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OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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ABSTRACT

This Functional Description for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB) documents the pupose of and requirements for the ICDB in order to ensure a mutual understanding between the development group and the user group of the system. This Functional Description defines ICDB and provides a clear statement of the initial operational capability to be developed.

SECTION 1. GENERAL

1.1 PURPOSE OF THE FUNCTIONAL DESCRIPTION

This Functional Description (FD) describes the system requirements for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB), a system being developed by the Military Traffic Management Command (MTMC) to provide data integration and worldwide management and tracking of common-user ocean cargo movements. This FD provides the following:

- the system and functional requirements that must be satisfied by ICDB;
- a description of current methodologies that are related to the functionality of the proposed ICDB;
- information on performance requirements, system functions, inputs and outputs, data and database characteristics, and user impacts;
- a description of how to achieve the required capabilities through design and development;
- cross-references to other ICDB documents, as necessary, which describe design and development issues in greater detail;
- a general description of the proposed hardware, software, and communications environment;
- a brief discussion of issues relating to security, failure, costing, and system development planning; and
- a basis for the development of system tests.

ICDB will provide data to and be a data repository for the WPS terminal-level system, will be a primary source for query responses and cargo traffic reports, will receive data from and provide data to other MTMC and non-MTMC systems, will provide capabilities for processing Advance Transportation Control and Movement Documents (ATCMDs), and will distribute manifests. More specific descriptions of ICDB functionality are given in Section 3.

It is important to note that this FD covers functionality for both initial operating capability (IOC) and for final operating capability (FOC) insofar as FOC has been defined at this time; in this FD, FOC functionality is labeled as such and will not be part of testing for initial implementation. It is also important

to note that FOC may include additional capabilities not identified in this FD. The purpose of these unspecified capabilities would be to increase ICDB functionality to support more fully the MTMC corporate database concept.

1.2 PROJECT REFERENCES

Headquarters, Department of the Army. Army Life Cycle Management of Information Systems. Army Regulation 25-3. UNCLASSIFIED. November 1989.

Oak Ridge National Laboratory. Database Specifications for the Worldwide Port System (WPS) Regional Integrated Database (ICDB). UNCLASSIFIED. ORNL/TM-12725. March 1994.

Oak Ridge National Laboratory. Architectural Analysis for the Worldwide Port System (WPS) Regional Integrated Database (ICDB). UNCLASSIFIED. ORNL/TM-12357. April 1993.

Oak Ridge National Laboratory. Logical Data Model for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. DRAFT, August 1992.

Oak Ridge National Laboratory. Baseline Logical Data Model for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. DRAFT, September 1992.

Oak Ridge National Laboratory. Functional Description for the Integrated Booking System (IBS). UNCLASSIFIED. ORNL/TM-11884. July 1991.

Oak Ridge National Laboratory. System/Subsystem Specifications for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. ORNL/TM-13119. (In press).

Oak Ridge National Laboratory. A Shared Data Environment for the Military Traffic Management Command Directorate of International Traffic. UNCLASSIFIED. ORNL/TM-12042. February 1992.

Oak Ridge National Laboratory. Standards and Conventions for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. ORNL/TM-12799. February 1995.

Oak Ridge National Laboratory. System Operation Manual for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. DRAFT, February 1994.

Oak Ridge National Laboratory. Maintenance Manual for the Worldwide Port System (WPS) Regional Integrated Cargo Database (ICDB). UNCLASSIFIED. DRAFT, March 1994.

U.S. Department of Defense. Military Standard Transportation and Movement Procedures (MILSTAMP). UNCLASSIFIED. October 1988; Change 6, May 1995.

U.S. Department of Defense. Military Standard: DOD Automated Information Systems (AIS) Documentation Standards. UNCLASSIFIED. DOD-STD-7935A. October 1988.

Worldwide Port System. WPS Management Plan. UNCLASSIFIED. Rev. 1, June 1992.

Worldwide Port System. WPS Database Specification. UNCLASSIFIED. FINAL, December 1991.

Worldwide Port System. WPS Functional Description (FD). UNCLASSIFIED. Rev. 1, June 1992.

Worldwide Port System. WPS System/Subsystem Specification. UNCLASSIFIED. Rev. 1, July 1992.

Worldwide Port System. WPS Software Unit Specification. UNCLASSIFIED. Rev. 1, July 1992.

Worldwide Port System. Worldwide Port System (WPS) Configuration Management Operational Requirements. UNCLASSIFIED. FINAL, February 1993.

1.3 ACRONYMS AND ABBREVIATIONS

A-2000	AUTOSTRAD 2000
AC	Area Command
ACI	Automated Carrier Interface
AIS	Automated Information System
AMC	Army Materiel Command
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASPUR	Automated System for Processing Unit Requirements
ATCMD	Advanced Transportation Control and Movement Documents
AUEL	Automated Unit Equipment List
AUTODIN	Automatic Digital Network
CASE	Computer-Aided Software Engineering
CDCP	Central Data Collection Point
CDOPS	Cargo Distribution Optimization Program
CFM	CONUS Freight Management
CISIL	Central Integrated System for International Logistics
COMPASS	Computerized Movement Planning and Status System
CONEX	Container Express
CONUS	Continental United States
COOP	Continuity of Operations Plan
CPU	Central Processing Unit
DA	Data Administrator/Data Administration
DAAS	Defense Automated Address System
DAMMS	Department of the Army Movement Management System
DASPS-E	Department of the Army Standard Port System--Enhanced
DBA	Database Administrator/Database Administration
DBMS	Database Management System
DDD	Direct Distance Dialing
DDN	Defense Data Network.
DED/D	Date Element Dictionary/Directory
DIC	Document Identifier Code
DLSS	Defense Logistics Standard System

DOD	Department of Defense
DODAAC	DOD Activity Address Code
DODIC	DOD Identification Code
DOE	Department of Energy
DOS	Disk Operating System
DPSC	Defense Personnel Support Center
DPI	Data Processing Installation
DTS	Defense Transportation System
EA	Eastern Area
EDI	Electronic Data Interchange
ETA	Estimated Time of Arrival
ETADS	Enhanced Transportation Automated Data System
ETR	Export Traffic Release
ETRR	Export Traffic Release Request
EOC	Emergency Operation Center
FD	Functional Description
FMS	Financial Management System
FOC	Final Operating Capability
FORSCOM	U.S. Forces Command
FY	Fiscal Year
GB	Gigabyte
GBL	Government Bill of Lading
GMT	Greenwich Mean Time
GSA	General Services Administration
GTN	Global Transportation Network
GUI	Graphical User Interface
HHG	Household Goods
HQ	Headquarters
IBS	Integrated Booking System
ICDB	Integrated Cargo Database
ID	Identifier
IDC	Intransit Data Collection
IEEE	Institute of Electrical and Electronic Engineers
IMDGC	International Maritime Dangerous Goods
IME	Information Management, Eastern Area
IOC	Initial Operating Capability
ITV	In-Transit Visibility
JCCO	Joint Container Control Office
JOPES	Joint Operation Planning and Execution System
LAN	Local Area Network
LDD	Logical Data Dictionary
LDM	Logical Data Model
LOGDRMS	Logistics Data Resource Management System
LOGMARS	Logistics Application of Automated Marking and Reading Symbols
LOGSA	U.S. Army Material Command Logistics Support
MB	Megabyte
METS	Mechanized Export Traffic System
MILSTAMP	Military Standard Transportation and Movement Procedures

MILSTRIP	Military Standard Requisitioning and Issue Procedures
MILVAN	Military Owned Demontable Container
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
NAOMIS	Navy Material Transport Office
OCONUS	Outside the Continental United States
ODT	Open Desktop
ORNL	Oak Ridge National Laboratory
PC	Personal Computer
PCFN	Port Call File Number
PMO	Product Management Office
POD	Port of Debarkation
POE	Port of Embarkation
POSIX	Portable Operating System Interface for Computing Environments
POV	Privately Owned Vehicle
QA	Quality Assurance
QBF	Query-By-Forms
R&M	Reliability and Maintenance
RAM	Random Access Memory
RDBMS	Relational Database Management System
RORO	Roll-on/Roll-off
SCAC	Standard Carrier Alpha Code
SCO	Santa Cruz Operation
SDE	Shared Data Environment
SEAVAN	Commercial or Government-Owned Shipping Container
SF	Standard Form
SITREP	Situation Report
SMMP	System MANPRINT Management Plan
SOCO	Shipping Order/Clearance Order
SPLC	Standard Point Location Code
SQL	Structured Query Language
SS	System/Subsystem Specification
STD	Standard
STRADS	Strategic Deployment System
SUS	Software Unit Specification
TAC	Transportation Account Code
TC ACCIS	Transportation Coordinator's Automated Command and Control Information System
TCMD	Transportation Control and Movement Document
TCN	Transportation Control Number
TCON	Trailer Container Number
TCP/IP	Transmission Control Protocol/Internet Protocol
TDR	Transportation Discrepancy Report
TERMAC	Terminal Area Code
TERMS	Terminal Management System
TOLS	TERMS On-line System
TOPS	Transportation Operational Personal Property Standard System
TSM	Terminal Support Module

TTU	Transportation Terminal Unit
UCR	Unit Cargo Release
UDM	Unit Deployment Manifest
UIC	Unit Identification Code
UMD	Unit Movement Data
UPS	Uninterrupted Power Supply
USAISC	U.S. Army Information Systems Command
USMTF	United States Message Text Formatting
USTRANSCOM	U.S. Transportation Command
VCC	Vessel Completed Card
WA	Western Area
WAN	Wide Area Network
WHIST-MOD	Worldwide Household Goods Information System for Transportation Modernization
WIN	WWMCCS Intercomputer Network
WIS	Worldwide Information System
WPS	Worldwide Port System
WWMCCS	Worldwide Military Command and Control System
4GL	Fourth-Generation Language

1.4 TERMS

Aged records	Records for which the length of time since the last status update is greater than a specified amount
Breakbulk	Any cargo that is shipped uncontainerized
Bulk	Dry or liquid cargo, such as oil, grain, ore, sulfur, or fertilizer which is shipped unpackaged in large quantities
Commodity codes and special handling codes	Codes that are used to identify shipment items, communicate special handling requirements, and express cost and billing-related financial calculations
Container Express	A controlled, reusable, serially-numbered, metal shipping container which is 8'6" long, 6'3" wide, and 6'10-1/2" high
Consignee	The activity, identified by a DODAAC, which is the recipient of the cargo being shipped
Consignor	The activity, identified by a DODAAC, which is shipping the cargo
Container	A SEAVAN, MILVAN, or CONEX in which cargo is placed for shipment
Defense Transportation System	A collection of systems, policies, and procedures used by DOD transportation activities and customers to move personnel, patients, and cargo

Discharge	The unloading of cargo from a vessel at the POD
Disposition	A situation in which the cargo has left the control of the port operator at the POD
DOD activity address code	A six-position alphanumeric code assigned to identify specific activities which are authorized to ship or receive material and to prepare documentation or billings
Document identifier code	A code which is used on all MILSTAMP data records and which is a means of identifying the functional area system (transportation, supply, etc.) to which the document relates and the intended purpose of the document (TCMD, manifest, tracer, etc.)
DOD identification code	A four-position alphanumeric code assigned to items of supply in Federal Supply Groups 13 (ammunition/explosives) and 14 (guided missiles)
Explosive cargo	Explosives, propellants, or pyrotechnics
Explosive cubic feet	Volume of explosive cargo in cubic feet
Export cargo	All shipments to be sent to an overseas destination, under the cognizance of either MTMC Area Command; export cargo is received at CONUS water terminals at both military and commercial facilities either as breakbulk (loose shipments) or in containers (SEAVANS)
Import cargo	All import, inbound, and retrograde shipments under the cognizance of either MTMC Area Command; import cargo is discharged at CONUS water terminals at both military and commercial facilities
Interterminal Transfer	A shipment unit received at a port and processed for which charges are assessed, then moved overland to another port where it is again processed as an original shipment
Lifted	Cargo that has been loaded on board a ship for transport
Measurement ton	A figure derived by dividing cubic feet by forty
MILVAN	Military owned demountable container, conforming to United States and international standards, operated in a centrally controlled fleet for movement of military cargo
MILVAN Tracking System	A MTMC-operated system for numbering and tracking military vans
Model number	An identifier to distinguish a type of item which is a member of a class of items within the military supply system

National stock number	A 7-digit numeric identifier which distinguishes a class of items in the military supply system
Offering	The submission of shipment documentation to a clearance authority for release instructions and to the booking office for ocean transportation to effect shipment or transshipment
Onward movement	Movement of cargo from POD to consignee
Port call file number	A number assigned to a record by the MTMC booking system METS (IBS) and passed to WPS by ICDB
Prime data	Mandatory data on a TCMD; usually listed in the upper portion of the TCMD and identified by DIC = T_0, T_1, T_2, T_3, or T_4
Release unit	Cargo requiring an export release — e.g., (1) cargo in lots of 10,000 lbs or more; (2) shipments that are classified as TOP SECRET, SECRET, or CONFIDENTIAL; explosives or other hazardous materials; cargo moving to an ammunition outloading port; shipments requiring exclusive use of a motor vehicle; perishable biological material; narcotics and drug abuse items; small arms; (3) shipments occupying full visible capacity of railway car or motor vehicle; (4) less-than-load shipments tendered as carloads or truckloads; (5) vehicles by drive-away service; (6) cargo in lots of 800 cubic feet or more
Retrograde cargo	Cargo which is moving out of the area of operations — e.g., unit cargo returning from deployment
SEAVAN	A commercial or government-owned (or leased) shipping container which can move (i.e., be lifted on and off a ship) via ocean transportation without bogie wheels attached [The term SEAVAN includes military vans (MILVANs) and Military Sealift Command Vans (MSCVANs) unless specifically excluded]
Shipment unit	One or more items assembled into one unit which becomes the basic entity for control throughout the transportation cycle
Staging	The act of assembling the vehicles and cargo to be transported in conjunction with a unit move; staging at the destination for containers involves the ocean carrier holding containers pending delivery either at the POD or at an intermediate site (e.g., a barge terminal) at government request
Stuffing	Loading a container with cargo
Super cargo	Personnel who accompany cargo
Tally transaction	A count of the pieces of cargo being handled including loading/unloading ships, trucks, and railcars; the transfer of cargo; etc.

