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AUTOMATED DOCUMENT CONVERSION SYSTEM HANDBOOK

THIS HANDBOOK IS FOR GUIDANCE ONLY. DO NOT CITE
THIS DOCUMENT AS A REQUIREMENT.

FOREWARD

1. This handbook is approved for use by the (Preparing Activity), Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.
2. This ADCS Handbook is intended to be used in conjunction with the ADCS Guidance Specification. It provides Program Managers with an understanding of the technical issues that must be addressed while creating a successful strategy for document conversion.
3. The ADCS Guidance Specification is a product of the DoD's Master Plan for Conversion. The ADCS Guidance Specification provides the Army with a unified approach for vector conversion. It assists in the establishment of a standards-based, neutral framework. Because the formats included in the Specification are predominately "neutral", it accommodates interoperability of numerous users despite differing hardware and operating systems.
4. Considerable research has been conducted to compile accurate and current information for ADCS Guidance Specification users. This includes surveys of data users (both Army and conversion vendor) and analysis of available formats. The optimal format (including exchange and neutral) representation for specific conversions has been determined. In addition, MIL 2549 has been evaluated and required metadata defined.
5. The activities included in this Handbook provide techniques for a thorough investigation of the user's infrastructure, an evaluation of existing documents, a means for format selection, an analysis of metadata, a process for tracking documents through the conversion process, and a method for conversion validation.
6. While use of this Handbook isn't required, it is strongly recommended. Through its use those responsible for document conversion decisions will have access to numerous processes which assist in ADCS Guidance Specification compliance. These processes are designed to ensure successful conversion procurement based upon sound business practices and weapon system life cycle phases.

ADCS HANDBOOK (DRAFT)

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1.0 SCOPE

1.1 Scope

This Handbook provides guidance and information to U.S. Army project managers and other individuals responsible for conversion of engineering drawings and related documents as defined in the Automated Document Conversion System (ADCS) Guidance Specification (Specification). The purpose is to assist in planning and implementing effective engineering document conversion activities and practices. The Handbook supports acquisition of conversion vendors based on ADCS Performance Specification develop using this Handbook and the ADCS Guidance Specification, and the use of industry standards and methods.

The Handbook provides the framework to determine the appropriate digital format to be used when contracting for conversion of engineering drawings and related documents. Through use of specific tables and forms the user will pinpoint the file format to be specified. A cost-benefit analysis also accompanies the handbook. This analysis will assist in determining a Government Concept of Operations (GCO) supporting best business practices. The rationale and justification for formats selected are explained and the benefits of using the ADCS Guidance Specification are defined.

This handbook is for guidance only and cannot be cited as a requirement. If cited as a requirement, the contractor does not have to comply.

2.0 APPLICABLE DOCUMENTS

2.1 General

The documents listed below are not necessarily all of the documents referenced herein, but are needed to fully understand the information provided in this Handbook.

2.2 Government Documents

2.2.1 Specifications, standards, and handbooks

The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the latest issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto.

DEPARTMENT OF DEFENSE STANDARDS

- MIL-PRF-28000-A
Digital Representation for Communication of Product Data;
IGES Application Subsets & Application Protocols
- MIL-PRF-28001
Markup Requirements and Generic Style Specifications for
Electronic Printed Output and Exchange of Text
- MIL-M-28002-B
Raster Graphics Representations in Binary Format,
Requirements for Raster Graphics Representation
- MIL-M-28003-A
Digital Representation for Communication of Illustration Data:
Computer Graphics Metafile Application Profile
- MIL-STD-2549
Configuration Management Data Interface

DEPARTMENT OF DEFENSE HANDBOOKS

- MIL-HDBK 61
Configuration Management Guidance
- Data Management Handbook

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications

The following other Government documents, drawings, and publications form a part of this document to the extent specified herein.

AMC Pamphlet 70-25 "Templates for Streamlining Acquisitions"

Computer-aided Acquisition and Life Cycle Support(CALS)Specification and Standards Documents

Federal Acquisition Regulation (FAR)

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.3 Non-Government publications

The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the latest issue of the DoDISS, and supplement thereto.

AEC	Electrical Applications Committee
ANSI	American National Standards Organization
ASME	American Society of Mechanical Engineers
IEEE	Institute of Electrical and Electronic Engineers
IPO	IGES/PDES Organization
IGES	International Graphics Exchange Specification
ISO	International Standards Organization

(Application for copies should be addressed to the document source, Appendix A)

2.2.4 Order of precedence

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence.

Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3.0 DEFINITIONS AND ACRONYMS

3.1 Acronyms

Acronyms used in this Handbook are listed in Appendix B.

3.2 Definitions

Definitions used in this Handbook are listed in Appendix C.

4.0 GENERAL PROCEDURES

4.1 Government Concept of Operations

Table I, ADCS Master Template, illustrates project objectives which Program Managers must meet and provides typical metrics to measure success. A review of the Master Template will help Program Managers understand ADCS goals and will provide metrics to assure a comprehensive Government Concept of Operations (GCO).

TABLE I. ADCS Master Template

ADCS Master Template	
ADCS Objectives	Typical Metrics
<p>Government Assure that government processes are in place, cost effectively sustain support requirements and equipment needs, achieve operational stability, evaluate staffing requirements, and measure/evaluate contractor's progress. It is important that specific procedures are defined, audit reporting and records procedures are defined, business rules are verified, and to assure that contractor meets approved engineering related document identification/tracking standards. The Government must also address the following items:</p> <ul style="list-style-type: none"> • Conduct operational testing • Validate the manufacturing ie: engineering related document conversion process • Conduct initial low-rate production tests • Certify contractor's conversion and documentation processes • Assure that data loss meets parameters specified in Phase I • Assign nomenclature as is appropriate • Recommend ADCS conversion format to be used • Define product handling procedures for original and converted documents • Determine storage medium for converted engineering related data • Determine final disposition of original engineering documents 	<ul style="list-style-type: none"> • Utilizing the ADCS Performance Specification, conversion software is chosen that produces the desired file format. The software applications meet the required criteria. • Production testing will provide quantifiable elements of cost, accuracy, speed, cleanup, storage, and overall timing • Tests will be conducted on any engineering related documents to include but not limited to: engineering, mechanical, electrical, civil, electronic, and architectural.
<p>Both Government and Contractor Both parties must have engineering related documents/data delivered and available on time, assure that the process of product identifying/tracking data is accurate and consistent, provide for converted document delivery and disposition, provide for and track changes and audit items. Audit planning and preparation need to be defined. Audits will review performance requirements, test plans and results, physical inspection of final product for accuracy, consistency, and cataloging/identification completion It is important to record and implement 'lessons learned' into the conversion process, and to assure that performance/cost parameters are met. Engineering related conversion format capabilities, costs per unit, quality of product and equipment needs (HW and SW) will be determined and agreed upon. Provide for converted engineering related document data to be available via on-line data services, Web based technology, secure networks and other appropriate means.</p>	<ul style="list-style-type: none"> • Identification/tracking data will be monitored to assure accuracy and consistency from conversion vendors. • Hardware and software test are conducted in a controlled manner to facilitate accurate decisions as to the format to be used • Test and evaluate the ability of each selected format to be used with on-line data services, Web based technology, and secure networks
<p>Contractor The documentation and validation of the ADCS is of primary importance. The contractor must report and record testing and implementation status, coordinate hardware and software capabilities and needs, assure that engineering documents conform to standards for identification/tracking, and provide training to appropriate personnel.</p>	<ul style="list-style-type: none"> • Measure conformance of format selected for the conversion process against goals and standards. • Report progress, problems, concerns and schedule changes to controlling authority

PRIMARY ADCS MANAGEMENT ACTIVITY
<ul style="list-style-type: none"> • Measure and evaluate contractor ADCS progress • Communicate and provide feedback as to any quality and cost issues associated with the conversion format(s) • Monitor quality of converted engineering documents against previously defined standards • Evaluate and approve or reject new formats, processes or technologies which could impact ADCS
<ul style="list-style-type: none"> – The use of various sources assist in project validation. They may include: <ul style="list-style-type: none"> – Surveys – Questionnaires – Statistics from JEDMICS – CITIS/ODIS transaction data – Internet hits <p>The following studies may be conducted to measure the program's overall success:</p> <ul style="list-style-type: none"> – Deviation requests vs. percentage of recurring problems. – Status account of audits: # planned, held vs. successfully completed. *Note the number of open actions remaining per audit vs. the number of completed actions. – Volume of unapproved engineering changes vs. approved

A documented, well-defined GCO is integral to program planning and management. The GCO outlines Government requirements, including the ability to receive and utilize various formats of digital data. This data may be provided by contractors, or interchanged among Government activities involved in document conversion. The GCO provides strategy for acquisition and use of data throughout a program life cycle. Comprehensive GCO development will provide the framework for Government and Contractor ADCS process development, documentation and implementation.

Conversion requirements for each system are unique and the opportunities for cost-effective application vary among contractor and Government activities. It is essential to have coherent strategy for engineering related document management and to be able to communicate that strategy effectively. Proper conversion to a vector format is a valuable asset which, if managed properly, can save time, increase efficiency, improve system quality and performance, and reduce cost. Decisions must be based on the overall program conversion strategy, defense system support strategy, available technology and analysis of cost and benefits of alternative methodologies. TABLE II, Activity Guide: Participants in the GCO Preparation Process provides an breakdown of participants and their role in the GCO Process.

TABLE II. Activity Guide: Participants in the GCO Process

Organization/IPT Members	Govt.	Ctr.	Role
• Document Management	✓	✓	Facilitator, Requirements, Standards
• Information Technology	✓	✓	Computing Resources, Infrastructure, Networks, Operating Systems, Servers, Communications and Data Standards/Protocols
• Providers/Users			
– Program Management	✓	✓	Plans, Schedules, Financial Information, Resources
– Engineering			System Engineering, Software Engineering, Specifications, Simulation and Test, Design Data/Models, Software
– Configuration Management	✓	✓	CM Data (Baselines, Status Accounting)
– Logistics	✓	✓	Support Equipment, Trainers, Training, Supply, Maintenance, Publications, Support Software
	✓		Operations, Deployment, End User
– Manufacturing		✓	Manufacturing, Production, Tooling, Models
– Quality		✓	Inspection Points, Critical Processes, SQA
– DCMC	✓		In-Process Insight, Single Process Initiative

NOTE:

This table references various organizations and members Participants most common to ADCS are primarily in Engineering, Logistics, and Manufacturing.

The GCO provides the framework for implementation of a partnership between government and its contractor. For the foreseeable future, engineering document conversion infrastructure must accommodate both legacy and standard processes. An effective GCO should address:

- Document users, types of documents, frequency of use and timeliness of document access or delivery to each user.
- Government hardware and software systems in use or in development to manage and use converted document data.
- CAD/CAM exchange requirements including format, media, applicable standards and existing telecommunications/network capabilities.
- Concurrent access by multiple functional users.
- Rights access authorizations and restrictions.
- Document management responsibilities.
- Flow of converted document /data among government sites.
- Identification of converted documents and metadata requirements.
- Methods to be used for the exchange and final disposition of document/data

TABLE III illustrates the means by which Program Managers typically progress through the conversion process.

TABLE III. Document Conversion Process

1. Identify Document Types	For EACH Type of Document		
	2. Identify WHO will use the Document (type)	3. Determine WHAT the users will do with each Document (type)	4. Identify the users Infrastructure
<ul style="list-style-type: none"> Drawings <ul style="list-style-type: none"> Mechanical Electrical Civil Architectural Electronic GIS Mapping Technical Manuals Graphics/Illustrations/Fold outs 	<ul style="list-style-type: none"> Acquisition Engineering Operations Maintenance Logistics Production 	<ul style="list-style-type: none"> View only Comment/Annotate Edit/Update/Maintain Process/Extract/Transform Archive Secondary distribution Analysis Production Test 	As is expected to be available after conversion <ul style="list-style-type: none"> Hardware Software Networks Web enabled Trained Personnel

For EACH Type of Document				
5. Identify Document Existing format	6. Determine Standards for Interchange of Converted Document Data	7. Determine Required Government and Industry Data Standards	8. Determine Type of Media for Delivery of Converted Data	
Composed Documents: <ul style="list-style-type: none"> Paper Mylar Aperture Card Microfiche Size of page, drawing, card, binder, book 	<ul style="list-style-type: none"> PDF IGES STEP DXF ASCII HTML 	<ul style="list-style-type: none"> Document Image Standards 	<ul style="list-style-type: none"> Magnetic Tape (9 track) Optical Disk Re-Writable CD-ROM Floppy Disk Telecommunication Ex: Email, Secure Network, Encrypted WEB Enabled Contract/Contractor Specific 	
Processable Data Files: <ul style="list-style-type: none"> 2-D / 3-D Raster Vector Text Document Image File GIS Mapping Graphics & Audio 	STEP IGES CGM CDEX DXF DWG EDIF	CCITT IPC PDF VHDL JEDMI CS		<ul style="list-style-type: none"> Engineering Drawing Standards
	SGML JEDMICS PDF	IGES DOC		Text Standards
	IGES JPEG	GIF CGM		Graphics Standards
	WAV		Audio File	

NOTE:

The Specification addresses the conversion of Composed (hard copy) and previously converted raster formatted documents. Vector-to-vector conversion and Composed-to-Raster conversion is outside the scope of the Specification. Reference to graphics and audio formats are for information purposes only.

