of the drawings are co-used by other systems. The M113 is high use system due to its versatility and low investment cost (for a tracked vehicle). Additionally, it is also a low cost system to maintain. Consequently, activity on this program is high and should remain high for years to come. Since the M113 is out of production funds, there is no PAA activity to pay for electronic conversion. With the movement to performance specs. Numerous TDP changes are necessary to eliminate the “hanging paperwork” that goes with M113 procurements. Conversion to electron (vector) format would facilitate this elimination.

Moreover, the M113 FOV and other Army weapons programs have technical data repositories that are in a snail paced state of transition from raster storage to CAD storage. The Prime

contractor has converted to a Native CAD environment for new designs, engineering change proposals and other modifications. Therefore, since conversion funds are not available within the program, an update to CAD during redesign only policy has been instituted that results in painstakingly slow transition from raster to CAD storage. With this slow rate of transition it is extremely difficult to take advantage of inherent process improvements associated with the use of CAD data in Government re-procurement and support processes. For example, during re-procurement in cases where a CAD drawing is available, it is often impossible use the CAD based engineering because each vendor may have a different native CAD package that is not compatible with the native CAD drawing files developed by the Prime Contractor. From a management perspective, this also requires Government engineering departments to maintain multiple Native CAD packages and the requisite personnel expertise to review drawings delivered from multiple contractors using different CAD packages. This slow transition has become a burdensome and expensive process that could be overcome through a directed conversion effort to a neutral CAD format. Other program specific concerns are as follows:

Current Drawing Format. The current engineering data format associated with TDPs is inadequate for cost-effective redesign, analysis, re-procurement, and production support. Drawings for the M113 FOV are predominately level 2 raster with some native CAD 2D drawings. However, the current Production, Design, and STS contracts with the OEM require delivery of drawings in an electronic format.

Density. As the most widely deployed tracked vehicle the M113 can be considered to be a high-density item. However, because there are a number of different models, sizable percentage of parts that may not be compatible from one version to another, the individual densities may result in a limited supplier base as a result of a lack of competitive incentive to invest in a part manufacturing facility.

Parts Obsolescence. The M113 has been in the field for over 20 years and is likely to remain fielded beyond the year 2012. As the fleet continues to age, demand for spare parts will increase resulting in Operation and Support cost increase and parts obsolescence problems. Configuration changes and upgrades as well as general aging of the vehicle fleet and its associated technologies may limit the availability of vendors willing to support the parts process.

REQUIREMENT:

DoD requirements exist for a complete, integrated, electronic TDP suitable for design, analysis, and full competitive procurement, which will allow for cost-effective parts manufacturing. The product information must be capable of being stored long term in a format that is readily accessible and completely translated by many different support systems during the life cycle of the product. Partial funding was provided in FY98 to address the high priority items (stock numbered items that had not been previously converted to CAD in Computervision CADD5 format with an expected near term re-procurement requirement). An additional requirement exists to convert the remainder of the stock numbered drawings and convert the Computervision CADD5 files to Pro/E, the current CAD system of choice.

Level of Conversion to Support Mission: It is recommended that the data be converted to Level 6 CAD Perfect exchange format. Level 6 is the highest quality of bulk conversion available. Video tracing and direct CAD redraw are two processes that are known to produce this high level of conversion. The Level 6 conversion process implemented shall result in a CAD-Perfect data file. This level of CAD conversion will ensure that all entities are dimensionally and orthogonally correct with fully editable vectors and text. Layers, blocks, symbols, and line types are incorporated. The resulting CAD file will contain sufficient design and engineering information to allow re-procurement activities to manufacture parts and equipment that meet spare parts requirements with minimal to no external guidance.

Storage Plans: After a rigorous quality assurance process, the digital files will be stored in JEDMICS until required for re-procurement.

Data Interchange Standards: It is proposed in addition to any native CAD standards applied, that the subject documentation also be converted and translated using the Data Exchange Format Standard (DXF) augmented by DOD-STD-100D (AR), DoD Automated Document Conversion Raster-to-Vector Evaluation Final Report dated 26 July 1996, and ANSI Y14.M 1982. This series of standards will result in a file that meets Army engineering and support needs while being readily transportable since DXF files can be imported into virtually all of the dominant native CAD software packages. In addition, a post conversion raster file should be submitted with each CAD file. For raster file conversion and storage, it is proposed that the C4 standard be applied for consistency with the JEDMICS image file storage format.

