NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AUTOMATED ASSESSMENT OF SQUADRON ENLISTED MANPOWER, TRAINING AND READINESS

by

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September 2002

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REPORT DOCUMENTATION PAGE	*Form Approved OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** September 2002	**3. REPORT TYPE AND DATES COVERED** Master's Thesis

4. TITLE AND SUBTITLE: Title (Mix case letters) Automated Assessment of Squadron Enlisted Manpower, Training and Readiness	**5. FUNDING NUMBERS**
6. AUTHOR(S) Daniel P. Granados Kreg L. Kelly	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited	**12b. DISTRIBUTION CODE**

13. ABSTRACT *(maximum 200 words)*

Manpower management within all activities of the United States Navy has traditionally been an extremely challenging function. Careful, crucial reconciliation of manpower reports such as the Enlisted Distribution and Verification Report (EDVR) and the Activity Manning Document (AMD) are a critical event in the proper execution of such a process. Unfortunately, an automated process where such a manual, regularly occurring, time consuming, error prone, man-hour intensive routine is performed does not currently exist. Specifically, in the area of Capability Ratings, Manning, Training, Equipment and Supplies, an activity should be able to extract a prescribed range of data from their EDVR and AMD and have it automatically calculate the T-Rating and M-Rating as required by the Functional/Type Wing Commander. This thesis will attempt to address the feasibility, and requirements for such an automated software application utilizing COTS technology with the additional utilization of application interface development to automate to the greatest degree possible, the regularly recurring reconciliation of the EDVR and Activity Manning Document.

14. SUBJECT TERMS Manpower Database, AMO Database, Squadron EDVR, Squadron AMD, Automated Manpower Assessment, Squadron Manning, Information Management Systems, Client/Server Systems, Information Systems, Database Management Systems, Database, Decision Support, Distributed Computing, NMCI, .NET, Web Enablement, Military Readiness	**15. NUMBER OF PAGES** 167
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

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AUTOMATED ASSESSMENT OF SQUADRON ENLISTED MANPOWER, TRAINING AND READINESS

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MASTER OF SCIENCE IN INFORMATION SYSTEMS TECHNOLOGY

from the

NAVAL POSTGRADUATE SCHOOL
September 2002

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ABSTRACT

Manpower management within all activities of the United States Navy has traditionally been an extremely challenging function. Careful, crucial reconciliation of manpower reports such as the Enlisted Distribution and Verification Report (EDVR) and the Activity Manning Document (AMD) are a critical event in the proper execution of such a process. Unfortunately, an automated process where such a manual, regularly occurring, time consuming, error prone, man-hour intensive routine is performed does not currently exist. Specifically, in the area of Capability Ratings, Manning, Training, Equipment and Supplies, an activity should be able to extract a prescribed range of data from their EDVR and AMD and have it automatically calculate the T-Rating and M-Rating as required by the Functional/Type Wing Commander. This thesis will attempt to address the feasibility and requirements for such an automated software application utilizing COTS technology with the additional utilization of application interface development to automate to the greatest degree possible, the regularly recurring reconciliation of the EDVR and Activity Manning Document.

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LIST OF ACRONYMS

ADO	ActiveX Data Object
AMD	Activity Manning Document
AMO	Assistant Maintenance Officer
API	Application Program Interface
BA	Billets Assigned
BNEC	Billeted Navy Enlisted Classification
BSC	Billet Sequence Code
CASE	Computer Aided Software Engineering
COB	Current On Board
COM	Component Object Model
COTS	Commercial –Off-The-Shelf
CSFWP	Command Strike Fighter Wing Pacific
CSEC	Computerized Self Evaluation Checklist
CTX	Compulsory Training Underway Exercise
CWO	Chief Warrant Officer
DAO	Data Access Object
DB	Database
DBMS	Database Management System
DCOM	Distributed Component Object Model
DNEC	Distributed Navy Enlisted Classification
EAOS	End of Active Obligated Service
EDA/L	Estimated Date of Arrival/Loss
EDVR	Enlisted Distribution and Verification Report
EDVRMAN	Enlisted Distribution and Verification Report Manual
EPMAC	Enlisted Placement Management Center
GUI	Graphical User Interface
IEEE	International
IT-21	Information Technology for the 21st Century
JTFX	Joint Training Forces Exercise
LAN	Local Area Network
LDO	Limited Duty Officer
MO	Maintenance Officer
MSDN	Microsoft Software Developers Network
NAMP	Naval Aviation Manpower Program
NAVMAC	Naval Manpower Analysis Center
NEC	Navy Enlisted Classification
NITRAS	Navy Integrated Training Resources and Administration System
NMCI	Navy-Marine Corps Internet
NTMPS	Navy Training Management and Planning System
OLAP	On Line Analytical Processing
OLE	Object Linking and Embedding
OMG	Object Management Group

OOA&D	Object Oriented Analysis & Design
PC-EDVR	Personal Computer-Enlisted Distribution and Verification Report
POB	Planned On Board
POE	Projected Operational Environment
PNEC	Primary Navy Enlisted Code
PRD	Planned Rotation Date
RDBMS	Relational Database Management System
RDO	Remote-access Data Objects
ROC	Required Operational Capability
SOAP	Simple Object Access Protocol
SORTS	Status of Readiness and Training System
SQL	Standard Query Language
SQMD	Squadron Manpower Document
TFMMS	Total Forces Manpower Management System
TSTA	Tailored Ships Training Availability
UI	User Interface
UIC	Unit Identification Code
UML	Unified Modeling Language
VB.NET	Visual Basic.NET
W3C	World Wide Web Consortium
XML	Extensible Mark up Language
XSD	XML Schema Definition

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ACKNOWLEDGMENTS

We would like to thank our advisors, Professors John Osmundson and Dale Courtney for their guidance, inspiration and teaching. They both greatly helped to provide the spark and fuel for the fire in our journey through this study.

We also would like to thank LT Dwayne Cole for his assistance early on for demonstrating that a multi-functional manpower management database is possible – he is a true pioneer in this respect.

Lastly, we would also like to thank CDR Tim Holland who, without his creativity intelligence, and visionary outlook, this thesis would not have begun.

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I. INTRODUCTION

A. BACKGROUND

In aviation squadrons throughout the Navy, the maintenance department makes up a predominant percentage of the command as a whole. Within this department are numerous highly trained technicians who play a critical role in the operational readiness and availability of the aircraft and systems for which they are responsible. It is for this very reason that the management of their training, career development and assignment is so vitally important within aviation squadrons. Ensuring that the right people are assigned to fill the right billets so a proper mix of experienced and not so experienced technicians always exists is the management goal. Knowing how to achieve this proper balance of maintenance expertise in a world where tours of duty force people to transfer every two to four years, and the attractiveness of civilian employment lures experienced technicians to leave the Navy, is one of the biggest challenges that face manpower managers overall.

Like any organization that deals with human resources, in order to address the challenges of managing personnel, training, and readiness in aviation squadrons, the functions and responsibilities of a manpower manager were developed and assigned to one officer in the command. Today, the Assistant Maintenance Officer (AMO) in a typical squadron executes this function. The AMO is normally an aviation ground officer who is an Aerospace Maintenance Duty Officer (AMDO), Limited Duty Officer (LDO), or Chief Warrant Officer (CWO). For most, their only exposure to any sort of manpower management education or training occurs during aviation ground officer school, or AMO School at Naval Air Station Pensacola, Florida. There, reference materials and responsibilities are reviewed and the process of manpower management within the Navy is discussed. As with any education or training, however, real insight and understanding does not immediately occur. It is only after some amount of on-the-job training and working in the fleet does one become experienced to the point that learning is reinforced. For most Assistant Maintenance Officers, it is said that the manpower management function can be the most complex yet critical aspects of the job. Is it not a wonder that in this day and age of the Information Revolution why manpower management remains as time consuming and complex as it does?

Assistant Maintenance Officers currently use paper copies of reports such as the Enlisted Distribution and Verification Report (EDVR) and the Squadron Manning Document (SQMD) or Activity Manning Document (AMD) to reconcile manning issues and manage their manpower databases. Both reports are published regularly. The EDVR is published monthly while the SQMD/AMD is published upon completion of an activity Aviation Manpower Requirements Determination (for SQMD's) or Shore Manpower Requirements Determination (for AMD's), or as major changes occur.

Technology has changed over the years and today now allows users to both view and download these documents via electronic means. Unfortunately, that is the limit to what the manpower manager at the squadron level can do. There exists no application to process data from different databases. More so, the databases from which these documents are generated are proprietary systems that require cooperation/authorization from the highest levels of Functional/Type Commanders to update or make changes to.

This thesis is a study of an application to address aspects of manpower management functions by automating the reconciliation process between the EDVR and the SQMD/AMD—matching the bodies assigned to the billets assigned within a squadron. The solution capitalizes on the use of existing commercial-off-the-shelf (COTS) technologies, existing manpower databases maintained within the Navy, and automating a process that is normally done on paper with pen mark-ups. This solution merely addresses a portion of the overall responsibilities of the manpower manager. A prototype application is also described in this thesis that provides the necessary functionality of such an application. Critical issues and communication channels are discussed and areas requiring future research are noted.

The future growth of web-based capabilities provided by the Navy-Marine Corps Intranet (NMCI) and the Navy's Information Technology for the 21st Century (IT-21) infrastructure may prove to be a logical path for manpower management to become increasingly easy to use on a more real time basis resulting in more accurate manpower management and reporting. Although the application presented in this thesis does not include an internet interface and is only prototype in nature, we foresee that an enterprise-scale development similar to that discussed here is inevitable— incorporating database and web-enabled tools, which presumably use the Internet as a logical communication medium to share data across activities, echelon commands and any distances imaginable. The biggest challenges manpower managers of today face are education of users and managers, and acquiring modern tools and technology to meet increasing demands of working more efficiently and intelligently. The usefulness of a relational manpower management database will depend on whether the system adds value to the underlying activity manning data, and ultimately, whether the end user gains knowledge of the overall readiness of their activity's command and personnel.

B. OBJECTIVES

Today, manpower management is a manual process. If not done correctly, one may rapidly become a spectator to the very process, gone awry, that is supposed to be so closely managed. What this thesis intends to provide is one way to greatly reduce the transaction costs and manual aspect of what may be viewed as a database management problem with respect to "bodies and billets." In our experience and understanding of manpower management, we asked the following: Would it be possible to develop an application that could automatically read and import data from an activity's EDVR and compare it with the standing SQMD/AMD at various milestone points of a deployment/turnaround cycle to produce a report of overall T-Ratings (a rating based on an individual's training level and years of experience in current Navy Enlisted Classification (NEC) Code) and M-Ratings (a simple Current On Board (COB) per Billets Assigned (BA)) for individuals within the command? If so, can the M-rating for each Type/Model/Series and/or system be computed and evaluated automatically? Could a secure, internet-based application be developed for the user to interface with a central database? Is it not only possible, but also practical to use a central, unified database for data input/output, storage, processing, and archiving of data to meet manpower management requirements so that the manager can make the best decisions afforded him at any given time?

Our objective in this study has boiled down to providing the manpower manager with a more automated method to reconcile the EDVR and SQMD/AMD so that the AMO can focus more on "management" and less on "processing" – something a computer functions better at.

C. SCOPE AND METHODOLOGY

1. Scope

This thesis will encompass a study of existing naval manpower COTS applications such as Enlisted Placement Management Center's (EPMAC) PC-EDVR, the WildCat Navigator for EPMAC telnet, Total Force Manpower Management System (TFMMS), the Navy Training and Management Planning System (NTMPS), and the Citrix Client for NTMPS database server access and other application interface technologies. Microsoft Access is used in this thesis as the primary database. Although databases that are more powerful exist, for the purpose of a database within a single department, Microsoft Access was found to soundly meet these needs. It is also part of the Navy's IT-21 office suite standard as well. This thesis will discuss areas of deployment and reveal its benefits to manpower managers as well as the shortcomings of the current process. Furthermore, it will suggest possible areas of additional applicability beyond the initial implementation environment. The ultimate goal of this thesis is to deliver a useable application and documentation that greatly increases efficiency and effectiveness of the manpower manager, enables greater manpower knowledge, and simplifies the reports processing functions.

2. Methodology

The methods used in this thesis research will consist of the following steps:

1. Conduct a literature search of directives, instruction, manuals, requirements, books, and other library information.

2. Interview current users (Squadron AMO's) who perform the manpower management functions.

3. Initiate and issue a user questionnaire to query for user desires, requirements, and areas for strategic improvement in the current manpower management process.

4. Conduct a thorough review of current manpower procedures, processes, and policies.

5. Develop use cases.

6. Explore and contrast the various alternatives applicable.

7. Determine how existing capabilities provide managers with the tools and information to make decisions based on current system inputs and outputs.

8. Gather data points via questionnaires on shortfalls and strengths of the existing system as well as what the ideal automated system might be.

9. Review current prototypes and utilize CASE tools for requirements analysis.

10. Utilize Object Oriented Analysis/Design and the Unified Modeling Language (UML) to assist in the determination of proper requirements and design of the thesis.

11. Determine and utilize the proper productivity metrics in order to determine existing performance levels compared to changes resulting from this thesis.

D. ORGANIZATION OF STUDY

This chapter provides a background to the importance of manpower management and introduces the research covered in this thesis. In Chapter II, a review of policies and regulations is presented in order to clearly illustrate requirements set upon the manpower manager and to educate the reader to such.

Chapter III focuses on the research methods used. In establishing user and application requirements we met with Commander Tim Holland, Command Strike Fighter Wing Pacific (Maintenance and Readiness) acting and Lieutenant Dwayne Cole, Assistant Maintenance Officer, VFA-125. A survey was also provided to all squadron AMO's of CSFWP for input as well via the NPS SPEAR website.

The name of this prototype application is Prometheus, named so after the mythical Greek god who taught humans various arts and endowed them with the spark of life from the flame of Zeus. In its development, the Unified Modeling Language (UML) was utilized in requirements analysis and application design. In Chapter III we discuss our reasoning, process, and results, which are demonstrated in Prometheus.

Chapter IV describes implementation issues such as compatibility, requirements, technical support and back-up issues.

Chapter V addresses operating procedures such as training, maintenance, and documentation.

Chapter VI presents the conclusion by readdressing questions initially presented in this research. Recommendations are also made to provide all parties interested with a potential solution to improving manpower management Navy wide.

II. LITERATURE REVIEW AND REQUIREMENTS DEFINITION

In this thesis, as with any other project, in order to more fully understand the problem being addressed, an attempt to first thoroughly understand that problem must take place. Prior to taking any action, one has to observe, analyze, and make an intelligent choice as to which direction to head off, otherwise a great deal of time, energy and effort might all be expended for no good reason. The development cycle will then need to start again from scratch in another attempt to "get it right". To prevent this wasted effort, we have decided to begin with a review of currently established instructions and directives with respect to manpower management in the Navy.

A. EDVR USERS' MANUAL

The Enlisted Distribution and Verification Report Manual (EDVRMAN) is a document published by the Enlisted Placement Management Center (EPMAC), New Orleans, Louisiana. The EDVRMAN publishes format and procedures for EDVR validation and review. As stated on the cover page of the document:

> The Enlisted Distribution and Verification Report Users' Manual (EDVRMAN) is the official manual for interpreting and validating the Enlisted Distribution and Verification Report. The EDVRMAN supplements basic regulation and requirements published in references (a) through (c). Nothing in the EDVRMAN shall be construed as contravening or superseding other directives issued by the Navy Department.

The EDVRMAN is a document that provides an in-depth explanation of all 12 sections of the EDVR. Within the manual, there are numerous references to "verification" and "validation" of data that are contained in the EDVR itself. "Required and recommended actions" are explained as well. For example, in Section 2, paragraph 2.2.3, it discusses the verification of the Distribution Navy Enlisted Classification (NEC) Code. Although "the [EDVR] system has a built-in DNEC to NEC inventory discrepancy flag process", the activity will still need to verify the NEC's of the prospective gain when alerted by the EDVR system. (EDVRMAN, section 2.2.3) Throughout the manual, "Required and Recommended Actions" for specific situations are also explained. More specifically, in Section 8, paragraph 8.5 of the EDVRMAN, the crux of manpower management tasking is stated:

> a. Upon receipt of the monthly EDVR, the activity will verify actual NEC qualifications and the validity of the assigned DNEC of the enlisted personnel on board in relation to:
>
> (1) The NEC authorized in the Activity Manpower Document (AMD), and its latest revision as contained in EDVR Section 6.
>
> (2) The individual's actual qualification against the member's field service record and EDVR sections 4 and 8.
>
> b. If the NEC or its principal is not held in the inventory, three asterisks and a numerical code (See Section 2, paragraph 2.2.3b for explanation of these codes) will appear in the INEC columns indicating that local verification of the member's qualification in accordance with Volume II of the Manual of Navy Enlisted Classification Standards (NEC Manual) NAVPERS 18068F is necessary and the command is required to take the following actions to correct the discrepancy…

Lastly, in Section 15 of the EDVRMAN, a decision logic table listing events, actions, references, and remarks can be found which greatly helps to guide the EDVR reviewer in the necessary direction to resolve questions or concerns. An extract of this table is located in Appendix A of this thesis. The EDVRMAN is an important document because "manning and assignment decisions are based on information contained in the EDVR. It is extremely important that each activity keep its account up-to-date and accurate by reporting personnel events as they occur and correcting errors when identified." (EDVRMAN, section 1.4)

B. COMPUTERIZED SELF EVALUATION CHECKLIST (CSEC)

The Computerized Self Evaluation Checklist (CSEC) is a document published by Naval Air Systems Command (AIR 3.2D), as a tool for ensuring that aviation commands are managing all programs required of the Naval Aviation Maintenance Program (NAMP), OPNAVINST 4790.2 in a standardized manner. There are 26 programs dictated in the NAMP, of which Manpower Management is one. In the CSEC, there is an area checklist for Manpower Management. The following questions, 14 in all, taken from the checklist have also been considered requirements for this thesis since it is from this checklist that the Type Commander Aviation Maintenance Management Team (AMMT) will evaluate a squadron.

NUMBER	QUESTION
2801C	Is the Manual of Navy Total Force Manpower Policies and Procedures (OPNAVINST 1000.16J) utilized by all echelons in dealing with manpower change requests or other manning issues? Ref. OPNAVINST 4790.2H, vol. I, par. 2.4e
2802C	Is the AMD reviewed biennially (every two years) by the Manpower Manager? Refs. OPNAVINST 4790.2H, vol. I, par. 2.4e and OPVANINST 1000.16J, par. 8.15.a
2803C	Is each publishing of the EDVR reviewed for accurate and up to date information? Refs. OPNAVINST 4790.2H, vol. V, par. 2.3e(12); EDVRMAN, par. 1.4; and NAVPERS 15909F, par. I.032
2804C	Are AMD (Activity Manning Documents) change requests submitted whenever changes are requested? Refs. OPNAVINST 4790.2H, vol. I, par. 2.4c and OPNAVINST 1000.16J, par. 1003.1
2805C	Are DNEC Change Requests submitted to EPMAC for personnel whose DNECs are incorrect or for personnel who obtain NECs currently listed on Manpower Authorization, but are unfilled? Refs. OPNAVINST 4790.2H, vol. I, par. 2.4e and EDVRMAN, secs. 8.3.2e, 8.5.1d and 8.5.2
2806C	Are appropriate personnel documents (EDVR, AMD and standard transfer directives) monitored to ensure personnel assigned already possess the requisite skills, or will receive training prior to arrival, commensurate with the billet/DNEC? Ref. OPNAVINST 4790.2H, vol. V, par. 2.3e(12)
2807C	Are maintenance personnel working in the billets assigned (DNEC) on the EDVR? Refs. OPNAVINST 4790.2H, vol. I, par. 2.4e and EDVRMAN, par. 8.5.2
2809C	When critical manning shortages (including NECs) are identified, is an Enlisted Manning Inquiry Report (EMIR) submitted to EPMAC? Ref. OPNAVINST 4790.2H, vol. I, par. 11.2.2b(6) and NAVPERS 15909F (ENLTRANSMAN), ch. 26.02
2810C	Are messages forwarded to EPMAC requesting PRD adjustments on personnel that are separated prior to their PRD? Ref. OPNAVINST 4790.2H, vol. I, par. 11.2.2b(6) and NAVPERS 15909F, par. 3.063

2811C Does the AMO determine the apportionment of maintenance personnel to the department and monitor/coordinate the assignment of TAD personnel? Ref. OPNAVINST 4790.2H, vol. I, par 11.2.2b(7)

2813C Are NEC discrepancies in the command's Activity Manpower Document corrected? Refs. OPNAVINST 4790.2H, vol. I, par. 2.4; EDVRMAN, sec. 8.5.1d; and OPNAVINST 1000.16J, par. 1003

2814C Are discrepancies in an individual's NEC qualification(s) (loss of required qualification/certification/proficiency, etc.) corrected by submitting a NACPERS 1221/1 or by completing the NEC Discrepancy Report? Ref. OPNAVINST 4790.2H, vol. I, par. 11.2.2b(6) and EDVRMAN, sec. 8.5.1d

2815C Does the activity maintain a current organizational roster board, automated or manual, which includes as a minimum, name, rate and billet assignment in conjunction with the AMD? Ref. OPNAVINST 4790.2H, vol. I, par. 11.4.b(12)

2816C Are individual NEC qualifications validated against assigned DNECs? Ref. OPNAVINST 4790.2H, vol. I, par. 11.2.2b(6) and EDVRMAN, sec 8.5

C. OPNAVINST 1000.16J (MANPOWER MANUAL)

The Manual of Navy Total Force Manpower Policies and Procedures instruction, OPNAVINST 1000.16J, is a document issued by the Office of the Chief of Naval Operations. This instruction is the governing document from which subordinate commands delineate additional manpower requirements for their specific functions and applications. The purpose of the document is to "provide policy guidance and procedures to develop, review, approve, and implement total force manpower requirements and authorizations for naval activities". (OPNAVINST 1000.16J, secn. 1.a) It also assigns management responsibilities and details manpower procedures for determining manpower requirements and authorizations. This document also establishes manpower requirements through several programs designed for all components of the Navy. The program specifically used for squadron manpower requirements is the Aviation Manpower Requirements Determination Program for Squadron Manpower Documents (SQMD's), carrier air wings (CVW's), and afloat aircraft intermediate maintenance departments (AIMD's).

First, an understanding of manpower requirements should be taken from the instruction. As stated in section 4.a (2):

> Manpower requirements shall be based on directed mission, functions, and tasks (MFT's) and/or required operational capability/projected operational environment (ROC/POE) and reflected on the Activity Manpower Document (AMD). Workload shall be determined using industrial engineering or other justifiable techniques that yield accurate manpower requirements.

Also, as stated in section 200.5:

> The ROC/POE is the most critical element in developing manpower documents. The ROC provides a precise definition of the unit's mission statement. The POE is a description of the specific operating environment in which the unit is expected to operate.

In section 4.a (3):

> Manpower requirements shall reflect the minimum quantity and quality of manpower required for peacetime and wartime to effectively and efficiently accomplish the activity's mission. Military quality information includes designator/paygrade, rating/rate, subspecialty (SUBSP), Additional Qualification Designation (AQD) and Navy Enlisted Classification (NEC) codes.

Responsibility for the Aviation Manpower Requirements Determination Program is assigned to Navy Manpower Analysis Center (NAVMAC) for the development and documentation of total force manpower requirements for all fleet activities. (OPNAVINST 1000.16J, secn. 4.b)

In section 5, manpower management is defined as "the methodical process of determining, validating, and using manpower requirements and active duty MPN/RPN manpower authorizations and end strength."

Lastly, the Activity Manning Document is described and defined in Chapter 10 of enclosure (1):

> Manpower requirements are initially published in draft SMDs, FMDs, SQMDs, and SEAOPDET manpower documents. Once the review cycle

> is complete, CNO (N12) will direct changes accordingly and NAVMAC will produce and upload a final SMD, FMD, SQMD, or SEOPDET manpower document into TFMMS. Subsequently, an AMD will be available from TFMMS and will serve as the single source for manpower requirements and authorizations data. The AMD displays a complete picture of total force manpower requirements as they change across the Future Years Defense Plan. (OPNAVINST 1000.16J, Encl. (1), Ch. 2, secn 200.2)

The SQMD that is processed and ultimately ends up as an AMD in TFMMS is the direct input tool for a command to affect changes to its manpower. It is for this reason that the squadron AMO must have a through understanding of command manning as well as all information (e.g. NEC, experience level, PRD, EAOS, etc.) pertaining to the members of the department. Additionally, changes to the SQMD may be required if there are changes in the assigned aircraft, flight hour utilization rates, fleet replacement squadron (FRS) student throughput, FRS curriculum, corrective maintenance model, and major changes in mission, force structure, or fleet issues. (OPNAVINST 1000.16J, Encl. (1), Ch. 2, secn. 202.3) Additionally, enclosure (1), section 203.2 lists SQMD manpower document development elements.

D. TOTAL FORCE MANPOWER MANAGEMENT SYSTEM (TFMMS)

The Total Force Manpower Management System (TFMMS) is the single authoritative database for total force manpower requirements and active duty MPN/RPN (Manpower and Personnel, Navy/Reserve Personnel, Navy) manpower authorizations and end strength. A manpower authorization cannot exist without a valid manpower requirement documented in TFMMS.

> TFMMS is an information system designed to support Deputy Chief of Naval Operations (M&P) (N1) by providing a single, authoritative source for manpower data. Located on a mainframe computer, this data includes manpower requirements, which manpower requirements are authorized (funded), and the resources used to authorize the requirement. TFMMS allows the ability to track manpower for the active military (officer and enlisted), reserve military, civilians, contractors, and other categories of manpower (e.g., other military services). TFMMS provides access to

> current data, and storage and retrieval of historical data for resource sponsors, manpower claimants, SMC's and other management information users. Additional information and procedures can be found in [the Total Force Manpower Management System (TFMMS) Users' Manual]. (OPNAVINST 1000.16J, secn. 900.1)

In addition to the central database used for housing manpower data, an application also exists for manpower users to interface with the database; however, access is limited to manpower personnel at the SMC level and above - a classification level that the squadron AMO is not granted. The TFMMS Micro Manpower Change Application (TMMCA) is a:

> …software package for [a] personal computer that allows manpower managers to initiate AMD Change Requests, provide AMD and end strength information, reports, and summaries. By using the TFMMS mainframe computer, TMMCA can be used to download a specific activity's or the entire manpower claimant's and/or SMC's AMD and end strength. The AMD and end strength can be copied and used on a PC for other TMMCA users to create AMD Change Requests and/or query reports. (OPNAVINST 1000.16J, secn. 901.1)

This application is not used at the squadron level, but is used at the Wing level. Squadron AMO's must coordinate with the Wing manpower manager for access/reports utilizing TMMCA.

E. DISCUSSIONS WITH CSFWP (MAINTENANCE AND READINESS)

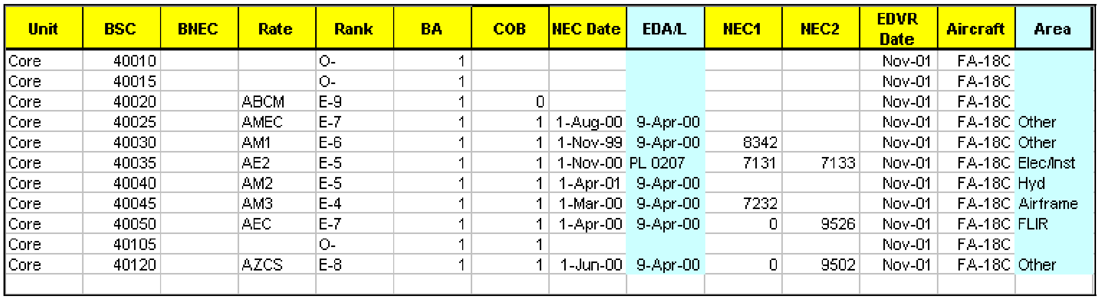
The idea of this thesis first occurred in the Fall of 2001 when, in our search for a database-related topic, we were given an opportunity to speak with the acting Commander Strike Fighter Wing Pacific (CSFWP) Maintenance Officer, Commander Tim Holland. Our first discussions with him were primarily via e-mail regarding the development of an application to report the training level of a squadron, or T-Rating as it is normally called, in a manner that would be easy to display, calculate, and brief to others. Commander Holland, who had been working on a solution to this himself, presented to us the idea that an activity utilize an application to import fields from their

EDVR/AMD, manually or automatically, enter the T-Rating for each individual at a number of points (projecting for the future as well based on present data) then evaluate the matrix to determine/calculate the overall T-Rating. Ideally it would evaluate values at the following points in the deployment training cycle: 1) Now, 2) TSTA, 3) CTX, 4) Fallon, 5) JTFX and 6) Deployment Day ONE. His comments became the essence of the first objective of this thesis. This greatly contributed to making the definition of the problem clear. In one e-mail from CDR Holland he stated:

> A very sophisticated program would simply read the EDVR/AMD directly and evaluate the M and T ratings. The idea is to identify early weak areas and get training or bodies and training to fix the problem. The tool must have the ability to do 'what if' scenarios and be simple to use by non-computer folks. Most JO's today can easily use Excel. Access is a bit problematic but with proper menus and utilities would work. (Holland, e-mail dated 11OCT01)

This became the first requirement, which we set out to analyze, and CSFWP Maintenance became the primary customer. It was during this analysis period when we concluded that the solution we sought was more likely a product of the squadron Assistant Maintenance Officers' manpower management process.

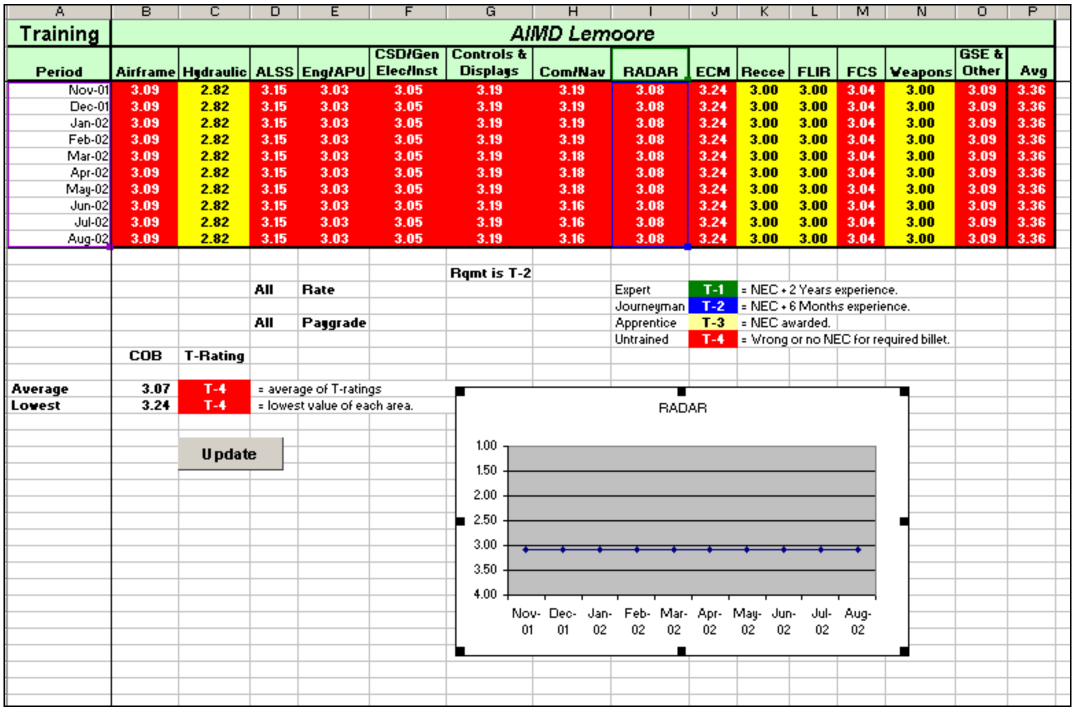
We began our definition phase by deciding to focus first on the T-Rating instead of the M-Rating, as it was the more complex of the two. The CSFWP MO specifically detailed what data fields were required as input in the calculations of the T-Rating. Depicted in Figure 1 below is a sample report of the fields used.



Unit	BSC	BNEC	Rate	Rank	BA	COB	NEC Date	EDA/L	NEC1	NEC2	EDVR Date	Aircraft	Area
Core	40010			O-	1						Nov-01	FA-18C	
Core	40015			O-	1						Nov-01	FA-18C	
Core	40020		ABCM	E-9	1	0					Nov-01	FA-18C	
Core	40025		AMEC	E-7	1	1	1-Aug-00	9-Apr-00			Nov-01	FA-18C	Other
Core	40030		AM1	E-6	1	1	1-Nov-99	9-Apr-00	8342		Nov-01	FA-18C	Other
Core	40035		AE2	E-5	1	1	1-Nov-00	PL 0207	7131	7133	Nov-01	FA-18C	Elec/Inst
Core	40040		AM2	E-5	1	1	1-Apr-01	9-Apr-00			Nov-01	FA-18C	Hyd
Core	40045		AM3	E-4	1	1	1-Mar-00	9-Apr-00	7232		Nov-01	FA-18C	Airframe
Core	40050		AEC	E-7	1	1	1-Apr-00	9-Apr-00	0	9526	Nov-01	FA-18C	FLIR
Core	40105			O-	1	1					Nov-01	FA-18C	
Core	40120		AZCS	E-8	1	1	1-Jun-00	9-Apr-00	0	9502	Nov-01	FA-18C	Other

Figure 1. Activity T-Rating Input Report

Almost all the data contained in this report is pulled from other reports, specifically from each squadron's EDVR and SQMD. There is one area where the AMO's input and logic are involved though - the assignment of "area". This is the area in the squadron to which the member is assigned for duty within the department. This is not data already published in any document, nor is it static. The AMO could change this area assignment periodically. The data from this report is then used to compile an overall activity report as illustrated below in Figure 2.



