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INFORMATION REQUIREMENTS OF
LOGISTICS EXECUTIVES IN THE
AUSTRALIAN DEPARTMENT OF DEFENCE

THESIS

Warren E. Richter
Australian Department of Defence

AFIT/GIR/LSY/88D-12

DEPARTMENT OF THE AIR FORCE

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Presented to the Faculty of the School of Systems and

Logistics of the Air Force Institute of Techology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Information Resources Management

Warren E. Richter, B.Ec.

Australian Department of Defence

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However, in keeping with the methodology followed in this study, my "critical success factors" were my wife Amanda and my sons Jeremy and Tristan. They displayed a great deal of tolerance and love towards the hermit when he occasionally left his cave.

Warren Richter.

ii

Table of Contents

List of Figures

List of Tables

AFIT/GIR/LSY/88D-12

Abstract

The purpose of this study was to develop a broad preliminary description of an information system for logistics executives in the Australian Department of Defence (DoD) and to establish system development priorities and a work plan. The study had four basic objectives: (1) Develop criteria to be used to select an information requirements determination methodology and select a methodology. (2) Use the methodology to develop a questionnaire. (3) Test and dispatch the questionnaire to logistics executives in the DoD with the aim of identifying their requirements for information. (4) Analyse and interpret results in a form useful for the development of a preliminary system description and work plan and make an assessment, based on the results, of the validity of a centralised approach to systems development.

The study found that the most appropriate information requirements determination methodology for the task was the Critical Success Factors (CSF) Methodology developed at the Massachusetts Institute of Technology by Dr. John F. Rockart. Analysis of the responses made by DoD logistics executives to a questionnaire based on that methodology revealed that these executives were generally _dissatisfied_ with the information available to them in respect of their CSFs.

vii

The diversity of needs identified by executives precluded the development of a preliminary system description and work plan but some important priorities for systems development were established. The major conclusion of the study was that _functionally-based approaches to systems development were not appropriate for information systems aimed at meeting the needs of logistics executives_ and several recommendations for reviews of current systems development priorities and approaches in the DoD were made.

It was also concluded that there was no evidence to suggest that a centralised approach to the development of these information systems was inappropriate.

INFORMATION REQUIREMENTS OF LOGISTICS EXECUTIVES
IN THE AUSTRALIAN DEPARTMENT OF DEFENCE

I. Introduction

General Issue

The Australian Department of Defence (DoD) is currently undertaking a complete redevelopment of its Navy, Army and Air Force's supply systems. The project, known as the Supply Systems Redevelopment Project (SSRP), will take at least ten years and cost well over $A150m.

The DoD recognises that it is not possible to have a single supply system because of different requirements among the three Services. However, with the aim of ensuring inter-operability, limiting competition between the Services for developmental resources, and concentrating effort on shared problems, it has been decided to implement at least a common "core" system.

To date, reasonable progress has been made in defining the new system at the lowest operating levels (essentially the depot and base supply sub-systems and their concomitant management information requirements), but obtaining and developing specifications for the highest level of the system (i.e., the executive information system; consisting of those system components aimed at supporting the needs of logistics executives) has proven to be an intractable problem.

More specifically, it has generally been accepted within the project team that the major reason for the lack of progress in this area was that there existed no clear framework for development and that the techniques used by the team in an attempt to develop this framework (unstructured interviews with logistics executives) were inadequate and very expensive in terms of both time and travelling costs.

Specific Problem

A conceptual framework which identifies the areas of principal concern to logistics executives is needed. The framework would be used to develop a preliminary description of an information system for logistics executives and to establish system development priorities and a work plan.

Research Objectives

Objective 1. Develop criteria to be used to select an information requirements determination methodology and select a methodology.

Objective 2. Use the methodology develop a questionnaire design.

Objective 3. Test and dispatch the questionnaire to logistics executives (generally one star officers and above and their SES equivalents) in the Australian DoD with the aim of identifying their requirements for information.

Objective 4. Analyse and interpret results in a form useful for the development of a preliminary system description and work plan (i.e., construct an "appropriate"

2

conceptual framework -- the framework can be considered appropriate if it clearly identifies information gaps and allocates priorities for development).

The analysis will also provide an opportunity to assess the validity of a centralised approach to system development by determining whether information requirements vary significantly among the various organisations and executives concerned.

Scope and Limitations

The scope and conceptual framework for this research is detailed in Chapter II. In brief, although this research is directed towards a problem facing a project, SSRP, that is primarily concerned with "supply", the interdependencies between supply and other elements of logistics and the interdependencies between logistics and other areas of concern to executives such as resources budgeting, dictates that the research should focus on logistics executive's requirements for information and not on executive's requirements for logistics information.

II. Background

Introduction

As noted in Chapter I, progress in identifying and
specifying those components of the new SSRP system aimed at
supporting the needs of senior logisticians was severely
constrained by the lack of a clear framework for development.
However, broad descriptions of their requirements for these
high-level components were made by the three Services. This
chapter assesses and classifies these requirements in the
light of a review of logistics and information management
literature and develops a conceptual framework for, and
establishes the scope of, the research.

The approach used is to assess Service requirements
from three viewpoints or dimensions: a subject matter
dimension, a management dimension, and an information systems
dimension. This enables the managerial activities
undertaken, the information required by these activities and
the broad type of information system needed to deliver the
information and support the activities to be identified. As
is explained in more detail in Chapter III, the choice of an
information requirements determination methodology was
strongly influenced by these factors.

Requirements Specified by each Service

Set out below are the major features of each Service's
requirements.

4

Navy:
- Policy, financial planning and control and management of capital equipment requirements.
- Information database designed to assist upper level supply management in making strategic decisions.
- Summaries, aggregates of data on regular basis or by demand.
- "Logistics" data.
- Time series analysis.
- Graphics.
- Rapid access facilities. [21:11-12]

Army:
- Access to data required by Director General-Supply.
- Performance measurement and trend detection processes which reveal:
  (1) system utilisation;
  (2) system effectiveness; and
  (3) organisational or procedural weaknesses.
- Interfaces with other user-developed logistics systems. [2:G5-G6]

Air Force:
- Supply and technical managers will require decision support systems capable of providing information drawn from a common logistics database.
- Supply functions to be supported at this level are:
  - Requirements Determination (quantities of items to be acquired or disposed of).
  - Procurement.
  - Inventory Resource Management.
  - Entitlements (setting scales of issue to units).
- This level (of the system) requires the machinery and methodologies to collect data and interpretive reports from all other levels. It also requires the ability to disseminate information and to carry out analysis and planning functions. [22:H2]

Logistics, Management and Information Systems Dimensions: Assessment of Requirements/Review of Literature

Interdependencies Among Logistics Elements. It is well

accepted by bo h practioners and writers in the discipline

5

that to be successful, logisticians must take an integrated, systems-oriented approach:

> Integration of the individual logistics processes is the key to meeting the ultimate goal of logistics, combat ready and sustainable forces; in other words, combat capability. Integration is accomplished through understanding the interrelationships of the various logistics functions; by knowing how changes in one function will affect other functions." [1:3]

> Logistics management can be more of a concept or philosophy than an organisational form. Its application is not tied to any specific structure. It is systems-oriented; yet it takes account of functional dependence, with organisational structure as a secondary consideration. It is an integrated approach as opposed to a partial, activities approach. [6:12]

Although the requirements specified by the three Services were in response to a request for initial specifications of the highest level components of a supply system rather than a logistics system, the need to take this integrated, systems-oriented approach is reflected in their stated requirements. For example, Navy require "logistics" data and a system to support "policy, financial planning and control and management of capital equipment requirements"; Army require "interfaces with other. . .logistics systems" and "processes which reveal system utilisation and effectiveness"; and Air Force require "decision support systems capable of providing information drawn from a common logistics database."

Thus, there are clear differences among the Services but one common thread runs through their requirements -- a need to access logistics and other information (rather than just

supply information) and make decisions on the basis of this information. The final section of this chapter discusses limitations to the scope of this research and defines more clearly what the term "logistics" means in this context. However, some appreciation of the management activities undertaken by executives and their concomitant information and support requirements needs to be gained before this can be done.

Management Dimension. A taxonomy of management activity originally proposed by Anthony (8:34)(11:215-220) and further developed by Gorry and Scott-Morton (12:916) has gained wide acceptance as a framework for analysis of information requirements (8:34) (16:397). It views management planning and control activities at three levels:

(1) Strategic Planning: the process of deciding on the objectives of the organisation, on changes in these objectives, on the resources used to attain these objectives, and on the policies that are used to govern the acquisition, use and disposition thereof.

(2) Management Control: the process by which managers assure that resources are obtained and used effectively in the accomplishment of the organisation's objectives.

(3) Operational Control: the process of assuring that specific tasks are carried out effectively and efficiently. [11:215-216]

This framework is often linked (14:87-95) (8:369-402) to the classic model of decision making developed by Simon which identifies and defines three stages in the decision making process:

7

The first phase of the decision making process--
searching the environment for conditions calling for
decision--I shall call intelligence activity.... The
second phase--inventing, developing, and analyzing
possible courses of action--I shall call design
activity. The third phase--selecting a course of action
from those available--I shall call choice
activity. [24:2-3]

The result is the two-dimensional framework illustrated

in figure 1. As explained in the section dealing with

information systems dimensions below, this framework

facilitates the association of requirements specifications

with particular types of information systems.

Decision Making Process	Management Activity		
	Strategic Planning	Management Control	Operational Control
Intelligence			
Design			
Choice			

Figure 1. Management Activity and Decision Making Framework

Both dimensions of this framework are reflected in the

Service's stated requirements. For example, requirements for

"an information database", "graphics", "research facilities",

"trend detection processes", and "decision support systems"

can be interpreted as reflecting a perceived need to support

the intelligence, design and choice phases of the decision

making process. Similarly, requirements for processes which

reveal "system utilisation,....system effectiveness,....and

organisational or procedural weaknesses" (Army), for

assistance in "making strategic decisions" (Navy), and for

8

the "ability to disseminate information and to carry out analysis and planning functions" (Air Force), reflect a need to support the strategic planning and management control processes and, to a lesser extent, operational control processes.

Information System Dimension. It needs to be borne in mind that the requirements analysed above relate to the highest level of the managerial hierarchy in the DoD. In other words, the "desired" system must provide the information and the decision making support needed by executives rather than middle or first-line (supervisors) managers. The following table shows the results of a study which asked managers at various levels within different organisations to rate the importance of managerial activities by hierarchical level.

Table 1. Importance of Activities by Management Level

Managerial Activities	Management Level		
	First-Line	Middle	Executive
Long-range planning	25	45	84
Products & services	33	50	58
Controlling	38	50	61
Monitoring business indicators	30	49	74
Supervising	65	50	33
Coordinating	31	52	70
Customer relations/ Marketing	27	49	69
External contact	38	45	57
Consulting	30	52	70

[17:17]

It seems reasonable to suggest that these results could be generalised to most organisations (including the DoD) and

9

that they confirm the emphasis on strategic planning and
management control evident in the Service's stated
requirements. An information system aimed at supporting
these requirements would have the focus on management
activities illustrated in Figure 3 below.
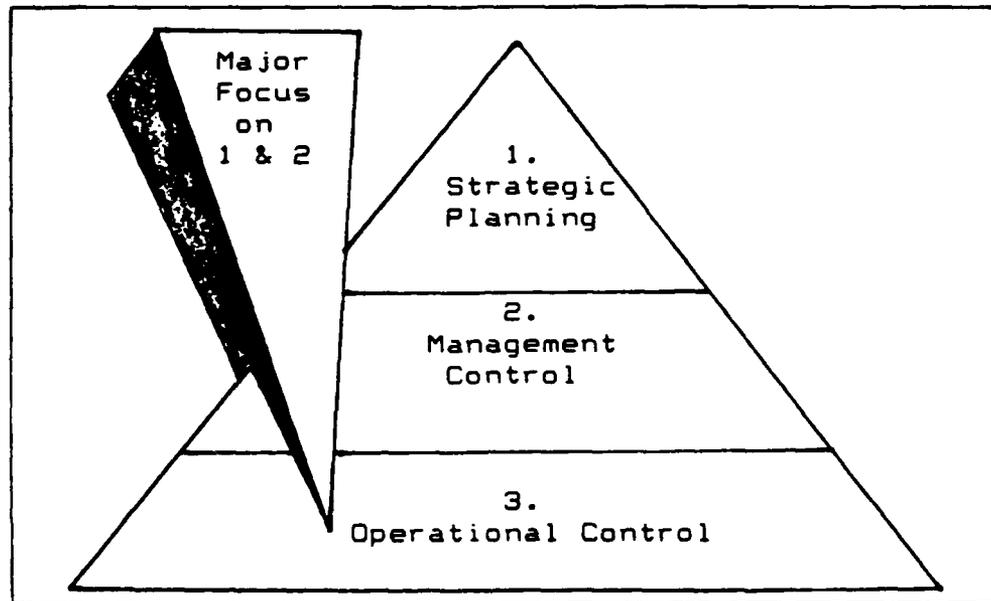
Figure 2. Focus of the Required System.

