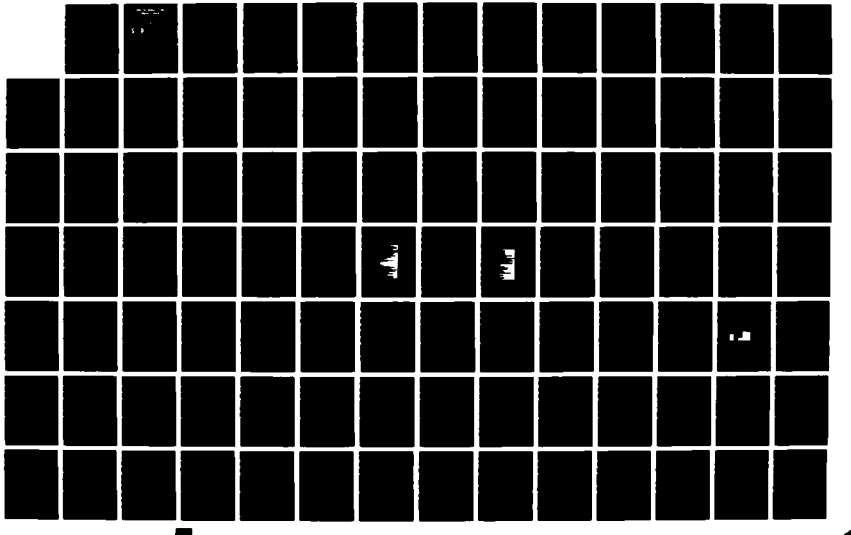
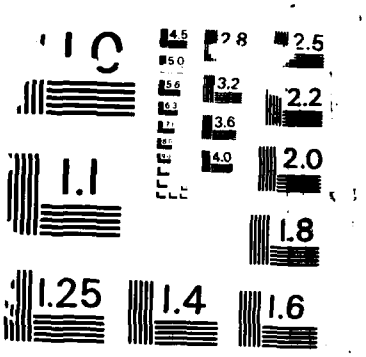
AD-A193 990 DEVELOPMENT OF AN INSTRUMENT FOR MEASURING AND ANALYZING CLIENT SATISFACT..(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA P A MORRIS ET AL. MAR 88 1/2

UNCLASSIFIED F/G 12/7 NL





COPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

(2)

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

DEVELOPMENT OF AN INSTRUMENT FOR MEASURING AND ANALYZING CLIENT SATISFACTION FOR NAVY REGIONAL DATA AUTOMATION CENTERS

by

Prima Amelia Escalona Morris

and

Robert Jack Birdwell

March 1988

Thesis Advisor: Nancy C. Roberts

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION Unclassified	1b RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; Distribution is unlimited
2b DECLASSIFICATION/DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION Naval Postgraduate School 6b OFFICE SYMBOL (*If applicable*) Code 54	7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School
6c ADDRESS (*City, State, and ZIP Code*) Monterey, California 93943-5000	7b ADDRESS (*City, State, and ZIP Code*) Monterey, California 93943-5000
8a NAME OF FUNDING SPONSORING ORGANIZATION 8b OFFICE SYMBOL (*If applicable*)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (*City, State, and ZIP Code*)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11 TITLE (*Include Security Classification*)
DEVELOPMENT OF AN INSTRUMENT FOR MEASURING AND ANALYZING CLIENT SATISFACTION FOR NAVY REGIONAL DATA AUTOMATION CENTERS

12 PERSONAL AUTHOR(S)
Morris, Prima Amelia Escalona and Birdwell, Robert Jack

13a TYPE OF REPORT	13b TIME COVERED	14. DATE OF REPORT (*Year, Month, Day*)	15 PAGE COUNT
Master's Thesis	FROM _____ TO _____	1988 March	118

16 SUPPLEMENTARY NOTATION
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.

17 COSATI CODES		
FIELD	GROUP	SUB-GROUP

18 SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*)
Customer satisfaction; ADP User satisfaction; Satisfaction measurement

19 ABSTRACT (*Continue on reverse if necessary and identify by block number*)

Client satisfaction was considered to be a critical indicator of the effectiveness of the services provided by the Navy Regional Data Automation Centers (NARDACs). The purpose of this thesis was to develop the means to measure this indicator.

Interviews of twenty-eight middle management clients served by NARDACs in four geographical regions within CONUS were conducted. Forty-four items that influence satisfaction were identified belonging to eight factor dimensions of the client satisfaction domain. The Likert Scale methodology was employed in the construction of the measurement instrument. The instrument was reviewed for completeness of items and logical soundness of operations by three independent groups of experts, thus achieving content validity. A client Satisfaction index is formulated from data obtained with the measurement instrument.

The instrument was piloted to a NARDAC site consisting of fifty-two client organizations

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	Unclassified
22a NAME OF RESPONSIBLE INDIVIDUAL Prof. Nancy C. Roberts	22b TELEPHONE (*Include Area Code*) (408) 646-2742 / 22c OFFICE SYMBOL Code 54Rc

#19 ABSTRACT (CONTINUED)

using self-administered mail surveys. Evaluation of the instrument was performed on the scored results of twenty-six pilot respondents. The pilot results were subjected to empirical tests for construct validity and reliability. The results indicated that the instrument could be used to measure client satisfaction after further piloting on a larger (at least two hundred twenty) sample size.

Approved for public release; distribution is unlimited.

Development of an Instrument for Measuring and Analyzing
Client Satisfaction for
Navy Regional Data Automation Centers

by

Prima Amelia Escalona Morris
Lieutenant Commander, United States Navy
B.A., University of Hawaii, 1972

and

Robert Jack Birdwell
Lieutenant, Supply Corps, United States Navy
B.A., University of Texas at Austin, 1980

Submitted in partial fulfillment of the
requirements for the degree of

MASTERS OF SCIENCE IN INFORMATION SYSTEMS

from the

NAVAL POSTGRADUATE SCHOOL
March 1988

Authors: Prima A E. Morris
Prima Amelia Escalona Morris

Robert J. Birdwell
Robert Jack Birdwell

Approved by: Nancy C Roberts
Nancy C. Roberts, Thesis Advisor

Douglas Moses, Second Reader

David R. Whipple, Chairman, Department of
Administrative Sciences

James M. Fremgen, Acting Dean of
Information and Policy Sciences

ABSTRACT

Client satisfaction was considered to be a critical indicator of the effectiveness of the services provided by the Navy Regional Data Automation Centers (NARDACs). The purpose of this thesis was to develop the means to measure this indicator.

Interviews of twenty-eight middle management clients served by NARDACs in four geographical regions within CONUS were conducted. Forty-four items that influence satisfaction were identified belonging to eight factor dimensions of the client satisfaction domain. The Likert Scale methodology was employed in the construction of the measurement instrument. The instrument was reviewed for completeness of items and logical soundness of operations by three independent groups of experts, thus achieving content validity. A client satisfaction index is formulated from data obtained with the measurement instrument.

The instrument was piloted to a NARDAC site consisting of fifty-two client organizations using self-administered mail surveys. Evaluation of the instrument was performed on the scored results of twenty-six pilot respondents. The pilot results were subjected to empirical tests for construct validity and reliability. The results indicated that the instrument could be used to measure client satisfaction after further piloting on a larger (at least two hundred twenty) sample size.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

We would like to thank the following individuals for their valuable assistance in this study. The help provided by all the NARDAC Commanding Officers, Client Liaison staffs, and clients at San Diego, San Francisco, Washington, D.C. and Norfolk and the Naval Postgraduate School faculty who participated in the interviews, reviews and pilot survey is appreciated. Without their interest and cooperation, the success of this thesis would not have been possible. We would especially like to thank Commander Charles F. Taylor, Jr., Commanding Officer of NARDAC Pearl Harbor and his staff for their continued support and endorsement of this thesis; Captain Mike Roth, Commanding Officer of NARDAC San Francisco and his staff for their support in the pilot survey; Mr. Dennis Mar for his assistance in the statistical analysis of the survey data; and Charlotte Birdwell, Jack Birdwell, and Luther Parker for their research assistance.

I. INTRODUCTION

> When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science. [Cited in Ref. 1: p. 89]

This observation by the renown British physicist, William Thompson (Lord Kelvin), may have been foremost in the minds of the Naval Data Automation Command (NAVDAC) corporate management during the development of a long-term business strategy for their field activities, the Navy Regional Data Automation Center (NARDACs). The steering committee, composed of the NARDAC Commanding Officers and top management in NAVDAC, was established as the NARDAC Board of Directors and chartered to address strategic planning matters and issues affecting the NARDACs as a result of a 1986 Coopers and Lybrand study of Navy Industrial Fund (NIF) activities.[1]

One of the issues that the NARDAC Board of Directors identified in the corporate long-range business plan was a need for a standardized index which would be used to measure the level of client satisfaction at the various NARDACs. The index would serve the purpose of providing an objective evaluation of each NARDAC's performance and its ability to deliver quality service to its clients. Also, as a measure of effectiveness, the index would be the cornerstone of their business

---

[1] The Secretary of the Navy (SECNAV) contracted Coopers and Lybrand to conduct a management analysis of all activities under the NIF program. The purpose of the study was to assess the NIF program's effectiveness and to find any areas of deficiency.

strategy to increase the NARDAC's competitive posture. This would be accomplished by accurately evaluating their current level of client satisfaction to enable the establishment of a base index from which management can take appropriate actions to make improvements.

Presently, a standardized measurement of effectiveness that empirically represents user satisfaction among those clients serviced by the NARDACs does not exist. Each NARDAC, operating as a cost center, is responsible for marketing its services to activities normally located within its geographical area of cognizance. As a result, the NARDACs currently assess client satisfaction using different methods, criteria, standards and metrics. This, in effect, has made it difficult for NAVDAC to obtain an accurate assessment of client satisfaction at each of their NARDACs.

A. EVOLUTION OF THE REQUIREMENT

1. Background

The NARDACs were formed as a result of the Navy Automated Data Processing (ADP) Reorganization study and implementation plan with the basic objective to improve the management and operation of the Navy's mission support ADP program [Ref. 2]. These field activities of NAVDAC were established to provide non-tactical ADP technical assistance and operational support to Navy activities ashore and afloat, Department of Defense (DOD) components and other Federal agencies. There are nine (9) NARDACs geographically dispersed within the continental United States (CONUS) and in Hawaii (See Figure 1.1). Although each NARDAC may vary in the ADP support it can provide, major functional services are offered at every site (See Appendix A).

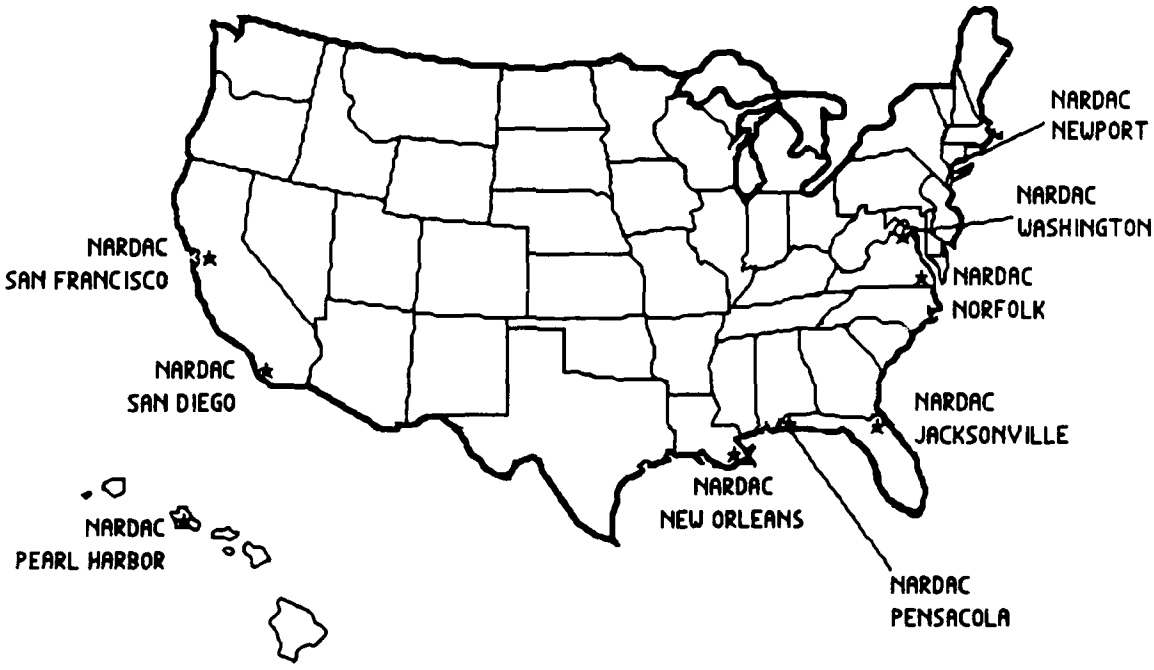


Figure 1.1 NARDAC Installations Map

2. History of Operations

Prior to fiscal year 1984, the NARDACs were mission-funded which meant that every NARDAC received an annual allotment of appropriated funds to cover its costs for the support provided to its clients. Based on that operational philosophy, ADP products and services were delivered at no cost to the clients. Because this ADP support was perceived by the clients as *free*, there was little concern on their part for costs, only the timeliness and quality of the requested support. In that regard, the NARDACs' primary mission was focused on providing ADP support to their clients within the planned budgets. The need to formally measure client satisfaction, therefore, was not a paramount issue at the time.

3. Present-Day Operations

Since fiscal year 1984, the NARDACs' cost of operations has been financed under the Navy Industrial Fund (NIF), a revolving fund from which working capital funded by Congress to the Department of Defense is allocated to the Navy as an appropriation. The initial funds by the NIF appropriation to the NARDACs were used to finance the costs of providing ADP services ordered by their clients. In return, the products furnished and services rendered by the NARDACs to other Navy activities and government agencies are performed on a cost reimbursable basis at standardized fiscal year rates.[1] It is therefore the responsibility of the client to submit a Program Objective Memorandum (POM) and budget

---

[1] Standardized fiscal rates refer to stabilized rates for products and services that are fixed for an entire fiscal year. The period of a fiscal year is from 1 October to 30 September.

accordingly for needed ADP services.[1] The clients *pay* the NARDACs through the use of a reimbursable order citing their own appropriated funds. In theory, the payment or reimbursement would then put the corpus of the revolving fund back to where it started. The financial operations of the NARDACs are comparable to that of private enterprises, i.e. working capital and clients are required. The NARDACs and other NIF activities, however, are run on a non-profit basis.

> Working with a NIF activity is much like contracting with a contractor -- the only significant difference is that the NIF activity is not out to make a profit for stockholders. [Ref. 3: p. H22]

Moreover, the importance of how effective a NARDAC operates cannot be understated. The less effective the NARDAC, the higher the charge for services [Ref. 3: p. H1].

According to CDR Charles Taylor, Commanding Officer of NARDAC Pearl Harbor, the change to NIF was made for two major reasons. First, in partial emulation of enterprises in the commercial sector, the intention was to discipline and motivate the NARDACs to provide the best possible service or risk going out of business. The second major reason was to provide a measure of discipline to the users. If services remained *free* to the users, as was the case when the NARDACs were under mission funding, there would be no incentive for the users to request only those services critical for mission accomplishment. Together, these two factors were intended to guarantee more efficient use of ADP resources in the Navy.

---

[1] The POM is a DOD Planning, Programming and Budgeting System (PPBS) document, prepared by the Services to the Secretary of Defense, which expresses total program requirements in terms of force structure, manpower, material and costs to satisfy assigned functions and responsibilities during the period of the Five Year Defense Program. [Ref 3: p. A11]

4. Impact of NIF on Operations

It was clearly obvious to the NARDACs that the transition to NIF forced a significant change in their way of doing business. NIF had introduced new factors into the NARDACs' system of operations which had, until then, only applied to comparable organizations in the commercial sector. The principal change in direction was now focused on the clientele from whom revenues to continue operations were obtained. In addition to providing quality ADP support, the issue of operating cost-effectively and to remain reasonably affordable for the clients, became of paramount importance. Moreover, unlike other NIF activities who maintain a quasi-monopoly over the products and services they provide, the NARDACs were now forced to compete with other government agencies, as well as the private sector, to provide non-tactical ADP support.

Because of the changes driven by NIF, client satisfaction has become critical for the NARDACs. Since all services are provided on a cost reimbursable basis and all operating expenses are paid for by revenues generated by the clients, the NARDACs must maintain a positive image and provide quality service in order to retain their share of the market. A client satisfaction index, therefore, could serve as a tool by which the NARDACs can gauge their market leverage and consequently make whatever adjustments necessary to remain competitive and financially operational.

B. OBJECTIVES

The objectives of this thesis are to identify the attributes relating to client satisfaction and to develop a standardized methodology for measuring and analyzing these attributes through the construction of a prototype measurement instrument and client satisfaction index for subsequent piloting and review at the NARDACs.

C. FOCAL RESEARCH QUESTIONS

The focal issues of this thesis are:

- What is an acceptable definition of a satisfied client?
- What attributes should be used to construct a client satisfaction index for a NARDAC?
- How should the data be gathered and in what form?
- What metrics should be used to measure and analyze the data and how can these metrics be validated?
- Can a microcomputer be used for data analysis and for maintaining information on customer satisfaction? If so, what software should be used?
- How can the data gathering and analysis process be institutionalized to make it part of an ongoing effort to meet client needs?

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

The scope of this thesis is limited to the development of a standardized prototype client satisfaction index specifically tailored to represent an empirical measurement of client satisfaction for the nine NARDACs. The NARDACs are located in CONUS at Naval Air Station (NAS) Alameda - for NARDAC San Francisco, NAS North Island - for NARDAC San Diego, New Orleans, NAS Pensacola, NAS Jacksonville, NAS Norfolk, Washington Navy Yard - for NARDAC Washington, and Newport; and in Hawaii at Naval Station Pearl Harbor. Each NARDAC has a unique set of clients within its geographical region. The research focuses primarily on those attributes relating to client satisfaction as ascertained from a cross-section of NARDAC clients.

E. ORGANIZATION OF THE THESIS

Chapter II presents a literature review pertinent to current thinking regarding client satisfaction, in private industry and in government.

Chapter III describes the methodology employed in the development of a measurement instrument designed as the basis for the formulation of the client satisfaction index.

Chapter IV presents an evaluation of the validity and reliability of the client satisfaction questionnaire as a measurement instrument.

Chapter V describes the construction of the Client Satisfaction Index (CSI) and several other methods of analyzing the data collected from the questionnaire.

Chapter VI presents the conclusions of the study and recommendations for implementation and further research . This chapter concludes the thesis.

