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An empirical study of the structure of needs assessment

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The Ohio State University, 1991
AN EMPIRICAL STUDY OF
THE STRUCTURE OF
NEEDS ASSESSMENT

DISSERTATION

Presented in Partial Fulfillment of
the Requirements for the Degree
Doctor of Philosophy in the Graduate School of
the Ohio State University

By
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The Ohio State University
1991

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Graduate Program in
Comprehensive Vocational
Education
To my wife,
Shelley Jean Ryan
and daughters,
Sarah Jaleh Ryan Hansen
and
Katurah Mona Ryan Hansen
I would like to express my sincere thanks to Dr. James Altschuld for his vision, faith and support, as well as to Dr. James Sage for his humane and highly considerate treatment of his students. Without the guidance of Dr. Altschuld, this paper would not exist. His ability to nurture the student's inquiry is outstanding. These two individuals, working in a truly collaborative manner, have taught me far more than research.

I would like to thank Dr. David O. Hansen, who has continually shown me encouragement and support, as well as a high standard for activity in international development.

In addition, there are many people who have made it possible for me to complete this program. I would like to mention a few and beg tolerance from those that I miss.

Thank you to Dr. Joel Magisos, who was the key to my attendance at The Ohio State University, to Dr. Dewey Adams, who demonstrated continually that the most noble life is a life of service to all, to Dr. Larry Miller, who introduced me to the world of research, to Dr. Robert Warmbrod, who's skill in classroom teaching will always impress me, and to Dr. Gert Loose.
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CHAPTER I
INTRODUCTION

There has been little empirical investigation regarding the general nature of needs assessment (Greene, 1985). This stands in sharp contrast to the acceptance of needs assessment as an activity that initiates technological innovation (Holt, 1984), human services intervention (Kaufman, 1988), problem solving, invention, and creativity (Arieti, 1976). At present, there is great interest in needs assessment and a substantial body of literature that describes and suggests needs assessment methods and procedures (Witkin, 1984). However, current empirical research does not offer adequate support for a general, grounded theory of needs assessment (Greene, 1985).

The purpose of this study was to describe, in an empirical manner, the process that is referred to as needs assessment. In order to accomplish this purpose, this study addressed these questions;

1) "Is there a general model of needs assessment?" and,

2) "If a general model of needs assessment is detectable, what are its characteristics and features?"

A useful starting point in addressing these questions is to examine the concept of need.
Need: The discrepancy

Need is the lack of something that is requisite, desirable, or useful (Webster's New Collegiate Dictionary, 1979).

Need is one of the most used, and least understood words in our vocabulary. There are two common uses of the word need (Witkin, 1984). In one sense, need is used as a verb, as in, "I need water." In another sense, need is used as a noun. An example is, "I have a water need."

This is not a trivial distinction. There is a difference between the two uses of the word need. This becomes evident when the word need is used in planning. As a verb, need directs attention to a solution. As a noun, there is no offer of a solution, only a problem. Using the water case as an example, "I need water," has clarified the point that water is the solution. On the other hand, "I have a water need," could mean that a plumber, a well, a glass, or any number of other things will solve the water problem. The use of need as a noun has helped articulate the problem, rather than the solution.

If the purpose of a given activity is to describe a solution, then need would naturally be used as a verb. But, if the purpose is to describe a problem, then the noun form is the proper use of the word need.

It is the noun form of the word need, that is under discussion in this study. Need, as a noun can be
operationally defined as a discrepancy (Witkin, 1984). This definition of need, referred to as the discrepancy definition (or gap definition), was described clearly by Wertheimer (1959).

Wertheimer's description of a discrepancy resulted from his research on "productive thinking." Arieti (1976), restated Wertheimer's description. This concept is recognized as the basic unit of planned change as;

the creative process moves from a structurally unstable or unsatisfactory situation (S1) to a satisfactory situation (S2) that offers a solution. In the passage from S1 to S2 a gap is filled (p. 17)

The concept of a discrepancy that separates an unsatisfactory situation (S1) from a satisfactory situation (S2) has become accepted today as the definition of need (Witkin, 1984).

Gratification or resolution of need is the act of passing from S1 to S2. The concept of "resolving needs," can be understood by using the analogy of resolving the image in the lens of a camera. The task in focusing a camera, is to resolve the difference between the double image that is seen. The goal is to see the two images as identical. In the same way, when an unsatisfactory situation and a satisfactory situation are identical, there is no need. The need becomes resolved.

Need and resolution of need can be illustrated within the context of general systems theory. Roth (1979), suggests that needs assessment may, in fact, be founded conceptually in systems theory and organization theory.
In general systems theory, a system is "a set of elements standing in interrelations," (von Bertalanffy, 1974, p. 38). A system can have as few as two different elements that share a relationship. This systems view of the structure of need is illustrated in Table 1 on page 5.

Table 1 contains various relationships that could exist between unsatisfactory and satisfactory conditions. In Table 1, these two conditions are the elements in a system. The relationship that they share, when they are distinctly different from each other, is the discrepancy, or need. This need relationship is defined by the difference between the two conditions. Four cases of need relationships are illustrated in the table.

Case one of Table 1 on page 5, is an example of an equilibrium situation. In this situation, we have ten of some unit and ten units are needed for us to be satisfied. Because there is no difference between the two conditions, no need exists.

In case two, the current condition of ten units becomes unsatisfactory. We use six units, leaving only four units. The result is that a need exists now for six units.

There are situations when the nature of the satisfactory condition is changed. This is illustrated in case three of Table 1. A change has been made in the satisfactory condition. In case three, ten units have become insufficient.
Table 1

THE STRUCTURE OF NEED

CONDITION

<table>
<thead>
<tr>
<th>CASE</th>
<th>unsatisfactory&lt;--discrepancy--&gt;satisfactory condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>condition (need) condition</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Case 1: Current condition is satisfactory

result: no need

Case 2: Current condition is unsatisfactory

result: need

Case 3: A change from case 1, in the nature of the satisfactory condition causes the current condition to be seen as unsatisfactory

result: need

Case 4: A change is planned to eliminate the discrepancy

result: need is resolved
Now, sixteen units are required in order to be satisfactory. This creates a discrepancy, or need, as a result. The need in this case is also for six units as it was in case two.

In case four, we have a discrepancy or need for six units. Change is planned to bring the situation from a state of need to a state of equilibrium. By adding six units to the unsatisfactory condition of four units, it is made equal with the satisfactory condition of ten units. The result is, that the need is resolved.

Table 1 illustrates both the creation and resolution of need. The focus of this study was on cases two and three from Table 1. These cases illustrate the description of need as a discrepancy. Of interest to this study was how we sense the existence and nature of needs. The assumption underlying this work was that we must be able to sense and in some way describe needs, before it is possible to resolve them.

According to Wertheimer (1959), all productive human activity is based upon the resolution of these discrepancies, or needs. If that is the case, then understanding how to resolve needs may be one of the most effective and basic human skills.

The act of resolving needs requires a confrontation with questions concerning planned change. One question is, "How do we know what change or changes will be useful in resolving need?" Another question is, "How do we design change?" In an effort to answer these questions, it may be useful to examine
how we learn about our needs in order to resolve them. Needs assessment is a field of activity that does that.

**Needs Assessment: The process**

What is needs assessment? Needs assessment is a process that identifies and prioritizes needs for the purpose of resolving them (Kaufman, 1988).

Roth (1979), states seven reasons why a needs assessment is conducted:

1) to define and accomplish a specific task,  
2) to obey an inter-agency order,  
3) to follow a legislative mandate,  
4) to determine a client’s needs,  
5) to identify new expansion areas,  
6) to identify cost-reduction areas, or  
7) to be part of a formal evaluation.

It would seem that such a basic skill as needs assessment would be described with a great amount of agreement. This is not the case. Ng (1988) states that, beyond this general description, there seems to be little agreement concerning the substance of needs assessment. The literature on needs assessment is described as polemic (Altschuld, 1990). The controversy over the nature of needs assessment is intense. According to Witkin (1984), there is little agreement on what elements or components comprise the process of needs assessment.
Roth (1979), conducted interviews with ten of the leading American experts in needs assessment. In one of her questions, she asked, "What are the most important features of a (needs assessment) model (p. 105) ?" Although there was no clear agreement, a few points stand out;

1) participation of the client group in all aspects
2) a need-awareness step
3) use of the discrepancy definition of need
4) a view of the organization within a larger system
5) preferencing, or prioritizing the goals

The comments are of needs assessment experts from the fields of education, and human services program design and evaluation. Their comments reflect the view of a narrow range of disciplines, and of an early time in the development of a new professional field. This general view is supported by the comments of at least three of the participants who referred to needs assessment as "primitive, and itself in need of development."

Definitions of needs assessment include many terms and activities. Misanchuck (1982, p. 1), declares that the needs assessment literature is "awash with adjectives."

In the midst of current disagreement, there seems to be at least three points of agreement. These are;

1) Needs assessment is learning more about need in order to resolve it (Spitzer, 1979).
2) There is no one correct method to do a needs assessment (Spitzer, 1979).

3) Needs assessment is an essential element in the planning process (Tesolowski, Newton & Cureton, 1988; LeBreton & Henning, 1961)

These points support both the diversity of needs assessment models and methods on one hand, and the existence of core characteristics of needs assessment on the other.

Kaplan (1964), suggests two types of models and their relationship, that may help to understand this dilemma. According to Kaplan, interpretive models are developed from a general model. The general model is generalizable to all of the interpretive model situations, but far less useful than the more specialized interpretive model. The interpretive model, although highly useful in a narrow range of specific applications, is not assumed to be generalizable to dissimilar situations. Nor can the interpretive model be used to illustrate the process in a general sense.

An example of this is easy to find. The automobile diagnostic model (used in car repair) is a method for trouble-shooting automobile problems. It directs attention to the subsystem (i.e. electrical, fuel, cooling systems, etc.) within the car that has the difficulty, through basic questions that direct our attention. This decision-tree process directs our attention to specific problem area in a very efficient and effective manner. The validity of the
automobile diagnostic model is based upon General Systems Theory. The General Systems Theory is not directly useful in fixing a car. It must be interpreted in the context of auto repair. However, because of the strength of the General Systems Model, the logic of a systems approach to car repair is not questioned.

If interpretive needs assessment models exist without a clear, broadly accepted, general needs assessment model, then the interpretive model validity could be questioned. Being able to describe and accept a general needs assessment model would be a primary validity issue in the field of needs assessment.

The possible existence of a general theory of needs assessment raises several questions. What do needs assessment activities have in common, that they are able to be seen as a general field of activity called needs assessment? What holds this group of assorted methods and terms together? Is there some clear description that allows needs assessment to remain a coherent field of endeavor? What is the cohesive force that allows needs assessment to become more than a loosely woven body of concepts, without a testable, theoretical base? What happens within needs assessment that distinguishes it from other activity?

The Needs Assessment Model: The structure

What happens during a needs assessment? Are there distinguishing features of needs assessment activity? Is
there any similarity that runs through various methods and approaches? In order to answer these questions, it is of help to make a brief comparison of three needs assessment structures (Roth, 1979; Kaufman, 1988; Holt, et. al. 1984).

This is not the first time that the suggestion of a common structure has been raised. Roth (1979), used factor analysis to identify six elements of needs assessment:

1) goals or philosophy given as a point of departure,
2) need identification and need prioritization,
3) treatment selection,
4) treatment implementation,
5) evaluation, and
6) modification and recycle.

Roth's study is limited to needs assessment in higher education. The six elements identified were descriptive of the entire intervention cycle, and only three elements (1-3), related specifically to needs assessment activity (Witkin, 1984).

A second needs assessment structure is the Organizational Elements Model (OEM), is presented by Kaufman, (1988). Kaufman emphasizes the development of a shared commitment on the part of all parties involved in the planning process. He recommends nine steps in doing a needs assessment. In order to understand Kaufman’s nine steps, it useful to examine his needs assessment and planning levels.
Kaufman suggests three levels at which it is possible to work when assessing needs. These levels are the middle level (micro), comprehensive level (macro), and the holistic level (mega). The middle level focuses on discrepancies related to the resources, processes, and individual products of an organization. At the comprehensive level, these first three concerns are viewed from the perspective of the overall contribution of the organization. This overall contribution is described as the sum total of the organization's products. Finally, the holistic level of planning, in Kaufman's view, begins the process by describing the intended impact of the organization upon society.

With this in mind, Kaufman's nine needs assessment steps are:

1) Decide to plan using data from a needs assessment
2) Select the needs assessment and planning level
3) Identify the needs assessment and planning partners
4) Obtain the planning partners participation
5) Obtain the planning partners acceptance of the needs assessment and planning level
6) Collect needs data
7) List identified and documented needs
8) Place needs in priority order
9) List and obtain agreement on the problems to be resolved
In the field of management of innovation, Holt et. al. (1984), identified five steps related to needs assessment in product innovation. Later, Holt (1985) differentiated between two major stages of needs assessment. The following is a list that combines Holt's (1984, 1985) two definitions:

Need recognition

1) need identification (begins with a knowledge of the goals and resources of the firm and searches for a vague perception of user need)

2) need evaluation (using available information, the user need is analyzed and evaluated, leading to a focused proposal)

Need clarification

3) need clarification (this centers around an in-depth study of the target user group, and leads to a list of all relevant aspects involved with the need)

4) need specification (a list of requirements are specified that serve as design parameters)

5) need updating (information is used to stay current with changing need requirements as development, production, and marketing continues)

Holt suggested later (1987), that needs assessment could be approached at two different organizational levels. The levels suggested were the operational level and the strategic level. Holt sees the operational level as the technical production level of an organization, while he views the
strategic level as a leadership and management activity. The difference between these levels is that more information concerning management philosophy, business concept, objectives, strategies, structure, and policies would be included in strategic needs assessment.

These three examples (Roth, 1979; Holt, 1985; Kaufman, 1988) represent a wide range of needs assessment structures that are suggested in the literature. It is useful to compare the three structures in terms of 1) the elements that they include, 2) the scope of activity that they suggest, 3) the organizational level at which each structure can be applied, and 4) The generalizable vs. specific nature of each structure.

The basic elements that are included in two or more of the three structures are illustrated in Table 2, on the following page. After each element is a comment on each authors use or non-use of that element.

The second point of comparison is in regard to the scope of activity implied by the three authors. The Kaufman structure is suggested as a way of knowing what the needs are. Kaufman does not consider the generation, implementation, and evaluation of solutions as being within the scope of a needs assessment. Both Roth and Holt suggest that these activities are in fact part of needs assessment.

This distinction may be related to the definition of innovation in the management of innovation literature.
Table 2

A COMPARISON OF ELEMENTS IN THREE NEEDS ASSESSMENT STRUCTURES

<table>
<thead>
<tr>
<th>ELEMENTS</th>
<th>NEEDS ASSESSMENT STRUCTURES (Roth, 1979; Kaufman, 1988; Holt, 1985)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Goals</td>
<td>All three authors agree on inclusion of this element.</td>
</tr>
<tr>
<td>Identification of needs</td>
<td>All three authors agree on inclusion of this element.</td>
</tr>
<tr>
<td>Prioritization of needs</td>
<td>All three authors agree on inclusion of this element.</td>
</tr>
<tr>
<td>Development of solutions</td>
<td>Roth and Holt include this element.</td>
</tr>
<tr>
<td></td>
<td>Kaufman does not include this element, but suggests that it be done.</td>
</tr>
<tr>
<td>Implementation</td>
<td>Roth and Holt include this element.</td>
</tr>
<tr>
<td></td>
<td>Holt's structure is based upon this element (the definition of innovation includes implementation).</td>
</tr>
<tr>
<td></td>
<td>Kaufman does not include this element, but suggests that it be done.</td>
</tr>
<tr>
<td>Evaluation of the solution</td>
<td>Roth and Holt include this element.</td>
</tr>
<tr>
<td></td>
<td>Holt's structure includes marketing (and sales) which functions as a type of summative evaluation)</td>
</tr>
<tr>
<td></td>
<td>Kaufman does not include this element, but suggests that it be done.</td>
</tr>
</tbody>
</table>


Innovation is defined as a process that is carried beyond invention to application of the product (Martin, 1984). Kaufman, on the other hand refers to these three elements (development, implementation, and evaluation of solutions) as parts of "needs analysis," not needs assessment.

The third point of comparison is the level within the organization at which the needs assessment structures may be applied. Kaufman has adapted his structure to three levels related to organizations. The three levels of Kaufman are the societal level, the level of the total contribution of the organization, and the level of specific products and services of the organization. Holt suggests a format for two levels within the organization. Holt's two levels are the technical and strategic levels that were presented earlier. Roth does not suggest levels, but there is nothing in the Roth needs assessment structure to limit its application to only one organizational level.

Fourth, it is useful to note how generalizable vs. specific the three structures are. The Kaufman structure is described from the perspective of organizational development. Furthermore, the emphasis of Kaufman assumes participative decision-making. The Holt structure is described from the perspective of product development. Holt focuses on appropriate technological resolution of the product user needs. Holt, though, does not insist on direct participation by the user in decision-making. For instance, the decision-
making on the part of the user may be implied through unobtrusive observation of the user's actions.

The Roth structure is very basic and generic in comparison to those of Kaufman and Holt. Because of that aspect, it may be quite generalizable to a number of situations. Likewise it may be so general as to offer little guidance in a given specific situation.

This brief comparison suggests that there may be more similarity than dissimilarity between these needs assessment structures. On the points of comparison, we find;

1) the elements included show similar profiles
2) there are differences concerning the scope of activity i.e. needs analysis vs. needs assessment
3) the organizational application levels are comparable
4) the generalizability of the structures is comparable

One implication of this similarity is that a generalizable pattern in needs assessment activity may exist. There may indeed be a pattern of activity that describes needs assessment in the generic sense of the word.

A note of caution must follow this comparison of needs assessment structures. Kaufman (1972, p. 46), issued a warning about the nature of needs assessment structures.

"Professionals specializing in this difficult area emphasize the tentative nature of any models or procedures extant. This presentation is no exception, for we simply do not know very much about this very important subject."
This sobering comment prompts the following questions. What is the nature of this, "very important subject"? What would a generalized model of the needs assessment process look like? How should we begin to describe a model that represents needs assessment activity?

This question of representation is a haunting issue. When we try to represent something else, we say that we are modelling that object. Kaplan's (1964), suggestion of two types of models that seem to apply here. These two types of models are, 1) the formal model, and 2) the interpretive model. As mentioned earlier, a formal model consists of the essential, generalizable elements of a theory. An interpretive model is a concrete instance of a theory.

Examples of these two types of models can be understood by thinking of the model of communication. A formal model of communication will include only the most basic elements that occur in all cases of communication. For instance, this might include the sender, message, receiver, and feedback. On the other hand, an interpretive model of electronic communication will include these basic elements, plus those elements that occur generally, in the context of electronic communication. These "extra" elements might be such things as transmitter, coder, decoder, etc.

The needs assessment structures that were compared above, do not seem to be formal models of needs assessment that represent general needs assessment activity. Rather, they
seem to be interpretive models that describe needs assessment activity in some specific context. This possibility is supported by Ng (1988), "Most of the extant literature dealing with the practice of needs analysis is situation-specific, with no attempts made to integrate the findings across a variety of settings." Ng suggests that more empirical study is needed to suggest a generalizable, usable model for practitioners.

Some empirical knowledge of needs assessment is required to claim that these models do, in fact, represent actual needs assessment activity. Witkin, when interviewed by Roth (1979), stated that there are very few complete models (of needs assessment), and no available research data on the comparison of needs assessments.

There have been case studies done to compare applications of needs assessment structures (Lewis, 1980; Witkin, 1984). These comparisons have been useful in improving the prescribed structures that exist.

There have also been literature-based comparisons of both needs assessment structures (Roth, 1979; Wanamaker, 1986), and the utilization of needs assessment findings (Greene, 1985; Koppel, 1986). Aside from case studies, and literature-based studies, there seems to be little empirical research done to describe needs assessment activity. According to Greene (1985, p. ii);
"The literature is filled with descriptions of needs assessment models and procedures, yet, there is a dearth of empirical studies supporting the described procedures."

Greene's comment strikes at the heart of the question of the validity of current needs assessment models and procedures.

How well do these structures represent needs assessment activity? In light of 1) the lack of empirical studies of the general nature, or underlying structure of needs assessment, 2) the strong consensus that needs assessment is basic to planning, and 3) the claim that human productivity is built upon resolving needs that are defined as discrepancies, we must ask some of the following questions. If resolving needs is the basis of human productivity, then how did mankind progress before the development of the field of needs assessment? Could it be that these suggested needs assessment structures and methods are a confirmation of what has always existed? Is it possible that the human being accomplishes in an informal manner, what these needs assessment structures suggest doing in a more formal way? Is it possible that there is an informal needs assessment process that occurs commonly in human endeavor?