Training	AIMD Lemoore														
Period	Airframe	Hydraulic	ALSS	Eng/APU	CSD/Gen Elec/Inst	Controls & Displays	Com/Nav	RADAR	ECM	Recce	FLIR	FCS	Veapons	GSE & Other	Avg
Nov-01	3.09	2.82	3.15	3.03	3.05	3.19	3.19	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Dec-01	3.09	2.82	3.15	3.03	3.05	3.19	3.19	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Jan-02	3.09	2.82	3.15	3.03	3.05	3.19	3.19	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Feb-02	3.09	2.82	3.15	3.03	3.05	3.19	3.19	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Mar-02	3.09	2.82	3.15	3.03	3.05	3.19	3.18	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Apr-02	3.09	2.82	3.15	3.03	3.05	3.19	3.18	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
May-02	3.09	2.82	3.15	3.03	3.05	3.19	3.18	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Jun-02	3.09	2.82	3.15	3.03	3.05	3.19	3.16	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Jul-02	3.09	2.82	3.15	3.03	3.05	3.19	3.16	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36
Aug-02	3.09	2.82	3.15	3.03	3.05	3.19	3.16	3.08	3.24	3.00	3.00	3.04	3.00	3.09	3.36

Rqmt is T-2

All Rate

All Paygrade

Expert	T-1	= NEC + 2 Years experience.
Journeyman	T-2	= NEC + 6 Months experience.
Apprentice	T-3	= NEC awarded.
Untrained	T-4	= Wrong or no NEC for required billet.

	COB	T-Rating	
Average	3.07	T-4	= average of T-ratings
Lowest	3.24	T-4	= lowest value of each area.

Figure 2. Monthly Activity T-Rating

From the discussions with the CSFWP MO, we were able to more clearly define the problem as a database situation where data from multiple databases needed to be aggregated and reported first, so that a calculation could be performed resulting in a rating that could be reported and displayed in a number of ways. The product of such an automated process could also be a feeder to the monthly Status of Readiness and Training System (SORTS) reports. We concluded that we would pursue an application that would automatically assess the existing training and readiness of an activity based on its EDVR and AMD.

F. SURVEY FOR REQUIREMENTS AND FINDINGS

Within CSFWP, there are 17 squadrons. Of these, many were not at NAS Lemoore, CA during the times we were able to visit there. In our attempts to reach as many AMO's as possible, and in coordination with the Wing AMO, an invitation to participate in an on-line survey was given to all wing AMO's. The survey was titled AMO Manpower Survey and was located at the following URL: http://www.nps.navy.mil/spear/surveys/amomanpower.htm. This survey was active from June 2002 until August 2002. Following are questions (Q's) that were used to poll AMO's for their input regarding requirements for an automated manpower application and the responses (R's) received:

Q1. What factors do you, the manpower manager, consider most important in performing this aspect of your job.

R1. RIS runs and the SQMD (soon to be F/A-18F AMD once finalized)

R2. Walking the beat, contacting EPMAC and BUPERS. Trips to same. The ARIS, and NTMPS (which you still can't get on NMCI).

R3. The ability to look at near-real time data on the number of incoming and outgoing personnel in order to report accurately the readiness with regards to manpower, training and NEC management

Q2. In what areas of manpower management do you feel you need help more than others?

R1. The continuity between what EPMAC-BUPERS and NAVMAC are able to see. I believe there should be "one-stop-shopping" when it comes to manpower and the assessment of where you are as an activity.

R2. AMD's and SQMD's need to be more precise. I don't need mission NEC's. Give me the baby, not the labor pains.

R3. The ability to capture data from various sources.

Q3. In performing the manpower management functions of your job, how do you assess the T-Rating for your department now?

R1. I take the number of billets with an NEC attached to it and plug the personnel within the department into those billets and assess the shortages or overages of each rate for the particular NEC.

R2. Don't know

R3. Through the use of SORTS software from OPS

Q4. Do training issues, with respect to generating a T-Rating report, for your department, exist? If so, which aspects are most challenging to you?

R1. no response

R2. Mainly for OP's.

R3. Collecting and disseminating the data.

Q5. How do you assess Manning levels for your department now?

R1. I take the POB-9 and divide it by the M+1 for each particular rate area and derive a percentage. Then I perform the same math for the overall maintenance department. As far as the SORTS for each mission area, OPS provides the "T" of the T& R matrix and I provide manning numbers for the SORTS report

R2. No response

R3. Through EDVR, ARIS

Q6. What format of the EDVR do you use?

R1. Paper copy

R2. Paper copy. ELECTRONIC COPY UNREADABLE (LIGHT GREY)

R3. Paper copy

Q7. How do you receive the monthly EDVR?

R1. Personnel Department copy of the downloaded document

R2. Downloaded from EPMAC

R3. Electronic file located on command LAN

Q8. In your opinion, what would be the ideal way to receive the EDVR?

R1. Electronically via the Web

R2. There should be a real-time, web-based EDVR which is easier to read than the current PC-EDVR. Should have access to detailers' database, which projects further out than EDVR.

R3. E-mail to admin, so they can e-mail me the sections I desire.

Q9. How do you receive the command Manning Document (SQMD/AMD)?

R1. Electronic file is e-mailed to you; WORD format, needs to be Excel

R2. CDFWP forwards electronic copy

R3. Squadron doesn't have one yet

Q10. In your opinion, what would be the ideal way of receiving the Manning Document?

R1. Electronically in Excel format

R2. E-mailed automatically to commands as soon as available.

R3. Same as EDVR

Q11. Are you familiar with the T-Rating CDR Holland was developing while acting as CSFWP Wing MO?

R1. no

R2. no

R3. no

Q12. If yes to above question, please elaborate some on what you thought its Strengths and Weaknesses were.

R1-3. All responses N/A.

Q13. Would more directions/instructions be desirable for this type of application?

R1-3. All responses N/A.

Q14. At what time periods is data input to your Manning Database?

R1. Weekly

R2. Daily

R3. Monthly

Q15. At what time periods is the data output? (i.e. to reports, archive files, other databases, etc.)

R1. Weekly

R2. Weekly

R3. As changes occur

Q16. At what time periods are reports written?

R1. Monthly

R2. Weekly

R3. As required

Q17. How many transactions do you process per month in you Manpower Database?

R1. 25

R2. 26-50

R3. 0-10

Q18. What should a manpower application be able to do for you in order to be considered a functional program?

R1. Be input and sorted in Excel

R2. Needs to project future manning based upon current information. Needs to present data in various forms, and be capable of generating outputs that can be designed by the user.

R3. Don't know

Q19. How much experience do you have with Microsoft Excel?

R1. Very much

R2. Very much

R3. Very little

Q20. How much experience do you have with Microsoft Access?

R1. Some

R2. Very much

R3. None

Q21. Please list references used/found useful regarding Manpower Management.

R1. NTMPS - SQMD - OPNAV 1000.16J - ROC/POE

R2. EDVRMAN

R3. Nothing that gives a brand new AMO a clue.

Q22. Please provide your contact information so that we may get back with you.

Survey Comments:

R3. EDVR needs to be replaced with a superior, real-time product.

G. SUMMARY

Requirements definition can probably be stated as being the most critical step of requirements analysis. Gaining a better understanding of what the issues are and how they are structured into the customer's business practices has been the goal of our requirements analysis in this study. In this particular instance; however, there are not only the users' ideas of how the business practices occur, but there are also instructions and directives that dictate specific actions and responsibilities. It is for this reason that we have considered many of these documents, such as the Computerized Self Evaluation

Checklist, as additional requirements of what a system must satisfy, and why we have reviewed them here in this chapter.

Chapter III will further expound on the results of this chapter, and then go further into an analysis of the requirements for our development. From this, we start the design and lastly development of the solution, which we are proposing in this thesis

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III. RESEARCH METHOD

A. MODELING UTILIZING THE UNIFIED MODELING LANGUAGE (UML)

1. Plan and Elaborate Phase

For this study, an Object Oriented Analysis and Design (OOA&D) methodology was used to identify system requirements. As opposed to a functional approach, an Object Oriented approach is taken to analyze the results of the requirements definition. To construct and present concepts and their relations, the Unified Modeling Language (UML) was used. From the software development aspect, the UML best standardizes representations and terminology as well as the steps of the development process. The requirements analysis product within this chapter has been produced using methods discussed in the textbook *Applying UML And Patterns; An Introduction To Object Oriented Analysis and Design*, by Craig Larman. Many of the figures and diagrams have been modeled in the Larman textbook style.

The ultimate goal of object oriented analysis and design utilizing the unified modeling language is "finding and describing objects or concepts in the problem domain" and "defining logical software objects that will ultimately be implemented in an object oriented programming language" such as UML. (Larman, p. 6)

Within OOA&D, although no structured process is prescribed, we have defined our development process as such: 1) Plan and Elaborate Phase, 2) Analyze Phase, 3) Design Phase, and 4) Construct Phase. The development process may be considered modular - steps do not necessarily have to be completed sequentially. In fact, at some points it may be desirable to work concurrently on more than one step. The beauty of OOA&D is that it is a methodology that is certified by the International Electrical and Electronics Engineers (IEEE) and the Object Management Group (OMG), an industry standards organization. It is well recognized throughout the software development industry and will be around for years to come.

In planning, we first identified the critical stakeholders. A critical stakeholder is someone who owns a process or is a critical component of a process. They could also be viewed as individuals, groups, or organizations that could make or break the project if their needs are not met. A list of our initial critical stakeholders follows with supporting statements attached.

a. Critical Stakeholders

1. *Assistant Maintenance Officer*

The squadron AMO is responsible for manpower management within an aviation squadron.

2. *CSFWP Maintenance Officer*

The Wing MO receives summary reports of each squadron's manning levels regarding training, qualification, and quantities.

3. *Enlisted Personnel*

The enlisted personnel whose careers are managed under this system depend on having correct, and timely information entered.

As further analysis concluded, not every entity is actually a critical stakeholder in every case. At one time or another however, these proved to be the critical stakeholders.

b. System Boundary

Identification of the system boundary was then stated. The System Boundary is established so that the development team is constrained in what they will address for system requirements. For this thesis, we have determined that the system boundary will be the application software developed to perform requirements of our customer as stated in the System Functions in Table 1 and use cases below.

Our system boundary constraint is the software system itself. Within this boundary lies the process of generating one new T-Rating report; the EDVR is updated once, AMD verified once, NEC Award Date verified once and a T-Rating report is generated and output once. In the use of this application, one AMO will be using only one session of our application at any given time. It is a stand-alone application at the user end. No network or connection of any kind is assumed to exist between more than just one AMO.

c. System Functions

Lastly, system functions were determined by reviewing established requirements as listed in chapter two of this thesis and from survey responses. A complete list of systems functions (what the system must do/perform) is displayed in Table 1. Also listed are attributes, details and constraints, and categories.

	Function	Category	Attribute	Details & Constraints	Category
R1.1	Import EDVR Access file to Relational db	Evident	Interface Metaphor	Forms window should be easy to interface to import and initiate system procedure. Notification when complete.	Must
R1.2	Import AMD if document has been changed in any way.	Evident	Interface Metaphor	Notification when complete and version.	Must
R1.3	Compare individuals listed in EDVR to billets listed in AMD to "fill" the slots.	Hidden	Accuracy, Interface Metaphor	None, but notify when complete.	Must
R1.4	Capture NEC field data for individuals from EDVR.	Hidden	Accuracy, Interface Metaphor	None, but notify when complete.	Must
R1.5	Capture Rate/Grade field data from EDVR.	Hidden	Accuracy	None, but notify when complete.	Must
R1.6	Capture COB quantity from EDVR.	Hidden	Accuracy	None, but notify when complete.	Must
R1.7	Capture experience time data.	Evident	Interface Metaphor Fault tolerance	Provide window for AMO to enter verification criteria. Must allow verification saves if there is a break in the processing.	Must
R1.8	Capture BNEC.	Hidden	Accuracy	None, but notify when complete.	Must

R1.9	Capture data for input from to Wing MO (see example).	Evident	Accuracy Fault tolerance	Notify upon completion.	Must
R2.1	Adjust inventory-manning levels as necessary.	Hidden	Interface Metaphor	Use data for M-Rating report.	Want
R2.2	Log, monthly, status of manning levels and training levels.	Evident	Interface Metaphor	Compile historical records by month of completed processing.	Want
R2.3	Log exported report to Wing MO.	Evident	Interface Metaphor Accuracy	Create a log of when reports generation completed and when forwarded.	Want
R2.4	DB must be secure due to readiness level/sensitivity nature of data.	Hidden	Accuracy	Data is sensitive in nature and should be made appropriately secure.	Must
R2.5	Provide a persistent storage mechanism.	Hidden	Fault tolerance	Back-ups should be prompted to be made on additional media.	Must
R2.6	Capture T-Rating of all rates broken out per Wing MO's categorization.	Evident	Accuracy	Upon completion of calculations, notification should occur.	Must
R3.1	Provide output report to Wing MO (export of data)	Evident	Interface metaphor	Options TBD still. Could be e-mail, hard copy or direct input to central database.	Want
R3.2	Generate report of combined data for entire Wing (all squadrons).	Evident	Interface metaphor Accuracy	Pertains to the Wing MO's master database for all squadrons.	Must
R3.3	Generate spreadsheet in color codes to indicate levels of qualification.	Evident	Interface metaphor	Per Wing MO, a stoplight style chart is desirable.	Want

R3.4	Search criteria should be by 1)Rate, 2)Pay grade, 3)Month (i.e. current month, POB1, POB2,…)	Evident	Interface metaphor	Allow options to sort report once generated.	Want
R3.5	Link Access from the client to the Wing MO's db to be able to directly input data.	Evident	Interface metaphor Fault tolerance	Further completion may include this capability. Encryption and receipt verification should be considered.	Want

Table 1. System Functions

d. High Level Use Cases

One of the best methods used to gain a better understanding of stakeholders' needs and system requirements is through the utilization of use cases. Use cases are descriptions of processes that will occur within the system. There are two general types of use cases: High Level and Expanded. Initially, use cases are completed at a high level and are used to describe processes briefly and generally. Expanded use cases are used later in requirements analysis for further decomposition. The list of use cases considered follows:

1. Wing MO imports subordinate squadron data to populate the database.
2. Wing MO reviews report generated of old data and new data for exceptions, changes, and correctness.
3. AMO populates T-Rating calculations with appropriate data from the AMD.
4. AMO populates T-Rating calculation with appropriate data from NITRAS, more specifically, NEC award dates.
5. Wing MO populates/updates working Wing T-Rating database with new data from squadrons.
6. Wing MO has report generated from updated database to exhibit new T-Rating levels of all squadrons.
7. Squadron AMO downloads/imports current EDVR from EPMAC.
8. AMO populates T-Rating database with appropriate new data from EDVR.

9. AMO generates new T-Ratings to provide to Wing MO.
10. AMO builds a new report to provide to Wing MO off new EDVR data.

Ultimately, we narrowed the high-level use cases down to just three in order to focus more on the essence of our system functions. The three high-level use cases decided upon were 1) Import EDVR (corresponding to item #7), 2) T-Rating Update (corresponding to item #9), and 3) Wing MO T-Rating Update (corresponding to item #5) due to their importance and influence in affecting the overall system:

Use Case: Import EDVR

Actor: AMO (initiator), EPMAC, or Personnel Division

Type: primary

Description: An AMO imports/updates the current EDVR. He opens the Access database and saves it as his new database filename. The old file (last month's) is archived and the current file data is now written into the core tables, queries and reports.

Use Case: T-Rating Update

Actor: AMO

Type: primary

Description: The AMO, once a new EDVR is received, will then update the Wing MO on the squadron's T-Rating. The T-Rating should take existing data from current databases (i.e. EDVR, AMD, NTMPS, TFMMS, and NITRAS) and combine them to build the report. Once the updated T-Rating is calculated, it will then be sent to the Wing MO so he can update the T-Rating Wing wide.

Use Case: Wing MO T-Rating Update

Actor: Wing MO, AMO

Type: secondary

Description: The Wing MO receives an updated T-Rating from each squadron AMO. Highlighted exceptions/changes are reviewed. Updated T-Rating report is generated from the updated database to display new T-Rating levels of entire Wing. This report should be viewable under a variety of sorting options.

e. Use Case Diagram

Use case diagrams are used to illustrate entities related in a process. Actors, use cases, system boundaries, and relations are described in these diagrams. An illustrated description of what users are involved with the system is given with use case diagrams. From these diagrams, it is easy to see the relations between users and the system and how they interact. It is also a quick way to depict the system boundary, which is shown as the box surrounding the use cases. In our application, the critical stakeholders are also the users in our T-Rating Update model. Figure 3 shows how these users are connected through the system boundary and which use cases are pertinent to each user.

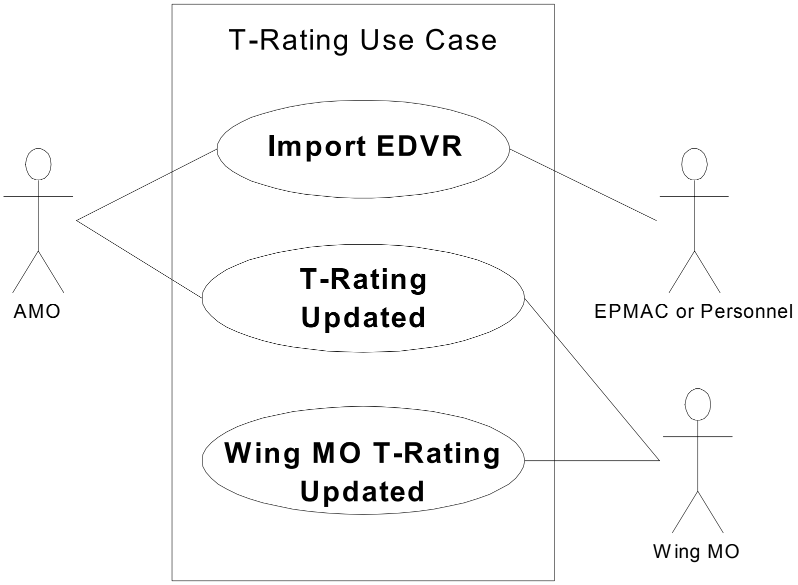


Figure 3. Use Case Diagram

f. Expanded Use Cases

In the process of refining requirements, a subsequent step to developing high-level use cases is the creation of expanded use cases. Here, a more detailed examination of what is to occur in the process is described. Expanded use cases differ from high level ones in that their documentation includes a "Typical Course of Events" section where the process is more specifically described step-by-step. Listed below is the expanded use case for the Import EDVR use case.

Section: Main

Use Case: Import EDVR

Actors: AMO (initiator), EPMAC, or Personnel Division

Purpose: Import the most current version of the EDVR to the T-Rating database.

Overview: An AMO decides to update/import the current EDVR. He opens the Access database file and archives the existing database. Then he opens the update file and saves it as his new database filename. The current file data is now written into the core tables, queries, etc…

Type: primary and essential

Cross References: Functions:

Typical Course of Events

Actor Action	System Response
1. This use case begins when the new EDVR is sent to the AMO from either EPMAC or Personnel Division. 2. The AMO opens the new database file. • AMO places new EDVR in the appropriate folder for import. • AMO imports new EDVR into PC-EDVR. • AMO opens T-Rating application.	
	3. Determines if EDVR file date is newer than the existing database file date. 4. If file is more current, prompt to "update now?" a. If "yes", see section "Update File". b. If "no", see section "No Update Now". c. If "cancel", see section "Cancel".

Section: Update File

Actor Action	System Response
1. The user selects "yes".	2. Notify user that first, the old file will be archived to archive folders, then execute archive process. 3. Notify user that new file will be imported and will overwrite and save as current file, then execute import process. 4. Notify user that Refresh must be selected in order to update queries, reports, etc… 5. Notify user when complete.

Section: No Update Now

Actor Action	System Response
1. The user selects "No".	2. Notify user "Update not initiated" and display message recommending the file be updated as soon as possible. Remind user to update in 3 days. 3. Close.

g. Ranked Use Cases

The use cases then need to be ranked in order to determine which should be decomposed first. Those use cases that more directly affect the core architecture of the process should be addressed first. The ranking scheme may be complex and algorithmic or it may use a simple fuzzy logic classification such as high-medium-low. Since we are dealing with primarily three use cases here, a simple fuzzy classification will suffice resulting in the priorities listed in Table 2.

Rank	Use Case	Justification
High	T-Rating Update	This is the pivotal process of this application.
Medium	Import EDVR	Important process; results fed into over-arching goal.
Low	Wing MO T-Rating Update	Primarily an output of the previous two use cases.
Low	Start Up*	Definition is dependent on other use cases.
Low	Shut Down	Minimal effect on architecture.

Table 2. Ranked Use Cases

h. T-Rating Update Expanded Use Case

In our development process, we have performed an iterative development cycle around the decomposition of our three use cases. The first cycle will undoubtedly be course; however, after iterations where improvements are implemented, refined system application procedures will eventually be achieved. As listed in Table 2, it can be seen that use case priority one is the T-Rating Update use case. With this, an expanded T-Rating Update – version one use case was created.

T-Rating Update – Version 1

Simplifications, goals, and assumptions

- Implement EDVR fields only.
- No calculations.
- Focus on one UIC for this case.
- Auto-import from existing file into this.
- AMO does not have to log in—no access control.
- There is no record overwriting or archiving requirements.
- Date of file/report and UIC updated for all outputs.
- AMO name and e-mail/phone listed on outputs.
- Completed T-Rating Updates are saved as current database and previous month's data is archived to an archive file.

Use Case: T-Rating Update – version 1

Actors: AMO (initiator), EPMAC or Personnel

Purpose: Import data from EDVR for T-Rating Update

Overview: An AMO decides to update T-Ratings. The AMO records/inputs the appropriate fields/data to the new T-Rating database. On completion, a report is generated, the ratings are calculated, and output is generated to the Wing MO.

Type: primary and essential.

Cross Reference: Functions: R1.1, R1.4, R1.6, R1.9, R3.3

Typical Course of Events	System Response
1. This use case begins when an AMO sits down at the PC to update the T-Rating report.	
2. The AMO opens the T-Rating application.	3. Query user to see if they would like to update the T-Rating report now.
4. AMO selects “yes” to update.	5. System updates database from new files. Old file is archived as a “filename_old” file.
	6. Notifies user that process is complete and that archive file now saved as “filename_old” in archive folder.
	7. Logs completed actions.
8. AMO logs out and T-Rating database has now been updated with new EDVR data.	

i. Conceptual Model and Decomposition

In order to facilitate the identification of concepts within this thesis, the utilization of a Concept Category List is presented. The goal of creating a conceptual model is to identify meaningful concepts in the domain of our process. The Concept Category List is used as a brainstorming tool. Quite often, concepts are missed in the early identification phase, and then later discovered during the design phase. To prevent this from occurring as much as possible, a list of more, rather than fewer, concepts is used. From the Concept Category List in Table 3, it can be seen that there are numerous concepts to consider.

Concept of Category	Examples
physical or tangible objects	Computer Report
specification, designs or descriptions of things	T-Rating Report Specifications T-Rating Report Descriptions
places	Squadron Wing MO's Office
transactions	Import, Archive (store), Download, Calculate/Compute, Write, Output, Display, Notify
transaction line items (i.e. SalesLineItems)	EDVRFileItem AMDFileItem NECAwardDateItem
roles of people	AMO (user) Wing MO
containers of other things	Database (contains files) Memory (contains files/report) Report (contains file data)
things in a container	Record data Files, database Reports
other computer or electro-mechanical systems external to our system	EPMAC, NITRAS, AMD (NTMPS), TFMMS, PC-EDVR
abstract noun concepts	Knowledge Insight Foresight Projection Manpower Management

organizations	EPMAC (New Orleans), NTMPS (Pensacola), Squadron, Air Wing, Personnel Division, Maintenance Department
events	EDVR receipt, EDVR update, T-Rating Calculation, AMD date verification, NEC Date Verification, File Archival, Notification, Report Generation, Output Forwarding
processes (often not represented as a concept, but may be)	EDVR receipt, EDVR update, T-Rating Calculation, AMD date verification, NEC Date Verification, File Archival, Notification, Report Generation, Output Forwarding

rules and policies	T-Rate policy:
	T-1 = NEC + Cruise Experience
	T-2 = NEC + Work Up Experience
	T-3 = NEC Awarded
	T-4 = Wrong NEC or no NEC

catalogs	NEC catalog Work center catalog Area catalog
records of finance, work, contracts, legal matters	N/A
manuals, books	OPNAVINST 1000.16H, EDVR Users' Manual, CSEC, NEC manual, NAMP OPNAVINST 4790.2H

Table 3. Concept Category List

2. Analyze Phase

A major transition now occurs – the build phase appears on the horizon. In the build phase, iterative development cycles occur as well. Then an analyze phase or analysis phase is started, within which the problems of the current cycle are closely investigated.

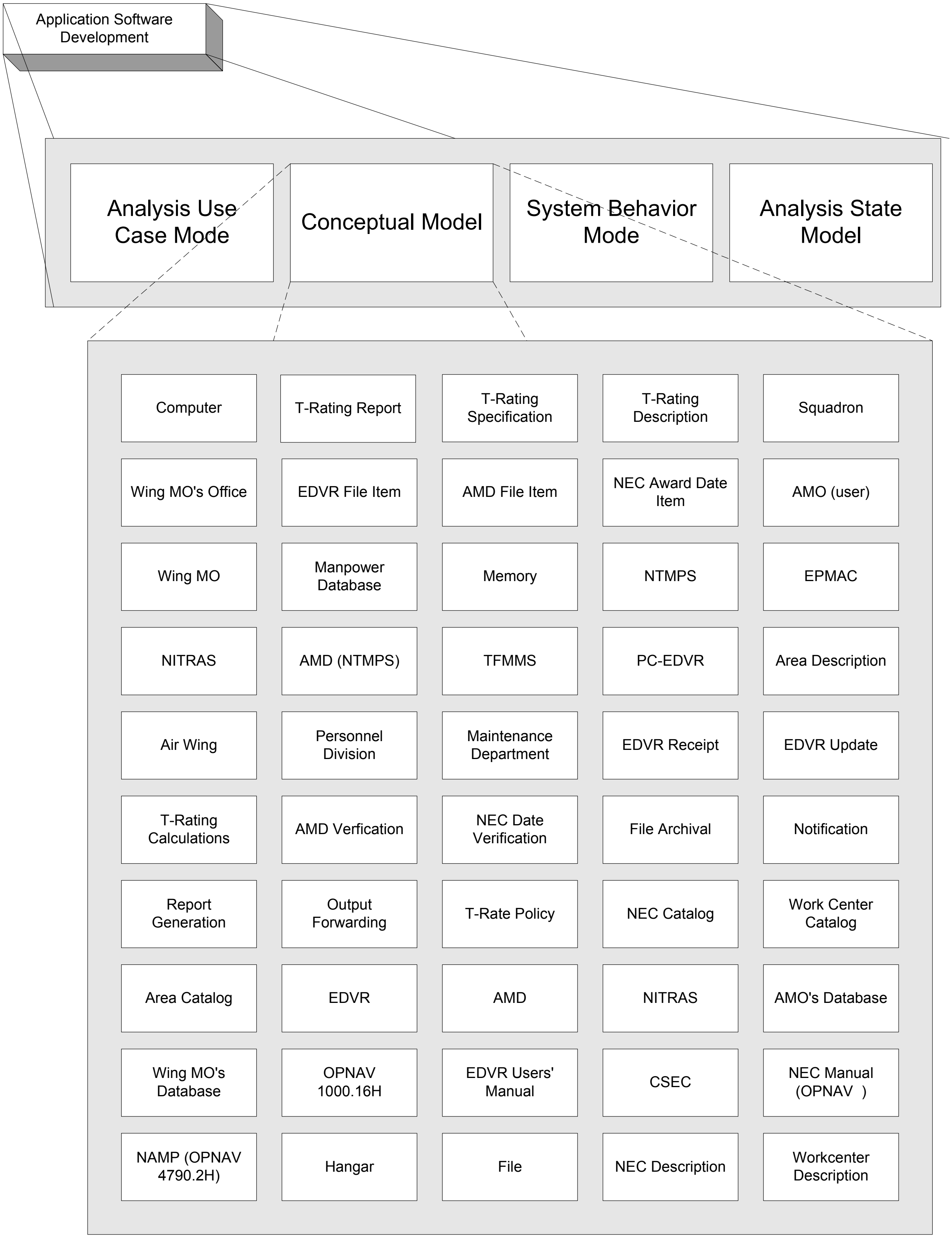
a. *Initial Concept Model*

The most critical model to develop during the analysis phase is the Conceptual Model. The conceptual model is important because it is from here that objects begin to take form for use in the design phase. The conceptual model basically illustrates the meaningful concepts taken from the Concept Category List and displays them in no particular fashion - the Concept Category List was merely used as a tool in generating concepts. Table 4 below is a list of the concepts considered pertinent to our application.

While all concepts listed below are not critical system process concepts, for documentary purposes, we have listed them. Ideally, the identification of concept objects is derived from expanded use cases. In this case; however, it was our desire to review all potential concepts in this process for reasons discussed in paragraph 1.i above.

b. Associations

Associations describe how concepts are related to each other. It is important to distinguish relationships that need to be established for an indefinite period of time regardless of duration. We have created a Common Associations List as a tool to aid in identification and definition of associations here. This list may be viewed in its entirety in Appendix B. Next, from this list, we then illustrated these associations, in relation to the concepts in the Conceptual Models. The individual diagrams resulting from this process may be viewed in Appendix C. In an effort to condense these separate conceptual models down to one that was concise and easier to convey the domain with which we are dealing, the Automated T-Rating Conceptual Model with associations was created as shown in Figure 4.



Computer	T-Rating Report	T-Rating Specification	T-Rating Description	Squadron
Wing MO's Office	EDVR File Item	AMD File Item	NEC Award Date Item	AMO (user)
Wing MO	Manpower Database	Memory	NTMPS	EPMAC
NITRAS	AMD (NTMPS)	TFMMS	PC-EDVR	Area Description
Air Wing	Personnel Division	Maintenance Department	EDVR Receipt	EDVR Update
T-Rating Calculations	AMD Verfication	NEC Date Verification	File Archival	Notification
Report Generation	Output Forwarding	T-Rate Policy	NEC Catalog	Work Center Catalog
Area Catalog	EDVR	AMD	NITRAS	AMO's Database
Wing MO's Database	OPNAV 1000.16H	EDVR Users' Manual	CSEC	NEC Manual (OPNAV)
NAMP (OPNAV 4790.2H)	Hangar	File	NEC Description	Workcenter Description

Table 4. Conceptual Objects (from Larman, p. 103)

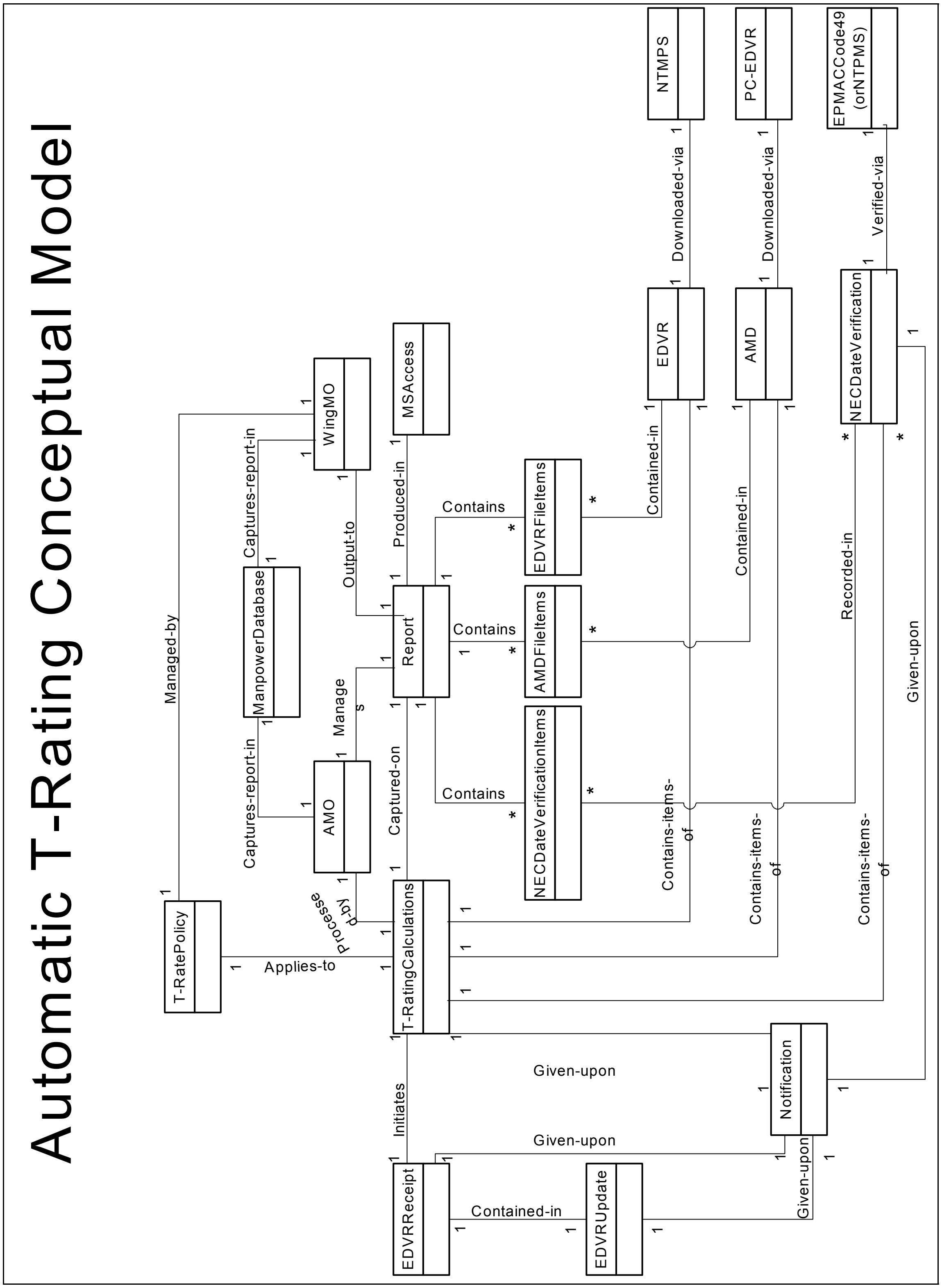


Figure 4. Concept Model and Associations

As with the creation of concepts, when defining associations, concern should not be given to whether the association will be used during design and construction. The goal is to establish associations between concepts that have been created.

In generating associations for this application, the following guidelines were used:

- Focus on those associations for which knowledge of the relationship needs to be preserved for some duration ("need-to-know" associations).
- It is more important to identify *concepts* than to identify *associations*.
- Too many associations tend to confuse a conceptual model rather than illuminate it. Their discovery can be time-consuming, with marginal benefit.
- Avoid showing redundant or derivable (common sense) associations.

c. Discussion of Conceptual Model Attributes

At this point, it is beneficial to identify the attributes of the concepts that are needed to satisfy information requirements of current use cases under development. An *attribute* is a logical data value of an object. Attributes are shown in the lower section of the concept box of Figure 5. A complete list of statements supporting the reason behind each attribute may be found in Appendix D. It is desirable to have such a list drawn up in order to see, very quickly, where the relation occurs and why it is important that each attribute be listed for the related concept.