II. LITERATURE REVIEW

A. INTRODUCTION

The theme of this year's American Marketing Association's annual meeting was "The Customer Is King." The meeting focused on, and stressed the importance of attracting and retaining customers. Many corporations and management consultants have come to the same realization that the key to maximizing profits is maximizing customer satisfaction (e.g., [Ref. 4: pp. 2-5], [Ref 5: pp. 13-16], [Ref. 6: p. 5]). During the past five years of financial deregulation, banking strategists have increasingly concluded that one of a bank's most important assets is its existing customer base [Ref. 7: pp. 6, 57]. IBM believes that satisfied customers are the basis of their continued business success [Ref. 8]. In the words of Darryl Landvater, President of Oliver Wright Video Production, Inc.,

> Although there are other ways to get an additional five percent of sales to the bottom line, many of them such as cutting expenditures for labor, equipment, and research and development are both painful and potentially damaging. It's easier to boost sales and earnings through superior customer service and at the same time improve the the long-term position of the company. [Ref. 9: p. 86]

Paul Allaire, President of Xerox, has recently made customer satisfaction it's "first priority", with return on assets (ROA) and increased market share second and third respectfully [Ref. 4: p. 2]. In a memo to his division directors, Allaire says, "we can only achieve our ROA and market share goals by satisfying our customers." Xerox's new focus on customer satisfaction was the basis for the cover story, "Customer Satisfaction: The Big Payoff" in Xerox's quarterly corporate publication *Benchmark* [Ref. 4]. In this article, five leading management consultants expound

on the importance of satisfying the customer and its payoff in increased profits. In the article, Robert Waterman, Jr., co-author of *In Search of Excellence*, cited a study from the Strategic Planning Institute in Cambridge, Massachusetts.

> Business sectors with a higher *service* content have a higher return on investment. The institute, which ranked similar companies in order by the relative quality of their products and services, found that the highest rated company in each area had a return on investment 100 percent higher than the lowest-ranked company. [Ref. 4: p. 3]

Christopher Lovelock, a former Harvard professor and principal of Christopher Lovelock and Associates, states that the key to improving customer satisfaction "...is with research to measure what characteristics of services or products are important to users as well as how customers perceive the goals provided by the company." [Ref. 4: p. 3]

Tom Peters, co-author of *In Search of Excellence* and *A Passion for Excellence*, believes that the qualitative aspects of business must be quantified. He believes in the old adage "What gets measured gets done." This philosophy is applied rigorously within his organization and at his executive seminars in the following manner.

> In the customer arena, we believe that regular quantitative measurement of customer satisfaction provides a much better lead indicator of future organizational health than does profitability or market-share change. We suggest monthly measurement. Further, we urge participants to make the level of customer satisfaction the primary basis for incentive compensation and annual performance evaluation for virtually every person at every level in every function throughout the organization. [Ref. 10: p. E1]

Clearly, customer satisfaction is an issue which is receiving considerable attention in the corporate community and recently it has been gaining momentum in the computer services industry. The purpose of this literature review is to survey some of the recent research that has been conducted in the area of customer

satisfaction with computer services and the instruments which were developed to quantify and measure *satisfaction*. The literature review is divided into three sections. The first section, *Measures of Computer User Satisfaction*, is a review of generic measures which could be used at any computer services organization or management information system/data processing (MIS/DP) department. The second section, *Survey of Current Industry Measures*, is a review of current measures of customer satisfaction used in the computer industry. And the last section, *Department of Defense Measures*, is a brief look at what kinds of measures of customer satisfaction are being used within the Department of Defense.

B. MEASURES OF COMPUTER USER SATISFACTION

The largest initial obstacle in conducting this literature review was finding information related to the measurement of *customer satisfaction* at a computer services organization. The problem was the word "customer". The computer industry and MIS/DP departments, in many instances, still refers to its customers as *users* instead of *valuable customers* [Ref. 11: p. 286]. According to W.H. Inmon, "Universally, data processing exists as a service organization within the company. The service is for the user, and the satisfaction of the user ultimately determines the success or failure of data processing." [Ref. 12: p. 224]

There have been several studies conducted recently on the concept of *computer user satisfaction* or *user information satisfaction* (UIS). In the words of Iivari, UIS refers to "...a cluster of concepts that imply the assessment of information systems or information services in the user's subjective terms." [Ref. 13: p. 57] The foundations of UIS are based on the research by Cyert and March [Ref. 14]. The essential concept is "...that an information system which meets the needs of its user will reinforce satisfaction with that system. If the system does not provide the

needed information, the user will become dissatisfied and look elsewhere ." [Ref. 15: p.786]

One of the first measures of UIS related to the total MIS/DP function in an organization which has received considerable attention was developed by S. W. Pearson [Ref. 16]. During his research, Pearson compiled a list of thirty-six factors relating to computer user satisfaction based on a literature review of twenty-two studies of computer-user interactions. These factors were then reviewed by three DP professionals for completeness and accuracy. As a result of the review, two additional factors were added to the list. Next, the list of thirty-eight factors was compared, using a critical incident analysis technique, to taped interview responses from thirty-two middle manager users in eight different organizations. This step concluded with the addition of one factor, making a total of thirty-nine distinct factors. These factors were then incorporated into a questionnaire which utilized the semantic differential technique. Each factor is measured by three separate scales using seven intervals from negative to positive responses. The first scale was a measure of one's perception by rating four bipolar adjective pairs. The second scale was a satisfactory - unsatisfactory pair and the third scale measured the importance of the factor to the user. The importance rating is used as a weighting factor for the overall satisfaction score. The description of the scoring method can be found in Reference 17. The questionnaire was empirically tested for validity and reliability using the same thirty-two middle managers previously interviewed. The instrument was found to be reliable and valid, based on the twenty-nine returned questionnaires. See Reference 17 for the results of the validity and reliability evaluation of the questionnaire.

A study by Ives, Olson and Baroudi was a continuation of the Pearson study with the emphasis to reduce the length of the overall measure and reinforce the validity of the instrument with more extensive testing [Ref. 15]. The results of their study reduced Pearson's thirty-nine original factors down to twenty-one factors with greater validity using a larger sample size. Description of their results can be found in [Ref. 15]. Ives, Olson, and Baroudi's work was based on the following definition of UIS: "...the extent to which users believe the information system available to them meets their information requirements."

Mathew & Co., a Data Processing Management consulting firm, has developed a reporting system for measuring DP-user satisfaction called "How're We Doing?" [Ref. 18: p. 10] The system requires users to annotate in a log, during a one month period, any problems with data processing based on nine "performance-related criteria." At the end of the month, the data from the log(s) are processed by Mathew & Co. which supplies the client with DP user satisfaction analyses in several different categories. The system is based on exception reporting (i.e., only problems with data processing are reported). The nine criteria are timeliness of output, quality of output, online availability, response time, systems development schedules, response to problems, and attitude and cooperativeness. Mathew & Co. provides its clients with reports on DP-user trends for the current month and trends over periods of three months, six months and twelve months.

C. SURVEY OF CURRENT INDUSTRY MEASURES

The banking industry recently began using a customer service index to measure and manage customer service [Ref. 7]. One index is based on twenty critical attributes of "Good Customer Service" according to a nationwide survey of bank

customers. Bank customers were asked to score all twenty attributes of their financial institution on a six- point scale, (6 = excellent).[1]

Keeping the customer satisfied with quality products and services is the challenge changing the face of the automotive industry also. The automotive industry uses a consumer satisfaction index to evaluate consumer demands (e.g., increasing showroom hours). [Ref. 19]

Sitmar Cruises attributes its highest rate of repeat passengers of any major cruise line to its "intensive customer research" using a 16-page customer survey [Ref. 4: p. 4]. Benjamin French believes random surveys are the best way of determining the effectiveness of an organization's customer satisfaction program.

> A brief questionnaire and accompanying letter of explanation are simple to prepare and provide an inexpensive way of taking the pulse of your customers. In addition to providing you with data on your effectiveness, the survey also conveys your concern for solving customer's problems and gives you another opportunity to restore their faith in your company and its products or services. [Ref. 20: p. 111]

However, James Carman, Professor of Business Administration at the Graduate School of Business, University of California at Berkeley, argues that surveys must be interpreted carefully because it is difficult for some customers to evaluate the quality of the service they received if they are lacking knowledge in the field. [Ref. 4: p. 5]

IBM distributes a survey to every one of their customers at least once a year in order to directly ascertain information relating to customer satisfaction and to improve their business relationship. The corporate offices send out periodic surveys to clients requesting their service perceptions. This is done independently from the regional

---

[1] The index was developed by Financial Products Group, a Chicago-based consulting firm serving the financial services industry, with the assistance of Market Facts, Inc.

offices. In fact, regional offices don't even know when this occurs. The survey is divided into eight major categories: quality of products, hardware maintenance and support, systems management, marketing support, technical support, education, telephone coverage, and overall rating. The survey is scored on a five-point Likert Scale (very satisfied to very dissatisfied) with a block for *no opinion.* In addition to the survey, there is a corporate-wide complaint system where client complaints are assigned to a high-level manager for investigation and follow-up. [Ref. 8]

At Electronic Data Systems Corporation (EDS), they believe feedback from the customer is an important step in maintaining a high level of customer satisfaction. EDS North American Commercial Group uses an extensive series of questionnaires as part of their *Quality Enhancement Program* (QEP)[1] to keep abreast of their customers needs and to continue to improve services and products. [Ref. 21]

D. DEPARTMENT OF DEFENSE MEASURES

The Philadelphia Naval Shipyard, a NIF-funded activity, does not use any proactive initiatives to ascertain customer satisfaction. Their criteria for measuring performance is based on adhering to project budget and schedule constraints[2]. The Military Airlift Command (MAC), an Air Force industrial funded activity, does not actively solicit information from their customers regarding customer satisfaction either. Instead, suggestion/comment forms are made available to MAC customers.[3]

---

[1] The contents of the questionnaire and the specifics of the QEP implementation policies and procedures are proprietary information of EDS North American Commercial Group and will not be disclosed in this thesis.

[2] Interview with Mr. Monteleon, Management Planning Division, Philadelphia Naval Shipyard, Philadelphia, Pennsylvania, 5 February 1988.

[3] Interview with CDR Jordan, USN, Navy Liaison Officer, Military Airlift Command Headquarters, Scott Air Force Base, 5 February 1988.

The Navy Public Works Centers (PWC), which are NIF-funded activities, have recently initiated a customer satisfaction evaluation program [Ref. 22]. The program, "Customer Evaluation of Support Provided by PWC", consists of a fifty-item questionnaire divided into six categories. The respondent is requested to rate the quality of service provided by the PWC using a seven-point scale. The questionnaire is scored in the following manner:

a. For customer responses where the "X" is placed in blocks 6 or 7, score 2 points;

b. For customer responses where the "X" is placed in blocks 3, 4, or 5, score 1 point;

c. For customer responses where the "X" is placed in blocks 1 or 2, score 0 points.

The best possible score is 100 points. To determine the annual grade from all of the customers who received a questionnaire, add the total questionnaire scores and divide by the total number of questionnaires that were completed in the year. The total score is weighted by customer size (i.e. four surveys from large customers, two from medium- sized customers and one each from all others.) The result is a summarized customer evaluation of the support provided by the PWC in the past year.

We found no published studies performed by the Department of the Navy or the Department of Defense in the area of customer or user satisfaction relating to computer services organizations or MIS/DP departments.[1]

---

[1] Searches were made through the Defense Logistics Studies Information Exchange (DLSIE), Defense Technical Information Center (DTIC), and DIALOG Information Services, Inc.

III. QUESTIONNAIRE DEVELOPMENT

The corporate heads of the NARDACs identified the critical requirement for a client satisfaction index, thus setting the stage for the next step of our research. We needed to identify a logical process to follow in order to arrive at an index that accurately represents the client's satisfaction with the NARDAC's performance in providing products and services. To represent that state of satisfaction as unequivocally as possible, it was imperative that the theme of our methodology be based on the inputs from actual NARDAC clients and their composite view of client satisfaction. This was important because it ensured that the fundamental building blocks for the construction of a meaningful index were obtained directly from representative samples of the source. By using this approach, we felt that our methodology would be sound in terms of face validity and the resulting product would be realistic and more readily accepted by the NARDACs and their client community.

From a study by Pearson, the measurement of client satisfaction mirrors the measurement of an individual's attitude or evaluative feelings toward some feature of the subjects of interest [Ref. 16]. There are various ways to collect data for measuring a client's attitude. One basic means is by interrogation which involves getting people to answer questions, either in person or through telephone interviews. Another interrogation technique, more widely used for measuring a person's attitude, involves an instrument, in most cases a questionnaire, which is one of the fundamental tools used in survey research. The reason for the popularity of the survey research method is due to the numerous benefits it offers.

- It provides a method for empirical verification of data.
- The data gathered by this method becomes a source of information which can be conveniently stored through automated methods and can be analyzed shortly after collection.
- The responses can be coded into a standardized form for recording in a quantitative manner; therefore a standardized measurement that is consistent across respondents is achieved and lends itself to the development of an index.
- Surveys can be administered fairly readily by an implementing organization (a NARDAC) and can be flexibly designed with minimum impact on the respondents' (the clients') time. ([Ref. 23] and [Ref. 24])

It is because of these advantages and its applicability to the measurement of client satisfaction that the survey research approach was selected for this study.

A. BACKGROUND

During the preliminary stages of the research, background information on the NARDACs was gathered in order to obtain an understanding of their organizational structure and hierarchy, corporate culture and environment, products and services, and client information. This background information was obtained during site visits at NARDAC San Francisco, NARDAC Washington and NAVDAC. Further data was received from NARDAC Pearl Harbor and NARDAC San Diego. Additionally, the marketing representative at Honeywell was interviewed to see how client satisfaction was viewed from the industry perspective. We also reviewed literature on customer satisfaction and found current trends in the field, particularly in service-oriented industries.

At the same time, we were given information on existing customer satisfaction methods employed by the NARDACs and Public Works Centers (PWC). Primarily, the methods used by these communities are informal and based on feedback from the client, usually obtained during personal visits or phone conversation. The PWCs and several NARDACs employed more formal methods, using questionnaires that

were developed in-house, as part of their marketing efforts. Some of these methods, extracted from a summary of findings [Ref. 25], are listed below.

- NARDAC Jacksonville developed a client assessment form which is used during quarterly client visits. This assessment seems to be the most formal means employed to gather client satisfaction information from the client's perspective.
- NARDAC San Diego identified specific client satisfaction indices with it's mainframe clients. These indices are: "95% products on time" and "98% on-line availability during prime time and off-shift hours." Prime time availability is particularly significant to its major client, the Naval Aviation Depot. These indices are assessed and reported during regular client meetings.
- NARDAC San Francisco recently developed an information form which will be used by client relations personnel when visiting clients. A portion of this form provides clients the opportunity to express satisfaction with or concerns about services.
- NARDAC Pensacola and NARDAC San Diego use written reports of visits or phone contacts to identify client problems or concerns. These reports also provide vehicles to convey the client's satisfaction with services.
- NARDAC Washington developed a quarterly rating report which is filled out by NARDAC Washington department directors. This report provides the department directors' expectation of a client's response to various service satisfaction questions.

Because of the wide diversity in methods used among the NARDACs, it is understandable why the NARDAC Board of Directors recognized the need for a standardized method of obtaining critical client satisfaction information.

B. FACTOR IDENTIFICATION

Using the information gathered from interviews with NARDAC management personnel, relevant organizational documents and literature searches, we generated a list of the major products and services that the NARDAC provides to its customers. From this list, an initial set of factors, which was seen as measuring the NARDACs'

performance in delivering products and services, was compiled. This initial set consisted of the following nine (9) factors:

- Computer capabilities
- Ease of obtaining services
- System design and programming expertise
- Technical support
- ADP consultation and assistance
- Training
- Cost of ADP services
- Customer support
- Timeliness and quality of products and services provided

In contrast, the factors used in existing NARDAC questionnaires [Ref. 25] included:

- Response to client requests (the quality of response and the rapidity of response)
- Thoroughness of information conveyed to clients
- NARDAC service accessibility to clients
- Cost
- Perception of the reliability of NARDAC personnel
- Non-recurrence of problems and willingness to refer other organizations to NARDAC for computing services

C. CONTENT VALIDATION

In order to validate the accuracy of our initial set of factors and thereby establish content validity, a method was needed which was expedient, allowed for personal interaction with existing clients to verify the assumptions made in compiling the list of factors, and permitted the opportunity to identify other aspects of the NARDAC-client relationship which may have been overlooked or omitted during previous interviews with NARDAC personnel and documentation review. It was decided then that interviews with a representative group of active NARDAC clients would

accomplish this objective. A series of interviews with clients served by the NARDACs would be conducted within research limitations.

1. Interview Procedures

Because of time constraints and a ceiling on travel expenses, it was necessary to set criteria for determining our interview sample. This criteria included location, types of client organizations to interview, who within the client organization to interview and number of interviews to conduct.

The first and foremost criterion was location. We wanted to focus on regions having a large concentration of Navy activities with differing ADP support requirements and where major NARDAC installations supporting these Navy commands offered a wide variety of computer services. The East Coast and West Coast regions appeared to satisfy this criterion and offered the best representative cross-section of respondents. The clients to be selected for interview were those supported by NARDAC San Francisco and NARDAC San Diego on the West Coast and NARDAC Washington and NARDAC Norfolk on the East Coast.

The next criterion was types of clients to consider for the interviews. Since the objective in this phase of the research was to obtain information on what factors affect or influence client satisfaction, we wanted to interview current/active clients who maintained some frequency of interaction with the NARDAC providing them services. One way of determining the relative degree of interaction was to examine the amount of revenue generated from the client during the last fiscal year. This data was readily available to the Client Liaison Officer at each NARDAC who compiled a ranked listing of clients (by revenues earned) from which candidate clients were selected. Although interviews with previous clients who had elected not to renew

services with the NARDAC were considered, we were unable to include that client category under this criterion because of time constraints.

Another criterion used in narrowing the sample size of clients for the interview was selection of the person in the client organization with whom to conduct the interview. We determined that the best candidate to satisfy this criterion was the individual designated by the client organization as the command's official liaison or point of contact (POC) with the NARDAC. This individual would usually belong in middle management, serving as the activity's ADP Officer. Since POC information normally resided alongside the client organization data, this information was maintained and kept current by the NARDAC's Client Liaison Officer.

The last criterion, number of interviews to conduct, was constrained by a number of factors:

- Number of days available to conduct the interviews
- Availability of the clients for the interview
- Length of the interview
- Travel time window required between interviews (during normal working hours)

In most cases, the Client Liaison Officer of the NARDAC was in a better position to juggle these constraints and therefore coordinated appointments with the clients and arranged the interview schedule. This schedule included interviews with 28 client organizations, the list of which is summarized in Appendix B. Each of us interviewed the client organization's POC, some of whom brought in members of their staff to provide input during the session.

After the appointments with the clients were scheduled, the Client Liaison Officer provided us a list containing the names and addresses of the clients to be

interviewed. Shortly thereafter, we contacted each client by phone to personally introduce ourselves and to explain the nature of our research. Following these phone calls, we mailed each client a letter containing the purpose of the interview, in particular, to obtain their views regarding the factors that they, as clients, would use to evaluate the services provided by their NARDAC. A sample letter can be found in Appendix C. A week before the interviews, we again called each client to verify receipt of the letter and to confirm the date and time of our interview. This call also gave the client the opportunity to ask specific questions about the interview or our research and allowed for any last minute rescheduling of the appointment if required.