This idea of informal and formal levels of needs assessment practice has been alluded to in the literature. It was suggested by Horrox (1984), that a full-blown formal needs assessment is called for when the investment of resources is high and the risk is high. The development of needs assessment, as a field, may have been a product of the
right ingredients with the right conditions. With the rising costs of human activity, and the increased concern for risk analysis, formal structures for assessing needs may simply have been a natural evolutionary product of the times. On the other hand, the similarity of process that has developed simultaneously in different disciplines may indicate a more deeply founded general process.

Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or a set of patterns? Can general needs assessment activity be observed in an empirical manner? These are important questions that should be answered in an attempt to describe needs assessment with empirical evidence.

**Problem Statement**

The generalizable nature of needs assessment is poorly articulated. If there were more empirical research that articulated the nature of a general needs assessment theory, it would offer a stronger foundation for developing specific applications of needs assessment.

The purpose of this research was to examine and describe the structural nature of needs assessment activities in an empirical manner. This research was a systematic effort to observe indications of the existence and nature of needs assessment activity as it occurs across a set of disciplinary fields, in real-life situations. Through these observations,
a description of the nature of needs assessment activity was generated.

Research Question

In this study, the question asked was, "What is the structural nature of the process of needs assessment?"

Through this empirical study this investigator has attempted to describe the general nature of needs assessment, and contribute answers to the following questions:

1) What occurs during needs assessment activity?

2) Are there consistently occurring functions that can be detected in all needs assessment activity?

3) Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or a set of patterns?

4) If there is a generalizable pattern(s), what might be the nature of that (those) pattern(s)?

5) When does needs assessment activity occur?

6) Are observations of needs assessment activity in different disciplines and contexts comparable?

Objectives of the Study

The objectives addressed by this study were:

1) to develop a method to be employed in empirical study and comparison of needs assessment activity,

2) to collect a comparative set of data describing needs assessment behavior,
3) to determine functions that are carried out in needs assessment activity,
4) to ascertain any pattern(s) of functions that occur in needs assessment activity.

Definitions of Terms

For the purposes of this study, the following definitions were used:

**Situation 1 (S1)**
an unsatisfactory condition

**Situation 2 (S2)**
a satisfactory condition

**Need**
the discrepancy between an unsatisfactory condition and a satisfactory condition

**Resolution of Need**
elimination of the discrepancy between an unsatisfactory condition and a satisfactory condition

**Needs Assessment**
the activity that occurs between and including, 1) the sensing of a need, and 2) the suggestion of parameters that guide the development of possible solutions.

**Assumptions**

It was assumed for the purposes of this study that the discrepancy definition initially described by Wertheimer (1959), clarified by Arieti (1976), and confirmed by Witkin
(1984), is sufficient to serve as a substantive definition of need and resolution of need.

Furthermore, it was also assumed, based upon the suggestion of Wertheimer (1959), and the literature review of Arieti (1976), that needs assessment may function as the initial step(s) in theories such as creativity and problem-solving.

Finally, it was assumed that needs assessment methods are diverse because of the influences of the individual, the discipline, and the context.

Limitations

This study was limited due to;

1) resources - This study was limited to the Columbus, Ohio metropolitan area. Ideally, it would have been useful to sample other contexts such as that of another culture. This would have added valuable information to the question of possible differences in planning patterns as a result of culture. Columbus, Ohio represented an appropriate sampling population for the needs of this study.

2) sampling methods - Because this was an exploratory study, purposive sampling was used. This type of sampling allows the researcher to focus on sites where there is a high probability of locating and observing the behavior under study. If further research is warranted, stronger controls on
sampling can be considered. It is assumed that purposive sampling is valid in this exploratory study.

3) the nature of the behavior described - to begin with, the needs assessment activity that leads the processes of creativity and problem solving is difficult to observe (Arieti, 1976). Arieti suggests that much of this activity occurs at the "endoceptual" level. This level is more primitive than conceptual thinking and by its nature, is not possible to observe. Secondly, the behavior must be observed directly by the observer, or recalled by the subject, and then recorded by the observer. Each of these two approaches are difficult. Because of the multi-disciplinary nature of the sample, an observer not equally familiar with all of the disciplines could introduce bias into some of the observations. Subject recall was used in order to more evenly distribute the threat of bias in observation. The subjects were asked to recall and record previous behavior. This assumed that the subject could recall activities performed on a previous project.

Significance of the Study

There is little descriptive literature of needs assessment as a general process, that is based upon empirical observations. This study offers empirical evidence of the nature of needs assessment. In addition, this study suggests patterns that exist within this activity, and what the inherent structure or nature of those patterns might be.
This research effort is significant because there is a noticeable lack of empirical evidence for the present models and structures in the field of needs assessment. Empirical evidence concerning the nature of the needs assessment process would support the field of needs assessment by suggesting a needs assessment theory, grounded in an emergent reality. This would allow the definition of a sound agenda for the development of the theory and practice of needs assessment.

Beyond the immediate field of needs assessment itself, this study could have significant implications in related theoretical work such as creativity, innovation and problem-solving. Because needs assessment is recognized as the initial step in these areas, any improvement in our ability to understand needs assessment could improve our ability to understand, and possibly improve our management efforts in the fields of creativity, innovation and problem-solving.

Summary

Need is a noun that is often operationalized as a discrepancy between an unsatisfactory and a satisfactory situation. Even though needs assessment is considered to be an essential process in planning, there is only limited general agreement upon the structure of the process.

At this time, there seems to be a proliferation of interpretive models that may have validity within circumscribed contexts, but there does not appear to be a
validated, generalizable, formal model of needs assessment. This is due, at least in part, to a lack of empirical evidence of the nature of needs assessment activity.

Because of this lack of empirical research, the goals of this study were to examine and describe needs assessment activity in an empirical manner.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

This literature review was structured to examine five aspects of needs assessment. The review begins with the general logic of needs assessment. This was done by examining three statements and their philosophical foundations.

The literature related to the application of needs assessment is presented here in three stages. The first stage relates to the application of needs assessment in everyday life situations, the second stage relates to the application of needs assessment to theoretical change models that concern human productivity, and the third relates to two specific theoretical models of change used in developing the structure of this investigation.

The effect of time on needs assessment is reviewed here. Literature-based issues concerning the time frame of a need have implications that were considered in this investigation.

A review of literature that describes needs assessment as a paradigm is presented. Literature that relates the case for viewing needs assessment as a paradigm is examined.

Finally, two empirical investigations (Roth, 1979 and Ng, 1988) on the structure of needs assessment were reviewed.
After presenting these five aspects of the needs assessment literature, there is a short summary of the literature review as a whole.

**The Logical Foundations of Purpose-driven Activity**

The logic that underlies needs assessment as a purpose-driven activity, can be organized in terms of two basic premises:

1) Needs assessment is a human activity.

2) Needs assessment is purposeful from two distinct perspectives; it fulfills a purpose and provides a purpose for future activity.

The literature supporting these statements is briefly examined.

1) Needs assessment is a human activity.

Woodfield (1976), describes teleology as the doctrine or study of ends or final causes (purposes). Teleological indicates that a thing exhibits or relates to design or purpose (Webster's New Collegiate Dictionary, 1979). Teleology comes from the greek word, tele (telos, plural) which means end, or purpose.

Teleology provides the philosophical foundation for goal-driven activities. The study of teleology deals with the question of purpose in human beings, as well as in nature as a whole. Within teleology, there are two perspectives that are important to consider when discussing needs assessment.
These two perspectives are those of the internalist and the externalist.

According to Woodfield (1976), the difference between the two perspectives lies in how the goals of a particular entity or agent are known and articulated. The internalist perspective sees goals as being originated by an internal state of the agent. This means that having a goal is predicated primarily on the nature of the agent itself.

The externalist perspective sees goals of an agent as being known and articulated through the behavior of the agent. This means that a goal is predicated on the observed behavior of the agent.

Statements produced by the two perspectives present the following case. The internalist perspective states that, "S has goal G." The externalist perspective states that, "G is the goal of S's behavior." A reductionist operation with the internalist perspective identifies causes within the agent that relate to its purpose. In the externalist case, reductionism identifies the final state of the agent to relate to the agent's purpose.

This internalist-externalist distinction is of prime importance to the definition of human need because it dictates what type of agent is credited with having goals and purposes. Humans are the only type of agent in the natural world that internalism credits with having goals and purposes. Externalism, on the other hand, would accept other
agents such as animals, minerals, natural phenomena, etc. as agents that have goals and purposes.

Internalism takes the position that unless an agent possesses some type of autonomous internal decision-making ability, it cannot be described as having goals. The internalist position would accept that other agents play roles in nature, but do not accept that goals and purposes can be attributed to them. To the internalist, non-human agents have no ability to change, choose, or affect their goals and purpose. Having the power to modify or set aside goals and purposes, is seen as the litmus test for having goals.

Woodfield (1976) suggests that this internal decision-making ability receives input from three recognized types or sources of internal state descriptions of the subject or agent. The three types of descriptions serve the needs assessment process as sources of information for describing the unsatisfactory (S1), and satisfactory (S2) conditions. These state descriptions, defined in chapter one, may be used to describe and measure the discrepancies, as well as to set goals and purposes.

The first type of internal state description is a "disposition of the agent". This disposition is a tendency or inclination that is intrinsic to the agent. We cannot see the disposition of the agent and must search for overt characteristics that suggest the nature of that disposition.
The disposition may be identified by the actions or functions carried out by the individual or group. The actions performed by an individual or group are a source of information about the nature of their purpose.

The second type of internal state description mentioned by Woodfield is based upon the focus of the agent's attention, or intent, upon some object. Although it is difficult to observe the intent of an individual or group, the object of intent can be identified. These objects are the focus of the agent's attention or intent and can be identified. Students, for example, are the object of intent of teachers. In this way, intent is identified by the type of object. In using intent for describing S1 or S2, Woodfield suggests that some sorting or clustering mechanism may be useful.

The third type of internal state description is based upon the use of other theories. Often, activity is predicated on theoretical constructs, such as general systems theory, control theory and information theory. Such theories tend to suggest goals and purposes. Theories may also be used to generate discrepancy information if they define for each goal. If the individual or group has adopted some formal theoretical framework, this framework may be used in order to construct a clear description of S1, S2 and the discrepancy.

The philosophic foundation of teleology suggests then, that the needs assessor should recognize and identify with the internalist perspective. The internalist perspective in
teleology is seen as synonymous with human goals and purpose-related activity. The internalist perspective does not recognize non-human sources such as animals, plants and minerals as possessing a teleological nature. The externalist perspective suggests that needs assessment is related to human activity and may be considered as teleological activity from an internalist perspective. This designation of "teleological," meaning purpose-related, is well supported by the needs assessment literature.

2) Needs assessment is purposeful from two distinct perspectives.

The literature also suggests that needs assessment has a "dual" teleological nature, in that it is related to purpose from two distinct perspectives. These two perspectives are, that needs assessment;

1) seeks purpose and goals for future activity (purpose-seeking activity), and
2) has a purpose as an independent activity in itself (purposeful activity).

This dual nature of needs assessment is illustrated in a statement by Kaufman (1986),

Planning sensibly starts with where to go and why to go there: needs assessment. (p. 25)

Needs assessment fulfills some current purpose and provides a purpose for future activity. The purpose of needs assessment is to seek clarity and the description of a meaningful purpose that will justify some further action.
Needs assessment accomplishes these purposes through the identification and prioritization of needs. This is supported by Kaufman's suggestion that needs assessment is a process that identifies and prioritizes needs for the purpose of resolving them (Kaufman, 1988).

The three examples (Roth, 1979; Holt, 1985; Kaufman, 1988) of needs assessment structures presented in chapter one, served to illustrate the importance of purpose in needs assessment. The first basic element that was included in all three of the structures was the identification of goals. The remainder of the identified elements were activities designed to attain the stated goals.

In summary, the literature suggests that needs assessment is both purpose-driven and purpose-seeking. The internalist teleological perspective suggests a logical framework for the study of needs assessment. In the study of needs assessment, the internalist teleological perspective supports the premises:

1) Needs assessment is a human activity.
2) Needs assessment is purposeful from two distinct perspectives.

The Application of Needs Assessment

1) Needs Assessment as a general human activity

Viewing needs assessment activity as teleological activity allows one to recognize its general nature. When a person
chooses to attain a goal that is different than their present state of affairs, they are engaged in discrepancy-based needs assessment (Kaufman, 1988), and teleological activity (Woodfield, 1976). The chosen goal may be rudimentary such as hitting a wall with a rock or scratching an itch. The goal may also be quite formal and specialized, such as landing a human being on the moon. These examples fulfill the discrepancy-based, and teleological criteria for needs assessment.

The acceptance of needs assessment as a general human activity is articulated further by Wertheimer (1959). Wertheimer stated that a discrepancy-based, or goal-oriented activity was the structure for productive thought in human activity from the common thinker to the likes of Einstein. The interdisciplinary research of Wertheimer, which studied a wide range of subjects, including Einstein, suggests that:

1) productive thinking is a pattern-finding, solution-oriented process, and

2) that this process is general to all humans, rather than specific to only those individuals trained formally.

A number of sources reaffirm that non-formal needs assessment activity occurs consistently in general human activity. Prominent among these was Dewey (1933), who stated that thinking does not begin on its own, but rather, is started by a;

1) a problem or dilemma, and continues to find 2) a solution or resolution of the problem. The function of
thought is to resolve discord. The two limits of every unit of thought are 1) a troubled situation and 2) a resolved situation. (p.5)

Breton and Gold (1987), described the natural innovational process of the human as being;

primed to innovate by bringing together on its endoceptual (preconceptual) level, a deep feeling for a need and the relevant knowledge to satisfy it. (p. 10)

This process is so natural that some authors suggest that it occurs constantly, preceding conceptual thought, at all activity levels in life. For example, routine problems on the production line are continually being resolved by the need-driven innovation of production managers. This routine process of pattern sensing and pattern matching is described as, "parameter analysis," by Li (1980).

Parameter analysis is a method of discrepancy analysis that attempts to suggest parameters within which alternative solutions must conform. Parameter analysis describes;

1) the various facets of the problem,

2) the limits and requirements implied and/or specified by each of these facets (subcomponents), and using this analysis to develop

3) evaluation criteria that will be used to compare and choose between any suggested solutions. Li commented that, parameter analysis simulates "how people think."

The discrepancy-based approach is supported by Tesolowski, Newton and Cureton, (1988),

the ultimate value of conducting individual or group needs assessment procedures must be based on the premise
that the best possible solution can result only after identified needs have been accurately described. (p. 27)

Witkin (1984), adds, "There is no good substitute for a systematic, reasonably objective way of assessing needs in order to make decisions about priorities for services or programs (p. 3)."

This tendency to plan programs and other solutions based upon a discrepancy approach is common to many fields, such as human services, education and training, organizational development, international development, and planning in general. This is confirmed by the literature. Witkin (1984), states that;

needs assessment is an integral part of organizational and community planning..., The alternative is to leave decisions on priorities to the unverified judgments of decision makers, which are based upon opinion, preference, bias, or the satisfaction of special interests. (p. 3)

According to the Ohio Department of Mental Health (1983), "the lack of connection between needs assessment information and subsequent service planning is perhaps the greatest 'missing link' in community plans (p. i)."

Mager (1988), who has provided education and training leadership for years, clearly states that;

there is only one justification for instruction: it is that one or more people cannot yet do something, and there is a need for them to be able to do it. (p. 5)

Mager's training model is built upon the concept of the discrepancy.

Statements published by at the Society for International Development's Roundtable on Biotechnology (1989), are typical
of the literature concerning need-driven development planning;

Clear objectives derived from the needs of LDC’s (Lesser Developed Countries) should steer the research programmes of both national and international organizations for development (interactive process between people and organizations concerning costs and socio-economic impacts suggested). . . .,

Programmes should be defined in terms of objectives to be reached rather than the technology to be used. This is in striking contrast to what actually happens in many donor organizations. (p. 18)

At this same meeting, Prince Claus of the Netherlands (SID, 1989), reaffirmed need-driven development as essential;

The needs of development should determine the ways in which biotechnology - and for that matter any advanced technology - is used instead of the application of biotechnology determining the course taken by the development process. (p. 18)

The area of planning has emerging interest in needs assessment issues. Kaufman (1986), states, "Interest in the front end of planning is increasing: where do objectives and interventions come from, and how may they be justified (p.34)."

According to LeBreton and Henning (1961),

Basic to the preparation of any plan is the recognition that a need exists for at least considering the feasibility of undertaking a study. (p. 61)

All of these comments have served to illustrate that needs assessment activity is a general human activity which occurs (a) in all facets of human endeavor, and (b) at both the non-formal and professional levels.
2) The relationship of Needs Assessment to Creativity, Invention, Problem-Solving, Innovation and Intervention

Besides recognition of needs assessment activity at non-formal and professional levels, the literature that includes the five models of creativity, invention, problem solving, innovation, and intervention, also refers to needs assessment activity. From a review of this literature, three basic observations can be made:

1) there are three main clusters of activity that relate to theoretical models of creativity, invention, problem-solving, innovation, and intervention.

2) creativity and invention differ somewhat from the other perspectives.

3) each of the five models listed above begins with needs assessment.

The three main clusters of activity that relate to the theoretical models of creativity, invention, problem-solving, innovation, and intervention are:

1) the recognition/clarification of a need or problem,

2) the development/choice of a solution, and

3) the verification/implementation of the solution.

These clusters are especially evident in the statements about need-related activity by Arieti (1976), Bailey (1978), Blumenfield (1985), Li (1980), Holt (1985), Mole and Elliott (1987), Hicks (1971), Twiss (1974), and Kepner and Tregoe (1965).
The distinguishing feature that differentiates creativity and invention from innovation, problem-solving and intervention is that both creativity and invention can occur without having the created/invented object produced and implemented. This is not true for problem-solving, innovation, and intervention. These last three models require, by their definitions, that there be an implementation activity.

This distinguishing characteristic between creativity and invention on the one hand, and problem-solving, innovation, and intervention on the other, is noted by authors such as Li (1980), Holt (1984), Mole and Elliott (1987), Twiss (1980) and Martin, (1984).

In other words, of these five theoretical models, only problem-solving, innovation, and intervention encompass all three clusters of activity listed above. Innovation, problem-solving, and intervention include within themselves, the smaller models of creativity and invention. Because of this, the study of innovation, problem-solving, and intervention encompasses the study of creativity and invention.

3) Needs Assessment - A focus on Intervention and Innovation

Problem-solving as a general theory, underlies both the models of intervention and technological innovation. This becomes evident by examining the model of intervention and of technological innovation.
The literature in general, treats intervention as a public sector phenomenon, and technological innovation as a private sector phenomenon. The public sector frequently applies the intervention model in designing human services programs, while the technological innovation model is applied by the private sector for the development of new products (Witkin, 1984; Holt, et. al, 1984; Martin, 1984; Pancer & Westhues, 1989). The similarities and differences between intervention and innovation are striking. These models of change have been developed by two complementary systems in society.

Intervention, often referred to as "the intervention cycle," has grown out of public sector human services concerns and programs. It is based upon social equity (Mole & Elliott, 1987). From a health perspective, Intervention is "the desire to intervene in the process of development and change in such a way as to maintain positive health behavior or to interrupt a behavioral pattern that is linked to increased risks for illness, injury, disability, or death," (Green et al., 1980, p. 10).

Green describes four generic intervention situations:

1) reduction in negative behavior
2) prevention of increased negative behavior
3) increase in positive behavior
4) prevention of decreased positive behavior

Each of these intervention situations is constructed from a recognized discrepancy in well-being. Based upon one of these
four situations, intervention cycle begins by sensing the need for intervention and studying it. This leads to the development, implementation, evaluation and revision of an intervention.

Another description of intervention activities is suggested by Pancer and Westhues (1989 p. );

1) Determination of societal values (values analysis)
2) Assessment of social needs (needs assessment)
3) Determination of goals (goal analysis)
4) Design of program alternatives (program logic analysis)
5) Selection of alternatives (feasibility study)
6) Program implementation (implementation assessment)
7) Program operation (process evaluation)
8) Program outcomes (outcome evaluation)

This description demonstrates the problem-solving framework that underlies intervention. It is the discrepancy that initiates the intervention cycle. (Egan, 1985). The problem-solving model is also imbedded within the Technological Innovation model.