Transportation control number	A 17-position alphanumeric data element assigned to control a shipment unit throughout the transportation pipeline
Terms of carriage	An indication of who is responsible for vessel loading and unloading; the second part of a two-part code, the first part of which is "vessel status"
Intransit data collection	TK7 data indicates the period from the earlier of offer or receipt day at the POE to vessel discharge day at the POD
Trailer data	Explanatory information on a TCMD concerning a shipment unit (e.g., hazard class, round count, lot number)
Transceived	Data that is transmitted or received
Transshipper	Any transportation activity, other than the shipper or receiver, which handles or documents the transfer of a shipment between conveyances. A transshipper may perform more than one type transshipment
Type package code	A 2-character code that identifies (1) for breakbulk shipments, the type of packing; (2) for a CONEX, the first position of the six-position serial number; or (3) for cargo containers, the type of container (e.g., SEAVAN, MILVAN, etc.)
Voyage document No.	An identifier provided by the booking agency to identify a portion of a voyage for a specific ship
Vessel status code	Identifies the type of shipping and payment agreement for a particular voyage; first position of a two-position code, the second part of which is "terms of carriage"
ZZA documents	Records including receipt/discharge and lift/disposition information used to update the MILVAN Tracking System

SECTION 2. SYSTEM SUMMARY

Section 2 describes the background and objectives of the ICDB mission. It summarizes the anticipated programmatic and operational improvements and expected impacts to be realized from the implementation of ICDB. More detailed characteristics are contained in later sections.

2.1 BACKGROUND

Part of MTMC's mission is to manage, track, and document the movement of Department of Defense (DOD) cargo through common user water ports during both peacetime and wartime. To accomplish this mission, MTMC currently relies on redundant and aging Automated Information Systems (AISs). The need to upgrade and integrate existing capabilities initiated the design and development of WPS.

A requirement exists with the implementation of the WPS in the continental United States (CONUS) to develop a regional database for WPS port-level systems to provide worldwide intransit visibility and to replace the current regional management system. Work on this project will be a cooperative effort involving the Oak Ridge National Laboratory (ORNL); the Office of the Deputy Chief of Staff for Information Management Product Management Office (PMO) at MTMC Headquarters (HQ); personnel with the MTMC Information Management Eastern Area (IME); the WPS Project Management Office; and MTMC functional representatives at HQ, Eastern Area (EA), and Western Area (WA).

2.2 OBJECTIVES

The objectives of ICDB are as follows:

- To provide visibility of worldwide cargo traffic data from WPS, the Mechanized Export Traffic System II (METS II), and the Automated System for Processing Unit Requirements (ASPUR) [the latter two will be combined as the Integrated Booking System (IBS)];
- To provide a common shipper interface;
- To provide an integrated database for efficient and reliable data management, data manipulation, data distribution, communication, inquiry, and reports production.

2.3 EXISTING METHODS AND PROCEDURES

Currently, in CONUS, the Terminal Management System (TERMS) provides export and import documentation of cargo movement at the individual ports in both peacetime and wartime; and the Terminal Support Module (TSM) provides documentation for unit moves. METS II and ASPUR provide bookings for non-unit and unit cargo movement, respectively.

Currently TERMS is located at MTMC EA in Bayonne, NJ, and at MTMC WA in Oakland, CA. Specific data inputs and reporting procedures concerning cargo movement are described in Military Standard Transportation and Movement Procedures (MILSTAMP).

2.4 PROPOSED METHODS AND PROCEDURES

It is proposed that TERMS and TSM be replaced by WPS at the port level, working in concert with ICDB at the regional level. ICDB will interface with several existing systems and eventually with IBS. The primary interface at IOC will be with WPS. Other participating data sources and recipients of data from ICDB are described in Section 5.4. ICDB is sized to support both peacetime and wartime conditions.

2.4.1 Summary of Improvements

ICDB will manage information associated with common-user ocean cargo movement. ICDB will provide MTMC regional commanders visibility of and management control over their subordinate terminals. It will improve communication among MTMC systems and will provide requested information to non-MTMC systems [e.g., the Global Transportation Network (GTN)]. ICDB will also provide a centralized data repository that will permit queries on cargo status from offered through lifted (IOC) and eventually to disposition (FOC).

ICDB will provide increased visibility to an existing community of DOD users and will provide visibility over ocean cargo data among multiple WPS port sites. ICDB will support both peacetime and wartime data volumes. ICDB will operate in a client-server mode of operation and will eliminate the requirement for a data processing installation (DPI) environment.

2.4.2 Summary of Impacts

The following sections describe the anticipated impacts of ICDB on the existing organizational and operational environments of the user.

2.4.2.1 User Organizational Impacts

A DPI environment will no longer exist; therefore, functional responsibilities of the ICDB system administrator, ICDB database administrator, and ICDB data administrator must be specified. All personnel must be trained commensurate with the duties outlined in the responsibilities of the position. More specific information will be furnished in the WPS-CONUS Regional SMMP (System MANPRINT Management Plan).

2.4.2.2 User Operational Impacts

Functional and operational personnel at the Area Commands (ACs), shippers, and outside agencies who need to access ICDB must be trained in ICDB functionality. The training in system usage should be minimal because ICDB is being designed with a user-friendly interface, which will include error messages, look-up tables in pop-up windows, and other "Help" utilities. Remote users will also receive automated assistance during their initial log-in procedures; their profiles will be recorded and used to provide automatic configuration at subsequent logins.

With implementation of ICDB, personnel at the ACs will be able to query a single system for cargo status and, thus, the impact will be to increase efficiency. ICDB will poll all WPS ports every five minutes. Although this is not "real-time" access to data as is currently provided by the TERMS On-line System (TOLS), the benefit of a single system query for cargo status is expected to be more important than a five-minute time delay.

Shippers who must obtain and use an on-line system for the first time will be impacted until they gain familiarity with the system. Inquiries and on-demand ad hoc queries will affect the functional users. This process will result in a significant gain in management oversight and cargo visibility of all terminal operations.

2.4.2.3 User Development Impacts

ICDB is being developed and maintained by MTMC with contractor support during design and operations.

development. MTMC functional and technical personnel assigned to the project will be required to test and evaluate the system. A standardized training program will be developed for functional users and system administrators.

2.5 ASSUMPTIONS AND CONSTRAINTS

The following assumptions and constraints apply to the development and/or operation of the ICDB.

- Implementation of ICDB is scheduled for FY95 as part of the WPS overall activities. For successful functionality of ICDB, interface agreements with external systems will be fully specified.

- At the present time, the central ICDB database is installed at MTMC Headquarters in Falls Church, Virginia, and two processing Hubs are installed corresponding to the geographical distribution of MTMC ocean cargo movement data (EA and WA). One Hub is located in Oakland, California; the other Hub is at Bayonne, New Jersey. The two Hub installations have identical processing modules and database structures; data residing at the Hubs will be minimal and temporary because the primary data repository will be at the central ICDB. Hubs will be connected to each other and to the ICDB and will support visibility over all ocean cargo movement data.

- The operational architecture will consist of a HP 877 super-mini at each Hub and at the Central server. Each 877 super-mini will consist of one HP 710 console, four HP 730 computer servers, and one HP 877 processor. Figure 2.1 shows the configuration for the operational hardware.

- A single database schema will be used for all processes that will read data from or write data to the relational database. Processing modules for ATCMDs and manifest distribution will use working tables in one or more databases separate from the main ICDB database.

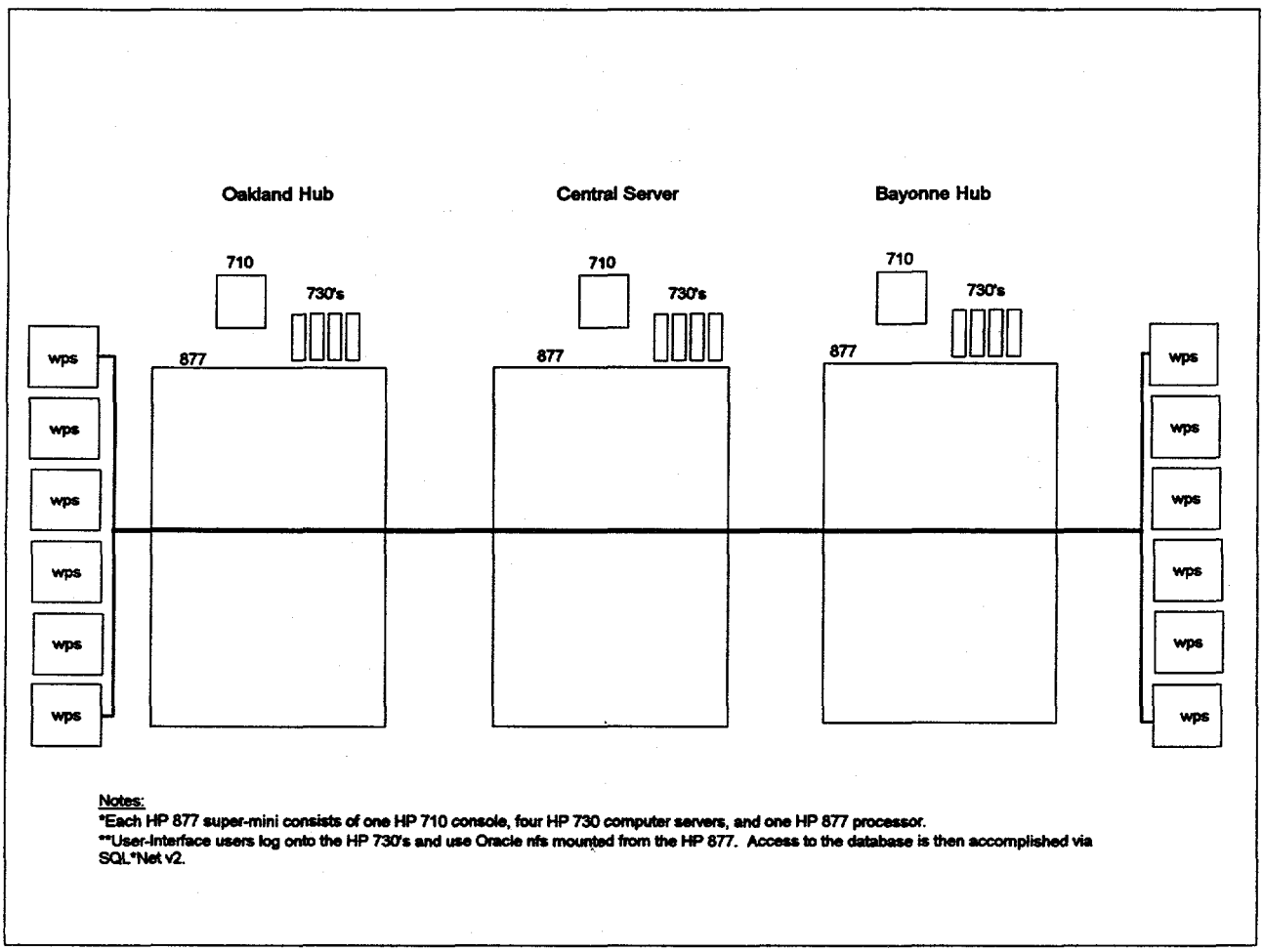

Figure 2-1. Configuration for the operational hardware.

- ICDB features will be limited to capabilities provided by the Oracle Relational Database Management System (RDBMS), Oracle Fourth-Generation Language (4GL), Oracle SQL*Menu, Oracle SQL*Forms, Oracle ReportWriter, Oracle SQL*Net, other Oracle tools, a tool for generating ad hoc queries (IQ), and the Ada procedural language.

- ICDB and its CONUS Hubs will support access to approximately 1600 userids, with about 150 concurrent logins per Hub (a maximum of 50 remote dial-in calls and 100 local users).

- User access to data will be controlled by the role assigned to the user by the System Administrator. These roles will limit/permit access for specified user groups.

- Within screens provided for the on-line ATCMD build, ICDB will receive and edit cargo documentation data entered from shippers.

- Current procedures allow for multiple occurrences of key cargo identifiers. ICDB will assign its own internal identifiers and may, therefore, return multiple results for certain queries.

- Errors identified during ICDB processing will be suspended for ICDB local review and will not be returned to WPS for correction. (See Section 3.2, "Functional Requirement 1. Process ATCMDs," Requirement 1.1.2f; see also "Functional Requirement 7. Perform Regional Processes," Requirement 7.1.) Similar functions are currently being managed by the ACs, and no new resources will be required.

SECTION 3. DETAILED CHARACTERISTICS

This section provides a detailed description of ICDB functions and performance requirements.

ICDB is a multi-user automated system based on client-server, relational database technology and hosted on Unix workstations in accordance with AUTOSTRAD-2000 (A-2000) guidelines. Full functionality of the system will, therefore, include all the standard facilities offered by this environment, such as electronic mail, text editors, and programming tools. These facilities are not required functions of ICDB, however, and will not be further discussed.

3.1 SPECIFIC PERFORMANCE REQUIREMENTS

The following sections are an overview of specific performance requirements. More detailed technical specifications may be found in the current ICDB Architectural Analysis (see reference in Section 1.2) and in the ICDB System/Subsystem Specifications (Final Version, September 29, 1995).

3.1.1 Accuracy and Validity

All input data will be edited for content validity based on internal system logic and, where applicable, table-driven edits. The Oracle RDBMS will provide a before image file that will contain data before changes are made to it. It is used to guarantee that transactions do not become permanent until they are complete, consistent, and committed by the user.

ATCMDs provided by shippers will be validated according to criteria established for comparison to the skeleton booking record and according to criteria established for WPS. Data received from WPS will receive validation checks according to the interface agreements established between ICDB and WPS. ICDB validation checks will be no more stringent than the editing criteria imposed by WPS. Because ICDB maintains data from more than a single port, it must, therefore, use some additional data elements to identify the source of the data. Data received from other sources (e.g., IBS) will be validated according to criteria to be established.