Creating an effective GCO by "walking" through the steps listed in Table III is facilitated with a User Worksheet. The User Worksheet allows Program Managers to systematically identify existing documentation and provides the framework necessary to record required information for each conversion project. Located in Appendix D, the User Worksheet is provided for photocopy and its use is recommended.

4.2 Conversion Strategy

4.2.1 Identifying Conversion Requirements

Conversion format selection depends upon numerous factors, including the context of the document/project and the end user's operating environment.

4.2.1.1 User Survey

A sample user survey is included in Appendix D. Modeled after a similar survey in the DoD CALS Deskbook, it is edited to specifically address the needs of ADCS. Use of the survey will provide information required to complete a conversion GCO. Program Managers are encouraged to modify the survey to provide information specific to the needs of the conversion task.

Depending on the type of conversion, size of the program for which the documents are required, and the phase of program development, the requirements of the program-specific conversion will vary. Each program will require and have access to its own unique infrastructure. The questionnaire is intended to determine the infrastructure in place and/or required for program-specific support.

The information collected with this questionnaire will be useful to the Program Manager in defining each functional requirement. A questionnaire should be completed by each functional area at each activity that supports a specific program. The Program Manager should either identify all functional areas and distribute the questionnaire directly to them or distribute questionnaires to the activities with instructions for them to distribute the surveys to the appropriate functional areas.

4.2.2 Selecting Conversion Method

The selection of the correct conversion method is critical to the conversion process. To understand the conversion requirement which must be contacted the program manager must understand the business process which the converted data is intended to support.

4.2.2.1 Business Requirements Analysis

Program Managers will perform Business Process Requirements (BPR) to assess the impact of the conversion results on the present business process. The Program Manager may perform this task through use of a BPR Analysis. Since converted information must be placed back into the business processes for the information to have a cost benefit to the DoD, the Program Manager must understand the present uses of engineering data and the expected uses. Using BPR, the Program Manager can successfully define document conversion format requirements that will have the greatest impact on improving the business processes.

4.2.2.2 Analyze Documents

The Program Manager should analyze the documents to be converted and separate, sort, and collate them into batches by Document Type, Drawing Style, Existing Format, Expected Use and Storage Requirements. The Program Manager may find it necessary to adapt this process to task-specific conversion requirement. If the documents are paper, distribution requirements may dictate smaller conversion packages while raster CD-ROMs generated from JEDMICS can support many more files. It is recommended that the package size of a conversion does not exceed 100 drawing regardless of the distribution media. If CR-ROMs are used, packages can be defined by using a file directory structure to define each package as separate. Table III illustrates the means by which Program Managers progress throughout the conversion process, beginning with a thorough analysis of existing documents.

Analysis begins with establishing the functional areas requiring the conversion of information. Conversion strategy is intended to be flexible. Conversion output products must be accessible to multiple applications, unless the functional need dictates otherwise. The converted document must meet specifications compatible with the functional application for which it was generated, but not be locked into a proprietary digital format. Thus, maximized flexibility increases the utility of converted documents to DoD document users.

Conversion does not alter access requirements or restrictions to documents under the Freedom of Information Act, Privacy Act, Information Security programs, or other forms of disclosure required by law. Conversion of documents requires responsible management of both the original and the converted documents.

Document conversion may be accomplished by;

- 1) Acquiring specialized but commonly available software and hardware,
- 2) Acquiring ADC services from another DoD organization, and
- 3) Acquiring ADC services from commercial conversion houses.

The output product of any conversion must conform to the same flexible technical standard format(s) regardless of the acquisition vehicle used.

The following factors should be considered when stating the requirements needed for conversion of drawings: Target Process, Target System, Budget, Functional Type, Present Media, Present Format, Storage Target and Distribution Media.

4.2.2.2.1 Target Process Requirement

The target process requirement of the converted documents impacts the Program Manager's decision as to which digital format should be specified. It must be assumed that the Program Manager will have previously determined if a drawing/document will or will not require CAD capabilities by compiling the information returned with a user survey or through other means. The following lists illustrates the types of uses for which a drawing is intended.

- View Only The ability to examine a document/data file without the ability to change it. This includes viewing selected portions of one or several documents as well as side-by-side comparisons of documents.
- Comment/Annotate The ability to evaluate and highlight for future reference or to make annotations, approvals, and comments without the ability to change the original file. Annotations are associated with a specific item or location within a document such that the annotations are displayed whenever that point or area of the document is displayed.
- Process/Extract/Transform The ability to extract and modify the format, composition, and structure of all or a portion of the document/data into another usable form without affecting the original content or format.
- Edit/Update/Maintain The ability to change the document/data either directly or through controlling software, in the active files on the host computer.
- Archive The placing of document/data into a repository to preserve it for future use.
- Secondary Distribution Your organization distributes the document/data to another organization.

Because ADCS is only to be used for conversion to vector formats, of these six categories ADCS is most commonly utilized when the end use is expected to be Process/Extract/Transform or Edit/Update/Maintain. Both of these uses will require drawing/documents converted to a CAD Capable or CAD Perfect format. This is not to say that there may never be a need for a drawing to be converted in a CAD format only to be used as an View Only, Archive, or Comment/Annotate, however such uses must have sound business reason to justify the expense necessary to convert to vector format if it may never be used by a CAD system. Drawing/documents intended for Secondary Distribution may or may not require vector conversion. Program Managers must evaluate the intended use by the secondary organization to determine if the expense of vector conversion is warranted.

4.2.2.2.2 Target System

The Program Manager should ensure that the capabilities of the target system for data import is understood. Most systems have a limited number of formats that can be accepted as input. If the data is converted to a non-importable format the additional conversions could cause loss of data accuracy.

4.2.2.2.3 Engineering Document Functional Types

Engineering documents are functionally different and therefore require different performance definitions to achieve the required format for the business processes. There are four functional areas for which Detailed Performance Specifications have been developed including: Mechanical,

Electrical/Schematic, AEC (Architectural/Electrical/Civil), and Mapping (GIS). Requirements for the four Functional Areas are listed in the Specification appendices described below:

- Mechanical
 - 2D, CAD Capable Guidance Specification, Appendix A
 - 2D, CAD Perfect Guidance Specification, Appendix B
 - 3D, CAD Perfect Guidance Specification, Appendix C

- Electrical
 - 2D, CAD Capable Guidance Specification, Appendix D
 - 2D, CAD Perfect Guidance Specification, Appendix E
 - Electrical Schematic Guidance Specification, Appendix F

- AEC
 - 2D, CAD Capable Guidance Specification, Appendix G
 - 2D, CAD Perfect Guidance Specification, Appendix H
 - 3D, CAD Perfect Guidance Specification, Appendix I

- Mapping/GIS
 - 2D, CAD Capable Guidance Specification, Appendix J
 - 2D, CAD Perfect Guidance Specification, Appendix K
 - 3D, CAD Perfect Guidance Specification, Appendix L

When developing the specific Performance Specification, if the vendor of choice has not converted documents to the specific conversion requirement (i.e. Mechanical 2D CAD Capable), the Detailed Performance Specification for that requirement shall be included in the information sent to the contractor. Once the contractor has the detailed specification, other Performance Specifications can be developed referencing the same Detailed Performance Specification.

4.2.2.2.4 Existing Engineering Document Media

The physical representation of engineering drawings takes the form of differing media. Legacy drawings may exist in paper or mylar, aperture cards, microfiche, or as raster data files from previous conversion initiatives.

4.2.3 Select Conversion Type

Once the analysis is complete, the most important process is the selection of the appropriate conversion type and data format. The selection of the conversion type will place very different requirements on the conversion activity. A good selection will result in improved business processes and reduced costs, while a poor selection will be a poor investment.

4.2.3.1 Text Conversion Analysis

There are multiple textual areas within a document that may be converted. Program Managers should determine the areas to be converted and the format to be used to store the end product. For instance, some specifications used in the procurement of additional product may require that only the text of the document be converted to ASCII or PDF while the document graphics continue to be stored in a raster format. The conversion requirements shall be based on the following factors: Target Process, Target System, Budget, Present Media, Functional Type, Storage Target, and Distribution.

Text based documents include Technical Manuals, part specifications, instructional /training guides, books or manuals, illustrations, tables, charts, etc. Program Managers must evaluate the same need, use, life cycle, etc. requirements for text-based engineering related document conversions as performed in evaluating engineering drawing conversions. Text documents may have a different set of conversion requirements for different functional uses.

The following factors should be considered when stating the requirements needed for text conversion: Target Process, Target System, Budget, Functional Type, Present Media, Present Format, Storage Target and Distribution Media.

4.2.3.2 Engineering Geometry Conversion Types

Successful format selection is dependant upon a thorough evaluation of the document's functional requirements as well as an understanding of various data formats representing documents, including the strengths and weaknesses of each data conversion format. Converting documents into standard (e.g. ASCII, TIFF, PDF, STEP, CGM, SGML, etc) formats requires conformity with approved non-proprietary technical standard formats. Neutral formats support interoperability, and allows for document-sharing between software applications on different computing platforms.

Several conversion formats are defined below. Depending upon particular conversion requirements one or more should be recommended for your specific conversion project. The following formats in TABLE IV are the most standard formats available for the conversion of engineering related documents.

TABLE IV. Data Conversion Format Descriptions

Formats	Conversion Format Description
ASCII	American Standard Code for Information Interchange is the world wide standard for the code numberings used by computers to represent all the upper and lower-case Latin letters, numbers, punctuation, etc. There are 128 standard ASCII codes each of which can be represented by a seven digit binary number: 0000000 through 1111111.
AUTOCAD	A Computer Aided Design (CAD) software package for mechanical engineering marketed by Autodesk, Inc. CAD is the part of Computer Aided Engineering (CAE) concerning the drawing or physical layout steps of engineering design.
CAL ,Type 1	CALS Type 1 raster format is a subset of the CITT Group 4 raster format as defined in MIL-STD 1840-A. The CAL Type 1 data format is the DoD standard storage format for raster information. This format is supported by some raster viewers but very few of the raster to vector conversion systems. The JEDMICS repository format for raster data storage and viewing is CALS Type 1, which makes JEDMICS a CAL Type 1.
CCITT, Group 4	The efficient compression of scanned raster images. Uses the code from the Group 4 facsimile recommendation of International Telegraph & Telephonic Consultant Committee. A "filed" form is described by using the architecture nomenclature of International Standard: ISO 8613.

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CGM	Computer Graphics Metafile, (CGM) data format, is an International standard for the exchange of 2D illustration. CGM is a hybrid format, allowing both vector and raster information to be contained in the same file. CGM is a common format used for the representation of non-CAD vector information and is the standard for technical illustration software. CGM Version 4 is the newly released standard for the representation of vector information on the WWW. The CGM standard is being supported by a wide range of organizations including Microsoft and Intergraph.
DXF	DXF data format is the most common storage format of information exchange for low end (<\$1000)CAD systems. DXF is supported by many vector viewers and is an output format for most raster to vector conversion systems. The ability of a CAD system to accept DXF files is based upon the pre-processor implemented for that systems. (i.e. from DXF to MicroStation). The DXF standard is an industry de-facto standard developed by AutoCAD for the electronic transfer of files.
EDIF	Electronic Data Interchange Format (EDIF) data format is the most common format for the exchange of electrical schematic information. All major electronic design systems support EDIF as an exchange format. To date, no raster to vector conversion packages support this function as a main product.
EPS	Encapsulated PostScript is a part of the first generation of Adobe Systems page description languages. A PostScript file that is intended to be incorporated into another PostScript file is called "encapsulated." EPS designed to allow graphic material from one program to be transferred and used in a document produced by another program. However, EPS cannot include certain PostScript commands and are required to have a Bounding Box comment. ESP files are restricted in that they can only define a single page of information. In all other respects EPS files look like normal PostScript files.
Gerber Format	This is the industry standard for circuit board manufacturing. RS-274-D is the technical name for Gerber Format, which is the standard photo plotting language. The format was first introduced in 1980, and has been upgraded several times since then. The most significant enhancement was the addition of embedded aperture codes in 1991. This feature allows each file to be completely self defining, needing no other accompanying documents for processing. These files include the data for all artwork layers, aperture list or lists of all layers and drill file in Gerber format.
HTML	Hypertext Markup Language is a coding language used to format hypertext documents on the World Wide Web. HTML is a "tag" embedded format built on SGML. It supports some standard characters from SGML and other non-ASCII characters as well. The World Wide Web Consortium (W3C) is the standards body for HTML.
IGES	Initial Graphics Exchange Format (IGES) neutral data file format is the most common translation software for higher end vector systems. The IGES specification is an ANSI approved standard for the transfer of product definition data among CAD/CAM Systems and application programs. IGES is a US national standard for CAD database translation between dissimilar systems. The present version of the standard is 5.I. While most CAD systems support this specification, the translation is only as good as the pre and post translators. There have been difficulties with "Flavor" of IGES. Flavors are caused by two different systems having dissimilar capabilities that cause trouble in the translation. Most raster to vector conversion systems support IGES as an output format.
PDF	Portable Document Format, PDF, is the third generation of Adobe Systems page description language. Essentially, PDF is EPS, with strict rules. For example, formatting and extra header and footers. PDF allows for good typographical control and precise alignment of all page elements. PDF has good control over basic entities (i.e. text, lines, and bezier splines), but doesn't allow for higher entities (i.e. arcs and circles). This means that the interpreter can concentrate on a very small entity set, but it also means that arcs and circles can be very badly behaved as the mathematics can easily break down. PDF is extremely large and verbose, and is best used with dedicated T1 lines by all users.
SGML	Standard Generalized Markup Language, defined in "ISO 8879:1986," is a generic markup language for representing documents. SGML represents document content data and structure, which allows document-based information to be shared and reused across applications and platforms. SGML defines elements in a DTD (Document Type Descriptor), similar to data base field definitions. The DTD allows SGML documents to be searched, printed, or programmatically manipulated by SGML-aware applications.
STEP AP 201	The Standard for the Exchange of Product Data (STEP) format is an international format for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" of IGES, the STEP standard community developed Application Protocols (AP's). AP 201, Explicit Draughting, is the representation of a two-dimensional drawing of a product.
STEP AP 202	The Standard for the Exchange of Product Data (STEP) format is an international format for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" or IGES, the STEP standard community developed Application Protocols. (AP's). AP 202, Associative Drafting, is the exchange of drawings of parts with "smart" dimensions.
STEP AP 203	The Standard for the Exchange of Product Data (STEP) format is an international format for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" of IGES, the STEP standard community developed Application Protocols (AP's). AP 203, Configuration Controlled Design, is the representation/exchange of a three dimensional mechanical part design structure and shape data with associated configuration management information.
STEP AP 210	The Standard for the Exchange of Product Data (STEP) format is an international format for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" of IGES, the STEP standard community developed Application Protocols. The AP 210 is the representation for electrical printed circuit assembly (PCA) design information. The AP defines the information shared between design and manufacturing process planning engineers for transforming a PCA detailed logical design into a manufacturable description. The detailed logical design identifies and connects between the PCA components. The manufacturable description describes the physical realization of that logical design. This AP also includes information needed to support configuration management of the PCA product data.
STEP AP 212	The Standard for the Exchange of Product Data (STEP) data format is an international for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" or IGES, the STEP standard community developed Application Protocols. The AP 212 is the representation for the exchange for design information of electrotechnical equipment used in plants, systems and devices. This AP allows for the description of information shared between the parties involved in the design, the installation and the commissioning of the apparatus. Design is understood as a process of combining components such as relays, programmable logic controllers, software to a system.
STEP AP 224	The Standard for the Exchange of Product Data (STEP) data format is an international for the exchange of CAD files. Because of the variety of CAD files and the problems associated with the "flavoring" or IGES, the STEP standard community developed Application Protocols. The AP 224 provides the mechanical product definition for Process planning using machining features.