The term technological innovation, is defined by Bright, (1964), is:

that sequence of activities by which technical knowledge is translated into a physical reality and becomes used on a scale having substantial societal impact. This definition includes more than the act of invention; it includes initiation of the technical idea, acquisition of necessary knowledge, its transformation into usable hardware or procedure, its introduction into society, and its diffusion and adoption to the point where its impact is 'significant'. (p. 36)
Bright (1964), suggests the following eight stages in the innovation process:

1) technical discoveries or market need
2) theory or design proposal
3) theory or design verification
4) model development
5) alternative models developed and evaluated
6) commercial introduction
7) adoption of the innovation
8) adaptation of technology to newly defined markets

According to Martin (1984), research consistently demonstrates that technological innovation is of two types. Approximately 80% of all technological innovation is developed from an assessment of need. Approximately 20% comes about through basic research. The larger portion of innovation, or "need-pull" innovation, as it is referred to, is developed to answer a market need that is identified early in the process.

"Technology-push" refers to products developed through basic research, that are matched to existing market needs sometime after the initiation of their development process (Holt et. al., 1984; Martin, 1984). Steele (1975, p. 10), refers to the two types of innovation as "problems looking for solutions vs. solutions looking for problems." In both cases, it is assumed within this model that the identified
needs are market needs with an economic purchasing power behind them (Swords-Isherwood, 1984; Mole & Elliott, 1987).

The nature of these two types of innovation are different. Need-pull innovation is incremental in nature and less dramatic. Because of this, it does not usually cause strong sudden economic growth patterns. Instead, it is characterized by constant growth. For this reason, it has been viewed as the mainstay of economic development.

Technological-push, on the other hand is a dramatic, revolutionary breakthrough. It can make and break companies overnight. The down side is that it is rare, and few companies have the economic stability to follow it as a main agenda (Martin, 1984; Mole & Elliott, 1987).

Technological Innovation, an essentially private sector model, attempts to describe market-driven invention and application of new processes and products. In the innovation process, the primary emphasis is on the product, and ultimately, the economic return. The person with the need seems to be secondary, as a means to an end.

Intervention, on the other hand, focuses on the person with the need as the primary emphasis (and ultimately, the individuals participation and/or equity of a group as a whole). The program or service is seen as a means to an end. The intervention approach is driven by social well-being, while the innovation model is driven by economic purchasing power (Merson, 1985; Mole & Elliott, 1987).
Because of specific underlying values, the Intervention model of change is normally encountered in the public sector, and the Technological Innovation model is usually found in the private sector. The public sector frequently applies the Intervention model in designing human services programs. The Technological Innovation model is applied by the private sector for the research and development of new products (Witkin, 1984; Holt, et. al, 1984; Martin, 1984; Pancer & Westhues, 1989).

There is not, however, a clear dichotomous division in the application of these models. This may be due in part to the fact that there are agencies in each sector that cross into the other to provide services. When this happens, there is usually an adoption/adaption of one or both of the two change models, producing some type of new form. An example of a new change model produced by this type of adaption is the case of the Oral Rehydration Therapy Project (ORT) (Rasmuson et. al., 1985). The ORT Program was sponsored by the World Health Organization, UNICEF, and the U.S. Agency for International Development. The program was carried out in a diverse group of countries.

The ORT program was a public sector initiative, as evidenced by its sponsorship. Implementation of the rehydration program required public education. At the same time, the risk of rejection by the target population was high. The program, or innovation to be implemented, was the
use of rehydration salts to combat the effects of childhood diarrhea.

This new change model, developed by mixing innovation and intervention to produce new meanings for old terms (Rasmuson et al., 1985). For instance, in order to increase the chances of success in the diffusion of the therapy, the public sector health education program was treated as a "product" to be "marketed." This "marketing" of the public sector product was driven by a "purchasing power" that was not economic in nature. The resources available to "purchase" the product were participation, and acceptance of public health education. The payment of these two resources, by the target population, were considered fair trade by the supplier (the project sponsor). The new model itself, was referred to as the "social marketing model," (Merson, 1985).

Social marketing is described by Merson as "marketing that is directed at a social benefit rather than a specific product and not necessarily for profit." Like commercial marketing, the aims of social marketing are to create a "marketing mixture," that will have 1) the right product, at 2) the right price, 3) in the right place, with 4) the right promotion. In social marketing "purchasing" the product is seen as a transfer of knowledge, rather than a transfer of money. Monetary exchange may be a component of the program, but is seen as contributing to the marketing effectiveness, rather than the end itself (Merson, 1985).
Social marketing combines the models of innovation and intervention, and problem-solving, and encompasses as well, the models of creativity and invention. Social marketing is a prime example of the similar nature of the five models of change. Finally, it should be noted that social marketing, and the models that it represents, are all initiated through the process of needs assessment.

As noted earlier, all five models (creativity, invention, problem-solving, innovation, and intervention) credit the initiation of the process with the identification of a discrepancy-based need. The sole exception to this statement is the portion of innovation that is a direct result of research and development (R&D). This R&D 20% of all technological innovation is seen as a product or process that is developed first, and then matched to a need, therefore, it is not need-driven (Martin, 1984). However 80% of all technological innovation is initiated by a needs assessment process Li (1980), Holt et.al. (1984), Mole and Elliott (1987), Twiss (1980), Martin, (1984). Because of this, the inclusion of the theory of innovation in this analysis is generally valid.

The role that needs assessment plays in these theoretical models (creativity, invention, problem-solving, innovation, and intervention), cannot be overstated. Clear identification of need is the second major influence in innovative success (Parker, 1978; Swords-Isherwood, 1984; Langrish, 1972).
Langrish studied 122 variables that affect innovation and found that successful companies have a much better understanding of user needs. The ability of these companies to be able to know and use the client's needs in the development of products was seen by Langrish as the main indicator of innovative success.

"Seeking out the right problem to solve is an essential prelude to profitable technological innovation. And problem recognition must start with a search for discrepancies between what is and what might be (Whitfield, 1975)." Van Gundy (1981), and Kepner and Tregoe (1965), make it quite clear that the use of the word problem refers to a discrepancy between a satisfactory and an unsatisfactory situation.

In summary, two points have been illustrated in this section of the literature review. First, needs assessment can be considered as a general human activity. Second, a study of needs assessment, set in the models of intervention, and technological innovation, has implications related to the models of creativity, invention, problem-solving.

**Needs Assessment: The time frame**

Holt et. al. (1984), has suggested that the timeframe in which the need occurs does not affect the discrepancy definition of need, but it may affect the assessment methods that are used to describe S1 and S2. In research carried out in three countries, Holt found that data collection and
analysis methods used to assess current needs, were different than those used to assess projected (future) needs. Holt proceeded to catalogue these methods in an effort to improve the systematic choice of method in needs assessment.

A question arises from Holt’s comments, concerning the effect of time frame on methods. If time frame affects data collection methods, could it also have an effect upon the functions carried out in the identification and description of the discrepancy (need)? If this is possible, then there might be some time-related variation in needs assessment itself.

At this point in the review of literature, we have seen that needs assessment:

- has a logical foundation,
- has a broad de facto acceptance, and
- may be affected by context and time.

What, then, is required to develop needs assessment as a coherent and cohesive field of study?

**Needs Assessment at a pre-paradigmatic stage**

Kuhn (1962), suggests that paradigms are able to define a legitimate research agenda because they are;

1) sufficiently unprecedented to attract an enduring group of adherents away from a competing perspective, and

2) sufficiently open-ended to leave plenty of unsolved problems with which to work.
If this is true, then the lack of a paradigm within a field of study may be noted by a low level of identification with the field and an incoherent or restricted body of research that drives the field.

Kuhn confirms at least part of this inference by stating that the lack of a paradigm causes a broad collection of facts in research activities with no apparent order or ranking. This unorganized collecting of facts is seen by Kuhn as a necessary first phase in the development of a paradigm and a coherent field of study.

As a field of study matures, a paradigm is established, and activity becomes unified and coherent, the pattern of research becomes centered upon three foci. The three foci of activity in normal paradigm-based research are;

1) gathering facts that, through the paradigm, reveal the nature of things,

2) factual determinations concerning paradigm-based predictions, and

3) empirical work that seeks to articulate the paradigm theory.

The third focus of activity seeks to articulate the paradigm theory, and is considered by Kuhn to be the most important and significant research work within a field. Kuhn further subdivides this activity into three specific goal areas:
1) the determination of physical or universal constants that apply within the paradigmatic view,
2) the determination of quantitative laws, and
3) the articulation of the paradigm within a new context or application.

Kuhn’s descriptive work in the history and nature of scientific paradigms is extremely useful in an attempt to understand the present state and development needs of the field of needs assessment.

Up to this point, this study has noted that in spite of:
- a general description and acceptance of the discrepancy model of needs assessment (Wertheimer, 1959; Witkin, 1984; Holt et al., 1984),
- an existing philosophical base for the development of needs assessment as a field (Woodfield, 1976),
- a widespread recognition of the role of needs assessment in productive human endeavor (Wertheimer, 1959; Witkin, 1984; Holt et al., 1984),
- an incorporation of discrepancy-based needs assessment into larger theoretical systems that describe productive human endeavor (Arieti, 1976; Li, 1980; Witkin, 1984; Martin, 1984; Blumenfeld, 1985), and
- an increase in planning activity that is built upon a discrepancy model of needs assessment (Witkin, 1984; Holt et al., 1984; Martin, 1984; Kaufman, 1988),
we witness an active field of research and development that exhibits;

- a lack of unifying theory,
- a lack of consistent terminology (Witkin, 1984),
- a profusion of context-specific methods that have not demonstrated adequate philosophical and empirical foundations (Roth, 1979), and
- a dependence upon the sponsorship of other fields (i.e., program evaluation, management of innovation, problem-solving, etc.) for its growth and development.

In short, needs assessment lacks the widespread recognition of a paradigm. From a Kuhnian perspective, this recognition problem may be causing a "stunted" growth pattern in the development of the field of needs assessment. This is not to say that there has not been rapid growth, but it seems to be concentrated in interpretive applications for specific contexts. The lack of research that attempts to articulate a general theory may be contributing to a somewhat confusing spectrum of terminology and methods.

Kuhn (1962), describes the three-stage development of paradigmatic fields of study as scientific revolutions. There is a pre paradigmatic stage in which facts are gathered in order to accumulate facts. These facts do not have sufficient organization to suggest the existence of a paradigm. This preparadigmatic stage is followed by the statement of a paradigm that is able to,
1) attract a sufficient following of adherents and
2) provide a sufficient number of problems to be resolved.

The paradigm statement is followed by the development of a pattern of research which appears in the following three focal areas:

1) gathering facts,
2) factual determinations related to paradigm predictions and
3) articulation of the paradigm theory.

Needs assessment seems to have reached a strong pre-paradigmatic stage. The statement and articulation of a unifying paradigm of needs assessment may be the next step that is required for needs assessment to grow and develop. The research aimed at stating and articulating the needs assessment paradigm would signal a maturing field from a Kuhnian perspective.

Needs Assessment: Related empirical studies

The aim of this investigation was to more clearly articulate a paradigm that is acceptable as a unifying theory of needs assessment. This study follows the efforts of Roth (1979), and Ng (1988), which attempted to articulate a paradigm for needs assessment within the fields of education and training. Because there are few studies that attempt this goal, both studies will be examined here in depth.
Roth (1979), addressed the question, "How are needs assessed?" Two subquestions in her study were:

1) "How is data gathered?", and

2) "What type of information is gathered in order to design effective change?"

To answer those questions, Roth turned to "state of the art" needs assessment sources. These primary sources were made up of 108 articles, needs assessment models, and selected from items collected through a process of computer searches and mail requests. In addition to these articles and models, ten interviews with experts were used as secondary data sources. These experts were nationally recognized individuals in the field of needs assessment and program evaluation.

The interview process which was a secondary data source, was designed to address issues of definition, essential features and problems related to needs assessment. Questions were also included that related to the development of the taxonomy. The interviews were analyzed in a qualitative fashion.

Roth developed a taxonomy of needs assessment models based upon information obtained from the publications and interviews. The taxonomy was used to describe a conceptual framework that might be potentially valuable to needs assessment practitioners. The models, studies and papers were mainly from education and training, with a few from such fields as health and city planning.
The 108 articles were classified on a list of 148 variables. In order to reduce this list to a manageable number, the following variables were eliminated:

1) the form of participant involvement (56 variables eliminated), and

2) technical characteristics concerning the measurement of the needs assessment context, data collection procedures used, and specific features (32 variables eliminated), and

3) redundant variables that measured the same phenomena, and variables (low variance) that would not significantly contribute to cluster analysis (14 variables eliminated). This reduced the number of variables to 46 for factor and cluster analysis.

Factor Analysis was used to identify seven key dimensions from the 46 variables for sorting the 108 cases. These seven key dimensional variables that explained 90% of the variation between the articles were:

1) time frame for setting objectives (inductive pre-set objectives vs. deductive post-set objectives)

2) concern with treatment

3) distinction between definitions of need

4) distinction between models and case studies

5) involvement of participants

6) distinction between performance and treatment levels

7) need identification and prioritization
The seven key dimensional variables were used to cluster the 108 articles into 16 groups. A hierarchical taxonomy was developed for these 16 groups, based upon their similarity on the seven previously identified dimensions. This was accomplished by cluster analysis of the 16 groups with each group being one case. The 16 groups were then profiled to describe the general characteristics of each group.

The process followed by Roth to collect and analyze data is illustrated in Table 3 on page 57. The illustration is based upon an analysis of the reductionist operations that were carried out to produce a final representation of reality.

Roth (1979), suggested the following six conclusions, based upon her research:

1) Most needs assessments were focused on performance and/or treatment needs.

2) Participant needs were the main focus with less attention on institutional needs.

3) There was much variation in which definition of need was used, although Kaufman’s discrepancy definition was recognized in over half of the cases.

4) Noninteractive surveys were the predominant data collection instrument used.

5) Public opinion surveys were the most popular means of gathering information.
6) The cases were evenly split between inductive models (begins with participant's expressed concerns) and deductive models (begins with the existing goals of the institution). Roth also suggested that the following stages exist in the needs assessment process:

1) state goals and philosophy
2) need identification
3) need prioritization
4) treatment selection
5) treatment implementation
6) evaluation
7) modification and recycle

A few critical comments are in order here. Roth recognized the importance of describing the general nature of needs assessment. Her research introduced a powerful analytical tool, cluster analysis, to produce a generalizable description of a very complex process. The complexity forced her to reduce, or abstract, reality at least six times (Table 3). The stages identified by Roth, resemble the Intervention model as discussed earlier in this chapter. Roth's final conclusion was that, "a conceptual framework for needs assessment must be based on more than a simple taxonomy of existing works in the area."

Ng (1988), in her study, asked the question, "What is the nature of the practice of needs analysis?" Subquestions in her research were:

1) "What are the contextual, situational, and personal variables that affect the outcome of needs analysis?", and
2) "What can be suggested toward describing a generalizable model of needs analysis.

In order to answer these questions, Ng collected data in two forms. First, tasks accomplished by the needs analyst were recorded by the analyst on 3x5 cards. Second,
naturalistic interviews with the analysts were conducted by Ng, after the fact.

Content analysis was used by Ng to organize the data. From this analysis, a description of the needs analysis processes, and the contextual, situational and personal variables, emerged. Five out of the 47 cases were discarded because they did not agree with a predefined theoretical definition of needs analysis. All cases were from the fields of human resource and organizational development.

The Ng study made at least five reductions, or abstractions of reality. These stages are illustrated in Table 4 on the following page.

Ng concluded that needs analysis is a dynamic, value-laden, non-linear process that has four phases:

1) pre-data collection
   (a) define/clarify purposes of needs analysis
   (b) Obtain client's perception of needs
   (c) Identify/establish standards/goals
   (d) Plan the needs analysis

2) data collection
   (a) Collect data
   (b) Identify needs-as-condition (discrepancies)
   (c) Identify causes/reasons
   (d) Verify

3) analysis
4) synthesis. 

(a) Identify needs-as-instrument (solutions)

(b) Examine feasibility

Once again, some critical observations are in order. There were points in this study that might be useful to reconsider in additional related investigations. First, the interview process was in a state of flux throughout Ng's investigation. Because Ng refined the interview questions between interviews, the advantage of having a comparative structure was lost. Second, the actual practice recorded by the student needs analysts, reflected the occurrence and lack of
occurrence of components that were predefined by the training needs analysis course. This predetermined theoretical set of criteria endangered the empirical objectives of Ng's investigation.

There are valuable methodological lessons to be gleaned from the studies of Roth (1979) and Ng (1988). Adapting Roth's use of cluster analysis to "fingerprint" the pattern observed at each site might prove to be very effective. This could be done using Ng's occurrence vs. non-occurrence rule. In order to accomplish this it would have been necessary to use a cluster-compatible statistic that accepts binary variables. This method of cluster analysis is examined in more depth in chapter three on methodology.

Another important methodological contribution of the Ng study to this study is the use of a structured interview that records the steps or actions taken by the needs analyst, on separate note cards. This could be used to allow for recall of steps performed irrespective of chronology. Chronological order could be established after the act of recording the steps.

Notable in both of these studies, is the need to articulate a general model of needs assessment. In the case of Roth, that model was a general model of educational needs assessment with application in higher educational settings. In the case of the Ng study, the goal was to articulate a
general model of needs assessment for application in analyzing training needs.

A point worth noting, is that in both studies the need for more empirical research in order to guide the development of the field is recognized. Roth (1979) and Ng (1988) suggested that there is a wealth of interpretive models and a dearth of general models.

A final point before leaving the Roth (1979) and Ng (1988) studies, is that the general direction demonstrated by both studies was to become more empirical in nature. Roth utilized published articles and interviews with experts as proxies. Ng interviewed the needs assessors directly about their specific project activity. In neither study, was the activity observed directly, yet the authors have presented a strong case for observing the activity as directly as possible.

Both of the studies (Roth, 1979; Ng, 1988), are efforts to articulate the theory of needs assessment. This, from a Kuhnian view, is necessary for the development of a normal, paradigmatic field of theory and practice.

Summary

Needs assessment is a teleological paradigm that describes the initial phase of purposeful human activity. The teleological foundations of needs assessment describe the free choice that human beings exercise in adopting, modifying, and rejecting goals and purposes.
Needs assessment appears as a first step to most productive human behavior, from both a theoretical and practical point of view. The five theoretical models of creativity, invention, problem-solving, intervention, and technological innovation can all be observed within the activities described by the intervention and technological innovation models.

Needs assessment may have structural differences based upon the time frame of the need. This is to say that current needs may require different functions to be carried out during the assessment process, than do future (projected) needs.

Paradigms are perspectives, or theories that are accepted by large numbers of individuals, who then set about the work of clarifying, describing and applying these perspectives to a particular field of interest. A paradigm has begun to develop, referred to as needs assessment, in spite of its lack of clear recognition and articulation. Due to the intermittent recognition and articulation of a general theory, or paradigm, needs assessment lacks some of the characteristics of a mature paradigmatic field of research and development.

This study attempted to clarify and describe a general needs assessment paradigm, if such exists. The purpose of this study was to observe evidence of needs assessment
activity in an attempt to articulate the general nature of the needs assessment.
CHAPTER III

METHODOLOGY

The purpose of this study was to describe the general process of needs assessment through observation and examination of reported evidence of actual needs assessment activity.

Population and Selection of Sample

The population of interest to this study, were public and private sector planning agencies that design interventions and innovations. The sample was a total of twenty planning agencies that fit this description. This sample was represented by forty subjects, two from each agency. The sample, including ten agencies from the public sector and ten agencies from the private sector, were chosen from the central Ohio area. Public sector agencies were used to represent intervention planners and private sector agencies represented technological innovation planners.

The sample used in this study was purposive in nature. Four criteria were used to select the sample sites. The criteria were:

1) representation (by both private and public sectors across five disciplines),

2) access (accessability as a data collection site),
3) cooperation (willingness to participate in the study) and
4) the extent to which the subject is involved in planning intervention and innovation

The review of the literature indicated that needs assessment activity occurs across disciplines. A representative sample of interdisciplinary activity was constructed by sampling five different disciplines. The sample will included pairs of agencies from the private and public sectors, matched by discipline. The interdisciplinary sample served the purpose of 1) representation of a broad spectrum of purposeful human activity, and 2) description of demographic characteristics but was not for the purposes of comparison.

The literature also indicated that there may be differences between the assessment of present versus future needs. Two interviews were carried out at each agency. One interview concerned a present need and one interview concerned a future need. In each case, different personnel were interviewed to avoid having the subject "learn" the interview. The structure of the sample is represented by the four cells shown in Table 5 on page 67.

Within the context of these four sampling cells, cluster analysis was used to detect patterns in the data. Through cluster analysis, any existing patterns of needs assessment activity between the subjects in general, should appear. An
increase in the appearance of a pattern between subjects would indicate a more generalizable structure of needs assessment activity.