At this point it is appropriate to briefly review
relevant literature with the aim of tentatively describing
the information system implied by the Service's stated
requirements at least clearly enough to enable an appropriate
information requirements determination methodology to be
selected.

Information system terminology (8:5)(5:9) and concepts
are evolving as technology and applications of technology
change. However, there seems to be some consensus emerging
(17:390) (8:10) that the term "management information
systems" (MIS) is most appropriately applied to the

10

"federation of....related information systems" (8:10) an

organisation may have to serve managerial needs.   Thus, a

given organisation's MIS may consist of several different

types of information systems.   There is no clear consensus on

the appropriate terminology for these systems but, for the

reasons given below, the two types of systems usually

described as "decision support systems" (DSS) and "executive

support systems" (ESS) are most relevant to the Service's

requirements.

Decision Support Systems (DSS).   The concept of DSS

is based on three assumptions about the role of the computer

in the decision making process.   DSS use computers to:

1. Assist managers in their decision processes in semi-
   structured tasks (i.e., where parts of the analysis
   can be systematised for the computer but where the
   decision maker's insight and judgement are required).

2. Support, rather than replace, managerial judgement.

3. Improve the effectiveness of decision making by
   facilitating exploration of the problem situation.
                                              [8:368] [14:1]

They are focused on a specific decision or class of

decisions, are usually modeling-oriented and, although this

is subject to some debate, can be considered to support the

design and choice phases of Simon's decision making model.

(16:17)

Executive Support Systems (ESS).   "ESS are focused

on a manager's or group of managers' information needs across

a range of areas.   Rather than being limited to a single

recurring type of decision, ESS incorporate in one system the

11

data and analytic tools to provide information support for many managerial processes and problems." (23:17) The majority of ESS are data retrieval oriented and hence (23:17) can be considered to primarily support the intelligence phase of Simon's model.

Conceptual Framework and Scope of Research.

On the basis of the foregoing, an information requirements determination methodology appropriate for both executive support and decision support systems is required. Most importantly, however, in recognition of the wide range of interests of logistics executives, this research focuses on logistics executive's information requirements and not on executive's requirements for logistics information. Thus, the scope of the research is dictated by a definition of "logistics executives" rather than a definition of "logistics".

Organisational Realities. There is no official DoD definition of "logistics executives" but a satisfactory working definition can be derived from the higher level organisational structure of the Australian DoD. For the purposes of this research, logistics executives are defined to be "senior officers (generally of the rank of Brigadier (one star) or above and their SES equivalents) who have primary responsibility for any of the following broad logistics functions in the Services and the Department of Defence: supply, facilities, logistics computing,

12

maintenance, engineering, movement and transport, logistics policy development and review, logistics policy and force development issues relating to the Chief of the Defence Force's responsibilities for logistics matters, and the Defence Contracting Organisation.

III. Methodology

Introduction

The specific problem addressed by this research and four
research objectives were identified in Chapter I.   The
general method used in the research was a mail census of
logistics executives.   A detailed description and
justification of the research design is given below under
headings derived from the research objectives.

Selection of an Information Requirements Determination Methodology

Development of Selection Criteria.   There has been
little research into the quality of information requirements
determination methodologies.   To quote a recent (1985)
article by Benbasat:

> Except for one study by Munro and Davis (1977), which
> analysed the quality of different information
> requirements determination processes, I have not found
> any studies that attempt specifically to test the value
> of these different methods.   I therefore believe that
> the following are some of the unresolved research issues
> in MSS (management support systems) design: (1) How
> does the designer choose the appropriate method or
> methods to guide the design activity? (2) What
> contextual variables guide this selection? (3) What
> kinds of research approaches are appropriate to evaluate
> the alternative methods? [3:76]

Under these circumstances, and given the requirement
established in Chapter II for a methodology "appropriate for
ESS and DSS", it was considered that a conservative approach
to the choice of a methodology was most appropriate.   As a
result, the first criterion established was that the

14

methodology must have been successfully used in other

organisations to develop specifications for ESS/DSS. In

addition to this, time and resource constraints were such

that interviews were not possible.

It was also considered essential that the methodology

should be intuitively attractive to executives in order to

ensure their support. The final set of criteria were:

- Attractiveness. The methodology must be intuitively
  attractive to executives to ensure their support.
  They must be convinced that their participation was
  worthwhile.

- Proven Record of Success. The methodology must have
  been successfully used in other organisations to
  develop ESS/DSS.

- Suitability for Mail Survey. The methodology must be
  suitable for a mail survey.

Candidate Methodologies/Review of Literature. Davis and

Olson (8:483) suggest that there are eight general

methodologies for determining information requirements:

1. Normative Analysis. This methodology is based on the
   fundamental similarity of classes of object systems.
   That is, if a set of basic functions can be
   identified (e.g, a payroll system), analysis then
   concentrates on tailoring the normative requirements
   to meet non-standard needs of a specific application.
   [8:483]

2. Strategy Set Transformation. This methodology
   derives organisation-level information requirements
   from the objectives of the organisation. The
   organisation's claimant structure (a claimant is
   someone with an interest in the organisation) is
   identified, goals for each claimant group are
   identified, and after review by top management, the
   goals and concomitant strategies are transformed into
   information system strategies and objectives. [8:459]

3. Critical Success Factors (CSF) Analysis. This
   methodology derives information requirements from the
   critical factors for operating and managing an

15

organisation. CSF Analysis essentially involves the identification, by executives, of their organisation's goals and the few key areas where things "must go right" in order to achieve them. Executive information requirements are then specified on the basis of the need to monitor and/or predict performance in these critical areas. [19:85-93]

4. Process Analysis. This methodology establishes information needs by undertaking a "total study" of the organisation and comparing the information needs identified in the study with the existing information systems. [19:84] [8:485]

5. Ends-means Analysis. This methodology is usually used to identify of "effectiveness" indicators in industrial settings (8:485) and is not considered appropriate for general application.

6. Decision Analysis. This methodology is not appropriate for general application as it is directed towards specific decisions and does not identify an organisation's overall requirements for information. [8:487]

7. Socio-technical Analysis. This methodology assumes that an organisation is made up of two "jointly independent, but correlative interacting systems -- the social and the technical" (5:27). It is highly participative in nature and is oriented to application-level analysis rather than organisation-level analysis. [8:487]

8. Input-Process-Output Analysis. This methodology describes an object "system" (or organisation) in terms of its inputs, outputs, and transformation processes. Sub-systems of the object system are analysed to subdivide them into smaller systems, etc., until information requirements and processing activities are identified. [8:487]

Methodology Selection

An extensive review of the literature resulted in the following assessments of the candidate methodologies against the selection criteria:

**Table 2. Assessment of Candidate Methodologies
Against Selection Criteria**

Methodology	Criteria		
	Attractiveness	Proven Success	Suitable for Mail Survey
Normative Analysis	No	No evidence found	No
Strategy Set Transformation	Possibly	No evidence found	No
CSF Analysis	Yes	Yes	Yes
Process Analysis	Possibly	Yes	No
Ends-means Analysis	No	No evidence	No
Decision Analysis	Not suitable for ESS		
Sociotechnical Analysis	Not suitable for ESS/DSS		
Input-process-output Analysis	Yes	Yes	No

As is indicated in Table 2. only one methodology, CSF Analysis, satisfied all three criteria. CSF Analysis has a proven record of success in determining executive's information requirements; (19:81-93) (25:121-129) (4:21-26) (20:4-7) (15:1-8) has been successfully used in a mail survey (25:121-129); and is intuitively attractive to executives (20:7) (4:26) (25:28). Most importantly, researchers in the information systems discipline have concluded that "the CSF method seems ideal as a tool from which to base a requirements analysis specification" (4:21) and a recent study found a strong positive correlation between monitoring of CSFs and organisational performance. (13:29)

17

Population

There are 44 executives in the three Services and the DoD that have primary responsibility for the broad logistics functions detailed in Chapter II. Given the qualitative and open-ended nature of the research problem (and questionnaire design) this small and heterogeneous population necessitated a census rather than a sample survey.

Development of Instrument

Questionnaire design invariably involves a compromise between the desire to seek as much data as possible and the need to minimise the burden on respondents. In this particular case, it was necessary to request each respondent to read lengthy explanatory documentation accompanying the questionnaire and then undertake the difficult task of identifying their organisation's major goals and concomitant CSFs. As this in itself represented a significant burden on busy executives, it was not considered feasible to collect classificatory data (such as the source of information required) in respect of goals and CSFs. The only "additional" information sought was the very few items needed to identify the individual, his organisation and rank, and his level of satisfaction with the information currently available to him in respect of each CSF (respondents were asked to tick a box on a 5-point Likert scale with two polar

18

positions; "Highly Satisfied" and "Highly Dissatisfied"). As a result, it was necessary to develop alternative means of placing goals and CSFs into classes of interest. The classification scheme and methodology is discussed in the following section.

Explanatory notes and a draft questionnaire reflecting these considerations was designed and pilot tested on three senior logistics executives in the DoD. Only minor "cosmetic" changes were made to the questionnaire and explanatory notes as a result of this test. Appendix A contains the final package sent to respondents as well as a copy of a letter advising the results of the pilot test.

Development of Classification Schema

Objects of Interest and Their Attributes. One of the major problems confronting this project was to organise the available data into a form useful for analysis. The first step in addressing this problem was to develop a model which described the objects of interest to the research and their attributes (information about the objects needed to accomplish the research objectives). Four objects of interest were identified: (1) logistics organisations, (2) the logistics executive, (3) executive's goals, and (4) CSFs associated with these goals.

The next step was to assign attributes to each of these objects of interest (in this case, "attributes" represent those items of information which needed to be known about the

19

objects of interest in order to accomplish the research objectives). This step was accomplished by working backwards from the highest level of the model. In other words, the desired outcomes of the research were first assigned to the object "Logistics Organisation" as attributes. Attributes of objects at lower levels were then assigned by determining what information was needed at that level in order to provide information required at higher levels. The model is depicted below.

Objects		Attributes
Logistics Organisation(s)	▷	Information requirements, priorities for executive information support, kinds of systems needed.
Executive (Respondent)	▷	Rank, logistics function of organisation headed, service, satisfaction with information available, source of information required.
Goal	▷	Goal description, satisfaction with information available, focus of interest, source of information required.
CSF	▷	CSF description, satisfaction with information available, focus of interest, source of information required.

Figure 3. Research Model

Classification Schema. Most of the information needed

to satisfy the requirements of the research model was readily

available (e.g., goal/CSF descriptions, satisfaction with

information available, rank, logistics specialty of

organisation headed, etc.,). However, the attributes "focus

of interest" and "source of information required" were not

collected and it was necessary to develop a classification

schema which could be used assign goals and CSFs to classes

reflecting these attributes.

To this end, four separate classifications were

developed; a managerial activity classification, a functional

classification, a control classification, and a source of

information classification. The schema and the decision

rules used to classify each goal and CSF are described below.

Functional Classification. This classification is

concerned with the subject matter embodied in the particular

goal or CSF. There are five possible classes: finance,

manpower and personnel, information systems, specialised, and

combined. The specialised class reflects functions related

to a narrow logistics specialisation (e.g., the CSF "User

publications matching equipment in service" would be

classified as "specialised").

Goals and CSFs were classified to these classes on the

basis of the predominant subject matter associated with the

goal or CSF, the combined class was used when it was

impossible to identify a clearly predominant subject matter.

Activity Classification.   This is Anthony's

classification of managerial activity previously described

in Chapter II. There are three classes:

Strategic Planning	Definition of goals, policies and general guidelines charting course for organisation. Determination of objectives. Long-range considerations.
Management Control & Tactical Planning	Acquisition of resources. Acquisition tactics, facility location, structuring of work. Establishing and monitoring of budgets. Medium time horizon.
Operational Planning and Control	Effective and efficient use of existing facilities and resources to carry out activities within budget constraints. Inventory levels, levels of service etc. Short time horizon.