Accuracy requirements for mathematical calculations include pieces, weight, and cube calculations and will be calculated to the nearest whole number. Dates will be calculated based on calendar day and time is based on a 24-hour clock. Dates and times will be maintained in Greenwich Mean Time (GMT). Accuracy and precision will be maintained throughout the system except where floating point numbers are involved. Wherever floating point is used, the Institute of Electrical and Electronic Engineers (IEEE) precision rules will be followed. The software design will avoid the use of floating point whenever possible.

3.1.2 Timing

ICDB must be able to respond in a timely manner to inquiries. The response times are dependent upon current system load and the complexity of the query. The goal of ICDB is that the average response time will be less than 5 seconds for simple queries and less than 1 minute for more complex queries. If a query takes longer than 5 seconds to process, the system will provide a "Working ..." message to the user. ICDB target timing objectives for queries and other processes are given in Table 3-1.

3.1.3 Capacity Limits

Memory capacity will be designed to ensure cost-effective on-line response time. Disk capacity will be designed to ensure reliable on-line storage for the amount of data to be kept on-line at all times. Communications capacity will be designed to ensure full throughput during deployment and mobilization yet will be cost effective during peacetime. The ICDB database server, through its communications servers, will support access to 1600 userids.

3.1.4 Reliability and Maintainability

A Reliability and Maintainability (R&M) Engineering Analysis must be prepared for ICDB. This document provides criteria against which ICDB will be tested. The R&M must be written within the context of the WPS port-level R&M report.

Table 3-1. Target performance timeframes for ICDB activities and processes*

Workload magnitude	Operational activity	Timing
Simple	Query or update single record from local access (maximum number of concurrent local online users is 100)	≤ 10 sec
Simple	Query or update single record from remote access (maximum number of concurrent remote dial-in users at a Hub is 50)	≤ 1 min (depending on communications speed)
Simple	Edit/check single field for on-line ATCMD	≤ 5 sec
Complex	Generate routine standard reports in draft mode	≤ 2 hrs
Complex	Process ≤ 250 ATCMDs (batch mode)	≤ 30 min
Complex	Perform multiple record query involving data aggregation and/or manipulation of up to a maximum of 500 records from local access	≤ 15 min
Complex	Transfer and process cargo records from a single WPS port; validate and load to server database for up to 1000 WPS update transactions/records (assuming dedicated line connectivity)	≤ 5 min
Very complex	Transfer and process cargo records from multiple WPS ports; validate and load to server database for up to 1000 WPS update transactions/records per port; up to 15 ports per Hub, and two Hubs (assuming dedicated line connectivity)	≤ 15 min
Very complex	Process and distribute export manifest: assume ≤ 500 containers (approximately 2000 records); manifests are processed serially according to the date-time they are received	≤ 15 min to provide electronic version (for access by POD); ≤ 90 min for other recipients
Very complex	Process, load to database, and distribute to appropriate WPS port import manifest (single vessel with ≤ 500 containers; approximately 2000 records)	≤ 30 min (with a goal of 10 minutes)

*If the database exceeds estimated size limits, these timing estimates should be revised.

3.2 FUNCTIONAL AREA SYSTEM FUNCTIONS

The WPS Regional ICDB is being developed to assist in cargo traffic management and documentation. Three major processing modules will support this requirement: process ATCMDs, process import manifests, and process export manifests. ICDB is also being developed to support regional terminal management. Query capability and management reports for cargo passing through WPS ports will provide that support. Other functional capabilities available to certain users include user/site control, error correction capabilities, and monitoring of miscellaneous reporting requirements.

This section describes the various ICDB functional processes under major system categories. Organizational interfaces and system administration are discussed in Section 5.

ICDB will include processing modules for batch-received, on-line-built, and skeletal ATCMDs (Functional Requirement 1). ICDB will include processing modules for loading import manifest data into the database and for validating and distributing import manifests (Functional Requirement 2). ICDB will include processing modules for loading data related to export manifests (e.g., date produced) and for validating and distributing export manifests (Functional Requirement 3). ICDB queries will be available through preformatted screens that assist the user in preparing the query. Status queries on single cargo shipments and queries that necessitate aggregating shipment data will be available (Functional Requirement 4). Management reports will be available (Functional Requirement 5). Appropriate regional personnel will be given permission to control user and site registrations and to maintain reference tables (Functional Requirement 6), and appropriate regional personnel will have oversight for error correction capabilities and other monitoring responsibilities (Functional Requirement 7). ICDB will also include capabilities that allow users to print or download a file to their PC (Functional Requirement 8).

FUNCTIONAL REQUIREMENT 1. PROCESS ATCMDs

1.1 Bulk ATCMD Validation and Distribution

1.1.1 The 80-character format of Advanced Transportation Control and Movement Document (ATCMD) is found in MILSTAMP and will not be detailed in this document. ATCMDs will be submitted to the Area Command via a variety of bulk data transmission methods. Pre-advance TCMDs will be produced by the current booking system (METS or IBS), and ATCMDs will be produced from ASPUR. For all transmission methods, a basic record-length validation will be performed to ensure that received files do not cause

aborts in subsequent programs. Data collected from the following sources will be placed in a central collection file for further processing:

a. AUTODIN. In the period before the Defense Digital Network (DDN) is fully implemented, the majority of ATCMD documents will be submitted via the Automatic Digital Network (AUTODIN). A utility will be developed to convert the medium and data format used by the SRT or DINAH to formats usable by the ICDB platform. Batch header/trailer and other AUTODIN control records will be removed.[1]

b. DDN. As the DOD phases out AUTODIN, the bulk of ATCMD traffic will be shifted to the DDN. Documents submitted via DDN will not contain extraneous records and will only require record-length and basic quality validation.

c. PC to PC MODEM TRANSFER. Appropriate utilities will be developed to convert data from the personal computer (PC) environment to that used on the ICDB platform.

d. LAN. Data from METS/ASPUR (IBS) will be communicated over the local area network (LAN).

1.1.2 Prior to distribution, all ATCMD documents received from shippers will pass a series of basic quality validations described below. These criteria will be modified as required to conform to changes in MILSTAMP. METS pre-advance TCMDs will not undergo validations or TCMD effectiveness checks but will be distributed to WPS according to Section 1.1.3 below.

a. TCN VALIDATION. A Transportation Control Number (TCN) must have no spaces and must only consist of the alphabetic characters, A-Z (upper case only) and the numerics 0-9. Note: A change to this validation allowed the dollar sign ($) to be added to the TCN for unit moves.

b. DOCUMENT IDENTIFIER (ID) VALIDATION. The Document Identifier Code (DIC) consists of three alphanumeric characters with no spaces allowed. Valid characters are as follows:

Position 1. T and L. NOTE: "V," "R," and "3" are considered valid for non-transceived ATCMDs only. An "L" in position 1 indicates MILSTAMP local agreement.

Position 2. B,C,D,E,F,G,H,J,L,P,U,V,X

Position 3. 0-9.

[1]Programs were written for AUTODIN. AUTODIN has since been replaced by DDN.

c. POE VALIDATION. The Port of Embarkation (POE) code consists of three alphanumeric characters with no spaces allowed. POE codes will be validated against a table of all valid POEs. Code tables in ICDB will be maintained by the functional proponent.

d. PRIME ATCMD FOR EVERY TRAILER. Each informational trailer, identified by third position DIC consisting of 5-9, shall be matched to a prime record, DIC position 3 of 0-4, by the TCN. Because of the possibility of duplicate TCNs, procedures have been agreed upon by WPS and ICDB for using a shipment unit identifier that uniquely identifies a shipment record.

e. SEAVAN PRIME FOR EVERY CONTENT. Each content TCMD, identified by DIC position 3 containing a "4", shall be matched by Trailer Container Number to a SEAVAN or other container prime record (DIC position 3 containing "2" or "3") with the same POE and POD.

f. Records failing any of the above edits will appear on a report presented to the functional manager for possible correction. This report will have the complete listing of the record and the specific error that caused the reject.

g. Invalid records will be retained in a suspense file/database for a period of 5 calendar days. The retention time frame will be adjustable. An appropriate screen format will be developed to allow the functional manager to correct and re-submit failed documents.

1.1.3 ATCMD documents passing initial edits will be loaded into the database, which will forward them to the appropriate WPS node in the appropriate format without delay. In the interim period while TOLS is still in use, ATCMD documents will be forwarded to TOLS for ports still not using WPS. TOLS input will be required in the original 80-column format.

a. Automatic distribution will be made according to the POE contained within the document. The POE will be compared against a matrix that will determine the WPS site responsible for that POE. There will be one WPS site responsible for each port. A portable WPS (i.e., a WPS that is not attached to a fixed WPS site) will have a WPS site assigned to it with a port code. ICDB will be able to obtain the port code through the WPS master site table.

b. Documents separated by WPS site identifier will be transmitted, via DDN or dedicated line, to the appropriate WPS platform in the appropriate format.

c. MILSTAMP (Figure 2-b-4, page 2-b-41) provides a format for shippers to indicate Government Bill of Lading (GBL) information for a batch of TCMDs. If this record is encountered (DIC = "GBL"), the GBL number and estimated time of arrival (ETA) will be added to all the following ATCMD records where the DOD Activity Address Code (DODAAC) and POE code represent the same site until the number specified in the GBL is reached.

d. The format for the WPS/ICDB ATCMD data exchange will be according to the WPS prime and trailer tables -- that is, SHIPMENT, OUTSIZE, NSN, STOPOFF, etc. A description of tables used for these data exchanges are documented in the WPS Database Specification.

1.1.4 Each ATCMD forwarded to WPS will be validated in accordance with MILSTAMP for the purpose of preparing the daily TCMD Effectiveness Report and to prepare Composite Error Files for the monthly system (currently being run at HQ MTMC). The following paragraphs detail the validation criteria.

a. SPECIFIC VALIDATION CRITERIA. There are 39 specific errors described in MILSTAMP Appendix E, which describes the TCMD effectiveness program. Since the exact nature of these errors are clearly defined in MILSTAMP, they will not be reproduced in this document.

b. MILSTAMP CODE TABLES. A series of tables will be provided for each of the code types listed in MILSTAMP Appendix F. These tables will consist of the MILSTAMP code, the plain language description and other pertinent data. Code tables will be maintainable through update transactions entered by a selected class of users/administrators.

c. TAC VALIDATION TABLE. Transportation Account Codes (TAC) will be validated by matching the submitted TAC to a table of valid TACs. This table will be user-modifiable by a selected class of user/administrators. [Provision will be made to include additional TAC validation criteria as supplied by Resource Management (RM).]

1.1.5 The ATCMD validation process will produce the following outputs:

a. DAILY COMPOSITE ERROR FILE. The length of the record is 192 characters. The record description is shown below. Each error field is a flag; a "1" in any field indicates that the record contains the specific error as specified in MILSTAMP Appendix E. This layout is subject to review.

Pos. 1-80	The TCMD record as transceived.
Pos. 81-130	Error flags 1-50. Each one position, either 0 or 1.
Pos. 131-136	Consignor Char(6).
Pos. 137	Seavan flag Char(1).
Pos. 138-142	Trailer Container Number Char(5).
Pos. 143	Container Sequence Code Char(1).
Pos. 144-160	TCN Char(17).
Pos. 161	DIC Position 3 Char(1).
Pos. 162	Type Error Char(1).
Pos. 163-166	Date Char(4) "YDDD".
Pos. 167-168	Cycle Char (2).
Pos. 169-172	Time Char(4).
Pos. 173	Location Char(1). (Area Command)
Pos. 174-181	GBL number Char(8).

Pos. 182 Journal Indicator Char(1).
Pos. 183-192 Filler Char(10). (spaces).

b. ICDB will provide the Weekly Shipper TCMD Error Listing and will distribute it according to procedures outlined in MILSTAMP, Appendix E, paragraph 3a.

c. ICDB will provide the Monthly MTMC Shipper TCMD Effectiveness Summary and will distribute it according to procedures outlined in MILSTAMP, Appendix E, paragraph 3b.

d. ICDB will provide the Monthly MTMC Service Effectiveness Summary and will distribute it according to procedures outlined in MILSTAMP, Appendix E, paragraph 3c.

1.1.6 All valid ATCMD documents will be loaded immediately into the ICDB database and forwarded to the WPS terminal according to the following rules of precedence and/or exception at the ICDB level.

a. All ATCMDs (including METS skeleton ATCMDs) will be checked to see if a record already exists in ICDB for the TCN being processed. (1) If no record exists in ICDB with an identical TCN as the one just received, then the record will be inserted into ICDB as a new shipment record and the record will be transmitted to the appropriate WPS. (2) If a record already exists in ICDB with an identical TCN as the one just received and if the shipment was manifested more than 60 days ago, this is considered a new shipment unit; all data will be processed as a new shipment unit in ICDB and the record will be transmitted to WPS. (3) If a record already exists in ICDB with an identical TCN as the one just received and if the shipment was manifested less than 60 days ago, this is considered an error and the record will be placed into an error table. (4) If a record exists in ICDB with an identical TCN as the one just received and if the existing shipment unit has not been manifested, then the DIC of the just-received record is checked. If it is a booking record (i.e., DIC1 = R), then the record just received will be used to update the booking fields (e.g., booked POE, booked POD) in the existing shipment unit record and the just-received record will not be transmitted to WPS. If the just-received record is not a booking record (i.e., DIC1 = T), then the existing record in ICDB is checked to see if it is a booking record only or if it is an ATCMD record. If the ICDB record is a booking record only, then the existing record is updated and the just-received record is sent to WPS. If the ICDB record is an ATCMD record, then the POE and receipt date are checked. If the existing POE matches the just-received POE, then the record is sent to WPS and is not processed at ICDB. WPS will then determine which changes to accept or reject and will update ICDB accordingly (see Section 1.1.6b below). If the existing POE does not match the just received POE and the shipment unit has been receipted at the existing POE, then the record is put into an error table and it is sent to the new WPS for processing. If the existing POE does not match the just received POE and the shipment unit has not been receipted at the existing POE, then the just-received record is sent to WPS for processing and the existing ICDB data is overlaid with the just-received data.

b. When WPS receives a record with an existing TCN, WPS will then determine which changes to accept or reject and will update ICDB accordingly. The WPS acceptance criteria are as follows:

- For breakbulk cargo, if the status is "en route," then shipper documentation and updates to the ATCMD will overlay all data except booked POE (see also below).