TIFF	Tagged Image File Format, TIFF data format is the most common storage format for raster information. It was developed by Microsoft and Aldus as a non-proprietary format for use by scanners. This format is supported by most raster viewers and all of the raster to vector conversion systems. Most scanning system will output files in the TIFF format.
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Creating a compilation of the drawings to be converted requires careful consideration of the format of existing drawings and cost-benefit consideration of vector format conversion. Appendix X (from L. Simmons) provides typical costs incurred in conversion of various type, size, and style of drawings. This analysis may be used to assist conversion format selection.

NOTE:

The use of ADCS funds to convert documents to any format other than vector is inappropriate. The Specification and Handbook only address conversion of hard copy media direct-to-vector and conversion of pre-existing raster files to vector.

4.2.3.3 Drawing Document Conversion Type

The objective of drawing conversion is to provide the most efficient and cost effective method for data conversion. If a contractor is determined to be the most cost effective method, the Program Manager must develop an ADCS Performance Specification based on the ADCS Guidance Specification. The ADCS Performance Specification shall be directly reference by the contracting document.

TABLE V – Geometry Document Conversion Type

Drawing Vector Data Formats	CAD Perfect Data Format	The conversion process implemented should result in a CAD Perfect data file. All entities should be dimensionally and orthogonally correct with fully editable vectors and text. Layers, blocks, symbols, and line types should be incorporated. This representation is required to provide a mathematically correct model for computer processing.
	CAD Capable Data Format	If your project does not require CAD Perfect data format, perhaps a CAD Capable format can be used. CAD Capable adds intelligence to drawing data by cleaning up the vector quality. As a result of this type of conversion, circles, arcs, and other geometric shapes are true and precise geometries. Lines are continuous and layered and objects are clear and orthogonally correct. Although representations are visually correct, the mathematical models created by CAD Capable conversions are not accurate.

4.2.3.4 Text Document Conversion Type

The Program Manager will include project-specific conversion requirements in the ADCS Performance Specification. The method used to convert the text data must conform to approved standards.

4.2.4 Metadata

JEDMICS Compact Disk Data Exchange (CDEX), Product Data Elements, and ADCS Data Elements are three types of metadata which provide different document information. Each is defined below to provide assistance in determining the metadata requirements for conversion procurement.

TABLE VI. Metadata Data Formats

Compact Disk Engineering Data Exchange (CDEX)	The main purpose of the JEDMICS Compact Disk Engineering Data Exchange (CDEX) format is to define the format for the exchange of data between JEDMICS repositories utilizing compact disc media. The target CD will contain a hierarchical directory structure in accordance with ISO-9660. The only mandatory requirements for data exchange utilizing CDs in and out of JEDMICS, are for Image files and Index structure.
Product Data Elements	These Product Data Elements contain indexing information not supported in JEDMIC/CDEX but are necessary to properly identify specific items represented in the drawing.
ADCS Data Elements	A JEDMICS/CDEX minimum data set can be enhanced by the inclusion of additional drawing-specific ADCS Data Elements. These Data Elements may be used to define the contents of the drawing, the attributes of the item represented by the drawing, and other characteristics necessary to overall identification and tracking of the document/data.
INDEX.DLF File Format	A DLF ASCII file will accompany a set of engineering data files. The file is formatted so each record goes on a separate line with bars separate fields. The INDEX.DLF file will allow the format as required in the current version of the JEDMICS Data File Index Structure (DFIS). These requirements must apply to all contractor data or when ordering CDs.
Data File Index Structure (DFIS)	The Data File Index Structure (DFIS) is a character delimited ASCII text file with one Image Row Entry (Record) per image referencing a data file in a hierarchical directory structure. Therefore, all documents converted to the ADCS Guidance Specification will have a field in the metadata called ADCS Conversion Type.

4.2.4.1 Compact Disk Data Exchange (CDEX)

CDEX is metadata about the data itself and can be used for storage, access and management. CDEX also defines the data exchange format between JEDMICS repositories utilizing compact disc media. This includes delivery of data from a contractor to a JEDMICS repository, the transfer of data between JEDMICS sites, CDs developed for an activity's business process that may also be used by another JEDMICS site and Advanced Technical Information System (ATIS) CDs produced from JEDMICS. Table VI contains forms listing the metadata elements and formats required for CDEX compliance. The program manager shall specify which optional elements should be considered as required for that particular procurement.

4.2.4.2 Product Data Elements

Product Data Elements contain indexing information not supported in JEDMICS/CDEX but are necessary to properly identify specific items represented in the drawing for Product Data Management (PDM). These metadata elements are more comprehensive than the established metadata fields of CDEX. Product Data includes associated data that supports production or building

bills of material generation. Material types, data about materiel specs, and processing specs illustrate examples of product data.

4.2.4.3 ADCS Data Elements

The JEDMICS/CDEX minimum data set is enhanced by the inclusion of additional drawing-specific ADCS Data Elements. These Data Elements may be used to define the contents of the drawing, the attributes of the item represented by the drawing, and other characteristics necessary to overall identification and tracking of the document/data. Examples of ADCS Data Elements are: Original Drawing date, conversion date, Vendor information, what the file is converted from and to, what sets were used, validation date, file size, grouping names of files, conversion software used, software revision and target system.

4.2.5 Final Disposition and Storage Requirements

Final disposition of the converted drawing/documents involves a number of decisions which are directly impacted by the intended use of the data. Storage requirements and distribution media are also impacted by intended use. When a Project Manager determines what the particular use of the data is, he must then evaluate where and how the data will be kept and what particular requirements may be imposed on the method and media used.

This Handbook does not address every possible choice; however, included are the most common. It should be noted that as technology advances additional media and methods may be adopted by DoD while older ones may become obsolete. Listed below are the typical media used to store and/or distribute converted drawings. Media definition can be found in Appendix C.

- 9 Track Magnetic Tape
- Optical Disk (CD-ROM)
- Re-writable Compact Disk
- Floppy Disk
- Telecommunication Media (email, secure network, encrypted)
- WEB Enabled
- Contract/Contractor specific

4.3 Conversion Procurement

Proper conversion procurement procedures must be identified and followed to ensure timely, accurate and complete conversions. This Handbook only assists in selected procurement related items. Figure 1 describes the suggested process to be followed. Due to the complex nature of assuring 100% accuracy in converted drawings, it is recommended that Program Managers limit their conversion vendors to relatively small groups of drawings, called Packets. If a conversion vendor proves capable of consistent and accurate conversions delivered on schedule with proper Metadata, then a Program Manager may allow Packets to be released to vendor on a regular schedule.

4.3.1 Packets

The Guidance Specification defines that vendors can expect drawing/documents be compiled into Packets of 'like kind'. Conversion processes and the type of drawing both impact the size and make-up of a Packet. This section provides guidance to the size, tracking, processing and delivery recommended for Packets.

4.3.1.1 Compiling Packets

A Program Manager should separate the drawings to be converted by the media, type, and intended use. Each packet type shall have an applicable Performance Specification associated with the conversion. By packet the drawings may be converted using procedures and processes selected by the conversion vendor in the most efficient manner. However, each packet should contain quantities of documents not to exceed a predefined limit. Also, different packet groups may have different Performance Specifications called out for conversion.

4.3.1.2 Tracking Packets

In order to assure that each drawing and packet is properly accounted for during the conversion process, a Program Manager must provide method for the cataloguing of each page contained in a packet and a method for keeping track of the Packets throughout the conversion process. There is a Packet Tracking Checklist in Appendix D that may be used to provide a minimum cataloguing information to accompany each packet. Should a Program Manager determine that they or the vendor requires additional information, other items may be added. Appendix D includes a Sample Packet Tracking Check Sheet for photocopy.

4.3.2 Conversion Process

Initially the documents are sorted into "like types", placing all of the mechanical drawings in one group, all electrical drawings in another, etc. Once sorted, the Program Manager selects a representative subset of all types which is the initial packet sent to the conversion vendor. This initial packet is considered the First Article Packet and contains the Performance Specification for Conversion and final output. The purpose of Performance Specification is to verify the ability of the conversion vendor to fulfill the contract. Each packet should have a contents list for packet tracking purposes.

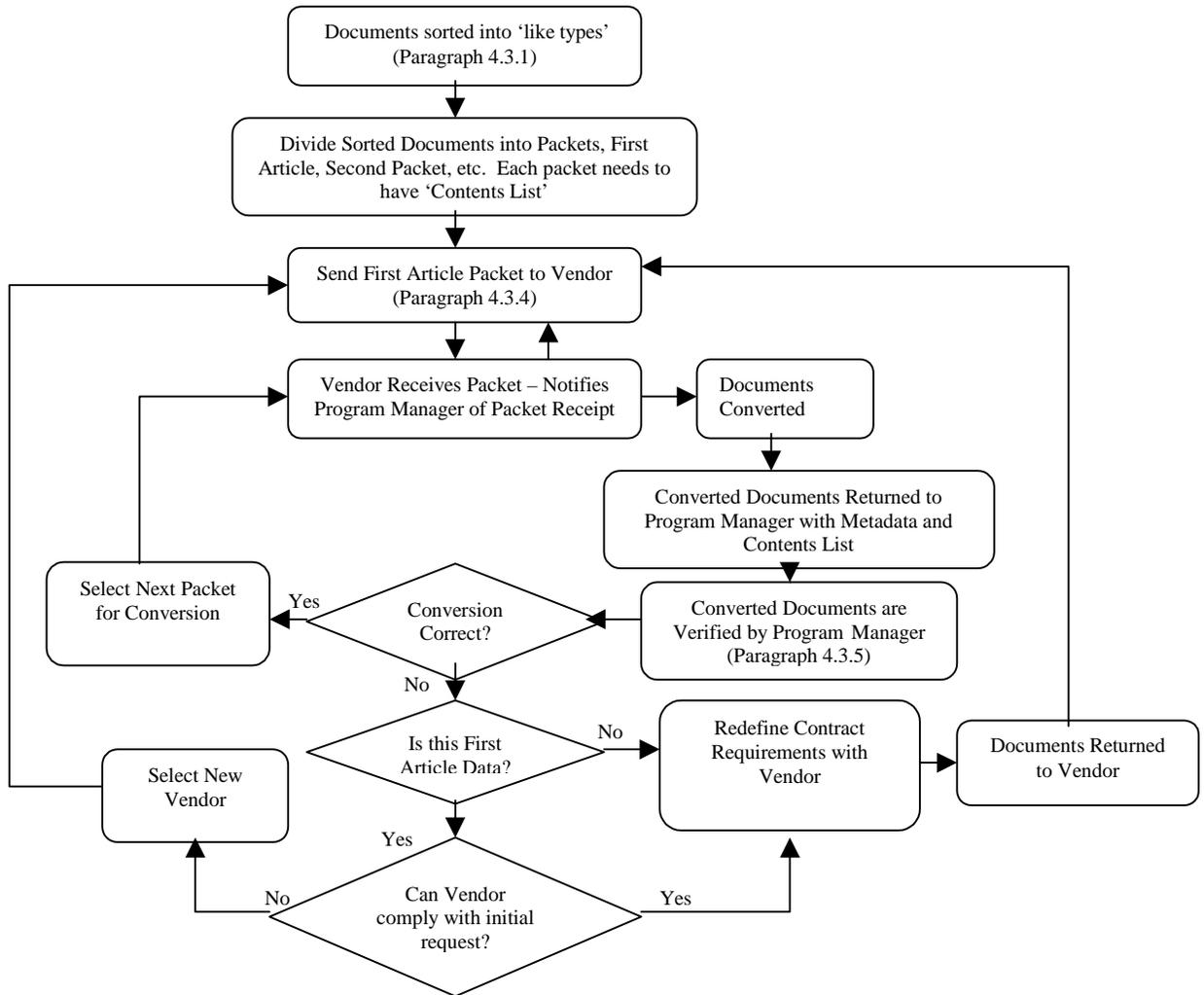


FIGURE 1. Conversion Flow

4.3.3 Delivery Schedule

Effective project management requires timely conversion of the documents. A Deliverable Schedule is recommended to facilitate communication between Program Managers and contractors. Appendix D contains a Sample Deliverables Schedule which allows for documentation of predefined Delivery dates.