Control Classification.   This classification is

concerned with the transformation process. Inputs come into

organisations, are transformed by work activity (processes)

and leave as outputs. There are four classes:

Input Control.	Focuses on the resources flowing into the organisation. Aims to ensure that the appropriate amount of resources (human, material, and capital) are available.
Process Control.	Focuses on ongoing work activities within the organisation. Aims to ensure that work activities are meeting expectations.
Output Control.	Focuses on the end result or output of the organisation (amounts, quality, service). Concerned more with past activities than future events.
Combined	No clear focus.

Information Source Classification.   This

classification is concerned with the source of the

information the executive will use in support of a particular goal or to monitor a particular CSF. There are three classes: narrow, broad, and external. Goals and CSFs were classified as "narrow" if the information concerned was sourced from within the executive's own organisation (i.e., the organisation he or she heads), "broad" if the information (or part of the information) was sourced from elsewhere within the Department of Defence, or "external" if the information (or part of it) was sourced from outside the Department of Defence.

Assessment of the Reliability of the Classification Schema and Decision Rules

The first ten responses (containing 218 goals/CSFs) were independently classified by the author and by two senior members of the AFIT Faculty, each of whom had considerable logistics and/or information systems experience. A copy of the explanatory documentation and decision rules given to the Faculty members is at Appendix B.

The results of a comparison of the classifications made by the author and the Faculty members are summarised in Figures 4 to 7 below:
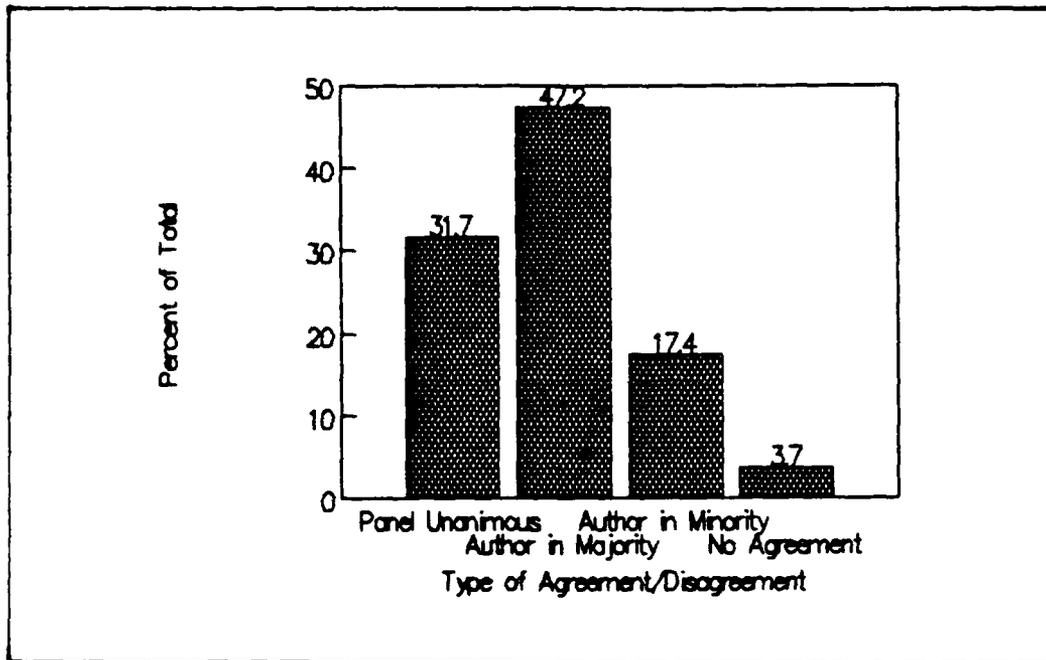
Figure 4. Reliability of Activity Classification
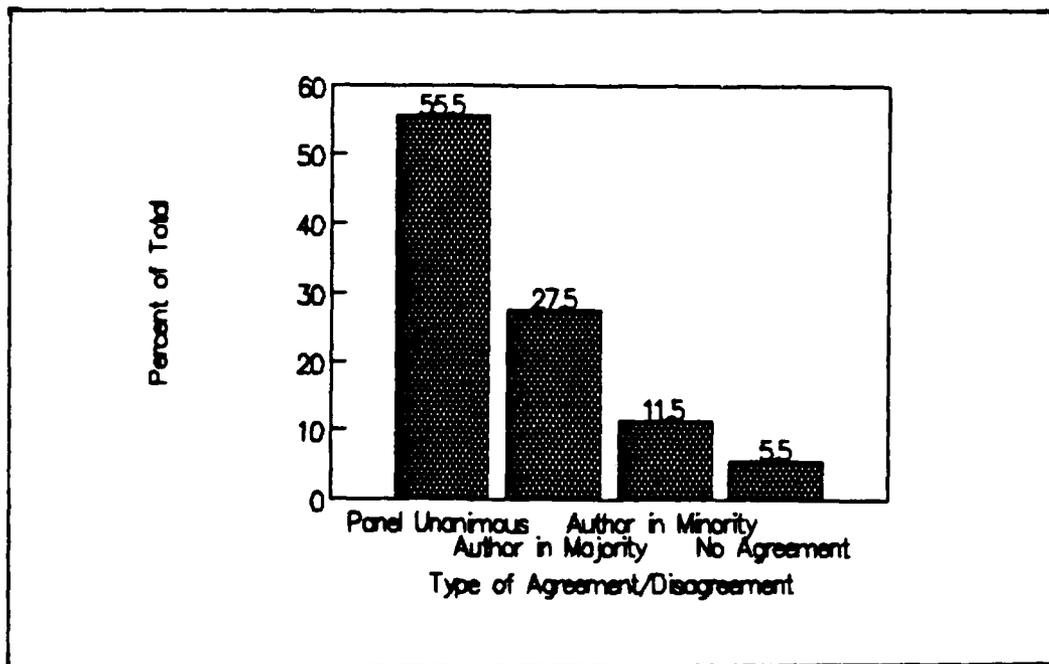
Figure 5. Reliability of Function Classification
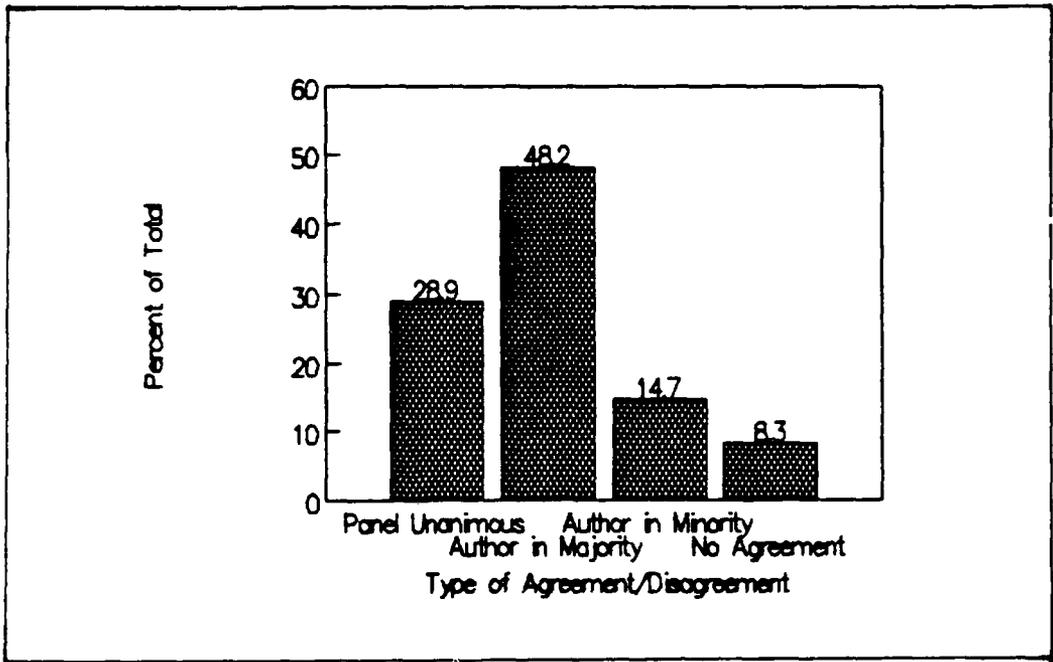
Figure 6. Reliability of Control Classification
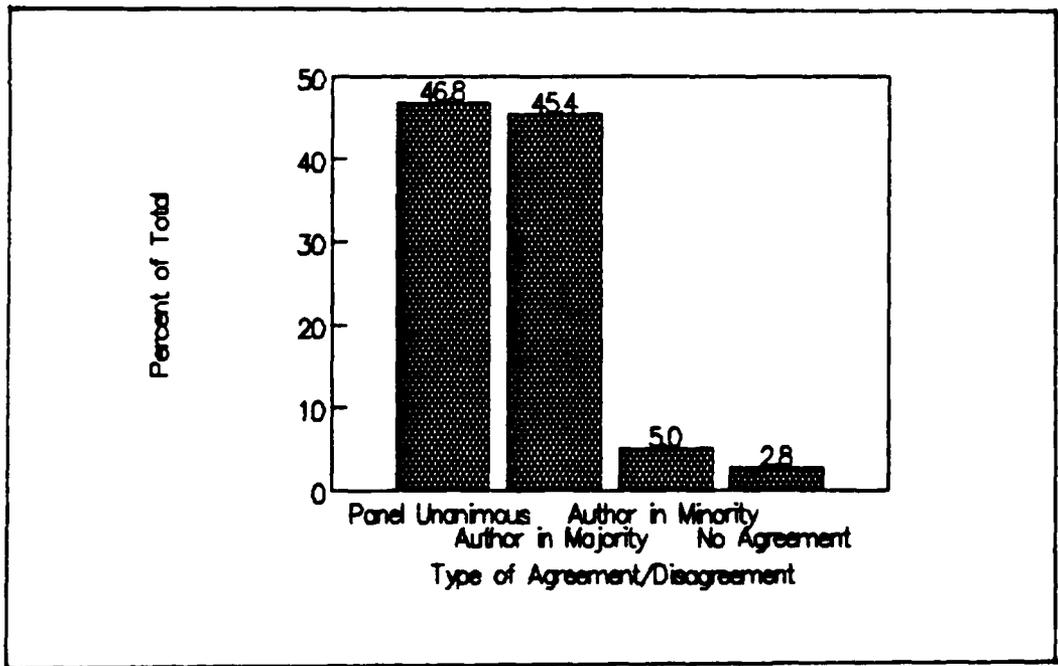
Figure 7. Reliability of Source Classification

On the basis of these comparisons, it was concluded that that the author was able to reliably classify goals and CSFs. Most importantly however, the schema was considered to be a valid and reliable measure of the broad focus of interest of executives.

Entry and Manipulation of Survey Data

Survey data was classified as described above and entered into DBIII PLUS database files. An example of the data stored in respect of each respondent is at Appendix C. Several DBIII PLUS programs were written to calculate mean satisfaction rates for the various classes of goals and CSFs. As these programs were both lengthy and complex, samples of output were re-calculated manually during processing to confirm accuracy. Data aggregated and cross-classified by DBIII PLUS programs were transferred to the QUATTRO spreadsheet program in order to produce graphs both for illustrative purposes and as aids for analysis.

Analysis of Variance (ANOVA)

As explained in more detail in Chapter IV, the performance of statistical tests was not a central objective of this research. However, mainly as a guide for future research, several simple analyses of variance were undertaken to assess whether observed differences between the mean satisfaction ratings of CSFs associated with each of the goals reported by various classes of respondents were statistically significant.

It should be noted that these results need to be treated with caution as in order to produce significant results, the data analysed consisted of respondent's goals and the mean satisfaction rate for CSFs associated with these goals. That is, the unit of analysis was the goal (141 observations) rather than the respondent (27 observations).

It can therefore be argued that the samples were not randomly drawn from the population. That is, there may be some statistically significant differences between respondent's goals and satisfaction rates and non-respondent's goals and satisfaction rates. In addition, the goals analysed were not independently drawn from the population in the strictest sense of that word as all of the goals reported by each respondent were included in the analysis. The analyses were undertaken with the BASS statistical software package.

IV. Findings

Introduction

This chapter presents the results of the analysis of response to the survey. A minor deviation from the survey design was caused by the fact that in one of the Services, 4 extra questionnaires were completed by officers who were outside of the original scope of the survey in the sense that they were not "executives" (i.e., Brigadier General equivalents). However, as each of these officers was a Colonel equivalent with responsibility for important logistics functions, it was decided to include their responses in the analysis.

Response

A total of 27 completed questionnaires were received in time to be used, 23 from respondents included in the original survey population of 44 plus the additional 4 discussed above -- a 56% response rate.

The following figures show response classified by Service, logistics specialty, and rank/Senior Executive Service (SES) level. The term "Staff Officers" in the first figure denotes Brigadier equivalents occupying executive positions in joint military/civilian organisations. The term "O Stars" in Figure 10 denotes the additional 4 responses received from "non executives".