- For container cargo, prior to a receipt status in WPS, all corrections will be applied. Once cargo is receipted, WPS prime information will remain unchanged. Container content data for source-loaded vans will be accepted from the shipper at any point in the cargo documentation process prior to manifesting.

- After the cargo is in receipt status at WPS and prior to the cargo being manifested, a shipper can submit ATCMD corrections to change the contents and TAC fields (for container shipments) or trailer data and TAC fields (for breakbulk shipments).

- To make any changes to the ATCMD other than those noted above, the shipper must contact WPS personnel at the port and request the change be made in WPS.

- The Defense Personnel Support Center (DPSC) has permission to use "dummy" container numbers. Corrections to the container numbers must be made through standard MILSTAMP TCMD change procedures.

1.1.7 Vehicle shipments with multiple piece counts will be "exploded" into separate TCMD transactions.

a. VEHICLE SHIPMENTS. If the second position of the DIC = "V" and the piece count is greater than 1 and less than 24, a separate record will be created for each piece. All data fields of the original record will be copied to the new records with the following exception. The last three positions of the TCN of the original record is submitted as "XXX" - position 16 of the TCN will be converted to a sequential alphabetic character beginning with "A". The letters "I", "O" and "X" will not be used. Example, a "TV1" document is submitted with 4 pieces. The record will be converted to 4 records. The 4 records will have TCNs ending with "XAX", "XBX", "XCX" and "XDX".

1.1.8 ICDB will resend ATCMD data to the appropriate WPS node. The resending process will be entirely controlled by the functional manager through screens dedicated for this purpose.

a. SCREEN REQUIREMENTS. The resend/divert request screen will have, as a minimum, all fields of the prime document and the date submitted. All fields will be queryable and non-modifiable except for POE, which can be changed to allow diversion to a different WPS node. An appropriate help function will be provided to equate the POE with its plain language equivalent.

b. RESEND PROCESSING. All resended/diverted documents will be converted to the format specified in Section 1.1.3d. Reforwarded data will be distributed to WPS nodes in the same manner as newly transmitted data.

1.2 On-Line ATCMD Preparation and Change Facility

1.2.1 The capability is required to allow low-volume remote users to access the ICDB to create or correct ATCMDs. The screens will be developed in the same format as similar purpose screens used in WPS. A user help capability will be provided to assist users in both selecting the proper document format and in choosing the correct responses for each field.

a. The basic entry process will start with a menu with which the user selects the basic document required (SEAVAN Prime, Breakbulk Prime, Content etc.). Based on the Document ID, the appropriate trailer screens will be automatically presented to the user in accordance with the MILSTAMP TCMD preparation matrix.

b. Field-level validation will be provided to ensure only correct responses are entered. Where possible, the user will be able to utilize a menu of valid codes/responses to select field contents.

c. When the TCN and, if applicable, van number have been entered, a search will be made of the ICDB database. If a record is found which matches these keys and is not a METS Pre-Advance TCMD, the transaction will be considered a change to an existing document and will be handled according to Section 1.2.2 below.

d. If a METS Pre-Advance TCMD is found, all fields will be populated with the data available from METS. All Pre-Advance TCMD data fields will be modifiable.

e. Newly created ATCMD documents will be immediately forwarded to the appropriate WPS node in accordance with Section 1.1.2 and will be loaded to the ICDB database.

1.2.2 The ATCMD capability will support a restricted set of changes to existing TCMD data by shippers. Changes will be allowed to TCMD data in any status except manifested. The change process will utilize the same screen format and editing criteria as the addition procedure described above.

a. Changes by shippers will be restricted to the following transactions only:

(1) CONTAINERS: New contents may be added. The TAC may be changed on old contents.

(2) BREAKBULK: Trailers may be added; TAC may be changed.

b. The WPS change record format is contained in the interface document.

c. Changes will be immediately transmitted to WPS and to ICDB.

1.2.3 Changes outlined above are not to be confused with MILSTAMP format ATCMD changes that will be submitted in batch mode. Such documents will be processed through the ATCMD facility outlined in Section 1.1.

FUNCTIONAL REQUIREMENT 2. PROCESS IMPORT MANIFESTS

2.1 Manifests for cargo originating OCONUS and being imported into CONUS will be transmitted to ICDB. The data will be collected and distributed to the appropriate WPS node and other recipients as needed without delay. Initial editing will be performed to preclude such problems as record length aborts. The ICDB database and associated query screens will provide management information on import manifest forwarding. The database will also be used to facilitate reforwarding as required/requested. Following are the primary means of data transmission:

a. AUTODIN. In the period prior to phase-out of AUTODIN, this medium will still be used to transceive manifests to the MTMC Area Command. Capability will be required to convert this data to a format appropriate to the ICDB. A table will be designed for manifest tracking information.

b. DDN. DDN transceived manifests will be immediately ready for distribution following initial quality editing.

c. PC TO PC MODEM TRANSFER. Utilities will be required to convert data from the MS-DOS environment to a format compatable with the ICDB platform.

2.2 Import manifests will be resent to WPS in the format described in Section 1.1.3d.

a. The POD will be found in the manifest header record (DIC = "TAJ") whose format is found in MILSTAMP, Chap. 3. and will not be repeated in this document.

b. Prior to distribution, a check will be made to ensure that no diversion has been entered for the manifest. See Section 2.3 below.

c. Import manifests will be resent to WPS in the format described in Section 1.1.3d. Resending will be via Oracle SQL*Net protocol, and the database will be annotated as to the disposition of the manifest.

d. The manifest management table of the database will contain, at a minimum, all the data elements of the Manifest Header and the following additional elements: date forwarded, WPS node, Status (resend or divert), diversion POD (i.e., POD diverted from), date diversion entered, AUTODIN Batch Number, and date-time group.

2.3 The capability will be provided to allow for the management of transceived import manifests. The functional manager will retain the capability of diverting incoming manifests to another POD (WPS node). The diversion process will be controlled by screens dedicated to this purpose.

a. GENERAL SCREEN REQUIREMENTS. The resend/divert screen will have all the fields of the Manifest Header (per MILSTAMP) and a diversion POD.

b. DIVERSION PROCESS. Any incoming manifests that meet the diversion criteria entered by the functional manager will have the originally entered POD replaced by the diversion POD and then sent according to the port matrix. Appropriate annotations will be made to the import manifest management table.

2.4 Resending/Diversion of import manifests will be accomplished by a user transaction entered on a screen dedicated for that purpose. Resending may be to the original POD/WPS node or may involve a change of POD/WPS node (diversion). Resending will occur as soon as possible following entry of the transaction by the functional manager.

a. ASCII files will contain the original manifest in 80-column format. WPS will receive the import manifest in Oracle tables as described in Section 1.1.3d.

b. The resend/divert screen will allow the user the option of resending an entire manifest or individual records. The full manifest resending screen will have all the fields of the Manifest Header record while the individual screen will have fields for TCN or TCON. Both screens will allow entry of a new POD.

c. The resending process will entail selection of the requested manifest from the database and sending via the port matrix.

FUNCTIONAL REQUIREMENT 3. PROCESS EXPORT MANIFESTS

3.1 Manifests, manifest supplements, and manifest adjustments for cargo exported from CONUS to OCONUS will be output from the local WPS system and transferred to ICDB for distribution to the POD and other recipients. A functional manifest management module will be provided to the functional manager, which will facilitate answers to distribution queries, retransmissions, and reprints. Manifests/supplements/adjustments will be sent to ICDB from WPS in the 80-character MILSTAMP format for outside distribution.

3.2 Distribution of manifest products will be controlled by a fully user maintainable control system. The manifest management module will allow the functional manager to change the recipients of a manifest. Distribution will be controlled by POD and Commodity Code with a comprehensive facility being available to allow distributions by other criteria. Manifests will be placed in an accessible area to be downloaded by request. A capability to produce hard copy will also be included.

3.3 Export manifests/supplements/adjustments will be transmitted to appropriate recipients via a variety of electronic means with DDN as the primary carrier.

a. DDN. Utilities will be prepared to transmit manifests to their DDN recipient.

b. AUTODIN. Utilities will be required to separate and batch the data and convert it to a medium compatable with AUTODIN transmission systems.

c. PC TO PC MODEM TRANSFER. Utilities will be prepared to convert manifest data from the format of the ICDB platform to MS-DOS.

d. FLOPPY DISK MANIFESTS. Utilities will be required to convert manifest data to MS-DOS diskettes in TSM format until TSM is entirely eliminated.

e. EDI. MSC and active EDI Ocean Carriers will receive manifest summaries via EDI through the ACI process. ICDB will provide ACI an ASCII file in the same format currently provided by TERMS.

3.4 Retransmissions of export manifest data from the Area Command to any recipient will be fully controlled by the Functional Manager through screens dedicated to that purpose. The Functional Manager will select the data to be retransmitted and actual retransmission will then be automatic.

a. RETRANSMISSION CRITERIA. Any single or combination of the following:

(1) VOYAGE DOCUMENT NUMBER.
(2) POE (with VOYDOC).
(3) POD (with VOYDOC).
(4) VESSEL STATUS (CHARTER), with VOYDOC.
(5) TRANSPORTATION CONTROL NUMBER.
(6) FULL VAN NUMBER (with DATE RANGE).

b. Retransmission requests based on criteria 1-4 above will result in the retransmission of one or more full manifests.

c. Criteria 5 and 6 will result in partial retransmisisons which will require that the original Manifest Header Record be included with the retransmitted records.

3.5 A capability will be required to manage the printing and distribution of hard copy manifests from the uploaded WPS data. The format of printed manifests is found in MILSTAMP Chap. 3 and will not be repeated in this document. Numbers of copies and recipients will be stored in the modifiable database. The manifest management facility for printed manifests will be equal in scope to the electronic distribution facility described above.

3.6 The Functional Manager will control the process of reprinting manifests through screens dedicated to that purpose. Reprint criteria will be identical to those described in Section 3.5 above and will include the capability of reprint by original printed manifest page number.

FUNCTIONAL REQUIREMENT 4: PROVIDE INQUIRY CAPABILITIES

4.1 A standard pre-formatted request for information on a single shipment will allow the user to enter a TCN (and/or other fields sufficient to identify the shipment) and receive status information; fields accessed and displayed will be the same for most queries [TCN, booked

POE, actual POE, booked POD, actual POD, pieces, weight, cube, breakbulk information, voyage document number, current status (i.e., en route, received, lifted), consignee, consignor, RDD]. All users will have the single shipment query available for their use.

4.2 A standard pre-formatted request for information on multiple shipments will allow the user to retrieve multiple records for display of detailed information based on user-entered selection criteria.

4.3 A standard pre-formatted request for information on multiple shipments will allow the user to retrieve summary information for display based on user-entered selection criteria.

4.4 Access to data will be restricted according to the user's profile in the RDBMS.

4.5 Some users will be able to make ad hoc requests; the number of these users will be limited to those identified by the functinal proponent, and they will be identified by their database profile. Ad hoc query capability will be provided through a commercial off-the-shelf software package, Intelligent Query (IQ)[2].

4.6 To assist the user, the screen form will provide "lists of values" for any field that could be ambiguous (e.g., specific port vs. entire port complex) or for which the selection could be made more efficient through use of a list (e.g., for "commodity code," the system will display a selection list of all commodity codes with their descriptions).

4.7 Direct access to SQL will be limited to a specific set of users (e.g., the DBA/DA).

FUNCTIONAL REQUIREMENT 5: PROVIDE MANAGEMENT REPORTS

5.1 Reports will be identified by two categories: management reports that are produced at predetermined times (daily, weekly, monthly) and reports that are provided on an "as required" basis.

FUNCTIONAL REQUIREMENT 6: PROVIDE USER, SITE, AND TABLE CONTROL

6.1 User registration with ICDB will include a user role within Oracle that limits or grants access to various ICDB processes and/or capabilities.

6.2 User and usage reports will be available to assist the System, Data, and Database Administrators to identify and isolate problems.

6.3 User roles will be determined in order to group users. These roles will be editable, which may be needed in a crisis situation.

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[2]IQ is a product of Programmed Intelligence Corp., Norcross, Georgia.

6.4 An Oracle table of site and/or system identifiers, addresses, and other pertinent information will be developed and maintained.

6.5 Screens will be provided for editing and/or deleting records on reference tables.

6.6 Reference table reports will be available that will assist in maintaining these tables.

6.7 A mechanism will be provided to access the operating system by specified users (e.g., the System, Data, and Database Administrators). In order to protect the system, data, and database, most users will not be able to access the operating system. See also Section 4.2.

FUNCTIONAL REQUIREMENT 7: PERFORM REGIONAL PROCESSES

7.1 Error correction facilities will be available to print lists of records which were rejected for the conditions listed below; users who have access to this facility will be able to edit or to delete the erroneous records.

a. ATCMD Shipment Records that do not pass the basic edit routines.

b. Import Manifest Records that do not conform to MILSTAMP requirements or which do not have an identifiable POD.

c. TACs that do not match the TAC reference table.

7.2 Capabilities will be provided for monitoring required transmissions [e.g., data sent to the Logistics Intelligence File (LIF), MILVAN Tracking System, or the Central Data Collection Point (CDCP) in Tracy, California].

7.3 ICDB will provide information to agencies and organizations as determined by interface agreements. See also Section 5.4.

7.4 On-line capabilities will be provided for printing outstanding discharge dates and for entering data in the event that data does not come from a WPS site (e.g., to enter discharge date at an OCONUS non-WPS POD).

7.5 On-line capabilities will be provided for adding, deleting, or changing code table data and for automatically distributing these changes to hubs and sites as needed.

FUNCTIONAL REQUIREMENT 8: PROVIDE UTILITIES

8.1 Capabilities will be provided that allow users to download or print to their PC the following:

a. Files created using IQ.

b. Files/reports created from Oracle Forms or Reportwriter.