Taking these concepts, associations, and attributes we arrive at the final T-Rating Conceptual Model as illustrated below in Figure 6. It should be noted here, that there is no such thing as a "right" or "wrong" concept model. Conceptual models should be used as tools to understand and establish the requirements of the system. Better models make it clearer for people to see overall, how the system will be designed, based on known information.

With this, we can see what the final T-Rating Conceptual Model, with associations and attributes, will look like and from which we can then analyze and gain further understanding of for the design phase. Figure 6 depicts this final diagram.

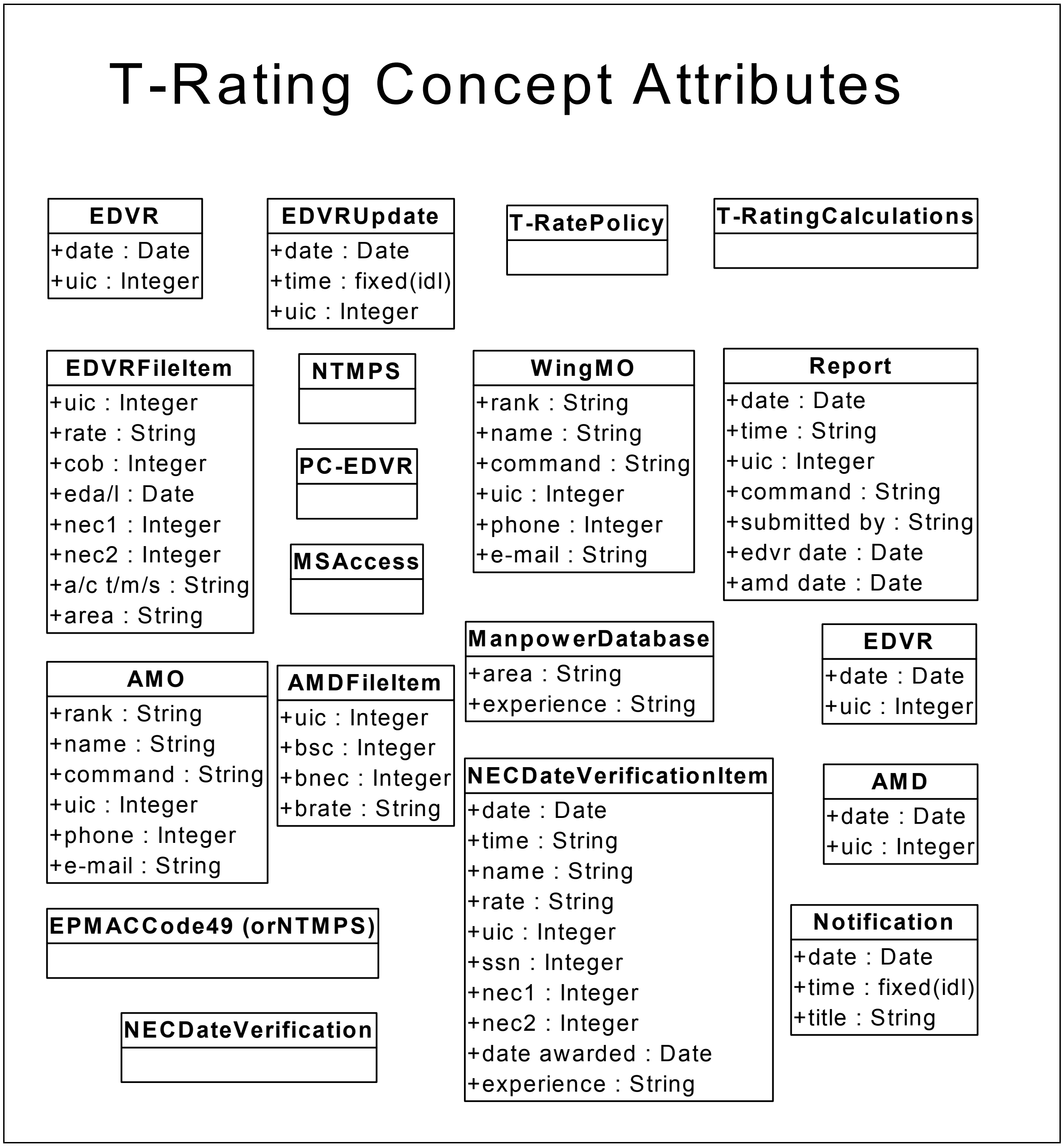


Figure 5. Concept Attributes

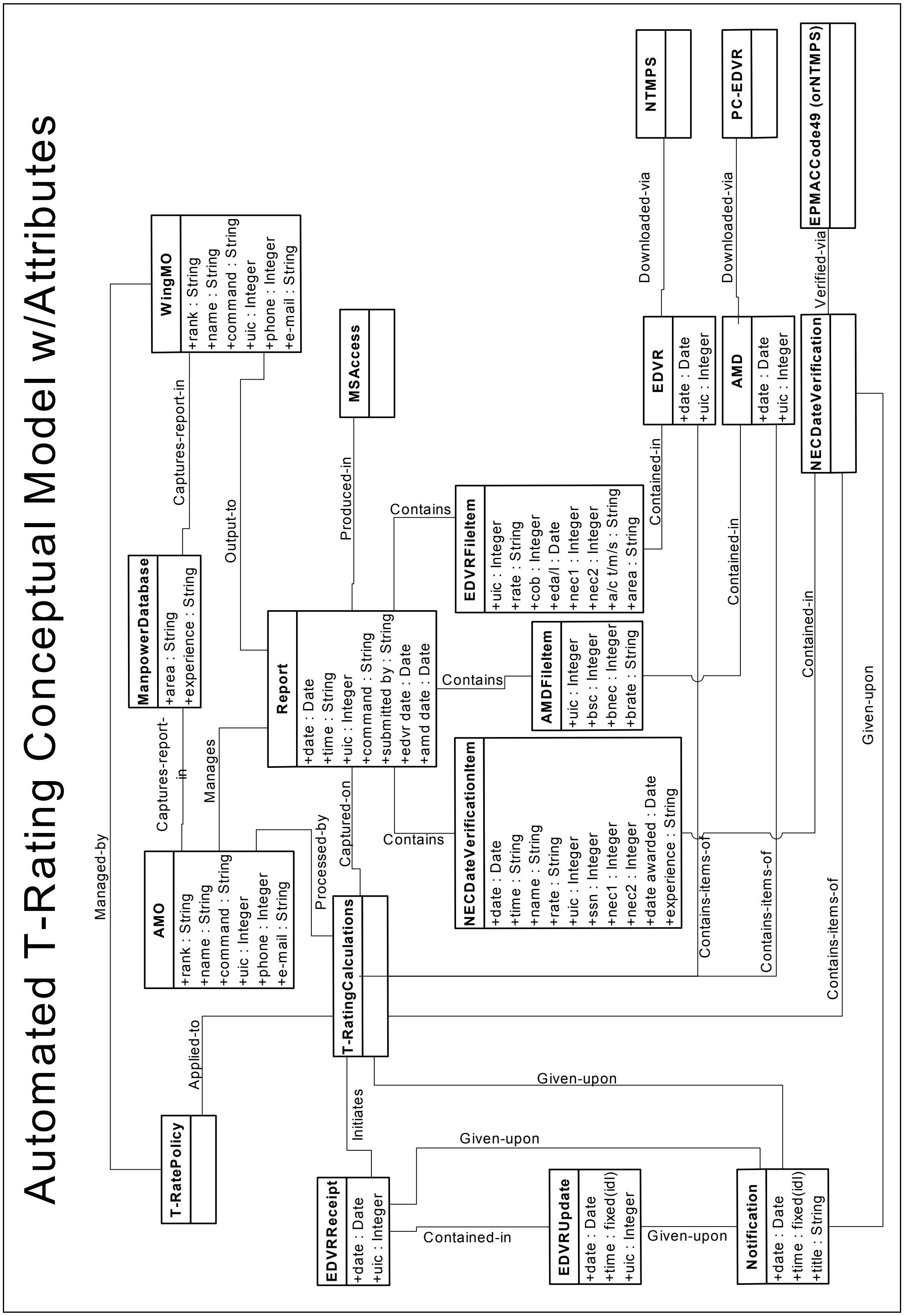
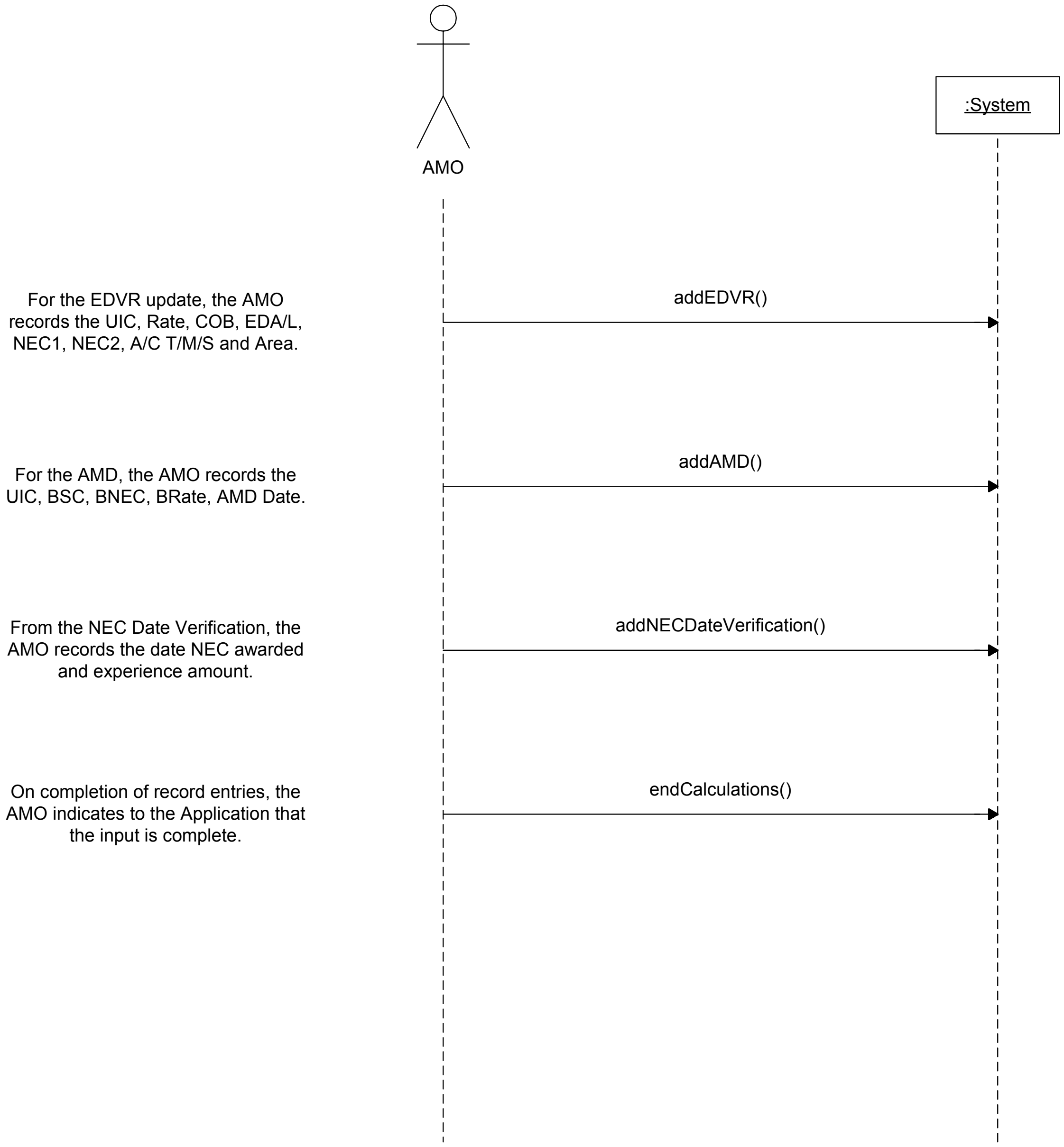


Figure 6. Conceptual Model with Attributes

d. System Sequence Diagrams

The use of System Sequence Diagrams is important in the analysis phase because they depict, in the UML notation, the important functions of the system processes and how they are related to the users, or Actors as they are termed in the UML notation. Other important factors that are identified in the diagram are things such as the use case, event orders, and intersystem events. Emphasis should be given to events that reach beyond the system boundary, depicted as an outlined box that contains use cases. Things outside this boundary are considered external, such as the actors in our case. One additional issue that is considered here is that of system behavior. This behavior is what is important and describes more of *what* a system does rather than *how* it is done. Figure 7 illustrates the use case from the perspective of the AMO and the system events. Figure 8 illustrates the use case from the perspective of the Wing Maintenance Officer.

Automated T-Rating System Sequence Diagram



For the EDVR update, the AMO records the UIC, Rate, COB, EDA/L, NEC1, NEC2, A/C T/M/S and Area.

For the AMD, the AMO records the UIC, BSC, BNEC, BRate, AMD Date.

From the NEC Date Verification, the AMO records the date NEC awarded and experience amount.

On completion of record entries, the AMO indicates to the Application that the input is complete.

Figure 7. AMO System Sequence Diagram

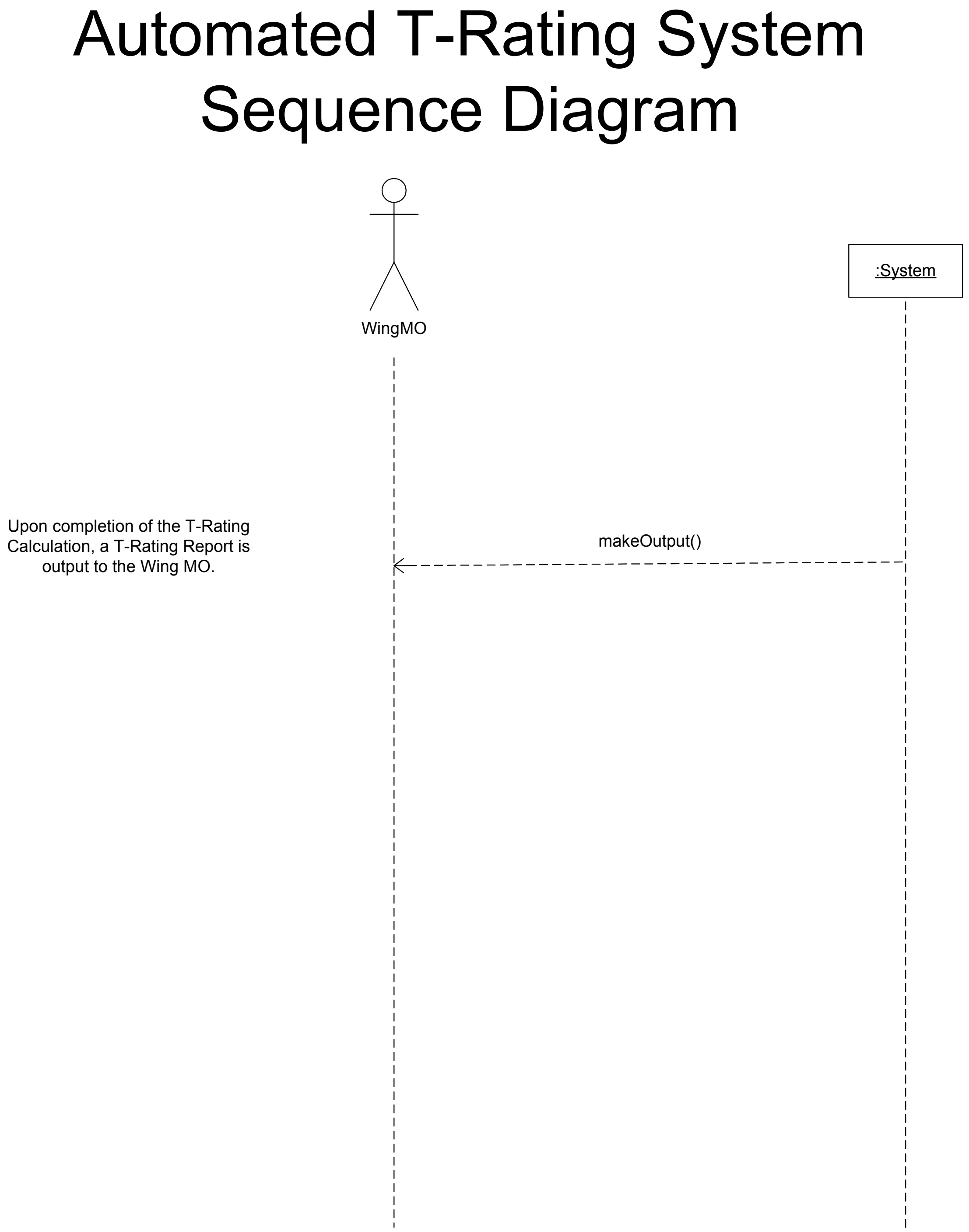

Automated T-Rating System Sequence Diagram
WingMO
:System
Upon completion of the T-Rating Calculation, a T-Rating Report is output to the Wing MO.
makeOutput()

Figure 8. Wing MO System Sequence Diagram

From the system sequence diagrams, it can be seen that the system will have four input messages and one output message, which make up the five system operations. These operations are explained as a system response to an event initiated by an external input such as an actor. Figure 9 depicts in the UML notation the five system operations that will need to be performed.

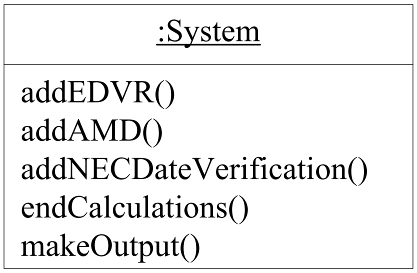


Figure 9. System Operations

e. Contracts

The last aspect of the analyze phase that needs to be considered is that of contract creation. Contracts are created to detail what more specifically should happen in the system operations. They are more ideally the process of what happens in the events that will take place in terms of state changes from before the event operation to after the event. In essence, a contract is used to capture the behavior of the system in more detail so that the developer can start to move toward the next phase where building begins.

A description of each section of a contract is shown in the following schema of Table 5. Not all sections are necessary, although the *Responsibilities* and *Post-Conditions* sections are recommended.

Name:	Name of operations and parameters.
Responsibilities:	An informal description of the responsibilities this operation must fulfill.
Type:	Name of type (concept, software class, interface)
Cross References:	System function reference numbers, use cases, etc.
Notes:	Design notes, algorithm, and so on.
Exceptions:	Exceptional cases.
Output:	Non-UI outputs, such as messages or records that are sent outside of the system.
Pre-Conditions:	Assumptions about the state of the system before execution of the operations.
Post-Conditions:	The state of the system after completion of the operation.

Table 5. Contract Schema

Contracts pertinent to the Automated T-Rating system operations are the adding of the EDVR to the system database, adding the AMD to the system database, adding the NEC Date Verification to the database, ending the Calculations when all EDVR, AMD and NEC Date data is present, and lastly, making output as in the form of reports.

Name: addEDVR

Responsibilities: Enter (record) the newly received EDVR file for use in the T-Rating Calculation.

Type: System

Cross References: System Functions: R1.1, R1.3, R1.4, R1.5, R1.6

Notes:

Exceptions:

Output:

Pre-conditions: EDVR file is saved to a specific location in order for system to address it for import.

Post-conditions:

- If a new T-Rating calculation, a *T-RatingCalculations* was created.
- A *T-RatingCalculationLineItem* was created.
- If a new T-Rating calculation, the new T-Rating was associated with the Manpower Database (association formed).
- The *EDVRLineItem* was associated with the *T-Rating Calculations*.
- If EDVR import was completed, a *Notification* message was created.

Name: addAMD

Responsibilities: Enter the AMD data for use in the T-Rating Calculation.

Type: System

Cross References: System Functions: R1.2, R1.3, R1.9

Notes:

Exceptions:

Output:

Pre-conditions: AMD is saved to a specific location in order for system to address it for import.

Post-conditions:

- If a new T-Rating calculation, a *T-RatingCalculations* was created.
- If a new T-Rating calculation, a *T-RatingCalculationLineItem* was created.
- The T-Rating was associated with the Manpower Database.
- An *AMDLineItem* was created.
- The *AMDLineItem* was associated with the *T-RatingCalculations*.
- If AMD import was completed, a *Notification* message was completed.

Name: addNECDateVerification

Responsibilities: Enter the NEC Award Date for use in the T-Rating Calculation.

Type: System

Cross References: System Functions: R1.8

Notes: This is a process that may require a number of repetitive cycles as each individual's NEC award date will need to be verified; something that may not be performed in one step.

Exceptions:

Output:

Pre-conditions: Members already onboard have been verified. Only new gains will require verification.

Post-conditions:

- If a new T-Rating calculation, a *T-RatingCalculation* was created.
- If a new T-Rating calculation, A *T-RatingCalculationLineItem* was created.
- The T-Rating was associated with the Manpower Database.
- An *NECDateVerificationLineItem* was created.
- The *NECDateVerificationLineItem* was associated with the *T-RatingCalculation*.
- If *NECDateVerification* was completed, a *Notification* message was created.

Name: endCalculations

Responsibilities: Record that it is the end of entry of T-Rating items, and display T-Rating report totals.

Type: System

Cross References: System Functions: R2.6.

Notes: This is notification to the system that all entries for the T-Rating Calculation are complete; processing may commence now.

Exceptions:

Output: On-Screen visual notification.

Pre-conditions: EDVR, AMD, NECDateVerification are known to the system.

Post-conditions:

- *T-Rating.isComplete* was set to *true* (attribute modification).

Name: makeOutput

Responsibilities: Record the T-Rating Calculation, make output to designated addressees.

Type: System

Cross References: System Functions: R3.1, R3.2, R3.3, R3.4.

Notes:

Exceptions:

Output: database file, e-mail, hard copy (for binders that may be kept).

Pre-conditions:

Post-conditions:

- Output is created.

3. Design Phase

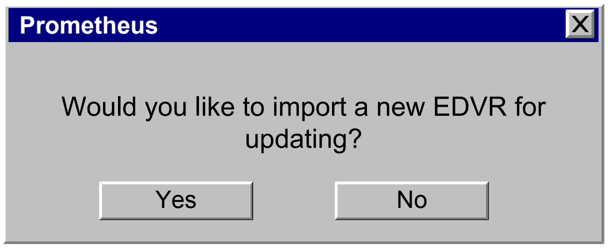
In this section, we make the transition to design where the actual concepts of operation will be drawn out more specifically. Again, we have primarily been concerned with the *what* that the system must do. Here, though we start to concentrate on *how* things will be processed.

In the design phase, a logical solution is presented to address the issues identified during the previous two phases of Plan and Elaborate, and Analysis. The pinnacle element of these two phases is the creation of collaboration diagrams. In collaboration diagrams, we diagram the process that is to satisfy the requirement so written for. In this section of the thesis, we present our description of the real use cases, diagram how our system processes will communicate in the form of collaboration diagrams, and lastly, summarize the critical links through the creation of the Design Class Diagram.

a. Real Use Case Description

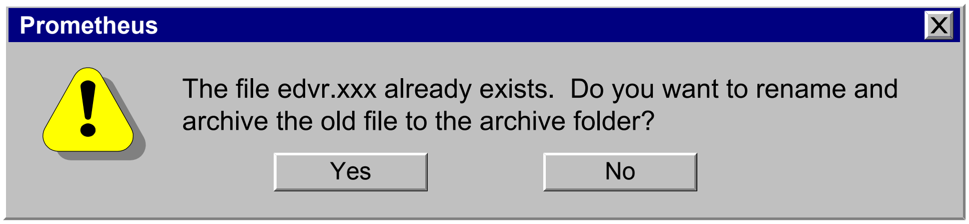
In the design phase, there are no high-level or expanded use cases. Instead, these are utilized in terms of real use cases. By real, what is meant is that the use case's actual design will be described using concrete input and output, as well as implementation methodologies. In this instance, we have taken the Import EDVR use case and described more specifically, using storyboarding, how the use case would be realized. As is shown, a graphical user interface will be used to provide a means of communication between the user and the system. At this point, the application is not fully developed, but with the depiction of the basic GUI windows, it becomes easier to see how the system may function as well as identify other requirements that need to be addressed.

Typical Course of Action	
Actor Action	System Response
1. This use case begins when a new EDVR has been posted to the LAN by the Command Career Counselor or Pers Div.	
2. The AMO will copy this file into the folder c:\\prometheus\edvr\import	
3. The AMO will double click the Prometheus icon to open the application.	4. Prometheus application will launch.
	5. Prompt user to import new EDVR from c:\\Prometheus\edvr\import.



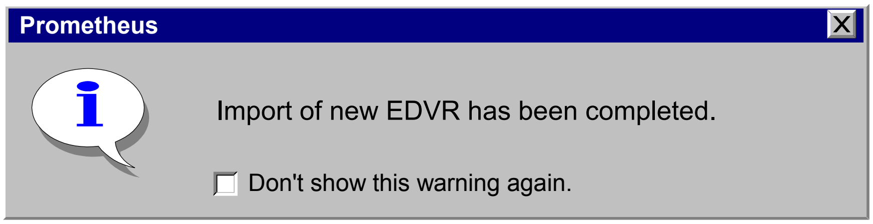
Would you like to import a new EDVR for updating?

	6. The system opens the new EDVR .txt file, and then copies the data/fields into the Prometheus database.
7. The AMO will select the "yes" button to confirm.	8. Name of EDVR file should already exist. Prompt user to rename and archive the old file



The file edvr.xxx already exists. Do you want to rename and archive the old file to the archive folder?

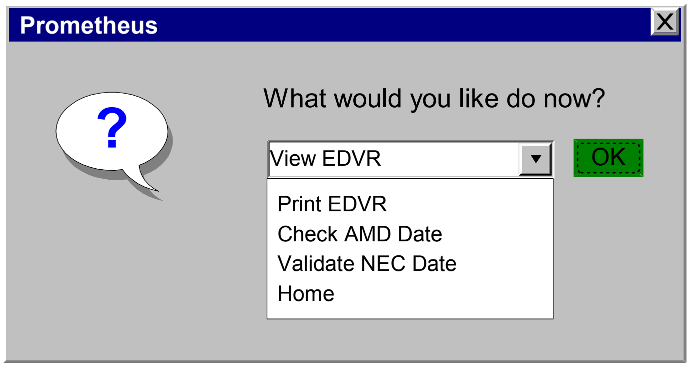
	9. Old file will be renamed as <DD_MMM_YY.___> and moved into the folder c:\\Prometheus\edvr\archives
	10. Notify user that import process has been complete.



Import of new EDVR has been completed.

□ Don't show this warning again.

	11. Prompt user to view or print out new EDVR.



What would you like do now?

View EDVR

b. Collaboration Diagrams

In the UML, two kinds of interaction diagrams exist: sequence and collaboration. Either may be used to express message interaction; however, collaboration diagrams are preferred because they are better suited to expressing system operations flow as well as describe the contextual meaning of such operations.

The collaboration diagrams use the pre- and post-conditions of the contracts in section 2.e of this chapter, and illustrate message interactions. A description of each diagram follows:

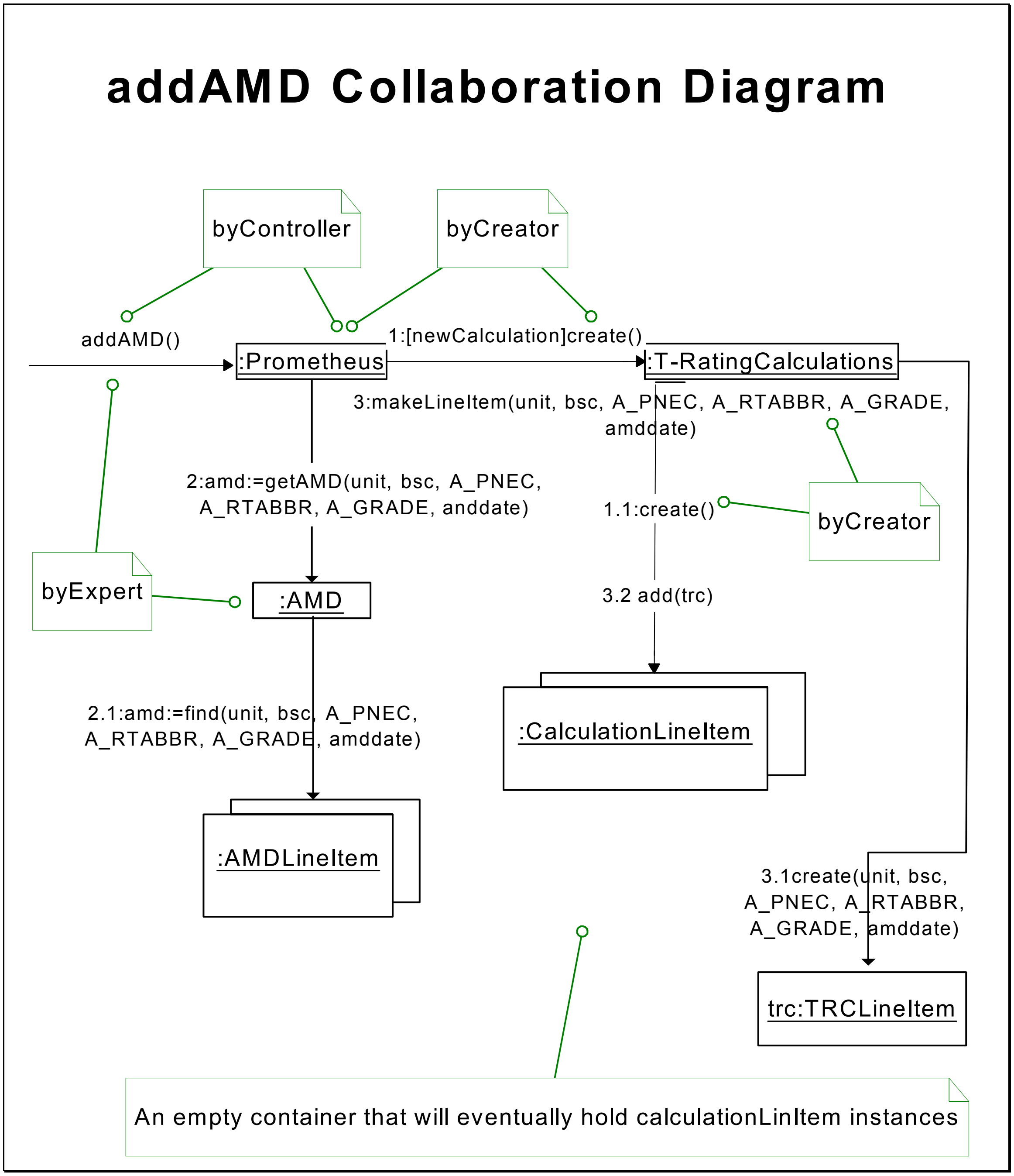

addAMD Collaboration Diagram
byController
byCreator
addAMD()
1:[newCalculation]create()
:Prometheus
:T-RatingCalculations
3:makeLineItem(unit, bsc, A_PNEC, A_RTABBR, A_GRADE, amddate)
2:amd:=getAMD(unit, bsc, A_PNEC, A_RTABBR, A_GRADE, anddate)
1.1:create()
byCreator
byExpert
:AMD
3.2 add(trc)
2.1:amd:=find(unit, bsc, A_PNEC, A_RTABBR, A_GRADE, amddate)
:CalculationLineItem
:AMDLineItem
3.1create(unit, bsc, A_PNEC, A_RTABBR, A_GRADE, amddate)
trc:TRCLineItem
An empty container that will eventually hold calculationLinItem instances

Figure 10. Add AMD Collaboration Diagram

The *addAMD* collaboration diagram in Figure 10 is read as follows:

1. The message *addAMD* is sent to an instance of *Prometheus*. It corresponds to the *addAMD* system operation message.

2. The Prometheus object sends the *addAMD* message to a *T-RatingCalculation* instance.

3. The *T-RatingCalculations* object creates an instance of *CalculationLineItem*.

4. The *Prometheus* object sends the *getAMD* message to an *AMD* instance.

5. The *AMD* object finds the datafields in the *AMD* and creates an instance of *AMDLineItem* called for.

6. The *T-RatingCalculations* object creates a *TRCLineItem* with the *AMD* data found in the instance of *AMDLineItem*.

7. The *TRCLineItem* just created is then added to and stored in the object *CalculationLineItem*.

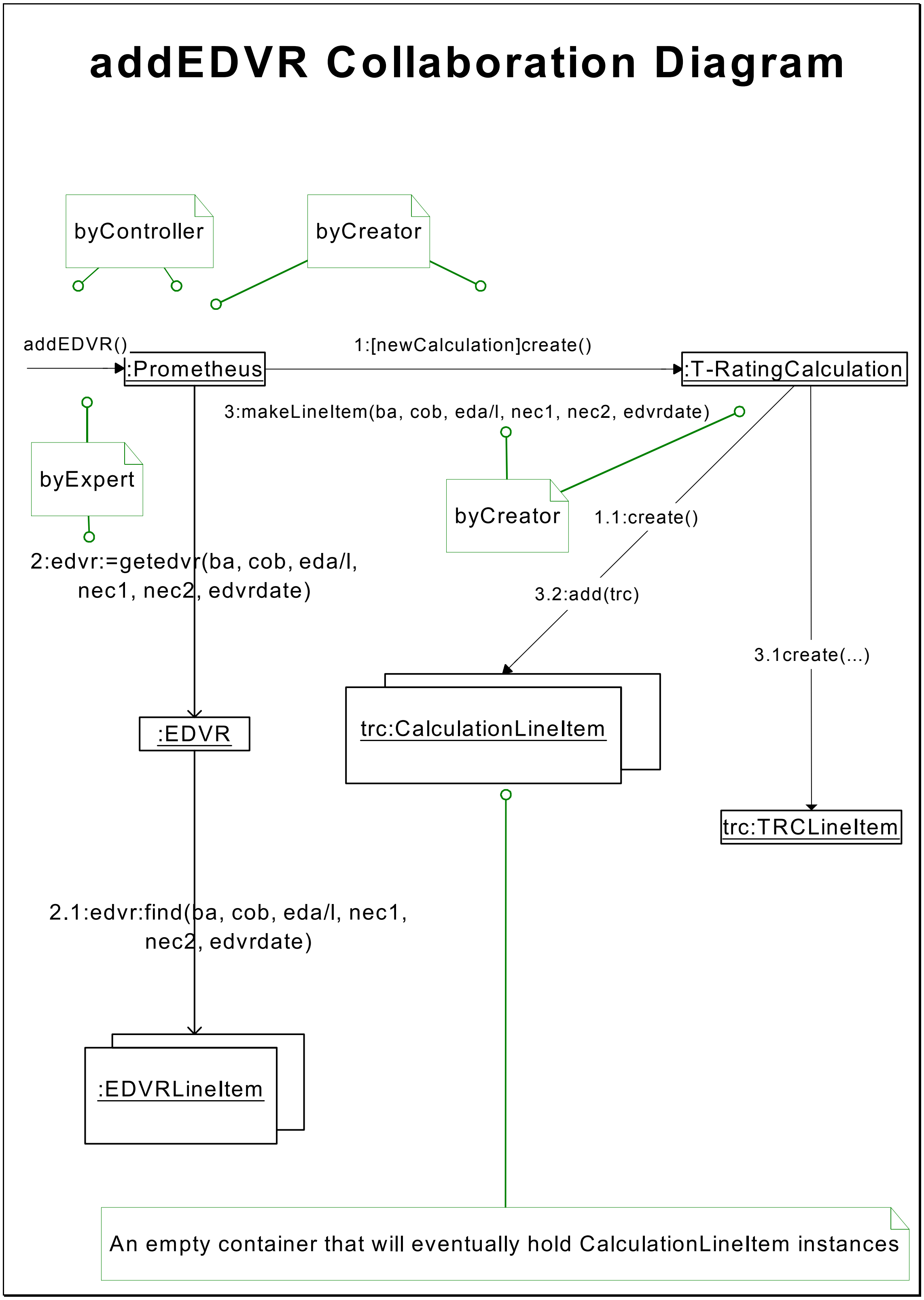

addEDVR Collaboration Diagram
byController
byCreator
addEDVR()
:Prometheus
1:[newCalculation]create()
:T-RatingCalculation
3:makeLineItem(ba, cob, eda/l, nec1, nec2, edvrdate)
byExpert
byCreator
1.1:create()
2:edvr:=getedvr(ba, cob, eda/l, nec1, nec2, edvrdate)
3.2:add(trc)
3.1create(...)
:EDVR
trc:CalculationLineItem
trc:TRCLineItem
2.1:edvr:find(ba, cob, eda/l, nec1, nec2, edvrdate)
:EDVRLineItem
An empty container that will eventually hold CalculationLineItem instances

Figure 11. Add EDVR Collaboration Diagram

The *addEDVR* collaboration diagram in Figure 11 is read as follows:

1. The message *addEDVR* is sent to an instance of *Prometheus*. It corresponds to the *addEDVR* system operation message.