In addition, comparisons were made in patterns of activity that occur between public and private sector subjects. Comparisons were also made between patterns of activity that occur between the assessment of present and future needs.

Table 5

SAMPLE STRUCTURE

<table>
<thead>
<tr>
<th>TIME</th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANGE MODEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention (Public)</td>
<td>10 Subjects</td>
<td>10 Subjects</td>
</tr>
<tr>
<td>Innovation (Private)</td>
<td>10 Subjects</td>
<td>10 Subjects</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20 Subjects</td>
<td>20 Subjects</td>
</tr>
</tbody>
</table>

Data Collection Issues

There are at least five issues that were of concern to the collection of data in this study. The five issues are; 1) level of formality, 2) conceptual level, 3) differences in
terminology, 4) linearity, and 5) anonymity. These five issues will be discussed individually.

1) Level of formality of the needs assessment activity. Formality of the needs assessment activity refers to the preplanned structure that is utilized for the purposes of successfully carrying out the needs assessment activity. Level of formality refers to both the quality and quantity of formality.

Kerlinger (1986) states that there are two basic modes of observation: we can watch people do and say things (direct observation), or we can ask people about their own actions and the behavior of others (self-report). It is not possible to observe needs assessment behavior directly, because there are a number of steps that occur at or near the subconscious level within the human being. Besides the overwhelming practical constraints of time and resources, there are also theoretical constraints related to endoceptual/conceptual activity that are explained in the work of Wertheimer (1959), and Arieti (1976). The case for self-report is further supported by the internalist teleological perspective. By asking the subject for information concerning those behaviors, we have stepped into the second mode described by Kerlinger.

Self-report is immediately related to the issue of the level of formality. This study examined reported needs assessment activity in situations where the subject may or
may not use readily recognizable or formalized needs assessment terms and structures. Considerable variation in structure, style, terminology and conscious effort were expected.

In order to detect needs assessment activity, the reporting by the subject must be relatively systematic and uniform. Yet, at the same time, the data collection method must also be sensitive to the subject's subtle suggestion of activities that have occurred. These activities are often not directly recognizable and/or observable by the investigator. While providing respondents with the opportunity to describe functions and activities in their own words, the reporting procedure must be systematic and uniform, as well as sensitive. The systematic and uniform data collection allow the reported activities to be grouped through a statistical analysis procedure called cluster analysis. Cluster analysis is the name of a group of multivariate techniques whose primary purpose is to group cases on the basis of similar characteristics that they possess (Hair, et. al., 1987). In cluster analysis, differences arising from level of formality and context can be minimized. In this type of analysis, we are asking whether a given group can be partitioned into subgroups which differ (Kachigan, 1982).

According to Green and Tull (1975), cluster analysis is an exploratory device used to reveal natural groupings. They also describe it as a pre-classification method whose purpose
is to formulate, rather than to test categories of data. Green and Tull add that cluster analysis is used for description, not for inference. Cluster analysis is designed to accept metric interdependent variable data. The use of this technique requires that the data have, or take on, a metric nature.

Comparing and representing information from one subject to another is difficult when the activities are different in level of formality and context. Problems of sorting and grouping, challenge the investigator to find some meaningful way of seeking and representing patterns. Miles and Huberman (1984), suggest clustering as a method for accomplishing this.

2) **Conceptual level of needs assessment activity.** The conceptual level of the needs assessment activity refers to the conscious effort that is directed toward successfully carrying out the activity.

Arieti (1976), suggests that creative problem-solving activity occurs at, at least, two levels in the brain. The common level is that of conceptual thinking. This type of thinking is characterized by ideas that can be represented and communicated as concepts. However, the second level of thinking, according to Arieti, is the endoceptual level where much of our conceptual thought is born. Endoceptual thinking is sub-conceptual activity that produces an entity called endocepts. Endocepts are not able to be represented, nor
communicated. Because endoceptual thinking does not produce concepts that can be observed, it was beyond the grasp of this study.

While this study did not attempt to observe, compare, or represent endoceptual activity, the level of cognition was considered. In a study that attempts to examine and describe reports of needs assessment activity, it may be that at personal, intuitive, and informal levels, some aspects of needs assessment activity are difficult to report.

3) Disciplinary differences in terminology. This refers to terms for the content of the material or for the process of the needs assessment activity itself.

The field of needs assessment is riddled with controversy about content, terms and method (Roth, 1979; Witkin, 1984, Ng, 1988). These issues are compounded by differences between disciplines. Also, it is not necessarily useful to compare the specific steps of one site to another. These specific steps may be so discipline-bound that they do not contribute to seeing a generalizable pattern. On the contrary, they may very well confuse the matter.

The politechnical confusion may necessitate the reduction of specific steps into a smaller and more generalized set of functions that take place during that needs assessment process. These functions would serve as valuable tool for comparison of information between subjects. The set of functions from each subject could be represented as a pattern
of functions. These functions would allow comparison and facilitate representation.

4) Process linearity. Process linearity refers to the directional flow of the process. Examples of this might be a straight linear process, or an iterative process with loops that circle back and repeat step(s) more than once.

Altschuld suggested (1988) that needs assessment may not be a strictly linear process, but rather an iterative process. Wertheimer (1959), states that this same discrepancy-related needs assessment process occurs whenever a problem is encountered and resolved. Mailman (1982), suggests that needs are often nested within larger needs and even the act of assessing one need requires confronting a group of problems that could be seen as nested needs within a larger need. It may be that a subset of linear processes is being confused with an iterative process. This could create the illusion of an iterative process (or vice versa). For instance, the process of "pre-needs assessment" is a term used for a focusing step that occurs in many needs assessments (Altschuld, 1988). During pre-needs assessment, needs are identified in general terms, and prioritized. The needs that are priorities are then recycled through a more specific identification and prioritization process. When this is viewed as recycling, this is iterative in nature. However, if the general problem and the specific problem are seen as
two distinct problems (one nested within the other), then the
process is linear in nature.

This study dealt with the issues related to linear vs.
iterative patterns in reported needs assessment activity. All
activity reported in this study was activity that concerned
the same discrepancy. By maintaining this policy during the
study, all subject data was compared on the basis of the
assessment of only one need per subject. Following this
single discrepancy policy facilitated the observation of
differences between linear and iterative characteristics in
the process.

5) **Anonymity** of subjects. Anonymity of the subjects is the
request for privacy.

The anonymity of the subject (or site) were a crucial
concern in the case of this study. Both privacy and
proprietary rights must be guarded. Proprietary rights in the
private sector cause access problems. If there is a subject
that considers his/her manner of solving problems to be
proprietary in nature, there may be a reluctance to be
observed. Subjects may not want to be compared to another
site, or represented in a public document. Because of these
concerns, specific steps carried out by the subject in
problem-solving, were reduced to more generalized functions.
By doing this, the information was "washed" of identifying
characteristics that are present with the explicit
description of each original step.
In summary, there are five issues that caused particular concern to this study. These are the level of formality, the conceptual level, terminology, linearity, and anonymity. In order to avoid major weaknesses that could be caused by these issues, the following steps were taken:

1) A policy was followed of observing evidence of needs assessment activity that is concerned with one need.

2) A systematic and uniform procedure was used that is sensitive to the subject's suggestion of activities that have occurred, but are not directly observable.

3) The specific steps were recorded and then developed into a description of the functions that occurred.

4) Cluster analysis was used to group, compare and describe the patterns of functions from different sites.

5) During data analysis, it was considered that observed activity may not represent the activity that occurred at an unconscious level of thought.

A data collection procedure was developed by this investigator, that conforms to the five listed suggestions. This procedure facilitated the collection of data that are focused, within practical limits, on one need. The procedure, explained later in this chapter, is systematic and uniform. At the same time this procedure allows for a naturalistic information generation process that is supportive of the second suggestion (above).
The third suggestion listed above, is translated into the procedures as a two-step process. The first step of the process is to collect the basic elements (actions) that have been taken by the subject. The second step is to develop those elements into a set of phases, or functions carried out by the subject. This two-step procedure protects the proprietary concerns of the subject. In effect, all technical operations are "masked," or "washed," by this procedure. The functions can then represent groups of elements, or steps, in an anonymous manner.

The anonymity of the subject itself was protected by use of site numbers for identification, and generalized descriptions that were developed from site-specific demographic information.

Cluster analysis was used at two levels to cluster and compare the observed needs assessment activity. The first level of cluster analysis took place during the interview process. As the subject generated the elements and functions performed, he/she followed the same general cluster analysis steps that guided a second level of computer-assisted cluster analysis.

The computer-assisted cluster analysis will applied four different clustering algorithms. This multiple method approach to clustering algorithms is based upon the advice of Hair, et. al. (1987). The use of multiple techniques in
clustering avoids errors in interpretation caused by bias in the clustering algorithm itself.

Data Collection Process

A structured interview guide was used in this study. This guide contained the following steps: 1) element identification, 2) element organizational sorting, 3) element clustering, 4) element cluster ordering, 5) element cluster naming, and 6) element cluster description and definition. These steps, in more detail are:

1) **Element identification**

The subject is provided with an ample supply of blank 4" x 6" note cards and a pen. Each of these cards is numbered for identification purposes (on the back of the card). The subject is first asked to answer all requests in terms of one intervention, or innovation project that has been completed. This is done to focus the collection of data on the resolution of one need, in an effort to avoid confusion. During this step, the subject is instructed:

"Please recall each step or action that was taken in relationship to a specific project (this project is pre-identified as one of the present or future needs assessment situations described earlier in the discussion on sampling). It is not important in what order the steps or actions are listed. please list them as you recall them without regard for chronological order. As each activity is remembered, please list it as one element, on the unlined side of a separate card. Use as many cards as you need to complete this step. Please write these elements at the most specific level of description that you are able to accomplish."
2) **Element Organizational Sorting**

After all elements are listed, the subject is then instructed;

"Please organize the cards on a single flat surface in whatever organizational pattern that makes most sense to you."

When this organizational step is accomplished, the results are recorded, using photography. The data recorded at this point are both 1) the content of the cards, and 2) the organizational pattern of the cards.

3) **Element Clustering**

When the previous results have been recorded, the subject is then instructed;

"Please identify any divisions in the organizational arrangement of cards that separate definite clusters of cards from other clusters. A cluster can be any selection of activities that the subject feels are different in some appreciable way from another cluster."

This is accomplished according to the judgement of the subject.

4) **Element Cluster Ordering**

The subject is then supplied with numbered cards that are equal in number to the number of clusters that have been created in the previous step by the subject. The subject is instructed;

"Please assign an order to the clusters, that makes sense to the you. Write the order number of the cluster on the cards that have been provided, and place the numbered cards next to its corresponding cluster."
5) **Element Cluster Naming**

The subject is then instructed;

"Please write a name for each cluster of elements on the unlined side of the numbered cards that you used to record the cluster order."

The names can be any terms that make sense to the subject. The names are recorded in relation to the clusters that they represent by means of photography. The data recorded through photography at this point are 1) the clusters of elements that have been identified, and 2) the numbered ordering of the clusters of elements, and 3) the names that have been assigned to label each cluster of elements.

6) **Element Cluster Description and Definition**

After naming each group, the subject is then instructed;

"Please write a description and a definition of the name and nature of each cluster. The descriptions and definitions should be written on the lined side of the cards. Your description and definition should include a statement of the function performed by the cluster of elements as a whole. Please write the function statement in the form: 'The function of this cluster is to...','"

**Data Analysis**

Two levels of cluster analysis took place in the analysis of the data. The first level of cluster analysis was accomplished during the data collection by the subject. This naturalistic, valuative process provided the needed input to accomplish a computer-assisted cluster analysis.

In the second level of data analysis, cluster analysis was carried out using the statistical package, SPSS-X (Norusis, 1988). The information provided by the subjects during the
ordering, naming, and the describing/defining steps of data collection was used to interpret and profile the computer-developed clusters.

Cluster analysis is a multivariate technique that is useful in organizing a set of elements by groups according to natural relationships between elements. Cluster analysis can be used with multiple metric interdependent variables, and accepts binary variables (multivariate data that can be measured in a binary numeric manner, and maintains an interdependent rather than dependent relationship). Nominal level data are acceptable in cluster analysis when stated as metric or binary variables (Green & Tull, 1975).

In this study, the names of the functions performed during needs assessment were generated. This data, being nominal in nature, was used in the cluster analysis. The existence, or non-existence of a function provides a decision rule for its binary measurement.

Cluster analysis was executed in three major steps. These steps are; 1) partitioning, 2) interpretation, and 3) profiling. Partitioning is the process of determining how the clusters will be developed. Interpretation is the process of understanding the technical characteristics of the cluster and the development of an appropriate name that defines the cluster. Profiling is the process of describing the general composite of characteristics that are derived from the subjects in the cluster. This composite description, or
Hair et. al. suggest that during partitioning, three major questions need to be considered. These questions are:

1) how should inter-object similarity be measured?,

2) What procedure (algorithm) should be used to place similar objects into groups or clusters?, and

3) how many clusters should be formed?

These three questions were used to guide the data analysis during at three levels, 1) the interview, 2) the computer-assisted data analysis, and 3) the generation of a theory/model. During the interview, all three questions were answered internally by the subject. These three questions are referred to later in chapter five and six.

The schematic diagram in Table 6 on page 81 illustrates the data collection and the two-stage use of cluster analysis. The first stage of cluster analysis was accomplished with the subject. During this stage, the three cluster analysis steps of partitioning, interpretation, and profiling was carried out, based upon the subjects expert technical judgement. The initial database was generated by the subject. The elements that were described earlier form the foundation of this study.

During the partitioning, the subject identified, sorted and clustered the elements on the basis of internal logic.
### Table 6

**DATA COLLECTION AND ANALYSIS PROCEDURE**

<table>
<thead>
<tr>
<th>Level</th>
<th>Cluster Analysis step</th>
<th>Procedural Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td></td>
<td>Element Identification</td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partitioning</td>
<td>Element Identification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organizational Sorting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element Clustering</td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>Element Cluster Ordering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element Cluster Naming</td>
</tr>
<tr>
<td></td>
<td>Profiling</td>
<td>Element Cluster Description and Definition</td>
</tr>
<tr>
<td></td>
<td>Computer Analysis</td>
<td>Function Set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite Function List</td>
</tr>
<tr>
<td></td>
<td>Partitioning</td>
<td>Function Rating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Function Set Clustering</td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>Functional Pattern(s) Identification and Description</td>
</tr>
<tr>
<td></td>
<td>Profiling</td>
<td>Analysis of Site-specific Demographic Information</td>
</tr>
</tbody>
</table>
Interpretation of the clusters involved the ordering and naming of the clusters by the subjects per instructions listed herein. These clusters were then referred to as functions. Profiling involved the technical description and definition of the functions by the subject.

The second level of cluster analysis, using the SPSS-X (Norusis, 1988) statistical analysis package, used the patterns of functions produced by the subject as input. The pattern of functions that represent needs assessment activity detected through each subject were compared for similarity. Subjects are defined here by a specific time frame (present or future), and a specific sector (private or public). A between-subject cluster analysis was accomplished by using a statistical concept known as Euclidean Distance. Euclidian Distance is, essentially, a measure of the length of a straight line drawn between two objects (Hair, et.al., 1987). This similarity measure of Euclidean Distance was used in conjunction with Ward’s clustering algorithm for between-subject comparison.

During this second level partitioning, similarity between functions was measured in two ways. First, Squared Euclidean Distance was used with Wards algorithm to cluster the functions themselves. The Wards method, according to Milligan (1978) demonstrates the greatest recovery rate. The functions were then clustered, using the Between Averages (UPGMA) algorithm and a binary similarity measure, available within
the SPSS-X (Norusis, 1988) statistical package, known as "Kulczynski similarity measure 2." The Kulczynski similarity measure 2 (K2) cannot be used with the Wards algorithm. This binary statistic has a range of 0 to 1. In this case, 0 equals the lack of a property, while 1 equals the possession of the property.

This binary measure will also give the conditional probability that one item is present, given that another item is present. This conditional probability is useful in identifying key items that suggest the occurrence of other items. Through the use of conditional probability, this study has distinguished primary needs assessment functions from secondary functions. Those functions with high mean conditional probability values have a "gate-keeper" identity. this means that if they exist, then the probability is high that other functions will exist.

Green and Tull (1975), suggest an ad hoc procedure for checking the validity of clusters. This procedure is the use of more than one clustering algorithm on the same data. The clusters generated by the different algorithms are then compared for similarity.

In this present investigation, hierarchical procedures were employed as clustering algorithms. Hierarchical procedures were chosen because they do not require the number of clusters to be pre-selected. This is important to the
investigation as, a meaningful number of clusters could not be known before the cluster analysis.

Within the hierarchical procedures there are agglomerative methods and divisive methods. Agglomerative methods start with each case as its own cluster and build a smaller number of larger clusters, based upon similarity. Divisive methods start with one large cluster and divide it into progressively smaller clusters, based upon dissimilarity. Agglomerative methods are commonly used by most computer packages. With manual calculation of the cluster analysis being the only access to divisive methods, the choice between the two methods is a moot point.

Within the category of agglomerative methods, there were two methods that are useful to this investigation. These two algorithmic procedures are;

1) the Average Linkage Between Groups (UPGMA), which is based upon the average euclidean distance between the clusters, and

2) Ward’s method, which is based upon the summed squares of all possible pairs of variables.

These algorithms are two different procedures for clustering the observed needs assessment behavior. Because clusters are constructed differently in each case, subtle differences may be introduced that can affect the analysis of the clusters that are generated. The results of the two techniques were compared for similarity.
The number of clusters were determined by the subject-generated information. This is supported by Hair, et. al (1987), as an "intuitive conceptual or theoretical relationship may suggest a natural number of clusters. (p.306)" In the SPSS-X package, it is possible to record all clusters formed. This was carried out in order to define a number of clusters that were meaningful in the context of this study.

The distance measurement between functional patterns were calculated, based upon a "fingerprint" of the subject data. This "fingerprint" is generated by recording the existence or non-existence of subject-specific functions, as compared to a composite list of functions. This comparison is between the subject-specific set of functions, and a composite list of functions generated between all subjects. Subject-specific functions are the set of functions that are reported by one subject. The composite list of functions is a list of functions that is formed by combining all subject-specific functions, and then modifying it by a series of decision rules. Examples of these decision rules are:

1) functions that are duplicated are listed only once, and
2) the function is restated, if necessary in a more general form for comparative purposes.

During the interpretation step of the computer-assisted cluster analysis (level two), the subject-generated information was used to generate a composite description the
nature of the functions. This information includes the name, description, and definition of the functions.

Profiling is accomplished during the second stage of cluster analysis through the general subject demographic information. Profiling is based upon 1) the similarity of items within clusters, and 2) the dis-similarity of subjects between clusters. In this case, the items were subjects and functions. This is done by developing a composite description of the cluster, based upon the characteristics of subjects and functions. The demographic information of subjects was coded to protect anonymity and proprietary rights. The demographic information referred to;

1) sector identification,
2) discipline/field identification, and
3) product/program type.

Information related to discipline was used only for the descriptive purposes of profiling. Due to the small cell size, disciplines will not be compared directly. The small sample size does not affect the number of variables (functions) or the use of cluster analysis (Milligan, 1991).

In addition to this comparison of clusters, the four cells that are defined by the sample was compared for similarities of needs assessment activity pattern. These four cells are shown in Table 5 on page 70.

Finally, a conditional probability analysis was carried out on each of the functions that make up the composite list
of functions. This conditional probability analysis helped to identify primary functions and secondary functions by identifying the conditional probability that particular functions will be carried out, given the existence of another function. The analysis is possible through the use of the "Kulczynski similarity measure 2" statistic.

Pilot Test

A pilot test of the structured interview procedures was carried out on three subjects. These pilot test subjects represented one public sector agency, one private sector agency, two present needs, and one future need. The subjects represented two disciplinary fields. With each subject, one interview was conducted. The photographs and the results of the pilot interviews were reviewed by two reviewers for validity and reliability.

Summary

Through the use of a structured interview process and a two-level cluster analysis, information that describes current needs assessment activity in the larger planned change process was collected and analyzed. This collection and analysis of data was for the purpose of describing needs assessment activity in an empirical manner, as it occurs in general planning activity. The results of this activity were in the form of clusters of patterns that represent needs assessment activity. These clusters are useful for
comparative and developmental purposes with current interpretive structures of needs assessment.
CHAPTER IV
RESULTS

The purpose of this study was to describe the process that is referred to as needs assessment. The intention of the investigator was to detect and describe the existence and nature of needs assessment activity. Six specific questions were asked in this study. These were:

1) What occurs during needs assessment activity?
2) Are there consistently occurring functions that can be detected in all needs assessment activity?
3) Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or a set of patterns?
4) If there is a generalizable pattern(s), what might be the nature of that (those) pattern(s)?
5) When does needs assessment activity occur?
6) Are observations of needs assessment activity in different disciplines and contexts comparable?