3.3 INPUTS AND OUTPUTS

All data elements currently identified as inputs and outputs for ICDB are described in the ICDB Database Specification. See Section 4.4 for design considerations regarding flat file and relational database aspects of ICDB. The most significant data exchanges occur between ICDB and individual port-level WPSs. Data flows showing ATCMD processing, import manifest processing and distribution, and export manifest distribution are shown in Figs. 3-1, 3-2, and 3-3. Input and output criteria for other ICDB interfaces are determined by interface agreements with these organizations. Additional information on ICDB interfaces is provided in Section 5.4.

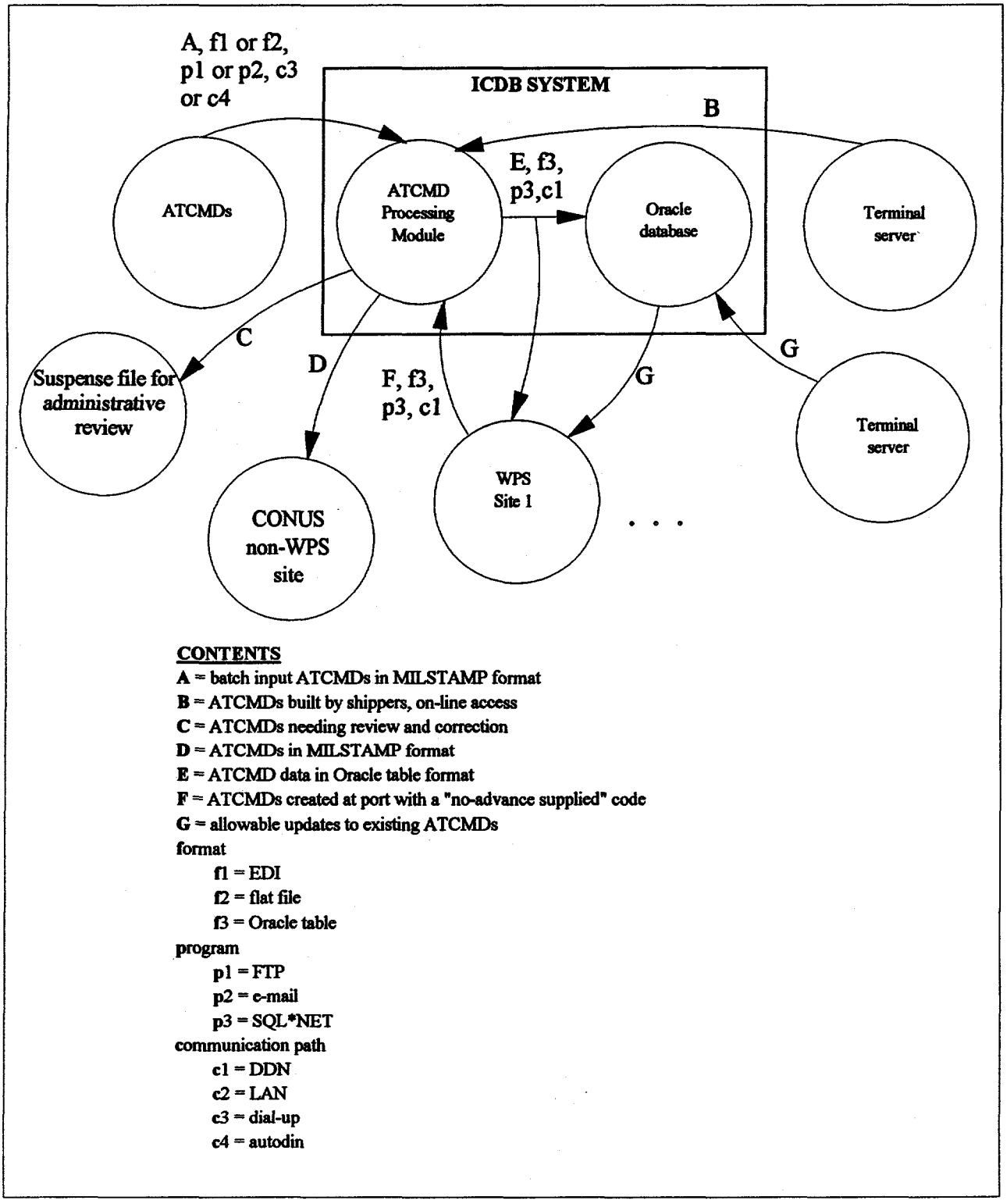
3.4 DATABASE/DATA BANK CHARACTERISTICS

ICDB data elements and entity relationships are completely specified in the ICDB Database Specification.

3.5 FAILURE CONTINGENCIES

Administrative procedures will include daily and weekly backups of ICDB (see also Section 4.2). Oracle's automatic recovery feature will be used to restore ICDB in the event of system failure. This recovery procedure consists of using redo log files to recover any changes made to the database since the most recent backup. These redo log files can be mirrored so that copies exist on multiple physical hard drives. Read consistency is guaranteed due to Oracle's implementation of rollback segments that are used to ensure that transactions are not made permanently until they are complete, consistent, and committed by the user.

The single database server and multiple Hub architectural design for ICDB (see Section 4.1) allows the implementation of system-wide fault tolerance. Failure of the database server does not affect data collection at the Hubs nor does the failure of a Hub affect the database server. The communications between the server and the Hubs is protected in a similar way. The Hubs and the server can detect network problems and use dialup lines to temporarily bypass the problem. Each server and Hub site has power and cooling backed up by an Uninterrupted Power Supply (UPS) and/or generator systems.



CONTENTS

A = batch input ATCMDs in MILSTAMP format
B = ATCMDs built by shippers, on-line access
C = ATCMDs needing review and correction
D = ATCMDs in MILSTAMP format
E = ATCMD data in Oracle table format
F = ATCMDs created at port with a "no-advance supplied" code
G = allowable updates to existing ATCMDs

format
- **f1** = EDI
- **f2** = flat file
- **f3** = Oracle table

program
- **p1** = FTP
- **p2** = e-mail
- **p3** = SQL*NET

communication path
- **c1** = DDN
- **c2** = LAN
- **c3** = dial-up
- **c4** = autodin

Figure 3-1. ATCMD data flows.

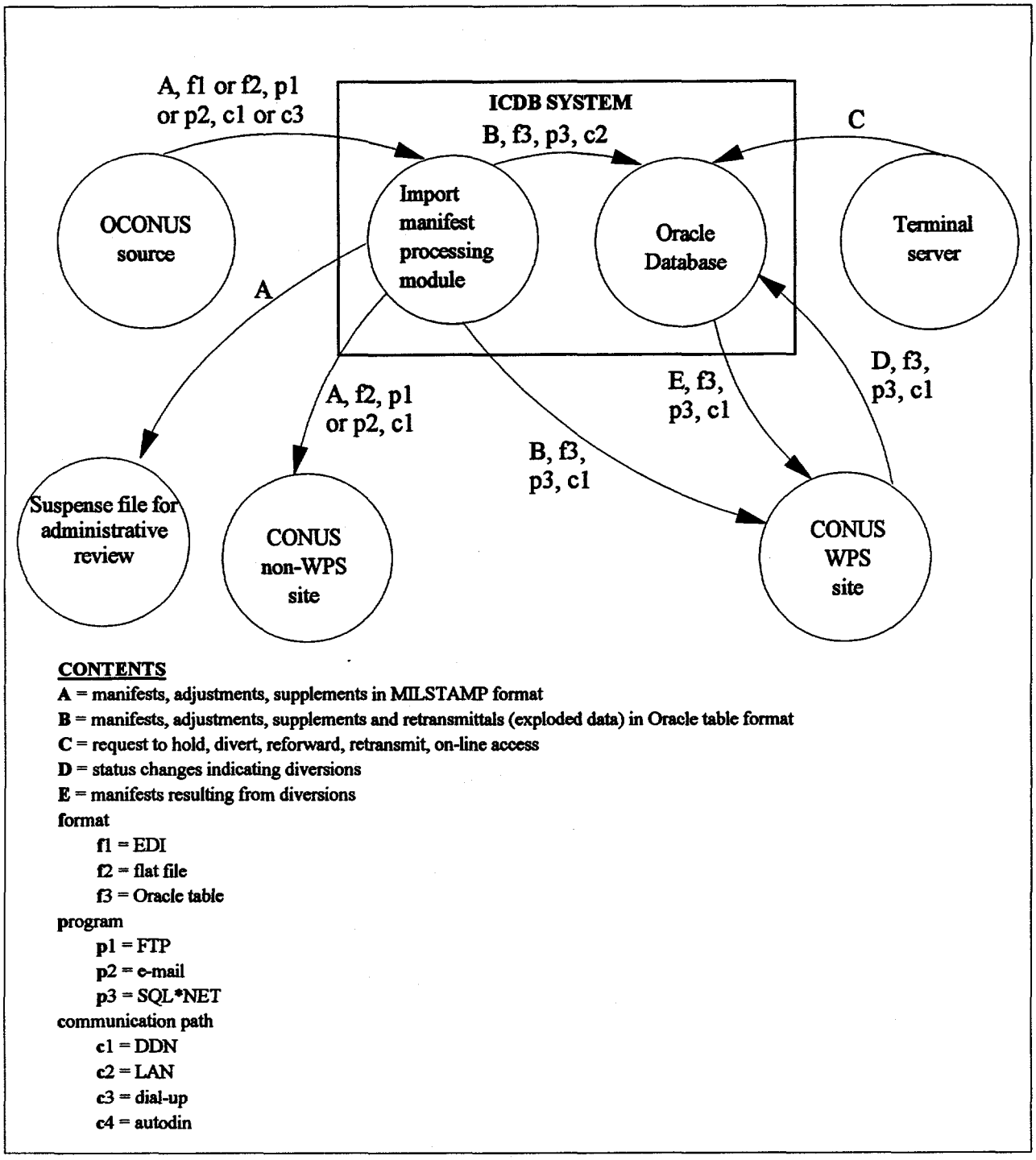


Figure 3-2. Import manifest processing and distribution. Note: These are IOC flows; for FOC, all WPS POE/POD combinations should communicate manifests as Oracle tables via SQL*Net.

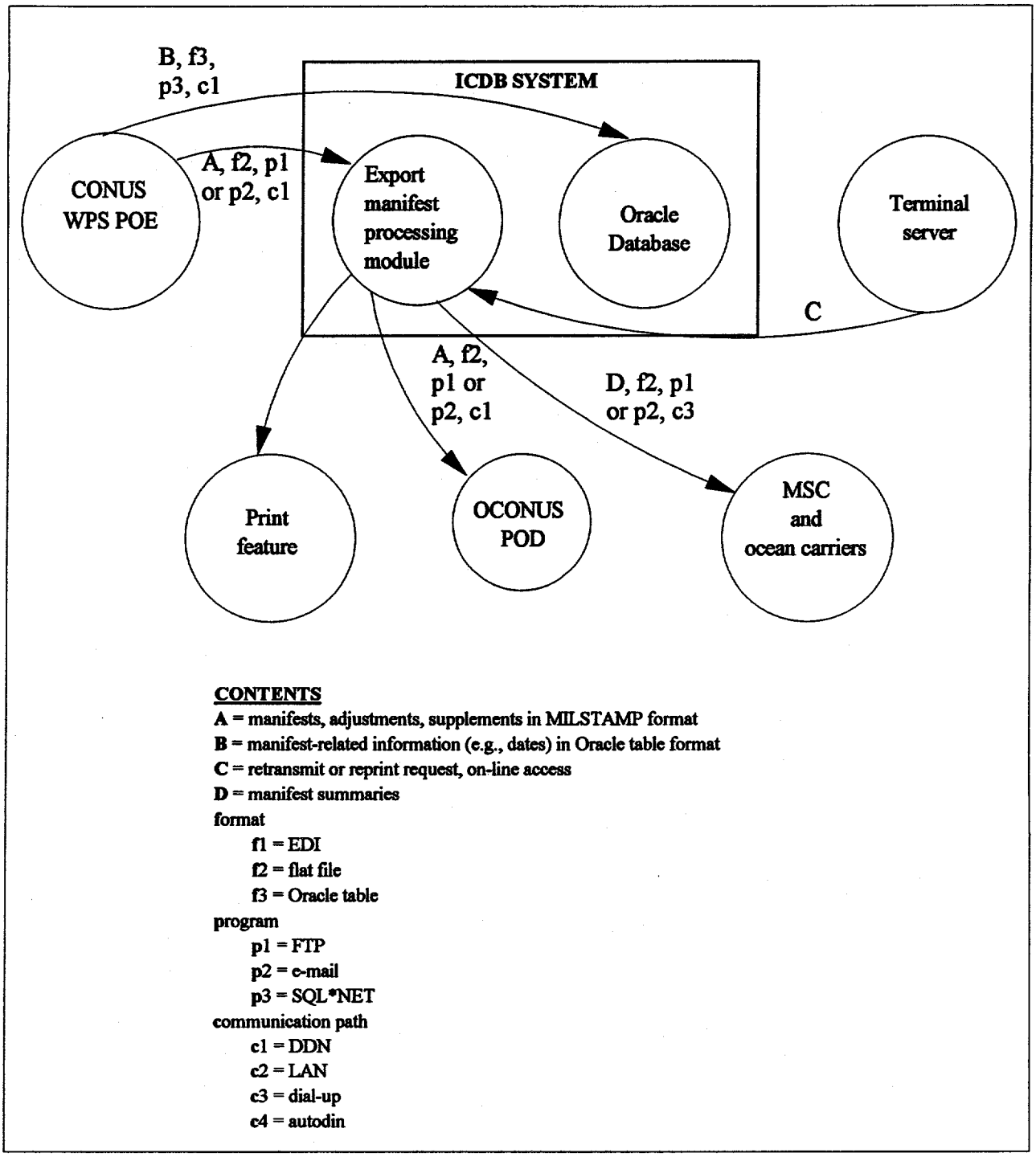


Figure 3-3. Export manifest processing and distribution. Note: These are IOC flows; for FOC, all WPS POE/POD combinations should communicate manifests as Oracle tables via SQL*Net.

SECTION 4. DESIGN CONSIDERATIONS

This section briefly describes how ICDB will satisfy the requirements delineated in Sections 2 and 3. This section also includes technical requirements when these do not relate directly to the functions and performance seen by the user and have not therefore been described in Section 3.