It is considered that the response represents a good cross section of the DoD logistics establishment.
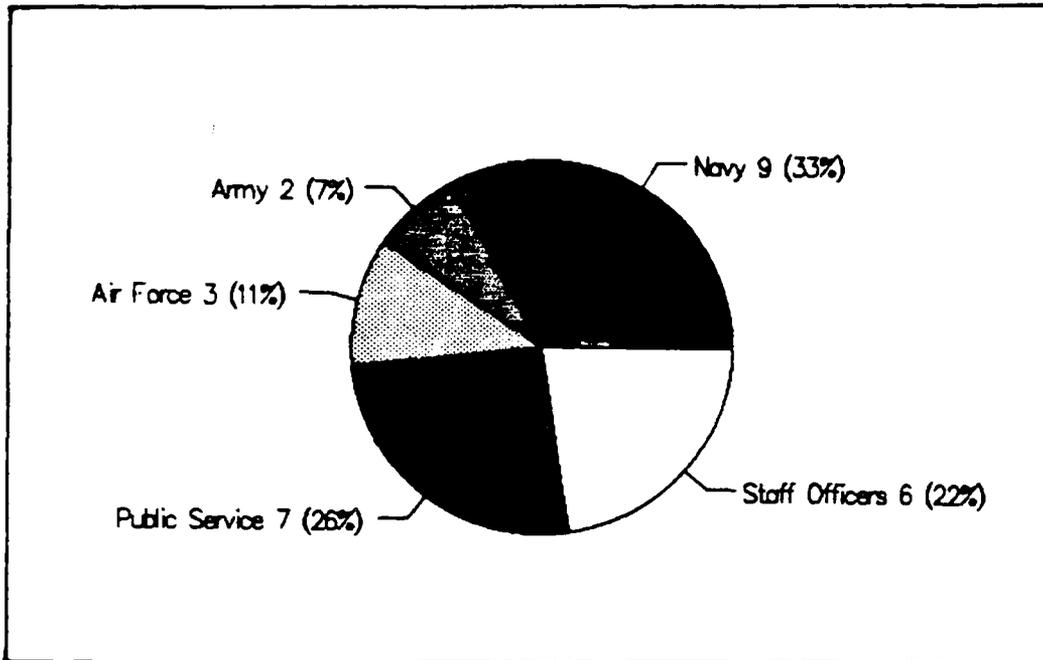
Figure 8. Response by Service
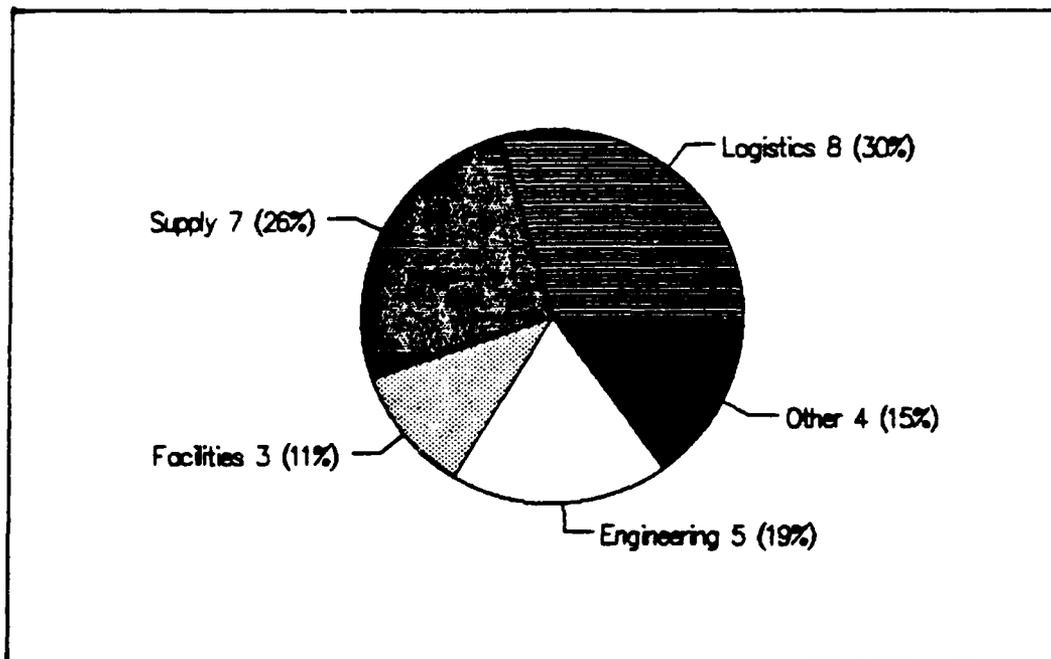
Figure 9. Response by Logistics Specialty
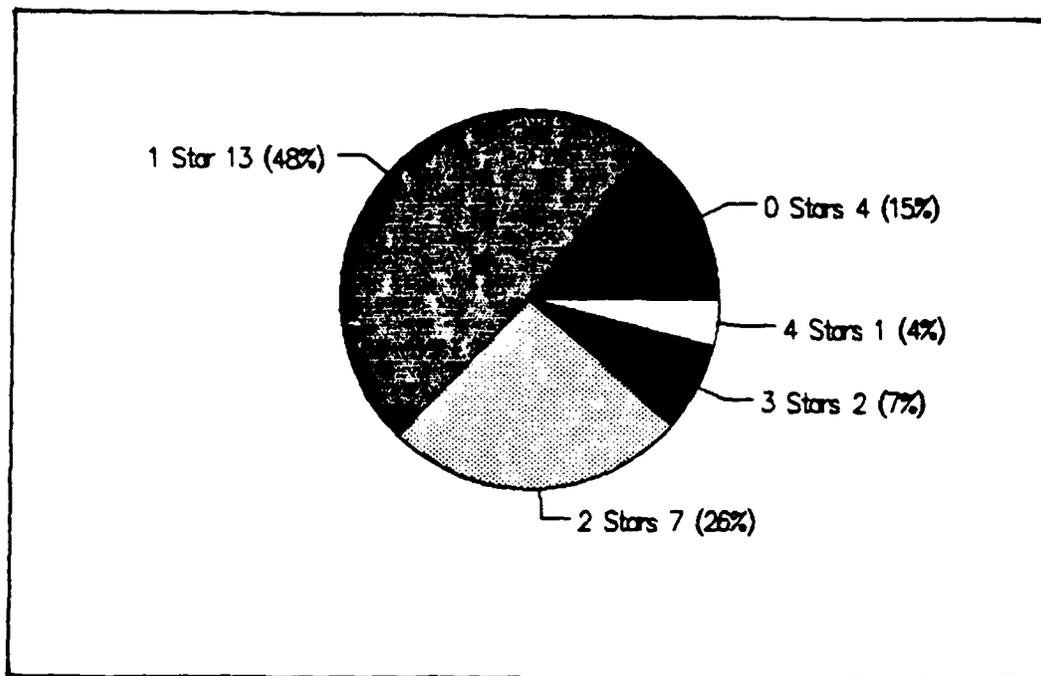
Figure 10. Response by Rank or SES Level

Analysis of Aggregated Data

The 27 respondents reported a total of 141 goals and 488 CSFs. Each goal and CSF was classified according to the schema and decision rules discussed in Chapter III. In addition, as indicated by Figures 8.-10. above, respondents (and therefore the data they reported) were classified according to their Service, logistics specialty, and rank/SES level.

Survey data aggregated on the basis of this classification schema is set out and discussed below.

Focus of Executive's Interest. The following figures show the relative proportions of goals/CSFs classified to

30

particular classes within the classification schema outlined in Chapter III.
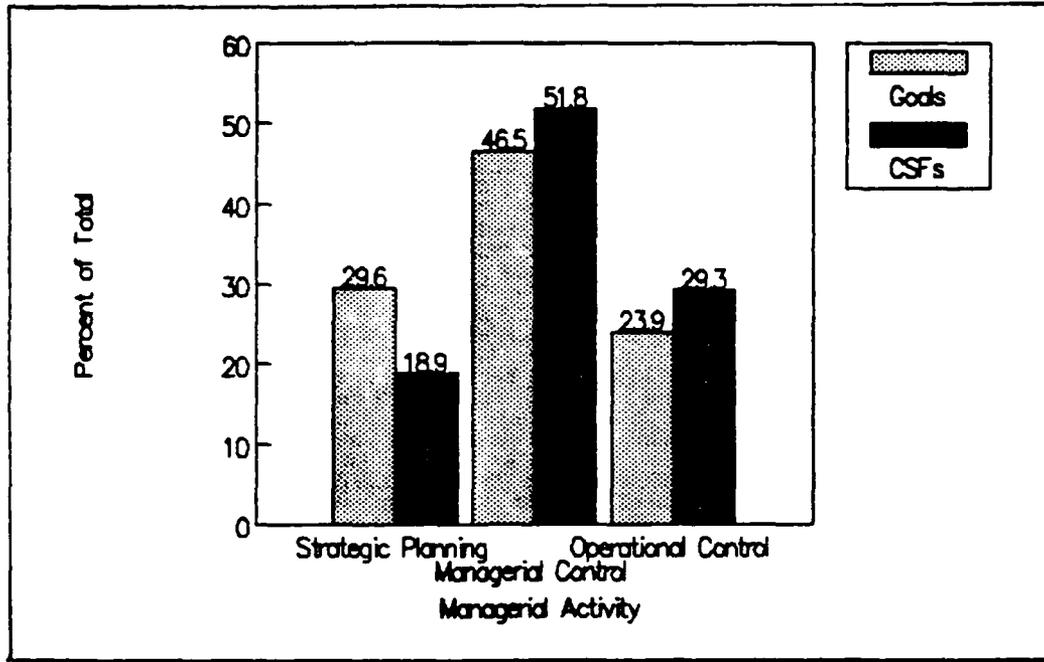
Figure 11. Managerial Activity Focus of Goals/CSFs
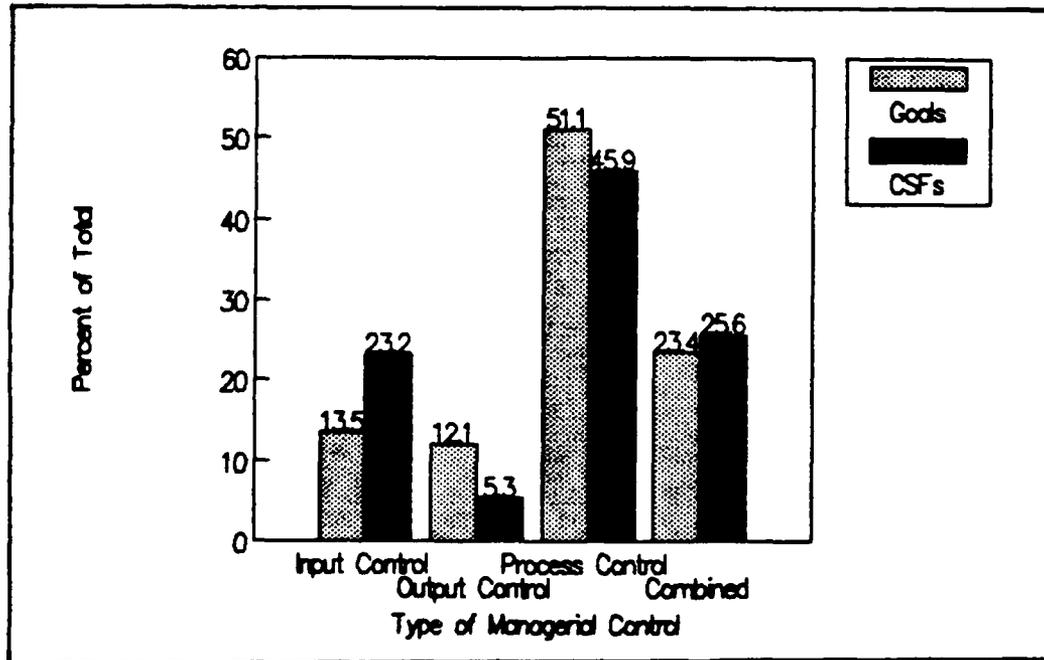
Figure 12. Control Focus of Goals/CSFs
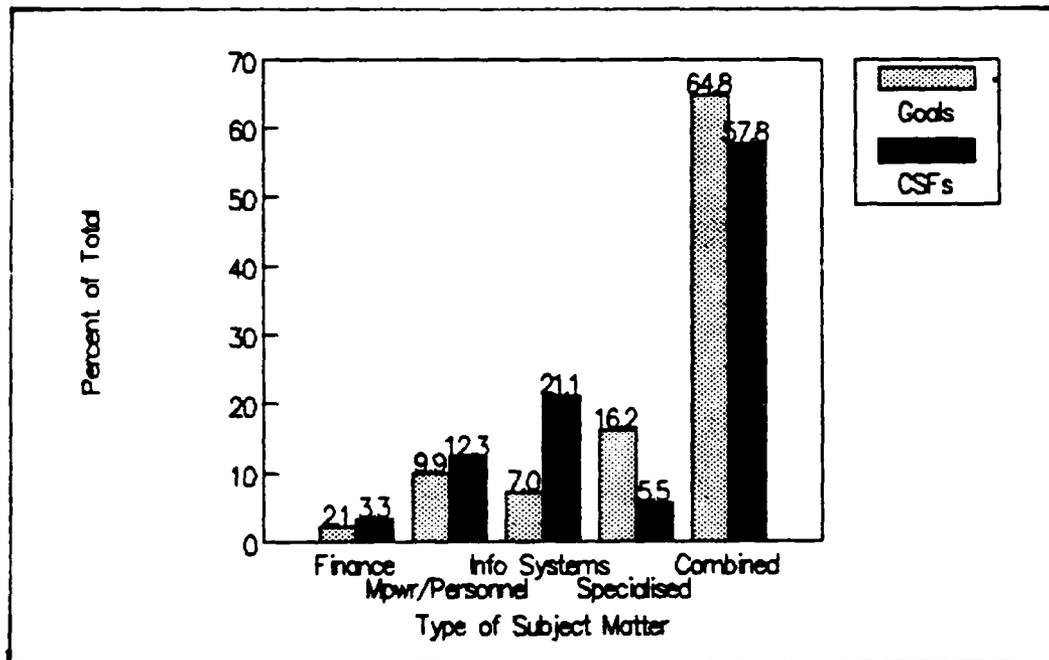
Figure 13. Functional Focus of Goals/CSFs
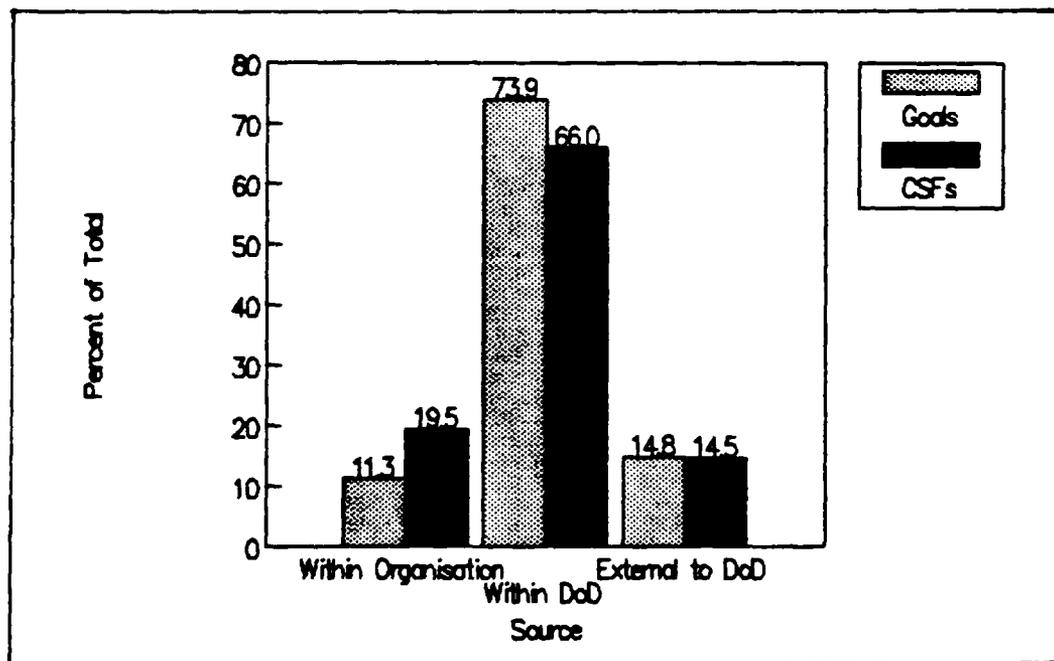
Figure 14. Source of Information Required by Executives