In order to answer these six questions, a data collection and analysis method was developed to detect, describe and compare needs assessment activity from a multi-disciplinary sample. Particular attention was paid to the effect of time
Because this study dealt with finding patterns in ill-defined natural situations, cluster analysis was used to structure meaningful observations. Observations were made using an open-ended, structured interview. The interview followed the three-steps of the cluster analysis process (i.e. partitioning, interpretation and profiling clusters). Analysis was carried out using a second level of cluster analysis with the help of the computer (see Table 6 on page 84).

For the purposes of this study, five definitions were accepted. These definitions are:
1) Situation 1 (SI) - an unsatisfactory condition
2) Situation 2 (S2) - a satisfactory condition
3) Need - the discrepancy between an unsatisfactory condition and a satisfactory condition
4) Resolution of Need - elimination of the discrepancy between an unsatisfactory condition and a satisfactory condition.
5) Needs Assessment - the activity that occurs between and including, 1) the sensing of a need, and 2) the suggestion of parameters that guide the development of possible solutions.

It is assumed, as noted in Chapter I, that 1) the discrepancy definition is sufficient to serve as a basis for developing substantive definitions of need and resolution of
need, 2) needs assessment may function as the initial step(s) in theories such as creativity and problem-solving, and 3) needs assessment methods are diverse because of the influences of the individual, the discipline, and the context.

**Descriptive Statistics**

The sample consisted of forty subjects. The formal postsecondary education of the individuals in the sample was multidisciplinary, as demonstrated in Table 7 below. Because there was often more than one field of training represented by an individual subject, the total number of fields in Table 7 is greater than the number of subjects.

<table>
<thead>
<tr>
<th>Field</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Engineering</td>
<td>6</td>
</tr>
<tr>
<td>Education</td>
<td>9</td>
</tr>
<tr>
<td>Arts/Humanities</td>
<td>5</td>
</tr>
<tr>
<td>Library Science</td>
<td>2</td>
</tr>
<tr>
<td>Communications</td>
<td>3</td>
</tr>
<tr>
<td>Human Resource Development</td>
<td>2</td>
</tr>
<tr>
<td>Journalism</td>
<td>3</td>
</tr>
<tr>
<td>Business</td>
<td>5</td>
</tr>
<tr>
<td>Economics</td>
<td>1</td>
</tr>
<tr>
<td>Architecture, Planning and Design</td>
<td>4</td>
</tr>
<tr>
<td>Social Science</td>
<td>2</td>
</tr>
<tr>
<td>Administration</td>
<td>8</td>
</tr>
<tr>
<td>History and Political Science</td>
<td>7</td>
</tr>
</tbody>
</table>

The postsecondary education of the sample ranged from 1-2 years of college credits to Ph.D. and M.D. Completed degrees are shown on the following page in Table 8.
This sample was designed to include twenty subjects each, from the private and public sectors. Within the sample of forty subjects, although not by design, were both females and males. There was no effort made to compare gender in this study. The ratio of females to males in these professional positions may or may not be representative of society at large. The figures in Table 9 below, are included solely for descriptive purposes.

Table 9

GENDER AND SECTOR IDENTIFICATION OF SUBJECTS

<table>
<thead>
<tr>
<th>Gender</th>
<th>Private Sector</th>
<th>Public Sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>12</td>
<td>28</td>
</tr>
</tbody>
</table>

The professional job titles of the sample, listed in Table 10 on page 93, indicate the organizational levels at which this study was carried out.
Table 10

PROFESSIONAL JOB TITLES OF SUBJECTS

Directors of;
Corporate Planning
Design
Marketing
Communications/Operations
Medical Education
Agency Resources
Program
Technical Services
Administration
Computing Sites

Managers of;
Planning/Quality of Corporate Education and Training
Quality Improvement
Human Resources

Executive Vice Presidents,
Senior Researchers,
Planners,
Administrators,
Community Education Specialists,
Fiscal Specialist,
Dean,
Editor,
State Architect, and
Government Relations Officer.

Two different subjects were interviewed (representing one present and one future problem) from each of the twenty agencies in the sample population. The alphabetical list in Table 11 on page 94 identifies the sample agencies.

The problems discussed during the interviews were diverse, and significant to the participating agencies. Table 12 on page 95 contains a comprehensive list of the problems studied. The subjects and investigator, in consultation, developed the descriptors of these problems.
The interviews were carried out as described in Chapter III. The interviews were a form of cluster analysis, using the subject as both the generator of input data, as well as the processor of data. The subject followed the three steps of partitioning, interpretation and profiling, as described. Each interview produced two levels of data. The first level of data were the task-specific cards that are referred to in the analysis as elements. These elements are, in many cases, political and/or proprietary in nature. For this reason, they are kept confidential. The element cards were used to
<table>
<thead>
<tr>
<th>Table 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMPREHENSIVE LIST OF PROBLEMS STUDIED</strong></td>
</tr>
<tr>
<td>Community-Based Comprehensive Urban Planning</td>
</tr>
<tr>
<td>Compatibility of Technological Leadership and Corporate Viability</td>
</tr>
<tr>
<td>Consumer Product Line Design Language</td>
</tr>
<tr>
<td>Deficit Management</td>
</tr>
<tr>
<td>Demographic Trends and Minority Needs</td>
</tr>
<tr>
<td>Developmental Perspectives</td>
</tr>
<tr>
<td>Development Standards</td>
</tr>
<tr>
<td>Distribution System</td>
</tr>
<tr>
<td>Educational Reform</td>
</tr>
<tr>
<td>Emissions Trading</td>
</tr>
<tr>
<td>Escrow System</td>
</tr>
<tr>
<td>Extending Services to Diverse Groups</td>
</tr>
<tr>
<td>Federal Regulation of Insurance</td>
</tr>
<tr>
<td>High-Performance Desk-Top Computing Proliferation</td>
</tr>
<tr>
<td>Human Services Software</td>
</tr>
<tr>
<td>Human Service System Restructuring</td>
</tr>
<tr>
<td>Institutional Memory/Continuity</td>
</tr>
<tr>
<td>Inter-group/Inter-component Linkage</td>
</tr>
<tr>
<td>Interior Design Licensing</td>
</tr>
<tr>
<td>Inter-organizational Planning for Children's Needs</td>
</tr>
<tr>
<td>Managing Diversity</td>
</tr>
<tr>
<td>Marketing Knowledge-Based Products</td>
</tr>
<tr>
<td>Medical Education Curriculum Revision</td>
</tr>
<tr>
<td>Medical Resident Procedural Credentialing</td>
</tr>
<tr>
<td>Musical Archive Retrieval</td>
</tr>
<tr>
<td>Parent Program Redesign</td>
</tr>
<tr>
<td>Performance Management</td>
</tr>
<tr>
<td>Organizational Development of Public Education</td>
</tr>
<tr>
<td>Organizational Restructuring</td>
</tr>
<tr>
<td>Organizational Shift from Products to Solutions</td>
</tr>
<tr>
<td>Organizational Synergy</td>
</tr>
<tr>
<td>Periodical Index Software</td>
</tr>
<tr>
<td>Political/Philosophic Program Shift</td>
</tr>
<tr>
<td>Residential Interior Design</td>
</tr>
<tr>
<td>Salary Planning</td>
</tr>
<tr>
<td>Satellite Dish Proliferation Policy</td>
</tr>
<tr>
<td>&quot;Signature&quot; Architecture</td>
</tr>
<tr>
<td>State Human Service Cutbacks</td>
</tr>
<tr>
<td>Student Satisfaction Measurement System</td>
</tr>
<tr>
<td>Total Quality Management</td>
</tr>
</tbody>
</table>
develop the second level of data. Through the cluster analysis process, the subject-developed clusters of elements that were named and described. This process of naming and describing the clusters is referred to in this study as Interpretation and Profiling. The data produced during the Interpretation and Profiling is accessible without restrictions of confidentiality. The element level data is accessible only to the subject and investigator.

Because of the wide variety of subjects, settings and problems, semantics were an issue. Different fields and disciplines use a variety of terms for similar concepts. In particular, the word used for a need varied greatly. In each case, the word that was most commonly used by the subject for a significant discrepancy between an unsatisfactory and a satisfactory situation, was used in the interview. Some of those alternative words were problem, gap, opportunity, market, discrepancy and concern. In each case, the definition underlying the word was checked to insure that the concept was consistent throughout the study.

A pilot test of three non-sample subjects was carried out in order to check the data collection process. This proved useful in eliminating technical and logistical "bugs". The three pilot interviews represented two present and one future problem, and one public and two private sector problems.
Cluster Analysis

1) **Partitioning**

As mentioned in Chapter III, Hair et. al. (1987) suggest three major questions that need to be answered during Partitioning. These three questions, which were used to structure the results of the partitioning step of Cluster Analysis, are:

1) How should inter-object similarity be measured?
2) What procedure (algorithm) should be used to place similar objects into groups or clusters?
3) How many clusters should be formed?

During the final portion of each interview, the description of each cluster underwent joint examination by the subject and the investigator. Terms that represented the general cluster as descriptors, were highlighted for later comparative use between interviews. These general cluster descriptors can be seen in Appendix A. This final step in the data collection process can be seen in Table 13 on page 98.

From the general cluster descriptors shown in Appendix A, the remainder of the interview notes, data and photos, a list of issues arose that were related to the development of a composite list of function descriptors. These issues, were the basis for the development of a series of decision rules
(Appendix B) were used to develop the composite list of functions. The rules provide a rational means for bridging the interdisciplinary and semantic gaps in the function descriptors.

In applying the decision rules, the general cluster descriptors were reviewed with the additional notes, photos and element cards. Representative examples of the interview photos appear in Appendix C. On each page of Appendix C,
there are two photos. The top photo was taken following Step 2 (Element Organizational Sorting) while the bottom photo followed step 5. These photos provided a visual comparison of the subjects organizational patterns before and after clustering the elements.

The interview notes and element cards are confidential. The occurrence of the functions was based upon the evidence provided by these materials and recorded for each interview in accordance with the decision rules. This shortened and standardized the list of function descriptors. For instance, one decision rule eliminated solution development behavior. This decision was in keeping with the pre-solution development focus of this study. This shortened interview data appears in Appendix D as standardized descriptors.

The functions from all interviews were then combined, and the duplicates were eliminated. This produced the final composite list of standard descriptors.

The final composite list of standard descriptors totaled 31. The development of the composite list can be seen in Table 13 on page 98. These descriptors represented all of the functions that were carried out by the forty subjects in their needs assessment activity. The composite list of descriptors can be seen in Table 14 on page 100.

The final step in the data analysis process illustrated in Table 13, involves the use of SPSSX (1988) to cluster the forty subjects and the thirty one functions identified in the
composite list. Each interview was "fingerprinted" against the composite list using binary coding (0 = nonexistence, 1 = existence) to record their activity. The forty subjects were then clustered through SPSSX, using

Table 14

COMPOSITE FUNCTION LIST

1 problem sensing mechanism
2 problem recognition
3 initiate activity
4 identify S1
5 monitor S1
6 analysis of S1
7 context
8 case study
9 causes
10 causal analysis
11 identify parameters
12 parameter analysis
13 value clarification
14 consultation
15 multiple data sources
16 multiple stakeholders
17 multiple data types
18 internal communication
19 communication mechanisms
20 identify S2
21 re-identify S2
22 articulate S2
23 analysis of S2
24 framing the problem
25 reframing (redefining) the problem
26 articulating the problem
27 prioritization
28 first solution
29 second solution
30 third solution
31 failure
Ward's algorithm for clustering and the Squared Euclidean Distance measure of inter-object similarity, as discussed in Chapter III. The thirty one functions were clustered, using the Between Average (UPGMA) algorithm and Kulczynski Similarity Measure 2 (K2) to measure inter-object similarity, as indicated previously. In addition to this, the functions were also clustered using Ward's algorithm and Squared Euclidean Distance, in order to check the recovery and stability of the UPGMA/K2 procedure. The results of the subject clustering exercise will be presented first, and then the function clusters.

The cluster analysis of subjects produced a continuously branching dendogram (found on the final page of Appendix E). A dendogram is a tree graph that displays the cases to be clustered (subjects and functions in this study) on the vertical axis and the number of clusters for each step of the analysis, on the horizontal axis. The dendogram in Appendix E shows an immediate branching into two basic groups of activity clusters. Subjects (cases) 21 and 22 mark the boundary between the two groups.

The rescaled distance shown on top of the dendogram is not a reflection of the actual distance, but rather, a rescaled distance from 0 to 25 that preserves the original ratio of distances (Norusis, 1988). By referring to this distance scale (from left to right), it is possible to get a relative idea of the "speed" with which the subjects clustered. By
midway in the process, all of the subjects on the lower end of the vertical axis had clustered together while the cases on the upper end of the vertical axis still maintained three definite subclusters. This gives an indication of relative homogeneity/heterogeneity of the subject data. Subjects that are very similar cluster quickly. Finally, the number of subjects that appear in a given cluster illustrate the predominance of that particular pattern of behavior.

Dendograms illustrate the hierarchical nature of the data. This hierarchy is produced by the SPSS-X statistical package using an agglomerative method of cluster analysis. The agglomerative method begins with the total number of individual cases on the left and proceeds until it arrives at one large cluster on the right. The hierarchical nature of the data produced by the agglomerative method can be seen by examining the dendogram in Appendix E. By reading the dendogram from right to left, it is easy to note the "levels" in the hierarchy.

Five levels of this hierarchy are represented in Table 15 on page 103. The membership of each cluster is defined in the table by the first and last subject (case) number as they are listed from top to bottom on the vertical axis. For example, the cluster membership of cluster A2 is defined as subjects 19-21. By referring to the vertical axis in
Table 15

HIERARCHY OF SUBJECT CLUSTERS

Level  Membership (by subject number)

1  
   28-29  
   TOTAL

2  
   28-21  
   A  
   B

3  
   28-8   19-21  
   22-39  
   11-25  
   20-29  
   A1   A2  
   B1   B2  
   B3

4  
   28-32   14-8  
   20-17  
   23-29  
   A1a   A1b  
   B3a   B3b

5  
   28-16   10-32  
   23-7   24-29  
   A1a1  A1a2   
   B3b1  B3b2
Appendix E, we can see that this includes subjects (cases) 19, 34, 30 and 21.

In Table 15, Level 1 contains the total membership of the sample. Each level that follows progressively subdivides, showing the membership of each subgroup. The clustering "speed" (horizontal axis) has been adjusted to equalize the hierarchical levels. This adjustment changes the shape, but not the content, of the dendogram.

The third question posed earlier by Hair et. al. (1987), is: "How many clusters should be formed?" In relation to the subjects in this investigation, there were two main clusters, A and B. These two groups break down into five subclusters, A1, A2, B1, B2 and B3. In addition to this, if the subdivisions of these five groups are meaningful, there are three subdivisions each of the A1 and B3 subject clusters.

Turning to the needs assessment functions, cluster analysis was carried out twice (see page 104). The reason for this repetition was to 1) provide conditional probability coefficients, and 2) check the validity of the UPGMA/K2 clustering step. The K2 measure provided a conditional probability coefficient. This K2 coefficient was useful in identifying key functions, as it represents the conditional probability that a particular function will exist, given the existence of another. The matrix provided in Appendix F lists all possible pairs of probabilities.
It was necessary to check the validity of the UPGMA/K2 clustering results because the K2 measure cannot be used with Ward's algorithm (SPSSX, 1988). Ward's algorithm is suggested by Milligan (1978) to be more stable and have a higher recovery rate than other algorithms. The UPGMA algorithm is considered the second best choice of algorithms by Milligan. Therefore, UPGMA/K2 method was used to produce a list of conditional probabilities, and Ward's/Squared Euclidean method was used to check the validity (cluster recovery) of the UPGMA/K2 clusters.

The results of the UPGMA/K2 method are displayed in Appendix F. Those of the Ward's/Squared Euclidean method are in Appendix G. Although the "speed" in which the two methods clustered the data was different, there was considerable similarity in the cluster membership results of the two clustering methods. The top five hierarchical levels (eight clusters) for the Ward's method are illustrated in Table 16, on page 107.

Of the eight clusters identified in Table 16, there are two main clusters, A and B. Cluster B remains stable at Level three, while cluster A continues to subdivide. There is a great deal of consistency between the clusters created by the Ward's - Squared Euclidean method and the UPGMA/K2 method. There are three general exceptions to this. First, cluster Alai is split in two in the UPGMA/K2 approach. Second, functions number 3, 8 and 18 demonstrate independence
of the clusters and each other. Third, while functions number 7 and 11 demonstrate independence of the clusters, they remain mutually interrelated to each other. This means that while functions 7 and 11 demonstrate transience in terms of cluster membership, they continue to remain in proximity to each other.

Ward's method has been shown by Milligan (1978) to be stronger in recovery tests, and the UPGMA method to be more affected by error. Because of this, the Ward's/Squared Euclidean clustering pattern, displayed in Table 16 on page 107, has been used to cluster the functions for the purposes of this investigation. Also, because of the strong similarity between the two clustering patterns, the conditional probability coefficients provided by the UPGMA/K2 method are considered as valid as used in this investigation to identify and interpret key functions.
Table 16

HIERARCHY OF FUNCTION CLUSTERS
(using Ward’s/Squared Euclidean)

<table>
<thead>
<tr>
<th>Level</th>
<th>Membership (by case number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6-18</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td>2</td>
<td>6-14</td>
</tr>
<tr>
<td></td>
<td>4-18</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>6-25</td>
</tr>
<tr>
<td></td>
<td>7-14</td>
</tr>
<tr>
<td></td>
<td>4-24</td>
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<tr>
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<td>7-11</td>
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<td></td>
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<tr>
<td></td>
<td>A1b</td>
</tr>
<tr>
<td></td>
<td>A2a</td>
</tr>
<tr>
<td></td>
<td>A2b</td>
</tr>
<tr>
<td></td>
<td>A2c</td>
</tr>
<tr>
<td>5</td>
<td>6-22</td>
</tr>
<tr>
<td></td>
<td>8-5</td>
</tr>
<tr>
<td></td>
<td>A1a1</td>
</tr>
<tr>
<td></td>
<td>A1a2</td>
</tr>
</tbody>
</table>
2) **Interpretation**

Interpretation considers the technical characteristics of the clusters and gives the cluster an appropriate name to reflect those characteristics. In naming these clusters, it is important to consider the focus of this investigation. The purpose of this investigation was to describe the general nature of needs assessment. Two related questions were, "When does needs assessment activity occur?", and "Are observations of needs assessment activity in different disciplines and contexts comparable?" This investigation was designed to examine the possible differences in needs assessment activity related to sector (private and public) and time (present and future). Table 17, on page 109, illustrates the breakdown of subjects by cluster, sector and time.

Based upon the data in Table 18, there is no indication of a sector or time relationship with the needs assessment activity of either the A group subjects or the B group subjects as a whole. This is demonstrated in Table 18 on page 110.

There is however a strong relationship indicated between some of the subject clusters and time. This seems to exist in both A and B groups. This relationship of specific subject clusters to time is demonstrated in Table 19 on page 110.
Table 17

SUBJECT CLUSTERS BY SECTOR AND TIME

<table>
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Table 18

A AND B SUBJECT CLUSTERS TO SECTOR AND TIME

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Table 19

SPECIFIC SUBJECT CLUSTERS TO TIME

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<tbody>
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</tr>
<tr>
<td>Clusters A1a2, A2 &amp; B3</td>
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</table>

In characterizing these subject clusters for the Interpretation step of cluster analysis, it is safe to say that there are definite present and future clusters of subjects. However, there is no clear sector identity that can be suggested for the subject clusters.
The other four related research questions concern the functions themselves, rather than the subjects. These questions are, "What occurs during needs assessment activity?, "Are there consistently occurring functions that can be detected in all needs assessment activity?, "Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or a set of patterns?, and "If there is a generalizable pattern(s), what might be the nature of that (those) pattern(s)? In order to attempt to answer those questions, the technical characteristics of the function clusters will be described for the purposes of naming or labelling each cluster of functions. This second step of cluster analysis, Interpretation, will be used later with the subject cluster interpretation data in order to profile the clusters.

The hierarchical structure of the function clusters was shown in Table 17 on page 109. The membership of each of the function clusters is shown in Table 20 on page 112.