4.1 SYSTEM DESCRIPTION

ICDB is being developed to support the MTMC worldwide mission to track the status of DOD cargo that passes through common-user ocean terminals in both peacetime and wartime. ICDB has been designed to be flexible and adaptive in a changing system environment (operational and planned changes). The Oracle RDBMS enhances this flexibility by being able to adapt to different types of hardware platforms to enable system mobility. ICDB is completely upgradeable and capable of expansion to support additional users and data retention volumes.

ICDB system components consist of a central database server and regional processing Hubs. In general, the flow of data will be (1) between a WPS site and the regional Hub that collects data from or sends data to that WPS site and (2) between a regional Hub and the central database server. In addition, data from Hub processing modules and from the central database server is provided to other organizations according to predetermined frequencies and procedures. Some ICDB functions and processes occur at the Hub and some occur at the central server. Figure 4-1 is a broad overview of where processing takes place.

4.2 SYSTEM FUNCTIONS

The primary functional requirements of ICDB are to provide users with advanced cargo documentation and manifests and to serve as a repository for WPS data in order to support terminal cargo management at a regional level. Functional modules include the following: ATCMD processing, import manifest processing, export manifest processing, inquiry, reports, user/site control, regional processes, and utilities. A detailed list of functional requirements is given in Section 3.2. A list of key functional requirements and the design approach to meeting these requirements is given in Table 4-1.

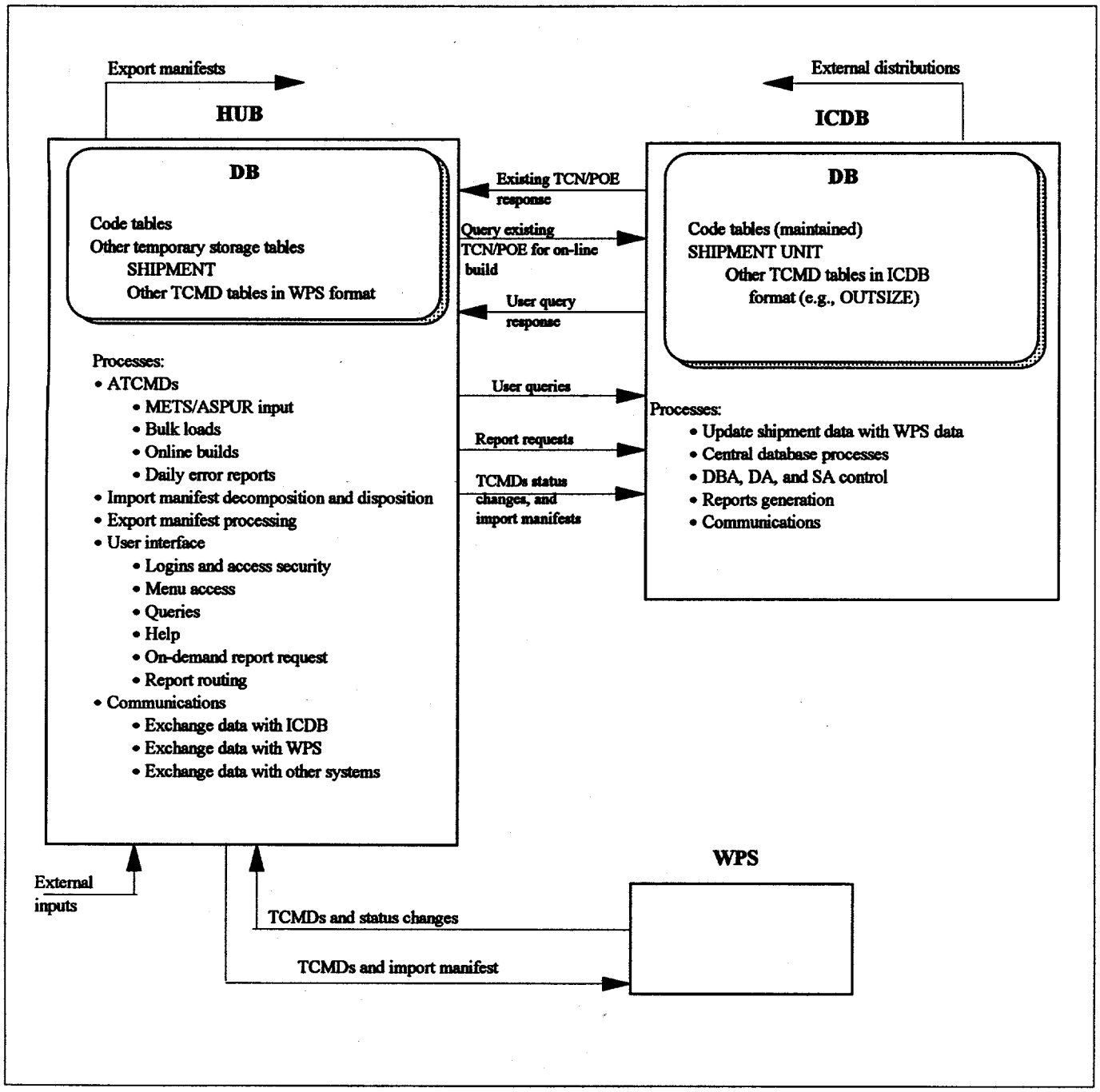


Figure 4-1. Location of ICDB process modules and related data tables.

Table 4-1. Key functional requirements and design attributes (IOC)

Requirement	Design approach
ATCMD processing	A processing module will accept 80-col batch input, provide basic validation, and load data into tables formatted for WPS (with a designation to identify the appropriate port); ICDB will load this data into ICDB tables; ATCMDs provided through the on-line build feature will be validated in the build process; ATCMDs with a no-advance supplied will be accepted from WPS. ATCMD error and exception reports will be generated.
Import manifest processing and distribution	For WPS PODs, the processing module will accept 80-col batch input, provide basic validation, explode appropriate fields, and place data in Oracle tables for the PODs and the ICDB database. For a non-WPS POD, the 80-col format will be transmitted to that POD.
Export manifest processing and distribution	A processing module will accept the manifest in 80-col format and will distribute it as appropriate.
Queries	A query processing module will provide responses to queries on cargo shipments.
Regional reports	Regional management reports will be provided as required.
User/site/table control	Utilities will be developed for menu-driven capabilities to register users, edit roles and groups, compile usage reports, maintain site and system routing identifiers and addresses, and maintain system code tables.
Regional processes	Utilities will be developed for correcting or deleting shipment records as appropriate for ATCMD and import manifest records that do not pass basic edits and to resolve some other errors on records. Capabilities will also be supplied for monitoring transmissions of required regional cargo traffic management reports and for performing other required oversight duties including maintaining and distributing code tables.
Utilities	Utilities will be developed that allow users to print or download files to their PC.

Other ICDB system/subsystem components are also being developed. Key system components are described below, and Table 4-2 describes design attributes for these system functions. It should be noted that many of these system functions must exist at both the central database server and at the Hubs.

A Continuity of Operations Plan (COOP) will be developed, which will address system backup. Procedures will be available for full and partial file system backups on a periodic basis, and incremental and complete database backups will be included in the COOP. Oracle daily and weekly backups will be performed (see Section 3.5). A C2 level of security is required (see Section 6).

Oracle tools will be available to control and monitor system access. Some ICDB users will have permission to update address lists for information transfer recipients. In addition, some users (e.g., the system administrator but not a shipper) will be able to access the operating system to conduct system administration duties. Tools will be available for diagnosing system and network problems. Electronic mail will be available on this system as a standard Unix utility for those users who have access to the operating system.

With respect to database administration (DBA) activities, Oracle tools will be used by the DBA to perform day-to-day maintenance on the database. These tools will be available for both command line use and menu/screen-based access.

The DBA will be able to monitor all database aspects of background processes. Tools will be available for DBA performance tuning.

Data administration tasks will be made easier through the use of scripts to assist with maintenance of data quality. Code tables will be maintained through screens developed for that purpose.

Communications handling will be a major effort of ICDB. Communications processing within each Hub will be responsible for receiving all data, checking for transmission errors, and distributing the data to ICDB, the ICDB manifest module, the ICDB ATCMD processing module, or to one of the miscellaneous processes connected with ICDB. The Oracle tool SQL*Net Version 2 will be used whenever possible to accomplish the data exchange. When Oracle-to-Oracle communications are not possible, a standard

Table 4-2. Key system requirements and design attributes

Requirement	Design approach
Backup and security	Both Unix and Oracle utilities can be used; Oracle provides on-line database backup, and off-line backups can be accomplished in Unix. Unix and Oracle provide multiple levels of security.
System Administration	Both Unix and Oracle utilities will be used. Although serious system administration will be performed at the Unix level, Oracle screens will be developed for repetitive system management activities, such as accessing usage reports.
Database administration	Oracle provides DBA tools to increase visibility of Oracle database status; these tools will be available both on the command line and as menu-driven modules. Scripts to modify configurations will also be developed. Utilities will be developed for adding database users, maintaining physical tables, and structuring and querying the database.
User/site/table control	Utilities will be developed for menu-driven capabilities to register users, edit roles and groups, compile usage reports, maintain site and system routing identifiers and addresses, and maintain system code tables.
Communications	Most communications will be accomplished via dedicated line or the Milnet/DDN lines. However, automatic fallback procedures for using TCP/IP across phone lines will be crucial. SQL*NET V. 2 will be commonly used, as will various Unix packages. Communication modules between WPS and ICDB will send ATCMD and import manifest data to the appropriate WPS sites and will obtain ATCMD data, status updates (including export manifest information), non-status WPS transaction records, and FMS transaction files from each WPS site. ICDB will prepare and transmit various standard reports and files as required by interface agreement.
Help	Help will exist as a multi-layered resource which will be available on different levels across ICDB modules. Oracle help will also be available. Applications will incorporate "Lists of Values" capability on the field level.
Archiving	As noted in the ICDB Architectural Analysis, the original plan for archiving was that it would be done on a CD-WORM jukebox. The disk volumes would act as either separate ICDB databases or as separate table sets within the main ICDB database. Access to archived data would be as fast as the jukebox can access the data. Little or no alterations would be necessary to the software parameters to access the archived data. The ICDB architecture guarantees a minimum of two years of data on the jukebox. Depending upon the amounts of data archived, it is possible that the jukebox could hold much more than two years. However, current archiving plans are on hold until the ICDB Oracle database is upgraded to a new release.

History files	The ICDB architecture will hold a rolling year (latest 13 months worth) of ICDB access and transactions logs on-line in the server's disk drives. Final decisions about archiving historical data are still being determined.

protocol and set of procedures will be used as stipulated in interface agreements. A communications program which will be responsible for sending and receiving non-Oracle data will be written.

Help screens will be accessible in ICDB via a standard access mechanism (menu buttons or function keys). Pop-up windows presenting lists of appropriate selections will be available for selecting data.

Archival processes will be developed. Procedures will be available for the DBA to archive old records off-line. Tools will be available for database and transaction log backups.

Some records will automatically be archived according to a predetermined retention schedule. The functionality of the storage and retrieval system of archived data will depend on the physical media used. It is expected, however, that data archived within two years will be accessible virtually on-line, although a load procedure may be necessary. History files will be available. A history of accesses and transactions will be maintained. A capability for intervention by the DBA will exist to send information and logs to history.

4.3 FLEXIBILITY

The ICDB system hardware and software is being designed and configured in such a way as to accommodate technological advances, changes in operations, or changes in responsibility. The Oracle RDBMS enhances this flexibility due to its continued availability on different hardware platforms, completely upgradeable design, capability of expansion to support additional users, physical structures, and data retention volumes.

4.4 SYSTEM DATA

ICDB data will exist in two basic formats: MILSTAMP format at the operating system level and relational DBMS tables. All validated data subject to editing, manipulation, or transformations (including formatting

by report generators) will be stored in the DBMS. Detailed data characteristics are discussed in the ICDB Database Specifications.

Because a primary purpose of ICDB is to provide worldwide visibility over cargo traffic, completion of the basic cargo shipment unit record is critical. Figure 4-2 shows the sources of data for categories of data including booking, advanced documentation, and status changes at the POE and POD. This figure shows construction of a typical CONUS, non-unit record for IOC. For a unit move shipment record, the only difference in the process is that the shipper does not send the ATCMD because ASPUR, which replaces METS II functionally for unit moves, creates the ATCMD and sends it to the ICDB Hub. Figure 4-3 shows how an IOC shipment unit record on ICDB is constructed for cargo originating OCONUS.

4.5 OPERATIONAL AVAILABILITY

ICDB is being designed to achieve an operational availability (A_0) of 95%. Hardware and software (with the exclusion of the ICDB specific applications) will be commercial off-the-shelf packages.