Interpretation of Executive's Focus of Interest. The
implications for information systems of the information
summarised in the above figures cannot be properly drawn
before individual responses are analysed in the next section.
However, the information does display some interesting and
important features.

First, the focus of executive concern on strategic
planning and management control and tactical planning
evidenced in Figure 11 (i.e., 76% of the goals and 71% of the
CSFs were classified to these managerial activities) confirms
the emphasis on these aspects of overall managerial activity
expressed in the Service's stated requirements for
information discussed in Chapter II. More to the point, the
information supports the suggestion made in that chapter that
"(the) requirements....reflect a need to support the
strategic planning and management control processes and, to a
lesser extent, operational control processes".

Second, a very large proportion of the executive's
goals/CSFs are focused on the control of processes within
their organisations rather than inputs or outputs. More
specifically, as shown in Figure 12, 51% of the goals and 46%
of the CSFs are concerned with these aspects of the
transformation process. Indeed, this proportion is probably
understated given that 23% of the goals and 26% of the CSFs
were classified to the "Combined" class.

Third, the disparate functional focus of goals/CSFs
(where 65% of the goals and 58% of the goals were classified

33

to the "Combined" class -- see Figure 13) reflects the interrelatedness of the logistics process i.e., "supply" cannot be considered in isolation from "engineering/maintenance" and vice versa. Again, this confirms the interpretation made in Chapter II that the Service's stated requirements, despite being made in response to a request for initial specifications of a supply system rather than a logistics system, reflect a need for an "integrated, systems-oriented approach" rather than narrow, functionally-based information systems.

Finally, the mutual dependence of logistics executives is strikingly emphasized by the information presented in Figure 14. Only 11% of the goals and 20% of the CSFs can be supported by information gathered entirely from within executive's own organisations.

Level of Satisfaction With Information Available. The Grandmean of the levels of satisfaction with information available in respect of each CSF reported was 2.63. As a Grandmean of "3" (mid-way on the 5-point Likert scale between "Highly Dissatisfied" and "Highly Satisfied") would be broadly indicative of a "Satisfied" rating, this result can be interpreted as an indication that logistics executives in the Australian DoD are generally dissatisfied with the information available to them.

In this context, it was of considerable interest, but

not central to the research, to determine whether there were
significant differences in mean satisfaction ratings among
various classes of executives. Set out below are three
figures which show the mean satisfaction rates of executives
classified by the logistics specialty of the organisation
they head, rank, and Service.
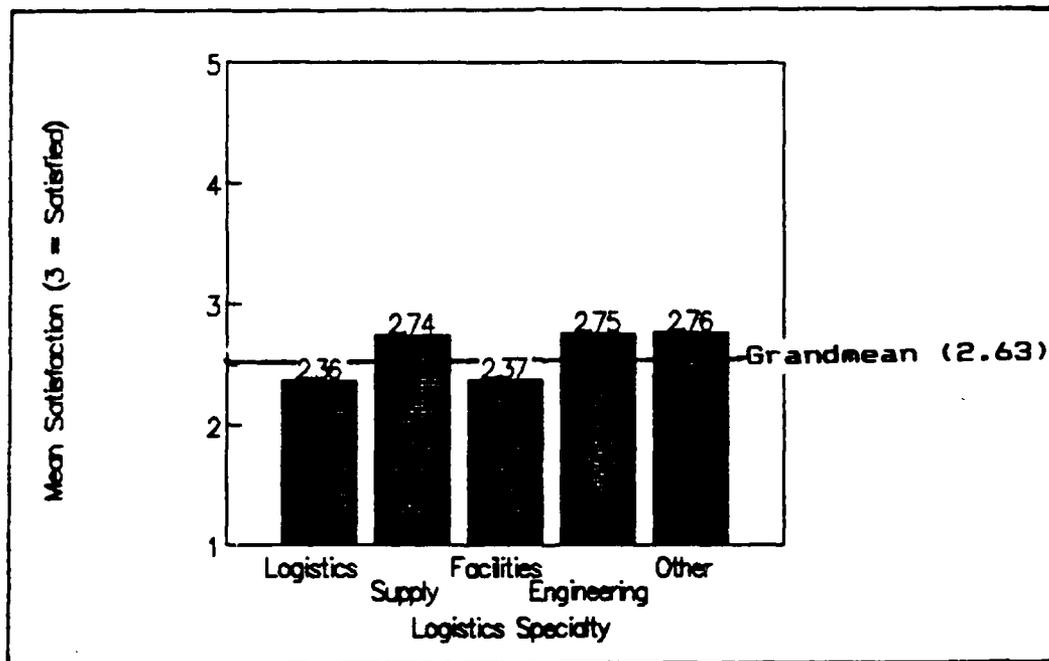
Figure 15. Mean Satisfaction by Logistics Specialty
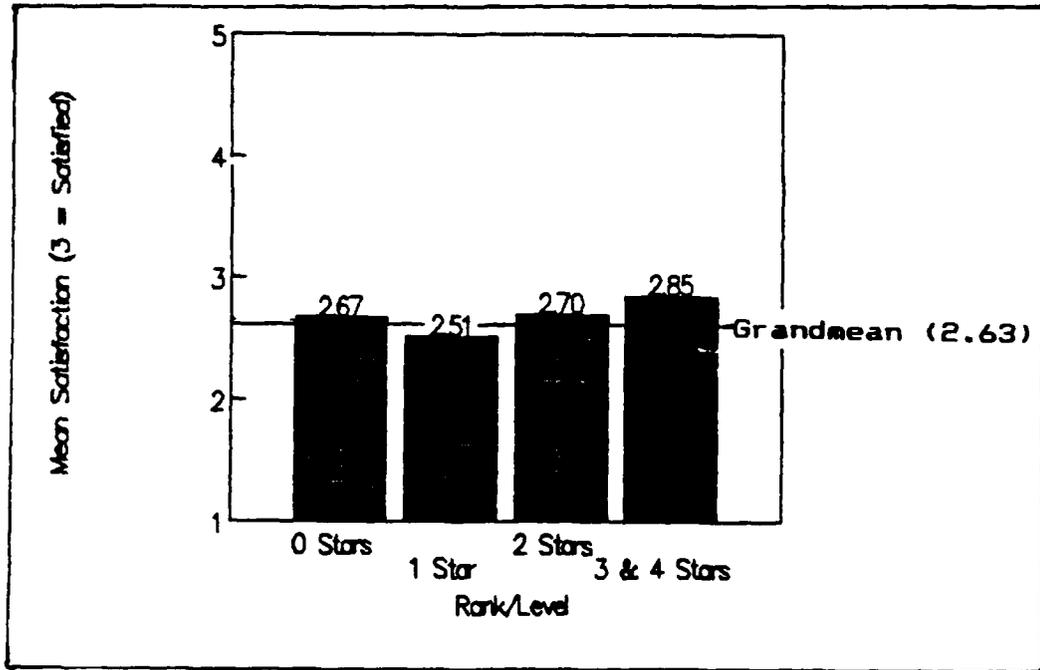
Figure 16. Mean Satisfaction by Rank/SES Level
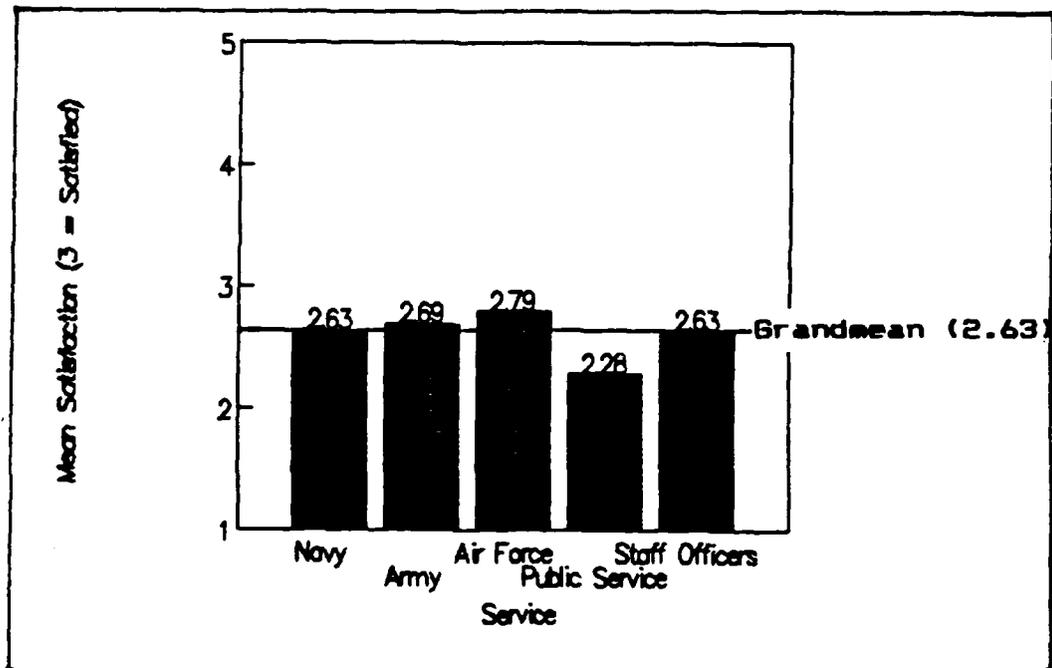
Figure 17. Mean Satisfaction by Service

The information presented in Figures 15-17 above does suggest that there may be differences in mean satisfaction ratings among the various classes of executives. Bearing in mind that the measure of satisfaction used in this research is an interval scale ranging from 1 to 5, the use of statistical techniques to determine the exact <u>extent</u> of these differences, or to establish confidence limits for the mean satisfaction rates of particular classes of executives is considered to be of questionable value. More importantly, knowing that say, Army "executives" are less satisfied with the information available to them than are say, Public Servants, is not important for this research.