To ensure efficient use of time during the interview and to facilitate data collection/recording, forms were used which we had prepared beforehand to guide us through the interview. These forms served to assist us in collecting background information regarding the clients (see Appendix D) and their views on what particular factors contributed to their satisfaction with NARDAC services (see Appendix E). In addition, the forms were used to ensure consistency in the types of information asked of the client. In certain instances, interviews were taped but not before receiving permission from the client. In no instance was permission denied.

2. Factor Validation

During the interviews, we asked each client to comment on the nine factors which we had previously compiled during the process described in Section B and to indicate whether each factor influenced their satisfaction with the NARDAC's performance in providing services. The client was also asked to identify any other factors which were not included in the original set and did influence their state of satisfaction. We then requested each client to rank all the factors by order of

importance. In some cases, clients were strongly inclined to group several factors equally important under the same ranking. Other clients felt that some of the factors were not pertinent to their current requirements and therefore excluded those factors from their ranking.

Following the completion of all the interviews, we compiled a tabulated list of factors that were ranked important to client satisfaction by each client. The compiled list provided us an across the board ranking of all the factors to help in determining which factors were considered most important by the clients. To obtain a composite ranking of the factors, we averaged the rankings given by the clients on each factor. The composite ranking of the top six factors included:

Ranking	Factor
1	Timeliness and quality of products and services
2	Technical support
3	System design and programming expertise
4	Ease of obtaining services
5	Customer support
6	Cost of ADP services

We ascertained that the highest ranked factor was, in fact, two separate factor dimensions, *Timeliness* and *Quality*. By incorporating these dimensions as separate factors, a modified list of seven factors was obtained. The remaining factors in the original set were not discounted. They were determined to be too specific in scope and were therefore considered to be candidate subelements (items) relating to one of the seven factors.

3. Item Development and Validation

Our next step was to identify specific items obtained from the interviews which related to the NARDAC's performance and which were measurable. The information was extracted from client comments documented on the form we used during the interviews (see Part 4 of Appendix E) and obtained in taped sessions. Working with our own individual set of interview data, we placed each item on a 3 by 5 card. When this was completed, we compared our sets of items for redundancy and clarification, while referring to information from other surveys and relevant literature. Our sets were then consolidated into a set containing forty-two performance-related items which were then categorized under one of the seven factors we had identified in the previous process. In those instances when items could not be placed under a category because of the factor's specificity, we redefined the scope of the factor and broadened its applicability to include the item. The factors, as modified by this process, are listed below.

- Timeliness of Products and Services
- Quality of Products and Services
- Technical Proficiency
- Hardware, Software and Communications Technology
- Accessibility
- Customer Support
- Service Level Management

The final set of items and modified factors established the client satisfaction domain for the NARDACs and provided the fundamental basis of what to measure in order to gauge the level of an individual client's satisfaction. The key elements of this set, which is presented in Appendix F and discussed in the following sections, formed the foundation for the construction of the measurement instrument.

D. MEASUREMENT INSTRUMENT

Several different measuring instruments were investigated through literature searches and reviewing surveys currently being used in the government and private industry to determine which instrument would best suit our study. Buzzell, Cox and Brown assert, the more structured the measuring instrument is, the more accurate the output [Ref. 26]. Typically, in marketing measurements, it is important to have a measure of the *degree* of the response. To aid in this type of measurement, degrees of response are scaled to make *more or less* discriminations. Three of the most common marketing measurements are variants of the Semantic differential scale, Likert scales and Paired comparisons (see Figure 3.1). According to Buzzell, Cox and Brown, however,

> Although it is possible to attach numbers to such a verbal scale for purposes of analysis, it should be remembered that this is still an ordinal scale, strictly speaking, and estimates with regard to intervals or degrees of response are simply estimates. Quantify them if you will, but there is no direct means of determining the validity of such quantifications.

There are several methods of collecting data for the instrument. The most common ones used in marketing research are *personal interviews*, *telephone interviews* and *self-administered questionnaires* (mail surveys). Listed in Figure 3.2 below are some of the advantages and disadvantages of each method, as cited by ([Ref. 27] and [Ref. 28]). The surveys that we found currently being used in the government and industry were all self-administered questionnaires. In the government, cost and time restraints seem to make self-administered mail questionnaires more prevalent.

1. Questionnaire Development Standards

Due to the limited resources available at a NARDAC to conduct surveys, self-administered questionnaires would be the easiest to implement. There are

SEMANTIC DIFFERENTIAL SCALE

"Would you rate General Motors as being:

Progressive	___	___	___	___	___	___	___	Conservative
	1	2	3	4	5	6	7	
Strong	___	___	___	___	___	___	___	Weak?"
	1	2	3	4	5	6	7	

LIKERT SCALE

"Ajax is an excellent cleanser."

___ Agree extremely strongly
___ Agree fairly strongly
___ Agree
___ Undecided
___ Disagree
___ Disagree fairly strongly
___ Disagree extremely strongly

PAIRED COMPARISONS, e.g.,

Do you prefer Brand A or Brand B?
Do you prefer Brand C or Brand A?
Do you prefer Brand B or Brand C?

Figure 3.1 Commonly Used Types of Rating Methods and Scales.

1. ***Personal interviews*** :

Advantages:

- They tend to allow the use of a more representative sample.
- Achieve higher return rate.
- Produce fewer incomplete questionnaires.
- More questions can be asked.
- More complex measurement methods can be used.
- Verification or responses may be made more readily.

Disadvantages:

- More costly.
- Subject to interviewer bias, error and cheating.
- Subject to response bias.

2. ***Telephone interviews*** :

Advantages:

- Can be conducted quickly.
- Relatively low cost.

Disadvantages:

- Sample bias.
- Usually must be brief.

3. ***Self-Administered questionnaires***:

Advantages:

- Least costly.
- Avoid interviewer bias.
- Larger number of respondents can be reached.
- More convenient to the respondent.
- Requires a smaller staff for administering.

Disadvantages:

- Sample is almost certainly not likely to be "representative" unless follow up is done.
- Must be carefully designed and pretested to avoid confusion on the part of the respondent.

Figure 3.2 Data Collection Methods (Advantages and Disadvantages)

several methods of conducting a self-administered questionnaire. The questionnaire could be administered to a group of respondents gathered at the same place at the same time (e.g., at a NARDAC Client Council/Advisory Board meeting). They could also be hand-delivered at the respondent's office to be completed and picked up at a later time. Mailing is another option, or a combination of mailing and one of the above methods can also be used. [Ref. 23: p. 159] The questionnaire can be hand-delivered, where it could be explained and any questions answered, and then mailed when completed. The questionnaire designed for the NARDACs was based on the premise that the survey would be mailed with limited intervention required by the NARDAC. The following criteria was used in developing the NARDAC Client Satisfaction questionnaire:

- Instructions for completing the questionnaire must be clear and concise.
- Scales must be easily understandable and unambiguous.
- Questions will be closed-ended and as easy to answer as possible.
- Definitions will be provided as required.
- Comment section will be provided.
- The number of questions should be held to an absolute minimum.
- Questionnaire must have an overall professional appearance (i.e., neat and legible).

Since the majority of the questionnaire respondents are considered middle to upper level management within their organization (GS-12 to GM-15), we felt a self-administered questionnaire would provide us with the needed information with minimum intrusion on their schedules. In this regard, we felt it was important that the instructions were self-explanatory and the questions easily answered. According to Arlene Fink, "A self-administered questionnaire that is hard to read can confuse or irritate respondents. The result is a loss of data." [Ref. 28: p. 44] We tried to

formulate the questions in the respondents' own vernacular. Definitions of certain terminology and phrases were provided to help alleviate any ambiguities. We also felt it was important to provide the respondent with an opportunity to comment on any of the items in the questionnaire or provide additional information since the questions were closed-ended. Additionally, the questionnaire had to make a good visual impression. Since the questionnaires are distributed to valued NARDAC clients, we felt that if the appearance made a bad first impression, then response rate could possibly suffer.

2. Questionnaire Format

The questionnaire measures the respondents level of satisfaction with respect to a set of forty-two performance related items. These items are grouped together into seven categories or factors as described in section B *(Factor Identification)* above. Although we were concerned with the length of the questionnaire, we allowed adequate space between questions for comments and to prevent the questionnaire from looking cluttered. The questionnaire is eight pages long or four pages copied back-to-back. It is widely acknowledged in the social research community that an improperly laid out questionnaire can not only confuse the respondents, but also make the scoring of the questionnaire more error-prone and time consuming. One of the most common questionnaire formats is one where the respondent is asked to check one response from a series [Ref. 27: p. 205]. Each item is scored using a five-point Likert scale. A *not applicable* box is also provided. According to Babbie, *boxes,* adequately spaced apart, are the best for the respondent to answer. The scale is measured from one to five, where five is *very satisfied*, and one is *very dissatisfied.* The respondents are asked to place an *X* in the box which most appropriately describes their level of satisfaction with that item. The scales are laid

out vertically to the side of each item to facilitate scoring of the questionnaire. Key words and/or phrases were underlined in each item to help focus the respondent's attention on the major point the item is measuring (see Appendix F).

3. Questionnaire Critique

After the first draft of the questionnaire was completed, it was sent out for review to all nine NARDAC Client Liaison Officers/Marketing representatives, and to various Naval Postgraduate School faculty (see Appendix C). Generally, the comments from the NARDACs were favorable. Most felt we had developed a comprehensive questionnaire and had addressed the major issues presently concerning the NARDAC clients. The majority of the comments focused on the format and length of the questionnaire. Although some of the NARDACs indicated there were some questions that might be redundant, none of them indicated which ones were the culprits. One NARDAC felt the sentence structure of the items was too choppy and short, and another suggested we include an *overall* rating question at the end of the questionnaire. Surprisingly, the majority of the comments regarding item construction came from the Naval Postgraduate School faculty. It was pointed out that many of our items were asking the respondent to rate more than one aspect in a single item. For example, in item twelve, the respondent is asked to rate the *format* and the *quality* of the Chargeback Report. The respondent may feel that the format is satisfactory, but the quality is not. Other comments dealt with the lack of definitions regarding the meaning of certain terms, and the order in which the questions were presented. The above comments were incorporated into the second draft of the questionnaire. Comments referring to the implementation of the questionnaire were disregarded because they fell outside the scope of our study (e.g., adding an internal routing stamp).

4. Questionnaire Second Draft *(Short Form)*

The second draft of the questionnaire looked considerably different from the first version (see Appendix G). It is divided into three major sections. The first section still measures the respondents level of satisfaction with respect to a set of performance related items, but the three comment lines have been dropped, two additional questions were added, and the ordering and grouping of the questions were changed. These revisions made the questionnaire appear to be shorter - four pages long or two pages copied back-to-back (*Short Form*). The items are still grouped together into seven categories or factors, but the names have changed. Although the length of the questionnaire was a concern, we did allow adequate spacing between questions to prevent the questionnaire from looking cluttered. The response boxes formed a matrix down the right side of the page to facilitate the scoring of the questionnaires. The scale was repeated at the top of each page for the convenience of the respondent.

A new section was also added to the *Short Form.* In Robert Alloway's paper, *Defining Success for Data Processing,* he discovered that in the six companies that he studied, all were violating the fundamental rule of management, "...identify which activities are most important and allocate resources to ensure good performance on those activities." [Ref. 29: p. 1] Thus, the second section of the questionnaire measures the relative importance of each of the seven major categories described in the first section of the questionnaire. Again, each category is scored using a five-point interval scale. Boxes are provided for the respondents answers. The scale is measured from one to five, where five is critical, and one is irrelevant. The use of the second section will be described in detail in Chapter V. The data from this section will not be used in the computation of the index; it will only be used as a

management tool. The last section of the questionnaire permits the respondent to make comments about any item(s) or general comments about the service provided by the NARDAC. The trailing edge of the questionnaire provides the NARDAC with pertinent administrative information regarding the respondent.

5. Final Review of Questionnaire

A revised *long form* [1] and the *short form* were sent out to all NARDAC Commanding Officers (COs) and NAVDAC for one last review before the pilot survey was conducted. During a NARDAC Board of Directors meeting, the COs decided that the scale identifiers at each extreme did not demonstrate enough differentiation from the other identifiers. Therefore, the words *extremely satisfied* and *extremely dissatisfied* replaced the identifiers *very satisfied* and *very dissatisfied.* They also changed the middle identifier from *Neither Satisfied Nor Dissatisfied* to *Neutral.* They felt this wording would be be easier to interpret by the respondents and NARDAC management. Other changes that were made included the definition of factors and items, the rearranging and regrouping of items, and the revision of some of the factor names. One additional factor was also added. The *short form* of the questionnaire was unanimously approved. They felt that the *long form* would be too overwhelming for most of their clients. However, they still would like to use the *long form* for specific clients from whom more data is required to help identify and resolve discrepancies.

---

[1] The revised *long form* is the original questionnaire with only content changes made. The format remained the same (see Appendix H).

IV. QUESTIONNAIRE EVALUATION

This chapter describes the methods we employed to evaluate the measurement instrument, the client satisfaction questionnaire. As discussed in the preceding chapters, this instrument was developed to capture the domain of client satisfaction for the NARDACs and the distinguishable elements (items) that influence this domain. The administration of the questionnaire to a group of subject clients at a pilot site and the evaluation of the questionnaire based on the scored results are presented. The results were analyzed using several statistical software packages. STATGRAPHICS, a personal computer (PC) based statistical graphics system, and the Statistical Package for Social Scientists (SPSS-X), a mainframe computer program, were used in performing descriptive statistics, construct validation tests, and reliability tests. In addition, various microcomputer programs were augmented to provide other tools for the evaluation of the measurement instrument.

A. PILOT DESCRIPTION

To collect the data for evaluation of the questionnaire, we used a self-administered mail survey. One NARDAC site was chosen to pilot the measurement instrument, consisting of fifty-two client organizations which formed the sample population. Although we realize that a nationwide survey would provide us with a greater *sample size to item ratio* and more statistically sound test results, time and schedule constraints and the lack of physical resources compelled us to preclude exercising this alternative. Nevertheless, we felt the pilot sample size was sufficient for an initial evaluation of the instrument. Considering geographical proximity, the

clients serviced by NARDAC San Francisco were therefore selected as the subject group for evaluation of the questionnaire (see Appendix I).

1. Pilot Administration

After receiving approval from the Commanding Officer of NARDAC San Francisco to conduct the pilot, we obtained a list of active clients from his Client Liaison staff. Information from this list included the name of the client organization, name of the organization's POC, mailing address and telephone number. Additionally, the staff supplied us with supplemental profile information on each client. The profile data consisted of current fiscal year revenues earned to date from the clients and types of services provided to the clients by the NARDAC.

Once the NARDAC Board of Directors gave us the approval to proceed with the pilot testing, we mailed each client a pilot survey package that consisted of a cover letter, the self-administered questionnaire (see Appendix J) and a pre-addressed return envelope. In the cover letter, we requested each client's cooperation in completing the questionnaire to assist us in evaluating the measurement instrument. The client was also asked to critique the questionnaire in terms of content, presentation and format. A sample of the cover letter is presented in Appendix C.

The survey packages were posted to the clients ten days before the requested return deadline which allowed the respondents at least one full work week to complete and return the questionnaire. The return envelope was provided to accelerate the return time.

2. Pilot Response

Of the fifty-two survey packages mailed, we received twenty-six completed questionnaires which seemed to suggest a fifty percent response rate. Current survey

research guidelines on percentage return rates indicate that fifty percent is an acceptable response rate. Babbie suggests that a response rate of seventy percent or more is very good, a response rate of at least sixty percent is good and a response rate of at least fifty percent is adequate for analysis and reporting. He does caution, however, that this yardstick is only a rough guide which has no statistical basis. The accepted practice in computing response rates is to omit all those questionnaires that could not be delivered due to bad addresses and the like. This number is subtracted from the initial sample size to obtain the net sample size. Then, the number of completed questionnaires is divided by the net sample size to produce the response rate. [Ref. 23: p. 165] Although the number of questionnaires we received was far below the number we expected, we felt that this could have been attributed to the timing of the pilot survey which occurred during the Christmas season (early December). To substantiate reasons for adjusting the net sample size, it was necessary for us to obtain concrete evidence for the number of omitted non-responses. To accomplish this, we made numerous attempts to contact by phone those clients who had not responded. In many cases, we were unsuccessful in our efforts due to busy signals or no answer. In those few instances when we were able to contact the client organization, messages were left to the organization's POC, yet no return calls were ever received. Some of the client organization POCs who were successfully contacted indicated that they never received the survey package. In one specific case, the survey package had been addressed to the client organization headquarters rather than to the field activity where the organization's POC was located. Among the non-respondents contacted, we accounted for three clients who did not receive the survey package. Two survey packages were returned for reasons of insufficient address or unknown addressee. And lastly, one completed

questionnaire arrived four weeks after our analysis of the initial set of twenty-six responses. Our net sample size after adjustment, therefore, was forty-six which yielded a response rate of fifty-seven percent.

Due to time and schedule constraints, subsequent mailings were not conducted. Moreover, we determined that the response rate of fifty-seven percent was acceptable for purposes of our evaluation.

3. Processing of Pilot Data

The twenty-six returned questionnaires were processed in the following manner. As survey packages were returned and after each envelope was opened, the questionnaire was reviewed and checked against the master mailing list. Each completed questionnaire was then assigned a unique client code. The convention used in assigning the client code was straightforward - a number that represented the sequence in which the questionnaire was received. The scored results of each questionnaire were then entered into a microcomputer based spreadsheet (EXCEL) and saved on diskettes for subsequent processing by various statistical software programs. The specific software programs and the results obtained from the processing of the scores are discussed in the next following sections.

B. DESCRIPTIVE STATISTICS

Basic descriptive statistics were used to evaluate the data collected from the pilot survey.[1] Frequency distributions were performed on each item in order to uncover any irregularities in the responses. What was found, was an unusually large number of *not applicable* (N/A) responses had been given for many of the items. Figure 4.1

---

[1] The descriptive statistics developed from the pilot survey are proprietary information of NARDAC San Francisco, and will not be disclosed in this thesis.