In order to interpret the function clusters, this investigator made use of the conditional probability coefficients produced through the use of the K2 similarity measure. The conditional probability coefficients calculated for each pair of functions, using the UPGMA/K2 method, are displayed in Appendix F. To find, for example, the
<table>
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<tr>
<th>Cluster Number</th>
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<tr>
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<td></td>
<td>18</td>
<td>internal communication</td>
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</table>
probability that function 8 will occur, given the occurrence of function 9, turn to the first page of the matrix in Appendix F. Follow down the variable column on the left side of the page, and at variable IX, follow the row of figures across the page to the last column, marked VIII. There you will find the value .6111.

The thirty-one functions have been rank ordered by their mean conditional probability values in Table 21 on page 114. The mean conditional probability is used here as an indicator of strength as a "gate-keeper" function. As mentioned in Chapter III, a gate-keeper function is one who's existence is the probable condition for the existence of another function.

In this study, the top three functions in Table 21 are those from cluster B1 in Table 20 on page 112. Three of those four functions have distinctly high values of .62, .61 and .59, followed by a drop of .14 to the next value of .45. These three functions also demonstrate distinctly low standard deviations of .13, .15 and .17. All other standard deviations range from .05 to .19 above these values.

Following these first three functions, there are ten functions that contain all eight of the functions from clusters B2 and Alb. These ten functions have the next highest mean values. These two groups of functions, B2 and
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Alb follow the B1 group in prominence as conditions for the existence of other functions. A difference between the B2/Alb group and the B1 group is that the flow of mean values is regular with no sharp distinction either within it, or between it and the functions that follow them.

It should be noted here, that Table 21 has a slight, but consistent inaccuracy. All means have been calculated by including the conditional probability of the function to itself (1.0). This is due to the limits of the software. This has increased all values by .03 over the value given if there had been only thirty pairs. As the error is 1) consistent, 2) not a significant amount and 3) this chart is for relative comparison rather than exact measurement, this does not merit further concern.

By using the B1 function cluster as "gatekeepers," a hierarchy of function clusters was created (Table 22, p. 117). This ordering procedure was based upon the conditional probability that another functions would exist, given the existence of a gatekeeper function. This hierarchy demonstrates the strength of occurrence of the functions. The order of function clusters also appears through this exercise.

The functions that demonstrated a greater than .80 conditional probability value were the four B1 functions in relation to themselves. The B2 and A2 function clusters demonstrated a greater than .60 probability of occurrence,
given the occurrence of the B1 functions. The exception to this was the functions numbered 17, 12 and 3 were slightly lower (.57 -.59). The A1 function clusters demonstrated a .50 probability of occurrence, given the occurrence of the B1 functions. Attention will now be turned toward the content of the function clusters.

The interpretation of the clusters requires that names that reflect content be given to the clusters. This is a highly subjective step. The fact that these cluster names are only references does little to ease the threat of starting a semantic war. The reader should keep in mind that the names used in this study are only general, descriptive terms. The names and clusters discussed here are displayed in Table 23 on page 119.
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</tr>
<tr>
<td></td>
<td>A1a2 5</td>
<td>monitor S1</td>
</tr>
<tr>
<td></td>
<td>A1a2 8</td>
<td>case study</td>
</tr>
<tr>
<td></td>
<td>A1a1 19</td>
<td>communication mechanisms</td>
</tr>
<tr>
<td></td>
<td>A1a1 21</td>
<td>re-identify S2</td>
</tr>
<tr>
<td></td>
<td>A1a1 6</td>
<td>analysis of S1</td>
</tr>
<tr>
<td></td>
<td>A1a1 23</td>
<td>analysis of S2</td>
</tr>
<tr>
<td></td>
<td>A1a1 26</td>
<td>articulating the problem</td>
</tr>
<tr>
<td></td>
<td>A1a1 22</td>
<td>articulate S2</td>
</tr>
</tbody>
</table>

Table 22

FUNCTIONS ORDERED BY CONDITIONAL PROBABILITY TO GATEKEEPER FUNCTIONS
The leading function cluster, B1, carries the preliminary structure of problem solving within it. It describes the essential steps in the pre-implementation phase of problem solving. It has been named "Process Structure" for the purposes of this investigation.

The B2 function cluster describes multiple interest sources. This input is often described in the literature as client, user or stakeholder input. This cluster has been named "User/Client Input."

All three of the A2 function clusters describe the nature of the problem itself. Function cluster A2a, which describes the general structure, was named "Problem Structure." Cluster A2b which deals specifically with causes has been named "Causal Data." The functions described in A2c initiate the collection of data (3 and 14) and structure that data (17 and 12). Because of this duel purpose, the cluster has been named "Managing Input/Data."

The A1 clusters become even less distinct in nature. This is because 1) the branching/clustering distance is great, 2) the conditional probability of occurrence lessens to .50 -.60 and 3) the level of occurrence of these functions in general, is low. The Alb function cluster seems to be self-explanatory in the name, "Try-Retry." These attempts were not always preceded by a great deal of systematic planning.
<table>
<thead>
<tr>
<th>Cluster Name</th>
<th>Cluster Number</th>
<th>Function Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Structure</td>
<td>B1</td>
<td>4</td>
<td>identify S1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>identify S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>problem recognition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>framing the problem</td>
</tr>
<tr>
<td>User/Client Input</td>
<td>B2</td>
<td>15</td>
<td>multiple data sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>multiple stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>value clarification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>internal communication</td>
</tr>
<tr>
<td>Problem Structure</td>
<td>A2a</td>
<td>7</td>
<td>context</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27</td>
<td>prioritization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>identify parameters</td>
</tr>
<tr>
<td>Causal Data</td>
<td>A2b</td>
<td>9</td>
<td>causes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>causal analysis</td>
</tr>
<tr>
<td>Managing Input/Data</td>
<td>A2c</td>
<td>3</td>
<td>initiate activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>consultation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>multiple data types</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>parameter analysis</td>
</tr>
<tr>
<td>Try-Retry</td>
<td>A1b</td>
<td>28</td>
<td>first solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31</td>
<td>failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>reframing the problem</td>
</tr>
<tr>
<td>Sensing/Monitoring</td>
<td>A1a2</td>
<td>8</td>
<td>case study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29</td>
<td>second solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30</td>
<td>third solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>problem sensing mechanism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>monitor S1</td>
</tr>
<tr>
<td>Articulation</td>
<td>A1a1</td>
<td>6</td>
<td>analysis of S1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>analysis of S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19</td>
<td>communication mechanisms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
<td>articulating the problem</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>re-identify S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
<td>articulate S2</td>
</tr>
</tbody>
</table>
The Ala functions are so infrequent that generalizing their nature is not productive. These functions seem to be communication-related. Because of its content, the Ala2 cluster has been named "Sensing/Monitoring." The Alal cluster was named "Articulation," for its role in clarification.

3) Profiling

All clusters have been partitioned and interpreted. The profiling step describes the clusters, based upon their characteristics. In part, this is done. There are, however, two sets of clusters, the subjects and the functions. These need to be described in relation to each other in order to describe what is done, when it is done and who does it.

In Table 24 on page 121, the eight function clusters and their occurrence in the subject clusters is shown. By occurrence, it is meant that the majority of functions of a function cluster occur with the majority of subjects in that subject cluster. This table is meant to summarize the general functional content of the clusters. The subject clusters have been prefixed with S as opposed to function clusters that carry the F prefix. This has been done for clarity in discussion.

It can be noted immediately, that function clusters FB1 (Process Structure) and Fb2 (User/Client Input) are strongly represented in the SB group of subject clusters. The SA
Table 24

SUBJECT CLUSTERS BY FUNCTION CLUSTER OCCURRENCE

<table>
<thead>
<tr>
<th>SUBJECT CLUSTER NUMBER</th>
<th>Function Cluster Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1a1 A1a2 A1b A2a A2b A2c B1 B2</td>
</tr>
<tr>
<td>A1a1</td>
<td>X  X  X</td>
</tr>
<tr>
<td>A1a2</td>
<td>X  X</td>
</tr>
<tr>
<td>A1b</td>
<td>X</td>
</tr>
<tr>
<td>A2</td>
<td>X  X</td>
</tr>
<tr>
<td>B1</td>
<td>X  X  X  X</td>
</tr>
<tr>
<td>B2</td>
<td>X  X  X</td>
</tr>
<tr>
<td>B3a</td>
<td>X  X</td>
</tr>
<tr>
<td>B3b1</td>
<td>X  X</td>
</tr>
<tr>
<td>B3b2</td>
<td>X  X  X</td>
</tr>
</tbody>
</table>

The group does not indicate the presence of function cluster FB2 (User/Client Input), and is more erratic in general. Also, it is interesting to note that function clusters FA1a1 (Articulation) and FA1a2 (Sensing/Monitoring) are not present, in a general sense, in any of the subject clusters. This is due to a low level of occurrence in general. The functions that make up function clusters FA1a1 (Articulation) and FA1a2 (Sensing/Monitoring) appear in a very scattered and inconsistent manner.
Earlier, in the Interpretation section (page 112) it was noted that the subject clusters demonstrated a time-related identity. In order to assist the discussion of this aspect of the clusters, Table 25 on page 123 has been developed. Table 25 describes the occurrence of subjects by functions (marked by an X) and shows more detail in terms of the level of occurrence of specific functions. The subject clusters in Table 25 have been grouped in the same time-related manner in which they appear in Table 19 (page 110). At the bottom of the table the Alai subject cluster is located because of its split present/future nature. In Table 25, the subject clusters are described by cluster number, individual subject numbers and individual subject time frame. The functions are described by function cluster numbers and individual function numbers. The individual function numbers must be read in a vertical manner (top to bottom) due to space limitations.

Two observations should be noted about the data in Table 25. The level of occurrence of the Ala functions is clearly demonstrated in the table. The Alai functions occur only once each among the forty subjects. The Ala2 functions occur only 2-3 times each. These are the most outlying functional events recorded in this study. This is in sharp contrast to the consistency of the B1 group. Even the B2 group displays a strong level of occurrence. The occurrence level drops off distinctly throughout the A group of function clusters.
### Table 25

**SUBJECT BY FUNCTION OCCURRENCE**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster #, B1 B2 A2a A2b A2c Alb Ala2 Alal</td>
<td>0202 1111 021 01 0111 232 02300 021222</td>
</tr>
<tr>
<td>and Time</td>
<td>4024 5638 771 90 3472 815 89015 639612</td>
</tr>
<tr>
<td>Present Cluster Group</td>
<td></td>
</tr>
<tr>
<td>Ala2 10 F</td>
<td>XXXX XXX X</td>
</tr>
<tr>
<td>26 P</td>
<td>XXXX XXX</td>
</tr>
<tr>
<td>01 P</td>
<td>XXXX X</td>
</tr>
<tr>
<td>13 P</td>
<td>XXXX XX X</td>
</tr>
<tr>
<td>32 P</td>
<td>XXX X X X</td>
</tr>
<tr>
<td>A2 19 F</td>
<td>XXXX X X X</td>
</tr>
<tr>
<td>34 P</td>
<td>XXXX X X X XXX X</td>
</tr>
<tr>
<td>30 P</td>
<td>X X X XXX</td>
</tr>
<tr>
<td>21 P</td>
<td>XXXX XXX XXX</td>
</tr>
<tr>
<td>B3a 20 P</td>
<td>XXX XXX X</td>
</tr>
<tr>
<td>36 P</td>
<td>XX XX X</td>
</tr>
<tr>
<td>03 P</td>
<td>XXXX XXX X</td>
</tr>
<tr>
<td>17 P</td>
<td>XX X XX X</td>
</tr>
<tr>
<td>B3b1 23 P</td>
<td>XXXX XX X X</td>
</tr>
<tr>
<td>27 P</td>
<td>XXXX XX</td>
</tr>
<tr>
<td>07 P</td>
<td>XXXX XXX</td>
</tr>
<tr>
<td>B3b2 24 P</td>
<td>XXXX X X</td>
</tr>
<tr>
<td>29 F</td>
<td>XXXX XX</td>
</tr>
<tr>
<td>Future Cluster Group</td>
<td></td>
</tr>
<tr>
<td>Alb 14 F</td>
<td>XXX XX X X</td>
</tr>
<tr>
<td>38 F</td>
<td>X X X X XX X X</td>
</tr>
<tr>
<td>05 F</td>
<td>X X X XX</td>
</tr>
<tr>
<td>06 F</td>
<td>X X X</td>
</tr>
<tr>
<td>08 P</td>
<td>XXX XX X XX X</td>
</tr>
<tr>
<td>B1 22 F</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>35 F</td>
<td>XXX XXX</td>
</tr>
<tr>
<td>37 F</td>
<td>XXXX XXX X</td>
</tr>
<tr>
<td>04 F</td>
<td>XXX X X X</td>
</tr>
<tr>
<td>12 F</td>
<td>XXX X X</td>
</tr>
<tr>
<td>31 F</td>
<td>XXX XXXX XX X</td>
</tr>
<tr>
<td>39 F</td>
<td>XXX XX X XX X X</td>
</tr>
<tr>
<td>B2 11 F</td>
<td>XXXX XXXX X XXX X</td>
</tr>
<tr>
<td>18 F</td>
<td>XXXX XXXX XX</td>
</tr>
<tr>
<td>33 P</td>
<td>XXX XXX X X X</td>
</tr>
<tr>
<td>25 F</td>
<td>XXXX X X XX XXXX</td>
</tr>
<tr>
<td>Split Present/Future Group</td>
<td></td>
</tr>
<tr>
<td>Alal 28 F</td>
<td>XXXX X</td>
</tr>
<tr>
<td>40 F</td>
<td>XXXX XX</td>
</tr>
<tr>
<td>02 P</td>
<td>XXXX X X</td>
</tr>
<tr>
<td>09 F</td>
<td>XXXX XX X X</td>
</tr>
<tr>
<td>15 P</td>
<td>XXXX X X</td>
</tr>
<tr>
<td>16 P</td>
<td>XXXX X X X</td>
</tr>
</tbody>
</table>
A second observation is related to the functional content of the Present and Future Cluster Groups. There is an absence of A2b (Causal Data) functions occurring in the Present Cluster Group. The only present subjects that demonstrate A2b functions are the two located in the Split Present/Future Group at the bottom of the table. The data in Table 25 relates the causal functions to the future needs situations in general. There were other small differences in function content related to the level of occurrence of functions 24, 11 and the A2c function cluster. These differences appear to be negligible.

In summary, the subjects demonstrated difference by time frame (present/future) but not by sector. The functions were clearly dominated by the B1 Process Structure functions. Second in occurrence, were the B2 User/Client Input functions. Following the B group of functions were a group of auxiliary functions that displayed a more erratic occurrence.
CHAPTER V
CONCLUSIONS

The purpose of this study was to describe, in an empirical manner, the process that is referred to as needs assessment. In this investigation, the following questions were asked, "Is there a general model of needs assessment?" and "If a general model of needs assessment is detectable, what are its characteristics and features?" In order to answer these two research questions, a series of six related ones were developed. They were:

1) What occurs during needs assessment activity?

2) Are there consistently occurring functions that can be detected in all needs assessment activity?

3) Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or a set of patterns?

4) If there is a generalizable pattern(s), what might be the nature of that (those) pattern(s)?

5) When does needs assessment activity occur?

6) Are observations of needs assessment activity in different disciplines and contexts comparable?

These questions will be addressed in the order that they appear.
What occurs during needs assessment activity?

There are many functions being carried out during the typical needs assessment. During this investigation, 31 functions were identified. These 31 functions are listed in Table 16 on page 109. Some of these functions guide the process itself, while others seem to be the sporadic use of specific methods.

These 31 functions can be grouped and described in eight hierarchical clusters of activity. Through the use of the Average Linkage Between Groups (UPGMA) algorithm with the Kulczynski Similarity Measure 2 (K2), certain relationships between these clusters of activity are suggested. These eight clusters of activity are:

1) Process Structure - This activity consists of recognizing the existence of, defining and framing discrepancy type needs.

2) User/Client Input - During this activity, multiple sources of data are sought out, with an emphasis on communication interests, facts and values.

3) Problem Structure - This activity describes the structural nature of the problem through its context, priorities and parameters.

4) Causal Data - The nature of the causes of the problem is the focus of this activity.

5) Managing Input/Data - This activity accomplishes the
dual purpose of managing 1) the input from data sources and 2) the data itself.

6) Try-Retry - An iterative attempt at resolving the need with or without preplanning is attempted in this activity.

7) Sensing/Monitoring - During this activity, deliberate attempts are made to sense or monitor past, present or future situations that are related to the problem.

8) Articulation - Clarification and elaboration of aspects of the problem situation characterize this activity.

Are there consistently occurring functions that can be detected in all needs assessment activity?

There are functions that consistently appear in needs assessment. These functions are the four discrepancy-related functions (the Bl cluster):

- recognition of need,
- identification of an unsatisfactory condition,
- identification of a satisfactory condition and
- framing the need.

These functions represent the distinctive character of needs assessment.

Framing the need did not occur as often as the first three functions. However, the drop in occurrence is noted in the future needs subjects (see Table 25). This could very likely be due to the nature of future needs. It may be that fewer future need subjects than present need subjects have reached the framing stage.
Is there enough similarity in needs assessment activity to be described as a generalizable pattern, or set of patterns?

There is enough similarity in needs assessment activity to describe a limited, generalizable pattern. This is based upon the strong consistency of occurrence of one function cluster and a fairly strong second cluster.

Beyond these two clusters, consistency of occurrence in the clusters of functions as a whole, varies. In descending order, the occurrence was less general throughout the sample. As demonstrated in Table 25 (page 123), the Process Structure activity occurred (at least half of the member functions) in 95% of the sample. This demonstrated a strong indication that a discrepancy definition of need underlies needs assessment activity.

The next activity area, User/Client Input occurred (at least half of the member functions) in 60% of the subjects. As the list progresses, the activities become less regular across the sample. All other function clusters occurred (at least half of the member functions) at a rate of 22% or below. For example, we can count the number of subjects in Table 25 that have two or more marks in their row, under the column label A2c. We find that there are a total of seven subjects, or 17.5% of the subjects in which this occurs. This inconsistency in level of occurrence between function clusters may be due to reasons such as field and discipline or differences between one problem and another.
If there is a generalizable pattern(s), what might be the nature of that (those) pattern(s)?

In order to describe the nature of the patterns that are suggested in this investigation, Table 26 (page 130) has been developed. This table describes the function clusters as they appear in order of descending conditional probability value to the B1 "gatekeeper" functions. As each function cluster is added, it represents a decreasing chance of occurrence in its complete state. It does, however, illustrate the potential contribution by the individual activities to needs assessment.

The Gatekeeper Functions make up the Process Structure cluster of activity. It should be noted that either the identification of S1 or S2 can follow the recognition of need. The order of S1 and S2 appeared in both manners. Quite logically, it occurred that the problem was recognized first, and framed last in relation to these four functions.