Alternatives To Conversion: The only alternative to conversion using the methodologies described herein is the process of updating drawings to a CAD format by the Prime Contractor using the Native CAD package owned by the Prime. This alternative has been shown to be more costly and time consuming therefore there are no viable, cost effective alternatives that will achieve the stated objectives short of requiring all re-procurement vendors utilize the same Native CAD software being used by the M113 Prime Contractor.

APPROACH:

As a follow-on effort, it is proposed that this project continue to follow the same approach implemented in FY98. This approach utilizes an integrated product team consisting of TACOM engineering and program management staff, the Army Service Champion/Point of Contact representative, and the two-conversion contractor's lead by Intergraph, Inc. to perform the data conversion. Further, it encompasses an on-going competitive element as each contractor is provided a set minimum number of drawings that may be increased based on performance. Additionally, a program specific specification developed during FY98 will be modified to encompass the additional effort envisioned to translate the partially complete Computervision CADD5 files into a neutral DXF format.

DELIVERABLES:

1. 10,000 additional Converted/Validated digital drawing images;
2. Metrics for time and cost of conversion process and benefits of conversion;
3. Business rules for application of Neutral CAD Data into business processes;
4. Lessons learned from the introduction of Neutral CAD Data;

SCOPE:

This project will require 12 months after contract award to complete. Existing vehicles will be used for contracting so that work can begin as soon as possible. The estimated schedule includes:

TITLE	FY 98	FY 99				FY00			
		1	2	3	4	1	2	3	4
Project Planning			◆						
Contracting			◆						
Data Conversion Pilot				■					
Data Conversion				■					
Integration with JEDMICS						■			
Integr/w TACOM Bus Proc							■		
Initial Operating Capability								■	

ESTIMATED COST:

M113 Program Data Conversion Augmentation \$X.XM		
<input type="checkbox"/> Conversion Services	Competed	\$X.XM
<input type="checkbox"/> Validation, Integration	TACOM	\$XXXX

**Automated Document Conversion System (ADCS)
Project Synopsis – Section V**

Bulk Conversion Pricing Model

Based on previous ADCS raster to CAD Bulk conversion projects the following outlines estimated costs for conversion, by level of conversion and sheet size/complexity. The costs are based on an average hourly rate of approximately \$35 per hour. Costs can change based on level of checking, level of associated information (meta-data requirements) and other factors. Costs assume out-sourced conversion only.

Cost of Excellent/High Clarity Drawings

Sheet Size	A/B	C/D	E/F	J/K
Paper to Raster Cost/Sheet	1.00	2.00	5.00	15.00
Raster To 2D CAD Capable Cost/Sheet	50.00	125.00	200.00	300.00
Raster To 2D CAD Perfect Cost/Sheet	105.00	225.00	395.00	600.00+

Cost of Fair/Good Clarity Drawings

Sheet Size	A/B	C/D	E/F	J/K
Paper to Raster Cost/Sheet	1.25	2.50	6.00	18.00
Raster To 2D CAD Capable Cost/Sheet	60.00	145.00	225.00	425.00
Raster To 2D CAD Perfect Cost/Sheet	125.00	275.00	450.00	875.00+

Cost of Poor/Low Clarity Drawings

Sheet Size	A/B	C/D	E/F	J/K
Paper to Raster Cost/Sheet	1.50	3.00	7.00	21.00
Raster To 2D CAD Capable Cost/Sheet	75.00	155.00	300.00	500.00
Raster To 2D CAD Perfect Cost/Sheet	165.00	350.00	650.00	1000.00+

It is estimated to require an additional 20% of the bulk conversion requirement to support in-house data validation requirements.

Although the conversion throughput (maximum number of sheets converted per week) will vary vendor to vendor, schedules should be generally based on the amount of data that can be validated in-house within one week.