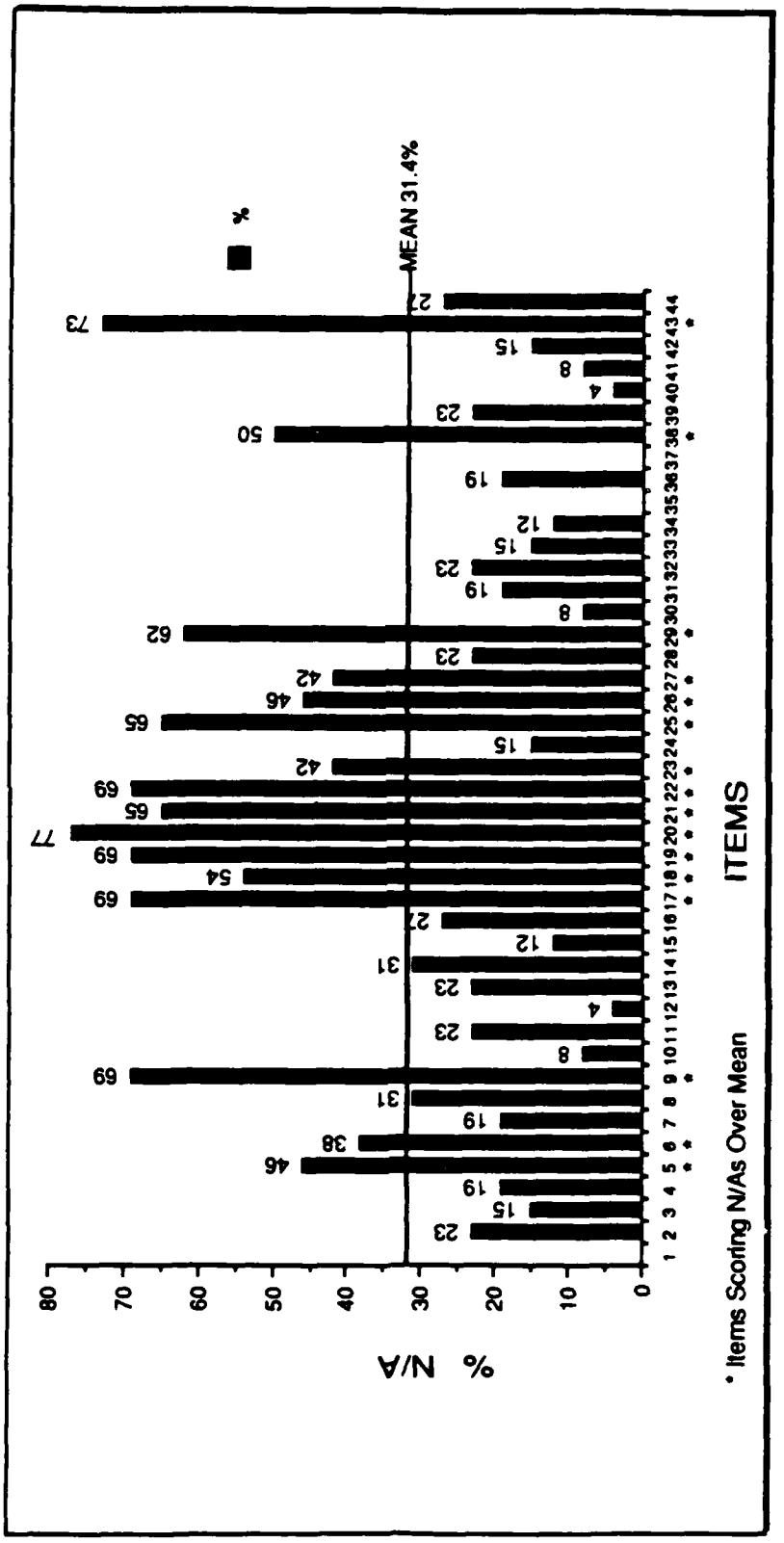


Figure 4.1 N/A Response Rate Per Item

shows a histogram of all the items and their associated percent of *not applicable* responses. A three-step process was used to determine the cause of the high *N/A* response rate.

The first step was to isolate those items that had an unusually large number of *not applicable* responses; the mean was chosen as the break-point. Any item which had a *not applicable* response rate above 31.4 percent was coded with an asterisk on the histogram as shown in Figure 4.1 (i.e., items 5, 6, 9, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 29, 38, and 42). Table 4.1 shows the break-down of the isolated items by factor.

It was interesting to note that all of the items for the factor *Quality of Products and Services*, and three out of the five items for the factor *Timeliness of Service*, fell above the mean (31.4%) *N/A* response rate. Problems discovered in item construction for these two factors will be discussed in Section D of this chapter.
The next step was to see if there were any relationships between the sixteen items listed in Table 4.1 and the respondents which contributed significantly to the *N/A* response rate for those items. Figure 4.2 shows the number of *N/A* responses for the sixteen isolated items by respondent. Again, the mean was chosen as the break-point to separate those respondents that had a significantly large number of *N/A* responses. The asterisks in Figure 4.2 indicate which respondents fell above the mean (9) rate (i.e., respondents 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 21, 22, 23, 24, and 25).

During the last step, we looked at the profile of the respondents isolated in the previous step to determine what may have caused these respondents to answer *N/A* to so many items. Table 4.2 lists all the pilot respondents (by code), NARDAC San Francisco's fiscal-year-to-date (FYTD) revenue for that respondent, and the type of

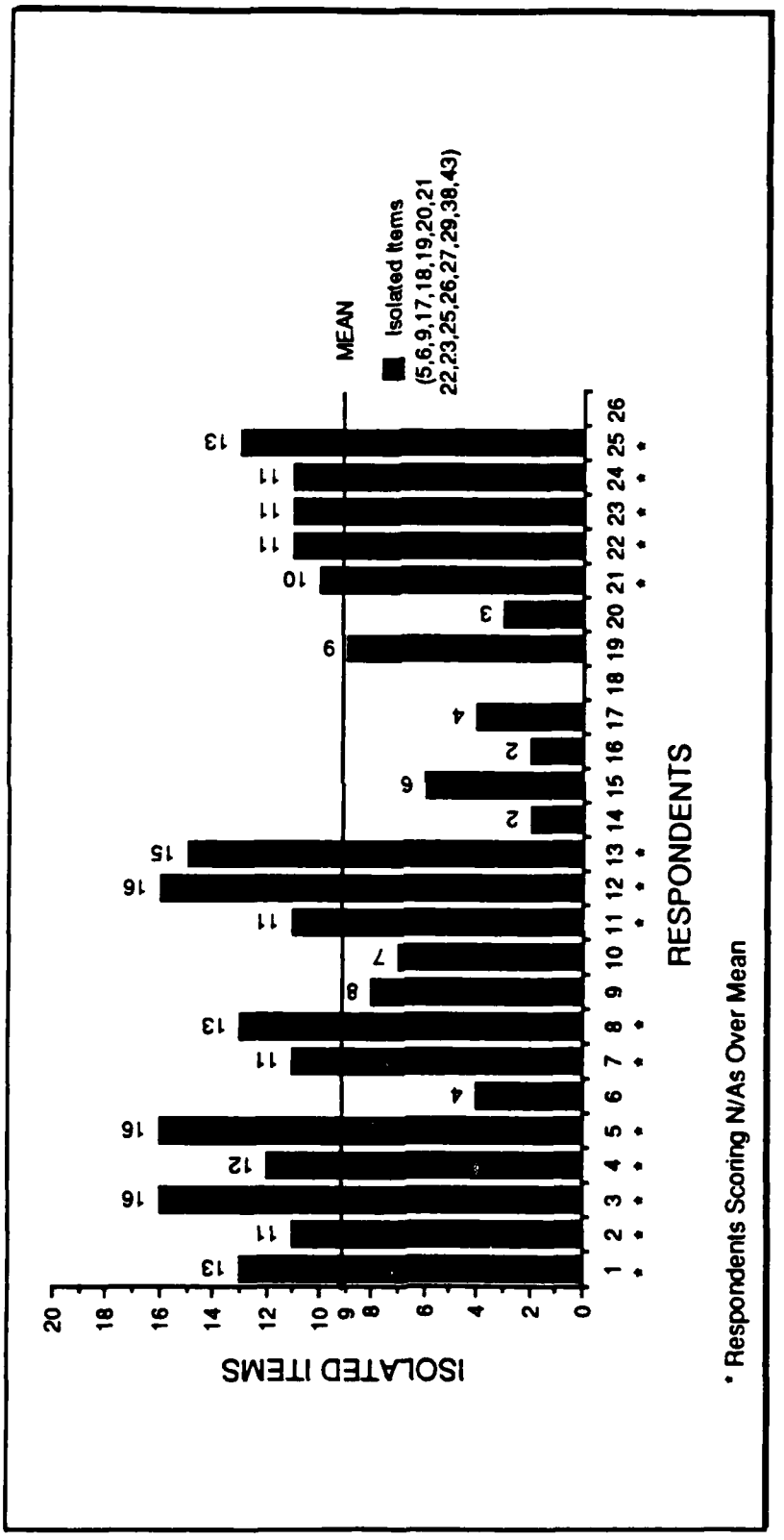


Figure 4.2 N/A Response Rate for the Isolated Items

TABLE 4.2 Pilot Client Profile Data

CLIENT CODE	FYTD REVENUE ($000)	SERVICE PROVIDED
1	*23*	*Risk Assessment*
2	*5*	*Training*
3	*2*	*Study*
4	*1*	*Programming*
5	*0*	-
6	46	Training & Procurement
7	*2*	*Training*
8	*17*	*Training*
9	10	IRC Support/Sperry
10	5	Labor
11	*14*	*Study & Procurement*
12	*1*	*Programming*
13	*117*	*ADP Security Risk Assesment*
14	26	Programming
15	24	IRC Support, Procurement, Tech Support
16	172	Programming, Telecom, Key-Entry, Burroughs, IV Phase
17	6	FYPR-Sperry
18	34	Sperry, Comlines, Terminal
19	1	Sperry
20	5	Labor, Misc, Telecom
21	*21*	*Procurement, Training*
22	*8*	*IRC Support, Procurement*
23	*293*	*Programming, Procurement*
24	*6*	*Training*
25	*0*	-
26	17	IRC Support, Procurement
Mean	32.9	For all respondents
Mean	*7.7*	*(Except for respondents 13 & 23)*
Sum	856	For all respondents

service provided. The respondents in ***bold*** type are the ones isolated in step two.

The following observations were made:

- The mean *FYTD Revenue* for all the isolated respondents (except respondents 13 and 23)[1] was $7,700. As compared to the total mean for all respondents, these are relatively small clients.
- Forty percent of the highlighted respondents only received training as a service. The questionnaire does not accommodate training services as well as other services provided by the NARDAC. This problematic area will be addressed in Section D of this chapter. It should also be noted that many of the NARDACs distribute separate surveys for clients receiving training.
- The contract for respondent 3 had not begun at the time the pilot was conducted.
- The contracts for respondents 5 and 25 have been cancelled.

TABLE 4.1 Break-down of Isolated Factors.

FACTOR	ITEM(S)
Accessibility	5
System Resources	6, 9
Cost Management	-
Quality of Products and Services	17, 18, 19, 20, 21, 22, 23
Timeliness of Services	25, 26, 27
Responsiveness	29
Staffing	38
General Business Practices	43

[1] Respondent 13 had a one time contract for ADP Security Risk Assessment and had little interaction with NARDAC San Francisco. Respondent 23 had a large hardware procurement which accounted for 75% of his total FYTD revenue. It was felt that these two respondents' relatively high FYTD revenue was not the norm and were disregarded in the computation of the mean for the isolated respondents.

It would be premature to make any widespread conclusions about the quality of the questionnaire from this phase of the evaluation since the number of respondents (26) from the pilot survey was small. Further testing of the instrument with a larger sample size will be required in order properly evaluate the questionnaire; however, it is clear that there are problems with some of the items in the factors *Quality of Products and Services* and *Timeliness of Services*. These issues will be addressed in Section D.

Generally, the comments about the questionnaire were quite favorable. Only seven out of the twenty-six respondents actually commented on the construction of the questionnaire. Of those who commented, over seventy percent thought the questionnaire was well prepared. A typical comment was, "Your questionnaire was quite thorough, easy to read, and concise...the instructions were fine...". Only one respondent (**#12**) felt the questionnaire was too long, but he is a new client and answered thirty-one of the forty-four items on the questionnaire with a *not applicable* response.

C. VALIDATION AND RELIABILITY PROCEDURES

The next step in the evaluation of the instrument was to test the questionnaire for its validity and reliability. In this study, we examined content validity or face validity and construct validity. Cronbach's alpha was used to examine reliability.

1. Content Validation

Content validation is determined from the content and operations of the measurement instrument [Ref. 15: p. 156]. Others, such as Babbie, refer to content validity as face validity or logical validity. For instance, if we were indeed interested in measuring client satisfaction of those clients supported by the NARDACs, then from a logical point of view each of the items considered should appear on its face to

indicate the respondent's satisfaction with the services provided by the NARDACs. [Ref. 23: p. 256] The content of the measurement instrument, therefore, has to be designed to include all important items or attributes affecting a client's satisfaction with the NARDAC support. As described in Chapter III, this has been the underlying theme of our methodology to identify those items and to test the list of items for completeness.

The items were examined, prior to the pilot, by independent groups of experts as the initial phase in validating the completeness of the items list. This follows a similar approach used by Pearson in which independent assessments and the collective experience of expert groups provided different perspectives to counterbalance any significant omissions that could have occurred. [Ref. 16: p.89] The first group of experts was selected on the basis of their experience in ADP and interaction with the clients. This group was composed of all the NARDAC Client Liaison Officers who reviewed the initial draft of the questionnaire. The same questionnaire was reviewed by another group of experts in the academic environment with research and consulting experience in the fields of data processing, survey research and statistics, and organizational management. This second group was comprised of faculty in the Information Systems, Operations Research and Administrative Sciences curriculums at the Naval Postgraduate School. Based on the comments and recommendations from the first two groups of experts, the item list was modified and the questionnaire revised. The revised questionnaire was then reviewed by a third group of experts with extensive experience in the data processing field and management in the Navy and with a history of formal interaction with client organizations. This last independent body of reviewers was made up of the Commanding Officers of the NARDACs and the NAVDAC staff, in essence, the

NARDAC Board of Directors. Details of these reviews are described in Chapter III, Section D, Parts 3 and 5. The modifications recommended by the three review groups and the independent assessment of the completeness of the item list indicated that the important items influencing a client's satisfaction with NARDAC services had been identified and validated.

The other aspect of content validity deals with the logical soundness of the operations for measuring the content of the items. To establish the operations for the measurement of this content, the Likert Scale methodology was used. The selection of this methodology for appropriateness and the development of the measurement instrument is described in Chapter III. On the basis of this approach, we determined that this measurement process was further evidence of content validity, although subjective in nature.

Content validity was likewise performed by the clients themselves during the pilot phase of the measurement instrument. The clients participating in the pilot were asked to critique the questionnaire by providing an assessment of the following:

- Clarity of item phraseology
- Appearance of item redundancy
- Omission of critical items
- Readability of the survey and ease of completion
- Clarity of the instructions

Their assessment of the above items addressed the questionnaire's content structure and completeness of items; therefore, further evidence of content validity had been achieved.

2. Construct Validation

In the previous section, content validity of the measurement instrument and the process in performing this test for validity was described. Construct validity focuses on the nature of the items being measured and the extent to which these particular items relate to one another. Thus, it attempts to measure the correlations among many independent items to determine whether these items are strongly enough related to describe a particular relational concept. In this case, construct validation was used to determine how strongly each of the forty-four items related to one another and to each of the eight factors. Factor analysis was the technique employed in an effort to perform this type of validation.

a. Factor Analysis Description

Factor analysis is a multivariate statistical tool that analyzes interrelationships among many items (e.g., questionnaire responses) and then explaining these items in terms of their common underlying dimensions (factors) [Ref. 31: p. 427]. It is, in effect, a simultaneously processed item interdependence technique that tells which item responses measure the same factor and to what extent they measure these factors.

In examining the pilot responses for construct validity, we performed factor analysis on the forty-four item scores for each of the twenty-six respondents. This was accomplished using the factor analysis software module in STATGRAPHICS on a Zenith 248 microcomputer and the SPSS-X factor analysis program on an IBM 3033/4381 computer. The purpose of these trials was to determine if there was indeed some logical pattern among the forty-four items intercorrelations and to see what dimensional factors would be generated based on the intercorrelations of these empirical input. STATGRAPHICS allows the use of

the original item responses and prompts for the number of factors to extract in the analysis. SPSS-X performs similarly and, as an addition, provides the feature of generating the number of factors automatically.

b. Factor Analysis Procedures

The forty-four item scores for each of the twenty-six respondents were entered into a file for processing by the statistical software programs. In the case of STATGRAPHICS, these entries were simultaneously stored by the software program to the work diskette. Parameter specifications used for the factor analysis runs were Pairwise (to handle N/A items) and Varimax rotation. The output in Pearson Coefficient format (available on SPSS-X only) contained more meaningful information for evaluation. The interested reader is referred to the STATGRAPHICS User Guide [Ref. 32] and SPSS User Manual [Ref. 34] for more details on the various factor analysis parameter options.

c. Interpretation of Factor Analysis Output

The output of a factor analysis program is presented in matrix form and consists of several key components. The columns represent the factors (artificial dimensions) generated from the observed relations among items. The values under each factor column represent the correlations between each item and each factor and is referred to as the *factor loadings*. In examining the output, one can determine the meaning of a given factor based on those items that load highly on it. Babbie points out that the generation of factors, however, has no reference to the meaning of the item, only their empirical associations. Furthermore, he offers two important criteria to consider while evaluating this data.

- A factor must explain a relatively large proportion of the variance found in the items, and
- Every factor should be more or less independent of every other factor. [Ref. 23: p. 328]

Although the interpretation of the complex interrelationships found in the factor analysis matrix output is no simple matter, the following provides a step-by-step method for evaluating the data.[1]

1. Examine the factor matrix. Each column denotes a separate factor. The values beneath the columns are the factor loadings for each item on each factor. The numbers on the left margin of the matrix represent each of the 44 items in the questionnaire.

2. Begin the analysis by starting at the first item on the first factor and move horizontally from left to right, looking for the *highest loading* for that item on any factor. For sample sizes less than 100, the lowest factor loading to be considered significant would be ± .50. If the *highest loading* is significant, underline it.

3. Proceed to the second item and, again moving from left to right horizontally, look for the *highest loading* for that item on any factor and underline it. Continue the procedure for each item until all the items have been underlined once for their highest significant loading on a factor. Some items may have several loadings.

4. Identify items that have not been underlined (those that do not load on a factor). If the item is considered important, leave the item as is. If the item(s) are considered of minor importance to client satisfaction, the item(s) may be eliminated and derive another factor analysis solution with the non-loading items eliminated.

5. When all significant items are loading on a factor indicating that a factor solution has been obtained, assign a name or meaning to the pattern of factor loadings. Items with higher loadings are considered more important. The final result will be a label or a name that represents each of the derived factors. [Ref. 34: pp. 250-251]

---

[1] It is recommended that the expertise of a social researcher be used in interpreting the factor analysis output.

d. Pilot Results

The factor analysis execution runs of the pilot data using both STATGRAPHICS and SPSS-X produced unusable output and therefore inconclusive results. One explanation for these results could be the small sample size to item ratio for this pilot (.59 : 1). Hair et. al. emphasizes that, as a general rule, there should be five times as many responses as there are items (5:1) to be analyzed and that this ratio is considered to be somewhat conservative. He further adds that when dealing with smaller sample sizes and a lower sample size to item ratio, any findings should be interpreted with caution. [Ref. 34: pp. 250-251] Ideally then, a preferred sample size to ensure a more meaningful and empirically sound evaluation of the questionnaire should be at least 220 (i.e., 5 times 44 items).