2. The *Prometheus* object sends the *addEDVR* message to a *T-RatingCalculation* instance.

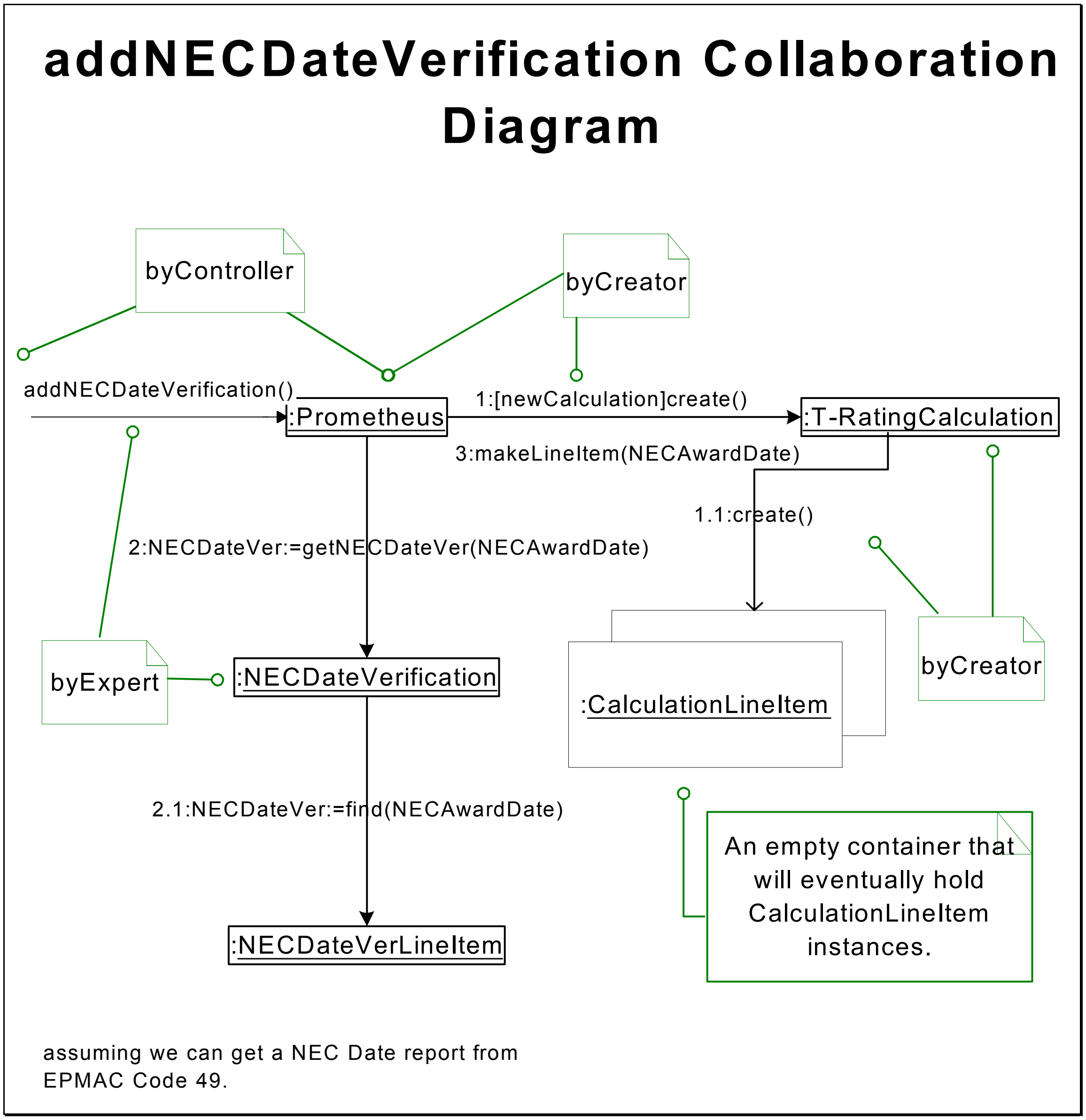
3. The *T-RatingCalculation* object creates an instance of *CalculationLineItem*.

4. The *Prometheus* object sends the *getEDVR* message to an *EDVR* instance.

5. The *EDVR* object finds the data fields in the *EDVR* and creates an instance of *EDVRLineItem* called for.

6. The *T-RatingCalculation* object creates a *TRCLineItem* with the *EDVR* data found in the instance of *EDVRLineItem*.

7. The *TRCLineItem* just created is then added to and stored in the object *CalculationLineItem*.


addNECDateVerification Collaboration Diagram
byController
byCreator
addNECDateVerification()
:Prometheus
1:[newCalculation]create()
:T-RatingCalculation
3:makeLineItem(NECAwardDate)
1.1:create()
2:NECDateVer:=getNECDateVer(NECAwardDate)
byExpert
:NECDateVerification
:CalculationLineItem
byCreator
2.1:NECDateVer:=find(NECAwardDate)
:NECDateVerLineItem

An empty container that will eventually hold CalculationLineItem instances.

assuming we can get a NEC Date report from EPMAC Code 49.

Figure 12. Add NEC Date Verification Collaboration Diagram

The *addNECDateVerification* collaboration diagram in Figure 12 is read as follows:

1. The message *addNECDateVerification* is sent to an instance of *Prometheus*. It corresponds to the *addNECDateVerification* system operation message.

2. The *Prometheus* object sends the *addNECDateVerification* message to a *T-RatingCalculation* instance.

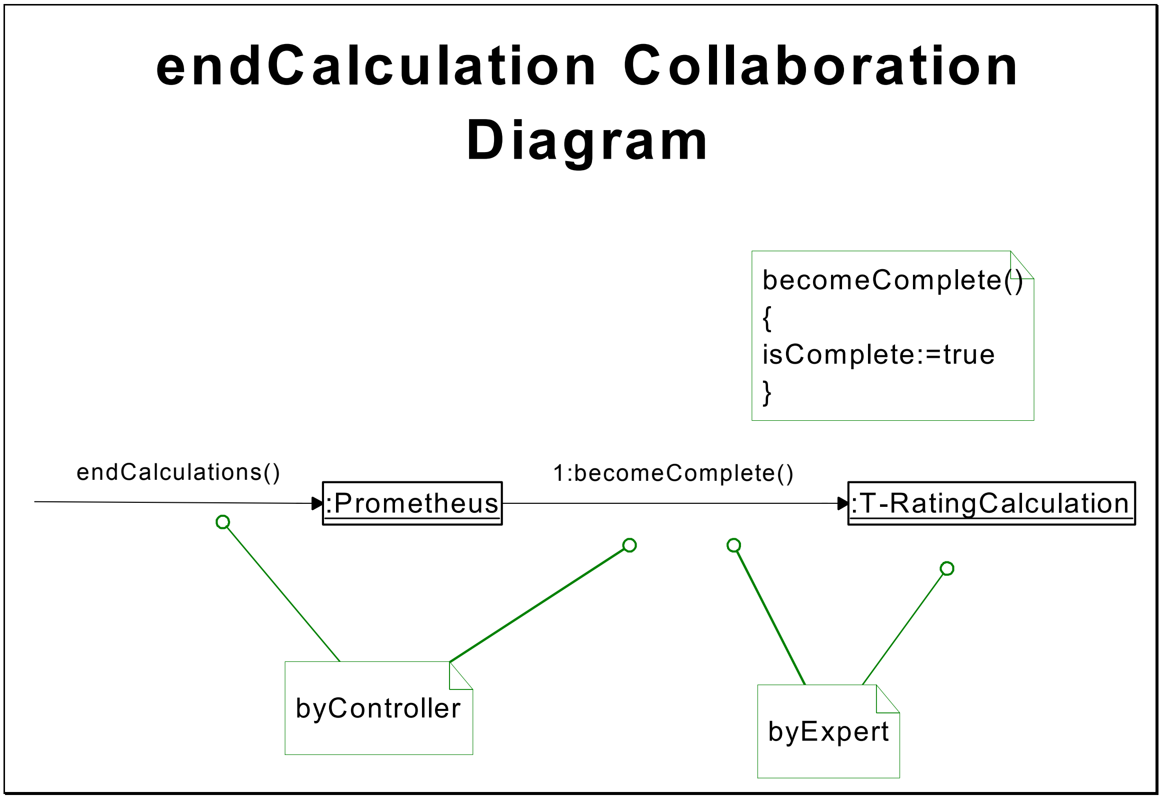
3. The *T-RatingCalculation* object creates an instance of *CalculationLineItem*.

4. The *Prometheus* object sends the *getNECDateVer* message to a *NECDateVerification* instance.

5. The *NECDateVerification* object finds the data in the *NECDateVerification* report and creates an instance of *NECDateVerLineItem* called for.

6. The *T-RatingCalculation* object creates a *TRCLineItem* with the NEC date data found in the instance of *NECDateVerLineItem*.

7. The *TRCLineItem* just created is then added to and stored in the object *CalculationLineItem*.



```
becomeComplete()
{
isComplete:=true
}
```

Figure 13. End Calculation Collaboration Diagram

The *endCalculation* collaboration diagram in Figure 13 is read as follows:

1. The message *endCalculations* is sent to an instance of *Prometheus*. It corresponds to the *endCalculations* system operation message.

2. The *Prometheus* object sends a *becomeComplete* message to a *T-RatingCalculation* instance.

3. The *becomeComplete* message is a simple, standard message to end processing.

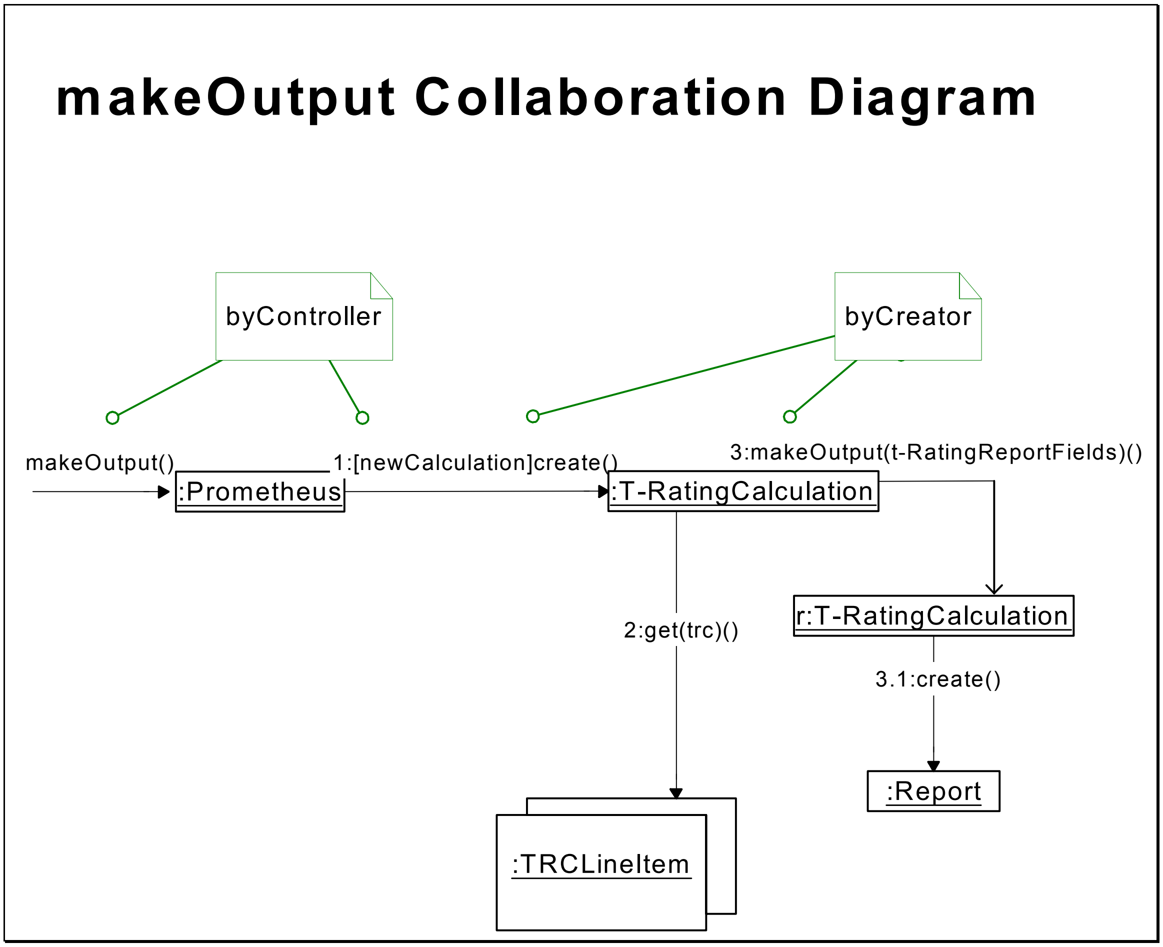


Figure 14. Make Output Collaboration Diagram

The *makeOutput* collaboration diagram in Figure 14 is read as follows:

1. The message *makeOutput* is sent to an instance of *Prometheus*. It corresponds to the *makeOutput* system operation message.

2. The *Prometheus* object creates a *T-RatingCalculation* object.

3. The *T-RatingCalculation* object sends the *getTRC* to the container *CalculationLineItem*.

4. The *T-RatingCalculation* object sends the *makeOutput* message to the report object *T-RatingCalculation*.

5. The report object sends a *create* message to the *Report* object in the format desired by the user (i.e. printer or file).

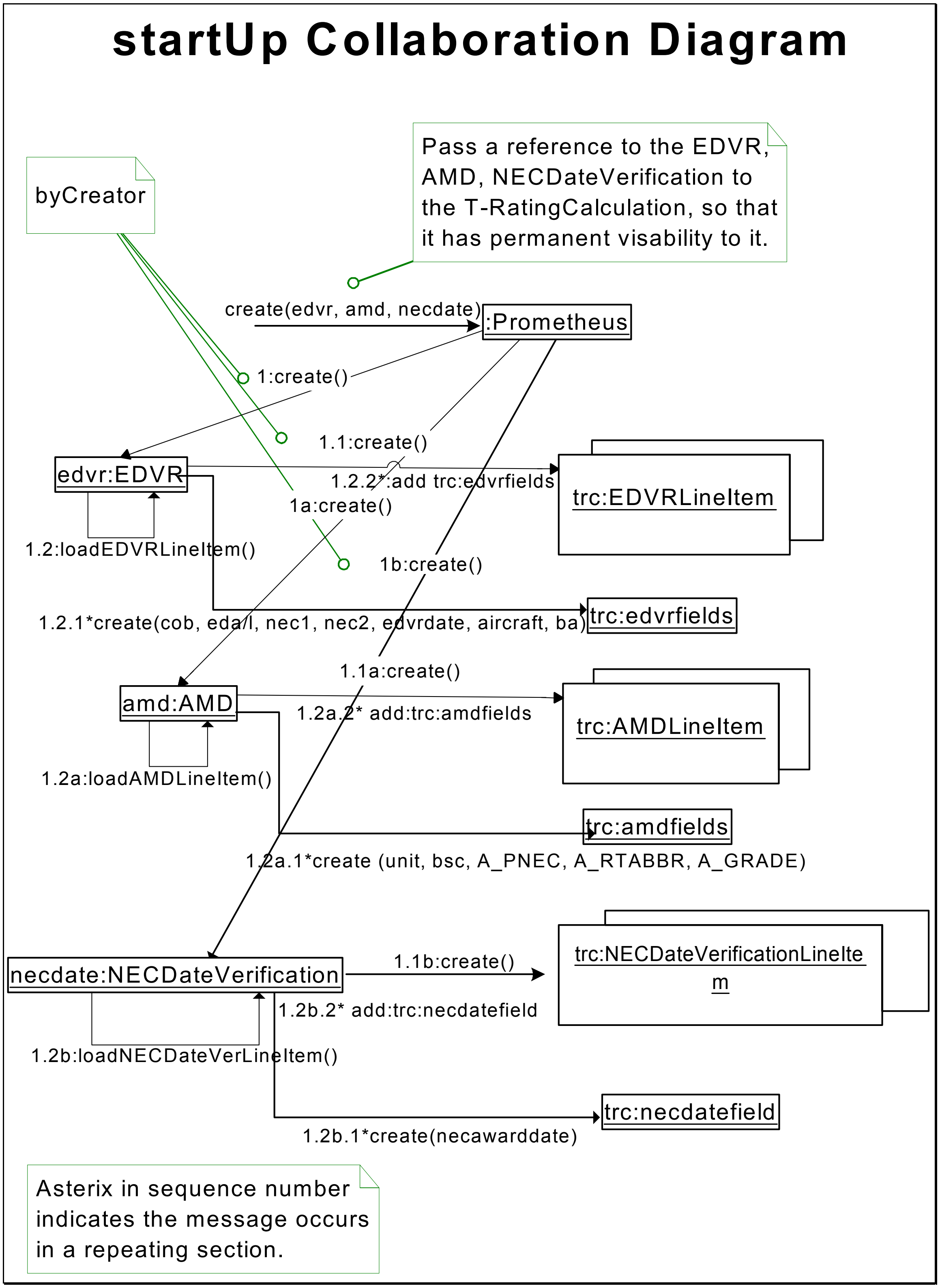

startUp Collaboration Diagram
byCreator
Pass a reference to the EDVR, AMD, NECDateVerification to the T-RatingCalculation, so that it has permanent visability to it.
create(edvr, amd, necdate)
:Prometheus
1:create()
1.1:create()
edvr:EDVR
1.2.2*:add trc:edvrfields
trc:EDVRLineItem
1a:create()
1.2:loadEDVRLineItem()
1b:create()
1.2.1*create(cob, edal/l, nec1, nec2, edvrdate, aircraft, ba)
trc:edvrfields
1.1a:create()
amd:AMD
1.2a.2* add:trc:amdfields
trc:AMDLineItem
1.2a:loadAMDLineItem()
trc:amdfields
1.2a.1*create (unit, bsc, A_PNEC, A_RTABBR, A_GRADE)
necdate:NECDateVerification
1.1b:create()
trc:NECDateVerificationLineItem
1.2b.2* add:trc:necdatefield
1.2b:loadNECDateVerLineItem()
trc:necdatefield
1.2b.1*create(necawarddate)
Asterix in sequence number indicates the message occurs in a repeating section.

Figure 15. Start-up Collaboration Diagram

The *startup* collaboration diagram in Figure 15 is read as follows:

1. The message *create( )* is sent to an instance of *Prometheus*.

2. The object *Prometheus* sends a *create( )* message to instances of *EDVR*, *AMD*, and *NECDateVerification*.

3. The objects *EDVR*, *AMD*, and *NECDateVerification* send a *load*LineItem* message to themselves to initialize these objects for system operation.

c. Design Class Diagram

In furthering this application from just an idea to real code, we come to the use of the class diagram. Typical information contained in class diagrams is:

- classes, associations, attributes
- interfaces with their operations and constraints
- methods
- attribute type information
- navigability
- dependencies

Whereas in the conceptual model where objects do not necessarily represent software definitions, in class diagrams abstractions of these concepts are defined in terms of software classes and components. The diagram in Figure 16 describes the information listed above for our application. One note regarding class diagrams however, they should be created taking into consideration the intended audience. If a CASE tool with automatic code generation is to be used, then full and exhaustive details are necessary. But if the class diagrams are being created for software developers to read, exhaustive detail may adversely affect any intended value added.

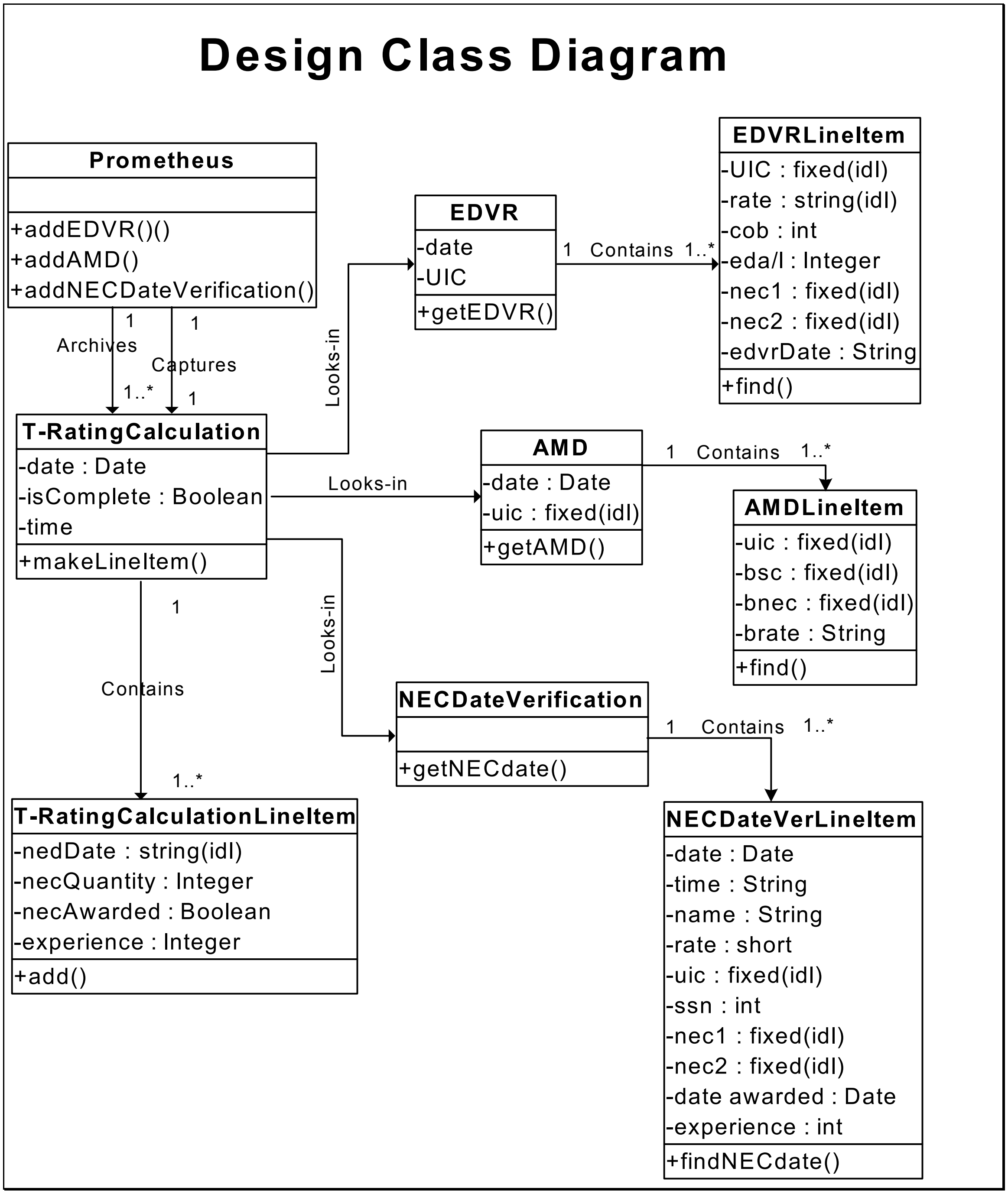


Figure 16. Design Class Diagram

4. Summary

In this chapter, we have performed requirements analysis by taking an Object Oriented Analysis and Design approach. We have used the Unified Modeling Language to identify, diagrammatically, the objects of the application and how these objects interrelate with each other in its domain. The goal of this phase of development has been to identify entities, classes and links so that the software developer may be able to duplicate as close as possible, the business process ideas of the customer and reproduce them in code represented by the software application developed in this thesis. The next step is to begin writing the code necessary to produce something more tangible for the user.

IV. MICROSOFT® .NET FRAMEWORK, VISUAL BASIC.NET AND ADO.NET IMPLEMENTATION

A. INTRODUCTION

The vast majority of applications built today involve data manipulation in some way—whether it is retrieval, storage, change, translation, verification, or transportation. For an application to be scalable and allow other applications to interact with it, the application will need a common mechanism to pass the data between the data provider and data consumers. Ideally, the vehicle that transports the data should contain the base data, any related data and metadata, and be able to track changes to the data as well. The Prometheus application uses the Microsoft® .NET Framework Visual Basic.NET (VB.NET) and ADO.NET to accomplish these tasks.

There have been many methods of handling data in previous versions of Visual Basic, beginning with the simple Data Access Objects (DAO) protocol, then Remote-access Data Objects (RDO), followed by ActiveX Data Objects (ADO), which has evolved today into ADO.NET. ADO.NET leverages the power of Extensible Mark-up Language (XML) to provide disconnected access to data. ADO.NET was designed hand-in-hand with the XML classes in the .NET Framework—both components of a single architecture. (Holzner, p. 19)

ADO.NET and the XML classes in the .NET Framework converge in the DataSet object. The DataSet can be populated with data from an XML source, whether it is a file or an XML stream. The DataSet can be written as World Wide Web Consortium (W3C) compliant XML, including its schema as XML Schema definition language (XSD) schema, regardless of the source of the data in the DataSet. Because the native serialization format of the DataSet is XML, it is an excellent medium for moving data between tiers making the DataSet an optimal choice for remote data access and schema context to and from an XML service.

B. ADO.NET ARCHITECTURE

Data processing has traditionally relied primarily on a connection-based, two-tier model. As data processing increasingly uses N-tier architectures, programmers are switching to a disconnected approach to provide better scalability for their applications. The Prometheus application utilizes the two-tier architecture, though it is built upon the ADO.NET principles laid out in this section for future N-tier implementation and scalability. (MSDN Library)

Note that ADO is no longer built into Visual Basic. ADO was based on Component Object Model (COM) protocols, and COM (as well as DCOM) is no longer built into Visual Basic either. Instead, ADO.NET uses XML to exchange data. Both COM and distributed COM (DCOM) technology has been replaced by the .NET framework. (Holzner, p. 19)

The ADO.NET core components have been designed to factor data access from data manipulation as illustrated in Figure 17. There are two central components of ADO.NET that accomplish this: 1) the DataSet and 2) the .NET data provider, which is a set of components including the Connection, Command, DataReader, and DataAdapter objects.

The other core element of the ADO.NET architecture is the .NET data providers, whose components are explicitly designed for data manipulation and fast, forward-only, read-only access to data. The Connection object provides connectivity to a data source. The Command object enables access to database commands to return data, modify data, run stored procedures, and send or retrieve parameter information. The DataReader provides a high-performance stream of data from the data source. Finally, the DataAdapter provides the bridge between the DataSet object and the data source. The DataAdapter uses Command objects to execute SQL commands at the data source to both load the DataSet with data, and reconcile changes made to the data in the DataSet back to the data source. (MSDN Library)

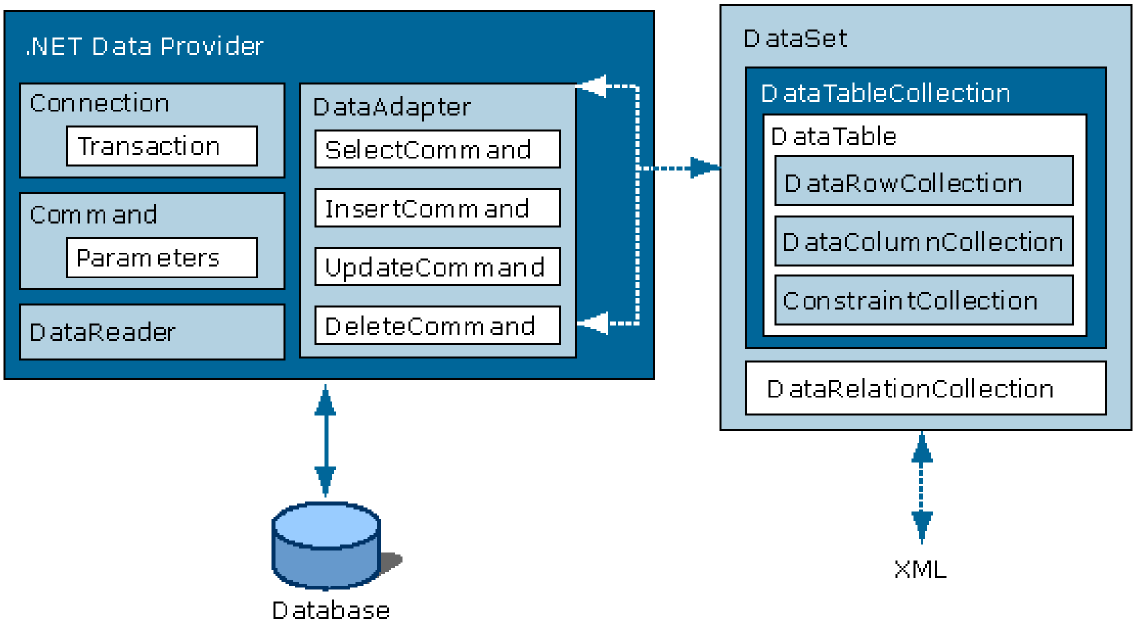


Figure 17. ADO.NET architecture and components

C. ADO.NET COMPONENTS

ADO is a Component Object Model interface to Object Linking and Embedding (OLE) DB providers; OLE DB expects to be accessed by consumers such as ADO. Figure 18 illustrates the OLE DB architecture. Formally, an OLE DB Consumer is any piece of system or application code that consumes an OLE DB interface, including the OLE DB components themselves. Figure 19 illustrates how ADO interfaces with the OLE DB object. (Vaughn, p. 15)

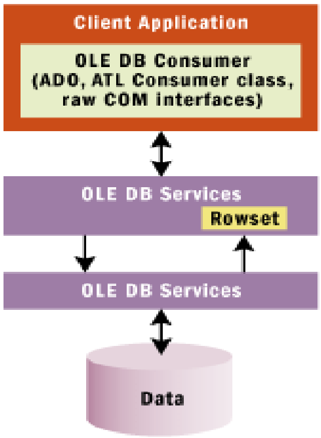


Figure 18. OLE DB Architecture

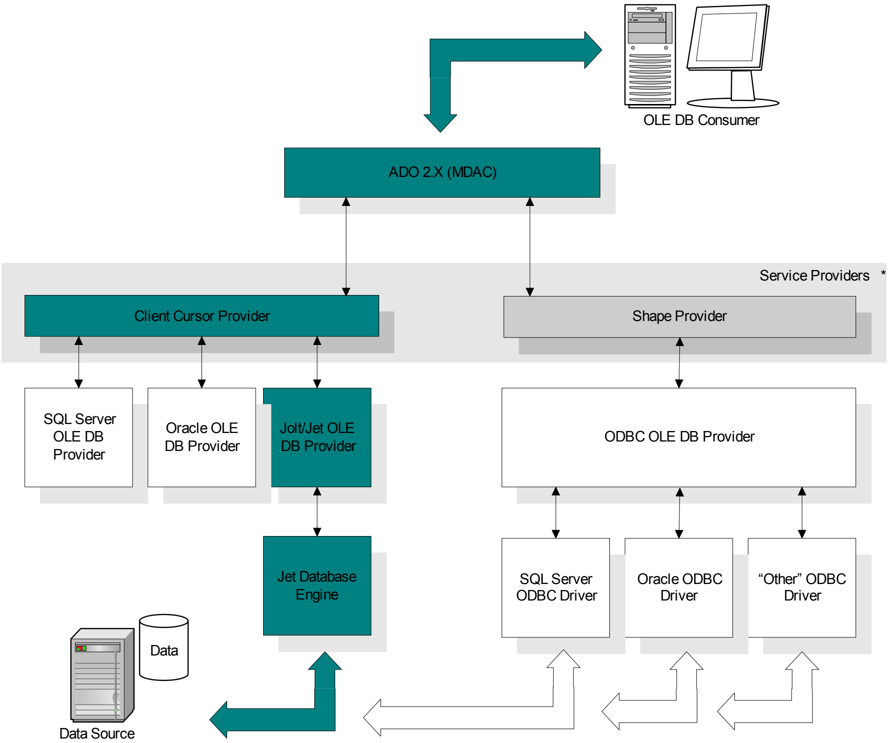


Figure 19. ADO – OLE DB Object Interface

A provider is any software component that exposes an OLE DB interface. OLE DB providers can be classified broadly into two classes: data providers and service components.