4.3.4 First Article Packet

The First Article Package is sent to the conversion vendor and acknowledgement of packet is recommended. The documents are converted and returned to the Program Manager in the predefined format and on the predefined media. The first article package shall not be less than 10 nor more than 50 drawings. The more complex the conversion the more drawings that should be required in a first article requirement. The Program Manager should determine the appropriate number of conversions required to ensure the contractor is successfully meeting the requirements of the Performance Specification.

If the First Article Package failure is more than 25%, a new first article package should be given to the contractor for conversion and the contractor should be placed on notice of failure to meet contractual requirements. If the contractor is unable to achieve first article acceptance on the next package, alternative vendors should be identified. Contractor which fail to meet first article requirements must also be subject to a larger sampling during the actual conversion process.

4.3.5 Validation

Validation is the means by which a contractor proves his ability to produce a conversion output that conforms to the requirements defined in the Specification. Program Managers establish specific quality requirements which are maintained through Audit and Validation. These requirements are detailed in the Performance Specification which is called out in the conversion contract.

Requirements may include responsibility for inspection, establishment of quality or inspection program requirements, warranties, instructions for nonconforming items, and contractor liability for nonconformance. This section does not include instructions for nonconforming items nor contractor liability for non-conformance; see FARS 46.407

Validation audits are performed during production and are completed after final delivery. Program Managers assure the accuracy of the following items which are critical to validate the end product of engineering related document conversion:

- Format
- Dimensionality
- Geometric Representation
- Metadata
- Associated Data

TABLE VII, below, provides the means to ensure that several Validation Items required in conversion procurement have been completed.

TABLE VII. Validation Items

Validation criteria	Metric	Yes	No
Format	Are the converted drawing/document files in the digital file format specified?		
Dimensionality	Are the requirements set forth in Appendix {X} met for each and every item?		
Geometric Representation	Is the representation exactly as specified in Appendix {X}?		
Metadata (Required)	Are the Required JEDMICS/CDEX Data Elements included and are they accurately listed?		
Metadata (Optional)	Are the Data Elements added from the Optional category (both ADCS specific and Product Data) included and listed accurately?		
Media	Is the specified Media used to deliver converted drawing/document files?		

The Program Manager uses at least one of four appropriate validation methods for the type of documents being converted. Demonstration, Inspection, Analysis and/or Test is used to determine that the conversion process meets contractual requirements. The results of these activities provide metrics used to define an acceptable product and to verify contractor compliance.

Until a level of confidence has been established, a higher number of the documents within a packet should be verified. More of the converted First Article packet should be verified than in subsequent packets when a level of confidence has been established.

4.3.5.1 Demonstration

The contractor demonstrates capabilities that meet the Performance Specification requirements for the task prior to contract award. The Program manager selects a test set of representative engineering documents and through demonstration ensure the qualifications of the potential contractor to perform the required document conversion.

4.3.5.2 Inspection

Efficient inspection prior to, during, and after the conversion process ensures that the contractor continues to work at an acceptable quality level. Conversion inspection includes at a minimum visual examination of a sample of converted documents to determine if the baseline conversion requirement has been met. Inspection assists Program Managers in determining if the contractor included the required metadata in the conversion, converted to the proper format, and is providing the accuracy required. Concerns about optional metadata may be addressed through Inspection.

4.3.5.3 Analysis

Program Managers employ analysis to ensure the conversion processes are complete and accurate. The analysis processes includes input to engineering target systems to test the functionality of the converted data. The validation activity uses analysis to determine that the converted information is accurate, that no information content was lost or altered in the conversion process, and that the functional requirements specified by the Performance Specification were achieved.

4.3.5.3.1 Standard Compliant Software

Program Managers should only consider software employing document/data formats in conformance with Industry, International, or Military standards. Verify that COTS (Commercial Off The Shelf) software used in the conversion process meets the standards is required. Program Managers should use existing DoD evaluation or secure the services of an independent vendor to perform testing and provide evaluations.

4.3.5.4 Test

Test is a Validation tool that measures, records, and evaluates qualitative and quantitative data obtained during a controlled operation of the conversion process against procurement specifications. Program Managers employ testing where the technical information provided in the conversion can be evaluated against a set of criteria. Information to evaluate correctness, accuracy or precision in the conversion is compiled.

5.0 Worksheets

Appendix D contains several forms and information to assist in validation. One form is a Sample First Article Signoff Sheet. Through use of this form Program Managers are assured that First Article was performed and allows for detailed explanation of success/failure. The second section, Validation Tables for Functional Areas, details the best means to verify specific conversion requirements. Validation requirements are separated by the functional areas of Mechanical, Electrical, Architectural and Mapping. Specific validation methods are provided for each specific conversion requirement. Validation Table use will provide Program Managers with a powerful tool for validating conversion format. The third form in Appendix D for Validation is a Sample Validation Signoff Sheet. Similar to the First Article Signoff Sheet, use of this form assures Program Managers that validation was performed and allows for detailed explanation of success/failure. If used in hard copy, both the First Article and Validation Sign-Off Sheet can be placed in a program book for quick reference and proof that First Article and Validation took place.

APPENDIX A

WORLD WIDE WEB RESOURCES

A.1.0 Scope

Appendix is not a mandatory part of the handbook. The information contained herein is intended for guidance only.

A.2.0 Purpose

To provide Program Managers with additional references to assist in conversion procurement.

Acquisition Reform Network	http://www-far.npr.gov/
ANSI	http://www.ansi.org/
Army Acquisition Network	http://acqnet.sarda.army.mil/
Army Engineering Publications (except adm)	http://www.usace.army.mil/usace-docs
Army Electronic Data Management System Prog Off	http://edms.redstone.army.mil/index.html
Army Materiel Systems Analysis Activity	http://amsaa-web.arl.mil
Army Publications	http://www.ntis.gov/databases/armypub.htm
CALS Document Library	http://www.fedworld.gov/edicals/calsinfo.html
CALS Specification & Standards Document	http://www.acq.osd.mil/cals/specstds.html
Defense Acquisition Deskbook	http://www.deskbook.osd.mil
DISA	http://www.disa.mil
DISA Data Integration Standards Association	http://www.disa.org/
DoD Guide to Modeling and Simulation	http://www.dsmc.dsm.mil/pubs/mfrpts/mrfr6.htm
DoD Index of Specifications and Standards - DODISS	http://www.dtic.mil/stinet/htgi/dodiss
HQ Army Materiel Command	http://www.amc.army.mil/news/news.htm
Federal Acquisition Regulation (FAR)	http://www.arnet.gov/far/
FedWorld CALS Resource Locator	http://www.fedworld.gov/edicals/locator.html
IEEE Standards Process Automation System	http://www.lmc.cinet/hytele/OTH115.htm
ISO Online	http://www.iso.ch
JEDMICS Homepage	http://206.3.148.4/welcome.html
JEDMICS CDEX file and Structure Format	http://206.3.148.4.cdex.html
JEDMICS C4 Image Format	http://206.3.148.4/c4.html
JEDMICS Data File Types	http://206.3.148.4/cadtypes.html
Joint Logistics Systems Center	http://www.jls.wpafb.af.mil
Lessons Learned	http://dsmc.dsm.mil/leslrnd/ll bpgen.htm

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Logistics Reinvention Office	http://www.acq.osd.mil/log/lro/index.html
Military Doctrine	http://www.fas.org/man/doctrine.html
Military Handbook Data Management Guide	http://www.acq.osd.mil/log/lro/index.html
MIL HNBK 61	http://ild.com/ir&m/cm infomil 61.html
MIL STD 2549	http://www.pica.army.mil/orgs/edmd/edd/sb/lees.html
MIL STD 963 (DID Prep)	http://www.ild.com/ir&m/dm.html
MIL-STD-600001 Mapping, Charting & Geodesy Accuracy	http://164.214.2.59/publications/specs/index.html
National Institute for Standards and Technology	http://www.nist.gov
Standards Document Library	http://www-library.itsi.disa.mil

APPENDIX B**ACRONYMS**

B.1.0 Scope

This Appendix is not a mandatory part of the handbook. The information contained herein is intended for guidance only.

B.2.0 Purpose

To provide definition to many Acronyms used throughout the Specification and Handbook.

ADCS	Automated Document Conversion System
AMC	Army Materiel Command
AMSAA	Army Materiel Systems Analysis Activity
AMSDL	Acquisition Management Systems and Data Requirements Control List
ANSI	American National Standards Institute
AP	Application Protocol
AS	Audit Strategy
ASCII	American Standard Code for Information Interchange
ASME	American Society of Mechanical Engineers
BMP	Bitmap (graphic file format)
BPR	Business Process Requirements
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CAE	Computer Aided Engineering
CAGE	Commercial and Government Entity
CALS	Computer-aided Acquisition and Life-Cycle Support
CALIP	CALS Implementation Plan
CAM	Computer-Aided Manufacturing
CCITT	International Telegraph and Telephone Consultative Committee
CDEX	Compact Disc Data Exchange
CD ROM	Compact Disc - Read Only Memory
CDRL	Contract Data Requirement List
CGM	Computer Graphics Metafile
CMM	Coordinate Measuring Machine
COTS	Commercial Off The Shelf
DED	Data Element Definition
DoD	Department of Defense
DID	Data Item Description
DLA	Defense Logistics Agency
DoDISS	Department of Defense Index of Specifications and Standards
DWG	A CAD drawing file format
DXF	A CAD drawing file format

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EIA	Electronic Industries Alliance
EDMS	Engineering Data Management Systems
FAR	Federal Acquisition Regulation
FCG	Functional Coordinating Group
GCO	Government Concept of Operations
GIF	Graphics Interchange Format
GIS	Geographic Information Systems
HQ	Headquarters
HTML	Hypertext Markup Language
HW	Hardware
IDEF	Integrated Definition Language
IEEE	Institute of Electrical and Electronic Engineers
IGES	Initial Graphics Exchange Specification
IPO	IGES/PDES Organization
IPR	Initial Program Review
ISO	International Standards Organization
JEDMICS	Joint Engineering Data Management Information and Control System
JPEG	Joint Photographic Experts Group
MIL-STD	Military Standard
MSCs	Major Subordinate Commands
PDES	Product Data Exchange using STEP
PDF	Portable Document File
PEOs	Program Executive Officers
PM	Program Manager
RFP	Request for Proposal
RFQ	Request for Quote
SGML	Standard Generalized Markup Language
SOW	Statement of Work
STEP	Standard for the Exchange of Product Model Data (ISO 10303)
SW	Software
TBD	To Be Determined
TIFF	Tagged Information File Format
TM	Technical Manual
WORM	Write Once Read Many
XML	Extensible Markup Language

APPENDIX C**DEFINITIONS**

C.1.0 Scope

This Appendix is not a mandatory part of the handbook. The information contained herein is intended for guidance only.

C.2.0 Purpose

To provide definition to many terms used throughout the Specification and handbook.

ADCS Policy	ADCS guidelines that provide criteria for migrating a document from one medium to another medium.
ADCS Tools	Hardware, software, and other devices used to migrate a document from one medium to another medium.
ANSI	American National Standards Organization, which promotes the use of U.S. standards internally, advocates U.S. policy and technical positions in international and regional standards organizations, and encourages the adoption of international standards as national standards where these meet the needs of the user community.
Archive	A system administration operation that compresses one or more separate files into a single file on a removable magnetic or optical media for permanent long-term storage and data protection. The archival file also contains information to allow the compressed files to be extracted by a restoration program.
ASME	American Society of Mechanical Engineers, an organization founded in 1880 and grown into an international society. ASME has thirty-eight technical divisions which offer invaluable resources to the engineering professional.
Attributes Revision	An identified and tracked change to a product structure element, document or document representation. The status of a particular revision may be released or working.
Budget	The funds programmed for document conversion.
CD ROM	Compact Disk Read Only Memory, a non-volatile optical data storage medium using the same physical format as audio compact discs, readable by a computer with a CD-ROM drive. A CD can store around 640 megabytes of data - about 12 billion bytes per pound weight.
Convert Document	A document migrated from one medium to another. The second-generation copy of an original document having been converted to digital form (digitized document).
Converted Data	A second-generation copy of data in digital form.
Cost Analysis Tools	Methods (automated or manual) used to evaluate cost.
Data	Information used as a basis for reasoning, discussion, calculation, and decision making.