3. Reliability Testing

According to Kerlinger, "reliability can be defined as the relative absence of errors of measurement in a measuring instrument". In other words it is the *accuracy* or *precision* of a measuring instrument. [Ref. 30: p. 405] There are basically two types of reliability tests that can be performed: test-retest method, and the internal consistency method (Cronbach's alpha). According to Carmines and Zeller, test-retest method is one of the easiest ways to estimate the reliability of empirical measurements [Ref. 31: p. 37]. In this method, the same survey is given to the same set of respondents after a period of time, and the correlation between the scores is obtained. If exactly the same results are obtained on the two administrations of the survey, the test-retest reliability coefficient will be 1.00 (i.e., perfect reliability). The problem with this method is that the respondent's perception of *client satisfaction* will presumedly change over time based on the quality of services provided by the NARDAC. Thus, a low test-retest reliability correlation may not indicate that the

reliability of the questionnaire is low. The test-retest method can also be expensive and impractical to administer.

A much better method of determining reliability is the measurement of the amount of error in the instrument. The amount of error in a measure can be determined using Cronbach's alpha test applied to interitem correlations, which can be expressed as follows:

$$\alpha = \frac{N\rho'}{[1 + \rho'(N - 1)]} \quad \text{where}$$

N = the number of items
ρ' = the mean interitem correlations.

The value α will vary between .00 and 1.00, when the mean interitem correlations[1] are between zero and one. The value α at 1.00 is perfect reliability, but a reliability score of .80 is considered acceptable for basic research [Ref. 15: p.788]. As with the factor analysis procedure, the reliability test was performed, but because of the small sample size, the results were inconclusive. It is recommended, however that a reliability test be performed on the instrument prior to implementing the Client Satisfaction survey. The ratio of sample size to number of items should be at least (5:1) or greater. Reliability testing is not available in the STATGRAPHICS program however; it can be easily tested using procedure *RELIABILITY* on SPSS-X. The *Alpha model* (Cronbach's alpha) is the default model in procedure *RELIABILITY*.

---

[1] To find the mean interitem correlation, the correlation coefficients are summed and divided by the total number of coefficients.

D. REVISED QUESTIONNAIRE

The frequency distributions calculated in section B above highlighted two factors that displayed an usually high rate of *not applicable* responses: *Quality of Products and Services* and *Timeliness of Services*. Each item within these two factors were carefully examined and compared to the profile of the respondents which answered *not applicable* to those items. From our analysis, we concluded that clients, such as those receiving training or Information Resource Center (IRC)[1] assistance, had difficulty answering the questions in those two factors.

As a result, questions 18 and 28 were identified as being too specific and were revised to broaden their applicability. Figure 4.3 illustrates the changes made. Of course, further testing of the instrument with a larger sample size will have to be performed to further refine the instrument, but we feel these preliminary changes will reduce the number of *not applicable* responses for the factors, *Quality of Products and Services* and *Timeliness of Services*. See Appendix K for the revised questionnaire.

---

[1] The IRC at NARDAC San Francisco was created to help Navy commands and other government agencies to deal with the microcomputer revolution. Basically, it helps the client take full advantage of the productivity enhancement capabilities of a microcomputer.

QUALITY OF PRODUCT AND SERVICES
(NARDAC's ability to deliver reliable services and excellent products)

CURRENT: 18. The quality of NARDAC's data processing services.

REVISED: 18. The quality of NARDAC's services.
(Services include training, Information Resource Center (IRC) assistance, data processing, Client Liaison services, studies, etc.)

TIMELINESS OF SERVICES
(NARDAC's ability to be punctual and "schedule conscientious" with its products and services)

CURRENT: 28. Timeliness of deliverables from NARDAC.

REVISED: 28. Timeliness of services from NARDAC.
(Services include training, Information Resource Center (IRC) assistance, data processing, Client Liaison services, studies, etc.)

Figure 4.3 Changes to items 18 & 28.

V. DATA ANALYSIS TECHNIQUES

A. INDEX CONSTRUCTION

An index is a composite measure very frequently used in social research [Ref. 27: p. 361]. Babbie lists the following advantages of an index:

- Allows a researcher to develop a composite measure of variables.
- A single data item might not have enough categories to provide the desired range of variation, but an index formed from several items would.
- Indexes are efficient *data reduction devices* : several indicators may be summarized in a single numeric score.

An *index* is constructed by accumulating scores assigned to individual attributes. The data from the client satisfaction questionnaire was formulated into an index, which would empirically describe the level of client satisfaction. The Likert scale was quantified by assigning values 5, 4, 3, 2, and 1 to *extremely satisfied, satisfied, neutral, dissatisfied,* and *extremely dissatisfied* respectfully; the *not applicable* scores were disregarded in constructing the index. According to Babbie, "the Likert format lends itself to a rather straightforward method of index construction. Since identical response categories are used for several items intended to measure a given variable, each such item can be scored in a uniform manner."[Ref. 27: p. 375] Using the values above, the scores on the questionnaire were averaged for each factor to arrive at a factor index:

$$F_j = \frac{1}{L} \sum_{k=1}^{m_j} I_{jk} \quad \text{where}$$

F_j = individual factor index
m_j = total number of items for factor j

L = number of applicable responses
I_{ij} = numeric score for item k of factor j,
= 1, 2, 3, 4, 5.

To determine the overall *Client Satisfaction Index* (CSI), all of the factor indices (F_j) are averaged:

$$CSI = \frac{1}{N} \sum_{i=1}^{8} F_j \quad \text{where}$$

N = number of meaningful factors
(i.e., factors where at least one item was applicable)
i = the number of factors.

The result will be a *CSI* value between one and five. Each factor was given an equal weight because there were no substantiating reasons for differential weighting of the factors. An interpretation of the index is shown in Table 5.1.

TABLE 5.1.

CSI RANGE VALUES	INTERPRETATION
4.21 to 5.00	Extremely Satisfied
3.41 to 4.20	Satisfied
2.61 to 3.40	Neutral
1.81 to 2.20	Dissatisfied
1.00 to 1.80	Extremely Dissatisfied

B. IMPORTANCE-PERFORMANCE GRID

The *Importance-Performance Grid* was developed by Robert Alloway, from the Sloan School of Management, Massachusetts Institute of Technology, to help identify which client satisfaction factors are most important and to allocate resources

to ensure good performance on those factors (i.e., "prioritizes management's attention"). [Ref. 29]

The last section of the questionnaire is used to collect data which can be used to develop an *importance-performance grid.* The respondent is asked to rate the *relative importance* of each of the eight performance related factors on a scale of one to five. These *importance* scores are then plotted against the average performance scores for each factor (F_j). After all the factors have been plotted, the grid is arbitrarily divided into four quadrants. The placement of the axes is a managerial decision based on what senior management feels are achievable standards of success (e.g., see Figure 5.1). Alloway defines the quadrants as follows:

> The upper-right corner is the relative *success* quadrant. This implies no change is necessary in importance-performance for these criteria.
>
> The lower-left quadrant is also *OK* in the sense that lower performance on these comparatively unimportant criteria is acceptable. My recommendation for these two quadrants, leave them be, might appear much too benign until one contemplates the level of managerial attention and effort required to improve the lower-right quadrant.
>
> The lower-right quadrant is the real *killer*. These criteria have high importance but low performance. These are the criteria which ruin a DP department's reputation, drive users up the wall, seriously impair DP's ability to deliver, and prevent user managers from receiving their relevant information.
>
> The upper-left quadrant should receive declining management attention. Any increased efforts to improve performance here are a relative *waste* of resources. Clearly DP management should not steal resources from the *success* quadrant for use in the *killer* quadrant, rather, DP should reallocate from *waste* and *OK* to *killer*. [Ref. 29: pp. 15-17]

Each client will have a unique profile based on his *Importance-Performance Grid* that will focus management's attention on the factors that the client feels requires

greater attention by the NARDAC. It will also assist the NARDAC in managing scarce resources.

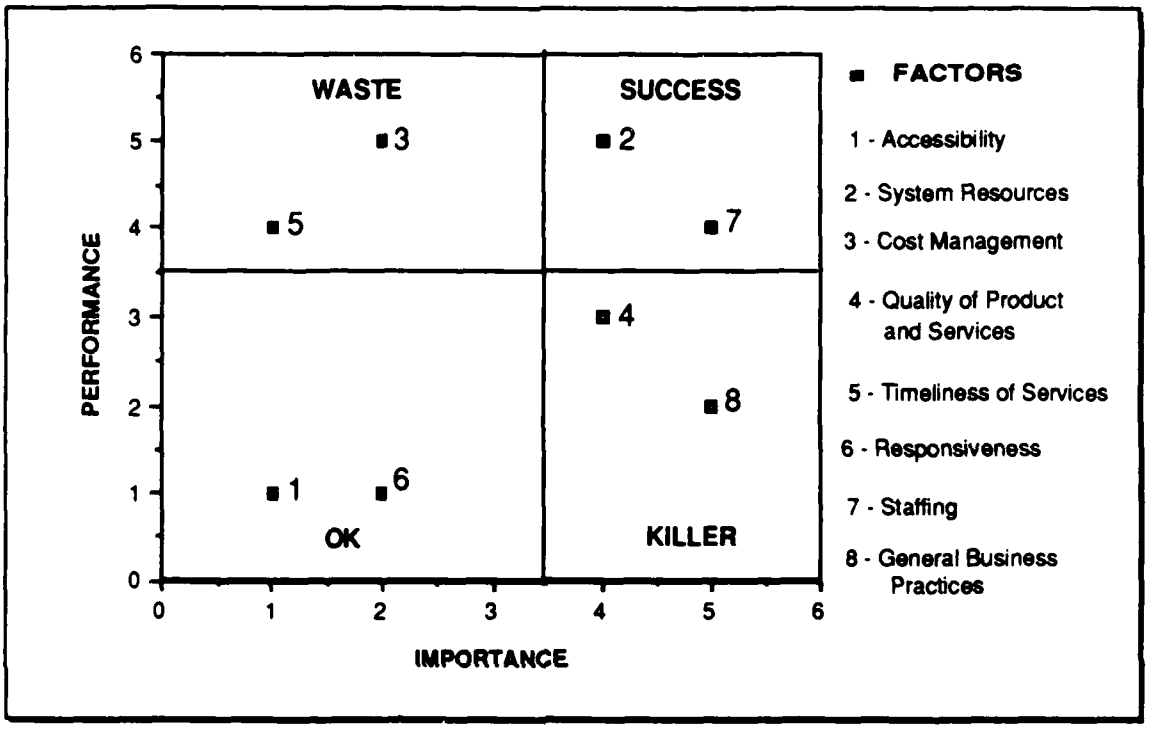


Figure 5.1 Importance-Performance Grid [Ref. 29]

In the above example (Figure 4.1), the grid clearly illustrates how the NARDAC performed on the various factors and the relative importance of each of those factors[1]. Using Alloway's definition of the quadrants as stated above, the NARDAC is performing quite well in the area of *System Resources* (2) and *Staffing* (7), which are viewed as important to the client's mission. Therefore, no change in the resource allocation is necessary. *Accessibility* (1) and *Responsiveness* (6), however, rated

[1] These scores are fictitious and were chosen for illustrative purposes only.

very poorly in performance. This rating, on face value, would indicate a need by management to focus more attention in those two areas; however, this particular client views the two factors as relatively unimportant. Therefore, it would be more productive to concentrate on the more important factors, *Quality of Products and Services* (4) and *Timeliness of Services* (5). These two factors were rated high in importance but low in performance and should have management's highest attention. According to Alloway, resources should be reallocated in order to bring factors in the *killer* quadrant into the *success* quadrant. He suggests pulling resources out of the *waste* quadrant. In this area, *Cost Management* (3) and *Timeliness of Services* (5) rated high in performance but low in importance, therefore efforts to improve performance would be wasting scarce resources.

C. FREQUENCY HISTOGRAM

Another interesting and informative way to view the data from the questionnaire is through the use of frequency histograms (Figure 5.2). Histograms are a very good and quick visual tool that can be used to see how all the respondents answered a particular item or factor. The frequency histogram fills in the holes where the CSI leaves off. To illustrate this point, it is plain to see from Figure 5.2 that the clients are quite satisfied with the *accessibility* of the NARDAC with sixty-five percent of the respondents answering *satisfied* or higher. The histogram could also point out a poorly constructed item if there was a very large percentage of *not applicable* responses.

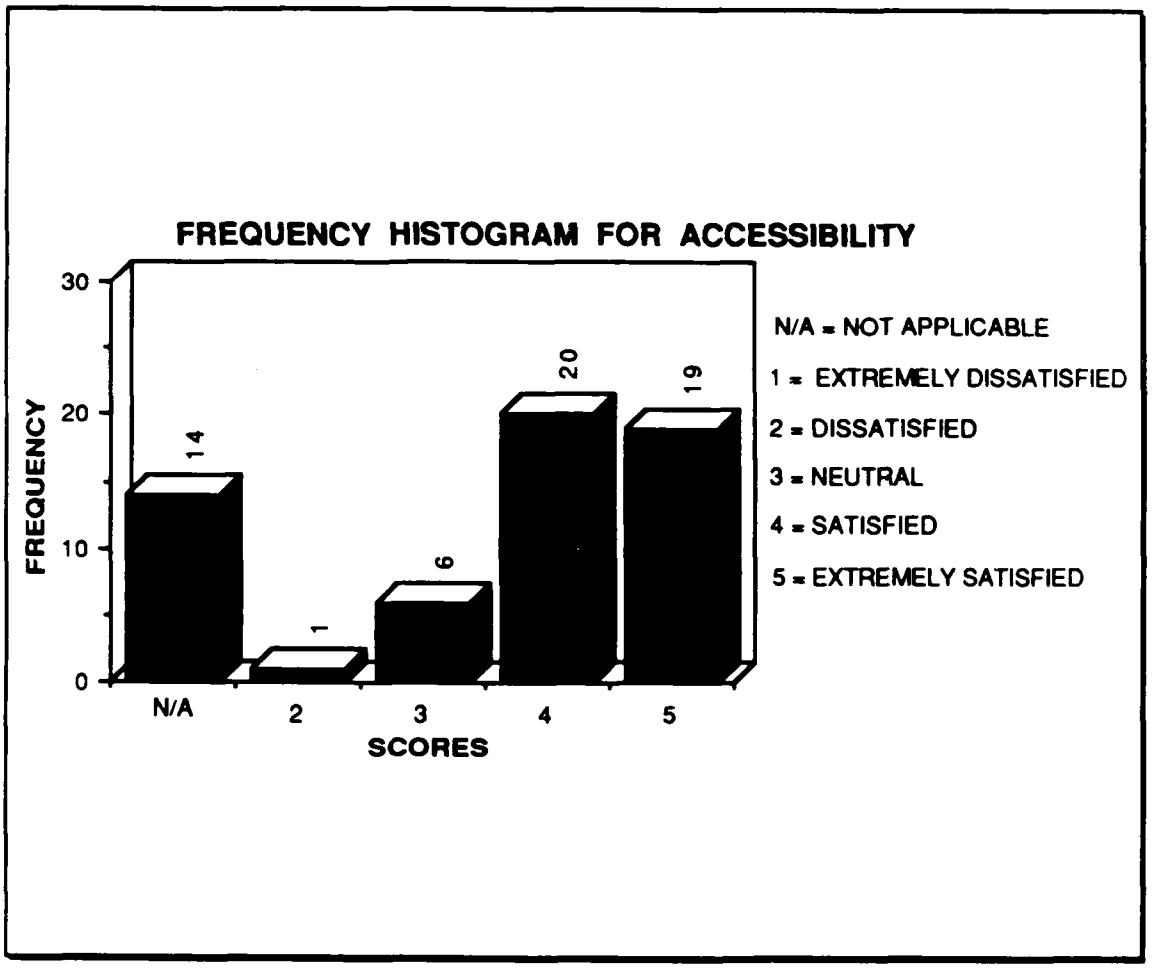


Figure 5.2 Example Frequency Histogram for *Accessibility*

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

In conclusion, the research objectives of this study were accomplished. Client satisfaction was defined within a domain of eight factors made up of forty-four attributes (items). An instrument (questionnaire) was developed to measure these factors and an index was constructed to derive an empirical measure of client satisfaction.

Through the process of conducting personal interviews with clients, holding discussions with NARDAC management, and digesting numerous articles and journals relating to customer satisfaction, *client satisfaction* was adequately defined by eight factors. Forty-four items were developed to further define the factors. A self-administered mail questionnaire was developed to collect the data. This method of data collection was viewed to be the easiest and least costly, as far as time and personnel resources are concerned, to implement by the NARDACs. Due to time and resource constraints, the survey instrument was piloted at one site, NARDAC San Francisco, using their fifty-two clients as the sample. Twenty-six respondents returned the questionnaire, which yielded a return rate of fifty-seven percent after accounting for undelivered questionnaires. Next, the pilot data was examined using descriptive statistics. As a result of this phase of the questionnaire evaluation, it was discovered that two factors exhibited a large number of *not applicable* responses. To alleviate this problem, two items (18 and 28) were revised to broaden their applicability. Content validity, or face validity, was achieved by subjecting the questionnaire to numerous critiques. The critiques were conducted by the nine

NARDAC Client Liaison Officers, faculty members at the Naval Postgraduate School, the nine NARDAC Commanding Officers, and by twenty-six client organizations during the pilot. Construct validity and reliability tests were also performed, but due to the small sample size to item ratio (.59 : 1), the results were discounted. Further testing with a larger sample will have to be conducted by the NARDACs prior to implementing the survey. Several methods of analyzing the survey data were presented in Chapter V. An index was developed to empirically represent client satisfaction and a suggested interpretation of the index was provided. The index is represented by the following equations:

$$F_j = \frac{1}{L} \sum_{k=1}^{m_j} I_{jk} \quad \text{where}$$

F_j = factor index for factor j
m_j = total number of items for factor j
L = number of applicable responses
I_{ij} = numeric score for item k of factor j,
= 1, 2, 3, 4, 5.

$$CSI = \frac{1}{N} \sum_{i=1}^{8} F_j \quad \text{where}$$

CSI = Client Satisfaction Index
N = number of meaningful factors
(i.e., factors where at least one item was applicable)
i = the number of factors.

An *Importance-Performance* grid was presented to help NARDAC management identify which client satisfaction factors are most important to the clients and how to allocate resources accordingly to increase client satisfaction. Another informative way to view the data collected from the survey is to use frequency histograms. The

histograms can easily identify items that are problematic (i.e., an item with a high *not applicable* response rate). As a result of this review, an item may need to be revised or maybe even deleted from the questionnaire.