A data provider is any OLE DB provider that owns data and exposes its data in a tabular form as a rowset, which is defined later in this section. Examples of data providers include relational database management systems (RDBMS), storage managers, spreadsheets, and service components. Prometheus uses the Jet 4.0 provider, which is the only native OLE DB provider available to access a Microsoft® Access (DBMS) database. The Microsoft® OLE DB Provider for Jet provides an OLE DB interface to Microsoft® Access databases and allows Microsoft® SQL Server™ 2000 distributed queries to query Access databases. (Vaughn, p. 15)

A service component is any OLE DB component that does not own its own data, but encapsulates some service by producing and consuming data through OLE DB interfaces. A service component is both a consumer and a provider. For example, a heterogeneous query processor is a service component - it has to draw data from one source, restructure it, and pass it up the food chain to the requesting component, the consumer. (Vaughn, p. 15-16)

A database management system (DBMS) is a type of data source whose job it is to return information in one form or another as an OLE DB data provider. In the Prometheus implementation, the DBMS is segmented into functional pieces (components) - each handling a specific job. In theory, component DBMS's offer greater efficiency than traditional DBMS's because consumers generally require only a portion of the database management functionality offered, thereby reducing resource overhead. OLE DB enables simple tabular data providers to implement functionality native to their tables. (Vaughn, p. 16) Microsoft® Access 2002 was chosen as a stand-alone DBMS for its powerful management and analyzing capabilities. This application was chosen for proof of concept primarily, although Access provides full XML support, enabling the creation of a sophisticated enterprise-wide database solution. The Prometheus E-Pro Alpha.mdb file can be integrated easily with the Web and ported over to a Microsoft® SQL Server DBMS with minimal programmatic changes. The following illustration of Figure 20 shows major components of the ADO.NET application.

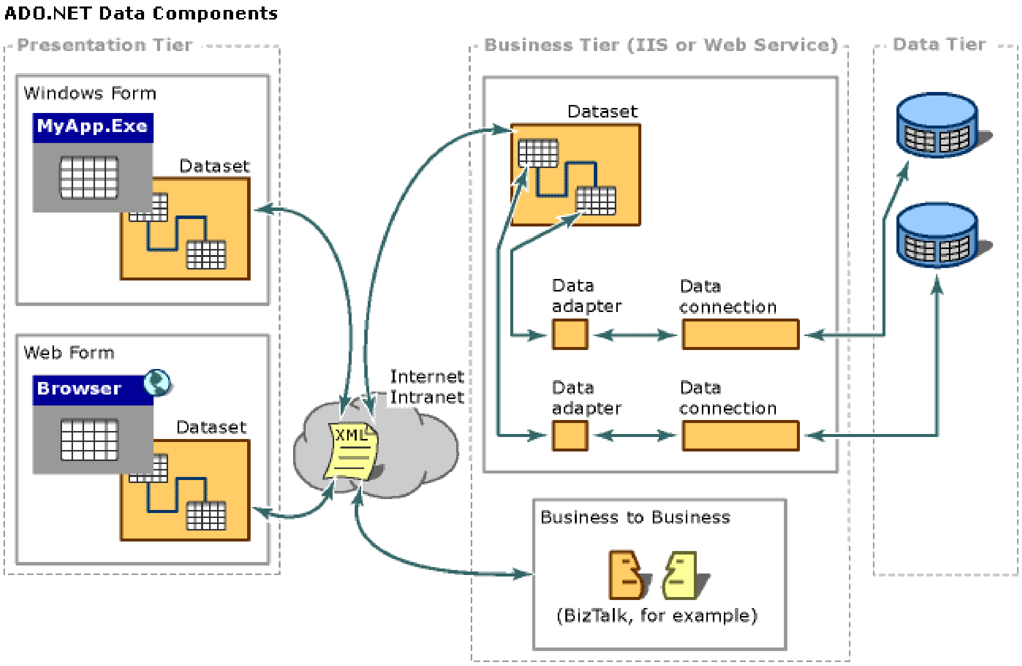


Figure 20. ADO.NET Components

1. DATA PERSISTED AS XML

ADO.NET is a new data-handling model that makes it easy to handle data on the Internet and on a local machine to communicate with local databases the way Prometheus does. At the heart of ADO.NET is XML; all data is represented in XML format and exchanged that way. Prometheus uses XML via the VB.NET application development environment to translate, verify, and exchange data.

Data needs to be moved from the data store to the DataSet and from there to various components. In ADO.NET, the format for transferring data is XML. Similarly, if data needs to be persisted, into a file for example, it is stored as XML. If you have an XML file, you can use it like any data source and create a DataSet out of it.

In ADO.NET, XML is a fundamental format for data. The ADO.NET data Application Protocol Interfaces (API) automatically create XML files or streams out of information in the DataSet and send them to another component. The second component can invoke similar APIs to read the XML back into a DataSet. The data is not stored in the DataSet as XML—for example, you cannot parse data in a DataSet using an XML parser but instead, in another more efficient format.

Basing data protocols around XML offers a number of advantages: 1) XML is an industry-standard format. This means that your application's data components can exchange data with any other component in any other application, as long as that component understands XML. Many applications are being written to understand XML, which provides an unprecedented level of exchange between disparate applications.

XML is text-based. The XML representation of data uses no binary information, which allows it to be sent via any protocol, such as HTTP. Most firewalls block binary information; however, by formatting information in XML, components can still easily exchange information.

2. SCHEMA DEFINED DATA STRUCTURES

ADO.NET uses XML directly when working with metadata. Here, DataSets are represented as XML. The structure of the DataSet—the definition of what tables, columns, data types, constraints, and so on are in the DataSet—is defined using an XML Schema based on the XML Schema Definition language (XSD). Just as data contained by a DataSet can be loaded from and serialized as XML, the structure of the DataSet can be loaded from and serialized as XML schema.

The ADO.NET DataSet, represented in Figure 21, is a data construct that can contain several relational rowsets, the relations that link those rowsets, and the metadata for each rowset. The DataSet also tracks which fields have changed, stores their new values, original values, and custom information in its Extended Properties collection. The DataSet can be exported to XML or created from an XML document, thus enabling increased interoperability between applications. (MSDN Library)

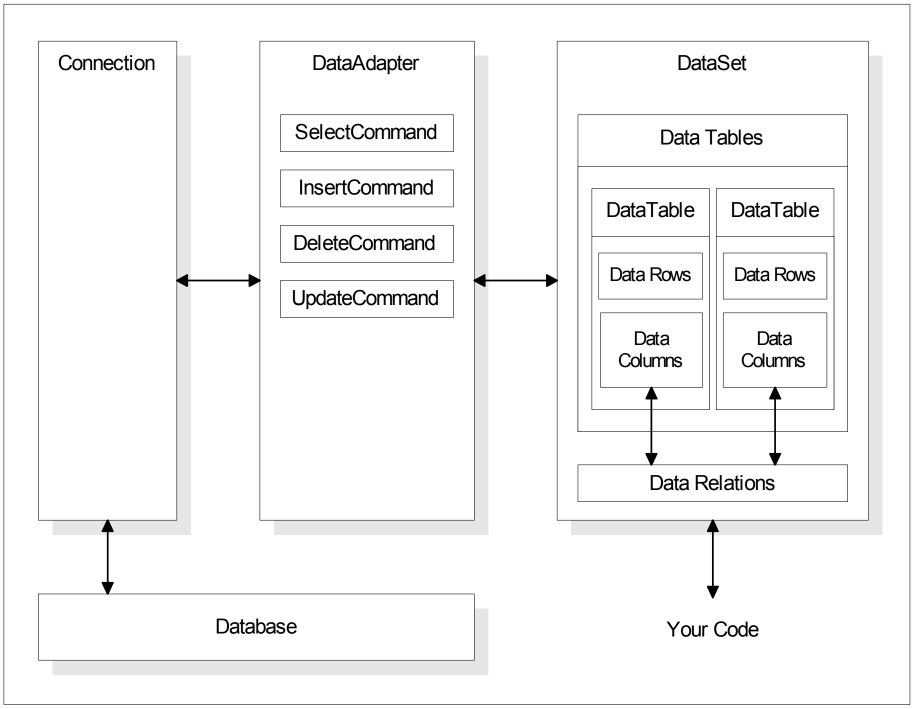


Figure 21. ADO.NET DataSet

3. DATA CACHING IN DATASETS

The most common data task is to retrieve data from the database and do something with it such as display it, process it, or send it to another component. Frequently, the application needs to process not just one record but a set of them: for example, a list of sailors or Billet Sequence Codes (BSC). Often the set of records that the application requires comes from more than one table such as Sailors, Systems, Assigned Aircraft, and other similar sets of related records as referenced in Prometheus. (MSDN Library)

Once these records are retrieved, the application typically works with them as a group. For example, the application might allow the user to browse through all the SAILOR records and examine their assigned BSC for one or more Sailors, then move to the next BSC and reassign a new BSC, and so on. (MSDN Library)

In the domain of Prometheus, it is impractical to go back to the database each time the application needs to process the next record. Doing so would undo much of the advantages gained by minimizing the need for open connections. The Prometheus application therefore, works with a temporary cache of records retrieved from the database and connects to the database only when required.

A DataSet is a cache of records retrieved from a data source. It works like a virtual data store. A DataSet includes one or more tables based on the tables in the actual database, and it can include information about the relationships between those tables and constraints on what data the tables can contain.

Contained in the DataSet is usually a reduced version of what the database contains. However, the DataSet can be worked with in much the same way as the real data. While doing so, the DataSet remains disconnected from the database, which frees it to perform other tasks.

You often need to update data in the database, although not nearly as often as you retrieve data from it. You can perform update operations on the DataSet, and these can be written to the underlying database.

An important point is that the DataSet is a passive container for the data. To retrieve data from the database and write it back, you use data adapters. A data adapter contains one or more data commands used to populate a single table in the DataSet and update the corresponding table in the database. A data adapter typically contains four commands, one each to select, insert, update, and delete rows in the database. Therefore, a data adapter's **Fill** method might execute a SQL statement such as `SELECT SID, LastName, FirstName FROM SAILORS` whenever the method is called.

Because a DataSet is effectively a private copy of the database data, it does not necessarily reflect the current state of the database. If you want to see the latest changes made by other users, you can refresh the DataSet by calling the appropriate **Fill** method.

One of the advantages of using DataSets is that components can exchange them as required. For example, a business object in the middle tier might create and populate a DataSet then send it to another component elsewhere in the application for processing. This DataSet property means that components do require individual queries of the database to retrieve related data. (MSDN Library)

D. PROMETHEUS CORE FUNCTION WALKTHROUGH

1. Import of the AMD and EDVR Text Files

Importing the AMD & EDVR text files via the Import Wizard is the preferred method of updating and maintaining the E-Pro Alpha.mdb database with the most current information available. Figure 22 is an Import Wizard screenshot.

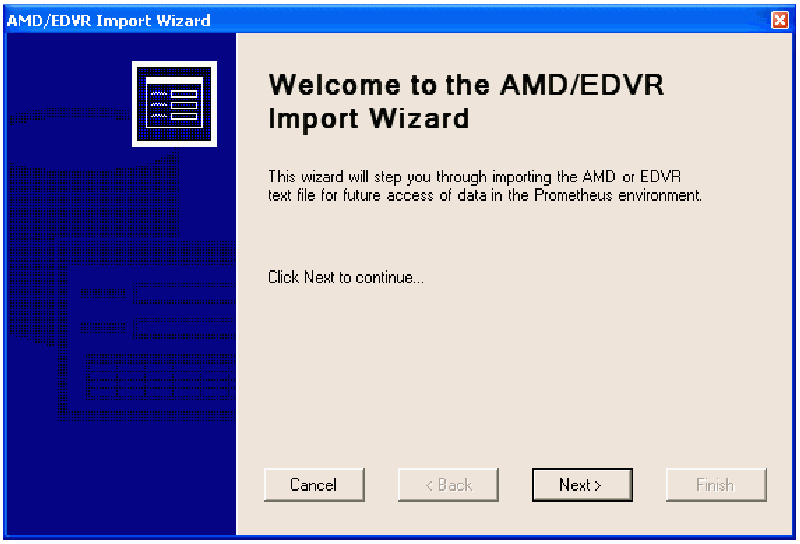
Prometheus can handle multiple imports of the same or dissimilar files. Imported files can be undone during the file verification process and are not permanent until the user has specifically accepted them. Once imported, the user can change properties via many input methods.

The Enlisted Placement Management Center (EPMAC) is the advocate for the distribution of active duty personnel to enhance the manning readiness of surface, submarine, aviation and ashore units. EPMAC provides a self-extractable file, formatted as UIC.exe (i.e. #####.exe). An authorized user of the EPMAC Bulletin Board System

(BBS) must download this file via the WildC.A.T Navigator program. WildC.A.T. Navigator is a simple telnet terminal client used to connect to the EPMAC BBS and transfer requested files to the user.

After the UIC.exe file download, and the user has extracted the AEEDVR.txt file, the following importation example applies.

Step 1. Launch the Import AMD/EDVR Wizard. From the Tools menu, select Import AMD/EDVR. The Import AMD/EDVR Wizard will automatically load with default values selected and display a welcome screen. Click Next > to continue the wizard



Welcome to the AMD/EDVR Import Wizard

This wizard will step you through importing the AMD or EDVR text file for future access of data in the Prometheus environment.

Click Next to continue...

Figure 22. Import Wizard Welcome Screen

Step 2. Choose the type of text file you are importing. Valid choices are the AMD or EDVR text files. Click **Next >** to continue and the import wizard will display the file type selection dialog.

Step 3. When the Verify File Dialog Window opens, the wizard will attempt to locate the file in its default location. For the EDVR file, it looks in the following order:

1. C:\Program Files\PCEDVR\Import\AEEDVRBB.txt
2. %Install Prometheus Directory%\Import\EDVR\AEEDVRBB.txt

3. The last known location where the file was previously opened.

NOTE: If the file is found, the Import Wizard will enable the **Next >** button for you to continue. If the file is NOT found, or you wish to change the location of the file, you **must** select the New Connection button, where you much select a new source file to be imported.

Step 4. Next, you must set up any preferences for importing the file. You will be stepped through two screens. After you have made your choices, click the Finish button to begin importing records.

NOTE: At the end of the wizard, regardless of your choices, you can undo, reject, or accept any additions made to the file prior to saving data to your database.

Step 5. The Import Wizard will import and format EDVR data. When complete, you will be notified and must click the **Next >** button to finish the wizard and load the EDVR Verification Window where you can view, edit, accept or reject the imported records as a group or individually.

The Activity Manning Document (AMD) is the single authoritative source for an activity's statement of manpower requirements (SMR) and manpower authorizations allocated to perform assigned missions. Navy Training and Management Planning System (NTMPS) at Pensacola, Florida provides access to their manpower databases via the Citrix© Independent Computing Architecture (ICA) Client. Prometheus provides a formatted query to be used by an authorized user of the NTMPS database. This file produces the AMD.txt file required for the AMD import wizard. Once the query file is ran on the NTMPS database via Citrix ICA Client, the created query file can be stored locally and imported similarly to the EDVR example.

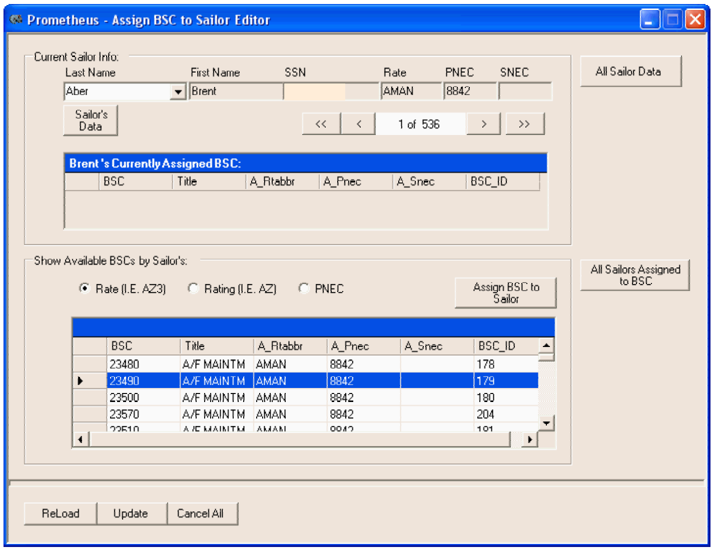
2. Assisted Assignment of the BSC to the Sailor Record

Billet Sequence code assignment is a primary function of the AMO. The Activity Manning Document is the single authoritative source for an activity's Statement of Manpower Requirements (SMR) and manpower authorizations allocated to perform assigned missions. More importantly to users, the AMD houses their command's applicable Billet Sequence Codes (BSC).

The AMD text file must be imported via the Import AMD/EDVR Function prior to assigning BSCs to your personnel. Until a successful import has taken place, the available BSCs will be blank. See how to Import the AMD into Prometheus for more details. Prometheus provides two methods for assigning BSCs to a Sailor.

a. Single Sailor Record Assignment

Figure 23 illustrates the data form provided for assigning a BSC to a single SAILOR record.



Prometheus - Assign BSC to Sailor Editor

Current Sailor Info:

Last Name	First Name	SSN	Rate	PNEC	SNEC
Aber	Brent		AMAN	8842	

1 of 536

Brent 's Currently Assigned BSC:

	BSC	Title	A_Rtabbr	A_Pnec	A_Snec	BSC_ID

Show Available BSCs by Sailor's:

● Rate (I.E. AZ3) ○ Rating (I.E. AZ) ○ PNEC

	BSC	Title	A_Rtabbr	A_Pnec	A_Snec	BSC_ID
	23480	A/F MAINTM	AMAN	8842		178
▶	23490	A/F MAINTM	AMAN	8842		179
	23500	A/F MAINTM	AMAN	8842		180
	23570	A/F MAINTM	AMAN	8842		204
	23510	A/F MAINTM	AMAN	8842		191

Figure 23. BSC Assignment Form

Advantages:

- Simple edit of single record in an easy-to-use interface.
- Records are sorted alphabetically by Last Name.
- Only available BSCs are displayed based on your choice of Rate, Rating, or NEC.
- Assistance tools are made available for your convenience.

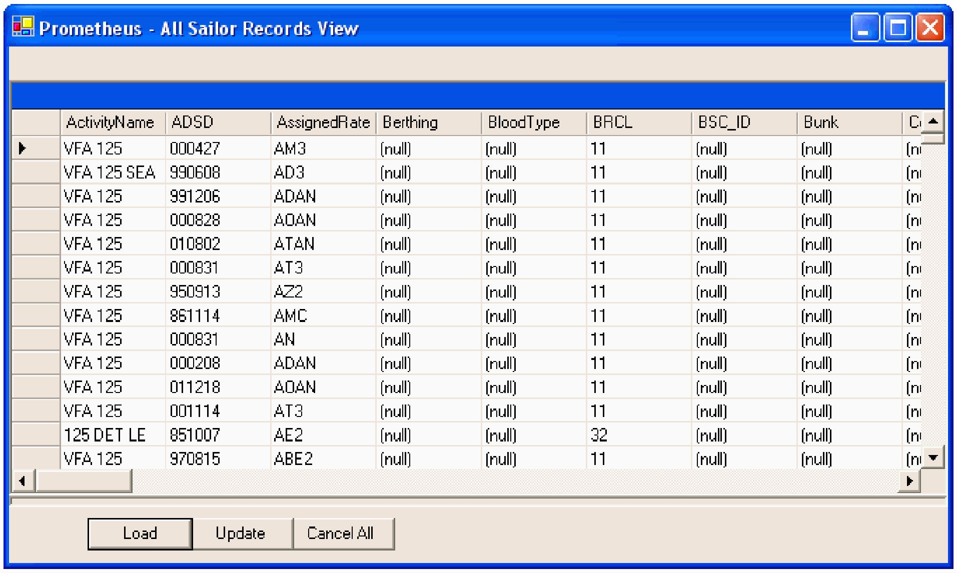
Disadvantages:

- You must assign a BSC to each sailor individually.

- If there are many sailors, you must still assign the BSC individually.

b. *Multiple Sailor Record Assignment*

Figure 24 illustrates the data grid for assigning BSCs to all Sailors.



	ActivityName	ADSD	AssignedRate	Berthing	BloodType	BRCL	BSC_ID	Bunk	C
▶	VFA 125	000427	AM3	(null)	(null)	11	(null)	(null)	(n
	VFA 125 SEA	990608	AD3	(null)	(null)	11	(null)	(null)	(n
	VFA 125	991206	ADAN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	000828	AOAN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	010802	ATAN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	000831	AT3	(null)	(null)	11	(null)	(null)	(n
	VFA 125	950913	AZ2	(null)	(null)	11	(null)	(null)	(n
	VFA 125	861114	AMC	(null)	(null)	11	(null)	(null)	(n
	VFA 125	000831	AN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	000208	ADAN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	011218	AOAN	(null)	(null)	11	(null)	(null)	(n
	VFA 125	001114	AT3	(null)	(null)	11	(null)	(null)	(n
	125 DET LE	851007	AE2	(null)	(null)	32	(null)	(null)	(n
	VFA 125	970815	ABE2	(null)	(null)	11	(null)	(null)	(n

Figure 24. BSC Assignment Data Grid

Advantages:

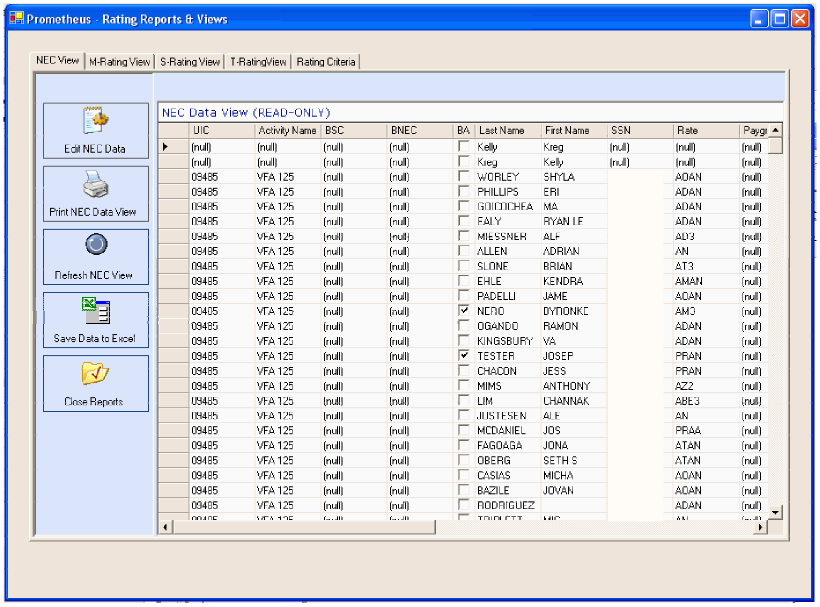
- Edit multiple records at once in an easy-to-use interface.
- Sort multiple records by your own preferences.
- Fast and effective means for editing numerous records at once.

Disadvantages:

- You must assign a BSC_ID (chosen from a list) to each sailor.
- There is no error checking for assigning an unqualified sailor to a particular BSC.

3. NEC Data, M-Rating and T-Rating

Manning Rating (M-Rating) refers to the quantity of personnel Current-On-Board per Billets Assigned (COB/BA). Training Rating (T-Rating) references a sailor's training level and years of experience in their current NEC. Figure 25 illustrates the primary data form used for viewing and printing NEC and rating datum calculations.



NEC Data View (READ-ONLY)

UIC	Activity Name	BSC	BNEC	BA	Last Name	First Name	SSN	Rate	Paygr
(null)	(null)	(null)	(null)	☐	Kelly	Kreg	(null)	(null)	(null)
(null)	(null)	(null)	(null)	☐	Kreg	Kelly	(null)	(null)	(null)
09485	VFA 125	(null)	(null)	☐	WORLEY	SHYLA		AOAN	(null)
09485	VFA 125	(null)	(null)	☐	PHILLIPS	ERI		ADAN	(null)
09485	VFA 125	(null)	(null)	☐	GOICOCHEA	MA		ADAN	(null)
09485	VFA 125	(null)	(null)	☐	EALY	RYAN LE		ADAN	(null)
09485	VFA 125	(null)	(null)	☐	MIESSNER	ALF		AD3	(null)
09485	VFA 125	(null)	(null)	☐	ALLEN	ADRIAN		AN	(null)
09485	VFA 125	(null)	(null)	☐	SLONE	BRIAN		AT3	(null)
09485	VFA 125	(null)	(null)	☐	EHLE	KENDRA		AMAN	(null)
09485	VFA 125	(null)	(null)	☐	PADELLI	JAME		AOAN	(null)
09485	VFA 125	(null)	(null)	☑	NERO	BYRONKE		AM3	(null)
09485	VFA 125	(null)	(null)	☐	OGANDO	RAMON		ADAN	(null)
09485	VFA 125	(null)	(null)	☐	KINGSBURY	VA		ADAN	(null)
09485	VFA 125	(null)	(null)	☑	TESTER	JOSEP		PRAN	(null)
09485	VFA 125	(null)	(null)	☐	CHACON	JESS		PRAN	(null)
09485	VFA 125	(null)	(null)	☐	MIMS	ANTHONY		AZ2	(null)
09485	VFA 125	(null)	(null)	☐	LIM	CHANNAK		ABE3	(null)
09485	VFA 125	(null)	(null)	☐	JUSTESEN	ALE		AN	(null)
09485	VFA 125	(null)	(null)	☐	MCDANIEL	JOS		PRAA	(null)
09485	VFA 125	(null)	(null)	☐	FAGOAGA	JONA		ATAN	(null)
09485	VFA 125	(null)	(null)	☐	OBERG	SETH S		ATAN	(null)
09485	VFA 125	(null)	(null)	☐	CASIAS	MICHA		AOAN	(null)
09485	VFA 125	(null)	(null)	☐	BAZILE	JOVAN		AOAN	(null)
09485	VFA 125	(null)	(null)	☐	RODRIGUEZ			ADAN	(null)
09485	VFA 125	(null)	(null)	☐	TRIPLETT	MIC		AN	(null)

Figure 25. NEC/Rating View/Print Form

The primary data form, *Prometheus – Rating Reports & Views*, incorporates three primary tools for user interaction with the database: Save/Export Data to Excel, Print NEC and Rating Views and Edit NEC Data.

4. M-RATING COMPUTATION

Prometheus accomplishes the M-Rating calculation for a specific activity by evaluating the number of personnel onboard and comparing that information to the authorized billets assigned to that activity. Prometheus provides two options for displaying M-Rating datum calculations: by period (nine-month projection) and by aircraft type. Prometheus uses the following simplified algorithm to accomplish this comparison:

a) Check each record's values for COB and BA (Yes = 1, No = 0) and record these values to a corresponding System and Aircraft type. These values are stored in a 3-dimension array. The 3-dimension array allocates record keeping space for 14 system types, 10 aircraft types, and COB and BA values for each record.

b) Prometheus checks desired output type—by period or by aircraft type. If by period, Prometheus permits only one aircraft type. Prometheus therefore calculates a ten-month projection. Note: these values equate to POB1 through POB9 where the tenth value is the actual COB of today's date. If by aircraft type, Prometheus dimensions each system type to its corresponding aircraft type.

c) Prometheus evaluates the stored values in the 3-dimension array and calculates the M-Rating. Prometheus then inserts these M-Rating calculations into a datagrid object on the M-Rating View tab.

The user initiates the M-Rating and T-Rating calculations when the form is loaded. Note: During testing of the function, only a small fraction of the sailors were assigned BSCs.

5. T-RATING COMPUTATION

The T-Rating computation was not a requirement of the Prometheus application, though we have incorporated it as a potential future program option. The T-Rating computation is average score given to each system of a particular aircraft over a nine-month projection. Each record or sailor's score relates to these current standards: T-1 equates to NEC awarded plus two years of experience; T-2 equates to NEC awarded plus six months of experience; T-3 equates to NEC awarded; T-4 equates to no NEC or incorrect NEC awarded.

E. SUMMARY

Prometheus is a distributed, front-end database client application that utilizes the Microsoft© .NET Framework and Visual Basic .NET to meet its development needs. At the heart of the Prometheus application is ActiveX Data Objects for the .NET Framework (ADO.NET). ADO.NET is a set of classes that expose data access services to the .NET programmer. Utilization of sound, object oriented ADO.NET, and .NET practices will afford the Prometheus application easy portability to a middle-tier business object that can be readily integrated into a professional n-tiered business model.

ADO.NET was designed to meet the needs of this new programming model: disconnected data architecture, tight integration with XML, common data representation with the ability to combine data from multiple and varied data sources, and optimized facilities for interacting with a database, all native to the .NET Framework. (MSDN Library) This chapter outlined the fundamental components and object models of ADO.NET employed in the Prometheus application, as well as give a brief explanation of data-access and data handling through ADO.NET and XML resources within the .NET Framework.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

As a result of this study, we have arrived at conclusive answers to questions presented in Chapter I.

> As circumstances currently stand today, gaining knowledge regarding the status of manpower within an activity is a manual, complex, and cumbersome process. Would it be possible to develop an application that could automatically read and import data from an activity's EDVR and compare it with the standing AMD at various milestone points of a deployment/turnaround cycle to produce a report of overall T-Ratings (a rating based on an individuals training level and years of experience in current Navy Enlisted Classification (NEC) Code) and M-Ratings (a simple Current On Board (COB) per Billets Assigned (BA)) for individuals within the command?

The answer to this question is *yes* as evidenced by the Prometheus application developed in this thesis. By using the EDVR and AMD databases that currently exist, we were able to develop an application that pulls only the data required in completing specific processes and functions. How this development differs from existing applications such as PC-EDVR and NTMPS' electronic AMD is that the user can now combine information from the two reports automatically in order to perform analysis that before had to be processed manually on paper. While the ability to import NEC Award Dates from EPMAC's database was not incorporated in this prototype, it would not be impossible to incorporate such a process. For now, the user will simply have to perform NEC Award Date verification as they had previously done and then input that data to Prometheus in producing T-Rating Calculations.

> If so, can the M-rating for each Type/Model/Series and/or system be computed and evaluated automatically?

We have been able to calculate the M-Rating for the activity by evaluating the quantity of personnel onboard and comparing that information to the billets that have been assigned to that activity. More specifically, two options are given: one by period (nine month projection) and the other by aircraft type.

Next, checks of COB (Y/N) and then the date for EDA/L to see whether the person filling the BSC will be on board in the next nine months are performed. These are called POB1 through POB9. Each gets a one for yes or zero for no. A check of BA for the BSC and a match for the PNEC and the BNEC (of the BSC - from AMD) is made.

A 3-dimension array (two are created here) is created and filled with the accumulative data consisting of the following: fourteen systems, ten aircraft, and two quantities (BA & COB/POB1-9). The results produced are 1) the total number of systems per aircraft and 2) whether they are COB and filling an authorized billet (BA).

The period method simply calculates one aircraft type and all 14 systems, and then evaluates the resulting projection out to 9 months.

> Can a secure web-based interface application be developed for the user to interface with the database via the use of the World Wide Web?

Although not a requirement in the development of this application, with the further expansion and increased use of the Navy-Marine Corps Internet infrastructure, the next logical extension of this development is web-enablement and the potential of being able to perform the same functions done in Prometheus via the Internet. This would add to the real-time functionality of manpower management as well as allow detached or deployed activities to make changes or updates as they occur. For this, minor alterations would be required to the interfaces for the web as well as the incorporation of additional security measures such as encryption and file protection. Firewall issues with Navy Network Operation Centers and base communications would also require investigation.

> Is it possible to use a central, unified database for data input/output, storage, processing and archiving of data to meet manpower management requirements so that the manager can make the best decisions afforded him at any given time?

This issue may be addressed by the establishment of a secure database server to house the manpower data for a group of activities. Issues such as which activities to group, where to locate servers, how long to store activity data and associated maintenance may be addressed through the review and analysis of requirements and needs of the users of the system.

B. RECOMMENDATIONS

1. Follow On Thesis Projects To Include:

a. Multiple Thesis Submissions

To further the study and development of this application as well as applicability to other activities, additional theses on this subject need to be promoted and coordinated. The result of this thesis has been targeted to a very narrow range of function and applications. On a much broader scale, thesis teams could focus on different sub-areas and combine the work into one overarching project. Possible thesis topics that could be researched are conversion of the Navy's flat database file systems to a relational database structure; use of On Line Analytical Processing (OLAP) capabilities; and career assignment, training, and management based on a centralized, multidimensional database. It is not necessary for all research that is conducted to become part of the working project, but this additional research will only add to development of the best solution possible.

b. Adaptation of NEC Award Date Report

The software development process performed in this thesis has been very enlightening, while at the same time humbling. Many of the processes involved were found to demand greater time and effort than originally anticipated—something anyone who has worked on a project understands. The function of NEC Award Date verification simply became a victim of time constraints in this case. Intentions for this matter were to perform similar data imports, as with the EDVR and AMD, then incorporate these data for use in calculations of the T-Rating, thereby eliminating the manual and very time-consuming steps that an AMO currently performs in generating this information. One potential limitation here however, was that we have based our theory on the assumption that a NEC Award Date report would be produced and published by EPMAC Code 49 for each UIC.

2. Changes to Existing Manpower Database Systems

Currently, the development of Prometheus is limited to a client-side application. Ideally, Prometheus should connect to a central database located on the NMCI and poll data remotely. The problem exists where the manpower manager must download his data via legacy software from different, remote data sources. Prometheus is built on a disconnected data model that uses snapshots of data that are isolated from the data source. Through NMCI, Prometheus or similar applications can adopt an N-tier solution where they connect to a central database and query the required data directly from the source. Ultimately, this solution would cut out the disparity and increase reliability of data accuracy and availability.

C. FUTURE ENHANCEMENTS

1. XML-based Web Service Application

We are entering the next phase of application development—a phase enabled by the internet and the concept of web services. A web service is an application that exposes its features programmatically over the internet using standard internet protocols. The move away from complex distributed applications to the creation of power applications that can be used by anyone, anywhere, increases the reach of applications and enables true uninterrupted service to all users. XML-based web services facilitate the idea of tightly coupled, highly productive aspects of N-tier computing with the loosely coupled, message-oriented concepts of the web.

Ideally, the next generation of manpower management tools should embrace the move to internet ready, XML-based web services. This would allow users access at anytime to data resources anywhere connectivity exists.