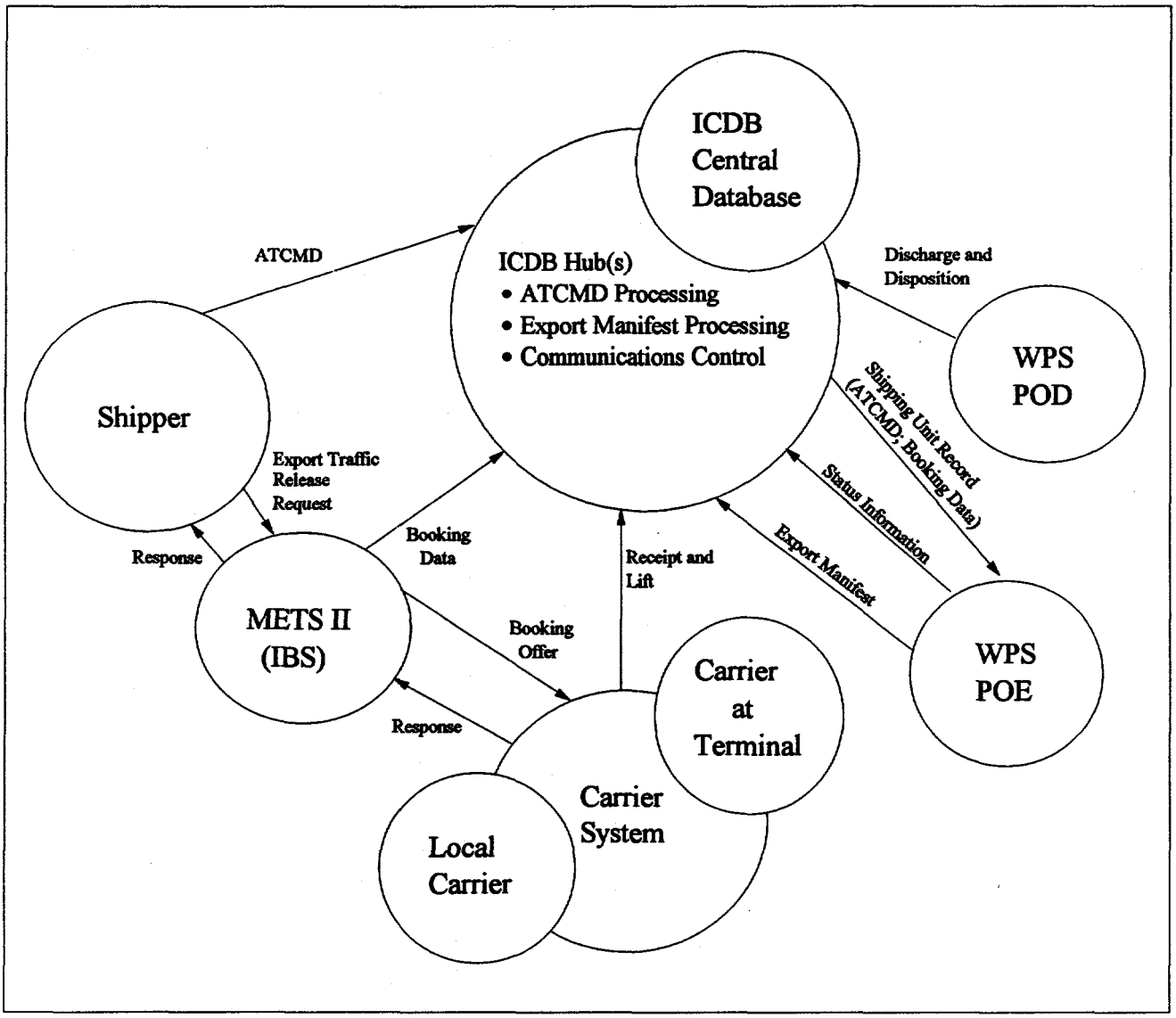


Figure 4-2. Completion of data fields of a typical CONUS, non-unit shipment unit record.

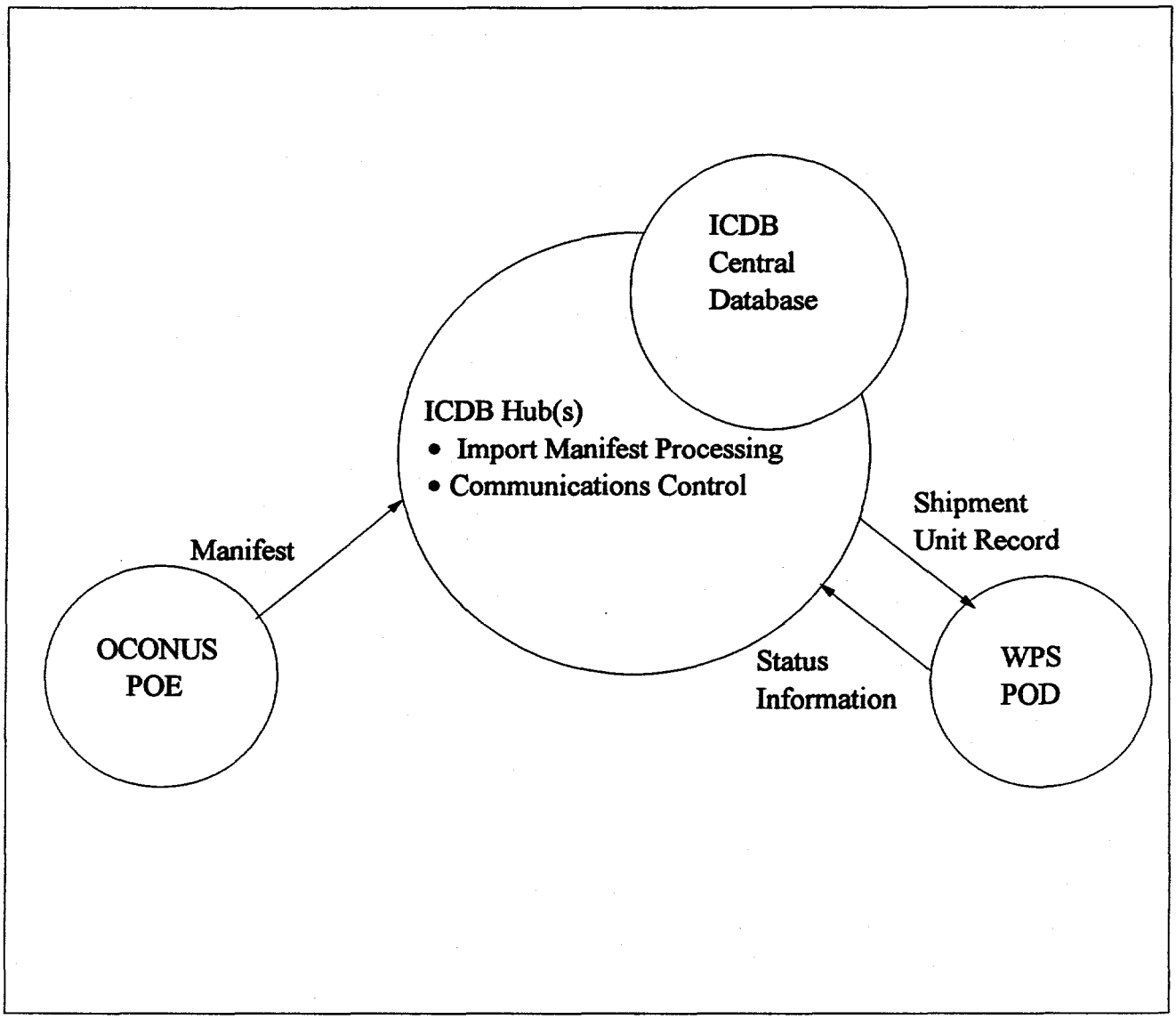


Figure 4-3. Completion of a shipment unit record for cargo originating OCONUS.

SECTION 5. ENVIRONMENT

This section describes in general terms the environment envisioned for ICDB. Sections 5.2-5.3 describe the operational environment (hardware, software, and communications). Interfacing systems and organizations are described in Section 5.4. The anticipated impact of ICDB to the organizational environment within which it will operate is presented in Section 5.5. Other environmental issues are addressed in Sections 5.6 and 5.7.

5.1 EQUIPMENT ENVIRONMENT

The initial development environment consisted of Sun 630 workstation servers and Intel 486-based clients. Later (December 1993) the development system was upgraded to Hewlett Packard (HP) in a configuration that emulated the production hardware.

An operational configuration based on a central, worldwide database server and regional processing Hubs was recommended in the ICDB Architectural Analysis. A hardware platform based on Hewlett-Packard models was also recommended. Specific details of this architecture are given in the ICDB Architectural Analysis.

5.2 SUPPORT SOFTWARE ENVIRONMENT

The support software environment for the server includes the Unix operating system and all utilities, Oracle RDBMS (version 7) and associated tools, and Ada as the procedural language.

Clients in the development environment will run Open Desktop (ODT) from Santa Cruz Operation (SCO) (with Unix and DOS support) and will connect to the server using Transmission Control Protocol/Internet Protocol (TCP/IP).

Oracle CASE was used during development of the ICDB database. Menu screens are developed using the Oracle SQL*Menu tool. Screen forms are designed using the Oracle SQL*Forms tool. Communications with other Oracle systems, e.g., WPS, will use Oracle SQL*Net.

ICDB will include software routines to support archival of information both on-line and on removable media in accordance with MTMC procedures. ICDB will also include both command-line and menus/forms-based utilities that support system and database administration. Currently, the ICDB data dictionary is contained in the Oracle CASE tool, CASE*Dictionary.

5.3 COMMUNICATIONS REQUIREMENT

ICDB is being developed using state-of-the-art communications technologies. Oracle SQL*Net will be used for all communications between ICDB Hubs and WPS using a dedicated line or Milnet/DDN lines. A detailed description of the hardware and software is provided in the ICDB Architectural Analysis.

5.4 INTERFACES

As the recipient of data from booking systems, shippers, carriers, and WPS ports and as a source of data for HQ, ACs, and other systems and organizations needing data, ICDB will serve as the central system for tracking cargo movement data for cargo passing through common-user ocean ports. ICDB will interface with other systems via electronic transmission of data in pre-specified formats. Table 5-1 shows the types of data sets to be received by ICDB; Table 5-2 shows the types of data sets to be sent from ICDB. Additional data sets will be identified as interface agreements with other organizations and/or automated systems are established. The types of users/organizations with which ICDB will interface are shown in Figure 5-1. These interfaces are provided in greater detail in Figure 5-2. Data going to non-WPS ports is processed by the Hubs and sent to TERMS but is not incorporated within the central database.

5.4.1 Major MTMC System Interfaces

The major systems with which ICDB must interface are WPS and METS/ASPUR (IBS). ICDB will interface with METS (IBS) to receive booking information (skeleton ATCMDs); the frequency will be every 4 hours for METS and approximately real-time after IBS is developed. The medium of exchange will be via flat files (METS) or possibly Oracle tables (IBS). ICDB will receive unit move information from ASPUR (IBS) in the form of ATCMDs. ATCMDs received via AUTODIN message will be entered manually into the ATCMD module until AUTODIN is replaced by DDN.

Table 5-1. Data sets to be received by ICDB[a]

Data set	Sending system	Format reference
ATCMD (skeleton)	METS/IBS	MILSTAMP
ATCMD	ASPUR/IBS	MILSTAMP
ATCMD, batch	Shippers	MILSTAMP
Shipment unit data	WPS	Oracle tables
Export manifest	WPS	MILSTAMP
Import manifest	WPS and others	MILSTAMP
Cargo traffic message	WPS	MILSTAMP
Reject message	WPS	Oracle table
Status	WPS	Oracle table
Status	ACI	Flat file
Status from POD	WPS or on-line access	MILSTAMP

[a]FMS data is pushed from WPS ports to FMS through Hub communication processes and is not entered into the central Server tables.

Table 5-2. Data sets to be sent from ICDB

Data set	Receiving system	Format reference
Shipment unit data	WPS	Oracle tables
Import manifest	WPS	Oracle tables
Manifests	Various	MILSTAMP
Cargo traffic message	WPS and non-WPS ports	MILSTAMP
ATCMD	ETADS/NAOMIS	MILSTAMP
History	HQ MTMC	Unique message
Receipt, lift, discharge, disposition, vessel status, hazardous, and explosive	LOGSA	Per interface agreement
Receipt, lift, vessel status, hazardous, and explosive	NAOMIS	Per interface agreement
Receipt, lift, vessel status, hazardous, and explosive	CISIL	Per interface agreement
Receipt, lift, vessel status, hazardous, and explosive	ETADS	Per interface agreement
Receipt, lift, discharge, disposition and vessel status	GTN	Per interface agreement
Receipt, lift, discharge, disposition for containers	JCCO	Per interface agreement
Receipt, lift, and vessel status	AAFES	Per interface agreement
Discharge	CDCP	Per interface agreement

*FMS data is pushed from WPS ports to FMS through Hub communication processes and is not entered into the central Server tables.

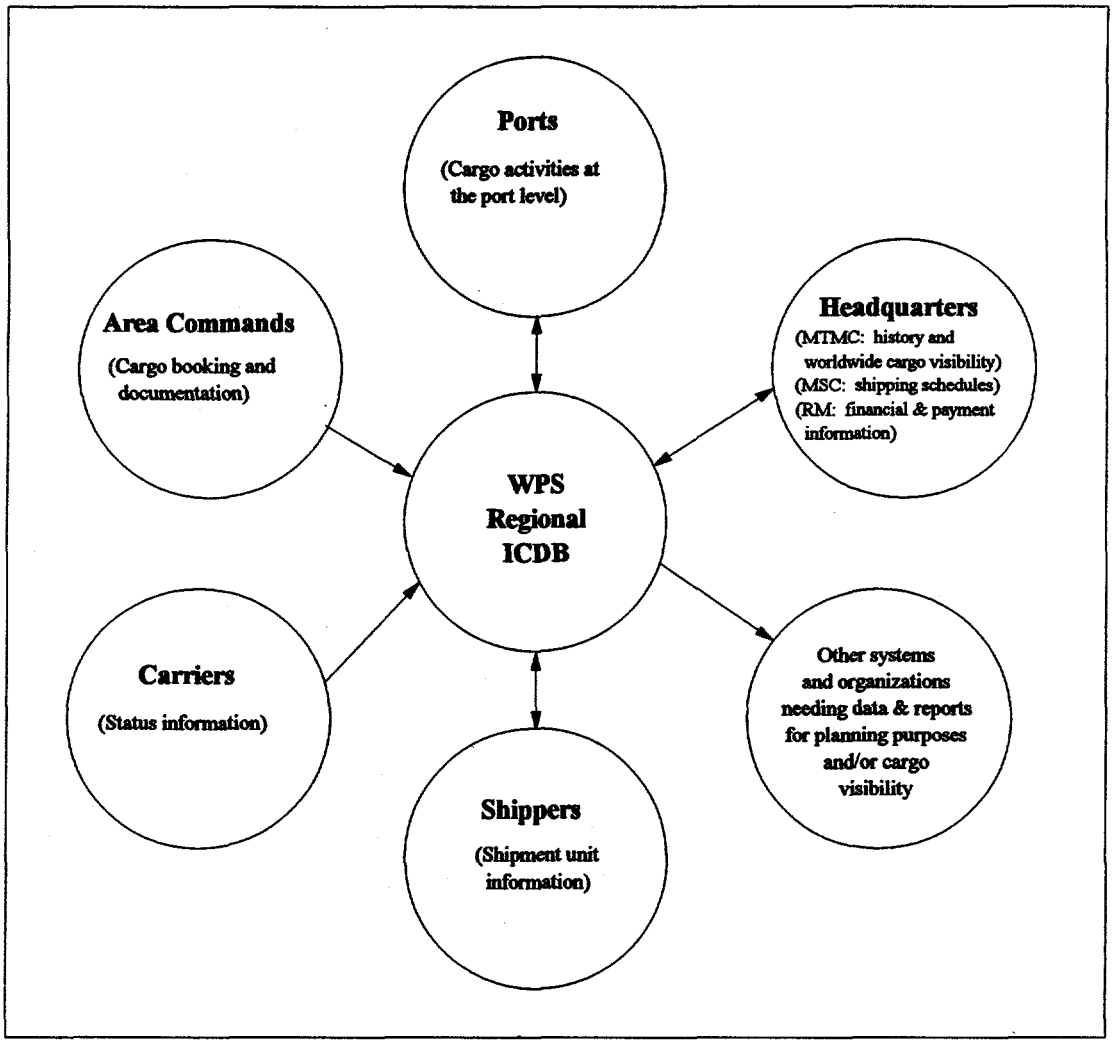


Figure 5-1. Functional distribution of data received by and sent from ICDB.