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Data Information Packets	Support documents, general documents, product/ asset configuration, configuration change control, configuration management action item status, project management, engineering parts list, basic document protection, basic files, and basic document representation is broken into data information input packets. These data information packets define the data and metadata that can reside in the database. There are 10 packets.
Data Item (Data Elements)	A generic term to any kind of data. Example data items include models, documents, drawings, and metadata.
Data Item Description (DID)	A completed form that defines the data required of a contractor. The form specifically defines the data content, preparation instructions, format, and intended use. DIDs are prepared in accordance with DOD-STD-963.
Department of Defense (DoD) Standard	A standard used to satisfy primarily multiple, military unique applications. There are five types of DoD standards: interface standards, design criteria standards, manufacturing process standards, standard practices, and test method standards.
Deviation	A specific written authorization to depart from a particular requirement(s) of an item's current approved configuration documentation for a specific number of units or a specified period of time, and to accept an item which is found to depart from specified requirements, but nevertheless is considered suitable for use "as is" or after repair by an approved method. A deviation differs from an engineering change in that an approved engineering change requires corresponding revision of the item's current approved documentation, whereas a deviation does not allow a revision of the item's current approved documentation.
Digital Data	A copy of data in a binary or numerical form that is interpreted by a computer. Often referred to as "electronic" data.
Document	A self-contained body of information or data which can be packaged for delivery on a single medium. Some examples of documents are: drawings, reports, standards, data bases, application software, and engineering drawings. Document is a form of Product Data. (Reference: MIL-STD-2549)
Document Conversion	The process of migrating a document from its original medium of storage to another medium of storage.
Document Management	The life-cycle management of documents in accordance with approved records management policies, processes and procedures.
Document Representation	A set of digital files which, when viewed or printed together, collectively represent the entire document (for example, a set of raster files or a set of CAD files). A document may have more than one document representation. (reference: MIL-STD-2549).
EIA	Electronics Industries Association, an organization founded to serve its membership, representing the entire electronic manufacturing community, encompassing the entire spectrum of US electronics manufacturing.

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Email	The transmission of memos and messages over a network. User can send mail to a single recipient or broadcast it to multiple users. An email system requires a messaging system, which provides the store and forward capability and a mail program that provides the user interface with send and receive functions.
Encrypted	To encode data for security purposes.
Engineering Change	A change to the current approved documentation of an item.
Engineering Data	Documents and files such as engineering drawings, technical manuals, models, parts lists, wire lists, specifications, standards, reports, instructions, requirement, directives, engineering change action documents, diagrams, and schematics. Engineering data is a form of Document which is a type of Product Data.
Facilities	Where a document is managed.
First Article	Includes pre-production models, initial production samples, test samples, first lots, pilot models and pilot lots. If it may be necessary to test a first article for conformance with specification requirements prior to regular production
Floppy Disk	A soft magnetic disk, portable, because they can be removed from a disk drive. They're slower to access than hard disks, have less storage capacity, but they much less expensive.
Formats	Specific characteristics (shape, size, style), organization, arrangement, or general layout of a collection of information.
Function	The action or actions which an item is designed to perform.
Functional Baseline	The approved functional configuration data (reference: MIL-STD-2549).
Functional Characteristics	Quantitative performance parameters and design constraints, including operational and logistic parameters and their respective tolerances. Functional characteristics include all performance parameters, such range, speed, lethality, reliability, maintainability and safety.
Handbook	A handbook is a guidance document that enhances user awareness by providing engineering information; lessons learned; possible options to additional technical issues; classification of similar item, materials, or processes; interpretative direction and techniques; and any other type of guidance information that may help the Government or its contractors in the design, construction, selection, management, support, or operation of systems, products, processes or services.
Hardware	Items made of material, such as weapons or computers and their components.
Human Resources	People
IEEE	Institute of Electrical and Electronic Engineers, an organization formed to provide a major entity that would offer increased responsiveness to the standards interests of IEEE societies and their representative industries.
Imaging	The technology that uses scanners to capture and convert document to a digital form.
Information	Facts or knowledge communicated or received.
Intelligent Document	A document (in digital form) containing, in addition to its primary data, embedded data used to enhance use of the primary data and/or facilitate

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	conveyance of the document's information.
Interoperability	The ability of the defense services and agencies to exchange information with each other (joint operations) or with an allied system (combined operations) to enable them to operate effectively together.
ISO	International Organization for Standardization, a non-governmental organization, whose mission is to promote the development of standardization and related activities in the world with a view to facilitate the international exchange of goods and services and to develop cooperation in the spares of intellectual, scientific, technical and economic activity.
Magnetic Tape	A data storage medium consisting of a magnet usable oxide coating on a thin plastic strip, commonly used for backup and archiving.
Medium	The environment on which information resides (e.g., microfilm, electronic, paper, etc.)
Metadata	Elements of information that describe data, such as document identifier, date, owner, release level, format, keywords, data location, approval authorizations, part identifier, and part name. Metadata is a form of Product Data.
MIL-STD-2549	Information pertaining to drawings, specification, standards, software and software
Native Format	The file structure produced by the application which created the files.
Non-Converted Document	A document NOT selected for migration.
Non-Migratable Document	A document not converted due to technological limitations.
Non-Government Standard	A standard document developed by a private sector association, organization, or technical society which plans, develops, establishes or coordinates standards, specifications, handbooks, or related documents. The term does not include standards of industrial companies. Non-government standards adopted by the DoD are listed in the DoDISS.
Off-Line Archival Storage	Persistent maintenance of information on a machine removable media such as tape or compact disk.
Original Document	A document being managed as the organization record. The first generation version of a document from which copies or reproductions are made.
Permanent Record	Records determined by NARA to have sufficient historical or other value to warrant preservation beyond the time they are needed for administrative, legal, or fiscal purposes.
Product Data	Documents files, and metadata related to a product's requirements, design, implementation and support. Includes, but is not limited to, documents and files such as engineering drawings, technical manuals, models, parts lists, wire lists, specifications, standards, reports, instructions, requirements, directives, engineering change action documents and product structures. Metadata includes data about documents and product structures.
Record	A record consists of information, regardless of medium, detailing the

	transaction of business.
Records Management	The planning, controlling, directing, organizing, training, promoting, and other managerial activities involving the life-cycle of information, including creation, maintenance (use, storage, retrieval) and disposal, regardless of media.
Screen a Document	Review for compliance with conversion policy.
Source Document	The original document that has passed through the conversion process.
Standard	A document that establishes uniform engineering or technical criteria, methods, processes and practices.
Support Equipment	Equipment and computer software required to maintain, test, or operate a product or facility in it's intended environment.
System	A complete system includes all equipment, related facilities, material, software, services, and personnel required for its operation and support to the degree that it can be considered a self-sufficient unit in its intended operational environment.
Tailoring	The process by which individual requirements (sections, paragraphs, or sentences) of the selected specifications, standards, and related documents are evaluated to determine the extent to which they are most suitable for a specific system and equipment acquisition and the modification of these requirements to ensure that each achieves an optimal balance between operational needs and cost.
Technical Data	Technical data is recorded information (regardless of the form or method of recording) of a scientific or technical nature (including computer software documentation.)
Technical Data Package	A technical description of an item adequate for supporting an acquisition strategy, production, engineering, and logistics support. The description defines the required design configuration and procedures required to ensure adequacy of item performance. It consists of all applicable technical data such as drawings and associated lists, specifications, standards, performance requirements, quality assurance provisions and packaging details.
Web-based Access	The ability to access and use documents through a commercial web browser.
Web Enabled	Able to connect to or be used on the World Wide Web

APPENDIX D

SAMPLE USER FORMS

D.1.0 Scope

This Appendix is not a mandatory part of the handbook. The information contained herein is intended for guidance only.

D.2.0 Purpose

The following series of forms will provide users adequate documentation of the various phases of document conversion. They may be downloaded in the existing form, or tailored to meet specific project needs.

D.3.0 Appendix Contents

D.3.1 Program Infrastructure Questionnaire

D.3.2 User Worksheet

D.3.3 Validation Tables for Functional Areas

D.3.3.1 Mechanical

D.3.3.2 Electrical

D.3.3.3 Architectural (AEC)

D.3.3.4 Mapping (GIS)

D.3.4 First Article Sign-off Sheet

D.3.5 Validation Sign-off Sheet

D.3.6 Packet Tracking Checksheet

D.3.7 Deliverables Schedule

D.3.1 PROGRAM INFRASTRUCTURE QUESTIONNAIRE

The following information is designed to help in determining the hardware, software and networking capabilities/requirements for the *{insert name of program or task}*. This information will aid in determining the Automated Document Conversion Strategy (ADCS) for this program.

It will be used to develop a Government Concept of Operation (GCO) and will be provided in an RFP or RFQ to potential bidders for developing a document conversion proposal. It will also provide the information necessary to produce a Guidance Specification to become part of a Statement of Work (SOW). The types of engineering document, delivery method, access media, mechanics of interchange, and use of the document/data required for this program will be based upon your responses to this questionnaire.

Please fill out this questionnaire as completely as possible and return it to the program office no later than _____.

Questions may be directed to: _____

PHONE: _____

FAX: _____

ADDRESS: _____

E-MAIL: _____

I. General Information

List general information about your organization and point of contact for your functional area.

FUNCTION: _____

POC: _____

PHONE: _____

CODE: _____

General Document/Data Requirements (e.g., Engineering Drawings, GIS, Technical Manuals, etc.): _____

II. Requirements

Indicate the intended use of each engineering related document that your organization requires to perform assigned functions in support of this program. The different means of using the data are described below:

- View Only (V) The ability to examine a document/data file without the ability to change it. This includes viewing selected portions of one or several documents as well as side-by-side comparisons of documents.
- Comment/Annotate (C) The ability to evaluate and highlight for future reference or to make annotations, approvals, and comments without the ability to change the original file. Annotations are associated with a specific item or location within a document such that the annotations are displayed whenever that point or area of the document is displayed.
- Process/Extract/Transform (P) The ability to extract and modify the format, composition, and structure of all or a portion of the document/data into another usable form without affecting the original content or format.
- Edit/Update/Maintain (E) The ability to change the document/data either directly or through controlling software, in the active files on the host computer.
- Archive (A) The placing of document/data into a repository to preserve it for future use.
- Secondary Distribution (S) Your organization distributes the document/data to another organization.

Target Process Table

Place an X in the box that specifies the intended functional use of the data in the target process. For example if the data converted was to be used for Updating of the Procurement information an X would be placed in the “P” column by the “Procurement” target process row.

	TARGET PROCESS DESCRIPTION	V	C	P	E	A	S
Engineering Drawing	Design						
	Design Analysis						
	Production						
	Procurement						
	Support/Maintenance						
	Technical Manuals						
	Testing						
	Other:						
	Other:						
Text Related	Technical Manuals						
	Schedules						
	Illustrations						
	Specifications						
	Tables & Charts						
	Other:						
	Other:						

V = View only

C = Comment/annotate

P = Process/extract/transform

E = Edit/update/maintain

A = Archive

S = Secondary distribution

III. Hardware Capabilities

List computer and peripheral equipment that will be used by your organization for the process that the engineering data is being converted for. As an example, if your conversion effort is for CAD/CAM and your CAD system is on a SUN workstation, you should specify the model under the Workstation row.

Hardware Capabilities Table

HARDWARE	
Personal Computers	
Workstation(s) (UNIX,etc.)	
Mainframe	

Other: _____

IV. Software Capabilities

List operating systems and versions used with hardware described previously. Describe the most common and/or standard commercial software products that have been selected by your organization for each category. Provide version numbers if possible.

Software Capabilities Table-

	PC BASED		WORKSTATION BASED		MAINFRAME BASED	
	OS	SOFTWARE	OS	SOFTWARE	OS	SOFTWARE
CAD						
CAM						
CAE						
GIS						
Text : Word processing						
Scheduling						
Program Management						
Graphic/Illustration						
Other						

V. Network Capabilities

Describe Local and Wide Area Network (LAN and WAN) capabilities that will be used in support of this program.

	Equipment/Product
Network operating system(s)	
Servers Ie:File, Communications,email, etc.	
Network Protocols	
External Communication Capabilities Ie:Direct line, DDN, NEWNET,Internet, Modems, etc.	