2. NMCI

The Navy Marine Corps Intranet (NMCI) affords the rare opportunity to enable web-based applications to exist throughout the Department of the Navy. This promises continuity and standardization of Navy business practices, most notably in the scope of this thesis: manpower management. One of the primary concerns when developing the Prometheus project was its straightforward transition to a web-based application. Future generations of manpower management software must be fully supported and administered under the NMCI contract. Under both the NMCI infrastructure and a managed, centralized database, such manpower applications would greatly enhance the productivity of manpower managers and the availability of standardized, fully functional management tools.

3. Security

The current beta release of the Prometheus management software does not address security concerns or requirements. Security of sensitive information is indeed paramount and future releases of manpower management software must recognize and adhere to sound secure software development practices. There are varieties of security resources that must be in today's server-side applications. Future manpower solutions can reduce vulnerabilities only by following good security design practices and properly using security technologies.

It is recommended that the next generation of manpower software exist as a web-based service. As such it is also recommended that the application utilize the Microsoft Web Services Security (WS-Security). Microsoft offers the Web Services Development Kit (WSDK) Technology for implementing security features from within the application. The WSDK sits on top of the Microsoft .NET Framework support for writing and consuming web services. This is the first toolset that implements security within a Simple Object Access Protocol (SOAP) message. By taking advantage of WS-Security for authenticating and signing data (i.e. authentication, integrity verification, and encryption from within the SOAP envelope), the next generation of manpower applications will no longer be tied to strictly using the security capabilities of the underlying transport and be inherently more secure.

Beyond the simple security of information as it is transferred to and from the client, the questions of user authentication and access must also be addressed. The .NET Framework's role-based security features provide a robust solution for implementing role-based security features into future manpower applications. The manpower application should incorporate role-based security features to enforce business policies and data integrity where the management of user access is done separately from the processes of the application itself.

4. Additional Subform Interfaces and Print Functions

Due to the scope of this project and the time constraints involved in development, several promising features were not incorporated into this release of Prometheus. Future releases of Prometheus or other manpower solutions should include the implementation of the following recommendations:

a. Drop down lists that display desired data in a clear and intuitive style. This would help assure precise and accurate data entry, remove confusion as to the proper data format, and assist in simplifying data validation.

b. Print preview for all printable datum and reports.

c. Email function for electronic submission of reports and datum.

d. Future versions of Prometheus should incorporate a wider range of reports and forms for every user category across the Department of the Navy. As beta testing evolves, feedback from manpower managers will be essential to developing a robust and useful application that can meet the needs of a range of end users.

D. PROTOTYPE DEMONSTRATION

On 11 September 2002, the Prometheus manpower management application was demonstrated at Commander Strike Fighter Wing Pacific, Naval Air Station Lemoore, CA. The Wing Assistant Maintenance Officer (N42A), Wing Manpower Manager (N13A), and three squadron AMO's, LT Bob Henley, LT Allen Ford and CWO Derrick Franckowiak graciously volunteered time to view the developed application and provide us with feedback. As a result of this demonstration, areas for added functionality were noted. Specifically, implementation of a BA to COB and BA to NMP comparison in order to calculate manning levels would be greatly increase the application's value. Additional comments received were positive and supportive of further study and development of this type of application.

E. SUMMARY

Manpower management within all activities of the United States Navy has traditionally been an extremely challenging function. Careful, crucial reconciliation of manpower reports such as the EDVR and the AMD are a critical event in the proper execution of such a process. Unfortunately, an automated process where such a manual, regularly occurring, time consuming, error prone, man-hour intensive routine is performed does not currently exist. Specifically, in the area of Capability Ratings, Manning, Training, Equipment and Supplies, an activity should be able to extract a prescribed range of data from their EDVR and AMD. Then have it automatically calculate the T-Rating for each individual at various milestone points of a deployment turnaround cycle and produce a report of an overall T-Rating and M-Rating as required by the Functional/Type Wing Commander. This thesis is an attempt to address these issues. The feasibility and requirements for such an automated software application have been proven. The application developed in this thesis has been able to achieve successfully, reconciliation of the EDVR and AMD within a single processing environment. While Prometheus is only a prototype, it illustrates that a solution to the manpower management problem of complexity and disintegrated databases exists and should be further developed on a much larger scale for all aviation squadrons as well as all activities within the Navy.

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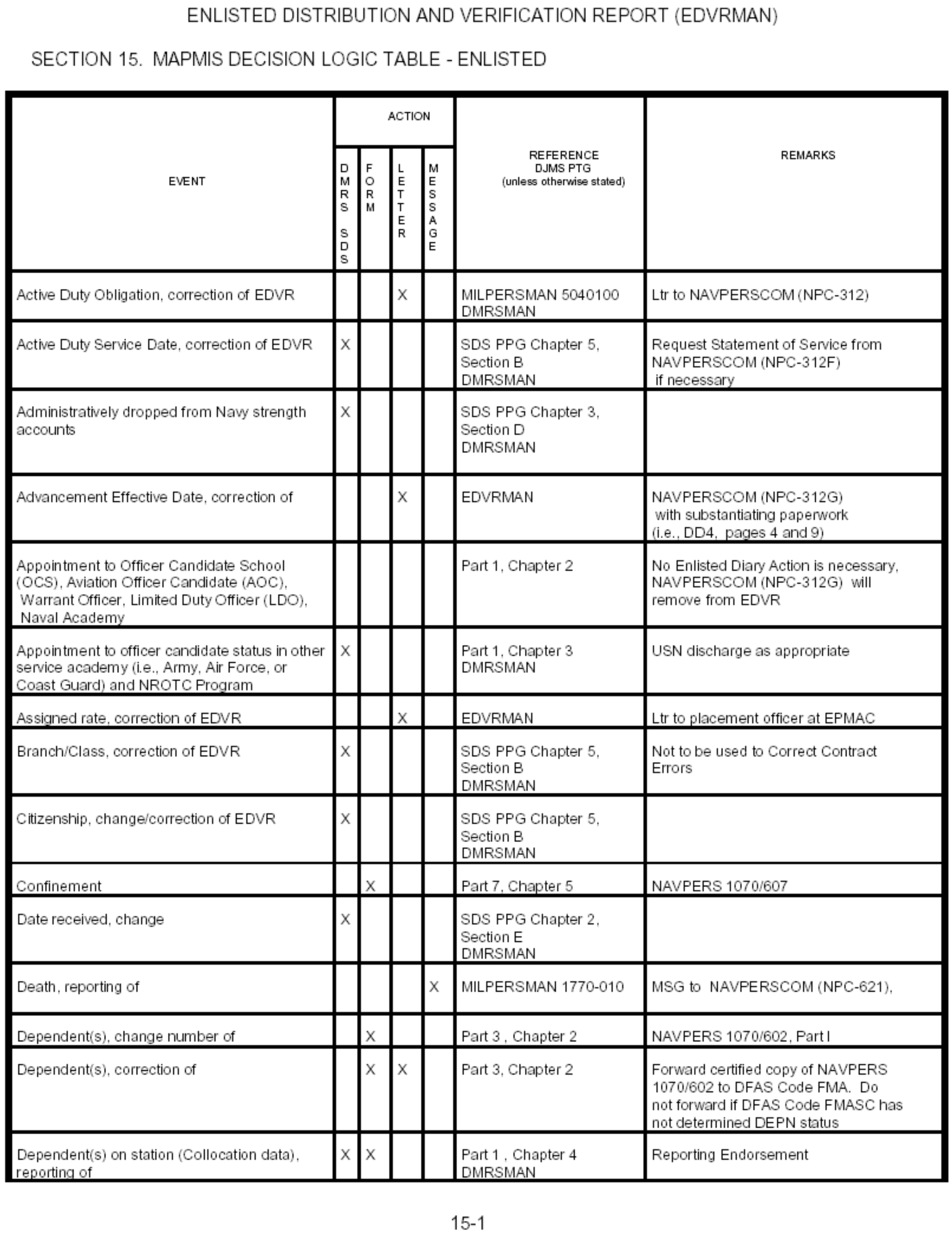
APPENDIX A MAPMIS DECISION LOGIC TABLE



ENLISTED DISTRIBUTION AND VERIFICATION REPORT (EDVRMAN)

SECTION 15. MAPMIS DECISION LOGIC TABLE - ENLISTED

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Active Duty Obligation, correction of EDVR			X		MILPERSMAN 5040100 DMRSMAN	Ltr to NAVPERSCOM (NPC-312)
Active Duty Service Date, correction of EDVR	X				SDS PPG Chapter 5, Section B DMRSMAN	Request Statement of Service from NAVPERSCOM (NPC-312F) if necessary
Administratively dropped from Navy strength accounts	X				SDS PPG Chapter 3, Section D DMRSMAN	
Advancement Effective Date, correction of			X		EDVRMAN	NAVPERSCOM (NPC-312G) with substantiating paperwork (i.e., DD4, pages 4 and 9)
Appointment to Officer Candidate School (OCS), Aviation Officer Candidate (AOC), Warrant Officer, Limited Duty Officer (LDO), Naval Academy					Part 1, Chapter 2	No Enlisted Diary Action is necessary, NAVPERSCOM (NPC-312G) will remove from EDVR
Appointment to officer candidate status in other service academy (i.e., Army, Air Force, or Coast Guard) and NROTC Program	X				Part 1, Chapter 3 DMRSMAN	USN discharge as appropriate
Assigned rate, correction of EDVR			X		EDVRMAN	Ltr to placement officer at EPMAC
Branch/Class, correction of EDVR	X				SDS PPG Chapter 5, Section B DMRSMAN	Not to be used to Correct Contract Errors
Citizenship, change/correction of EDVR	X				SDS PPG Chapter 5, Section B DMRSMAN	
Confinement		X			Part 7, Chapter 5	NAVPERS 1070/607
Date received, change	X				SDS PPG Chapter 2, Section E DMRSMAN	
Death, reporting of				X	MILPERSMAN 1770-010	MSG to NAVPERSCOM (NPC-621),
Dependent(s), change number of		X			Part 3 , Chapter 2	NAVPERS 1070/602, Part I
Dependent(s), correction of		X	X		Part 3, Chapter 2	Forward certified copy of NAVPERS 1070/602 to DFAS Code FMA. Do not forward if DFAS Code FMASC has not determined DEPN status
Dependent(s) on station (Collocation data), reporting of	X	X			Part 1 , Chapter 4 DMRSMAN	Reporting Endorsement

15-1

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Dependent(s) on station (Collocation data), change number of	X				SDS PPG Chapter 5, Section B DMRSMAN	
Deserter, reporting of		X		X	MILPERSMAN 1600-060 (Also refer to Part 1, Chapter 2 for items required to be reported on NAVPERS 1070/606 in connection with Desertion)	MSG to NACIC Great Lakes, IL, info copy to NAVPERSCOM (NPC-842), DFAS and EPMAC.
Deserter, return of		X		X	MILPERSMAN 1600-050	MSG to NACIC Great Lakes, IL, info copy to NAVPERSCOM (NPC-842), DFAS and EPMAC . NAVPERS 1070/606, 1070/607
Designator, change	X				SDS PPG Chapter 5, Section B DMRSMAN	
Diary corrections, general	X				SDS PPG Chapter 5, Section B DMRSMAN	
Discharge	X	X			Part 1, Chapter 3 DMRSMAN	Detaching Endorsement
Distribution NEC, change	X		X		EDVRMAN DMRSMAN	DMRS transaction to EPMAC or complete NEC Discrepancy Report
Duty Status, change	X				SDS PPG Chapter 5 , Section B DMRSMAN	Use TAC 376 to change ACC 3XX to 1XX/3XX or 105 to 381 or 1XX to 393. Use TAC CHACC for all other ACC changes.
Education level, change	X				SDS PPG Chapter 5, Section C DMRSMAN	
Ethnic Group Designator, correction of	X				SDS PPG Chapter 5, Section B DMRSMAN	
Exceptional Family Member			X		OPNAVINST 1754.2	Submit ltr to NAVPERSCOM (NPC-662F) to remove from the EFM program. Submit documents per the OPNAVINST 1754.2 for enrollment in the program.
Extension of Enlistment (USN) (Execute)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/621 to NAVPERSCOM (NPC-312G)
Extension of Enlistment (EREN) (USNR) (Execute)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/621 to NAVPERSCOM (NPC-312G)
Extension of Reserve Active Duty Obligation (RAD0) (USNR) (EXECUTE)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/622 to NAVPERSCOM (NPC-312G)

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Extension of Enlistment (USN) (Becomes operative)	X				Part 1, Chapter 2 DMRSMAN	
Extension of Enlistment (EREN) (USNR) (Becomes operative)	X				Part 1, Chapter 2 DMRSMAN	
Extension of Reserve Active Duty Obligation (RADO) (USNR) (Becomes operative)	X				Part 1, Chapter 2 DMRSMAN	
Extension of Enlistment (USN) (Cancelled)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/621 to NAVPERSCOM (NPC-312G)
Extension of Enlistment (EREN) (USNR) (Cancelled)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/621 to NAVPERSCOM (NPC-312G)
Extension of Reserve Active Duty Obligation (RADO) (USNR) (Cancelled)	X				Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/622 to NAVPERSCOM (NPC-312G)
Failed to Report for Duty or Temporary Duty	X				SDS PPG Chapter 2, Section D DMRSMAN	Comply with MILPERSMAN 1600-040 and TRANSMAN 24.06 prior to submitting failed to report transaction
Foreign Language Proficiency Data, reporting of	X				SDS PPG Chapter 5, Section C DMRSMAN	
FORMAN, reporting or correction of	X				SDS PPG Chapter 4, Section F DMRSMAN	
Gain (diary), correction of	X				Part 1, Chapter 4 DMRSMAN	
Gain (diary) - Erroneous or duplicate, cancellation of	X				SDS PPG Chapter 2, Section D DMRSMAN	
GI Bill election, correction	X				SDS PPG Chapter 5, Section C DMRSMAN	
High Year Tenure, waiver of			X		OPNAVINST 1160.5 Series	Ltr to NAVPERSCOM (NPC-814C)
Limited Duty Designator, charge			X		MILPERSMAN 1306-020	Ltr to NAVPERSCOM (NPC 821)
Loss (diary), correction of	X				Part 1, Chapter 4 SDS PPG Chapter 3, Section E DMRSMAN	
Loss (diary) - Erroneous or duplicate, cancellation of	X				Part 1, Chapter 4 DMRSMAN	
Lost Time Adjustment (UA)		X			Part 1, Chapter 2	NAVPERS 1070/606
Lost Time Adjustment (Confinement)		X			Part 7, Chapter 5	NAVPERS 1070/607

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Military Spouse Data, reporting of	X				SDS PPG Chapter 5 Section C DMRSMAN	
Miscellaneous change (diary), correction of	X				SDS PPG Chapter 5, Section B DMRSMAN	
Missing (in action, etc)	X			X	MILSPERSMAN 1770-020 SDS PPG Chapter 3, Section D DMRSMAN	
Missing, return from	X			X	DMRSMAN MILPERSMAN 1770-020	New gain transaction Message to NAVPERSCOM (NPC-621)
Name, change			X		MILPERSMAN 1000-130	Ltr to NAVPERSCOM (NPC-312F)
Name, correction of EDVR	X				SDS PPG Chapter 5, Section B DMRSMAN	
NEC, change (including Tertiary, Quaternary, Quinary)			X		NAVPERS 18068F, Section I EDVRMAN	NAVPERS 1221/1 or complete NEC Discrepancy Report
NEC (OA-DG), change	X				SDS PPG Chapter 5, Section B DMRSMAN	
Overseas Accession Gain	X				Part 1, Chapter 1 DMRSMAN	
Pay Entry Base Date, correction of	X				SDS PPG Chapter 5, Section B DMRSMAN	For lost time use NAVPERS 1070/606, NAVPERS 1070/607. Request Statement of Service from NAVPERSCOM (NPC-312E) if necessary.
Projected Rotation Date, change			X		ENLTRANSMAN 3.06	Ltr to Assignment Control Authority
Race/Population Group Code, change	X				SDS PPG Chapter 5, Section B DMRSMAN	
Rate, administrative reduction or restoration of	X				SDS PPG Chapter 5, Section B DMRSMAN	
Rate, advancement in	X				Part 1, Chapter 2 DMRSMAN	E-1 to E-2 advancement (if the projected advancement is not reflecting on LES); E-2 to E-3 advancements and advancements other than those authorized by NETPDTC
Rate, advancement declined				X	BUPERSINST 1430.16 Series	MSG to NETPDTC

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Rate, advancement recommendation withdrawn				X	BUPERSINST 1430.16 Series	If prior to exam results send MSG to NETPDTC. If after exam results, send MSG to NAVPERSCOM (NPC 852 / 862). Info copy to NETPDTC and DFAS.
Rate, advancement withheld				X	BUPERSINST 1430.16 Series	Send MSG to NAVPERSCOM (NPC-852/862). Info copy to NETPDTC and DEFAS
Rate, reduction (disciplinary action)		X			Part 7, Chapter 5	NAVPERS 1070/607
Recalled to active duty (Voluntary/Involuntary)	X				Part 1, Chapter 1 DMRSMAN	Submit NAVPERS 1070/601 to NAVPERSCOM (NPC-312G)
Received at TAD point	X				SDS PPG, Chapter 2, Section D DMRSMAN	Prepare Reporting Endorsement if member has pay record in possession. If reporting onboard toaugment normal manning submit an ATAD transaction.
Received onboard for duty	X	X			Part 1, Chapter 4 DMRSMAN	Reporting Endorsement
Received onboard for temporary duty	X	X			Part 1, Chapter 4 DMRSMAN	Reporting Endorsement
Reenlistment, immediate	X	X			Part 1, Chapter 2 DMRSMAN	Submit NAVPERS 1070/601 to NAVPERSCOM (NPC-312G)
Released to inactive duty	X	X			Part 1, Chapter 3 DMRSMAN	Detaching Endorsement
Reservist first reports for extended active duty	X	X			Part 1, Chapter 1 DMRSMAN	Reporting Endorsement Submit NAVPERS 1070/622 to NAVPERSCOM (NPC-312)
Reservist reports for AT (Formerly known as ACDUTRA)						No MAPMIS action
Reservist first reports for Active Duty for Special Work (ADSW)	X	X			Part 1, Chapter 1 DMRSMAN	Reporting Endorsement Submit NAVPERS 1070/622 to NAVPERSCOM (NPC-313)
Retained Beyond EAOS (Involuntary Extension by SECNAV)	X				Part 1, Chapter 2 MILPERSMAN 1050155	No MAPMIS action. NAVPERSCOM will notify DFAS.
Retained Beyond EAOS (for Convenience of Government and for essential service)		X			Part 1, Chapter 2 MILPERSMAN 1050155	Military Pay Order, NAVPERS 1070/613
Return to active duty or cancellation of an administrative drop from Navy strength accounts	X				SDS PPG Chapter 2, Section D DMRSMAN	
Sea Duty Commencement Date, change			X		ENLTRANSMAN 3.101	Ltr to NAVPERSCOM (NPC-451D)

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Security data, change		X	X		EDVRMAN	Forward OPNAVINST 5510/413, Personnel Security Action Request, to Director, Department of the Navy Central Adjudication Facility (DON CAF) with a copy of current OPNAV 5520/20, Certificate of Personnel Security Investigation, Clearance and Access to correct security data.
Sex code, correction of EDVR	X				SDS PPG Chapter 5, Section B DMRSMAN	
Shore Duty Commencement Date, change			X		ENLTRANSMAN 3.162	Ltr to NAVPERSCOM (NPC-451D)
SSN, change			X		MILPERSMAN 1000-060	Ltr to NAVPERSCOM (NPC-324F)
SSN, correction of EDVR			X		EDVRMAN	Submit SSN correction to NAVPERSCOM (NPC-312F) along with a certified copy of social security card issued by Social Security Administration.
Special category code, change			X		ENLTRANSMAN 24	Ltr to NRPC Code 30 or appropriate NAVPERSCOM Code
Special Duty Assignment Pay or change	X				Part 1, Chapter 8 DMRSMAN	
Special Program Indicator (SPI)			X		EDVRMAN	Ltr to NAVPERSCOM (NPC-913) (TAR) Ltr to NAVPERSCOM (NPC-4010) (ADSW)
Submarine service, change type of	X				SDS PPG Chapter 5, Section B DMRSMAN	
Terminated appointment as an officer or officer candidate as NAVCAD, AOC, OC, Naval Academy MIDN, NROTC or OCAR					Part 1, Chapter 2	No MAPMIS action. NAVPERSCOM will gain member on EDVR
Terminated appointment as a temporary officer or officer candidate in the Army, Air Force, or Coast Guard Academies and reverted to enlisted status.	X				Part 1, Chapter 2 DMRSMAN	
Time in Rate, correction of			X		EDVRMAN	Ltr to NAVPERSCOM (NPC-312G) with substantiating paperwork (i.e., DD4, pages 4 and 9)
Transferred from TAD Point	X	X			Part 1, Chapter 4 DMRSMAN	Prepare Detaching Endorsement if member has pay record in possession. If member was onboard toaugment normal manning submit a DTAD transaction.
Transferred PCS or TEMDU	X	X			Part 1, Chapter 4	

EVENT	ACTION				REFERENCE DJMS PTG (unless otherwise stated)	REMARKS
	DMRS SDS	FORM	LETTER	MESSAGE		
Transferred to Fleet Reserve or Retired List	X	X			Part 1, Chapter 3 DMRSMAN	Detaching Endorsement
Unauthorized Absence		X			Part 1, Chapter 2	NAVPERS 1070/606
Watch Qualifications; establishment, change, or removal of	X				DMRSMAN	

When in doubt, forward copy of all related documents with letter explaining MAPMIS problem to:

1) NAVPERSCOM (NPC-3) for all pay-related items.
2) NAVPERSCOM (NPC-4) for distribution related items

Note: This Decision Logic Table includes transactions/events that affect MAPMIS data not listed on the EDVR.

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APPENDIX B COMMON ASSOCIATIONS LIST

Category	Examples
A is a physical part of B	Memory-Computer
A is a logical part of B	T-RatingSpecification-Report T-RatingSpecification-Report Squadron-AirWing EDVRFileItem-EDVR/EDVRUpdate AMDFileItem-AMD(NTMPS)/AMD NECAwardDateItem-NITRAS ManpowerDatabase-AMO'sDatabase Report-T-RatingCalculations EDVRReceipt-EDVRUpdate EDVRUpdate-EDVR T-RatingCalculations-EDVR T-RatingCalculations-AMD T-RatingCalculations-NECAwardDate AMDVerification-EDVRUpdate AMDVerification-AMD AMDVerification-T-RatingCalculations NECDateVerification-T-RatingCalculations NECDateVerification-EDVRUpdate FileArchival-EDVRUpdate Notification-EDVRUpdate Notification-T-RatingCalculations ReportGeneration-T-RatingCalculation OutputForwarding-T-RatingCalculations T-RatePolicy-T-RateCalculations

Category	Examples
	NECCatalog-NECManual WorkCenterCatalog-AMOsDatabase AreaCatalog-AMOsDatabase
A is physically contained in/on B	Computer-WingMOsOffice Report-Computer T-RatingSpecification-Computer T-RatingDescription-Computer
A is logically contained in B	T-RatingSpecification-T-RatePolicy T-RatingDescription-T-RatePolicy Squadron-AirWing EDVRFileItem-EDVR AMDFileItem-AMD NECAwardDate-NITRAS(or NTMPS) ManpowerDatabase-WingMOsDatabase ManpowerDatabase-AMO'sDatabase Report-T-RatingCalculations PC-EDVR-Computer WingMO-AirWing EDVRUpdate-File(or EDVR) NECDateVerfication-T-RatingCalcuations AMDVerification-T-RatingCalculations T-RatingCalculations-ReportGeneration NECCatalog-AMOsDatabase WorkCenterCatalog-AMOsDatabase AreaCalculation-AMOsDatabase AMOsDatabase-Computer WingMOsDatabase-Computer

Category	Examples
	NECDescription-NECCatalog WorkcenterDescripti-WorkcenterCatalog AreaDescription-AreaCatalog
A is a description for B	NECDescription-NEC WorkcenterDescription-Workcenter AreaDescription-Area
A is a line item of a transaction or report B	T-RatingCalculations-Report EDVRFileItem-EDVR AMDFileItem-AMO NECAwardDateItem-NITRAS(or NTMPS)
A is known/logged/recorded/reported/captured in B	Report-ReportGeneration T-RatingSpecification-R-RatePolicy T-RatingDescription-T-RatePolicy EDVRFileItem-EDVR EDVRFileItem-EDVRUpdate EDVRFileItem-T-RatingCalculations EDVRFileItem-ReportGeneration EDVRFileItem-Report EDVRFileItem-AMOsDatabase AMDFileItem-AMD AMDFileItem-AMDVerification AMDFileItem-T-RatingCalculations AMDFileItem-T-RatingCalculations AMDFileItem-ReportGeneration AMDFileItem-Report AMDFileItem-AMOsDatabase NECAwardDate-NITRAS(or NTMPS)

Category	Examples
	NECAwardDate-AMOsDatabase NECAwardDate-EPMAC NECAwardDate-PersDiv(ServiceRecord) NECAwardDate-T-Rating Calculations NECAwardDate-NECDateVerification NECAwardDate-ReportGeneration NECAwardDate-OutputForwarding
A is a member of B	AMO-Squadron WingMO-AirWing
A is an organizational sub-unit of B	Squadron-AirWing PersonnelDivision-Squadron MaintenanceDept-Squadron
A uses or manages B	AMO-AMO’sDatabase AMO-EDVR AMO-AMD AMO-NECAwardDate AMO-Computer AMO-Report AMO-EDVRFileItem AMO-AMDFileItem AMO-ManpowerDatabase AMO-PC-EDVR AMO-EDVRReceipt AMO-EDVRUpdate AMO-T-RatingCalculations AMO-AMDVerification AMO-NECDateVerification AMO-FileArchival

Category	Examples
	AMO-Notification AMO-ReportGeneration AMO-OutputForwarding AMO-T-RatePolicy AMO-WorkCenterCatalog AMO-CSEC AMO-EDVRUsersManual WingMO-Computer WingMO-Report WingMO-T-RatePolicy WingMO-AMO WingMO-ManpowerDatabase WingMO-Notification WingMO-OutputForwarding WingMO-WingMOsDatabase
A communicates with B	AMO-WingMO AMO-PersonnelDivision AMO-ManpowerDatabase AMO-WingMOsOffice AMO-EPMAC AMO-MaintenanceDepartment AMO-NTMPS(in Pensacola) WingMO-AirWing WingMO-Squadron WingMO-WingMOsOffice WingMO-ManpowerDatabase
A is related to transaction	WingMO-Report WingMO-Notification

Category	Examples
	AMO-ReportGeneration AMO-EDVRReceipt AMO-EDVRUpdate AMO-Report AMO-T-RatingCalculations AMO-AMDVerification AMO-NECDateVerification AMO-FileArchival AMO-Notification AMO-OutputForwarding
A is a transaction related to another transaction B	EDVRReceipt-EDVRUpdate T-RatingCalculations-EDVRUpdate T-RatingCalculations-AMDVerification T-RatingCalculations-NECDateVerification FileArchival-EDVRUpdate Notification-EDVRUpdate Notification-AMDVerification Notification-NECDateVerification Notification-T-RatingCalculations Notification-ReportGeneration Notification-OutputForwarding Notification-EDVRReceipt
A is next to B	AMO-Computer AMO-ManpowerDatabase AMO-PC-EDVR AMO-PersonnelDivision AMO-EDVR

Category	Examples
	AMO-AMD AMO-OPNAV1000.16 AMO-EDVRUsersManual AMO-CSEC AMO-NECManual WingMO-AirWing WingMO-Computer WingMO-ManpowerDatabase WingMO-OPNAV1000.16 Squadron-Squadron
A is owned by B	Report-AMO Squadron-AirWing PC-EDVR-EPMAC PersonnelDivision-Squadron MaintenanceDepartment-Squadron ReportGeneration-AMO OutputForwarding-AMO T-RatePolicy-WingMO EDVR-EPMAC AMD-NTMPS NITRAS-NTMPS ManpowerDatabase-AMO ManpowerDatabase-WingMO

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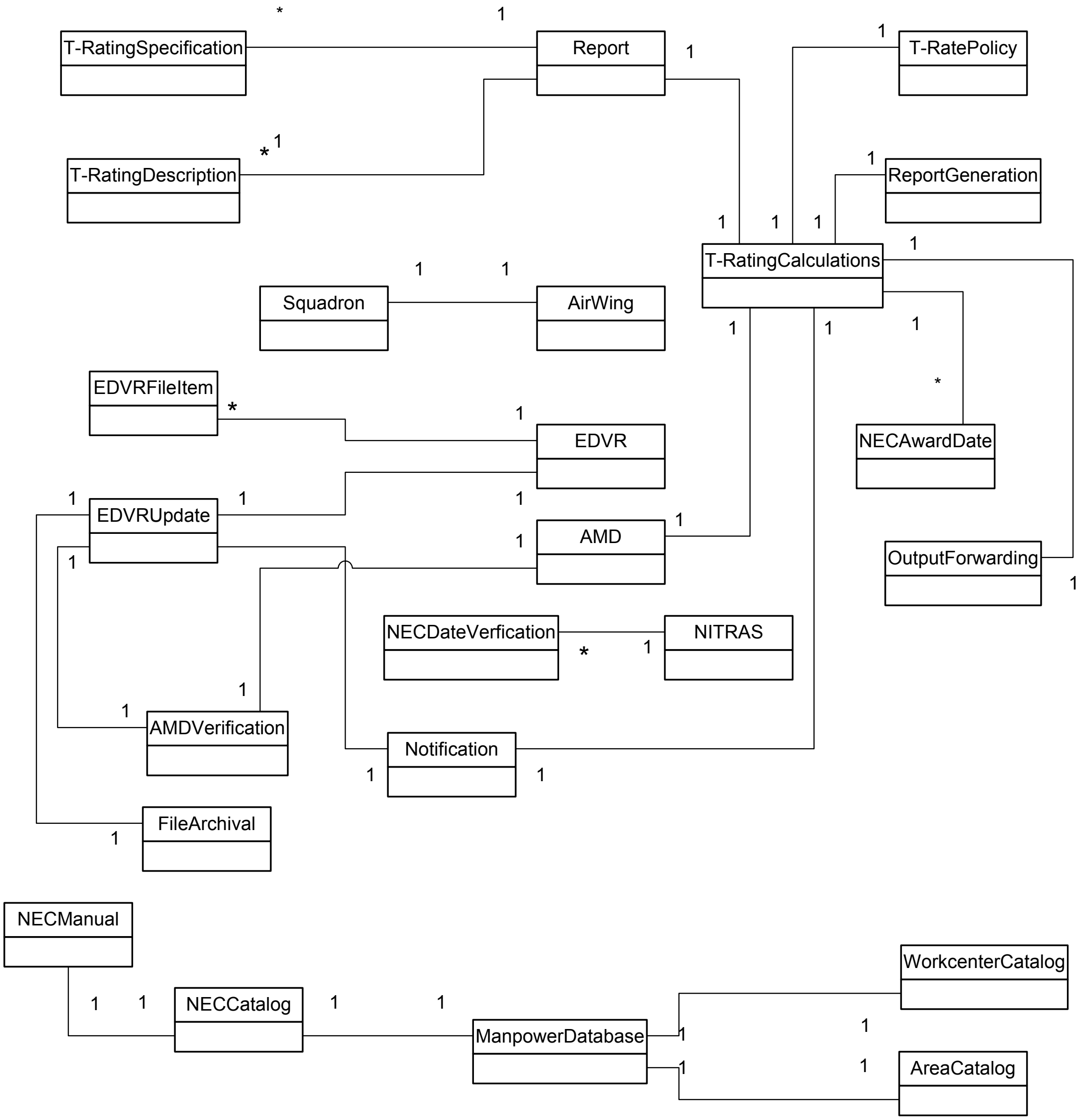
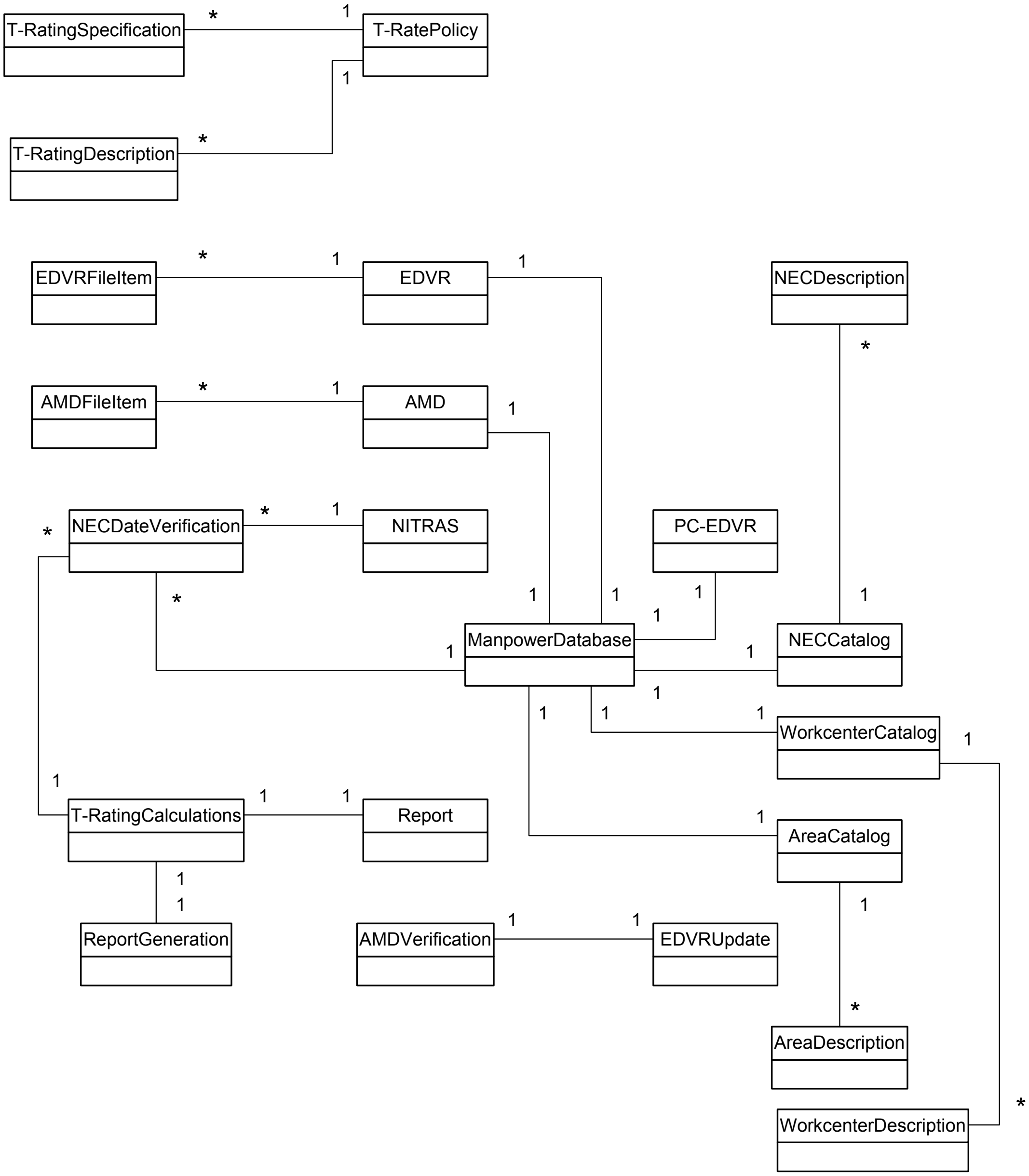
APPENDIX C CONCEPT ASSOCIATION DIAGRAMS