However, as a possible guide for future research, analyses of variance (ANOVA) were undertaken on a dataset containing the mean satisfaction rates for CSFs associated with each of the 141 goals reported by executives and the results are summarised below. Copies of the BASS programs and printouts of results are given in Appendix D.

Table 3.　Results of ANOVAs (Dependent Variable = Mean Satisfaction)

Independent Variable	Adjusted R-squared	F Value	Probability > F
Logistics Specialty	0.07687457	3.91467	0.00485 *
Rank/SES Level (No. of Stars)	0.00000000	0.93773	0.44419
Service	0.04636723	2.36141	0.04327 *

For the reasons given in Chapter III, these results need to be treated with some caution. However, two of the results (marked with an asterisk) appear to be statistically significant and two tentative conclusions can be drawn from them; mean satisfaction rates are not the same (1) among the Services and, (2) among organisations with different logistics functions. These conclusions are discussed further in Chapter V.

Analysis of Individual Responses.

The approach taken in this section is to focus on those CSFs which exhibit two characteristics; relevance for information systems (subjectively determined by the author) and a low satisfaction rating.

As could be expected in a survey of this nature, many of the CSFs reported by respondents were concerned with factors which were not related to information systems per se. For example, The CSF "Gain the support of the Secretary/Chief of Defence Staff and the Minister for the proposed concept" is typical of many of the policy-related CSFs reported by respondents.

Of the 488 CSFs reported, 103 had both low satisfaction ratings (i.e., a rating of 1 or 2) and relevance for information systems. These "remaining" CSFs are discussed further below.

Degree of Commonality. There were several common themes running through the remaining "unsatisfactory" CSFs although slightly more than half (53) could be categorised as

38

being unique to a particular respondent. The overall

impression created, albeit subjective, is one of diversity of

need combined with dependence on other organisations for

information and inputs. As previously discussed, very few of

the information needs expressed by logistics executives can

be satisfied from within their own organisations. However,

it is also clear that only a few of these requirements could

be satisfied by generalised information systems in the sense

that one system architecture could provide the functionality

required.

A number these CSFs are listed below as examples of the

range of interest and diversity of need expressed by

logistics executives:

- Reliable data from Units/Military Districts to define
  requirements (for facilities).

- Automate the local purchase function of Supply
  Units.

- Comprehensive information from equipment
  manufacturer/supplier.

- Cost analysis techniques and simulation studies.

- Major contracts monitoring system.

- Ability to measure resources contributing to discrete
  logistics activity.

- Provision of cost of resources.

- Access to suitable modelling techniques.

- Optimise the utilisation of budgeted resources and
  develop a programme budgeting environment for
  increased effectiveness in resource management.

- Monitor experience levels of subordinates.

It was noted earlier that despite the diversity of needs, there were several common themes running through the CSFs under discussion. These themes and their number of occurrences, either as CSFs in their own right or as components of other CSFs, are listed below.

. Performance reporting/monitoring (20 CSFs).

. Planning/monitoring tasks and achievements (7).

. User perceptions of effectiveness/customer servicing (6).

. Training -- needs identification, bids for resources, monitoring of skills (6).

. Costs of resources/budgeting information (5).

. Simulation/modeling (6).

Analysis of Findings in Terms of Research Objectives

Four research objectives were laid out in Chapter 1, the first three of which related to the selection of a requirements determination methodology and the design and dispatch of a questionnaire to logistics executives. It is considered that these three objectives have been achieved and that the results obtained confirm the efficacy of the CSF methodology and the general approach used in this research.

The fourth objective is re-stated below:

"Objective 4. Analyse and interpret results in a form useful for the development of a preliminary system description and work plan (i.e., construct an "appropriate" conceptual framework -- the framework can be considered appropriate if it clearly identifies information gaps and allocates priorities for development). The analysis will also provide an opportunity to assess the validity of a centralised approach to systems development by determining whether information requirements vary significantly among the

40

various organisations and executives concerned".

This objective specifies three outputs; (1) a preliminary system description and work plan, (2) a conceptual framework identifying information gaps and allocating priorities, and (3) an assessment of the validity of a centralised approach to systems development.

Preliminary System Description and Work Plan/Conceptual Framework. The diversity of needs expressed by executives suggests that it would be impractical, if not impossible, to develop a single, monolithic logistics information system. This in turn, means that it is not appropriate to attempt to produce a preliminary "single" system description or conceptual framework.

However, it is possible to describe in broad terms at least, some of the features of the kinds of information systems and approaches to the development of these systems that are implied by the results of this research.

First, although logistics executive's needs are diverse, the interdependence of logistics processes and the mutual dependence of logistics executives discussed earlier, suggests that these systems should be integrated (in terms of sharing common data and adhering to common data standards) at least to the extent dictated by the flows of information between different systems.

Second, it has already been mentioned that the disparate functional focus of logistics executives implies that narrow, functionally-based information systems are inappropriate.

41

The corollary of this is that design process itself should

not be approached from a functional (i.e., finance, manpower

etc.,) perspective. Chapter V discusses this issue in more

detail.

Third, the common themes identified above are

significant in that they provide some guidance on priorities

for, and approaches to, systems development:

Performance Reporting/Monitoring. Executives are

clearly dissatisfied with the information available to them

in this regard. The development of appropriate performance

measures and performance monitoring systems is, on the basis

of this research, the area of most urgent need.

Planning/Monitoring of Tasks and Achievements.

This theme may appear to overlap with its predecessor but the

CSFs subjectively classified to this category are concerned

more with the intimate day-to-day management of tasks and

subordinates than the broad logistics processes and

responsibilities addressed by performance reporting and

monitoring.

The needs embodied within these CSFs have been

interpreted as a requirement for a fairly simple set of

managerial aids such as those provided by software packages

like SIDEKICK and MACPROJECT. That is, easy-to-use "desktop

accessories" which assist managers in their day-to-day

activities.

User Perceptions of Effectiveness/Customer

Servicing. Again, there may appear to be some overlap between this and other themes but the CSFs which led to this category seem to imply a need for some kind of subjective feedback from users/customers rather than a formal measure of say, output or turnaround time.

This need may be satisfied by regular surveys of users/customers to obtain their views of the services supplied to them. Given a sufficiently large sample size and/or a sufficient number of survey results over time, this kind of subjective survey can become "objective".

Training. The CSFs leading to the identification of this theme suggest a requirement for a fairly simple information system (or component of a larger executive support system) which provides a means of associating personnel and job categories with training courses and skills requirements and vice versa.

Costs of Resources/Budgeting Information. This theme is of interest in that it relates to a functional area within the DoD (Finance) which is currently undertaking a major redevelopment of its information systems. It is discussed in more detail in Chapter V.

Simulation/Modeling. The CSFs related to this theme imply a requirement for the development of decision support systems aimed at improving the effectiveness of decisions made by particular executives. Recommendations on the means of achieving this are made in Chapter V.

43

<u>Validity</u> <u>of</u> <u>a</u> <u>Centralised</u> <u>Approach</u> <u>to</u> <u>Systems</u> <u>Development</u>.

There is nothing in these findings to suggest that a
centralised (i.e., single development team) approach to the
development of information systems for logistics executives
is inappropriate. There is diversity but there is also
commonality.

The findings do suggest that regardless of whether
development is undertaken by one or several development
teams, systems designers must approach the development task
from the same perspective that executives obviously apply to
their responsibilities; that is, an integrated logistics
perspective rather than a narrow, functional perspective.
Means of achieving this are discussed and recommended in the
next chapter.

V. Conclusions and Recommendations

Conclusions About the Methodology

It is considered that the results obtained from this research are valuable and provide a useful base for information systems planning and policy development in the Australian DoD. The use of a mail survey rather than interviews enabled the results to be produced quickly and cheaply but imposed three significant limitations on the research.

First, it was not possible to explain the CSF methodology in detail and in a few cases respondents confused activities and tasks with CSFs thereby reducing the usefulness of their response.

Second, the diversity noted in Chapter IV may be partly due to semantic differences among responses rather than "real" differences. An interview-based methodology would have enabled responses to be standardised.

Third, as discussed in Chapter III, the need to keep the burden on respondents to a minimum limited the amount of data that could be collected. The classification schema went some way towards overcoming this but had the disadvantage of being subjective and therefore not completely reliable.

Despite these limitations, it is considered that on balance, the results vindicate the approach taken.

General Conclusions and Recommendations

As explained in Chapter I the genesis of this research
was the difficulty experienced by the Supply Systems
Redevelopment Project Team in obtaining and developing
specifications for the highest level (those components aimed
at supporting the needs of executives) of the proposed DoD
Supply System. At present the Department is also undertaking
a complete redevelopment of its Manpower and Finance
information systems -- the total cost of the three projects
is estimated to exceed $A300m.

The three project teams are developing the highest
levels of their systems independently although they are
cooperating with each other to develop common interfaces and
standards. However, as far as can be determined, (18)
these project teams are developing the executive level
components of their systems from a functional perspective.
That is, the information and information processing,
manipulation and presentation facilities delivered to users
by these components is determined by the information
collected and processed at the lower (transaction processing
and operations management) levels of these systems.

As previously discussed, the findings of this research
suggest that information systems designed from a functional
perspective are unlikely to satisfy the requirements of
logistics executives. Without knowing the details of how
executives requirements are being determined by these project

46

teams it would be unreasonable to come to conclusions about the approach being taken by these teams. However, it does seem to be reasonable to suggest that these approaches be reviewed in the light of this research.

In addition, these teams' systems specifications and work plans should be reviewed in the light of the common themes and possible priorities for systems development identified in Chapter IV. For example, on the basis of the number of times it was mentioned by executives, the area of most urgent need is performance measuring/monitoring. There are also important requirements which do not relate to the subject matter areas being addressed by these teams and it is unlikely for example, that any of these teams will provide the "desktop accessories" discussed in Chapter IV.

The research has also uncovered what appear to be significant differences in the levels of satisfaction of executives classified to particular organisations and logistics specialties. For the reasons given in Chapter IV, the exact extent of these differences are not important but they do point to a need to review the systems development resources allocated, or proposed to be allocated to these groups.

Concluding Remarks

This research has taken the first step towards linking the management needs of the logistics establishment in the Australian DoD to its information systems but more work is

needed to develop detailed priorities and systems
specifications and to gain executive's confidence and
support.

As always, the main problem will be to obtain the
resources necessary to undertake these tasks. However, a
very strong case can be made for them. After all;

> "Critical success factors are those few things that must
> go well to ensure success for a manager or an
> organisation...they include issues vital to an
> organisation's current operating activities and to its
> future success." [20:17]

CLD   2013/1988

August 1988

Dear

I would be grateful if you would personally complete the attached
questionnaire and return it to LT COL Clark, DLDR (CP4-2-09), in
the enclosed envelope as soon as possible.

The questionnaire is based on the Critical Success Factors
Technique which is designed to help executives identify the
management information they need in order to monitor their
organisation's performance in critical areas. Further information
about this technique is given in explanatory notes attached to the
questionnaire.

The objective of this initial survey is to broadly identify
logistics executives' key information requirements across the full
range of their responsibilities. Departmental investigations of
management information requirements in the past have generally
focused on middle managers' information requirements within fairly
narrowly defined boundaries (e.g. supply and finance). We do not
have a clear picture of our overall requirements for executive
support. The results of this survey will therefore be of
considerable value for logistics information system planning and
resource allocation.