B. RECOMMENDATIONS

In this last section of our study, we provide several strongly recommended strategies for implementing the measuring instrument that has been developed. In addition, the results and conclusions of our study indicate several areas that may be pursued for further research.

1. Implementation Strategies

The following is a list of recommendations for measuring and analyzing client satisfaction for the Navy Regional Data Automation Centers:

- More rigorous and extensive validation of the measurement instrument should be conducted. With a larger sample size (i.e., at least 220 respondents), the measurement instrument could be fully tested and evaluated for construct validity using the factor analysis method and for reliability using Cronbach's alpha.
- The results of this study and any follow-on actions or plans should be published for dissemination to the NARDAC clients. This information could help to bolster general acceptance of the instrument by the client community. It is especially important that the clients who participated in the interview and the pilot receive this feedback to show confidence that their comments were used constructively.
- The results of this study should also be provided to all NARDAC employees affected by this study. Such information would help to generate positive support and interest in this area and foster general acceptance of the measurement instrument.

- The measurement instrument should be prepared in booklet form to present a more professional appearance. The booklet is bound and not loosely attached together. Moreover, this is the norm in industry and professionally prepared surveys.
- Responsibility for the maintenance and administration of the measurement instrument and its associated database should be assigned to the Client Liaison Officer of each NARDAC. This provides centralized administration of client related data and the possible incorporation of the client satisfaction index (CSI) into the NARDAC's client profile.
- The instrument should be initially administered to all NARDAC clients to establish a baseline CSI by obtaining 100% participation. From our extensive research and lessons learned from the pilot, the questionnaire should be delivered to the clients in person by a NARDAC representative (e.g., the Client Liaison Officer/staff). This ensures certainty of delivery and provides the NARDAC representative the opportunity to update profile information regarding the client. The return of the questionnaire may be accomplished by mail using pre-addressed envelopes with telephone follow-up, or by collecting the questionnaire in person on a predetermined date. To keep the CSI database current, the survey should be administered at least biannually and may be conducted after periodic Advisory Board or Client Council meetings.
- A cover letter, such as the one in Appendix C, should be attached in front of the questionnaire.
- The survey results can easily be processed and maintained on a microcomputer. A microcomputer-based spreadsheet software package, such as *LOTUS 1-2-3*, can be used to consolidate the data from the questionnaire and compute the client satisfaction index. A spreadsheet package with graphics capabilities can produce visually enhanced output of the data (e.g., CSI histograms, frequency histograms of respondents, or other graphics relating to the respondents).
- The measurement instrument should be used to track client satisfaction over time and circumstance. With trend analysis, the effects of technological or

policy changes implemented by the NARDACs on client satisfaction could be identified and evaluated.

2. Further Research Areas

The following is a list of recommendations for further research:

- The forty-four items of the measurement instrument could be re-examined. Further examination of the items could provide insight into the characteristics of each item which could further define client satisfaction. This would be beneficial in identifying performance elements for the NARDACs.
- The use of the measurement instrument could be incorporated into a productivity model that would include effectiveness and efficiency measures. This would allow for the setting of target goals for each NARDAC and the measurement of progress toward those goals. [adapted from Ref. 16: p. 191]
- The measurement instrument could be tailored to other ADP service organizations requiring the measurement of client satisfaction.

REFERENCES

1. Pressman, Roger S., *Software Engineering: A Practitioner's Approach*, McGraw-Hill, 1987.

2. *A Client's Guide to NARDAC Services- A General Overview*, Naval Data Automation Command.

3. *Practical Comptrollership* (a textbook used in Financial Management Courses), Naval Postgraduate School, Monterey, California.

4. "Customer Satisfaction: The Big Payoff", *Benchmark*, Xerox Corporation, Winter 1987.

5. Dorsky, Lawrence R., "Management Measures for Customer Satisfaction", *Proceedings Annual Reliability and Maintainability Symposium*, 1985.

6. "Service Must be a Product Attribute", *Marketing News*, vol. 20, 10 October 1986.

7. Motley, Biff, "Community Bank Strategies - Developing a Customer Service Index", *Bank Marketing*, May 1985.

8. *IBM - Customer Satisfaction*, International Business Machines Corporation, White Plains, New York, G520-5082-1, February 1986.

9. Landvater, Darryl, "Close to the Customer", *Infosystems*, vol. 32, no. 9, September 1985.

10. Peter, Tom, "Quality Is All Very Well, But There's A Lot To Be Said For Quantity", *The San Diego Union*, 30 June 1986.

11. Raburn, Vern, "Does Anyone Care About Users?", *Personal Computing*, October 1986.

12. Inmon, W. H., *Management Control of Data Processing : Preventing Management-By-Crisis*, Prentice-Hall, Inc., 1983.

13. Iivari, Juhani, "User Information Satisfaction (UIS) Reconsidered: An Information System as the Antecedent of UIS", *Proceedings of the Eigth International Conference on Information Systems*, Pittsburgh, Pennsylvania, 6-9 December 1987.

14. Cyert, R.M., and March, J.G., *A Behavioral Theory of the Firm*, Prentice-Hall, Englewood Cliffs, New Jersey, 1963.

15. Ives, Blake; Olson, Margrethe H.; and Baroudi, Jack J., "The Measurement of User Information Satisfaction", *Communications of the ACM*, vol. 26, no. 10, 1983.

16. Pearson, Sammy W., *Measurement of Computer User Satisfaction*, Ph.D. dissertation, Arizona State University, Tempe, 1977.

17. Bailey, James E., and Pearson, Sammy W., "Development of a Tool for Measuring and Analyzing Computer User Satisfaction", *Management Science*, vol. 29, no. 5, May 1983.

18. "How're We Doing?", *ICP Interface: Data Processing Management*, vol. 8, no. 1, January-February 1983.

19. Brown, Kevin, "Industry Gears up to Meet Consumer Demands", *Advertising Age*, 23 February 1987.

20. French, Benjamin I., *Customer Service Manual*, Prentice-Hall, Inc., 1976.

21. *Quality Enhancement Program*, Electronic Data System Corporation, North American Commercial Group, 1987.

22. Naval Facilities Engineering Command Letter 1000: ser. no.15/0237, to Public Work Centers, Subject: *Customer Evaluation of PWC Provided Services*, 5 June 1987.

23. Babbie, Earl R., *Survey Research Methods*, Wadsworth Publishing Co., 1973.

24. Fowler, Floyd J., *Survey Research Methods*, Sage Publishing Co., 1987.

25. Navy Regional Data Automation Center, San Diego Letter 5230: ser. no. 09L/1341, to the Naval Data Automation Command Board of Directors, Subject: *June Board of Director's Tasking*, 18 September 1987.

26. Buzzell, Robert D.; Cox, Donald F.; and Brown, Rex V., *Marketing Research and Information Systems*, McGraw-Hill, Inc., 1969, pp. 132-155.

27. Babbie, Earl R., *The Practice of Social Research*, 4th ed., Wadsworth Publishing Co., 1987.

28. Fink, Arlene, and Kosecof, Jacqueline, *How to Conduct Surveys*, Sage Publications, Inc., 1985.

29. Alloway, Rober M., "Defining Success for Data Processing", *Center for Information Systems Research*, Sloan WP no. 112-80, March 1980.

30. Kerlinger, Fred N., *Foundations of Behavioral Research* , 3rd ed., Holt, Rinehart and Winston, 1986.

31. Carmines, Edward G., and Zeller, Richard A., *Reliability and Validity Assessment*, Sage Publications, Inc., 1979.

32. *STATGRAPHICS, Statistical Graphics System Users Guide*, Statistical Graphics Corporation, Inc., 1986.

33. *SPSS-X User's Guide*, 3rd ed., SPSS, Inc., 1988.

34. Hair, Joseph F., Jr.; Anderson, Rolt E.; and Tatham, Ronald L., *Multivariate Data Analysis with Readings*, Macmillan Publishing Company, 1987.

APPENDIX A. MAJOR NARDAC SERVICES

DATA PROCESSING SERVICES
- TIME SHARING
- DEDICATED

ANALYSIS AND PROGRAMMING SERVICES
- MICROCOMPUTER
- MINICOMPUTER
- MAINFRAME

MICROCOMPUTER TRAINING

ADP SECURITY SERVICES
- TRAINING
- RISK ASSESSMENT ANALYSIS

DATA COMMUNICATIONS PLANNING SERVICES

ADP EQUIPMENT PROCUREMENT ASSISTANCE SERVICES

TECHNICAL CONSULTATION SERVICES

APPENDIX B. CLIENT ORGANIZATIONS INTERVIEWED

SAN DIEGO:

COMMANDER, NAVAL AIR FORCE, U.S. PACIFIC FLEET
COMMANDER, NAVAL SURFACE FORCE, U.S. PACIFIC FLEET
FLEET ACCOUNTING AND DISBURSING CENTER, U.S. PACIFIC FLEET
NAVAL AIR STATION MIRAMAR
NAVAL AIR STATION NORTH ISLAND
NAVAL AVIATION DEPOT NORTH ISLAND
NAVAL SEA SUPPORT CENTER, U.S. PACIFIC FLEET
NAVAL STATION SAN DIEGO
PERSONNEL SUPPORT ACTIVITY SAN DIEGO
PERSONNEL SUPPORT ACTIVITY NAVAL TRAINING CENTER

MONTEREY:

NAVAL POSTGRADUATE SCHOOL

SAN FRANCISCO:

COMMANDER, NAVAL BASE SAN FRANCISCO
MILITARY SEALIFT COMMAND, U.S. PACIFIC FLEET
NAVAL AIR STATION ALAMEDA
NAVAL AVIATION DEPOT ALAMEDA
NAVY SUPPLY CENTER OAKLAND
PERSONNEL SUPPORT ACTIVITY SAN FRANCISCO
SHIP INTERMEDIATE MAINTENANCE ACTIVITY ALAMEDA

WASHINGTON, D.C. :

NAVAL DATA AUTOMATION COMMAND
NAVY INSPECTOR GENERAL
CHIEF OF NAVAL PERSONNEL
COMPTROLLER OF THE NAVY
PERSONNEL SUPPORT ACTIVITY, NAVAL DISTRICT WASHINGTON

NORFOLK:

COMMANDER IN CHIEF, U.S. ATLANTIC FLEET

FLEET ACCOUNTING AND DISBURSING CENTER, U.S. ATLANTIC FLEET

NAVAL AIR STATION NORFOLK

NAVAL AVIATION DEPOT NORFOLK

NAVAL FACILITIES ENGINEERING COMMAND

APPENDIX C. CORRESPONDENCE

17 August 1987

Commander
Naval Interview Headquarters
U.S. Atlantic Fleet
Norfolk, VA 23150

Dear Interviewee,

In a continuing effort to better serve their customers, the Naval Data Automation Command (NAVDAC) and the Navy Regional Data Automation Centers (NARDACs) have undertaken steps to improve customer satisfaction. As part of this effort, they have requested our assistance in developing an index which will be used as a measure of customer satisfaction. We are students at the Naval Postgraduate School in the Computer Systems Management curriculum. We are conducting this research in partial fulfillment of our Master of Science Degree in Information Systems and in hopes of providing NAVDAC and the NARDACs with a meaningful and useful tool.

To develop the customer satisfaction index, we must first identify those critical factors which the customers would use to evaluate the services provided by the NARDAC. As discussed in our phone conversation, we will be conducting a personal interview with you regarding these customer satisfaction attributes on the «date» of August «time». We expect the interview to last approximately one hour. Below, is a representative list of factors which we feel relate to customer satisfaction. We would appreciate your views on them during the interview, or any others that you think may be pertinent.

- Computer capabilities (mainframe/mini/micro support)
- Ease of obtaining services
- Systems design and programming
- Technical support
- ADP consultation and assistance
- Training
- Cost of ADP services
- Customer support
- Timeliness and quality of products and services provided

If you have any questions concerning the interview or our schedule, please leave a message for us at our curriculum office, Autovon 878-2174/2175 or commercial (408) 646-2174/2175, and we will contact you as soon as possible.

We appreciate your assistance in this effort and look forward to meeting you on the <date>.

Sincerely,

Prima A. Morris
LCDR, USN

Robert J. Birdwell
LT, SC, USN

19 October 1987

Dear Client Liason Officer,

As part of the continuing effort to better serve their customers, the NAVDAC Board of Directors requested our assistance in developing an index which will be used as a measure of customer satisfaction. We are students at the Naval Postgraduate School in the Computer Systems Technology curriculum. The research we are conducting in this area is in partial fulfillment of our Masters of Science Degree in Information Systems, and will hopefully provide NAVDAC and the NARDACs with a meaningful and useful tool.

In developing the customer satisfaction index, we have identified those critical factors which existing customers would use to evaluate the services provided by the NARDAC. We obtained these relevant data through a series of personal interviews from a cross-sampling of customers served by NARDAC San Diego, NARDAC San Francisco, NARDAC Washington and NARDAC Norfolk. These interviews were conducted in the format shown in enclosures (1) and (2). In addition to the interviews, we have also conducted comprehensive literature searches, reviewed customer satisfaction surveys/questionnaires currently in use by government and commercial organziations, and interviewed a number of marketing and client liason representatives in private industry to complement our research.

We value your input and field expeerience in the client liason area. Please review the initial draft of the customer satisfaction survey (enclosure (3)) and forward your comments to us by 1 November 1987. Enclosed is a pre-addressed, stamped envelope for your convenience and the timely delivery of your comments. The return date is critical to our research deadline; therefore, we would appreciate your cooperation in helping us meet our milestones.

If you have any questions regarding the survey and/or our research, please leave us a message at Autovon 878-2174/2175 or commercial (408)646-2174/2175 and we will return your call as soon as possible.

Sincerely,

Prima A. Morris, LCDR, USN

Robert J. Birdwell, LT, SC, USN

13 November 1987

Commanding Officer
NARDAC

Dear Captain,

We are forwarding two (2) drafts (revised) of the NARDAC Client Satisfaction Survey, which we developed in response to requirements from the NARDAC Board of Directors, for your review and comments. Both questionnaires are identical in content but differ in format. As part of our research, please indicate which questionnaire format (long form or short form) you prefer and why. As requested by Commander Taylor, please forward your comments via electronic mail to NARDAC Pearl Harbor by 23 November 1987.

If you have questions regarding the questionnaires and/or our research, we may be reached at Autovon 878-2174/2175 or commercial (408) 646-2174/2175.

Very Respectfully,

Prima A. Morris, LCDR, USN

Robert J. Birdwell, LT, SC, USN

7 December 1987

Commander
Naval Client
U.S. Pacific Fleet
San Francisco, CA 94130

Dear Client,

We are students at the Naval Postgraduate School in the Computer Systems Technology Curriculum currently developing a Client Satisfaction Index for the Navy Regional Data Automation Centers (NARDACs). The Client Satisfaction Index is designed to measure each client's level of satisfaction with the products and services provided by the NARDAC. In order to arrive at this measurement, a questionnaire is used as the instrument from which the Client Satisfaction Index is derived. This questionnaire was developed based on comments from NARDAC clients whom we interviewed in your area and other geographical locations.

Please assist us in validating the Client Satisfaction Survey instrument by completing the enclosed questionnaire. We also request your personal critique of the questionnaire. Please comment on the following:

1. Are there any items you didn't understand?
2. Are there any items you felt were redundant?
3. Are there any items you feel are critical to client satisfaction that were not addressed in the survey?
4. Was the survey easy to read and complete (format)?
5. Were the instructions to complete the survey sufficient?

Please write your comments directly on the survey below the items you are addressing or at the end of the survey. We are soliciting your personal comments, therefore a formal reply from your command is not required. Your comments and the results of your completed survey will be held in strict confidence, to be used only by us to assess the quality and validity of the survey instrument.

In order for us to meet our scheduled milestones, please return your completed survey in the enclosed, pre-addressed envelope as soon as possible but not later than 17 December 1987. If you have any questions regarding the survey or any aspect of our research efforts, we may be reached at Autovon 878-2174/2175 or commercial (408)646-2174/2175.

Thank you for your interest and cooperation.

Sincerely,

Prima A. Morris, LCDR, USN

Robert J. Birdwell, LT, SC, USN

<<NARDAC COMMAND LETTERHEAD>>

Date

From: Commanding Officer, Navy Regional Data Automation Center, _____
To: Commanding Officer, _____, (Code: XXX)

Subj: CLIENT SATISFACTION SURVEY

Encl: (1) Client Satisfaction Survey

1. As part of a continuing effort to improve our service, please take a few minutes to complete the enclosed questionnaire.

2. The purpose of the Client Satisfaction Survey is to assist us in determining what action can be taken to develop more effective ADP support for our customers. Your response will enable us to better understand your present and future needs. The questionnaire is designed to snapshot present conditions; therefore, please answer the questionaire to reflect current conditions.

3. We feel this survey will be mutually beneficial. We appreciate your continued assistance in helping us serve you.

APPENDIX D. INTERVIEW INFORMATION SHEET

DATE OF INTERVIEW: _____

NAME OF ORGANIZATION: _____

NAME OF INTERVIEWEE: _____

GRADE / RANK: _____

CURRENT POSITION: _____

LENGTH OF TIME
INVOLVED WITH NARDAC: _____

TYPE OF SERVICE(S):
NARDAC PROVIDES: _____

_____

_____

_____

_____

_____

_____

_____

FREQUENCY OF INTERACTION
WITH NARDAC (i.e., daily,weekly): _____

_____

APPENDIX E. INTERVIEW QUESTIONS

1. What are the factors or areas you feel that the NARDAC customers should use to measure customer satisfaction?

2. What is, in your opinion, a satisfied NARDAC customer?

3. Rank the factors in order of importance:

_____ Computer capabilities (mainframe/mini/micro support)
_____ Ease of obtaining services
_____ System design and programming expertise
_____ Technical support
_____ ADP consultation and assistance
_____ Training
_____ Cost of ADP services
_____ Customer support
_____ Timeliness and quality of products and services provided
_____
_____
_____
_____

4. Specifically, how would you evaluate or measure each of the factors?

APPENDIX F. ORIGINAL QUESTIONNAIRE

1 *NARDAC CUSTOMER SATISFACTION SURVEY*

Please place an X in the box which best describes your level of satisfaction with each of the following statements. (Additional comments are welcome).

Customer Support

1. NARDAC's understanding of the impact on your command for late or inaccurate products or services.

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

2. NARDAC's familiarity with your command's mission.

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

3. How satisfied are you with the level of assistance provided in preparing proposals for new projects?

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

4. Flexibility to satisfactorily respond to changes in your specification requirements.

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

5. Courteous and professional attitude of the NARDAC personnel with whom you deal.

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

6. Promulgation of general purpose information about what is happening around NARDAC (i.e., new hardware, system software, application software, training, new personnel, etc.) through newsletters, electronic bulletin boards, and Client Council Meetings.