VI. Standards/Specifications

Indicate your organization's familiarity and use of the following standards/specifications by putting a check next to the appropriate documents:

Govt. Specifications	Govt. Standards	Commercial
<input type="checkbox"/> MIL-PREF-28000 (IGES)	<input type="checkbox"/> MIL-STD-100 (Drawings)	<input type="checkbox"/> ISO 10303 (STEP) <input type="checkbox"/> AP201 (2D) <input type="checkbox"/> AP203 (3D)
<input type="checkbox"/> MIL-PREF-28001 (SGML)	<input type="checkbox"/> MIL-STD-490 (Spec Practices)	<input type="checkbox"/> ANSI/EIA 548 (EDIF)
<input type="checkbox"/> MIL-PREF-28002(Raster)	<input type="checkbox"/> MIL-STD-974 (CITIS)	<input type="checkbox"/> ANSI/IEEE 1076 (VHDL)
<input type="checkbox"/> MIL-PREF-28003 (CGM)	<input type="checkbox"/> MIL-STD-2549 (Config Mgt) <input type="checkbox"/> MIL-HDBK-61	<input type="checkbox"/>
<input type="checkbox"/> MIL-DTL-3100 (TDPs)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MIL-STD-38764 (TMs Std Practice)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MIL-	<input type="checkbox"/>	<input type="checkbox"/>

OTHER (List) _____

D.3.2 USER WORKSHEET

USER WORKSHEET

The following questions are designed to help Program Managers identify the information needed to include in the Performance Specification. Providing accurate information to your contractor is critical to assuring successful conversion. Use of the following tables will progressively build a solid foundation of pertinent project-specific information. This worksheet follows Table II, Document Conversion Process.

D.3.2.1 For the {insert weapon system}, there may be differing numbers of drawings for varying drawing types. After separating the drawings by type, determine the number and type of your drawings.

Check those that apply:	Insert total # of drawings
Mechanical <input type="checkbox"/>	
Electrical <input type="checkbox"/>	
Civil <input type="checkbox"/>	
Architectural <input type="checkbox"/>	
Electronic <input type="checkbox"/>	
GIS Mapping <input type="checkbox"/>	
Technical Manuals <input type="checkbox"/>	
Graphics/Illustrations/Foldouts <input type="checkbox"/>	

D.3.2.2 Identify who will use the document by type: Fill in the corresponding blank with one of the following users: Acquisition, Engineering, Operations, Maintenance, Logistics, Production. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Document Type	Insert Users
Mechanical	
Electrical	
Civil	
Architectural	
Electronic	
GIS Mapping	
Technical Manuals	
Graphics/Illustrations/Foldouts	

D.3.2.3 Detail users intent for the documents by type. Possible uses are :View only, Comment/Annotate, Edit/Update/Maintain, Process/Extract/Transform, Archive, Secondary Distribution, Analysis, Production, Test. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Target Process Table

Place an X in the box that specifies the intended functional use of the data in the target process. For example if the data converted was to be used for Updating of the Procurement information an X would be placed in the “P” column by the “Procurement” target process row.

	TARGET PROCESS DESCRIPTION	V	C	P	E	A	S
Engineering Drawing	Design						
	Design Analysis						
	Production						
	Procurement						
	Support/Maintenance						
	Technical Manuals						
	Testing						
	Other:						
	Other:						
Text Related	Technical Manuals						
	Schedules						
	Illustrations						
	Specifications						
	Tables & Charts						
	Other:						
	Other:						

V = View only C = Comment/annotate P = Process/extract/transform
 E = Edit/update/maintain A = Archive S = Secondary distribution

D.3.2.4. Identify the users infrastructure, as it is expected to be available after conversion. Insert the appropriate information in the space provided. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Users	Hardware	Software	Networks	Web Enabled	Trained Personnel
Acquisition					
Engineering					
Operations					
Maintenance					
Logistics					
Production					

D.3.2.5. Determine the existing format of all documents and provide a breakdown of their type and number. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Document Type	#Paper	#Mylar	#Aperture Cards	#Microfiche	Document Size
Mechanical					
Electrical					
Civil					
Architectural					
Electronic					
GIS Mapping					
Technical Manuals					
Graphics/Illus/ Foldouts					

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Document Type	#2D /3D	# Raster	# Vector	# Text	Document Image File	GIS Mapping	Graphic & Audio
Mechanical							
Electrical							
Civil							
Architectural							
Electronic							
GIS Mapping							
Technical Manuals							
Graphics/ Illustrations/ Foldouts							

D.3.2.6. Determine standards for interchange of the converted document data. In the corresponding tables, break down the number of existing documents by their existing formats.

Mechanical Documents

Composed Documents:	DXF	IGES	STEP AP ?	?	?	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMI CS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
Document Image File									
Total Number of Documents									

Electrical Documents

Composed Documents:	PDF	IGES	RTF	ASCHII	HTML	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMII CS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
Document Image File									
Total Number of Documents									

AEC Documents

Composed Documents:	PDF	IGES	RTF	ASCHII	HTML	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMICS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
Document Image File									
Total Number of Documents									

Mapping (GIS) Documents

Composed Documents:	PDF	IGES	RTF	ASCHII	HTML	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMICS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
GIS Mapping									
Document Image File									
Total Number of Documents									

D.3.2.7. Select the preferred media for delivery. User may find it helpful to check of the following which is best suited for the pending project. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Output Media	Labeling of Output
9 Track Magnetic Tape	Printed Label
Optical Disk (CD-ROM)	Print ID/Index Number on Media
Re-Writable Compact Disk	Print ID/Index Number on Media
Floppy Disk	Printed Label
Telecommunications Media (email, secure network, encrypted)	Electronic tag
WEB Enabled	URL tag
Contract/Contractor specific	To be determined

D.3.2.8. Separate the total number of documents by intended conversion process and place them into document packets. Insert the appropriate information below.

Documents Format	Total Number of Documents	Size	Number Included in First Article Packet	Number Included in Second Packet	Number Included in Production Packets
Paper		A			
		B			
		C			
		D			
		E			
		F			
Mylar					
Microfiche					
Drawing					
Card					
Raster					
Vector					
Text					
Document Image File					
GIS Mapping					
Graphics					
Number of Documents Validated					

D.3.2.9. Use the Sample Deliverables Schedule, Appendix D to facilitate communication with contractor. It list a series of Deliverable Dates throughout the conversion project. This form will be helpful to use throughout the conversion process because it documents the agreed upon date and allows for any deviation from the original schedule. This form should be modified and initialed if changes are necessary.

D.3.2.10. Determine the process to assure Packet Tracking. Paragraph 4.3.1.2 in the Handbook defines the Packet Tracking Process. Appendix D includes a sample Packet Tracking Check Sheet for use. Following is a copy of the Check Sheet.

Index Item	To Contractor	From Contractor
Packet Tracking Number		
Contractor name/CAGE		
Contractor Number		
Weapon System		
If Digital: the file name		
Index name		
If Hard Copy: type of media		
Number of sheets		
Method of shipment and tracking number		
Security Classification		
Disposition of Originals		

D.3.3 Output Format User Worksheet

Use separate Output Format User Worksheets for additional Target Processes.

D.3.3.1 What is the functional type for your drawings? Select the type from the table below and place the code on the line to the right.

_____ (1)

Functional Type	Code
Mechanical Drawings	M
Electrical Drawings	E
ACE Drawings	A
GIS Mapping Drawings	G

D.3.3.2 What is your target process. Select your target process from the table below and place the code on the line to the right.

_____ (2)

Target Process	Code
Design	D
Design Analysis	A
Production	P
Procurement	R
Support/Maintenance	S
Technical Manuals - Drawing	E
Testing	T
Technical Manuals - Text	M
Schedules	C
Illustrations	I
Specifications	F
Tables and Charts	B

D.3.3.3 What is the target hardware? Select the type of hardware from the table below and place the code on the line to the right.

_____ (3)

Hardware Type	Code
PC	P
UNIX	U
Mainframe	M

D.3.3.4 What is the target system import format? Select the format from the table below and place the code on the line to the right.

_____ (4)

Import Format	Code
ASCII - Standard Text Format	A
CALS Type 1 - Raster format	L
CGM V.4 - Computer Graphics Meta-file	C
DXF - Most common storage format	D
EDIF - Electronic Data Interchange Format	E
HTML - Hypertext Format	H
IGES - Initial Graphics Exchange Format	I
JEDMICS - Joint Engineering Data Management Information and Control System	J
PDF - Portable Data Format	P
RTF - Rich Text Format	R
STEP AP 201- Standard for the Exchange of Product Data	S
STEP AP 203- Standard for the Exchange of Product Data	Z
TIFF - Tagged Image File Format	T

D.3.3.5 What is the intended functional use of the data? Select the functional use from the table below and place the code on the line to the right.

_____ (5)

Functional Use	Code
View Only	V
Comment/ Annotate	C
Process/Extract/Transform	P
Edit/Update/Maintain	E
Archive	A
Secondary Distribution	S

D.3.3.6 Copy the letters from each of the lines on the right and place them on the following line to determine your five letter code:

_____ (1) _____ (2) _____ (3) _____ (4) _____ (5)

D.3.3.7 To determine the output format, find the five-letter code in the table below and it will give you your output format. A description of the Output Format Types is in the table following the Five-Letter Code table.

Five-Letter-Code	Output Format
MDPDV	
MAPDV	
MPPDV	
MMPDV	
MMPDV	
MPPDV	
MSUDV	
MTUEP	
MDUJE	M3DCP
???	

Output Format Description

Output Format	Description
M2DCC	Mechanical 2D CAD Capable
M2DCP	Mechanical 2D CAD Perfect
M3DCP	Mechanical 3D CAD Perfect
E2DCC	Electrical 2D CAD Capable
E2DCP	Electrical 2D CAD Perfect
ESCH	Electrical Schematic
A2DCC	AEC 2D CAD Capable
A2DCP	AEC 2D CAD Perfect
A3DCP	AEC 3D CAD Perfect
G2DCC	Mapping (GIS) 2D CAD Capable
G2DCP	Mapping (GIS) 2D CAD Perfect
G3DCP	Mapping (GIS) 3D CAD Perfect

D.3.3.8 The table below lists the recommended output formats. Those formats that are required are designated with an "R". The formats designated with an "O" are optional.

Target Format	CMG	DXF	EDIF	IGES	STEP
Mechanical 2D CAD Capable					
Mechanical 2D CAD Perfect					
Mechanical 3D CAD Perfect		O		R	O
Electrical 2D CAD Capable					
Electrical 2D CAD Perfect					
Electrical Schematic					
AEC 2D CAD Capable					
AEC 2D CAD Perfect					
AEC 3D CAD Perfect					
Mapping (GIS) 2D CAD Capable					
Mapping (GIS) 2D CAD Perfect					
Mapping (GIS) 3D CAD Perfect					

N/A - Not Applicable O - Optional Format R - Required Format

D.3.4 Validation Tables for Functional Areas

D.3.4.1 **Validation Table for Mechanical Drawing Types**

Requirement	Mechanical 2D CAD Capable	Mechanical 3D CAD Capable	Mechanical 3D CAD Perfect
General Requirements			
File Intelligence			
Line Styles			N/A
Symbol Libraries			
Extraneous Markings			
Information Transfer			
Revision Histories			
Revision Block			
Dates			
Revision Balloons			
SQAPs and QARs			
Text Size			
Sheet Size			
Assembly Drawings			
Title Blocks			
Indexing			
Military Specification Drawings			
XREFs			
Illegible Items			
Drawing Protection			
Quality Assurance Process			
Data Outside Border			
Disposition of Originals			
JEDMICS C4 DPI			
Layering and Color			
Dimensionality			
Threads			
Line Width			
Bilateral Tolerances			
Drawing Scale			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Mechanical Drawing Types (Continued)

Requirement	Mechanical 2D CAD Capable	Mechanical 3D CAD Capable	Mechanical 3D CAD Perfect
Title Block Scale			
JEDMICS-C4 Scale			
LTSCALE			
Hatching			N/A
Attributed Blocks			
Explode Blocks			
DIM-CEN			
"DIMCEN" Tolerance			
Circle Centerlines			
Converted Dimensions			
Association			
Leader Lines			
Arc/Circle Leader Lines			
Geometric Tolerance Symbols			
Diameter References			
Dimension Variables			
DIM TEXT			
Moving Dimensions			
Text Style			
Case			
Legibility			
Justification			
Width			
Heights			
Spacing			
CAGE			
Contractor Information			
Material Engineer's Stamp			
Multiple Signatures			
Signatures			
FSCM			
Code Identification Numbering			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Mechanical Drawing Types (Continued)

Requirement	Mechanical 2D CAD Capable	Mechanical 3D CAD Capable	Mechanical 3D CAD Perfect
Scale Notes Renaming			
Title Block			
Justification			
Order of Notes			
Initial Note			
Spacing of Notes			
Additional Notes			
Precious Metal Indicator Code (PMIC)			
Physical Properties			
Current Notes			
Unnumbered Notes			
Parts Lists			
Drawing Standard			
Conversion			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

D.3.4.2

Validation Table for Electrical Drawing Types

Requirement	Electrical 2D CAD Capable	Electrical 2D CAD Perfect	Electrical Schematic
General Requirements			
File Intelligence			
Line Styles			
Title Blocks			
Symbol Libraries			
Extraneous Markings			
Information Transfer			
Revision Histories			
Revision Block			
Dates			
Revision Balloons			
SOAPs and QARs			
Index Information	N/A		
Text Size			
Sheet Size			
Conversion Format	N/A	N/A	
Assembly Drawings			N/A
Title Blocks			
Indexing			
Military Specification Drawings			
XREFs			
Illegible Items			
Drawing Protection			
Quality Assurance Process			
Data Outside Border			
Disposition of Originals			
JEDMICS C4 DPI			
Color			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Electrical Drawing Types (Continued)