The three High Conditional Probability Functions begin with the User/Client Input activity. The level of occurrence suggests that needs assessment has a strong "bottom up" nature. The second of these functions is the Problem Structure activity. As process-structured input accumulates, it begins to describe the structure of the specific problem. The third set of functions in this group is the Causal Data activity. Causal data activity identifies and analyzes causes of the specific problem. This definition and analysis
### Table 26

**A GENERAL STRUCTURE OF NEEDS ASSESSMENT**

<table>
<thead>
<tr>
<th>Cluster Name, Number, Member Functions and Conditional Probability Cluster</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1) Gatekeeper Functions</strong></td>
<td></td>
</tr>
<tr>
<td>Process Structure (B1) .80 -.99</td>
<td>The essential steps that form the core process in the pre-implementation phase of problem solving.</td>
</tr>
<tr>
<td>problem recognition</td>
<td></td>
</tr>
<tr>
<td>identify S1</td>
<td></td>
</tr>
<tr>
<td>identify S2</td>
<td></td>
</tr>
<tr>
<td>framing the problem</td>
<td></td>
</tr>
<tr>
<td><strong>2) High Conditional Probability Functions</strong></td>
<td></td>
</tr>
<tr>
<td>User/Client Input (B2) .60 -.79</td>
<td>Accessing multiple interest sources for client, user or stakeholder input.</td>
</tr>
<tr>
<td>multiple data sources</td>
<td></td>
</tr>
<tr>
<td>multiple stakeholders</td>
<td></td>
</tr>
<tr>
<td>value clarification</td>
<td></td>
</tr>
<tr>
<td>internal communication</td>
<td></td>
</tr>
<tr>
<td>Problem Structure (A2a) .60 -.79</td>
<td>Describing the general structure of the specific problem.</td>
</tr>
<tr>
<td>context</td>
<td></td>
</tr>
<tr>
<td>prioritization</td>
<td></td>
</tr>
<tr>
<td>identify parameters</td>
<td></td>
</tr>
<tr>
<td>Causal Data (A2b) .60 -.79</td>
<td>Describing and analyzing the causes of the specific problem.</td>
</tr>
<tr>
<td>causes</td>
<td></td>
</tr>
<tr>
<td>causal analysis</td>
<td></td>
</tr>
<tr>
<td><strong>3) Low-Conditional Probability Functions</strong></td>
<td></td>
</tr>
<tr>
<td>Manage Input/Data (A2c) .50 -.59</td>
<td>Describing the specific problem by 1) initiating the collection of data and 2) structuring the data.</td>
</tr>
<tr>
<td>consultation</td>
<td></td>
</tr>
<tr>
<td>multiple data types</td>
<td></td>
</tr>
<tr>
<td>initiate activity</td>
<td></td>
</tr>
<tr>
<td>parameter analysis</td>
<td></td>
</tr>
<tr>
<td>Try-Retry (A1b) .50 -.59</td>
<td>Attempts at resolving the need which are not always preceded by systematic planning.</td>
</tr>
<tr>
<td>first solution</td>
<td></td>
</tr>
<tr>
<td>failure</td>
<td></td>
</tr>
<tr>
<td>reframing the problem</td>
<td></td>
</tr>
<tr>
<td>Sense/Monitor (A1a2) .50 -.59</td>
<td>Communicating through preplanned mechanisms that build a knowledge base concerning past and present events.</td>
</tr>
<tr>
<td>second solution</td>
<td></td>
</tr>
<tr>
<td>third solution</td>
<td></td>
</tr>
<tr>
<td>problem sensing mechanism</td>
<td></td>
</tr>
<tr>
<td>monitor S1</td>
<td></td>
</tr>
<tr>
<td>case study</td>
<td></td>
</tr>
<tr>
<td>Articulation (A1a1) .50 -.59</td>
<td>Communicating through both preplanned and unplanned activity to clarify various aspects of the needs assessment process, activities and data.</td>
</tr>
<tr>
<td>communication mechanisms</td>
<td></td>
</tr>
<tr>
<td>re-identify S2</td>
<td></td>
</tr>
<tr>
<td>analysis of S1</td>
<td></td>
</tr>
<tr>
<td>analysis of S2</td>
<td></td>
</tr>
<tr>
<td>articulate S2</td>
<td></td>
</tr>
</tbody>
</table>
contributes to the description of the structure of that particular problem. Although these three function clusters make up the High Conditional Probability group in Table 26, the B2 set of functions is by far the highest in occurrence (Table 25, page 123).

The four Low Conditional Probability group functions begin with the Managing Input/Data activity. This activity is essentially a management function. It does, however, focus on dual purposes. First, it manages the data collection process with the clients and users by initiating the collection of data and by consultation. Second, it manages the data that results from that process by structuring the multiple data types and the parameter analysis.

The second function cluster in this group is the Try-Retry activity. This activity consisted of attempts at resolving the need, with or without preplanning. This activity cluster often represented less productive activity that can be described as "stabs in the dark."

The third function cluster in this group is the Sensing/Monitoring activity. This activity was rare in occurrence and consists of preplanned or deliberate attempts at sensing or monitoring past situations (case studies), present situations (S1 and solution attempts) or future situations (new problems).

The last function cluster in this group is Articulation.
Articulation, which was a group of outlier activities (one or two occurrences each) clarifies and elaborates aspects of the problem situation. This includes analysis of S1 and S2, planned communication mechanisms and re-identification of the problem. This final cluster in Table 25 completes the picture of needs assessment activity as this empirical evidence suggests it.

There is a generalizable pattern of activity emerging from the results of this study. This pattern is that needs are recognized, an unsatisfactory condition is identified, a satisfactory condition is identified and the discrepancy between the two conditions is framed as a need. In general, this takes place with the input of a user or client. These four functions, standing in relation to one another, fit the definition of a system. Within the definition of a system, each of these functions can be defined and studied as a subsystem.

If these are, in fact, the primary functions of needs assessment, then some questions about these functions could be raised. We know that recognition of need can be and often is, reactive. If we were to assume that needs assessment could be a proactive process, we must develop our ability to sense and recognize need in a deliberate and proactive manner. The natural outcome might be the development of more choice in setting organizational agendas rather than
following reactive or random agendas. This would require the
development of systematic need sensing mechanisms.

The fourth function of the B2 group, framing need, poses
two methodological challenges. First, the need must be framed
in a comparative manner (parallel terms). This requires
identical terms such as attendance, objects, cooperation,
etc., that are measured in both the S1 and S2 conditions.
Second, the need must be stated in meaningful, observable
terms that reflect valid content.

The issues raised by the four B1 functions suggest further
research in the field of needs assessment. Some of these
suggestions will be listed later in this chapter.

When does needs assessment activity occur?

Needs assessment precedes attempts, by individuals and
organizations from a variety of fields and disciplines, to
develop solutions to current or projected problems. Although
there was no evidence of differences based upon sector
identity (private, public), there is evidence of variations
between the needs assessment activity that occurs in present
and future time frames. For instance, there may be more
causal analysis related to assessing future needs. This
relationship between time and causal analysis is quite
interesting. Time frame was designed into the sample because
of the comments of Holt et. al. (1984) that needs assessment
activity may differ between present needs and future needs.
In examining the needs assessment methods that Holt
associated with future needs, there is a systems analysis of causes listed. This study seems to confirm Holt's observations.

Another observation is that although User/Client Input occurs in both public and private sectors, and present and future time frames, it was observed more often with future needs than with present needs. The significance of this is unclear but warrants further observation.

Are observations of needs assessment activity in different disciplines and contexts comparable?

There are two possible questions here. The first is, "Is it possible to compare different disciplines and contexts?" The second question is, "How do different disciplines and contexts compare in needs assessment activity. In regard to the first question, it is possible but extremely challenging to carry out a comparative study of needs assessment activity across disciplines. The difficulties encountered regarding semantics, style, conceptual language, etc. create serious hurdles. As further studies add more structure to our knowledge of this vital area of human activity, the ability to focus and control our study should increase tremendously.

In spite of this, there were some notable successes in this study, in regards to dealing with comparative data. The conditional probability performed well in developing a
meaningful hierarchy from the data. This method also displayed a reasonable recovery rate in cluster analysis when used in tandem with Ward's algorithm.

Another success was in identifying 31 function descriptors among a semantic sea of confusion. This was accomplished, even though the comprehensive list of problems studied (Table 12) demonstrated a remarkable interdisciplinary challenge.

Turning to the second question, it was not the purpose of this study to compare the needs assessment activity of different disciplines. The reason for this was that the restriction on cell size in the sample did not allow credible comparison. Instead, the five disciplines were included to guarantee the diversity of the sample in a systematic manner. However, an observation should be noted here that may suggest further investigation. The general difference between the A and B function clusters was the strong inclusion of Client/User Input in B subject cluster activity as compared with little of this in the A clusters (refer to Table 24 on page 121). Of the five disciplines included in this study, Design and Computer Technology were split equally between the A and B clusters. Three-fourths of the Education and Health subjects were in the B subject clusters. Research, on the other hand, was located entirely in the A subject cluster group. This inclusion of Research as a part of the sample was enough to neutralize any "bottom up" trend in this study,
initiated by the Education and Health data. Research, it would seem, is quite "top down."

These discipline-related comments may be of use in structuring further study. The case presented here for further interdisciplinary comparative research is strong. This study describes what the subjects did and a bit about when it was done but says little about who did it.

**General Conclusions**

These final comments relate to 1) Table 25 (page 123) and 2) the development and articulation of a paradigmatic model to guide the field of needs assessment. Regarding the model presented here, there are some striking confirmations of previous literature. The research of Whitfield (1975), suggests that, "problem recognition must start with a search for discrepancies," and Langrish (1972) states, "a clear identification of need is the second major influence in innovative success." The K2 coefficients for the Process Structure (Bl) functions affirm these statements.

The dominance of the Process Structure functions that were identified in this study affirm the statements of Dewey (1933) and Wertheimer (1959). Dewey's definition (quoted on p. 39) is narrative description of the four Process Structure functions identified in this study. Their description of the basic unit of productive activity was the discrepancy between an unsatisfactory situation (S1) and a satisfactory situation (S2). Wertheimer's fundamental suggestion that we frame a
problem before framing a solution to match it, is supported and articulated in this study.

The question of linear vs. iterative models was raised by Altschuld (1988). If this model is valid, the answer may be, "neither." It may be that the "illusion of iterativeness" is caused either by the Try-Retry activity, or by the carrying out of the same activity on different subsystems of complex need systems.

The following comments relate to furthering the development and articulation of a paradigmatic model to guide the field of needs assessment. It is useful to see the needs assessment process as relevant to both public sector interventions and private sector technological innovation. This would allow and encourage more cross-disciplinary research and application of model and methods.

Although there are unique characteristics that differ between sectors, they may not affect the general model. It may be that the bias noted above (page 135) toward "top down" activity in the research subjects is related to the non-needs assessment portion of the technological innovation model that was described earlier in the literature review. It may be that research is more of a product-driven model than a need-driven model, as suggested in the technological innovation literature (Martin, 1984).

The comparison between the model described here and the models of Holt, et.al. (1984), Kaufman (1988) and Roth (1979)
in Chapter I, shows a great deal of consistency. This is particularly true with Holt's model. In light of this study, the model described by Holt seems to be more of a generic needs assessment model. This model shows development in articulating the needs assessment paradigm, as compared with the interpretive models of Roth (program evaluation) and Kaufman (organizational development).

Of particular interest are Roth's comments (1979) that were noted earlier concerning the most important features of a needs assessment. The participation of clients, a needs awareness step, the use of the discrepancy definition of need, a systems view and prioritization all surfaced in this study. The comment by Roth (1979) that "a conceptual framework for needs assessment must be based on more than a simple taxonomy of existing works in the area," should animate others to further the empirical study in this vital field.

The development of needs assessment as a paradigmatic field should be guided by Kuhn's (1962) comments regarding the articulation and development of paradigms. Needs assessment draws increasing support from all disciplines and fields. In addition, this field is a profoundly endowed research area, in terms of questions to answer. These are two characteristics of a paradigmatic field.

According to Kuhn, the most important focus of normal paradigm-based research is, "empirical work that seeks to
articulate the paradigm theory." He adds that one goal of that articulative research is to, "attempt the determination of physical or universal constants that apply within the paradigmatic view." This research was an attempt to articulate a paradigmatic model of needs assessment by determining applicable universal constants. Beyond this study there are ample suggestions for further research.

Suggestions for Further Research

Kuhn (1962) suggested that there are three stages in the development of a paradigm. First, a pre-paradigmatic effort is made to collect facts without concern for organization. Second, a paradigm is stated that attracts a large number of adherents. This paradigm statement provides both problems to solve and the tools to solve those problems, within the paradigm. Third, a pattern of research is developed that supports the collection of facts, making of predictions and articulation of the paradigm. This pattern of research allows the determination of physical and universal constants, quantitative laws and interpretive models of the paradigm in new contexts.

Because of the unique and seemingly general nature of needs assessment, it merits development as a paradigm. In order to further the process of developing the paradigm of needs assessment, the following suggestions for further research are made:
-investigate the generalizability of the general model of needs assessment by further research with specific factors such as educational background, personality types, gender, age, culture, organizational structures, learning style, etc.,

-tighten the sampling controls
-investigate the order of occurrence of functions
-develop a sensitive and adequate language for expressing complex discrepancy manipulations in equations
-describe needs assessment in General Systems terms
-identify the design and evaluation points (controls) in a needs assessment system

-investigate the nature of Woodfield's (1976) internal state descriptions (objects of intent, overt characteristics and underlying theories) and their usefulness in assessing need

-investigate the use of cluster analysis as a method for sorting types of objects of intent, as mentioned by Woodfield (1976), for needs assessment purposes

-investigate the application of Woodfield's (1976) internal state descriptions to the design of goal data systems for use in management information systems

-continue the research begun by Holt et.al. (1984) for developing and organizing needs assessment methods

-investigate the possible use of cluster analysis as
a general tool for describing and carrying out needs assessment activities

- strengthen and develop the valid use composite lists (used in this study) as a tool for interdisciplinary research
- strengthen and develop the interview process that was initiated in this study
- investigate the organization patterns used by subjects in clustering element cards and its possible effects on framing the need
- refine the paradigm statement as it continues to develop through further description and articulation to specific contexts
- encourage cross-fertilization of research between the fields of technological innovation, program evaluation and cognitive science.
- identify the parameters for developing causal analysis methods that are compatible with present-need situations

In closing, it is wise to keep in mind Kaufman's (1972) words of caution concerning the "tentative nature of any (needs assessment) models or procedures." Nonetheless, any success by this or future studies in the development of general theory, standardized terminology or methodology will assist needs assessment in fulfilling its purpose of providing purpose, goals and focus to human endeavor.
APPENDICES
Appendix A

General Cluster Descriptors
General Cluster Descriptors

Interview: 1
Number: C-1
Keywords: initial knowledge that a problem exists

Number: C-2
Keywords: obtain facts; context

Number: C-3
Keywords: what areas to be addressed; identify parameters

Number: C-4
Keywords: propose solutions; sharing/consultation process with stakeholders to produce a proposed solution

Number: C-5
Keywords: monitor solution
Interview: 2

Number: C-1
Keywords: cause the problem

Number: C-2
Keywords: define the problem; problem recognition and definition

Number: C-3
Keywords: steps to propose a remedy; parameter definition
Interview: 3
Number: C-1
Keywords: listening to needs; need recognition

Number: C-2
Keywords: evaluating environment; context

Number: C-3
Keywords: current; outcome; defining the discrepancy  
(current/goal)

Number: C-4
Keywords: reassessment used to plan; clarifying/articulating  
current/Goal (discrepancies)

Number: C-5
Keywords: potential collaborators; resource assessment
Interview: 4

Number: C-1

Keywords: communicate a program shift

Number: C-2

Keywords: communicate a political shift

Number: C-3

Keywords: projected a philosophy (the shift at a state level).

Number: C-4

Keywords: identify the discrepancy; identified community knowledge and attitude (contrast to the philosophy).

Number: C-5

Keywords: identified and clarified dominant philosophy and probability of success.

Number: C-6

Keywords: identify shift in practice in support of philosophy

Number: C-7

Keywords: first demonstration of practice based on new philosophy

Number: C-8

Keywords: communicates dominant funding policy

Number: C-9

Keywords: communicate the extension of policy to programs
Interview: 5

Number: C-1

Keywords: activities affecting the staff; causal activity (on staff reaction) in terms of this problem (a staff problem)

Number: C-2

Keywords: external impacts; causal activity creating business/management environment

Number: C-3

Keywords: management activities; management trend causal activity creating business/management environment
Interview: 6
Number: C-1
Keywords: evaluate; define needs
Number: C-2
Keywords: select designer
Number: C-3
Keywords: translate needs into documents
Number: C-4
Keywords: build as designed
Interview: 7

Number: C-1A
Keywords: describe client activities; awareness of problem

Number: C-1B
Keywords: describe actions by vendors; aware [of] problem

Number: C-1C
Keywords: describe internal activities; aware of the problem

Number: C-2A [sub-divided by respondent after photo]
Keywords: recognition by vendor of problem

Number: C-2B [sub-divided by respondent after photo]
Keywords: [not listed]

Number: C-3A
Keywords: identifies steps taken and taking to change
external image

Number: C-3C
Keywords: identify steps taken and taking to change internal image

Number: C-3B
Keywords: identify steps taken and taking to tell how we
resolve the problem
Interview: 8
Number: C-1
Keywords: to frame problem; set policy
Number: C-2
Keywords: direct solution development and implementation
Number: C-3
Keywords: identify goals
Number: C-4
Keywords: identify solution parameters
Interview: 9

Number: C-1

Keywords: creation and recognition of the problem; sensing that the problem existed

Number: C-2

Keywords: discussions involving the problem; clarifying nature of the problem.

Number: C-3

Keywords: identify the problem and impact of the requested solution; framing the problem and solution parameters.
Interview: 10

Number: C-1

Keywords: history; consciousness of history.

Number: C-2

Keywords: on-going conditions; red flags; sensing the existence of the problem; general situation

Number: C-3

Keywords: specific incidents indicate that there is a problem; defining the problem characteristics

Number: C-4

Keywords: indicate[s] the need; clarification and prioritization of need; formal framing of problem
Interview: 11
Number: C-1
Keywords: served as a catalyst to begin.
Number: C-2
Keywords: approved; general approval
Number: C-3
Keywords: approved; approval of plan of action (to plan)
Number: C-4
Keywords: selected expertise not available "in-house"
Number: C-5
Keywords: educate to what a comprehensive plan is
Number: C-6
Keywords: cooperation; recognize need for and obtain, cooperation
Number: C-7
Keywords: data was gathered to assess situations; identify (frame) situations
Number: C-8
Keywords: committees were formed; recognition of community leaders
Number: C-9
Keywords: issues; identify issues
Number: C-10
Keywords: reported on the process; public communication
Number: C-11
Keywords: community; participate; public participation
Number: C-12
Keywords: adopt; adoption
Number: C-13

Keywords: consultants participate; outside (external) expertise
Number: C-14

Keywords: goal-setting and factors; identify goals and factors
Number: C-15

Keywords: collecting information to prepare for the future; collecting data/documents for this planning project.
Interview: 12

Number: C-1

Keywords: make people aware; problem sensing

Number: C-2

Keywords: develop a position; value clarification and consensus building; goal status definition.

Number: C-3

Keywords: actions taken by others; external current status.

Number: C-4

Keywords: action/inaction taken by myself.

Number: C-5

Keywords: Monitoring Change
Interview: 13

Number: C-1

Keywords: develop, evaluate and improve structure

Number: C-2

Keywords: provide resources

Number: C-3

Keywords: carry out work and check

Number: C-5

Keywords: establish a framework

Number: C-4

Keywords: carry out work and provide feedback
Interview: 14
Number: C-1
Keywords: identify causes; problem causes

Number: C-2
Keywords: identify organizational problems between agencies; identify inter-organizational issues; problem characteristics.

Number: C-3
Keywords: elements within a given agency and require unique solutions; identify intra-organizational issues; problem characteristics.

Number: C-4
Keywords: elements of the problem-at-large within another state; (reflective) a parallel problem and solution case study (extra-organizational agency)

Number: C-5
Keywords: control/political issues; defining parameters or limits within which to program change.
Interview: 15

Number: C-1

Keywords: bring to light the existence of a problem; recognize existence of a problem; sense a problem.

Number: C-2

Keywords: investigate the problem; nature or characteristics of the problem

Number: C-3

Keywords: give information; transfer information

Number: C-4

Keywords: promises that the problem will be investigated; confirm further investigation

Number: C-5

Keywords: give the problem to me; framing the problem

Number: C-6

Keywords: clarification of the problem; [problem] continues to exist

Number: C-7

Keywords: continuing problem
Interview: 16

Number: C-1
Keywords: realization that a problem exists

Number: C-2A
Keywords: determine magnitude

Number: C-2B
Keywords: determine causes

Number: C-3
Keywords: arrive at solution

Number: C-4
Keywords: implement
Interview: 17

Number: C-1A

Keywords: identify organization structure

Number: C-1B

Keywords: identify reasons

Number: C-2

Keywords: identify outside influences; resource limits and supports
Interview: 18
Number: C-1A
Keywords: perception that processes not at desired levels; no plan or methodology; sensing discrepancy organizationally

Number: C-1B
Keywords: local mirrored in national; lack of a suitable methodology; confirming relationship of micro/macro; sensing discrepancy (macro environment) nationally.

Number: C-2
Keywords: sponsored criteria; development of goals

Number: C-3
Keywords: measure against the criteria.

Number: C-4
Keywords: measure against other organizations

Number: C-5
Keywords: put assessment into action; prioritizing discrepancies.

Number: C-6
Keywords: developing assessment/change teams for sub-micro level; developing resources (Human Resource Development of process and skills) to respond to discrepancies.
Interview: 19

Number: C-1

Keywords: recognize problem; recognition

Number: C-2

Keywords: objectively understand [the] nature (of the problem).

Number: C-3

Keywords: vents doubt from research; acknowledgement that something will be "off-plan."

Number: C-4

Keywords: absorb results of research.

Number: C-5

Keywords: allow expression of frustration; dump feelings.

Number: C-6

Keywords: development of solutions; allotting reflection time rather than reaction.

Number: C-7

Keywords: feel able; empowerment

Number: C-8

Keywords: allow response; allotting rebound time.

Number: C-9

Keywords: apply real knowledge

Number: C-10

Keywords: consolidate understanding; develop conclusions; framing (synthesize problem).