   ☐ 0 NOT APPLICABLE
   ☐ 5 VERY SATISFIED
   ☐ 4 SATISFIED
   ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
   ☐ 2 DISSATISFIED
   ☐ 1 VERY DISSATISFIED

7. Timeliness of response for a request for services.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

8. Level of attention given to your project and command.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

9. When a problem associated with a NARDAC product or service is reported, how satisfied are you with the timeliness and quality of the resolution?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Service Level Management.

10. Accuracy of the initial planning/cost estimates for your project request.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

11. Ability to adequately explain costs and verify charges.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

12. Format and quality of the Chargeback Report.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

13. Current rates NARDAC charges for services are competitive with industry.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

14. How satisfied are you with the coordination and follow-up on tasks/projects assigned to subcontractors?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Assessibility

15. Communication channels between you and your NARDAC point of contact.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

16. Procedures for requesting various NARDAC services.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

17. Hours of operations.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

18. Physical location of NARDAC.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

19. Vistor parking spaces at NARDAC.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Hardware, Software, and Communication Technology.

20. Current computer hardware capabilities (mainframe, minicomputers, microcomputers).

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

21. Ability to meet your projected automated information system requirements.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

22. Currency and variety of software packages available.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

23. Telecommunication capabilities and services satisfy/meet my command's operational needs.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

Technical Proficiency.

24. Level of expertise of the technical staff.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

25. The technical staff is well versed in a broad range of ADP subject areas.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

26. The technical staff is keeping abreast of the latest developments in the ADP arena.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

27. Ability to design and develop creative and innovative systems.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

28. Personnel assigned to your project demonstrated the proper skill level required to perform the task(s) specified in the Statement of Work.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

29. Ability of the technical staff to communicate in customer terms/language.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Quality of Products and Services.

30. The quality and accuracy of deliverables.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

31. Availability of online and batch systems (i.e., the total time the system is up).

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

32. Quality of system documentation/manuals (e.g., readable, correct, up-to-date).

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

33. The performance of your system(s) currently running on NARDAC computers.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

34. NARDAC develops reliable and cost effective application programs for their customers.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

35. Response time of online systems.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

36. Maint ...ance performed on current systems (i.e., responsiveness in incorporating modifications and corrections).

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

37. Quality of training.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Timeliness of Products and Services.

38. Adherance to project schedules as specified in the Statement of Work.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

39. Adherance to production processing schedules.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

40. Timeliness of progress reports.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

41. Timely notification of any delays in output.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

42. Reliable and timely delivery of output.

☐ 0 NOT APPLICABLE
☐ 5 HIGHLY AGREE
☐ 4 AGREE
☐ 3 NEITHER AGREE NOR DISAGREE
☐ 2 DISAGREE
☐ 1 HIGHLY DISAGREE

(Optional): Name_____ Telephone_____
PLEASE PRINT

Thank you for completing this survey. The enclosed envelope has been provided for your convenience.

APPENDIX G. QUESTIONNAIRE SECOND DRAFT SHORT FORM

NARDAC CLIENT SATISFACTION SURVEY

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES YOUR *LEVEL OF SATISFACTION* WITH EACH OF THE FOLLOWING ITEMS. *(Additional comments may be made on the last page).*

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 VERY SATISFIED 4 SATISFIED 3 NEITHER SATISFIED NOR DISSATISFIED 2 DISSATISFIED 1 VERY DISSATISFIED

Accessibility.

1. How satisfied are you with the availability of your NARDAC point of contact. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
2. The procedures for obtaining various products and services. (refer to NAVDACINST 5230.1) N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
3. NARDAC's current hours of operation. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
4. The physical location of NARDAC relative to your command. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
5. The quantity of visitor parking spaces at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

System Resources.
(Encompasses hardware, software, and teleprocessing technology)

6. How satisfied are you withNARDAC's current computer hardware capabilities. *(i.e., mainframe, minicomputers, microcomputers)* N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
7. NARDAC ability to meet your projected automated information system requirements. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
8. The currency and variety of software packages available. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
9. NARDAC's ability to provide teleprocessing services to meet your command's operational needs. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

Cost Management.

10. How satisfied are you with NARDAC's adherence to project budgets? N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐.
11. NARDAC's ability to adequately explain cost and verify charges. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
12. The format of the Chargeback Report *(i.e., easy to read and understand)*. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
13. The accuracy of the Chargeback Report N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
14. The current rates NARDAC charges for products and services.. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 VERY SATISFIED 4 SATISFIED 3 NEITHER SATISFIED NOR DISSATISFIED 2 DISSATISFIED 1 VERY DISSATISFIED

15.	Flexibility in charging for services (e.g., fixed-price contract, tiered rate structure, etc.).	N/A☐	5☐	4☐	3☐	2☐	1☐
	Quality of Products and Services. *(NARDAC's ability to deliver reliable services and excellent products)*						
16.	How satisfied are you with the quality of NARDAC software products?	N/A☐	5☐	4☐	3☐	2☐	1☐
17.	The quality of NARDAC's data processing services.	N/A☐	5☐	4☐	3☐	2☐	1☐
18.	The controls over data security.	N/A☐	5☐	4☐	3☐	2☐	1☐
19.	The reliability of online and batch systems *(i.e., the total time the system is up).*	N/A☐	5☐	4☐	3☐	2☐	1☐
20.	The accuracy of system documentation/manuals.	N/A☐	5☐	4☐	3☐	2☐	1☐
21.	The performance of your system(s) currently running on NARDAC computers.	N/A☐	5☐	4☐	3☐	2☐	1☐
22.	The response time of NARDAC's online systems.	N/A☐	5☐	4☐	3☐	2☐	1☐
23.	When a problem associated with a NARDAC product or service is reported, how satisfied are you with the quality of the resolution?	N/A☐	5☐	4☐	3☐	2☐	1☐
	Timeliness of Services.						
24.	How satisfied are you with NARDAC's adherence to project schedules as specified in the Statement of Work?	N/A☐	5☐	4☐	3☐	2☐	1☐
25.	Adherence to production processing schedules.	N/A☐	5☐	4☐	3☐	2☐	1☐
26.	Timeliness of progress reports.	N/A☐	5☐	4☐	3☐	2☐	1☐
27.	Software maintenance performed on existing systems *(i.e., responsiveness in correcting program errors).*	N/A☐	5☐	4☐	3☐	2☐	1☐
28.	Timeliness notification of delays in output.	N/A☐	5☐	4☐	3☐	2☐	1☐
29.	Timeliness of deliverables	N/A☐	5☐	4☐	3☐	2☐	1☐
30.	Timeliness of response for a request for services.	N/A☐	5☐	4☐	3☐	2☐	1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 VERY SATISFIED 4 SATISFIED 3 NEITHER SATISFIED NOR DISSATISFIED 2 DISSATISFIED 1 VERY DISSATISFIED

31.	When a problem associated with a NARDAC product or service is reported, how satisfied are you with the timeliness of the resolution?	N/A☐	5☐	4☐	3☐	2☐	1☐
	Competency						
32.	How satisfied are you with the technical staff's level of expertise? *(Technical staff includes computer specialists, programmers, and system analysts)*	N/A☐	5☐	4☐	3☐	2☐	1☐
33.	The technical staff's range of knowledge in their respective ADP fields..	N/A☐	5☐	4☐	3☐	2☐	1☐
34.	The technical staff's knowledge of the latest developments in their respective ADP fields.	N/A☐	5☐	4☐	3☐	2☐	1☐
35.	NARDAC's ability to design and develop creative and innovative systems.	N/A☐	5☐	4☐	3☐	2☐	1☐
36.	The NARDAC personnel assigned to your project (i.e..do they demonstrate the proper skill level to perform the task(s) specified in the Statement of Work.	N/A☐	5☐	4☐	3☐	2☐	1☐
	Coordination and Communications						
37.	How satisfied are you with NARDAC's understanding of the impact on your command for late or inaccurate products or services?	N/A☐	5☐	4☐	3☐	2☐	1☐
38.	NARDAC's familiarity with your command's mission.	N/A☐	5☐	4☐	3☐	2☐	1☐
39.	The level of assistance provided in preparing proposals for new projects	N/A☐	5☐	4☐	3☐	2☐	1☐
40.	Flexibility to satisfactorily respond to changes in your specification requirements.	N/A☐	5☐	4☐	3☐	2☐	1☐
41.	Courteous and professional attitude of the NARDAC personnel with whom you deal.	N/A☐	5☐	4☐	3☐	2☐	1☐
42.	Promulgation of general purpose information about what is happening around NARDAC *(i.e., new hardware, system software, application software, training, new personnel, etc.)* through newsletters, electronic bulletin boards, and Client Council meetings.	N/A☐	5☐	4☐	3☐	2☐	1☐
43.	The coordination and follow-up on tasks/projects assigned to subcontractors.	N/A☐	5☐	4☐	3☐	2☐	1☐
44.	The ability of NARDAC's technical staff to communicate in client terms/language. *(Technical staff includes computer specialists, programmers, and system analysts)*	N/A☐	5☐	4☐	3☐	2☐	1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 VERY SATISFIED 4 SATISFIED 3 NEITHER SATISFIED NOR DISSATISFIED 2 DISSATISFIED 1 VERY DISSATISFIED

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES THE ***RELATIVE IMPORTANCE*** TO YOUR ORGANIZATION OF EACH OF THE FOLLOWING ***PERFORMANCE CRITERIA*** AS IT RELATES TO CLIENT SATISFACTION.

USE THE FOLLOWING SCALE:	5 CRITICAL	4 IMPORTANT	3 AVERAGE	2 NOT IMPORTANT	1 IRRELEVANT
1. Accessibility	5☐	4☐	3☐	2☐	1☐
2. System Resources	5☐	4☐	3☐	2☐	1☐
3. Cost Management	5☐	4☐	3☐	2☐	1☐
4. Quality of Products and Services	5☐	4☐	3☐	2☐	1☐
5. Timeliness of Services	5☐	4☐	3☐	2☐	1☐
6. Competency	5☐	4☐	3☐	2☐	1☐
7 Coordination and Communications	5☐	4☐	3☐	2☐	1☐

Comments:_____

_____

_____

_____

_____

_____

_____

_____

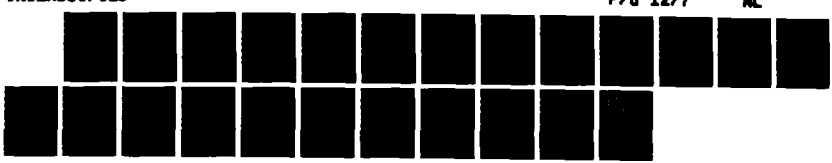
Name_____ Code_____ Telephone_____

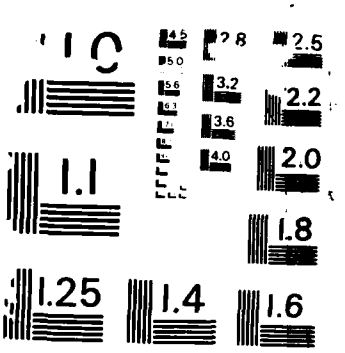
PLEASE PRINT

Thank you for completing this survey. The enclosed envelope has been provided for your convenience.

AD-A193 990 DEVELOPMENT OF AN INSTRUMENT FOR MEASURING AND ANALYZING CLIENT SATISFACT..(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA P A MORRIS ET AL. MAR 88 2/2

UNCLASSIFIED F/G 12/7 NL





APPENDIX H. QUESTIONNAIRE SECOND DRAFT LONG FORM

NARDAC CLIENT SATISFACTION SURVEY

Please place an X in the box which best describes your *level of satisfaction* with each of the following statements:
(Additional comments are welcome).

Accessibility

1. How satisfied are you with the availability of your NARDAC point of contact?

2. The procedures for obtaining various products and services.
(refer to NAVDACINST 5230.1)

3. NARDAC's current hours of operation.

4. The physical location of NARDAC relative to your command.

5. The quantity of visitor parking spaces at NARDAC.

0 NOT APPLICABLE
5 VERY SATISFIED
4 SATISFIED
3 NEITHER SATISFIED NOR DISSATISFIED
2 DISSATISFIED
1 VERY DISSATISFIED

System Resources
(Encompasses hardware, software, and teleprocessing technology)

6. How satisfied are you with NARDAC's current computer hardware capabilities,
(i.e., mainframe, minicomputers, microcomputers) ?

0 NOT APPLICABLE
5 VERY SATISFIED
4 SATISFIED
3 NEITHER SATISFIED NOR DISSATISFIED
2 DISSATISFIED
1 VERY DISSATISFIED

7. NARDAC's ability to meet your projected automated information system requirements.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

8. The currency and variety of software packages available.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

9. NARDAC's ability to provide teleprocessing services to meet your command's operational needs.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Cost Management.

10. How satisfied are you with NARDAC's adherence to project budgets?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

11. NARDAC's ability to adequately explain costs and verify charges.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

12. The format of the Chargeback Report *(i.e., easy to read and understand)*.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

13. The accuracy of the Chargeback Report.

14. The current rates NARDAC charges for products and services.

15. Flexibility in charging for services *(e.g., fixed-price contract, tiered rate structure, etc.)*.

0 NOT APPLICABLE
5 VERY SATISFIED
4 SATISFIED
3 NEITHER SATISFIED NOR DISSATISFIED
2 DISSATISFIED
1 VERY DISSATISFIED

Quality of Products and Services.

16. How satisfied are you with the quality of NARDAC's software products?

17. The quality of NARDAC's data processing services.

18. The controls over data security.

0 NOT APPLICABLE
5 VERY SATISFIED
4 SATISFIED
3 NEITHER SATISFIED NOR DISSATISFIED
2 DISSATISFIED
1 VERY DISSATISFIED

19. The reliability of online and batch systems *(i.e., the total time the system is up).*

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

20. The accuracy of system documentation/manuals.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

21. The performance of your system(s) currently running on NARDAC computers.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

22. The response time of online systems.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

23. When a problem associated with a NARDAC product or service is reported, how satisfied are you with the quality of the resolution?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Timeliness of Services.

24. How satisfied are you with NARDAC's adherence to project schedules as specified in the Statement of Work?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

25. Adherence to production processing schedules.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

26. Timeliness of progress reports.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

27. Software Maintenance performed on existing systems *(i.e., responsiveness in correcting program errors)*.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

28. Timeliness of notification of delays in output.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

29. Timeliness of deliverables.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

30. Timeliness of response for a request for services.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

31. When a problem associated with a NARDAC product or service is reported, how satisfied are you with the timeliness of the resolution?

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Competency

32. How satisfied are you with the technical staff's level of expertise?
(Technical staff includes computer specialists, programmers, and system analysts)

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

33. The technical staff's range of knowledge in their respective ADP fields.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

34. The technical staff's knowledge of the latest developments in their respective ADP fields.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

35. NARDAC's ability to design and develop creative and innovative systems.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

36. The NARDAC personnel assigned to your project. (i.e., do they demonstrate the proper skill level to perform the task(s) specified in the Statement of Work.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Coordination and Communications

37. How satisfied are you with NARDAC's understanding of the impact on your command for late or inaccurate products or services?

38. NARDAC's familiarity with your command's mission.

39. The level of assistance provided in preparing proposals for new projects.

40. Flexibility to satisfactorily respond to changes in your specification requirements.

41. Courteous and professional attitude of the NARDAC personnel with whom you deal.

42. Promulgation of general purpose information about what is happening around NARDAC *(i.e., new hardware, system software, application software, training, new personnel, etc.)* through newsletters, electronic bulletin boards, and Client Council Meetings.

For each question:

- ☐ 0 NOT APPLICABLE
- ☐ 5 VERY SATISFIED
- ☐ 4 SATISFIED
- ☐ 3 NEITHER SATISFIED NOR DISSATISFIED
- ☐ 2 DISSATISFIED
- ☐ 1 VERY DISSATISFIED

43. The coordination and follow-up on tasks/projects assigned to subcontractors.

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

44. The ability of NARDAC's technical staff to communicate in client terms/language.
(Technical staff includes computer specialists, programmers, and system analysts)

☐ 0 NOT APPLICABLE
☐ 5 VERY SATISFIED
☐ 4 SATISFIED
☐ 3 NEITHER SATISFIED NOR DISSATISFIED
☐ 2 DISSATISFIED
☐ 1 VERY DISSATISFIED

Please place an X in the box which best describes the *relative importance* of each of the following *performance criteria:*

1. **Accessibility**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

2. **System Resources**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

3. **Cost Management**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

4. **Quality of Products and Services**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

5. **Timeliness of Service**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

6. **Competency**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

7. **Coordination and Communications**
☐ 5 CRITICAL
☐ 4 IMPORTANT
☐ 3 AVERAGE
☐ 2 NOT IMPORTANT
☐ 1 IRRELEVANT

Name_____ Code_____ Telephone_____
PLEASE PRINT

Thank you for completing this survey. The enclosed envelope has been provided for your convenience.