Requirement	Electrical 2D CAD Capable	Electrical 2D CAD Perfect	Electrical Schematic
Dimensionality			
Reference Designators	N/A	N/A	
Threads	N/A		N/A
Line Width			
Bilateral Tolerances			N/A
Drawing Scale			
Title Block Scale			
JEDMICS-C4 Scale			
LTSCALE			
Hatching			
Attributed Blocks			
Explode Blocks			
DIM-CEN			N/A
"DIMCEN" Tolerance			N/A
Circle Centerlines			N/A
Converted Dimensions			N/A
Association			N/A
Leader Lines			N/A
Arc/Circle Leader Lines			N/A
Geometric Tolerance Symbols			N/A
Diameter References			N/A
Dimension Variables			N/A
DIM TEXT			N/A
Moving Dimensions			N/A
Text Style			
Case			
Legibility			
Justification			
Width			
Heights			
Spacing			
CAGE			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Electrical Drawing Types (Continued)

Requirement	Electrical 2D CAD Capable	Electrical 2D CAD Perfect	Electrical Schematic
Contractor Information			
Electrical Engineer's Stamp			
Multiple Signatures			
Signatures			
FSCM			
Code Identification Numbering			
Scale Notes Renaming			
Title Block			
Justification			
Order of Notes			
Initial Note			
Spacing of Notes			
Additional Notes			
Precious Metal Indicator Code (PMIC)			
Physical Properties		N/A	N/A
Current Notes			
Unnumbered Notes			
Parts Lists			
Drawing Standard			
Conversion			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

D.3.4.3

Validation Table for AEC Drawing Types

Requirement	AEC 2D CAD Capable	AEC 2D CAD Perfect	AEC 3D CAD Perfect
General Requirements			
File Intelligence			
Geometric Representation	N/A	N/A	
Line Styles			N/A
Symbol Libraries			
Extraneous Markings			
Information Transfer			
Revision Histories			
Revision Block			
Dates			
Revision Balloons			
SOAPs and QARs			
Text Size			
Sheet Size			
Assembly Drawings			
Title Blocks			
Indexing			
Military Specification Drawings			
XREFs			
Illegible Items			
Drawing Protection			
Quality Assurance Process			
Data Outside Border			
Disposition of Originals			
JEDMICS C4 DPI			
Layering and Color			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for AEC Drawing Types (Continued)

Requirement	AEC 2D CAD Capable	AEC 2D CAD Perfect	AEC 3D CAD Perfect
Dimensionality			
Line Width			
Bilateral Tolerances		N/A	
Drawing Scale		N/A	
Title Block Scale			
JEDMICS-C4 Scale			
LTSCALE			
Hatching		N/A	
Mircostation			N/A
AUTOCAD			N/A
Attributed Blocks			
Explode Blocks			
DIM-CEN		N/A	
DIMCEN Tolerance		N/A	
Circle Centerlines		N/A	
Converted Dimensions			
Association			
Leader Lines			
Arc/Circle Leader Lines			
Diameter References			
Dimension Variables			
DIM TEXT			
Moving Dimensions			
Text Style			
Case			
Legibility			
Justification			
Width			
Heights			
Spacing			
CAGE			
Contractor Information			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Electrical Drawing Types (Continued)

Requirement	AEC 2D CAD Capable	AEC 2D CAD Perfect	AEC 3D CAD Perfect
AEC Engineer's Stamp			
Multiple Signatures			
Signatures			
FSCM			
Code Identification Numbering			
Scale Notes Renaming			
Title Block			
Justification			
Order of Notes			
Initial Note			
Spacing of Notes			
Additional Notes			
Current Notes			
Unnumbered Notes			
Drawing Standard			
Conversion			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

D.3.4.4

Validation Table for Mapping (GIS) Drawing Types

Requirement	Mapping 2D CAD Capable	Mapping 3D CAD Perfect	Mapping 3D CAD Perfect
General Requirements			
File Intelligence			
Line Styles			
Symbol Libraries			
Extraneous Markings			
Information Transfer			
Revision Histories			
Revision Block			
Dates			
Revision Balloons			
SOAPs and QARs			
Text Size			
Sheet Size			
Assembly Drawings			
Title Blocks			
Indexing			
Military Specification Drawings			
XREFs			
Illegible Items			
Drawing Protection			
Quality Assurance Process			
Data Outside Border			
Disposition of Originals			
JEDMICS C4 DPI			
Layering and Color			
Dimensionality			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Mapping (GIS) Drawing Types (Continued)

Requirement	Mapping 2D CAD Capable	Mapping 3D CAD Perfect	Mapping 3D CAD Perfect
Threads	N/A	N/A	
Line Width		N/A	
Bilateral Tolerances			
Drawing Scale			
Title Block Scale			
JEDMICS-C4 Scale			
LTSCALE			
Hatching			
Microstation			N/A
AUTOCAD			N/A
Attributed Blocks			
Explode Blocks			
DIM-CEN			
"DIMCEN" Tolerance			
Circle Centerlines			
Converted Dimensions			
Association			
Leader Lines			
Arc/Circle Leader Lines			
Geometric Tolerance Symbols	N/A	N/A	
Diameter References			
Dimension Variables			
DIM TEXT			
Moving Dimensions			
Text Style			
Case			
Legibility			
Justification			
Width			
Heights			
Spacing			
CAGE			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

Validation Table for Mapping (GIS) Drawing Types (Continued)

Requirement	Mapping 2D CAD Capable	Mapping 3D CAD Perfect	Mapping 3D CAD Perfect
Contractor Information			
GIS Engineer's Stamp			
Multiple Signatures			
Signatures			
FSCM			
Code Identification Numbering			
Scale Notes Renaming			
Title Block			
Justification			
Order of Notes			
Initial Note			
Spacing of Notes			
Additional Notes			
Precious Metal Indicator Code (PMIC)	N/A	N/A	
Physical Properties	N/A	N/A	
Current Notes			
Unnumbered Notes			
Parts Lists	N/A	N/A	
Drawing Standard			
Conversion			

I – Inspection D – Demonstration T – Test A – Analysis N/A – Not applicable

D.3.5

**FIRST ARTICLE
VALIDATION SIGNOFF SHEET**

Validation criteria	Metric	Yes	No
Format	Is the First Article sampling of converted drawing/document files in the correct digital file format specified?		
Dimensionality	Have the requirements set forth in the Detailed Performance Specification been met for each and every item?		
Geometric Representation	Is the representation exactly as specified in the Performance Specification?		
Metadata (Required)	Are the Required JEDMICS/CDEX Data Elements included and are they accurately listed?		
Metadata (Optional)	Are the Data Elements added from the Optional category (both ADCS specific and Product Data) included and listed accurately?		
Media	Were the converted documents delivered on the Media specified?		
Originals	Originals disposed of as specified?		

Packet # _____ Type _____ Conversion Required _____

Did this packet produce a successful First Article Conversion? yes _____ no _____

Name of Validator _____ Approved by _____

Is the First Article rejected? yes _____ no _____

Reason for rejection _____

Date First Article was resent to the contractor _____

Date second attempt returned from contractor _____

Did second attempt meet required specifications? yes _____ no _____

Was Second attempt validated? yes _____ no _____

Name of Validator _____ Approved by _____

Approval Date _____

D.3.6

VALIDATION SIGNOFF SHEET

Validation criteria	Metric	Yes	No
Format	Are the converted drawing/document files in the digital file format specified?		
Dimensionality	Have the requirements set forth in the Guidance Specification been met for each and every item?		
Geometric Representation	Is the representation exactly as specified in the Guidance Specification?		
Metadata (Required)	Are the Required JEDMICS/CDEX Data Elements included and are they accurately listed?		
Metadata (Optional)	Are the Data Elements added from the Optional category (both ADCS specific and Product Data) included and listed accurately?		
Media	Were the converted documents delivered on the Media specified?		
Originals	Originals disposed of as specified?		

Packet # _____ Type _____ Conversion Required _____

Did this packet produce a successful conversion? yes _____ no _____

Name of Validator _____ Approved by _____

Reason for rejection _____

Name of Validator _____ Approved by _____

Approval Date _____

D.3.7

PACKET TRACKING CHECKLIST

Program Manager:

Packet Tracking Number _____

Contractor Name/CAGE _____

Contract Number _____

Weapon System _____

Digital File Name or Index _____

Hard Copy Media Type/Number
of Sheets _____

Method of Shipment and
Tracking Number _____

Security Classification _____

Disposition of Originals _____

Contractor:

Delivery Date and Time _____

Accepted By: _____
Name

D.3.8

DELIVERABLES SCHEDULE

	Contract Date	Actual Date	Initials
First Article Packet Delivery Date	___/___/___	___/___/___	_____
First Article Packet Returned	___/___/___	___/___/___	_____
Validation of First Article Packet Complete	___/___/___	___/___/___	_____
First Production Packet Delivered	___/___/___	___/___/___	_____
First Production Packet Returned	___/___/___	___/___/___	_____
Subsequent Production Packet Delivered	___/___/___	___/___/___	_____
Post Production Audit	___/___/___	___/___/___	_____

Contractor

Program Manager



D.3.9 EXAMPLE of USER WORKSHEET

USER WORKSHEET

The following questions are designed to help Program Managers identify the information needed to include in the Performance Specification. Providing accurate information to your contractor is critical to assuring successful conversion. Use of the following tables will progressively build a solid foundation of pertinent project-specific information. This worksheet follows Table II, Document Conversion Process.

D.3.2.1 For the {insert weapon system}, there may be differing numbers of drawings for varying drawing types. After separating the drawings by type, determine the number and type of your drawings.

Check those that apply:	Insert total # of drawings
Mechanical <input checked="" type="checkbox"/>	5,000
Electrical <input type="checkbox"/>	
Civil <input type="checkbox"/>	
Architectural <input type="checkbox"/>	
Electronic <input type="checkbox"/>	
GIS Mapping <input type="checkbox"/>	
Technical Manuals <input type="checkbox"/>	
Graphics/Illustrations/Foldouts <input type="checkbox"/>	

D.3.2.2 Identify who will use the document by type: Fill in the corresponding blank with one of the following users: Acquisition, Engineering, Operations, Maintenance, Logistics, Production. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Document Type	Insert Users
Mechanical	<i>Acquisition & Engineering</i>
Electrical	
Civil	
Architectural	
Electronic	
GIS Mapping	
Technical Manuals	
Graphics/Illustrations/Foldouts	

D.3.2.3 Detail users intent for the documents by type. Possible uses are :View only, Comment/Annotate, Edit/Update/Maintain, Process/Extract/Transform, Archive, Secondary Distribution, Analysis, Production, Test. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Target Process Table

Place an X in the box that specifies the intended functional use of the data in the target process. For example if the data converted was to be used for Updating of the Procurement information an X would be placed in the “P” column by the “Procurement” target process row.

	TARGET PROCESS DESCRIPTION	V	C	P	E	A	S
Engineering Drawing	Design				X		
	Design Analysis		X				
	Production						
	Procurement						
	Support/Maintenance						
	Technical Manuals						
	Testing						
	Other:						
	Other:						
Text Related	Technical Manuals						
	Schedules						
	Illustrations						
	Specifications						
	Tables & Charts						
	Other:						
	Other:						

V = View only C = Comment/annotate P = Process/extract/transform
 E = Edit/update/maintain A = Archive S = Secondary distribution

D.3.2.4. Identify the users infrastructure, as it is expected to be available after conversion. Insert the appropriate information in the space provided. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Users	Hardware	Software	Networks	Web Enabled	Trained Personnel
Acquisition	<i>PC</i>	<i>ProE</i>			
Engineering	<i>UNIX</i>	<i>ProE</i>			
Operations					
Maintenance					
Logistics					
Production					

D.3.2.5. Determine the existing format of all documents and provide a breakdown of their type and number. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Document Type	#Paper	#Mylar	#Aperture Cards	#Microfiche	Document Size
Mechanical					
Electrical					
Civil					
Architectural					
Electronic					
GIS Mapping					
Technical Manuals					
Graphics/Illus/ Foldouts					

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Document Type	#2D /3D	# Raster	# Vector	# Text	Document Image File	GIS Mapping	Graphic & Audio
Mechanical		4,000	1,000				
Electrical							
Civil							
Architectural							
Electronic							
GIS Mapping							
Technical Manuals							
Graphics/ Illustrations/ Foldouts							

D.3.2.6. Determine standards for interchange of the converted document data. In the corresponding tables, break down the number of existing documents by their existing formats.

Mechanical Documents

Composed Documents:	DXF	IGES	STEP AP ?	?	?	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMI CS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster				4,000					
Vector			1,000						
Text									
Document Image File									
Total Number of Documents									

Electrical Documents

Composed Documents:	PDF	IGES	RTF	ASCHII	HTML	?	?	?	Total
Paper									

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Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMI CS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
Document Image File									
Total Number of Documents									

AEC Documents

Composed Documents:	PDF	IGES	RTF	ASCII	HTML	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMICS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
Document Image File									
Total Number of Documents									

Mapping (GIS) Documents

Composed Documents:	PDF	IGES	RTF	ASCII	HTML	?	?	?	Total
Paper									
Mylar									
Aperture Card									
Microfiche									
Size of Page, Drawing, Card, Binder, Book									
Processable Data Files:	TIFF	CALS Type 1	DXF	JEDMICS	EDIF	STEP AP 201	STEP AP 203	CGM V. 4	Total
2D / 3D									
Raster									
Vector									
Text									
GIS Mapping									
Document Image File									
Total Number of Documents									

D.3.2.7. Select the preferred media for delivery. User may find it helpful to check of the following which is best suited for the pending project. This information should result from a thorough investigation of the end user, possibly through use of the User Survey.