Number: C-11

Keywords: share results; sharing framed problem
Interview: 20

Number: C-1

Keywords: what must be tolerated; general parameters; recognition of the existence and general nature of the problem

Number: C-2A

Keywords: instructor concerns; stakeholder concerns; context

Number: C-2B

Keywords: management concerns; stakeholder concerns; context;

Number: C-2C

Keywords: student concerns; stakeholder concerns; context

Number: C-3

Keywords: quality beliefs that need to be adopted by this organization; organizational definition of goals; stakeholder concerns; organizational concerns
Interview: 21

Number: C-1

Keywords: collect; compare; analyze relevant information; need sensing

Number: C-2

Keywords: first response; problem recognition

Number: C-3

Keywords: 2nd response; improved fit, higher/better likelihood of success.

Number: C-4

Keywords: 3rd response; generalizing the 2nd response to the broader context; modification/transfer of pilot (response 2) to larger organization based upon the needs in a larger organizational sense
Interview: 22

Number: C-1

Keywords: needs sensing mechanism; sensors

Number: C-2

Keywords: an early perception; personal perception of a need; sensing a need.

Number: C-3

Keywords: show visible products; illustrate/demonstrate need; attempt solutions

Number: C-4

Keywords: other people to agree; articulating the need; achieve general recognition of the need.

Number: C-5

Keywords: sensitivity everyday now
Interview: 23

Number: C-1

Keywords: inform; generate thinking; sensing the problem; existence of [the] problem

Number: C-2

Keywords: initiate activity; set (developmental/design) activity parameters

Number: C-3

Keywords: setting agenda and parameters for program

Number: C-4

Keywords: leadership for planning/design activity

Number: C-5

Keywords: supports leadership in planning/design

Number: C-6

Keywords: understanding context; consensus building; regulatory

Number: C-7

Keywords: leadership and monitoring; inform; coordinate; communicate for the planning/design process.
Interview: 24

Number: C-1

Keywords: they [events] emerged; a process begins to happen without design; recognition/acceptance organizationally of the existence of a problem

Number: C-2

Keywords: activities that were planned or designed in advance; consensus-based parameter analysis of the boundaries of performance management and the requirements of the organization (gaps to be filled).

Number: C-3

Keywords: answers and questions (perspectives) outside of the organization; organizational learning about external knowledge and [the] intentional use of performance management.

Number: C-4

Keywords: lack of control; don’t foresee; learning about external knowledge and use of performance management.
Interview: 25
Number: C-1
Keywords: client realizes
Number: C-2
Keywords: team was formed
Number: C-3
Keywords: field research; field analysis workshop
Number: C-4
Keywords: make range of opportunities visible
Number: C-5
Keywords: reconceptualized the opportunity
Number: C-6
Keywords: to signal discontinuity [in the client’s activity]
Number: C-7
Keywords: produced prototype
Number: C-8
Keywords: documented results and approach
Interview: 26

Number: C-1

Keywords: establish policy

Number: C-2

Keywords: presents different views; present facts and views

Number: C-3

Keywords: design a solution
Interview: 27

Number: C-1

Keywords: initiate change; recognition of current deficiency

Number: C-2

Keywords: assure standards; initiate change through clarified standards and goals

Number: C-3

Keywords: satisfy the needs; evaluate need and initiate resolution
Interview: 28

Number: C-1

Keywords: proposal; problem

Number: C-2

Keywords: alternative programs; solution
Interview: 29
Number: C-1
Keywords: find out needs; demand needs and response needs
Number: C-2
Keywords: find fit; demand needs and response needs
Number: C-3
Keywords: learning what to adjust; response needs
Number: C-4
Keywords: adjust products
Number: C-5
Keywords: presentation; promote products
Number: C-6
Keywords: gather data; aid in other clusters
Interview: 30

Number: C-1

Keywords: recognized the need; began initiatives to become an integrated organization

Number: C-2

Keywords: appoint new individuals; support the strategy; align key management leadership with the intentions for linkage

Number: C-3

Keywords: changes were accomplished; systems appeared impervious to change

Number: C-4A

Keywords: final performance cited here (as) a proxy for failures of strategy

Number: C-4B

Keywords: momentum for success here has been gaining
Interview: 31
Number: C-1
Keywords: understand the problem; develop community

Number: C-2
Keywords: define parameters of the problem

Number: C-3
Keywords: best approaches; alternative solutions
Interview: 32

Number: C-1

Keywords: initial meeting; introduction; client recognition of problem

Number: C-2

Keywords: gather information; personal, financial and time needs/limits; need characteristics; problem parameters

Number: C-3

Keywords: the presentation; show ideas and discuss; reaching a mutual agreement; proposal; negotiation; consensus; agreement

Number: C-4

Keywords: close; formalizing the agreement; transition from design activity to solution activity

Number: C-5A

Keywords: events that preceded; events and problems which arose.

Number: C-5B

Keywords: final conflict

Number: C-5C

Keywords: never enough; inability to accept

Number: C-6

Keywords: Client and I picked up where we had left off; we continue working
Interview: 33
Number: C-1
Keywords: establish precedence
Number: C-2
Keywords: community action; to take citizen action
Number: C-3
Keywords: to initiate involvement
Number: C-4
Keywords: familiarization with history
Number: C-5
Keywords: check the perspective
Number: C-6
Keywords: illustrate the similarities and general needs
Number: C-7
Keywords: gather input; gaining insight and perspective or expertise (governmental)
Number: C-8
Keywords: input from community; gaining insight and perspective of the community
Number: C-9
Keywords: reading, research, observing, writing; analysis, synthesis, incubation of data.
Number: C-10
Keywords: organizational feedback and approval; internal proposal evaluation
Number: C-11
Keywords: external relations
Interview: 34
Number: C-1
Keywords: definitions of dissonance

Number: C-2
Keywords: reflections from previous experiences; outside perspectives

Number: C-3
Keywords: problem definition [based upon] dissonance from client perspective

Number: C-4
Keywords: reflections as action being taken; corrective

Number: C-5
Keywords: outside influences

Number: C-6
Keywords: define action steps
Interview: 35

Number: C-1

Keywords: describe key activities preceding

Number: C-2

Keywords: describe key activities subsequent [and] up to (first year).

Number: C-3

Keywords: describe key activities [of the] second year
Interview: 36

Number: C-1

Keywords: describe aspects of culture; describe the context

Number: C-2

Keywords: describe events which contributed to the problem; defining the nature of the problem

Number: C-3

Keywords: describe the decision-making process; defining the nature of the solution
Interview: 37
Number: C-1
Keywords: sensing existence of a discrepancy
Number: C-2
Keywords: identify key informants/stakeholders
Number: C-3
Keywords: description of a discrepancy
Number: C-4
Keywords: discuss the problem; consultation
Number: C-5
Keywords: develop a proposal
Number: C-6
Keywords: share with the group that would/could choose; approval/buy-in
Number: C-7
Keywords: develop an action plan.
Interview: 38
Number: C-1A
Keywords: identify personal elements
Number: C-1B
Keywords: define internal environment
Number: C-1C
Keywords: identify internal pressures and assumptions
Number: C-2
Keywords: identify external environment
Number: C-3
Keywords: identify personal elements
Interview: 39
Number: C-1
Keywords: perception; sensing of problem

Number: C-2
Keywords: manager role; current management

Number: C-3
Keywords: key issues; identify issues

Number: C-4
Keywords: legal considerations; identify initial legal aspects

Number: C-5
Keywords: minority issues; identify minority characteristics of problem

Number: C-6
Keywords: aside legal consideration; identify additional legal aspect

Number: C-7
Keywords: female issues; identify female issues

Number: C-8
Keywords: actions taken; initial solution probes

Number: C-9
Keywords: address balance; attempts at balance in diversity (gender, race, culture, etc. expressed as personal vs. professional).

Number: C-10
Keywords: diversity in interactions; solutions to intra-organizational (diversity-based) communication.
Number: C-11

Keywords: gather and analyze information; management information system.

Number: C-12

Keywords: ways; in flux description (at present)

Number: C-13

Keywords: changed basic attitude; value change in process from conformity to diversity
Interview: 40
Number: C-1
Keywords: origination.
Number: C-2
Keywords: why; context description
Number: C-3
Keywords: aware of problem.
Number: C-4
Keywords: responding; framing current and goal conditions; framing the discrepancy
Appendix B

Decision Rules
COMPOSITE LIST DECISION RULES

General Rules

1-Solution-related activity is excluded.

2-Eliminate time and organizational structure as distractions from functional structure by using photos, notes and task cards.

3-Use photos for establishing task to task and function to function relationships.

4-Be inclusive in terms of the content of the task cards.

5-Allow the recording of multiple and possible illogical or contradictory functions in each cluster.

6-Avoid semantic exercises by using substantive descriptors.

Listing Rules

7-List functions that are "close but different," as; "multiple data sources," "multiple stakeholders," and/or "multiple data types," as appropriate.

8-List the S1 or the S2 in the order that it is encountered.

9-List the existence of internal communication functions as "internal communication."

10-List the existence of value/opinion/consultation activity as "value clarification."

11-List the existence of knowledge-based consultation as, "consultation."

12-List the existence of context-gathering activity as "context."

13-Identify pre-designed activity as "mechanisms," to distinguish it from spontaneous activity of similar nature.

14-List intentional study of problem causes as "causal analysis."

15-List the simple mention of causes as "causes."

16-List simple recognition/sensing of the problem as "problem recognition."
17-List premature or unsuccessful solution attempts by its number such as "first solution."

18-List recognition of lack of success following a premature or unsuccessful solution attempt as "failure."

19-List single functions that are continuous activity into more than one cluster only once per interview.

20-Check the face validity of descriptors by comparing the transcripts against the composite list.

21-Sample five respondents to check the validity of the functions identified ("a partial member check").
Appendix C

Representative Interview Photographs
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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Appendix D

Standardized Descriptors
Standardized Descriptors

Interview: 1

Number: C-1  recognition of the problem
Number: C-2  identify S1 unsat. cond
              identify S2
              frame problem
Number: C-3  identify parameters

Interview: 2

Number: C-1  causes
Number: C-2  problem recognition
              identify S1
              identify S2
              define the problem
              value clarification

Interview: 3

Number: C-1  need recognition
              multiple data sources
              multiple stakeholders
              value clarification
Number: C-2  context
              value clarification
Number: C-3  identify S1
              identify S2
              framing the problem
Number: C-4  value clarification
              articulating the problem

Interview: 4

Number: C-1  recognition of the problem
              identify S2
              internal communication
Number: C-2  recognition of the problem
              identify S2
              internal communication
identify S2
internal communication

Number: C-4 multiple stakeholders
identify S1

Number: C-5 articulate S2

Number: C-6 articulate S2

Number: C-7 articulate S2

Number: C-8 articulate S2

Number: C-9 internal communication
articulate S2

Interview: 5

Number: C-1 problem recognition
causes
causal analysis

Number: C-2 context
causes
causal analysis

Number: C-3 causes
causal analysis (org)
multiple data sources

Interview: 6

Number: C-1 recognition of the problem
context

Number: C-2 identify S1
causes

Number: C-3 identify S1

Number: C-4 identify S1

Interview: 7

Number: C-1A recognition of the problem (client)
identify S1

Number: C-1B recognition of the problem (vendors)
identify S1

Number: C-1C recognition of the problem (internal)
identify S1
multiple stakeholders
multiple data sources

Number: C-2A identify goal (vendor)
framed problem
value clarification

Number: C-2B identify S2 (client/org)
framed problem
consultation
value clarification

Interview: 8

Number: C-1 recognition of the problem
identify S1
causes
consultation

Number: C-2 context
consultation
multiple data sources
multiple stakeholders

Number: C-3 identify S2

Number: C-4 identify parameters
causal analysis

Interview: 9

Number: C-1 recognition of the problem
internal communication

Number: C-2 identify S1
identify S2
internal communication
prioritization
value clarification

Number: C-3 causal analysis
prioritization
framing the problem

Interview: 10
Number: C-1  context

Number: C-2  recognition of the problem
multiple data types
identify SI

Number: C-3  context
identify parameters

Number: C-4  prioritization
identify S2
framing of problem

Interview: 11

Number: C-1  recognition of problem
initiate activity

Number: C-2  internal communication

Number: C-3  internal communication

Number: C-4  consultation

Number: C-5  multiple stakeholders
consultation
value clarification

Number: C-6  multiple stakeholders
multiple data sources
internal communication

Number: C-7  identify SI
multiple data sources
multiple data types
consultation
internal communication

Number: C-8  clarification of values
identify SI
multiple stakeholders
consultation

Number: C-9  identify SI
value clarification
prioritization

Number: C-10 multiple stakeholders
communication mechanisms
Number: C-11 clarification of values
identify S1
multiple stakeholders
internal communication

Number: C-12 clarification of values

Number: C-13 consultation

Number: C-14 multiple stakeholders
multiple data sources
multiple data types
identify S2
frame the problem

Number: C-15 multiple data sources

Interview: 12

Number: C-1 recognition of the problem
identify S1

Number: C-2 value clarification
internal communication
consultation
identify S2

Interview: 13

Number: C-1 framed problem
internal communication

Number: C-2 identify parameters
internal communication

Number: C-3 recognition of the problem
identify S1
identify S2
internal communication
value clarification

Number: C-4 recognition of the problem

Number: C-5 recognition of the problem check
identify S1
identify S2

Interview: 14
Number: C-1 recognition of problem
identify S1
causes
causal analysis

Number: C-2 identify S2

Number: C-3 identify S1

Number: C-4 case study

Number: C-5 parameter analysis

Interview: 15

Number: C-1 recognition of a problem
identify S1

Number: C-2 identify S1

Number: C-3 internal communication

Number: C-4 internal communication

Number: C-5 identify S2
frame problem

Number: C-6 internal communication

Number: C-7 internal communication
prioritization

Interview: 16

Number: C-1 recognition of the problem
identify S1
identify S2

Number: C-2A framing the problem
prioritization

Number: C-2B causal analysis
consultation

Interview: 17
Number: C-1A context
   identify S2
   multiple stakeholders

Number: C-1B identify S1
   multiple stakeholders
   multiple data sources

Number: C-2 context
   framing the problem

Interview: 18

Number: C-1A recognition of the problem (internal)
   multiple stakeholders
   internal communication
   value clarification
   context
   identify S1

Number: C-1B recognition of the problem (external)
   identify S1

Number: C-2 identify S2

Number: C-3 framing the problem
   consultation

Number: C-4 framing the problem
   multiple data types
   multiple data sources
   prioritization

Interview: 19

Number: C-1 recognition of the problem
   multiple stakeholders

Number: C-2 identify S1

Number: C-3 analysis of S1

Number: C-4 identify S1

Number: C-5 failure

Number: C-6 framing problem

Number: C-7 first solution
Number: C-8 failure

Number: C-9 analysis of S2

Number: C-10 identify S2 re-framing problem

Interview: 20

Number: C-1 recognition of the problem identify S1

Number: C-2A context identify S1

Number: C-2B context identify S1

Number: C-2C context identify S1 multiple stakeholders multiple data sources value clarification

Number: C-3 identify S1 definition of S2

Interview: 21

Number: C-1 need sensing mechanism monitor S1

Number: C-2 problem recognition identify S1 first solution failure

Number: C-3 identify S2 framing the problem second solution

Number: C-4 re-framing (redefining) the problem third solution

Interview: 22
Number: C-1 recognition of the problem
identify S1
internal communication
values clarification

Number: C-2 recognition of the problem
identify S1

Number: C-3 first solution
multiple stakeholders
values clarification

Number: C-4 identify S2
internal communications
values clarification

Number: C-5 values clarification
identify S2

Interview: 23

Number: C-1 recognition of the problem
consultation
identify S1
multiple data sources
multiple stakeholders

Number: C-2 identify S2
frame problem
identify parameters

Interview: 24

Number: C-1 recognition of the problem
consultation

Number: C-2 identify S2
consultation
frame problem
parameter analysis

Number: C-3 frame problem
consultation
identify S2

Number: C-4 recognition of the problem
consultation
identify S1
Interview: 25

Number: C-1 recognition of the problem causes causal analysis

Number: C-2 initiate activity consultation first solution failure

Number: C-3 identify S1 multiple data sources multiple data types values clarification

Number: C-4 identify S2 parameter analysis

Number: C-5 frame the problem

Interview: 26

Number: C-1 recognition of problem identify S2

Number: C-2 identify S1

Number: C-3 prioritization identify parameters context framing the problem

Interview: 27

Number: C-1 recognition of problem multiple stakeholders multiple data sources identify S1

Number: C-2 multiple data sources identify S2 frame problem

Interview: 28
Number: C-1  causes
    recognition of the problem
    identify S1

Number: C-2  identify S2
    frame the problem

Interview: 29

Number: C-1  recognition of a problem
    multiple data sources
    multiple data types
    multiple stakeholders
    consultation
    identify S1
    identify S2

Number: C-2  parameter analysis
    framing the problem

Interview: 30

Number: C-1  recognized the problem
    initiated activity

Number: C-2  first solution

Number: C-3  failure

Number: C-4A redefinition of the problem

Interview: 31

Number: C-1  recognition of the problem
    initiate activity
    identify S1
    consultation
    multiple data sources

Number: C-2  identify S2
    internal communication

Number: C-3  parameter analysis
    multiple stakeholders
    values clarification

Interview: 32
Number: C-1  recognition of problem

Number: C-2  multiple data sources
value clarification
identify S1
identify S2
identify parameters

Interview: 33

Number: C-1  recognition of problem
first solution
context

Number: C-2  value clarification
second solution

Number: C-3  failure

Number: C-4  context

Number: C-5  recognition of (continued) problem
consultation

Number: C-6  prioritization

Number: C-7  context (govt)
consultation

Number: C-8  context (comm)
multiple stakeholders
value clarification

Number: C-9  identify S1
identify S2
multiple data sources

Interview: 34

Number: C-1  recognition of problem
identify S1
context

Number: C-2  identify S2

Number: C-3  frame problem

Number: C-4  frame problem
multiple data sources
first solution
failure

Number: C-5 identify parameters

Number: C-6 identify S2
framing problem

Interview: 35

"First try" recognition of the problem
identify S1
multiple data sources
multiple stakeholders

Number: C-1 identify S2
internal communications
values clarification
multiple stakeholders
identified S2

Interview: 36

Number: C-1 identify S1
identify S2
context

Number: C-2 context
value clarification
multiple stakeholders

Interview: 37

Number: C-1 recognition of the problem
parameter analysis
internal communication
identify S1

Number: C-2 multiple stakeholders
value clarification

Number: C-3 identify S2
identify S1
framing the problem

Interview: 38
Number: C-1A recognition of the problem
   identify S1

Number: C-1B identify S1
   causes

Number: C-1C recognition of the problem
   identify S1
   causal analysis

Number: C-2 recognition of the problem
   causes
   causal analysis
   identify S1 (external)
   multiple data sources
   values clarification

Number: C-3 problem sensing mechanism
   case study

Interview: 39

Number: C-1 internal communication
   recognition of the problem

Number: C-2 identify S1

Number: C-3 identify S1

Number: C-4 identify S1

Number: C-5 identify S1

Number: C-6 identify S1

Number: C-7 identify S1
   multiple stakeholders
   multiple data sources
   multiple data types

Number: C-8 parameter analysis
   first solution

Number: C-9 second solution

Number: C-10 third solution

Number: C-11 internal communication
identify S1
identify S2

Number: C-12 parameter analysis
identify S1
identify S2

Number: C-13 internal communication
re-framing the problem

Interview: 40

Number: C-1 causes

Number: C-2 causal analysis

Number: C-3 recognition of the problem.

Number: C-4 identify S1
identify S2
framing the problem
Appendix E
Cluster Analysis of Subjects using
Ward's Algorithm and Squared Euclidean Distance Measure

-Squared Euclidean Dissimilarity Coefficient Matrix
-Agglomeration Schedule
-Dendogram
13-Jun-91 SPSS RELEASE 4.1 FOR IBM OS/MVS
11:10:44 The Ohio State University IBM 3081-D

Data Information

- 40 unweighted cases accepted.
- 0 cases rejected because of missing value.
- Squared Euclidean measure used.

Squared Euclidean Dissimilarity Coefficient Matrix

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Squared Euclidean Dissimilarity Coefficient Matrix (Cont.)
**Hierarchical Cluster Analysis**

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**HIERARCHICAL CLUSTER ANALYSIS**

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Appendix F
Cluster Analysis of Functions using
Between Average (UPGMA) Algorithm and
Kulczynski 2 Distance Measure

-Kulczynski 2 Similarity Coefficient Matrix
-Agglomeration Schedule
-Dendogram
Data Information

40 unweighted cases accepted.
0 cases rejected because of missing value.

Kulczynski 2 measure used.

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Appendix G
Cluster Analysis of Functions using Ward's Algorithm and Squared Euclidean Distance Measure

- Agglomerate Schedule
- Dendogram
## Hierarchical Cluster Analysis

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