A is a Logical Part of B



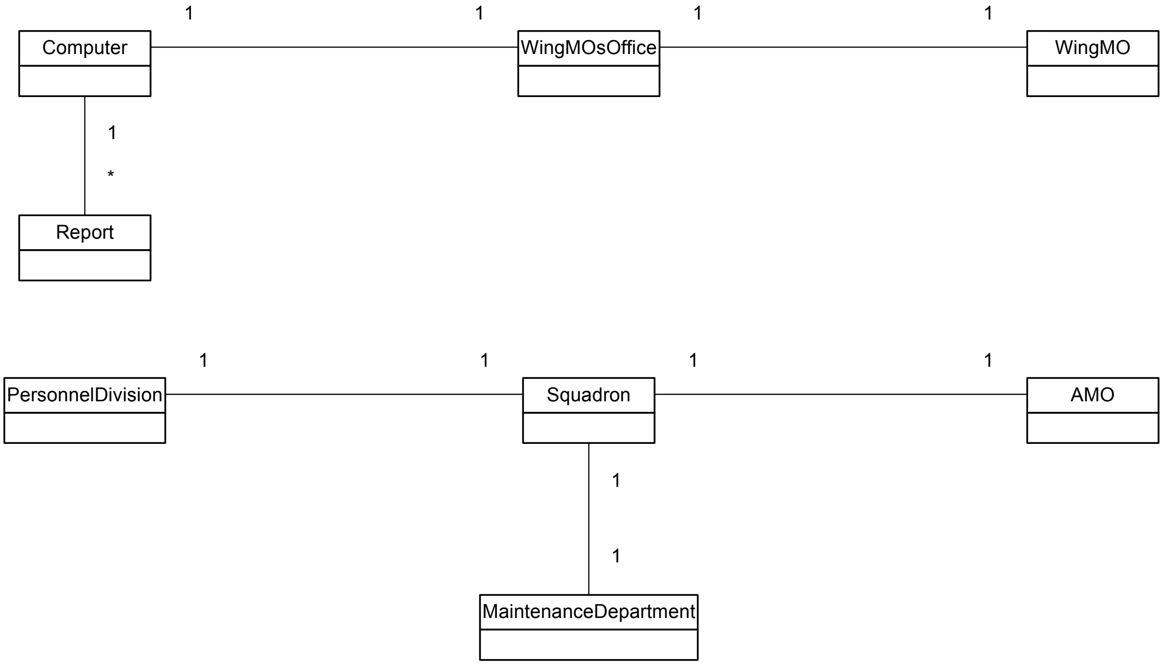
"Contained-in"

A is Logically Contained in B



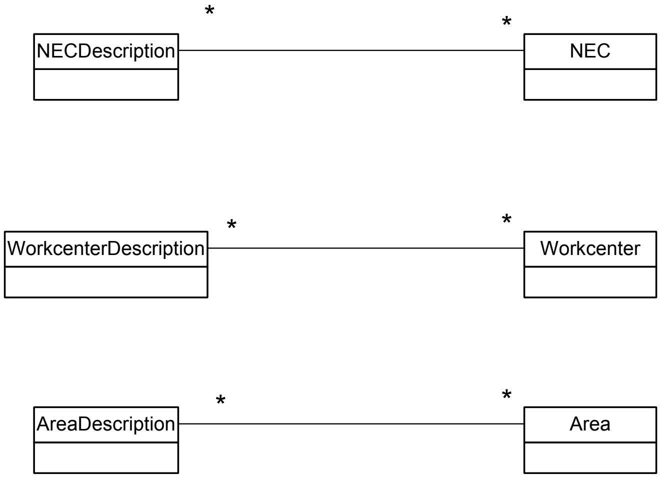
"Logically-in"

A is Physically Contained in B



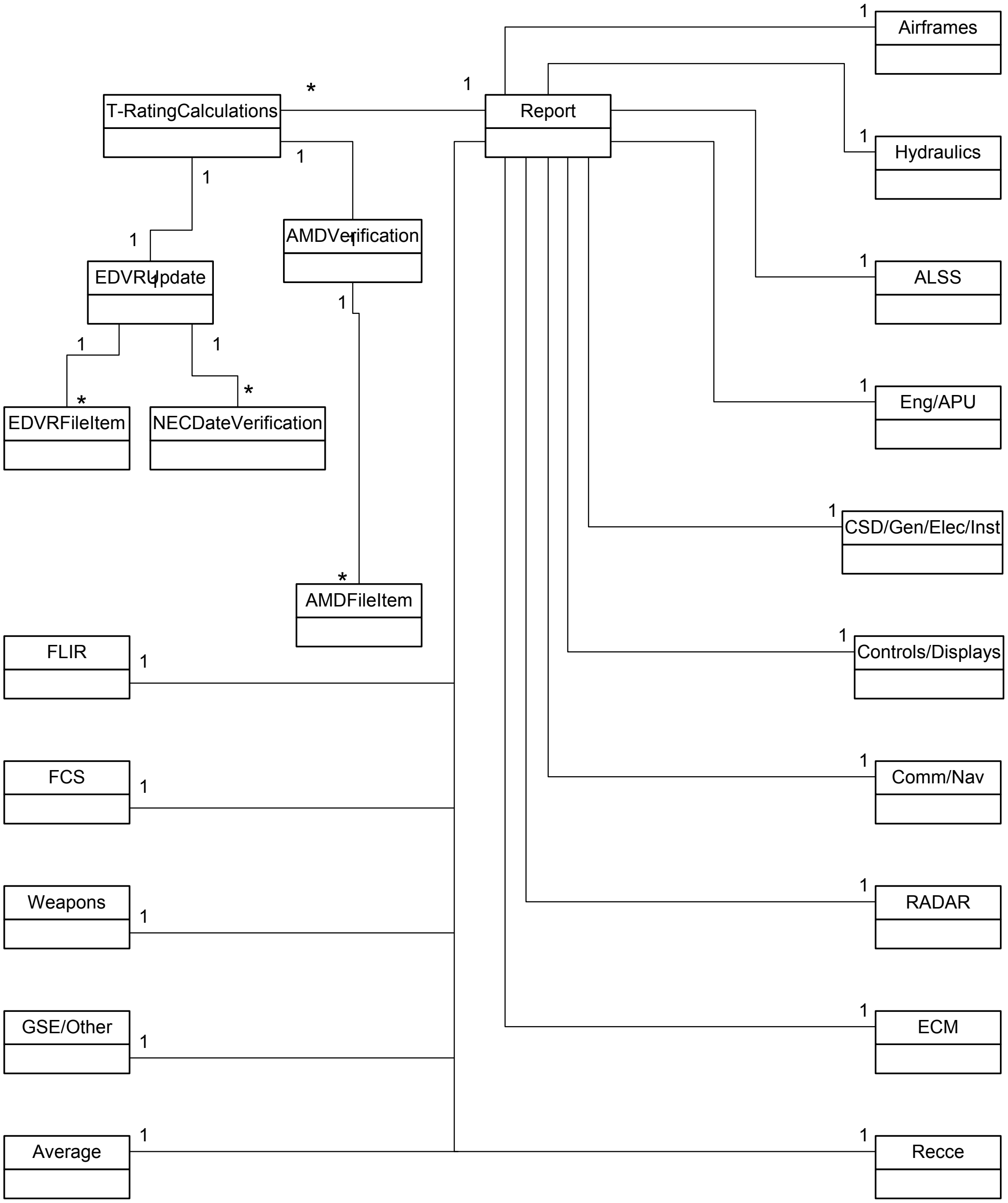
"Housed-in"

A is a Description For B



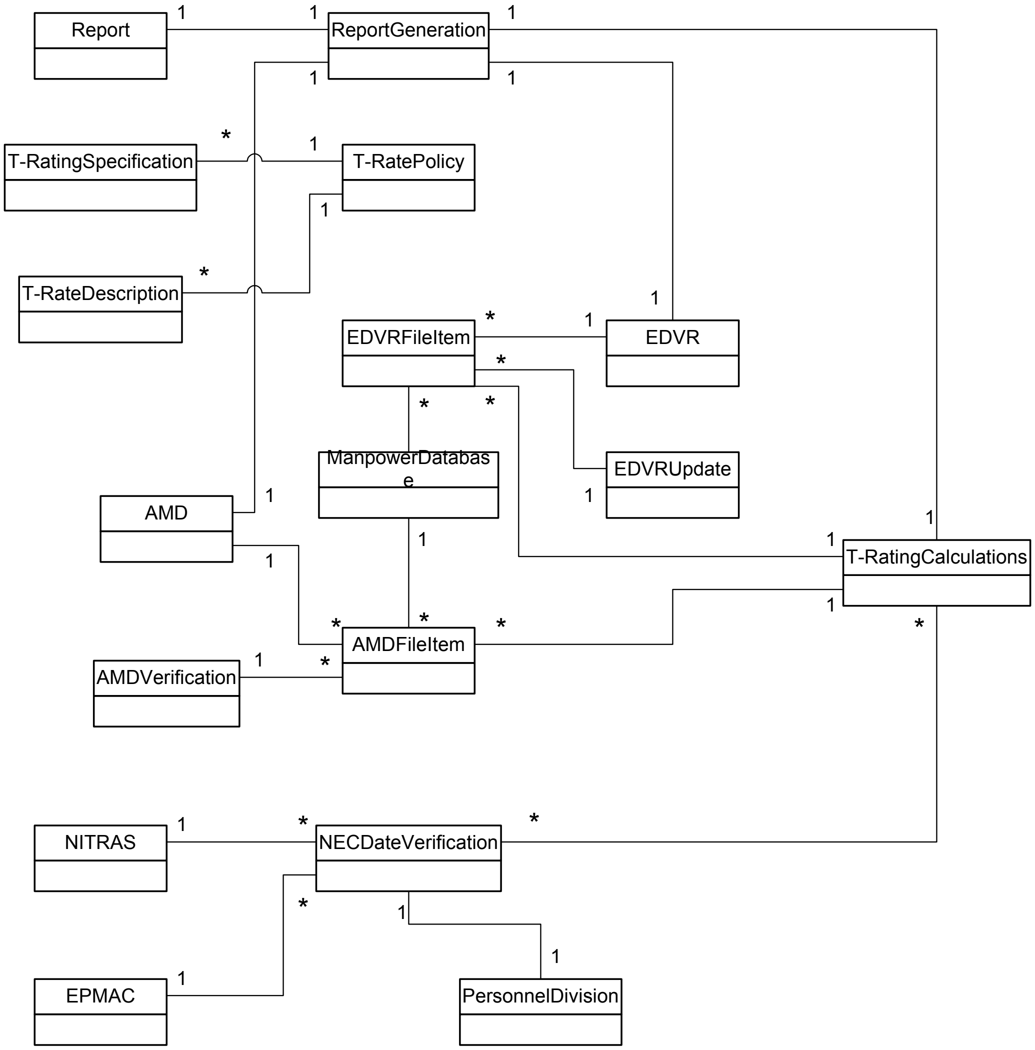
"Describes"

A is a Line Item of Transaction or Report B



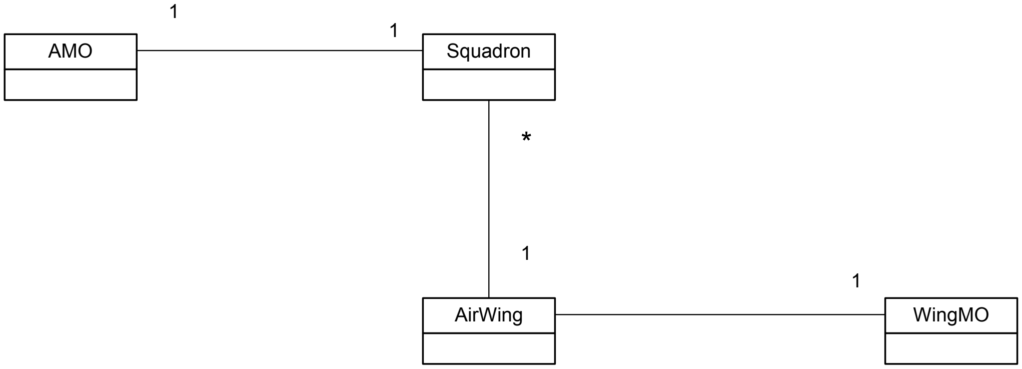
"Contained-in"

A is Known/Logged/Recorded/ Reported/Captured in B



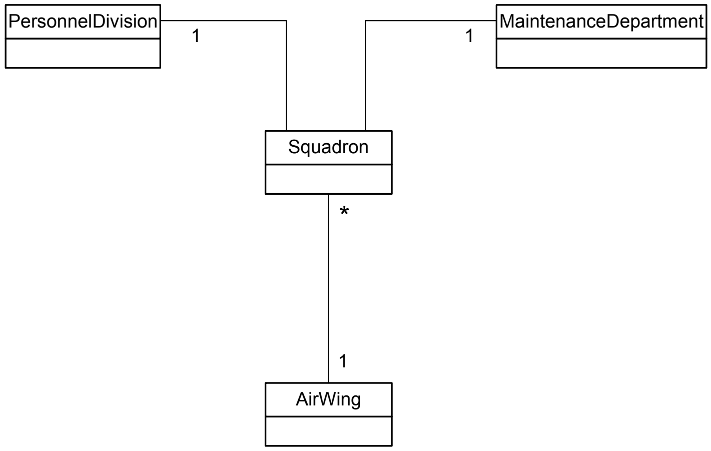
"Captured-on" or "Logs-completed-on"

A is a Member of B



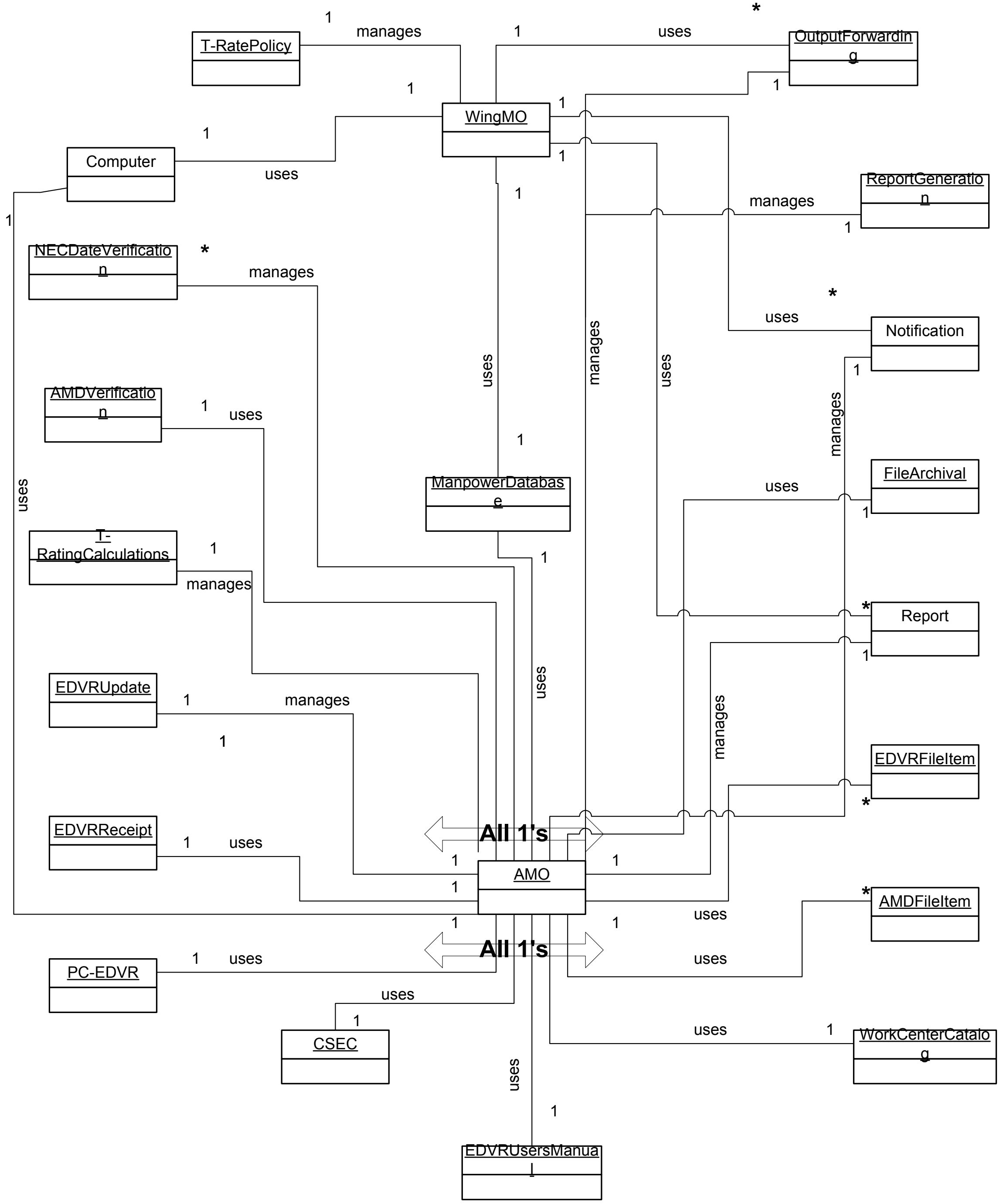
"Member-of"

A is an Organizational Sub-Unit of B



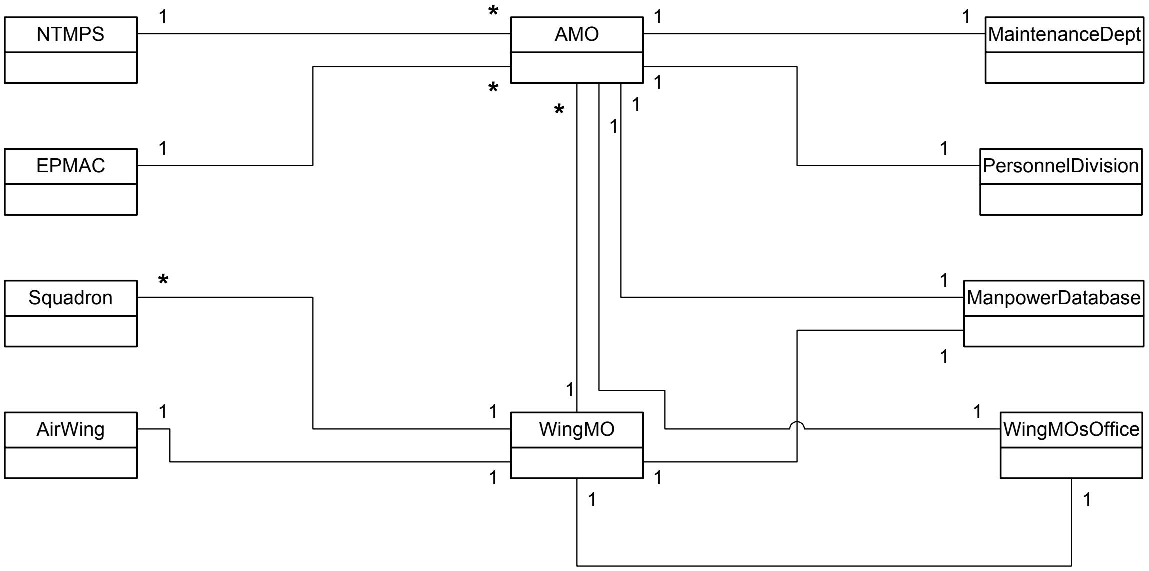
"Subunit-of"

A Uses or Manages B



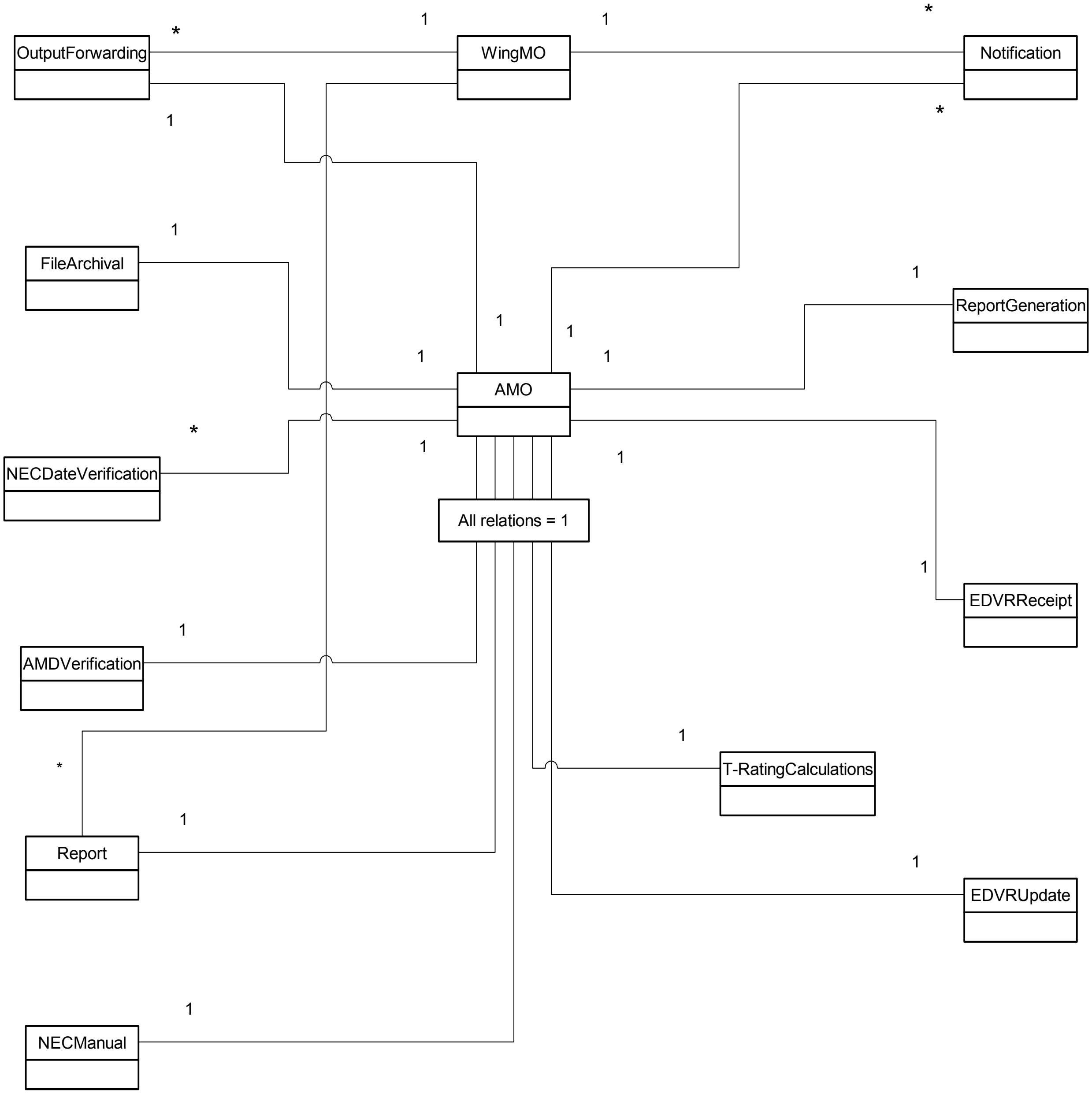
"Uses" or "Manages"

A Communicates with B



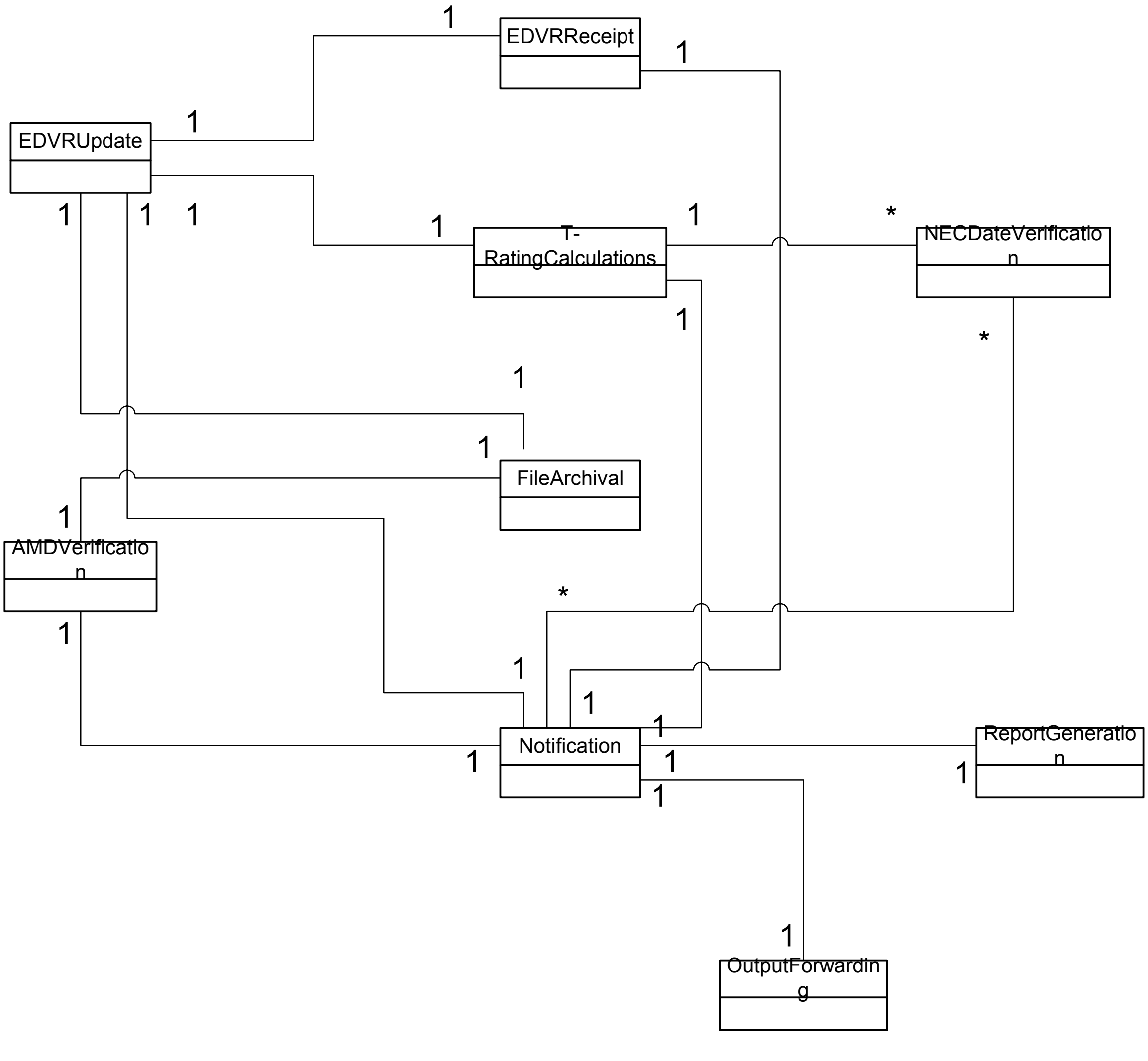
"Communicates-with"

A Is Related To Transaction B



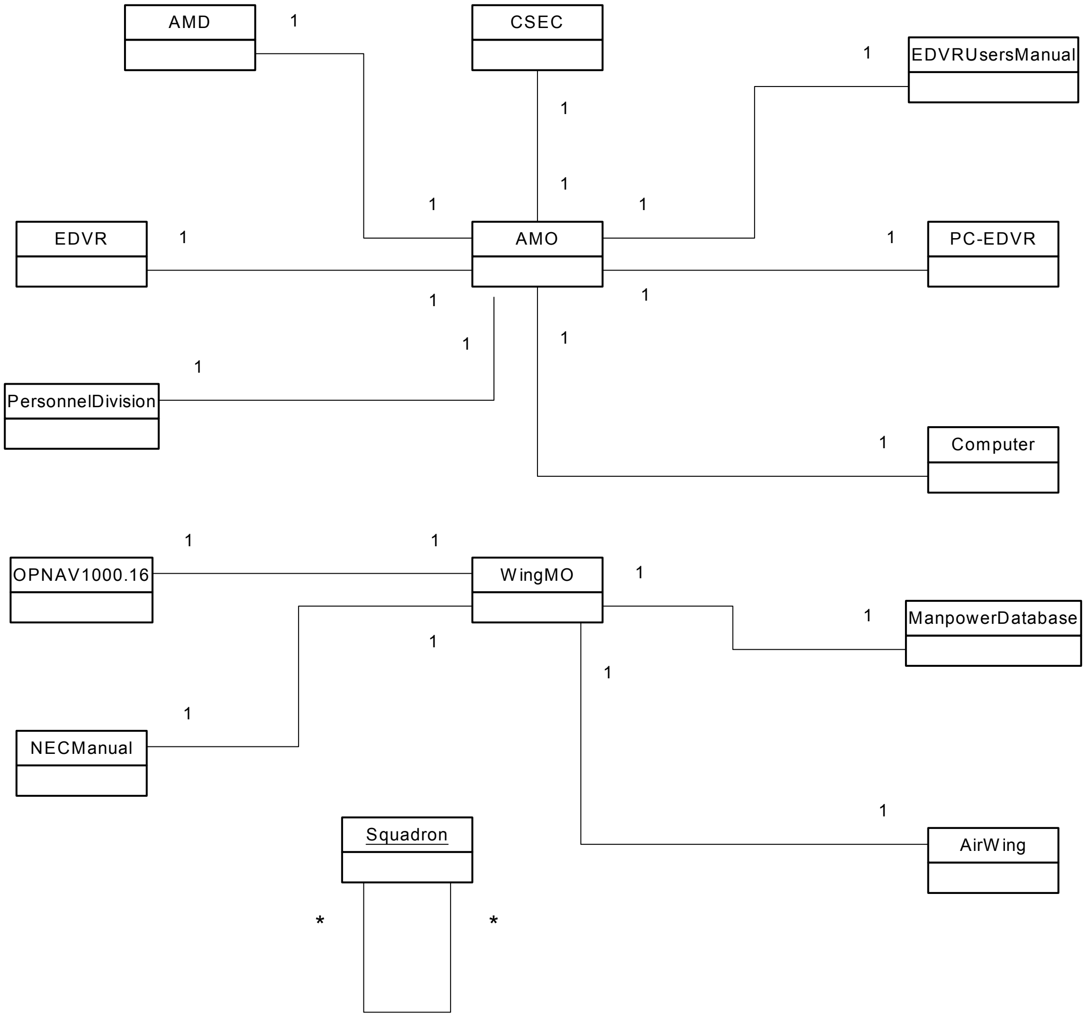
"Related-to"

A is a Transaction Related To Another Transaction B



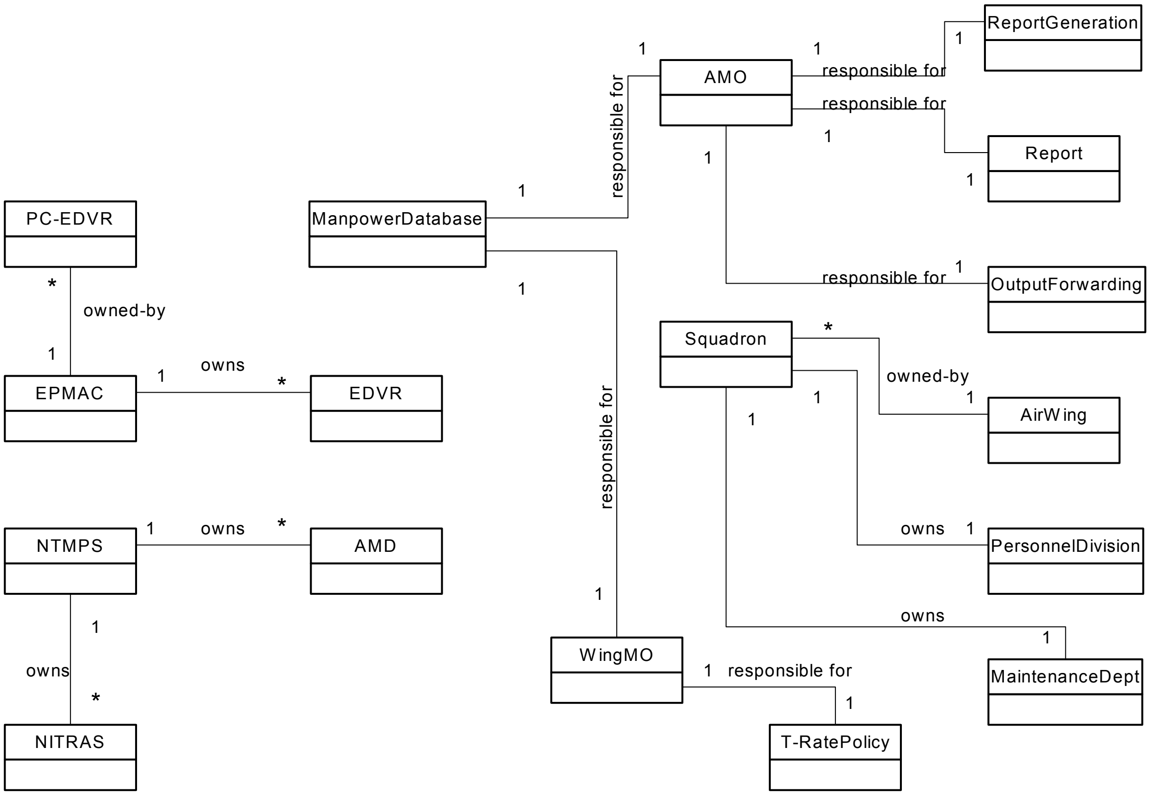
"Related-to"

A is Next to B



"Next-to"

A is Owned By B



"Owned-by"
"Responsible-for"
"Owns"

APPENDIX D CONCEPT MODEL ATTRIBUTE DISCUSSION

EDVRReceipt	*date* - When the new EDVR is received the date will be recorded. *uic* - Identification of the Command to which the new EDVR belongs.
EDVRUpdate	*date* – In order to compare the new EDVR to the on-hand EDVR, the date will be required. *time* – In order to list when the update was completely processed, the time field should be known. *UIC* – In order to confirm that the correct EDVR is received the UIC will need to be known.
Notification	*date* – In order to determine when notification was delivered the date needs to be known. *time* – In order to determine when notification was delivered, the date needs to be known.
ManpowerDatabase	*area* – In order to complete the T-Rating calculation report, the area of work needs to be known. *experience* – In order to complete the T-Rating calculation, the amount of experience needs to be known.
AMO	*rank* – In order to properly list the author on the report submission, the rank needs to be known. *name* – In order to properly list the author on the report submission, the name needs to be known. *command* – In order to properly list the author on the report submission, the command needs to be known. *UIC* – In order to properly list the author on the report submission, the UIC needs to be known. *phone* – In order to list author contact information, the phone number is needed. *e-mail* – In order to list author contact e-mail address.