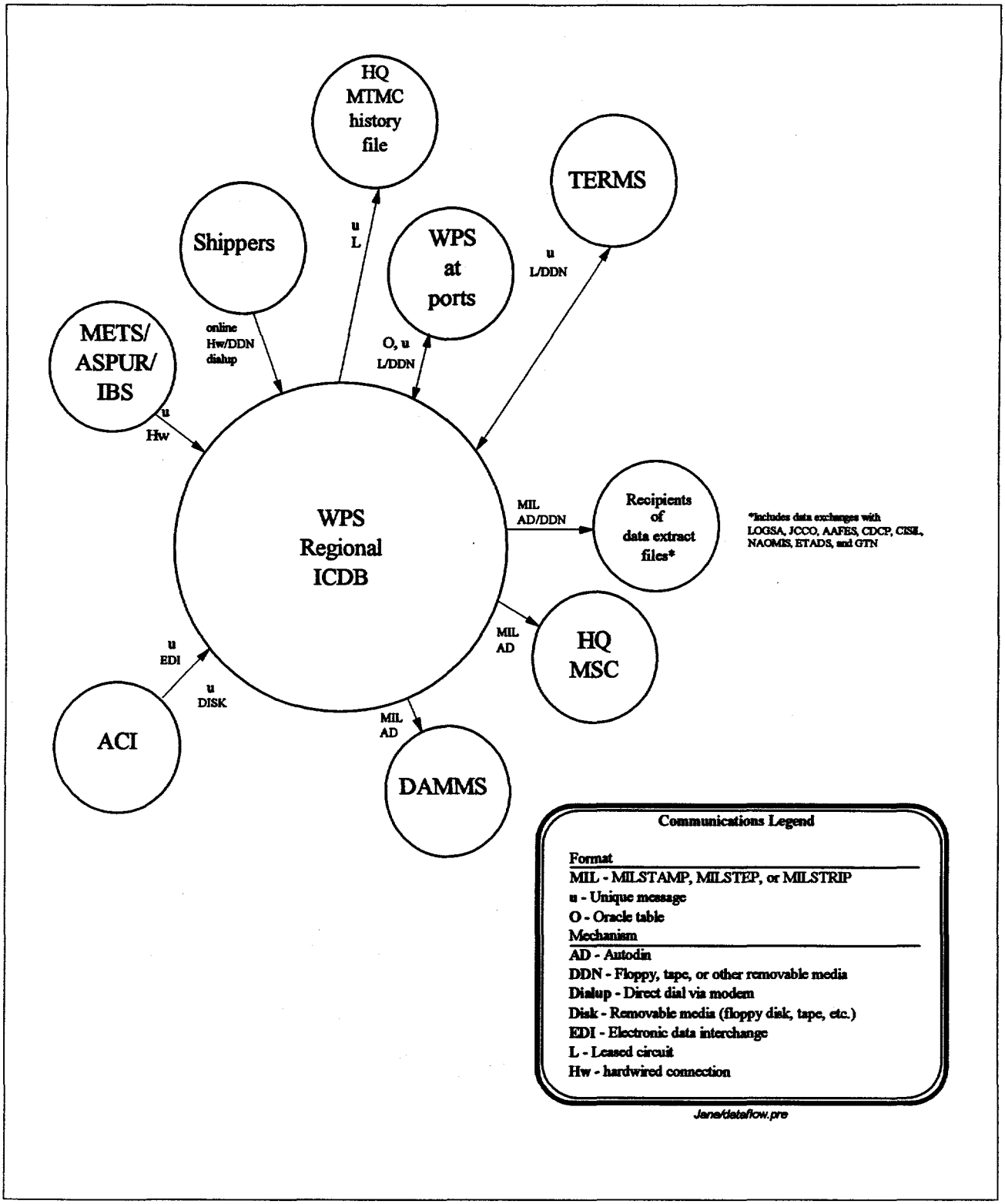


Figure 5-2. Data flows to and from ICDB.

5.4.2 Other MTMC Systems

Interface agreements for communications with MTMC systems other than WPS and METS/ASPUR (IBS) are currently under development.

ICDB will be a flow-through point for contractor pay messages being sent between WPS sites and FMS. The frequency will be "as required"; the medium of exchange is flat files.

ICDB will send data to MTMC's MILVAN, a system maintained by the Joint Container Control Office (JCCO) for milvan tracking.

5.4.3 Major Non-MTMC Systems

ICDB will interface with major non-MTMC transportation systems. The interface with the U.S. Transportation Command via the GTN will be as identified by the interface agreement between GTN and MTMC. The frequency of exchange is to be daily though the frequency may be changed; the medium of exchange is flat files.

ICDB will accept data through the Automated Carrier Interface (ACI) from carriers to obtain carrier status information. The frequency is "as required"; the medium of exchange will match current file formats being passed through ACI. No data will be sent form ICDB to ACI.

A file containing discharge information will be sent to the Central Data Collection Point (CDCP) in Tracy, California, for TK7 data processing; the frequency is monthly; the medium of exchange is flat files in MILSTAMP format.

A file containing receipt, lift, discharge, disposition, vessel status, hazardous, and explosive data will also be prepared for the U.S. Army Material Command Logistics Support (LOGSA) at Presidio, California; the frequency is daily; the medium of exchange is flat files in MILSTAMP format.

A file containing receipt, lift, vessel status, hazardous, and explosive data will be prepared for the Navy Material Transport Office (NAOMIS); the frequency is daily; the medium of exchange is flat files.

A file containing receipt, lift, vessel status, hazardous, and explosive data will be prepared for the Enhanced Transportation Automated Data System (ETADS); the frequency is daily; the medium of exchange is flat files.

A file containing receipt, lift, vessel status, hazardous, and explosive data will be prepared for the Central Integrated System for International Logistics (CISIL); the frequency is daily; the medium of exchange is flat files.

Manifest data will be sent to a HQ MSC mailbox via dedicated line or DDN as it is processed, and ICDB will provide DAMMS with MILSTAMP format manifests.

5.4.4 On-line Interface

The ICDB user interface located at the ICDB Hub will be designed to allow the user to request information from the central server. ATCMDs, manifests, and WPS data sets for which ICDB identifies data in error will be placed in their appropriate error files for correction by functional administrators at the AC via the on-line interface. ICDB is being designed to support multiple types of queries and reports (see also Section 3.2).

On-line access will also permit users to remotely dial-in to update records with data not available from WPS (e.g., discharge date at the POD for an OCONUS non-WPS port).

5.5 SUMMARY OF IMPACTS

The following impacts are currently under consideration. Although they are assumed to be valid, additional impacts may be identified during the implementation and initial start-up of the system.

5.5.1 ADP Organizational Impacts

Automated data processing personnel will be required for the operation, maintenance, and enhancement of ICDB. Personnel requirements include a database administrator, data administrator, and system administrator. It is possible that a network administrator may be needed.

5.5.2 ADP Operational Impacts

ICDB will operate in a client-server architecture on a central database with Hubs. Users will access the Hubs via a LAN.

5.5.3 ADP Development Impacts

ICDB is being developed by a contractor and MTMC Eastern Area. The impact of joint development is as follows:

- all sites have a role in decisions, development, and testing,
- IME must be able to understand ORNL's processes and be able to maintain the system, and
- standards for development and configuration management will already have been established as a necessary part of this approach to development.

5.6 FAILURE CONTINGENCIES

For contingency situations, maintenance of a mirror machine is always a possibility, even after implementation has begun. This duplication provides insurance against disk failure. Back-up procedures will be done on a daily basis, usually triggered from the Unix script that will automatically run at night or during "downtime" periods. This procedure will be an issue that evolves during the life of ICDB. Recovery techniques are being defined and documented. Recovery techniques training will be provided to individuals designated this responsibility. Specific operational procedures in case of a failure will be defined in the ICDB COOP and the ICDB System User's Manual.

The design of ICDB hardware and system software as described in the ICDB Architectural Analysis considers reliability as a paramount issue. Any failure type that has a statistical significance has been addressed in that document. It has been suggested to geographically and functionally distribute the system to allow parts of it to fail (or be shut down for maintenance) without affecting any other part. Components sending data to the affected part accumulate its input data and components receiving data from the affected part await its output data. The system is specifically designed so that effects on any part will not be permanent.

5.7 ASSUMPTIONS AND CONSTRAINTS

The system design assumes the availability of reliable communications, maintenance as needed, and facilities (e.g., air conditioning, space for computers, etc.) All other assumptions have been bolstered by designed-in assurances.

SECTION 6. SECURITY

6.1 BACKGROUND INFORMATION

ICDB will be an unclassified computer system. System security will be designed for operation at a C2 level. Because ICDB will be used for tracking all DTS cargo during both peacetime and wartime, a large number of users will have access to the ICDB database through the Hub access mechanisms. Precautions must be implemented to ensure that no user can access information that is not pertinent to his/her information needs. The following sections describe those points at which illegal entry and/or potential degradation to the database could occur.

6.2 CONTROL POINTS, VULNERABILITIES, AND SAFEGUARDS

This section describes the points in the system which require specific safeguards.

6.2.1 Control Points

6.2.1.1 Input Control Points

Data will be entered into ICDB from many sources (see Section 5.4). All of these are input control points. At the lowest level, ICDB data that has arrived via one of the communications channels previously described is guaranteed by the technology and standards used within the channel to be that data that entered the channel at the other end. In other words, the communications systems will introduce no errors into the data because all the channels contain some mechanism of error detection and correction. Data corruption during communications has the highest incidence and would be the primary cause of errors in the data if it were not for the detection and correction technology currently in use.

All disk storage devices used on all computer-based systems or sub-systems also have error detection capabilities built in. On the ICDB servers, the RAID disk systems will not only detect errors but will correct them as well. Modern disk technology has virtually eliminated data corruption because of disk

drive failure. The Hewlett-Packard server hardware selected will have the capability to detect all memory bit errors and even correct single bit errors.

All ICDB users will be granted userids and passwords. The degree of ICDB access will be based on role permissions granted; roles will be assigned depending on user requirements and mission.

6.2.1.2 Process Control Points

Modern communications systems will output only data that is identical to the input data. Whenever the communications system finds that for any reason it cannot do this, it will notify its ICDB server computer of its difficulties. At this time, software safeguards can be executed either automatically or by the computer operator.

6.2.1.3 Output Control Points

Outputs include management reports, automated MILSTAMP/MILSTEP/MILSTRIP report requirements, and responses to pre-formatted queries. All of these outputs have been reviewed during their design and programming to ensure the absence of faulty logic in the selection statements. In addition, user profiles as defined through role/group assignments will restrict the output products that a specific user can request. Data communication is carefully controlled through current technology (see Section 6.2.1.1). Therefore data output will be carefully managed.

6.2.2 Vulnerabilities

ICDB is being designed to prevent conditions in the applications or system that cause error, loss, or compromise of information. The ICDB system is highly automated and requires little human intervention.

6.2.3 Safeguards

The following security measures will exist at the Hubs and at the central ICDB server.

- Sheltered physical quarters enclosed within a secure Army base or building.
- An armed guard located at the entrance of the base or building.
- Controlled entry into the base or into the building housing the computers.

- Lockable doors to the room in which the computers are located.

The system will limit access to users with a valid userid and password combination. Duplicate passwords will not be assigned, and passwords will not be shared. Passwords will be changed on a regular basis or as dictated by regulations.

Procedures for collection, preparation, and backup of data are noted in Section 4. Policies for administration of the system, data, and database must be developed and closely monitored. In addition, it is expected that a network administrator will be required to maintain network operation when OCONUS sites become operational.

ICDB will contain a disclaimer screen identifying the system as a government unclassified system.

Cargo movement records will be archived to a disk or tape storage device, labeled, and maintained. Policies for length of maintenance are in accordance with MTMC standard procedures.

All of the ICDB hardware is dedicated to the single use of ICDB. No functionality unrelated to ICDB will be authorized use of ICDB system resources.

User ID and password authorizations are one technical safeguard for entry into the system. In addition, user access will be limited to partitioned modules, as appropriate. Also, methods for detecting abnormal patterns of use and "hacking" tendencies will be pursued. Finally, protection against electronic surges and against viruses will be implemented. These procedures may include both system auditing and Oracle auditing.

Data quality will be maintained through data validation procedures implemented during data entry and through implementation of the data dictionary and integrity constraints of the RDBMS.

6.3 SYSTEM MONITORING AND AUDITING

ICDB will use the Oracle and Unix system monitoring features for the production of audit trails and reports to monitor the usage and efficiency of the system.

SECTION 7. SYSTEM DEVELOPMENT PLAN

The WPS Regional ICDB began development testing in the spring of 1995. System qualification tests (SQTs) were conducted in Oakland, California, in the summer and early fall of 1995. Successful implementation of the WPS Regional ICDB began in September 1995.

SECTION 8. COST FACTORS

An economic analysis associated with the ICDB will be documented in the WPS Economic Analysis (EA). All cost factors for the Regional WPS ICDB will be discussed in the WPS EA, and alternatives for system development and system design will be presented. Therefore, no cost analysis is contained in this FD, and no separate cost analysis will be conducted for ICDB.

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