APPENDIX I. PILOT POPULATION

Naval Surface Force,U.S. Pacific Fleet, San Diego
Fleet Accounting and Disbursing Center U.S. Pacific Fleet, San Diego
Fleet Hospital Support Office, Alameda
Naval Station,Treasure Island, San Francisco
Naval Air Station, Lemoore
Naval Air Systems Command, Naval Air System Command HQ, Washington, D.C.
Naval Biosciences Laboratory, Oakland
Naval Strike Warfare Center, Naval Air Station, Fallon
Shipbuilding,Conversion and Repair USN, Hunters Point, San Franciscco
Naval Weapons Station, Concord, CA
Naval Supply Systems Command, Washington, D.C.
SIMA NRMF San Francisco, NAS Alameda
USS Enterprise CVN-65
Naval Base, San Francisco
Navy Public Works Center San Francisco Bay
Mare Island Naval Shipyard, Vallejo
Naval Education and Training Financial Information Processing Center, NAS Pensacola
Navy Accounting and Finance Center, Washington, D.C
Naval Air Station, Alameda
Naval Reserve Force, New Orleans
Naval Air Station, Moffett Field
Service Group 1, Oakland
Shipbuilding, Conversion and Repair USN, Seattle
U.S. Maritime Defense Zone Pacific, Alameda
Navy Military Personnel Command, Washington, D.C.
Naval Aviation Depot, Naval Air Station, Alameda
Navy Comptroller Standard System Activity, Pensacola
Naval Supply Center, Oakland
Personnel Support Activity, San Francisco
Military Sealift Command Pacific, Oakland

Naval School Physical Distribution Management, Oakland
Naval Medical Command, Northwest Region, Oakland
Special Boat Unit Eleven, San Francisco
Naval Postgraduate School, Monterey
Naval Facilities Engineering Command, Alexandria, VA
USS Kiska
Naval Supply Center Puget Sound, Bremerton, WA
Joint Military Postal Activity Pacific, San Francisco
Marine Barracks, Naval Air Station, Alameda
Sacramento Army Depot, Sacramento
Navy Astronautics Group, Point Mugu, CA
Chief Preservation Assistance Branch, San Francisco
Navy Resale and Services Support Office, Field Support Office, Oakland
Navy Legal Service Office, San Francisco
Mare Island Naval Shipyard, Vallejo
Naval Station Mare Island, Vallejo
Tactical Electronic Warfare Squadron One Twenty Nine, NAS Whidbey Island
Defense Subsistence Region Pacific, Alameda
Naval Air Station, Fallon
Naval and Marine Corps Reserve Center, San Francisco
Naval Electronic Systems Engineering Center Vallejo
NARDAC Newport

APPENDIX J. PILOT QUESTIONNAIRE

NARDAC CLIENT SATISFACTION SURVEY

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES YOUR *LEVEL OF SATISFACTION* WITH EACH OF THE FOLLOWING ITEMS. *(Additional comments may be made on the last page).*

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

Accessibility.
(Ease of obtaining service)

1. The availability of your NARDAC point of contact. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
2. The procedures required in *NAVDACINST 5230.1* for obtaining various NARDAC products and services. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
3. The current hours of operation at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
4. The physical location of NARDAC relative to your command. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
5. The quantity of visitor parking spaces at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

System Resources.
(Encompasses hardware, software, and teleprocessing technology)

6. The current computer hardware capabilities at NARDAC. *(i.e., mainframe, minicomputers, microcomputers)* N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
7. The ability of NARDAC to meet your projected automated information system requirements. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
8. The currency and variety of software packages available at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
9. The ability of NARDAC to provide adequate teleprocessing services to meet your command's operational needs. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

Cost Management.
(Includes controls over project budgets, rates charged for services, billing procedures, and price structures)

10. NARDAC's ability to provide an accurate assessment of both the costs and the schedule for a project. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
11. NARDAC's adherence to project budgets. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
12. The ability of NARDAC to adequately explain project costs. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
13. The format of NARDAC's Chargeback Report *(i.e., easy to read and understand).* N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
14. The accuracy of NARDAC's Chargeback Report. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

15. The current rates NARDAC charges for products and services.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
16. Flexibility in charging for NARDAC products and services. *(e.g., fixed-price contract, tiered rate structure, etc.).*	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
Quality of Products and Services. *(NARDAC's ability to deliver reliable services and excellent products)*	
17. The quality of NARDAC developed application system products.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
18. The quality of NARDAC's data processing services.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
19. The security controls over your data that is maintained on NARDAC computers. *(i.e., physical security, user id/passwords, etc.)*	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
20. The reliability of NARDAC online and batch systems *(i.e., the total time the system is up).*	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
21. The accuracy of NARDAC's system documentation/manuals.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
22. The response time of NARDAC's online systems.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
23. The quality of the resolution to a problem associated with a NARDAC product or service.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
Timeliness of Services. *(NARDAC's ability to be punctual and " schedule conscientious" with its products and services)*	
24. NARDAC's adherence to project schedules as specified in the Project Request.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
25. The ability of NARDAC to adhere to production processing schedules.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
26. The frequency of NARDAC progress reports.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
27. The timely notification of delays in output.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
28. Timeliness of deliverables from NARDAC.	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
Responsiveness *(How quickly NARDAC reacts or responds to client needs)*	
29. Software maintenance performed on existing NARDAC systems *(i.e., responsiveness in correcting program errors).*	N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

30.	The responsiveness of NARDAC to a request for services.	N/A☐	5☐	4☐	3☐	2☐	1☐
31.	The responsiveness of NARDAC to resolving a reported problem associated with a product or service.	N/A☐	5☐	4☐	3☐	2☐	1☐
32.	The flexibility of NARDAC to changes in your project requirements.	N/A☐	5☐	4☐	3☐	2☐	1☐
33.	The level of assistance provided in preparing proposals for new projects.	N/A☐	5☐	4☐	3☐	2☐	1☐
	Staffing. *(Encompasses the resourcefulness and requisite qualifications of NARDAC personnel)*						
34.	The overall range of expertise within the NARDAC organization.	N/A☐	5☐	4☐	3☐	2☐	1☐
35.	The level of expertise of the NARDAC personnel with whom you deal.	N/A☐	5☐	4☐	3☐	2☐	1☐
36.	The ability of NARDAC personnel to keep abreast of the latest developments in their respective functional area.	N/A☐	5☐	4☐	3☐	2☐	1☐
37.	The courteous and professional attitude of the NARDAC personnel with whom you deal.	N/A☐	5☐	4☐	3☐	2☐	1☐
38.	The technical staff's ability to design and develop creative and innovative systems. *(Technical staff includes computer specialists, programmers, and system analysts)*	N/A☐	5☐	4☐	3☐	2☐	1☐
39.	The technical staff's ability to satisfactorily analyze and document your project requirements.	N/A☐	5☐	4☐	3☐	2☐	1☐
40.	The ability of NARDAC's technical staff to communicate in client terms/language.	N/A☐	5☐	4☐	3☐	2☐	1☐
	General Business Practices. *(The manner in which NARDAC conducts business with its clients)*						
41.	NARDAC's familiarity with your command's mission as it relates to data processing.	N/A☐	5☐	4☐	3☐	2☐	1☐
42.	NARDAC's understanding of the impact on your command for late or inaccurate products or services.	N/A☐	5☐	4☐	3☐	2☐	1☐
43.	The coordination and follow-up on tasks/projects assigned to subcontractors.	N/A☐	5☐	4☐	3☐	2☐	1☐
44.	Promulgation of general purpose information about what is happening around NARDAC *(i.e., new hardware, system software, application software, training, new personnel, etc.)* through newsletters, electronic bulletin boards, and Client Council meetings.	N/A☐	5☐	4☐	3☐	2☐	1☐

4 *NARDAC CLIENT SATISFACTION SURVEY*

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES THE *RELATIVE IMPORTANCE* TO YOUR ORGANIZATION OF EACH OF THE FOLLOWING *PERFORMANCE CRITERIA* AS IT RELATES TO CLIENT SATISFACTION.

USE THE FOLLOWING SCALE:	5 CRITICAL	4 IMPORTANT	3 AVERAGE	2 NOT IMPORTANT	1 IRRELEVANT
1. **Accessibility** *(Ease of obtaining service)*	5☐	4☐	3☐	2☐	1☐
2. **System Resources** *(Encompasses hardware, software, and teleprocessing technology)*	5☐	4☐	3☐	2☐	1☐
3. **Cost Management** *(Includes controls over project budgets, rates charged for services, billing procedures, and price structures)*	5☐	4☐	3☐	2☐	1☐
4. **Quality of Products and Services** *(NARDAC's ability to deliver reliable services and excellent products)*	5☐	4☐	3☐	2☐	1☐
5. **Timeliness of Services** *(NARDAC's ability to be punctual and "schedule conscientious" with its products and services)*	5☐	4☐	3☐	2☐	1☐
6. **Responsiveness** *(How quickly NARDAC reacts or responds to client needs)*	5☐	4☐	3☐	2☐	1☐
7. **Staffing** *(Encompasses the resourcefulness and requisite qualifications of NARDAC personnel)*	5☐	4☐	3☐	2☐	1☐
8. **General Business Practices** *(The manner in which NARDAC conducts business with its clients)*	5☐	4☐	3☐	2☐	1☐

Comments:_____

Name_____ Code_____ Telephone_____
PLEASE PRINT

Name of your organization_____ Name of your NARDAC POC_____

Thank you for completing this survey. The enclosed envelope has been provided for your convenience.

APPENDIX K. REVISED QUESTIONNAIRE

NARDAC CLIENT SATISFACTION SURVEY

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES YOUR *LEVEL OF SATISFACTION* WITH EACH OF THE FOLLOWING ITEMS. *(Additional comments may be made on the last page).*

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

Accessibility.
(Ease of obtaining service)

1. The availability of your NARDAC point of contact. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
2. The procedures required in *NAVDACINST 5230.1* for obtaining various NARDAC products and services. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
3. The current hours of operation at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
4. The physical location of NARDAC relative to your command. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
5. The quantity of visitor parking spaces at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

System Resources.
(Encompasses hardware, software, and teleprocessing technology)

6. The current computer hardware capabilities at NARDAC. *(i.e., mainframe, minicomputers, microcomputers)* N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
7. The ability of NARDAC to meet your projected automated information system requirements. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
8. The currency and variety of software packages available at NARDAC. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
9. The ability of NARDAC to provide adequate teleprocessing services to meet your command's operational needs. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

Cost Management.
(Includes controls over project budgets, rates charged for services, billing procedures, and price structures)

10. NARDAC's ability to provide an accurate assessment of both the costs and the schedule for a project. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
11. NARDAC's adherence to project budgets. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
12. The ability of NARDAC to adequately explain project costs. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
13. The format of NARDAC's Chargeback Report *(i.e., easy to read and understand)*. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
14. The accuracy of NARDAC's Chargeback Report. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

15.	The current rates NARDAC charges for products and services.	N/A☐	5☐	4☐	3☐	2☐	1☐
16.	Flexibility in charging for NARDAC products and services. *(e.g., fixed-price contract, tiered rate structure, etc.).*	N/A☐	5☐	4☐	3☐	2☐	1☐
	Quality of Products and Services. *(NARDAC's ability to deliver reliable services and excellent products)*						
17.	The quality of NARDAC developed application system products.	N/A☐	5☐	4☐	3☐	2☐	1☐
18.	The quality of NARDAC's services. (Services include training,Information Resource Center (IRC) assistance, processing,Client Liaison services,studies,etc.)	N/A☐	5☐	4☐	3☐	2☐	1☐
19.	The security controls over your data that is maintained on NARDAC computers. *(i.e., physical security, user id/passwords, etc.)*	N/A☐	5☐	4☐	3☐	2☐	1☐
20.	The reliability of NARDAC online and batch systems *(i.e., the total time the system is up).*	N/A☐	5☐	4☐	3☐	2☐	1☐
21.	The accuracy of NARDAC's system documentation/manuals.	N/A☐	5☐	4☐	3☐	2☐	1☐
22.	The response time of NARDAC's online systems.	N/A☐	5☐	4☐	3☐	2☐	1☐
23.	The quality of the resolution to a problem associated with a NARDAC product or service.	N/A☐	5☐	4☐	3☐	2☐	1☐
	Timeliness of Services. *(NARDAC's ability to be punctual and " schedule conscientious" with its products and services)*						
24.	NARDAC's adherence to project schedules as specified in the Project Request.	N/A☐	5☐	4☐	3☐	2☐	1☐
25.	The ability of NARDAC to adhere to production processing schedules.	N/A☐	5☐	4☐	3☐	2☐	1☐
26.	The frequency of NARDAC progress reports.	N/A☐	5☐	4☐	3☐	2☐	1☐
27.	The timely notification of delays in output.	N/A☐	5☐	4☐	3☐	2☐	1☐
28.	Timeliness of services from NARDAC. (Services include training,Information Resource Center (IRC) assistance, processing,Client Liaison services,studies,etc.)	N/A☐	5☐	4☐	3☐	2☐	1☐
	Responsiveness *(How quickly NARDAC reacts or responds to client needs)*						
29.	Software maintenance performed on existing NARDAC systems *(i.e., responsiveness in correcting program errors).*	N/A☐	5☐	4☐	3☐	2☐	1☐
30.	The responsiveness of NARDAC to a request for services.	N/A☐	5☐	4☐	3☐	2☐	1☐

NARDAC CLIENT SATISFACTION SURVEY

USE THE FOLLOWING SCALE:

N/A NOT APPLICABLE 5 EXTREMELY SATISFIED 4 SATISFIED 3 NEUTRAL 2 DISSATISFIED 1 EXTREMELY DISSATISFIED

---

31. The responsiveness of NARDAC to resolving a reported problem associated with a product or service. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

32. The flexibility of NARDAC to changes in your project requirements. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

33. The level of assistance provided in preparing proposals for new projects. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

Staffing.
(Encompasses the resourcefulness and requisite qualifications of NARDAC personnel)

34. The overall range of expertise within the NARDAC organization. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

35. The level of expertise of the NARDAC personnel with whom you deal. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

36. The ability of NARDAC personnel to keep abreast of the latest developments in their respective functional area. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

37. The courteous and professional attitude of the NARDAC personnel with whom you deal. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

38. The technical staff's ability to design and develop creative and innovative systems. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐
(Technical staff includes computer specialists, programmers, and system analysts)

39. The technical staff's ability to satisfactorily analyze and document your project requirements. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

40. The ability of NARDAC's technical staff to communicate in client terms/language. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

General Business Practices.
(The manner in which NARDAC conducts business with its clients)

41. NARDAC's familiarity with your command's mission as it relates to data processing. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

42. NARDAC's understanding of the impact on your command for late or inaccurate products or services. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

43. The coordination and follow-up on tasks/projects assigned to subcontractors. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

44. Promulgation of general purpose information about what is happening around NARDAC *(i.e., new hardware, system software, application software, training, new personnel, etc.)* through newsletters, electronic bulletin boards, and Client Council meetings. N/A☐ 5☐ 4☐ 3☐ 2☐ 1☐

NARDAC CLIENT SATISFACTION SURVEY

PLEASE PLACE AN X IN THE BOX WHICH BEST DESCRIBES THE *RELATIVE IMPORTANCE* TO YOUR ORGANIZATION OF EACH OF THE FOLLOWING *PERFORMANCE CRITERIA* AS IT RELATES TO CLIENT SATISFACTION.

USE THE FOLLOWING SCALE:	5 CRITICAL	4 IMPORTANT	3 AVERAGE	2 NOT IMPORTANT	1 IRRELEVANT
1. **Accessibility** *(Ease of obtaining service)*	5☐	4☐	3☐	2☐	1☐
2. **System Resources** *(Encompasses hardware, software, and teleprocessing technology)*	5☐	4☐	3☐	2☐	1☐
3. **Cost Management** *(Includes controls over project budgets, rates charged for services, billing procedures, and price structures)*	5☐	4☐	3☐	2☐	1☐
4. **Quality of Products and Services** *(NARDAC's ability to deliver reliable services and excellent products)*	5☐	4☐	3☐	2☐	1☐
5. **Timeliness of Services** *(NARDAC's ability to be punctual and "schedule conscientious" with its products and services)*	5☐	4☐	3☐	2☐	1☐
6. **Responsiveness** *(How quickly NARDAC reacts or responds to cient needs)*	5☐	4☐	3☐	2☐	1☐
7. **Staffing** *(Encompasses the resourcefulness and requisite qualifications of NARDAC personnel)*	5☐	4☐	3☐	2☐	1☐
8. **General Business Practices** *(The manner in which NARDAC conducts business with its clients)*	5☐	4☐	3☐	2☐	1☐

Comments:_____

Name_____ Code_____ Telephone_____
PLEASE PRINT

Name of your organization_____ Name of your NARDAC POC_____

Thank you for completing this survey. The enclosed envelope has been provided for your convenience.

BIBLIOGRAPHY

Korzeniowski, Paul, "Navy Beats Net Snafus", *Network World*, 13 July 1987.

Naval Data Automation Command Memo 5230: ser 91-67/2247, Subject: *NARDAC Long Range Business Planning Meeting (LRBP) of 10-12 June 1987*, 29 June 1987.

Naval Data Automation Command Instruction 5230.1C: Code 40, Subject : *Procedures For Requesting Services From Navy Regional Data Automation Centers (NARDACS) and Navy Data Automation Facilities (NAVDAFS)*, 10 June 1986.

Navy Regional Data Automation Center, San Diego Letter 5230: Serial 09L/0985 to the Naval Data Automation Command Board of Directors, Subject: *IBM Client Relations Survey*, 28 July 1987.

Navy Regional Data Automation Center, San Diego Letter 5230: Serial 09l/1004 to Navy Regional Data Automation Center, Pearl Harbor, Subject: *Board of Directors' Tasking*, 3 August 1987.

Navy Regional Data Automation Center, San Francisco, *Marketing Plan For FY 1985.*

Navy Regional Data Automation Center, San Francisco, *Marketing Plan For FY 1987.*

Nolan, R.L., and Seward, H.H., "Measuring User Satisfaction to Evaluate Information Systems", In R.L. Nolan (Ed.), *Measuring the Data Resource Function*, West Publishing Co., 1974.

Peters, Thomas J., and Waterman, Robert H., Jr., *In Search of Excellence*, Warner Books, 1982, pp. 156-200.

Scott, Leslie C., "NARDAC Provides ADP Support to Navy Departments", *Government Computer News*, vol. 3, no. 9, September 1984.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station Alexandria, Virginia 22304-6145	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, California 93943-5002	2
3.	Chief of Naval Operations Director, Information Systems (OP-945) Navy Department Washington, D. C. 20350-2000	2
4.	Department Chairman, Code 54 Department of Administrative Sciences Naval Postgraduate School Monterey, California 93943-5100	1
5.	Computer Technology Curriculum Office, Code 37 Naval Postgraduate School Monterey, California 93943-5100	1
6.	Dr. Nancy C. Roberts, Code 54 RC Department of Administrative Sciences Naval Postgraduate School Monterey, California 93943-5100	1
7.	Dr. Doug Moses, Code 54 MO Department of Adminstrative Sciences Naval Postgraduate School Monterey, California 93943-5100	1
8.	Director Naval Data Automation Command (Code 90) Washington Navy Yard Washington, D. C. 20374-1662	2

9. Commanding Officer 1
Navy Regional Data Automation Center Washington
Washington Navy Yard
Washington, D. C. 20374-6435

10. Commanding Officer 1
Navy Regional Data Automation Center Norfolk
Naval Air Station, Bldg. V-53
Norfolk, Virginia 23511-6427

11. Commanding Officer 1
Navy Regional Data Automation Center Jacksonville
Naval Air Station
Jacksonville, Florida 32212-0111

12. Commanding Officer 1
Navy Regional Data Automation Center New Orleans
4400 Dauphine Street
New Orleans, Louisiana 70145-7700

13. Commanding Officer 1
Navy Regional Data Automation Center San Diego
Naval Air Station, North Island
San Diego, California 92135-5110

14. Commanding Officer 1
Navy Regional Data Automation Center Pensacola
Naval Air Station, Bldg. 603
Pensacola, Florida 32508-6100

15. Commanding Officer 1
Navy Regional Data Automation Center San Francisco
Naval Air Station, Bldg. 8
Alameda, California 94501-5007

16. Commanding Officer 1
Navy Regional Data Automation Center Pearl Harbor
Box 140
Pearl Harbor, Hawaii 96860-5200

17. Commanding Officer 1
Navy Regional Data Automation Center Newport
Bldg. 1A - NETC
Newport, Rhode Island 02841-5053

18. Commander Charles F. Taylor, Jr., SC, USN — 1
5506 Bittern Avenue
Ewa Beach, Hawaii 96796-3227

19. Lieutenant Commander Prima A. Morris, USN — 1
217 Ceret Court
Vienna, Virginia 22180

20. Lieutenant Robert J. Birdwell, SC, USN — 1
7400 Bucknell Drive
Austin, Texas 78723

END

DATE

FILMED

DTIC

JULY 88