WingMO	*rank* – In order to properly submit report, rank needs to be known. *name* – In order to properly submit report, name needs to be known. *command* – In order to properly submit report, command needs to be known. *UIC* – In order to properly submit report, UIC needs to be known. *phone* – In order to list contact information, the phone number is needed. *e-mail* – In order to list contact e-mail address.
Report	*date* – In order to establish date of submission, date needs to be known. *time* – In order to establish time of submission, time needs to be known. *UIC* – In order to establish command submitting report UIC needs to be known. *command* – In order to list alphanumeric designation of command, command needs to be known. *submitted by* – In order to list name of author, name needs to be known. *EDVR Date* – In order to establish baseline of current EDVR, EDVR date needs to be known. *AMD Date* – In order to establish baseline of current AMD, AMD date needs to be known.

EDVRFileItem	*UIC* – In order to identify the command, UIC needs to be known. *rate* – In order to identify the rate of the member filling the billet, rate needs to be known. *COB* – This will be used for Manning Rates subsequent to T-Rate *EDA/L* – In order to provide report fields per the Wing MO's request. *NEC1* – The primary NEC which the member has been ordered into the command with. *NEC2* – The secondary NEC which the member has been ordered into the command with. *A/C T/M/S* – Aircraft Type/Model/Series *Area* – In order to complete the T-Rating calculation report, the area of work needs to be known.
AMDFileItem	*UIC* – In order to identify the command, UIC needs to be known. *BSC* – In order to determine specific billets, the BSC is needed. *BNEC* – In order to determine T-Rating, BNEC is needed to determine who has been assigned into which billet. *BRate* – In order determine the billet rate, the BRate needs to be known.

NECDateVerificationItem	*date* – In order to determine when the verification was processed the date is needed. *time* – In order to determine the time when the verification process was completed the time is needed. *name* – In order to correctly identify the member for which the verification is being done the member's name is needed. *rate* – In order to correctly identify the member for which the verification is being done the member's rate is needed. *UIC* – In order to correctly identify the command to which the member is attached the UIC is needed. *SSN* – In order to correctly identify the member for which the verification is being done the member's SSN is needed. *NEC1* – In order to verify correctly the member's experience level the NEC is needed. *NEC2* – In order to verify correctly the member's experience level the NEC is needed. *Date Awarded* – In order to correctly determine the member's T-Rating the Date Awarded is needed. *Experience* – In order to correctly determine the member's T-Rating the Experience needs to be correctly determined.
EDVR	*date* - When the new EDVR is received the date will be recorded for comparison purposes. *uic* - Identification of the Command to which the new EDVR belongs to for comparison purposes.
AMD	*date* - When the new EDVR is received the date will be recorded. *uic* - Identification of the Command to which the new EDVR belongs.

APPENDIX E USERS' MANUAL

PROMETHEUS MANPOWER MANAGEMENT SOLUTION

Naval Postgraduate School, Monterey CA, 93943-5001

PrometheusMMS User Guide

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Naval Postgraduate School Database Implementation

Prometheus Manpower Management Solution (PMMS) User Guide

LCDR Daniel P. Granados, USN
LT Kreg L. Kelly, USN

Naval Postgraduate School, Monterey CA, 93943-5001

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Setup

Introduction

Thank you for using the Prometheus Manpower Management Solution (PMMS) electronic database. PMMS was created by LCDR Daniel P. Granados and LT Kreg L. Kelly as a thesis research project in manpower management at the Naval Postgraduate School in Monterey, California.

In order to address the challenges of managing personnel, training, and readiness in aviation squadrons, the functions and responsibilities of a manpower manager were developed and assigned to one officer, the Assistant Maintenance Officer (AMO). For most Assistant Maintenance Officers, it is said that the manpower management function is the most complex and critical aspect of their job.

Assistant Maintenance Officers currently use paper copies of reports such as the Enlisted Distribution and Verification Report (EDVR) and the Squadron Manning Document (SQMD) or Activity Manning Document (AMD) to reconcile manning issues and manage their manpower databases. Both reports are published regularly. The EDVR is published monthly, while the SQMD/AMD are published upon completion of an activity Aviation Manpower Requirements Determination (for SQMD) or Shore Manpower Requirements Determination (for AMD), or as major changes occur.

The PMMS application attempts to address the specific functions of manpower management by automating the reconciliation process between the EDVR and the SQMD/AMD—allowing the AMO to match bodies assigned to the billets assigned within a squadron. The solution capitalizes on the use of existing commercial-off-the-shelf (COTS) technologies, existing manpower databases maintained within the Navy, and process automation of what is traditionally completed through use of paper and pen.

PMMS is a prototype application and therefore only addresses a portion of the overall responsibilities of the manpower manager. PMMS functionality is currently focused on the aviation side of naval forces afloat and ashore. We hope that PMMS and future editions of this product will prove to be powerful business tools, helping manpower managers reduce paperwork redundancy, save valuable time and resources, and effortlessly manage and maintain valuable data about their personnel.

System Requirements

The PMMS application is a Microsoft© .NET stand alone application that interfaces with a Microsoft Access® Database. To use PMMS, it is strongly recommended that your computer meet the following minimum requirements:

- PC with 300 megahertz or higher processor clock speed recommended; 233 MHz minimum required (single or dual processor system); Intel

Pentium/Celeron family, or AMD K6/Athlon/Duron family, or compatible processor recommended

- 128 megabytes (MB) of RAM or higher recommended (64 MB minimum supported; may limit performance and some features)
- 260 megabytes (MB) of available hard disk space*
- Super VGA (800 × 600) or higher-resolution video adapter and monitor
- CD-ROM or DVD drive
- Keyboard and Microsoft Mouse or compatible pointing device
- Microsoft® Windows 2000, XP, .NET Family Operating Systems or later.
- Microsoft© .NET Framework with Service Pack 2 installed.

Microsoft© Jet 4.0 Database Engine and Microsoft Data Access Components 2.6 or greater installed. These components are standard in Windows 2000 platforms and greater.

*Prometheus Application requires 4.7 MB of available hard disk space. E-Pro Alpha.mdb ships at 8.3 kilobytes (KB). The size of the database file (.mdb file) cannot be determined and varies at any given time as the user adds on to it. Size requirements noted above reflect the local copy of all source files, legacy files and datum, and archived images used to create this project.

Installation Instructions

Option 1: PMMS is a self-contained Microsoft© .NET stand alone application and database solution that can be accessed from any physical medium with read/write access. Simply double-click the PMMS icon to launch the application from its root directory. **NOTE**: if using PMMS in this manner, the database file E-Pro Alpha.mdb must be in the treed directory as follows "…\Database Files"

Option 2: setup.msi file is located in the root directory of the distributed PMMS program. Double-click the setup.msi file in order to start the installation process. Installation can be done to any physical medium that the user has read/write access to (i.e. zip disks, CD-RW). It is highly recommended that the user install the PMMS program in its default location in order to ensure maximum operability. **NOTE**: Prometheus application installs several core application files that are required for proper operation of the program. These files are located in predetermined locations and can not be moved after installation. Movement or modification of any of the core application files will cause the program to fail since the program has been written to look in predetermined file locations in order to perform its functions.

Uninstalling the Software

If PMMS was installed using the setup.msi file provided with the distributed PMMS program, uninstalling the software may be accomplished via two methods:

1. From the Start Menu > All Programs > PMMS Beta 1 Folder, click Uninstall Prometheus.
2. From the Control Panel, click Add or Remove Programs. Scroll and select Prometheus Manpower Management Solution v1.0.1B, and click Change/Remove button to uninstall.

Warning: Uninstalling Prometheus will delete the database file E-Pro Alpha.mdb. Deleting this database file will permanently remove all stored data and will be unrecoverable without a prior backup. The current version of Prometheus does not include a backup utility at this time. To backup any data files prior to uninstallating Prometheus, the user must copy the file to a secure location on a separate disk.

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User Interface Familiarity

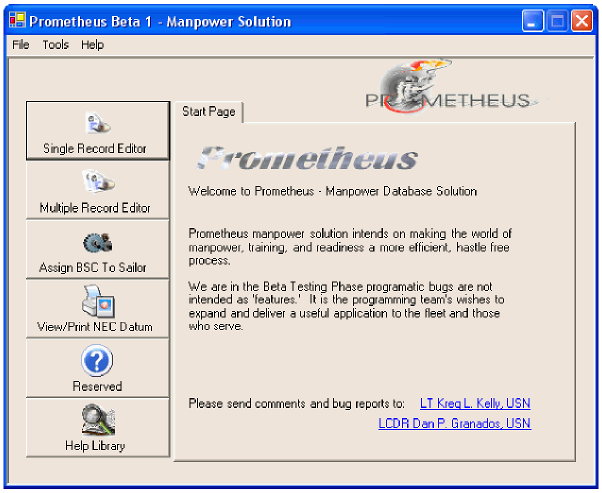
This section will introduce you to the Graphical User Interface (GUI), which is the primary means for interacting with the PMMS application.

About the User(s)

The PMMS database has been designed for multiple users, providing a wide range of capabilities for each particular user. Each type of user interfaces with the appropriate form type to complete required tasking. Currently, the PMMS GUI supports only the role of the AMO. Later versions of PMMS will expand the application interface into user groups and their appropriate functionality requirements.

Introducing the User Interface

When you first open (initiate a session with the database) PMMS, a main window is presented for input as shown below in Figure 26.



Welcome to Prometheus - Manpower Database Solution

Prometheus manpower solution intends on making the world of manpower, training, and readiness a more efficient, hastle free process.

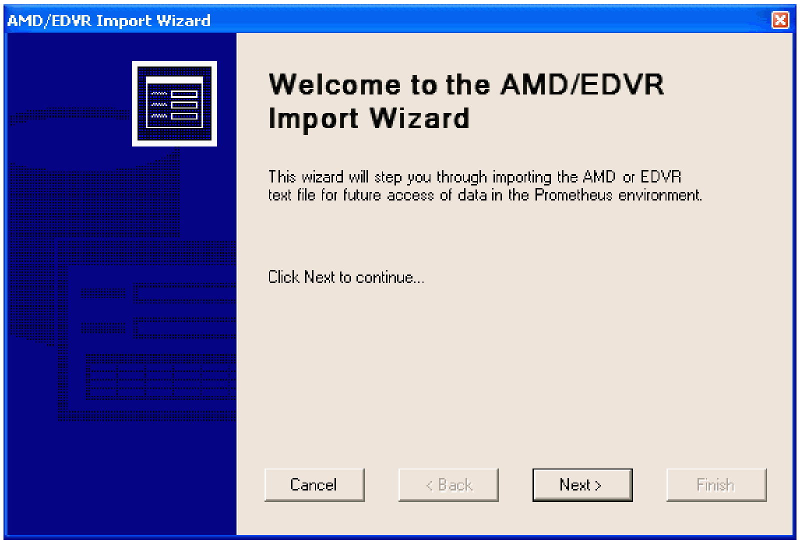
We are in the Beta Testing Phase programatic bugs are not intended as 'features.' It is the programming team's wishes to expand and deliver a useful application to the fleet and those who serve.

Please send comments and bug reports to: LT Kreg L. Kelly, USN
LCDR Dan P. Granados, USN

Figure 26. PMMS Main Window

The Main Menu is your starting point from where you can launch the desired application functions (forms and reports) that will help you manage your personnel. The Main Menu initiates the following Prometheus Core Functions, which are pictured below as Figures 27 through 30. For extensive information about each core function, see Chapter 3, Managing Basic Features.

1. Import AMD & EDVR Text Files



AMD/EDVR Import Wizard

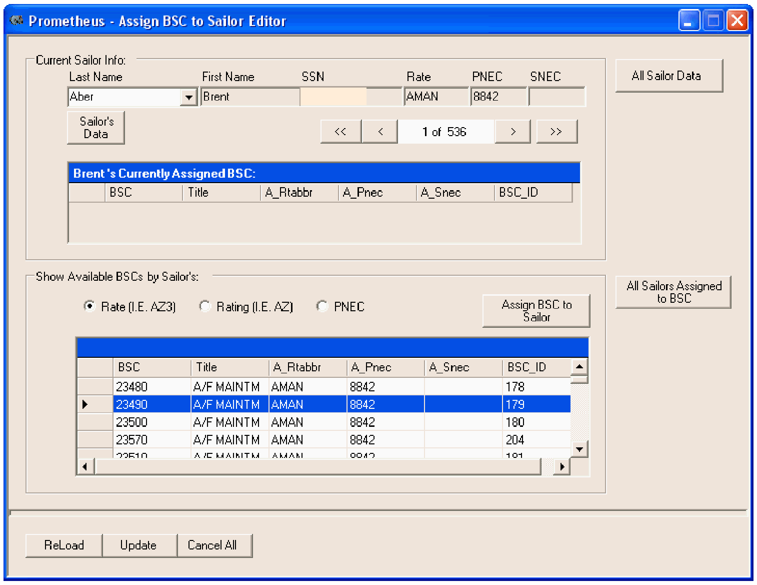
Welcome to the AMD/EDVR Import Wizard

This wizard will step you through importing the AMD or EDVR text file for future access of data in the Prometheus environment.

Click Next to continue...

Figure 27. Import Wizard

2. Assign Billet Sequence Code (BSC) to SAILOR record.



Prometheus - Assign BSC to Sailor Editor

Current Sailor Info:

Last Name	First Name	SSN	Rate	PNEC	SNEC
Aber	Brent		AMAN	8842	

1 of 536

Brent 's Currently Assigned BSC:

	BSC	Title	A_Rtabbr	A_Pnec	A_Snec	BSC_ID

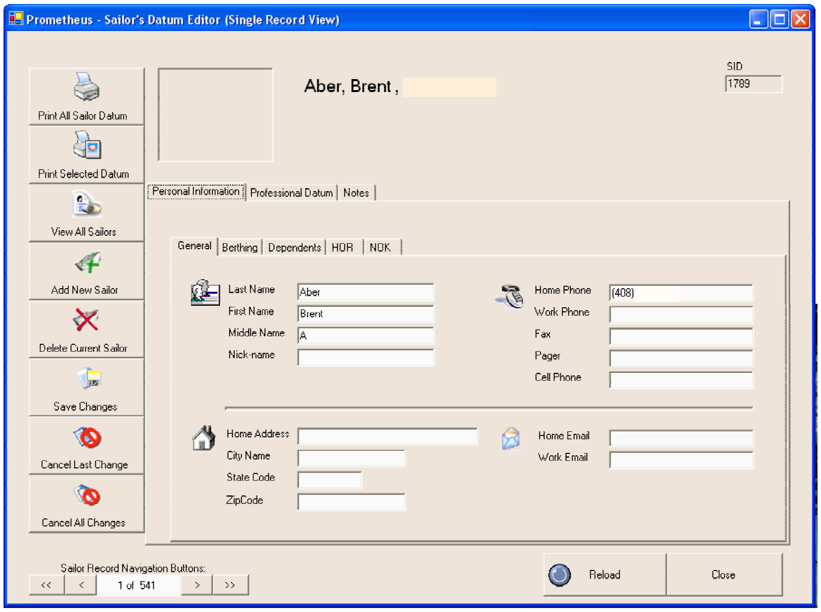
Show Available BSCs by Sailor's:

● Rate (I.E. AZ3) ○ Rating (I.E. AZ) ○ PNEC

	BSC	Title	A_Rtabbr	A_Pnec	A_Snec	BSC_ID
	23480	A/F MAINTM	AMAN	8842		178
▶	23490	A/F MAINTM	AMAN	8842		179
	23500	A/F MAINTM	AMAN	8842		180
	23570	A/F MAINTM	AMAN	8842		204
	23510	A/F MAINTM	AMAN	8842		181

Figure 28. BSC Form

3. Maintain Sailor Personal & Professional Data.



Aber, Brent ,

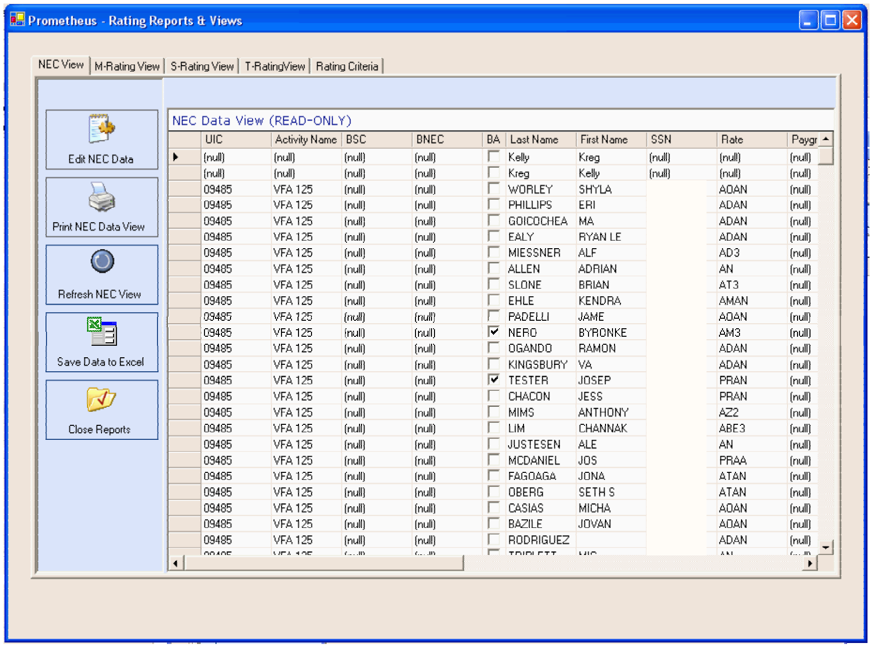
SID 1789

Last Name: Aber
First Name: Brent
Middle Name: A
Nick-name:
Home Phone: (408)
Work Phone:
Fax:
Pager:
Cell Phone:
Home Address:
City Name:
State Code:
ZipCode:
Home Email:
Work Email:

1 of 541

Figure 29. Personal & Professional Data

4. View, Modify & Print NEC Datum.



NEC Data View (READ-ONLY)

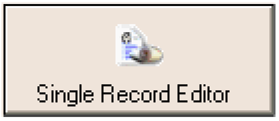
UIC	Activity Name	BSC	BNEC	BA	Last Name	First Name	SSN	Rate	Paygr
(null)	(null)	(null)	(null)	□	Kelly	Kreg	(null)	(null)	(null)
(null)	(null)	(null)	(null)	□	Kreg	Kelly	(null)	(null)	(null)
09485	VFA 125	(null)	(null)	□	WORLEY	SHYLA		ADAN	(null)
09485	VFA 125	(null)	(null)	□	PHILLIPS	ERI		ADAN	(null)
09485	VFA 125	(null)	(null)	□	GOICOCHEA	MA		ADAN	(null)
09485	VFA 125	(null)	(null)	□	EALY	RYAN LE		ADAN	(null)
09485	VFA 125	(null)	(null)	□	MIESSNER	ALF		AD3	(null)
09485	VFA 125	(null)	(null)	□	ALLEN	ADRIAN		AN	(null)
09485	VFA 125	(null)	(null)	□	SLONE	BRIAN		AT3	(null)
09485	VFA 125	(null)	(null)	□	EHLE	KENDRA		AMAN	(null)
09485	VFA 125	(null)	(null)	□	PADELLI	JAME		ADAN	(null)
09485	VFA 125	(null)	(null)	☑	NERO	BYRONKE		AM3	(null)
09485	VFA 125	(null)	(null)	□	OGANDO	RAMON		ADAN	(null)
09485	VFA 125	(null)	(null)	□	KINGSBURY	VA		ADAN	(null)
09485	VFA 125	(null)	(null)	☑	TESTER	JOSEP		PRAN	(null)
09485	VFA 125	(null)	(null)	□	CHACON	JESS		PRAN	(null)
09485	VFA 125	(null)	(null)	□	MIMS	ANTHONY		AZ2	(null)
09485	VFA 125	(null)	(null)	□	LIM	CHANNAK		ABE3	(null)
09485	VFA 125	(null)	(null)	□	JUSTESEN	ALE		AN	(null)
09485	VFA 125	(null)	(null)	□	MCDANIEL	JOS		PRAA	(null)
09485	VFA 125	(null)	(null)	□	FAGOAGA	JONA		ATAN	(null)
09485	VFA 125	(null)	(null)	□	OBERG	SETH S		ATAN	(null)
09485	VFA 125	(null)	(null)	□	CASIAS	MICHA		ADAN	(null)
09485	VFA 125	(null)	(null)	□	BAZILE	JOVAN		ADAN	(null)
09485	VFA 125	(null)	(null)	□	RODRIGUEZ			ADAN	(null)

Figure 30. NEC Data View

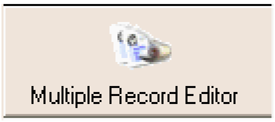
Identifying Keys & Buttons

Illustrations and explanations of the buttons and controls found throughout the PMMS application are provided below:

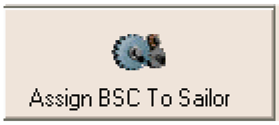
Prometheus Main Application Window



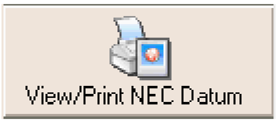
Initiates the opening of the Single Sailor Record Editor and allows the user to modify sailor data in an organized and detailed manner.



Initiates the opening of the Multiple Sailor Record Editor and provides a simple mechanism to modify numerous and similar data in an efficient manner.

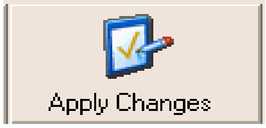


Initiates the opening of the Assign BSC to Sailor Form.

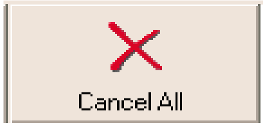


Initiates the opening of the View/Print NEC Datum Form. This button picture is also used with other function forms to print formatted or selected data.

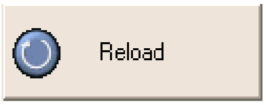
Form Specific Control Buttons



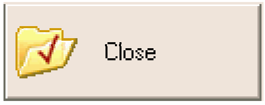
This button is used for multiple record forms. It applies all changes to data fields that have been made by the user since the last reload/loading of the data. **Note**: All data will be saved to the database.



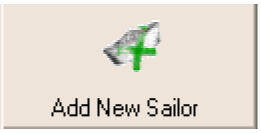
This button is used for multiple record forms. It cancels all changes made to data fields that have been made by the user since the last reload/loading of the data. **Caution**: All changes will be lost when this process is initiated.



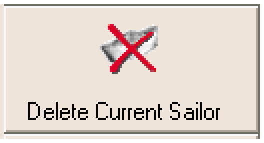
This button reloads the data from the database. **Caution**: Any changes made to the data fields will be lost if changes were not saved previously.



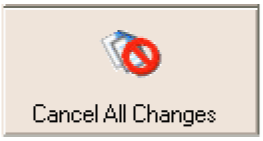
This button is used to close the current form it is attached to.



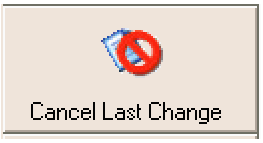
This button is used on the Single Sailor Record Form. It adds a new Sailor Record to the database.



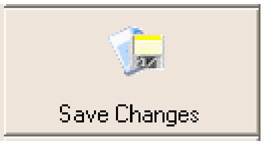
This button is used on the Single Sailor Record Form. It deletes the currently viewed Sailor Record from the database.



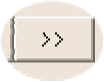
This button is used on the Single Sailor Record Form. It cancels all changes made to the currently viewed Sailor Record & restores the original data from the database.



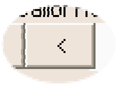
This button is used on the Single Sailor Record Form. It cancels the last change made to the currently viewed Sailor Record & restores the original data from the database.



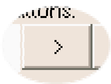
This button is used on the Single Sailor Record Form. It saves all changes made to the currently viewed Sailor Record to the database.



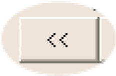
Navigation button. Moves to the Last individual record in the database.



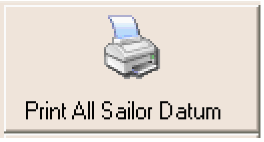
Navigation button. Moves to the previous individual record in the database from the currently viewed record.



Navigation button. Moves to the next individual record in the database from the currently viewed record.



Navigation button. Moves the First individual record in the database.



Prints all available data of a particular form's view.

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Managing Basic Features

Navigating Forms

To navigate about the fields in a form, the user has two options. The first option is to use the mouse to click on a field to be modified and then enter the appropriate information. The second option involves the keyboard only. Simply press the <Tab> key and the cursor will move to the next field for user modification. Refer to Navigating Forms above for more information.

Form Buttons & Controls

Below are the controls for navigating through records in the database. Each record holds unique information particular to a single sailor. The caption window, show in Figure 31 below indicates which record the user is currently viewing. Button descriptions are listed below, following Figure 31.

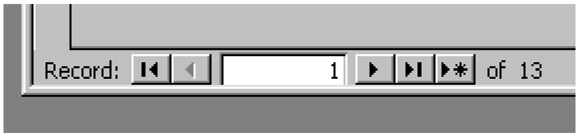


Figure 31. Form Navigation Buttons

|◀ Takes the user to the first record in the database.

◀ Takes the user to the previous record in the database.

▶ Advances the user to the next record in the database.

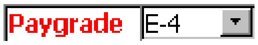
▶| Advances the user to the last record in the database.

▶* Inserts a new record in the database for input of a new sailor.

Using Drop-down Menus

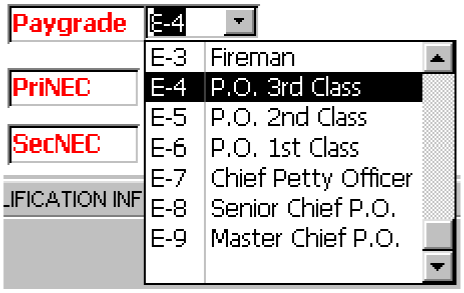
When you select a drop down menu (shown in figure 32 below), a list of available options will be presented in a list window near the insertion window (shown in figure 33 below).

Simply enter the desired input choice by selecting, or pressing the <Enter> key on your keyboard to input the highlighted data into the sailor's database record.



Paygrade E-4

Figure 32. Paygrade Drop Down List



Paygrade E-4

PriNEC

SecNEC

.IFICATION INF

E-3	Fireman
E-4	P.O. 3rd Class
E-5	P.O. 2nd Class
E-6	P.O. 1st Class
E-7	Chief Petty Officer
E-8	Senior Chief P.O.
E-9	Master Chief P.O.

Figure 33. Paygrade Drop Down List open

Note: this screen is for demonstration purposes only. This form and its features have been reserved for future releases of Prometheus.

How to Create New Sailors

Use the Insert New Record Button on any individual record form.

How to Modify Record Information

Changes made to a sailor's record (the information currently viewed in a particular interface window) are real time. New inputs, modifications, deletions, etc. are real time and automatically affect the database.

How to Generate a Report

Reports are generated automatically from each form by pressing the "Print" button. Once depressed, a formatted report will display allowing the user to preview data prior to actual printing. Later versions of PMMS will incorporate a greater range of reports and forms for every user category which will greatly enhance manpower management productivity.

How to Print a Report

Use the Print Current Report buttons along side the type of report you are interested in. Available reports for printing can be seen in the Reports menu, Figure 3.

How to View a Report

Note: Currently every print action initiates a print preview of the report requested. Future editions of Prometheus will incorporate a specific Preview function.

How to Email a Report

Use the E-mail Current Report button along side the type of report you are interested in. Available reports for e-mailing can be seen in the Reports menu, Figure 3. Note: Launching the E-mail Current Report button will launch the default E-mail client assigned to your operating system. For more information, see your system help files.

How to use Prometheus Core Functions

Extensive information on Prometheus' Core Functions can be found in the Prometheus Help Library from within the application. Here, they can be printed and viewed in hard copy as necessary.

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USER’S MANUAL GLOSSARY

BMP file A Microsoft Windows bitmap file that has the extension .bmp. A bitmap file defines an image (such as the image of a scanned sailor) as a pattern of dots (pixels).

Button A control on the GUI that allows the user to easily interact with the PMMS. See *Identifying Keys & Buttons* for more information.

Email Electronic Mail – An abbreviation for electronic mail. Software that you can use to electronically transmit items over a communication network.

Email Client A computer program designed to transmit electronic media via the internet.

Database A usually large collection of data organized especially for rapid search and retrieval.

Division Unit of personnel assigned to the primary maintainer of the database. For all intensive purposes, there is no functional limit to the size of the division, vice system limitations.

Form The custom dialog between the user and the PMMS database via the GUI. For an example and more information see *Introducing the User Interface*.

PMMS Prometheus Manpower Management Solution

GUI Graphical User Interface. The window(s) presented to the user by the PMMS for interaction with the notebook program.

Subform A subform is a form within a form. The primary form is called the main form, and the form within the form is called the subform. A form/subform combination is often referred to as a hierarchical form, a master/detail form, or a parent/child form. The main form and subform in this type of form are linked so that the subform displays only records that are related to the current record in the main form.

Additional References An extensive glossary of terms and acronyms can be found in the Prometheus Help Library from within the PMMS application.

APPENDIX F DOWNLOAD THE APPLICATION

The Prometheus Application developed in this thesis is considered to be an open source program. It is intended that for it to be used by aviation squadron manpower managers. The URL may be used in order to download the Prometheus Application.

http://library.nps.navy.mil/uhtbin/hyperion-image/27Sep%5Fgranados%5Fkelly/Prometheus.exe

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GLOSSARY

Term	Comments
T-Rating	A rating based on an individual's training level and years of experience in their current NEC.
NEC	Navy Enlisted Classification; refers to the job specialty or rating classification code.
M-Rating	Manning Rating which refers to the quantity of personnel Current-On-Board per Billets Assigned (COB/BA).
Web-Based Interface	An interface to allow use of the Internet to access a centralized database.
TRMS	Type-Command Readiness Management System.
PC-EDVR	An application distributed by EPMAC New Orleans, LA for the purpose of processing the activity's EDVR via a personal computer.
EPMAC	Enlisted Personnel Manpower Activity Center; manages enlisted personnel assignments/qualifications for all Navy enlisted; New Orleans, LA.
Import EDVR	The act of bringing in a more current EDVR into the manpower database utilizing PC-EDVR application.
Import EDVR	Description of the process of importing the EDVR.
T-Rating Update	Description of the process of calculating and updating the new T-Rating after a new EDVR has been received.
Wing MO T-Rating Update	Description of the Wing MO's T-Rating database being updated.
EDVR Receipt	The transaction of being notified of and accepting a new EDVR.
EDVR Update	A new EDVR, which has not yet been imported to the manpower database via PC-EDVR.
T-Rate Policy	The definition of the T-Rating categories as set forth by the Wing MO.
T-Rating Calculations	The process of calculating the T-Rating.

Term	Comments
Notification	An e-mail message of notification when a process or action has been completed.
Manpower Database	The main database that holds all manning data for the AMO from which data for the T-Rating come.
Report	The report output of the T-Rating calculations.
EDVR File Items	Line items from the EDVR.
AMD File Item	Line items from the AMD.
NEC Date Verification Item	Line item from the NEC Date Verification
NEC Date Verification	The verification of the NEC Award Date.
date: Date	Date; taken from other source documents and annotated on documents produced in the process.
time: Time	Time; annotated to aid in keeping track of when processes occur and are completed.
uic: UIC	Unit Identification Code; a fixed five digit integer code.
title: String	In a Notification, the message will have a title that details the type of action/process that has occurred.
area: String	The area of maintenance on a T/M/S that has been assignment to the enlisted member as annotated by the AMO.
experience: String	The amount of time that a member has worked in the skill area to which the NEC applies. Quantity may range from months to years.
rank: String	Rank listed in standard Navy format for address purposes.
name: String	For address purposes.
command: String	The command designation (i.e. VFA-125).
phone: Integer	The telephone number including area code. Also includes DSN phone number.
e-mail: String	The e-mail address of individuals for communication purposes.
submitted by: String	Name and rank of officer submitting report or correspondence.

Term	Comments
edvr date: Date	Date of the EDVR
amd date: Date	Date of the AMD
cob: Integer	Current On Board; quantity of personnel on board in a specific category.
eda/l: Date	Estimated Date of Arrival/Loss.
nec1: Integer	NEC 1 of an individual record as listed in the EDVR.
nec2: Integer	NEC 2 of an the individual record to which NEC 1 comes from as listed in the EDVR.
a/c t/m/s: String	Alphanumeric designation of an aircraft type/model/series (i.e. F/A-18C)
bsc: Integer	Billet Sequence Code; assigned in the AMD for each billet listed.
brate: String	Billeted Rate; the rate that has been assigned to the billet listed in the AMD under A_RTABBR column.
date awarded: Date	The actual date that an NEC has been awarded as verified by the AMO or verification process.
T-RatingCalculation	A concept of each T-Rating Calculation process that is initiated by the AMO.
T-RatingCalculationLineItem	A specific line item of the T-Rating Calculation.
bnec	Billeted NEC as listed in the AMD under A_PNEC column.

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