Output Media		Labeling of Output
9 Track Magnetic Tape		Printed Label
Optical Disk (CD-ROM)	X	Print ID/Index Number on Media
Re-Writable Compact Disk		Print ID/Index Number on Media
Floppy Disk		Printed Label
Telecommunications Media (email, secure network, encrypted)		Electronic tag
WEB Enabled		URL tag
Contract/Contractor specific		To be determined

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D.3.2.8. Separate the total number of documents by intended conversion process and place them into document packets. Insert the appropriate information below.

Documents Format	Total Number of Documents	Size	Number Included in First Article Packet	Number Included in Second Packet	Number Included in Production Packets
Paper		A			
		B			
		C			
		D			
		E			
		F			
Mylar					
Microfiche					
Drawing					
Card					
Raster	4,000		50	250	500
Vector	1,000		10	50	100
Text					
Document Image File					
GIS Mapping					
Graphics					
Number of Documents Validated					

D.3.2.9. Use the Sample Deliverables Schedule, Appendix D to facilitate communication with contractor. It list a series of Deliverable Dates throughout the conversion project. This form will be helpful to use throughout the conversion process because it documents the agreed upon date and allows for any deviation from the original schedule. This form should be modified and initialed if changes are necessary.

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D.3.2.10. Determine the process to assure Packet Tracking. Paragraph 4.3.1.2 in the Handbook defines the Packet Tracking Process. Appendix D includes a sample Packet Tracking Check Sheet for use. Following is a copy of the Check Sheet.

Index Item	To Contractor	From Contractor
Packet Tracking Number		
Contractor name/CAGE		
Contractor Number		
Weapon System		
If Digital: the file name		
Index name		
If Hard Copy: type of media		
Number of sheets		
Method of shipment and tracking number		
Security Classification		
Disposition of Originals		

D.3.3 Output Format User Worksheet

Use separate Output Format User Worksheets for additional Target Processes.

D.3.3.1 What is the functional type for your drawings? Select the type from the table below and place the code on the line to the right.

 M
(1)

Functional Type	Code
Mechanical Drawings	M
Electrical Drawings	E
ACE Drawings	A
GIS Mapping Drawings	G

D.3.3.2 What is your target process. Select your target process from the table below and place the code on the line to the right.

 D
(2)

Target Process	Code
Design	D
Design Analysis	A
Production	P
Procurement	R
Support/Maintenance	S
Technical Manuals - Drawing	E
Testing	T
Technical Manuals - Text	M
Schedules	C
Illustrations	I
Specifications	F
Tables and Charts	B

D.3.3.3 What is the target hardware? Select the type of hardware from the table below and place the code on the line to the right.

 U
(3)

Hardware Type	Code
PC	P
UNIX	U
Mainframe	M

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D.3.3.4 What is the target system import format? Select the format from the table below and place the code on the line to the right.

 J
(4)

Import Format	Code
ASCII - Standard Text Format	A
CALS Type 1 - Raster format	L
CGM V.4 - Computer Graphics Meta-file	C
DXF - Most common storage format	D
EDIF - Electronic Data Interchange Format	E
HTML - Hypertext Format	H
IGES - Initial Graphics Exchange Format	I
JEDMICS - Joint Engineering Data Management Information and Control System	J
PDF - Portable Data Format	P
RTF - Rich Text Format	R
STEP AP 201- Standard for the Exchange of Product Data	S
STEP AP 203- Standard for the Exchange of Product Data	Z
TIFF - Tagged Image File Format	T

D.3.3.5 What is the intended functional use of the data? Select the functional use from the table below and place the code on the line to the right.

 E
(5)

Functional Use	Code
View Only	V
Comment/ Annotate	C
Process/Extract/Transform	P
Edit/Update/Maintain	E
Archive	A
Secondary Distribution	S

D.3.3.6 Copy the letters from each of the lines on the right and place them on the following line to determine your five letter code:

 M D U J E
(1) (2) (3) (4) (5)

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D.3.3.7 To determine the output format, find the five-letter code in the table below and it will give you your output format. A description of the Output Format Types is in the table following the Five-Letter Code table.

Five-Letter-Code	Output Format
MDPDV	
MAPDV	
MPPDV	
MMPDV	
MMPDV	
MPPDV	
MSUDV	
MTUEP	
MDUJE	M3DCP
???	

Output Format Description

Output Format	Description
M2DCC	Mechanical 2D CAD Capable
M2DCP	Mechanical 2D CAD Perfect
M3DCP	Mechanical 3D CAD Perfect
E2DCC	Electrical 2D CAD Capable
E2DCP	Electrical 2D CAD Perfect
ESCH	Electrical Schematic
A2DCC	AEC 2D CAD Capable
A2DCP	AEC 2D CAD Perfect
A3DCP	AEC 3D CAD Perfect
G2DCC	Mapping (GIS) 2D CAD Capable
G2DCP	Mapping (GIS) 2D CAD Perfect
G3DCP	Mapping (GIS) 3D CAD Perfect

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D.3.3.8 The table below lists the recommended output formats. Those formats that are required are designated with an "R". The formats designated with an "O" are optional.

Target Format	CMG	DXF	EDIF	IGES	STEP
Mechanical 2D CAD Capable					
Mechanical 2D CAD Perfect					
Mechanical 3D CAD Perfect		O		R	O
Electrical 2D CAD Capable					
Electrical 2D CAD Perfect					
Electrical Schematic					
AEC 2D CAD Capable					
AEC 2D CAD Perfect					
AEC 3D CAD Perfect					
Mapping (GIS) 2D CAD Capable					
Mapping (GIS) 2D CAD Perfect					
Mapping (GIS) 3D CAD Perfect					

N/A - Not Applicable O - Optional Format R - Required Format

D.3.5

**FIRST ARTICLE
VALIDATION SIGNOFF SHEET**

Validation criteria	Metric	Yes	No
Format	Is the First Article sampling of converted drawing/document files in the correct digital file format specified?		
Dimensionality	Have the requirements set forth in the Detailed Performance Specification been met for each and every item?		
Geometric Representation	Is the representation exactly as specified in the Performance Specification?		
Metadata (Required)	Are the Required JEDMICS/CDEX Data Elements included and are they accurately listed?		
Metadata (Optional)	Are the Data Elements added from the Optional category (both ADCS specific and Product Data) included and listed accurately?		
Media	Were the converted documents delivered on the Media specified?		
Originals	Originals disposed of as specified?		

Packet # _____ Type _____ Conversion Required _____

Did this packet produce a successful First Article Conversion? yes _____ no _____

Name of Validator _____ Approved by _____

Is the First Article rejected? yes _____ no _____

Reason for rejection _____

Date First Article was resent to the contractor _____

Date second attempt returned from contractor _____

Did second attempt meet required specifications? yes _____ no _____

Was Second attempt validated? yes _____ no _____

Name of Validator _____ Approved by _____

Approval Date _____

D.3.6

VALIDATION SIGNOFF SHEET

Validation criteria	Metric	Yes	No
Format	Are the converted drawing/document files in the digital file format specified?		
Dimensionality	Have the requirements set forth in the Guidance Specification been met for each and every item?		
Geometric Representation	Is the representation exactly as specified in the Guidance Specification?		
Metadata (Required)	Are the Required JEDMICS/CDEX Data Elements included and are they accurately listed?		
Metadata (Optional)	Are the Data Elements added from the Optional category (both ADCS specific and Product Data) included and listed accurately?		
Media	Were the converted documents delivered on the Media specified?		
Originals	Originals disposed of as specified?		

Packet # _____ Type _____ Conversion Required _____

Did this packet produce a successful conversion? yes _____ no _____

Name of Validator _____ Approved by _____

Reason for rejection _____

Name of Validator _____ Approved by _____

Approval Date _____

D.3.7

PACKET TRACKING CHECKLIST

Program Manager:

Packet Tracking Number A001

Contractor Name/CAGE PEE Conversions, Inc. / XXXX

Contract Number 99-xx-001-a

Weapon System HUMVEE

Digital File Name or Index N/A

Hard Copy Media Type/Number
of Sheets CD-ROM / ,000 Sheets

Method of Shipment and
Tracking Number FedEx / Tracking # 11223344-5566

Security Classification Unclassified

Disposition of Originals Return with conversion

Contractor:

Delivery Date and Time _____

Accepted By: _____
Name

D.3.8

DELIVERABLES SCHEDULE

	Contract Date	Actual Date	Initials
First Article Packet Delivery Date	<u>02/01/99</u>	<u>02/03/99</u>	_____
First Article Packet Returned	<u>02/17/99</u>	___/___/___	_____
Validation of First Article Packet Complete	___/___/___	___/___/___	_____
First Production Packet Delivered	___/___/___	___/___/___	_____
First Production Packet Returned	___/___/___	___/___/___	_____
Subsequent Production Packet Delivered	___/___/___	___/___/___	_____
Post Production Audit	___/___/___	___/___/___	_____

Contractor

Program Manager

6.0 EXAMPLE of Performance Specification

NOTE: This draft, dated 1/20/98 prepared for the U.S. Army Materiel Systems Analysis Activity, has not been approved and is subject to modifications. DO NOT USE PRIOR TO APPROVAL. (Project)

EXAMPLE Performance Specification

PERFORMANCE SPECIFICATION

For EXAMPLE Weapon System

Automated Document Conversion System (ADCS)

Submitted for review by:
Product Data Integration Technologies, Inc.
Technical Services-East
4130 Faber Place Drive
Charleston, SC 29405

Foreword

This EXAMPLE Weapon System Performance Specification provides the Contractor with specific procurement requirements for technical data conversion. It allows individual organizations to specify individual requirements while conforming to an overall conversion requirement. The performance specification is necessary to secure full, accurate, and complete conversion of engineering related drawings/documents from hard copy or digital raster format to a vector format to be used in Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) processes.

The DoD has an expressed goal to convert technical documents required for acquisition, maintenance and material management by the Year 2002. This Performance Specification addresses specific requirements for converting engineering drawings.

1.0 Scope

This document includes performance requirements for the U.S. Army's Automated Document Conversion System (ADCS). It defines functional requirements for ADCS as applied to engineering related drawings, documents and data. It defines vendor requirements for the conversion of engineering drawings and related technical data.

2.0 Purpose

The purpose of this document is to provide organizations with the requirements needed for the contractor to specify requirements for converting documents and drawings into a digital form in the most cost-effective manner. This Performance Specification shall be delivered to the contractor to ensure the contractor meets the requirements herein stated.

3.0 Procurement Requirements

3.1 Document Packet Tracking

The contractor shall track all documents/files and packets provided by the government. The contractor shall include date received, document/file type, storage location, status, and contract to be converted using. The document tracking mechanism shall allow a government personnel or representative to determine each of the about requirements for any given drawing under contract by the contractor. The system may be manual or electronic.

3.2 Input Format

The contractor shall be provided with Mechanical Engineering documents. The information to be converted shall be provided to the contractor as files on a CD-ROM. Delivery of documents shall be via FedEx bonded messenger.

3.3 Document Conversion Requirement

Engineering documents delivered to the contractor shall be converted from existing format to Mechanical 3D CAD Perfect format. A complete definition of the conversion code is available in ADCS Performance Specification Detailed Requirement 'Definition Packages' for each defined Conversion Code. All requirements specified in the ADCS Performance Specification Detailed Requirement Specifications must be met to satisfy this requirement.

3.4 Document Conversion Format

The data shall be converted into DXF vector format.

3.5 Document Conversion Media

The converted information shall be returned to the Government on CD-ROM. The media shall be marked with an index number written on CD-ROM with felt marker.

3.6 Converted Document Delivery

The converted information shall be delivered to the government via FedEx bonded messenger.

3.7 Metadata

Contractor shall provide associated information (metadata) about the document conversion in JEDMICS format. A complete definition of the metadata format codes is available in ADCS Performance Specification Detailed Requirement Specifications for each defined Metadata Format Code. All requirements specified in the ADCS Performance Specification Detailed Requirement Specifications must be met to satisfy this requirement.

3.8 Disposition of Input Data

The original documents will be returned to the government according to instructions included with the Packet Tracking Check List that accompanies the media.

3.9 Safety and Security Documents

Contractor shall be responsible for maintaining document safety and document security according to the specification list on the Packet Tracking Check List that accompanies the media.

3.10 Document Arrival Acknowledgement

A signed copy of the Packet Tracking Check List shall be forwarded to the Program Manager in a timely manner upon the receipt/arrival of a document packet.

4.0 Validation

Validation audits shall be performed during the production as per the Validation criteria specified. The contractor shall be provided with a copy of the Validation Requirement Sheet and informed that the requirements defined in the Validation Requirements Sheet will provide the means for validation of his services.

4.1 First Article Packet

Contractor shall convert the First Article Packet, containing as a minimum fifty drawings and return them to the Project Manager within two weeks for validation of the contractor's ability to meet the requirements of this Performance Specification. The converted documents shall be validated using standard validation methods defined above.

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