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Please note that your individual response will be combined with others and will not be attributed to you personally. The results of the survey will be made available to all addressees.

For further information, contact LT COL Terry Clark, DNATS 8632477, or (062) 662477.

A.E. HEGGEN
AVM
CLD

August 1988

INFORMATION REQUIREMENTS OF LOGISTICS EXECUTIVES
QUESTIONNAIRE

Purpose. This questionnaire is designed to obtain details of
your key management information requirements as well as an
indication of your level of satisfaction with the management
information currently available to you.

Scope. For the purposes of this survey, logistics executives
are defined to be senior officers, generally of the rank of
Brigadier (one star) and above, and their SES equivalents, who
have responsibility for any of the following logistics functions
in the Armed Forces and/or the Department of Defence: Supply,
facilities, logistics computing, maintenance, engineering,
movement and transport, logistics policy development and review,
logistics policy issues relating to the Chief of the Defence
Force's responsibilities for logistics matters, and Defence
contracting.

Confidentiality. Your response will be combined with others and
will not be attributed to you personally.

Instructions/Explanatory Notes. Part 1 of the questionnaire
seeks personal and organisational information and is self-
explanatory. Part 2 of the questionnaire asks you to (1) identify
the major goals you have established for your organisation (i.e.
the organisation you head), (2) identify the critical success
factors associated with each of these goals, and (3) for each
critical success factor identified, indicate your level of
satisfaction with the management information currently available
to you. Please do not confine your answers to "logistics" issues
only. It is important that your information requirements across
the full range of your responsibilities are identified.

To assist you in completing the questionnaire, attached is a
description of the Critical Success Factors (CSF) Technique, an
example of a completed questionnaire, and a set of sample goals
and associated CSFs.

Definition of Critical Success Factors (CSFs). CSFs are, for any
organisation, the limited number of areas in which results, if
they are satisfactory, will ensure successful performance for the
organisation. They are the few key areas where "things must go
right" for the organisation to succeed. As a result, CSFs are
areas of activity that should receive constant and careful
attention from management.

51

CRITICAL SUCCESS FACTORS ANALYSIS
BRIEF DESCRIPTION/EXAMPLES OF CRITICAL SUCCESS FACTORS

Background.

Critical Success Factors (CSF) Analysis is a fairly new technique developed at the Massachusetts Institute of Technology (MIT) to determine requirements for management information.

It has been recognised for some time that most management information systems have failed to live up to expectations. Executives receive too much data and too little information:

"...The information explosion crosses and criss-crosses executive desks with a great deal of data. Much of this is only partly digested and much of it is irrelevant."
John F. Rockart MIT.

CSFs - What are they?

Critical success factors are, for any organisation, the limited number of areas in which results, if they are satisfactory, will ensure successful performance for the organisation. They are the few key areas where "things must go right" for the organisation to succeed and, as a result, are areas of activity that should receive constant and careful attention from management.

CSF Analysis - What is it?

CSF Analysis is flexible and can be adapted to suit different organisations. Some of the most successful applications of the technique have involved a three-phase process where CSF Analysis (undertaken in the first phase) is supplemented by other systems development tools and techniques in later phases as follows:

Phase One: Identify primary goals/objectives and associated CSFs. (Key Technique - Critical Success Factors Analysis).

Phase Two: Develop and evaluate measures (both hard (objective) and soft (subjective)) to be used to monitor performance and provide information for decision making. (Key Technique - Decision Analysis).

Phase Three: Rapid development of low risk, managerially useful systems. (Key Technique - Prototype development, implementation, use and refinement).

Advantages of CSF Analysis.

In contrast to most other requirements determination methodologies, CSF Analysis provides a means of quickly and cheaply identifying executives needs as lengthy analyses of organisational attributes and functions are not required. In particular, it provides a common language for executives and information systems analysts and helps executives to determine those factors on which he or she should focus attention.

EXAMPLES OF GOALS AND CSFs

The following examples are intended to be illustrative of the
kinds of goals and CSFs which particular executives may identify for
their organisations.

	Goals	CSFs
Supply organisation 1.	Improve responsiveness of supply system to operational demands.	. forward planning at base/unit level . level of inventory at bases/units . delivery times depot -> units . "operators" perceptions of service levels
	Reduce administrative lead times.	. training of staff . automation of routine functions . financial delegations . forward planning/ demand forecasting
Supply organisation 2.	Reduce annual budget "underspending"	. financial modelling/ monitoring . training of staff . early identification of procurement needs
	Reduce "stock-outs" of critical items	. critical item identification/ monitoring system . procurement lead times . repair pipelines
	Improve resource allocation	. monitoring of service levels X weapon system & service levels X location . manpower forecasting/ monitoring . cost centre budgeting . operators perceptions of service levels
Logistics organisation 1.	Obtain sufficient resources	. budget justifications . needs identification . resource utilisation monitoring
	Improve organisational unity	. team cohesiveness . health and morale

53

PART 1. PERSONAL/ORGANISATIONAL INFORMATION

LAST NAME ..Sones........ RANK OR SES LEVEL AS LEVEL 2.... ABBREVIATED APPOINTMENT TITLE(e.g. DGSUP-A) AS.X.Y.Z...

TELEPHONE NUMBER ..66-12345.

PART 2. ORGANISATIONAL GOALS, CRITICAL SUCCESS FACTORS, AND ASSESSMENT OF MANAGEMENT INFORMATION CURRENTLY AVAILABLE

A. MAJOR GOALS.
In the spaces provided on each page please list the major goals you have for the organisation you head. (Most organisations have not more than four or five major goals).

B. CRITICAL SUCCESS FACTORS (CSFs)
Please briefly describe the critical success factors associated with each goal listed. (There are usually less than four for each goal).

C. ASSESSMENT OF MANAGEMENT INFORMATION CURRENTLY AVAILABLE TO YOU.
For each CSF please indicate your level of satisfaction with the information available to you by ticking the appropriate box. In determining your level of satisfaction you should consider aspects such as; information availability, accuracy, timeliness, and level of detail.

GOAL 1

Improve responsiveness & supply system to operational demands.

COMMENTS ?

Information on level of responsiveness available but more accurate processing to be gained.

Information not available - improvements required.

CRITICAL SUCCESS FACTORS (Goal 1)

....forward planning at base/unit level.

...level of inventory at base/unit

...delivery times - depot → units.

...operator perception of supply service levels.

...measures of review levels.

	ASSESSMENT			
Highly Dissatisfied				Highly Satisfied
☐	☐	☐	☐	☐
☑	☐	☑	☐	☐
☐	☐	☐	☐	☐
☑	☐	☐	☐	☐
☐	☐	☐	☑	☐
☐	☐	☐	☐	☐

GOAL 2

Reduce administrative lead times

CRITICAL SUCCESS FACTORS (Goal 2)

	ASSESSMENT					
	Highly Dissatisfied					Highly Satisfied
training of staff	☐	2	☐	☐	☐	☐
automation of routine functions	2	☐	☐	2	☐	☐
improved delegation/responsibility at lower level	2	2	☐	☐	☐	☐
demand forecasting capability workload forecasting capability	2	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

COMMENTS ?

GOAL 3

CRITICAL SUCCESS FACTORS (Goal 3)

	ASSESSMENT					
	Highly Dissatisfied					Highly Satisfied
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

COMMENTS ?

55

INFORMATION REQUIREMENTS OF LOGISTICS EXECUTIVES QUESTIONNAIRE

PART 1. PERSONAL/ORGANISATIONAL INFORMATION

LAST NAME ....   RANK OR SES LEVEL ....   ABBREVIATED APPOINTMENT TITLE (eg DGSUP-A).............

TELEPHONE NUMBER ....

PART 2.   ORGANISATION GOALS, CRITICAL SUCCESS FACTORS, AND ASSESSMENT OF MANAGEMENT INFORMATION CURRENTLY
          AVAILABLE

A. MAJOR GOALS.
    In the spaces provided on each
    page please list the major goals
    you have for the organisation
    you head. (Most organisations
    have not more than four or
    five major goals).

B. CRITICAL SUCCESS FACTORS (CSFs)
    Please briefly describe the
    critical success factors
    associated with each goal listed.
    (There are usually less than four
    for each goal).

C. ASSESSMENT OF MANAGEMENT INFORMATION
    CURRENTLY AVAILABLE TO YOU.
    For each CSF please indicate your
    level of satisfaction with the
    information available to you by
    ticking the appropriate box. In
    determining your level of
    satisfaction you should consider
    aspects such as: information
    availability, accuracy, timeliness,
    and level of detail.

			ASSESSMENT		
	Highly Dissatisfied				Highly Satisfied

GOAL 1

CRITICAL SUCCESS FACTORS (Goal 1)

[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]
[]	[]	[]	[]	[]	[]

COMMENTS ?

56

PAGE 2

GOAL 2

COMMENTS

CRITICAL SUCCESS FACTORS (Goal 2)

ASSESSMENT

Highly Dissatisfied

Highly Satisfied

GOAL 3

COMMENTS

CRITICAL SUCCESS FACTORS (Goal 3)

Highly Dissatisfied

Highly Satisfied

GOAL 4

CRITICAL SUCCESS FACTORS (Goal 4)

ASSESSMENT

Highly Dissatisfied   Highly Satisfied

COMMENTS?

GOAL 5

CRITICAL SUCCESS FACTORS (Goal 5)

Highly Dissatisfied   Highly Satisfied

COMMENTS

PAGE 4

GOAL 6

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COMMENTS?

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GOAL 7

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COMMENTS

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CRITICAL SUCCESS FACTORS (Goal 6)

ASSESSMENT

	Highly Dissatisfied					Highly Satisfied
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]

CRITICAL SUCCESS FACTORS (Goal 7)

	Highly Dissatisfied					Highly Satisfied
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]
....	[]	[]	[]	[]	[]	[]

59

PAGE 5

GOAL 8

COMMENTS?

CRITICAL SUCCESS FACTORS (Goal 8)

ASSESSMENT

Highly Dissatisfied — — — — — Highly Satisfied

GOAL 9

COMMENTS

CRITICAL SUCCESS FACTORS (Goal 9)

Highly Dissatisfied — — — — — Highly Satisfied

Classification Schema -- Explanatory Notes
          and Decision Rules For Panel Members

Background

A questionnaire was sent to every logistics executive in the
Australian DoD seeking details of their goals, critical
success factors (CSFs) associated with each goal, and an
assessment of their satisfaction with the information
available to them in respect to each factor. A copy of the
questionnaire is attached.

In order to arrive at some general conclusions about the
information "focus" of Australian logistics executives it is
necessary to classify the goals and CSFs detailed in
responses in a consistent and meaningful way. To this end,
the following classification schema and decision rules have
been developed.

Schema and Decision Rules

1. Functional Classification.

This classification is concerned with the organisational
function embodied in the particular goal or CSF. There are
five possible classes: finance (F), manpower and personnel
(M), information systems (I), specialised (S), and combined
(C).

Goals and CSFs should be classified to these classes on the
basis of the predominant subject matter associated with the
goal or CSF. For example, the CSF "Staff training/education"
would be classified as M. Goals and CSFs should be classified
to the combined class "C", when it is impossible to identify
a predominant subject matter. The specialised class reflects
functions related to a narrow logistics specialisation. For
example, the CSF "User publications matching equipment in
service" would be classified as "S".

2. Activity Classification

This classification is concerned with the management activity
embodied in the goal or CSF and is drawn from R.N. Anthony's
Planning and Control Systems: A Framework for Analysis.
(Harvard University Press, Cambrige 1965). There are three
classes: strategic planning (S), management control and
tactical planning (M), and operational planning and control.
A fuller explanation of these classes is given below:

Strategic Planning   Definition of goals, policies and general
                      guidelines charting course for
                      organisation. Determination of
                      objectives. Long-range considerations.

Management Control & Tactical Planning	Acquisition of resources. Acquisition tactics, facility location, structuring of work. Establishing and monitoring of budgets. Medium time horizon.
Operational Planning & Control	Effective and efficient use of existing facilities and resources to carry out activities within budget constraints. Inventory levels, levels of service etc. Short time horizon.

3. Control Classification.

This classification is concerned with the transformation process. Inputs come into organisations, are transformed by work activity (processes) and leave as outputs. There are four classes: input control (I), process control (P), output control (O), and combined (C). Goals and CSFs should be classified to these classes on the basis of the predominant control focus. The combined class should only be used when there is no clear focus on input, output or control. A fuller explanation of these classes is given below:

Input Control.	Focuses on the resources flowing into the organisation. Aims to ensure that the appropriate amount of resources (human, material, and capital) are available.
Process Control.	Focuses on ongoing work activities within the organisation. Aims to ensure that work activities are meeting expectations.
Output Control.	Focuses on the end result or output of the organisation (amounts, quality, service). Concerned more with past activities than future events.
Combined	No clear focus.

4. Information Source Classification

This classification is concerned with the source of the information the executive will use in support of a particular goal or to monitor a particular CSF. There are three classes: narrow (N), broad (B), and external (E). Goals and CSFs should be classified as "N" if the information concerned is sourced from within the executive's own organisation (i.e, the organisation he or she heads), "B" if the information (or part of the information) is sourced from elsewhere within the Department of Defence, or "E" if the information (or part of it) is sourced from outside the Department of Defence.

Appendix C -- Information Stored About Each Response

The various DBIII PLUS files used enabled the following data to be retrieved for each response:

. ID -- Identifier.

. LNAME -- Last Name.

. RANK -- Rank or SES level.

. APPTITLE -- Appointment title e.g., DGSUP-A (Director General Supply - Army).

. SERVICE -- (Navy, Army, Air Force, Public Service, Staff Officer).

. LOGCODE -- Logistics specialty of organisation headed (e.g., L = logistics, S = Supply etc.).

. STARS -- Number of stars (e.g., Brigadier = 1 star).

. GRANDMEAN -- Mean satisfaction rate for all CSFs.

. GOAL -- Verbatim transcript of each goal reported.

. GOALMEAN -- Mean satisfaction rate for all CSFs associated with a particular goal

. CSF -- Verbatim transcript of each CSF reported

. SCORE -- Satisfaction rate with information available in respect of each CSF reported.

The following information was stored about each goal/CSF.

. ACTIVITY CLASSIFICATION -- As described in Appendix B.

. FUNCTIONAL CLASSIFICATION -- "   "   "   "

. CONTROL CLASSIFICATION --   "   "   "   "

. SOURCE CLASSIFICATION --   "   "   "   "

63

Appendix D: BASS ANOVA Programs and Printouts

BASS 88.10, Program File: C:\BASS\LOGCODE.PRG 11-11-80 Page 1

ANOVA Procedure Report for Dataset(s):
  goal Created: 11-11-88 02:52

Dependent Variable:
SATISFACTION - Mean Satisfaction for CSFs
Mean: 2.63340426   Std. Deviation: 0.87387873

Levels found for class variables:
LOGCODE:L,O,E,F,S
The first 4 value(s) listed will have associated dummy
variables.
The last value listed is the "omitted level"; it occurred in
33 cases.

Model Statistics:
NOBS: 141   Multiple Correlation: 0.32132472
Std Error: 0.83961759   R-Squared: 0.10324958
Dataset Type: DATA   Adjusted R-Squared: 0.07687457

Analysis of Variance:
Source DF Sum of Squares   Mean Square   F Value   Prob > F
Model   4   11.03872   2.75968   3.91467   0.00485
Error   136   95.87425   0.70496
   Total   140   106.91297

Parameter Estimates:
Variable Coeff   Std.Error   Tolerance   Std.Coeff.   T   Prob
CONSTANT 2.655895 0.07481778   0.00000000 35.50 0.000
_D1_   -0.395181 0.12517398 0.61388302 -0.32719412 -3.16 0.002
   LOGCODE=L
_D2_   0.228867 0.16043487 0.52526580   0.15983083   1.43 0.156
   LOGCODE=O
_D3_   0.128105 0.14034548 0.57752830   0.09753187   0.91 0.363
   LOGCODE=E
_D4_   -0.222145 0.17897937 0.47649884 -0.14600558 -1.24 0.217
   LOGCODE=F

Analysis of Variance for Classification Effects:
Source   DF Sum of Squares   Mean Square F Value   Prob > F
LOGCODE   4   11.03872   2.75968 3.91467   0.00485
LOGCODE   4   11.03872   2.75968 3.91467   0.00485

Error   136   95.87425   0.70496

```
**This program generates an ANOVA model where the logistics
**specialty of the organisation headed by the is the independent
**variable and Mean Satisfaction is the dependent variable.

run create >goal;
    infile tot.dat;
    input ID $ SERVICE $ LOGCODE $ STARS $ SATISFACTION
    ACTIVITY $ CONTROL $ FUNCTION $ SOURCE $;
    label SERVICE = SERVICE (N)avy (A)rmy (F) Airforce (PP)
                    Public Service (NP, AP, FP) - Service Staff
                    Officers
          LOGCODE = Logistics Specialty
          STARS = Rank/SES Level
          SATISFACTION = Mean Satisfaction for CSFs Associated
                    with this goal
          ACTIVITY = Managerial Activity (S)trategic Planning
                    (O)perational
          CONTROL = Control Focus (I)nput (P)rocess (O)utput
                    (C)ombined
          FUNCTION = Subject Matter (F)inance
                    (M)anpower/Personnel (I)nformation Systems
                    (S)pecialised (C)ombined
          SOURCE = Information Source (N)arrow (B)road
                    (E)xternal;
run anova <goal;
    model SATISFACTION = LOGCODE;
    class  LOGCODE;
```

ANOVA Procedure Report for Dataset(s):
  goal Created: 11-11-88 02:47

Dependent Variable:
SATISFACTION - Mean Satisfaction for CSFs Associated with this
                goal
Mean: 2.63340426   Std. Deviation: 0.87387873

Levels found for class variables:
SERVICE:PP,AP,FP,N,F,A
The first 5 value(s) listed will have associated dummy variables.
The last value listed is the "omitted level"; it occurred in 13
cases.

Model Statistics:
NOBS: 141   Multiple Correlation: 0.28359398
Std Error: 0.85337861   R-Squared: 0.08042554
Dataset Type: DATA   Adjusted R-Squared: 0.04636723

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob > F
Model	5	8.59853	1.71971	2.36141	0.04327
Error	135	98.31443	0.72826		
Total	140	106.91297			

Parameter Estimates:

Variable	Coeff	Std. Error	Tolerance	Std.Coeff.	T	Prob
CONSTANT	2.632417	0.08936380	.	0.00000000	29.46	0.000
_D1_ SERVICE=PP	-0.362712	0.14921595	0.74552498	-0.23234941	-2.43	0.016
_D2_ SERVICE=AP	-0.414084	0.29816626	0.43916718	-0.17295840	-1.39	0.167
_D3_ SERVICE=FP	0.166749	0.16797380	0.71415113	0.09695136	0.99	0.323
_D4_ SERVICE=N	0.057370	0.13533569	0.76756859	0.03993367	0.42	0.672
_D5_ SERVICE=F	0.268171	0.19116723	0.66677788	0.14178623	1.40	0.163

Analysis of Variance for Classification Effects:

Source	DF	Sum of Squares	Mean Square	F Value	Prob > F
SERVICE	5	8.59853	1.71971	2.36141	0.04327
SERVICE	5	8.59853	1.71971	2.36141	0.04327
Error	135	98.31443	0.72826		

```
**This program generates an ANOVA model where the respondent's
**service is the independent variable and Mean Satisfaction
**is the dependent variable.

run create >goal;
     infile tot.dat;
     input ID $ SERVICE $ LOGCODE $ STARS $ SATISFACTION
     ACTIVITY $ CONTROL $ FUNCTION $ SOURCE $;
     label SERVICE = SERVICE (N)avy (A)rmy (F) Airforce (PP)
                     Public Service (NP, AP, FP) - Service Staff
                     Officers
           LOGCODE = Logistics Specialty
           STARS = Rank/SES Level
           SATISFACTION = Mean Satisfaction for CSFs Associated
                          with this goal
           ACTIVITY = Managerial Activity (S)trategic Planning
                      (O)perational
           CONTROL = Control Focus (I)nput (P)rocess (O)utput
                     (C)ombined
           FUNCTION = Subject Matter (F)inance
                      (M)anpower/Personnel (I)nformation Systems
                      (S)pecialised (C)ombined
           SOURCE = Information Source (N)arrow (B)road
                    (E)xternal;
run anova <goal;
     model SATISFACTION = SERVICE;
     class  SERVICE;
```

ANOVA Procedure Report for Dataset(s):
  goal Created: 11-11-88 02:50

Dependent Variable:
SATISFACTION - Mean Satisfaction for CSFs Associated with this
                goal
Mean: 2.63340426   Std. Deviation: 0.87387873

Levels found for class variables:
STARS:1,2,4,3,0
The first 4 value(s) listed will have associated dummy variables.
The last value listed is the "omitted level"; it occurred in 17
cases.

Model Statistics:
NOBS: 141   Multiple Correlation: 0.16382914
Std Error: 0.87465717   R-Squared: 0.02683999
Dataset Type: DATA   Adjusted R-Squared: 0.00000000

Analysis of Variance:

Source DF	Sum of Squares	Mean Square	F Value	Prob > F
Model 4	2.86954	0.71739	0.93773	0.44419
Error 136	104.04342	0.76503		
Total 140	106.91297			

Parameter Estimates:

Variable Coeff	Std. Error	Tolerance	Std.Coeff.	T	Prob
CONSTANT 2.699995	0.11665453	.	0.00000000	23.15	0.000
_D1_ -0.151887 STARS=1	0.14075222	0.58383341	-0.11946599	-1.08	0.282
_D2_ 0.085282 STARS=2	0.16235362	0.59035373	0.05783144	0.53	0.600
_D3_ 0.320005 STARS=4	0.35827651	0.31403067	0.13482629	0.89	0.373
_D4_ -0.310904 STARS=3	0.23523802	0.51541647	-0.15572665	-1.32	0.189

Analysis of Variance for Classification Effects:

Source	DF	Sum of Squares	Mean Square	F Value	Prob > F
STARS	4	2.86954	0.71739	0.93773	0.44419
STARS	4	2.86954	0.71739	0.93773	0.44419
Error	136	104.04342	0.76503		

```
**This program generates an ANOVA model where the respondent's
**rank or SES level is the independent variable and Mean
**Satisfaction is the dependent variable.

run create >goal;
    infile tot.dat;
    input ID $ SERVICE $ LOGCODE $ STARS $ SATISFACTION
    ACTIVITY $ CONTROL $ FUNCTION $ SOURCE $;
    label SERVICE = SERVICE (N)avy (A)rmy (F) Airforce (PP)
                        Public Service (NP, AP, FP) - Service Staff
                        Officers
          LOGCODE = Logistics Specialty
          STARS = Rank/SES Level
          SATISFACTION = Mean Satisfaction for CSFs Associated
                        with this goal
          ACTIVITY = Managerial Activity (S)trategic Planning
                        (O)perational Control (M)anagerial Control
          CONTROL = Control Focus (I)nput (P)rocess (O)utput
                        (C)ombined
          FUNCTION = Subject Matter (F)inance
                        (M)anpower/Personnel (I)nformation Systems
                        (S)pecialised (C)ombined
          SOURCE = Information Source (N)arrow (B)road
                        (E)xternal;
run anova <goal;
    model SATISFACTION = STARS;
    class  STARS;
```

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Thesis Chairman: Major Thomas Triscari, Jr., Associate Professor of Systems Management

Approved for public release IAW AFR 190-1.

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UNCLASSIFIED

The purpose of this study was to develop a broad preliminary description of an information system for logistics executives in the Australian Department of Defence (DoD) and to establish system development priorities and a work plan. The study had four basic objectives: (1) Develop criteria to be used to select an information requirements determination methodology and select a methodology. (2) Use the methodology to develop a questionnaire. (3) Test and dispatch the questionnaire to logistics executives in the DoD with the aim of identifying their requirements for information. (4) Analyse and interpret results in a form useful for the development of a preliminary system description and work plan and make an assessment, based on the results, of the validity of a centralised approach to systems development.

The study found that the most appropriate information requirements determination methodology for the task was the Critical Success Factors (CSF) Methodology developed at the Massachusetts Institute of Technology by Dr. John F. Rockart. Analysis of the responses made by DoD logistics executives to a questionnaire based on that methodology revealed that these executives were generally _dissatisfied_ with the information available to them in respect of their CSFs. *Keywords!*

The diversity of needs identified by executives precluded the development of a preliminary system description and work plan but some important priorities for systems development were established. The major conclusion of the study was that _functionally-based_ _approaches_ _to_ _systems_ _development_ _were_ _not_ _appropriate_ _for_ _information_ _systems_ _aimed_ _at_ _meeting_ _the_ _needs_ _of_ _logistics_ _executives_ and several recommendations for reviews of current systems development priorities and approaches in the DoD were made.

It was also concluded that there was no evidence to suggest that a centralised approach to the development of these information systems was inappropriate.